Via Courier and E-mail

August 15, 2011

Mark D. Marini, Secretary
Department of Public Utilities
One South Station, 2nd Floor
Boston, Massachusetts 02110

Re: Massachusetts Electric Company and Nantucket Electric Company
d/b/a National Grid
D.P.U. 11-___

Dear Secretary Marini:

Enclosed please find Massachusetts Electric Company and Nantucket Electric Company
d/b/a National Grid’s 2010 Energy Efficiency Annual Report. Also enclosed is a Motion for
Protective Treatment of Confidential Information. The confidential information is being submitted
under separate cover to the Hearing Officer. Please note that the unabridged copies of the RFPs
have been submitted only to the Department Secretary. All others will receive the abridged version
of the RFPs.

Very truly yours,

Patricia Crowe

Enclosures

cc: Jeffrey Leupold, Hearing Officer
   Danielle Rathbun, Assistant Attorney General
   Steven Venezia, Deputy General Counsel, DOER
   Jerrold Oppenheim, Esq., Democracy and Regulation
   Jeremy McDiarmid, Environment Northeast

40 Sylvan Road, Waltham, MA 02451
T: 781-907-1848  F: 781-907-5701  patricia.crowe@us.ngrid.com
COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES

MOTION OF MASSACHUSETTS ELECTRIC COMPANY AND
NANTUCKET ELECTRIC COMPANY D/B/A
NATIONAL GRID
FOR PROTECTIVE TREATMENT OF CONFIDENTIAL INFORMATION

I. INTRODUCTION

Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid (the “Company” or “National Grid”) hereby request that the Department of Public Utilities (“Department”), pursuant to G.L. c. 25, § 5D, protect from public disclosure certain confidential, competitively sensitive and proprietary information submitted as part of its 2010 Energy Efficiency Annual Report (“2010 Report”). Specifically, the Company requests that the Department protect from public disclosure confidential, proprietary, competitively sensitive audit information. As discussed below, if this information is released publicly, it could discourage employees from participating in audits and providing the information necessary for an audit to be successful. In addition, such public disclosure could harm the competitive business position of the Company and its customers.

II. STANDARD OF REVIEW

The Department is authorized to protect from public disclosure “trade secrets, confidential, competitively sensitive or other proprietary information provided in the course of proceedings.” G.L. c. 25, § 5D. In interpreting this statute, the Department has held that G.L. c. 25, § 5D, “places the burden of proof on companies requesting confidential treatment.” The Berkshire Gas Company et al., D.P.U. 93-187/188/189/190, at 20 (1994).
Accordingly, a party seeking to protect information from public disclosure must demonstrate that: (1) the information for which protection is sought constitutes trade secrets, confidential, competitively sensitive or other proprietary information; and (2) there is a need to ensure nondisclosure of the information. The Berkshire Gas Company et al., D.T.E. 01-41, at 17 (2001); Western Massachusetts Electric Company, D.T.E. 99-56, at 4 (1999). In assessing the need for nondisclosure, the Department will consider the interests at stake, the likely harm that would result from public disclosure of information, and the public policy implications of such disclosure. See, e.g., D.P.U. 93-187/188/189/190, at 20-23; Boston Gas Company, D.P.U. 92-259, at 106 (1993), Essex County Gas Company, D.P.U. 96-105, at 2-3 (1996). Where a party proves such a need, the Department will protect only so much of the information as is necessary to meet the need for nondisclosure and may limit the length of time that such protection is in effect. D.T.E. 01-41, at 17-18; D.T.E. 99-56, at 4; D.P.U. 93-187/188/189/190, at 20.

III. ARGUMENT

The Company seeks to protect from public disclosure certain audit information contained in its Electric 2010 Report. Section VI of the Energy Efficiency Annual Report Template, approved by the Department in D.P.U. 08-50-C on May 5, 2011, requires the Company to:

List all audits (internal and external) conducted during the program year, as well as within the last five years, that relate to the Program Administrator’s energy efficiency activities. For each audit:

- describe its purpose/scope;
- identify the entity that conducted the audit;
- describe how the audit was conducted;
- provide the date on which the audit was completed;
- identify the recommendations, if any, included in the final audit; and
- describe the Program Administrator-specific process for determining whether a recommendation is implemented or rejected;
- what recommendations were implemented and the impact on the energy efficiency programs; and
- for those recommendations that were rejected, the reasoning behind the rejection.
In compliance with this requirement, the Company provides, as part of its 2010 Report, the requested summary information regarding two internal audits and one audit completed by Navigant. As discussed below, the summary information on recommendations from the two internal audits should be protected from public disclosure.

Two of the audits discussed in the Company’s Electric 2010 Annual Report were conducted by its Internal Audit Department and addresses financial, operational, compliance and information technology data related to the Company’s energy efficiency programs in 2006 and 2007. This audit was performed in the regular course of business pursuant to the Company’s audit plan and was not the result of, or related to, any particular incident or circumstances calling for audit or other review. The information contained in Audit Report No. 0338 is same information provided by the Company pursuant to a Motion for Confidentiality approved by the Department in Massachusetts Electric Company and Nantucket Electric Company, D.P.U. 09-63 Hearing Officer Ruling Approving Motion for Protective Treatment (May 11, 2010). The information provided in the second internal audit, Audit Report No. 0223 is similar to that information provided in Audit Report No. 0338. The audit information for which the Company seeks confidential treatment is proprietary, competitively sensitive business information that the Company considers, and treats as, confidential.

Protective treatment is necessary because the information is a critical analysis of the Company’s internal processes which, if publically available, may harm the Company’s reputation and brand. Failure to protect such information will dissuade the Company from conducting self-assessments and improving internal processes. If released to the public, vendors and bidders may question the Company’s internal business practices and avoid submitting bids. The Company and its customers would, therefore, be deprived of possible cost reductions due to decreased competition. Encouraging employees to participate in audits and to provide all
required information is of critical importance to the success of the audit. This enables the Company to obtain candid information that would otherwise be difficult or impossible to gather. Public disclosure of the information obtained during an audit may also chill employee participation, thus reducing the information made available to the Company, which would negatively impact management’s ability to continue to improve operations. Maintaining the confidentiality of information obtained during an audit allows the Company to obtain the highest quality information, which it can use to improve its operations. Accordingly, consistent with past Department practice, the Company’s internal audit information should be protected from public disclosure.

In the past, the Department has granted protective treatment for utility self-assessments because disclosure may affect the willingness of employees to reveal information fully and completely. See New England Gas Company, Hearing Officer Ruling at 5-6 (August 23, 2007), Boston Gas Company d/b/a KeySpan Energy Delivery New England, D.T.E. 03-40, Hearing Officer Ruling (October 9, 2003), and Massachusetts Electric Company and Nantucket Electric Company, D.P.U. 09-63 Hearing Officer Ruling (May 11, 2010) (Department allowed confidential treatment of internal audits conducted to evaluate operations). Thus, consistent with Department precedent, the information relating to the recommendations in the Company’s internal audits set forth in Section VI of its 2010 Annual Report should be protected from public disclosure.

To the Company’s knowledge, information in Section VI as to the internal audit recommendations is not otherwise available in the public domain. Protecting the information from public disclosure will not adversely affect the public interest. The information has been provided to the Department, subject to this motion, and will be made available to the Attorney

Page | 4
General, and any legitimate intervenor, upon execution of an appropriate nondisclosure agreement.

IV. CONCLUSION

In sum, the Department should find (1) that the audit information contained in the Company’s Annual Report constitutes confidential, competitively sensitive or other proprietary information, and (2) that the Company has proved the need for its nondisclosure. Accordingly, the Company requests that the information be granted confidential treatment for a period of two years from the date of the Department’s final order in this proceeding. Should the Department allow this motion, the Company reserves the right to renew its request for confidential treatment consistent with Department precedent.
WHEREFORE, the Company respectfully requests that the Department grant its motion for protective treatment of confidential information.

Respectfully submitted,

NATIONAL GRID

By its attorney,

________________________________
Patricia Crowe.
40 Sylvan Road
Waltham, MA 02451
781-907-1848

Dated: August 15, 2011
These reviews were completed by National Grid’s Internal Audit department between August 2006 and August 2011

National Grid Audit Report No. 0223
“Demand Side Management Program”

Final Report January 12, 2007

Covering: New England (including Mass.) -electric

Objective & Scope
The overall objective of this review was to assess the adequacy of controls over the demand side management programs.

The scope of our work focused on the incentive calculation and integrity of the underlying supporting data.

Our work included the following steps:
- interviewed key personnel in the Energy Efficiency and P&P groups to gain an understanding of the processes supporting the incentive calculation
- documented existing controls over data maintained within the DSM program tracking systems
- assessed data integrity via sample testing of impact factors, avoided cost values and other pertinent data
- reviewed the incentive calculation process by interviewing and sampling of key components in the annual filings.

Recommendations

While we noted adequate controls in place overall, we noted the following opportunities for improvement:

____________________

National Grid Audit Report No. 0338
“Demand Side Management Program – Spending”
Final Report January 18, 2008

Covering: New England (including Mass.) -electric

Objective & Scope
The objective of this review was to assess the adequacy of controls over the DSM program expenditures for the Small Business Services (SBS) program.

The scope of this review included internal and external costs charged to SBS programs. Our work involved the following steps:

- Interviewed key personnel to gain an understanding of the process.
- Reviewed procedures/guidance supporting internal and external charges.
- Tested a sample of SBS customer applications and vendor invoices for controls around expenditures.
- Reviewed process by which actual expenditures are tracked and monitored against the budget.
- Used a data mining tool (ACL) to identify invoice data variances.

**Recommendations** We found the controls to be adequate overall, we did note some areas where they could be further strengthened.
2010 Electric Energy Efficiency Annual Report

Massachusetts Electric Company
Nantucket Electric Company
d/b/a National Grid

August 2011
# TABLE OF CONTENTS

## I. INTRODUCTION

A. PURPOSE OF ANNUAL REPORT 5  
B. ORGANIZATION OF ANNUAL REPORT 6  
C. SUMMARY OF PROGRAM PORTFOLIO 7

## II. PROGRAM PERFORMANCE 9

A. RESIDENTIAL SECTOR PROGRAMS 9  
   1. Summary 9  
   2. Residential Programs 15  
   3. Residential Pilot Programs 35  
B. LOW-INCOME SECTOR PROGRAMS 49  
   1. Summary 49  
   2. Low-Income Programs 53  
C. COMMERCIAL & INDUSTRIAL SECTOR PROGRAMS 60  
   1. Summary 60  
   2. C&I Programs 65  
   3. C&I Pilot Programs 74  
D. HARD TO MEASURE INITIATIVES 76

## III. EVALUATION MEASUREMENT AND VERIFICATION ACTIVITIES 77

A. SUMMARY 77  
B. RESIDENTIAL PROGRAM STUDIES 80  
   1. Massachusetts New Homes with ENERGY STAR Estimated Maximum Potential Savings from Enhanced Code Compliance with the IECC 2009 Residential Building Code in Massachusetts (Study 1) 80  
   2. Massachusetts New Homes with ENERGY STAR Mystery Shopping (Study 2) 81  
   3. The Massachusetts New Homes with ENERGY STAR Program 2011 Baseline Phase 1 Completion of Planning (Study 3) 83  
   4. Massachusetts 2010 Residential Retrofit and Low-Income Evaluation Brushless Fan Motors (Study 4) 84  
   5. Massachusetts 2010 Residential Retrofit and Low Income Evaluation MassSAVE (Study 5) 86  
   6. 2010 Net to Gross Findings Home Energy Assessment (Study 6) 89  
   7. Non-Electric Impact (NEI) Findings for the 2010 MassSAVE Home Energy Services (MassSAVE) program (Study 7) 91  
   8. Massachusetts ENERGY STAR Lighting Program 2010 Annual Report (Study 8) 93  
   9. Massachusetts Appliance Turn-in Program Evaluation Integrated Report Findings FINAL (Study 9) 95  
   10. Cross-Cutting Net-to-Gross Methodology Study for Residential Programs Suggested Approaches (Final) (Study 10) 99  
   11. Estimated Net-To-Gross (NTG) Factors for the Massachusetts Program Administrators (PAs) 2010 Residential New Construction Programs, Residential High Efficiency Heating Equipment (HEHE) and Multi-Family Gas Programs and Commercial and Industrial Gas Programs (Study 11) 101  
   12. HEHE Process and Impact Evaluation (Study 12) 103  
   14. Massachusetts New Homes with ENERGY STAR Process Evaluation of the Four to Eight Story Multi-Family New Construction Pilot Interim Findings (Study 14) 109  
   15. The Massachusetts New Homes with ENERGY STAR Program Major Renovations Pilot Evaluation Preliminary Report on Non-Participant Interviews (Study 15) 110  
   16. The Massachusetts New Homes with ENERGY STAR Program Version 3 Pilot Evaluation (Study 16) 111  
   17. Massachusetts Cross-Cutting Behavioral Program Evaluation (Study 17) 113  
C. LOW-INCOME STUDIES 116  
   1. Final Report for Low Income Program Massachusetts 2010 Residential Retrofit and Low Income Evaluation (Study 18) 116  
D. COMMERCIAL & INDUSTRIAL PROGRAM STUDIES 119
1. Non-Controls Lighting Evaluation for the Massachusetts Small Commercial Direct Install Program (Study 19) 119
3. Final Report High Bay Lighting Market Effects Study Project 1A New Construction Market Characterization (Study 21) 122
4. Final Commercial New Construction Customer Quantitative Profile Project 1A New Construction Market Characterization (Study 22) 124
5. Supply Chain Profile Project 1A New Construction Market Characterization (Study 23) 125
6. Final Report Project 1B Chain & Franchise Market Characterization (Study 24) 127
8. Final Report Project 1C Combined Heat & Power Market Characterization (Study 26) 130
9. Project 6B Comprehensive Design Approach Process Evaluation (Study 27) 132
10. Impact Evaluation of 2008 and 2009 Custom CDA Installations (Study 28) 138
11. Project 7 General Process Evaluation Final Report (Study 29) 139
12. 2010 Commercial and Industrial Electric Programs Free-ridership and Spillover Study (Study 30) 141
13. C&I Lighting Measure Life and Persistence Project (Study 31) 142
14. C&I Lighting Loadshape Project FINAL Report (Study 32) 143
15. C&I Unitary HVAC Loadshape Project Final Report (Study 33) 144
16. Cross Cutting C&I Free-Ridership and Spillover Methodology Study Final Report (Study 34) 149
17. Prescriptive Condensing Boiler Impact Evaluation Project 5 Prescriptive Gas (Study 35) 150

E. SPECIAL AND CROSS SECTOR STUDIES 151
1. Industry Practices and Policies on Energy Efficiency Program Rebate/Incentives (Study 36) 151
2. Community Based Partnership Interim Process Evaluation (Study 37) 153

F. FUTURE STUDIES 155

IV. STATUTORY BUDGET REQUIREMENTS 158
A. INTRODUCTION 158
B. MINIMIZATION OF ADMINISTRATIVE COSTS 158
C. COMPETITIVE PROCUREMENT 160
D. LOW-INCOME SPENDING 161

V. PERFORMANCE INCENTIVES 162

VI. AUDITS 165
I. INTRODUCTION

In the first full year of the three-year energy efficiency plans, as reviewed and approved by the Department on January 28, 2010 in D.P.U. 09-116 through 09-127 (the “Gas and Electric Orders”), program year 2010 showed remarkable success with respect to goal attainment and achievement of real benefits for the environment and the economy in the Commonwealth of Massachusetts. Collectively, Massachusetts Electric Company and Nantucket Electric Company each d/b/a National Grid (“National Grid” or the “Company”), along with all the gas and electric distribution companies and municipal aggregators (together, the “Program Administrators” or “PAs”) were able to deliver on their goals during program year 2010, as established in the Gas and Electric Orders, while maintaining the balance between meeting the budget for their programs and complying with the directives of the Green Communities Act in ensuring that they make available all cost-effective energy efficiency opportunities. Overall, the Company and other Program Administrators worked diligently with the Department of Public Utilities (“Department”), the Department of Energy Resources (“DOER”), the Energy Efficiency Advisory Council (“EEAC”), and other interested stakeholders to meet what were intentionally designed to be very challenging 2010 program year goals. In many cases, achievements in savings and benefits exceeded those goals. Program year 2010 performance showed that strong savings levels were achieved, that both Residential and Commercial & Industrial (“C&I”) program implementation showed strong results, and that the Program Administrators worked well to implement the programs in the field while also ramping up programs to unprecedented spending and savings levels so as to meet obligations not just for program year 2010, but for the full life of the three-year plans.

On a statewide basis, the results shown by the Program Administrators are generally at or in excess of initially projected amounts for annual MWh and therm goals. In fact, as noted by the EEAC in its in its recent 2010 annual report to the Massachusetts General Court and the Department, the combined efforts of the PAs resulted in enough savings to power 85,000 households and heat 14,000 homes annually. At the same time, the results show greenhouse gas emission reductions equivalent to the annual output of over 74,000 cars, and significant progress towards greenhouse gas, NOx, and SO2 emission reductions. The ability to achieve or exceed nearly all of the statewide goals and targets, despite a very difficult economic climate in the Commonwealth, results in significant benefits for the environment, the economy, and end-use customers.

In addition, while working to achieve their programmatic goals for 2010, the Company and other Program Administrators have worked diligently to establish statewide marketing of energy efficiency program offerings through the use of the Mass Save label, which won the AESP Outstanding Achievement in Marketing and Communications Award based on work accomplished in 2010. Simultaneously, the Program Administrators have engaged in 37 studies across a wide span of program sectors to ensure that the Evaluation, Monitoring, and Verification (“EM&V”) elements of these program offerings remain a critical and vital tool to evaluate and transform measures in the future to meet demand in an ever-changing marketplace. The Company and other Program Administrators have worked diligently with financial institutions, and, through the partnership with the Massachusetts Bankers Association, worked to develop financing options to expand access to energy efficiency measures for customers in 2010, for the life of the three-year plans, and beyond.
The Company and other Program Administrators have continued to be engaged in the monthly EEAC process, and have worked collaboratively with each other and the EEAC’s consultants to meet stringent reporting and data collection deadlines so as to adequately monitor and review where the Three-Year Plan efforts have succeeded, and where improvement could be anticipated for the future. Given the unprecedented nature of these efforts and the significantly ambitious goals established in the Three-Year Plans, the Company and other Program Administrators contend that the 2010 program year performance has been an unmitigated success and has in many ways exceeded the expectations for the first year of the Three-Year Plan. The Company and other Program Administrators continue to endeavor to achieve deeper savings from participating customers, and have worked to reach a broader range of customers for the implementation of all cost-effective energy efficiency program offerings.

A. Purpose of Annual Report

The Company is pleased to provide its Energy Efficiency Annual Report (“Annual Report” or “EEAR”) for 2010. As specified by the Department in D.P.U. 08-50, the purpose of the Annual Report is to:

- Provide a comparison of the Company’s planned, preliminary year-end, and evaluated (where applicable) expenses, savings, and benefits at the portfolio, sector, and program levels for the program year.
- Identify significant variances between the Company’s planned and evaluated costs, savings, and benefits for the program year, and discuss reasons for such variances.
- Discuss how program performance during the program year informs the Company’s proposed modifications to program implementation, if any, during upcoming years.
- Describe the EM&V activities undertaken by the Company (both individually and jointly with other Program Administrators) that have not been included in previous Annual Reports, and explain how the results of the EM&V studies impact program cost-effectiveness.
- Describe the performance incentives that the Company proposes to collect.
B. Organization of Annual Report

The Company’s 2010 Annual Report is organized as follows:

- Section I.C provides summary information on program performance at the portfolio and sector levels.
- Section II provides detailed information on program performance at the sector and program levels for the residential, low-income, and C&I sectors.
- Section III provides detailed information on the EM&V studies included in the Annual Report for each sector.
- Section IV addresses statutory budget requirements.
- Section V addresses the performance incentives the Company proposes to collect.
- Section VI addresses audits conducted during the past five years.
- Section VII provides detailed supporting documentation.
C. **Summary of Program Portfolio**

Tables I.A and I.B provide summary information on program performance at the portfolio and customer sector levels, respectively.¹

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>122,750,040</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>8,387,376</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>MWh</td>
<td>3,244,653</td>
<td>3,173,391</td>
<td>-2%</td>
</tr>
<tr>
<td>Annualized</td>
<td>MWh</td>
<td>289,774</td>
<td>298,979</td>
<td>3%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>600,783</td>
<td>524,776</td>
<td>-13%</td>
</tr>
<tr>
<td>Lifetime Summer</td>
<td>kW</td>
<td>46,605</td>
<td>42,851</td>
<td>-8%</td>
</tr>
<tr>
<td>Winter</td>
<td>kW</td>
<td>44,228</td>
<td>48,946</td>
<td>11%</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>112,698,309</td>
<td>54,627,993</td>
<td>-52%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>506,917,628</td>
<td>461,664,975</td>
<td>-9%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>174,381,683</td>
<td>142,735,607</td>
<td>-18%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>332,535,946</td>
<td>318,929,368</td>
<td>-4%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>2.91</td>
<td>3.23</td>
<td>11%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

As shown in Table I.A above, the only significant variances at the portfolio level occurred with Lifetime NEBs where actual value was 48% lower than the planned value and TRC Costs where actual spending was 18% lower than planned expenses.²³

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¹ The Company is also providing the Department of Public Utilities (the “Department”) with working Microsoft Excel spreadsheets for all of the tables included in this Annual Report. Such tables include all formulas and functions used in each table.

² Unless otherwise noted, “Significant” variances are defined throughout this Annual Report as variances of +/-20% or more between the stated values.

³ The NEBs underperformed overall primarily because of the negative NEBs related to lighting in the C&I programs and the MassSave program. The negative NEBs in C&I are applied to the gas and oil savings and are associated with reduced heat generated by more lighting which is more efficient. These NEBs were excluded from the plan data and are included in the annual report.
As shown in Table I.B above, significant variances exist in the Low-Income sector for TRC Benefits, TRC Costs, and low-income BCR. Benefits are 22% below planned estimates and costs are 37% below planned values resulting in a BCR that is 24% above the planned BCR. The C&I Sector also had lower than planned spending. These two sectors, along with the Residential sector, had year end spending that was twenty percent lower than planned.

Within the Low Income sector, all the programs had lower than planned total resource costs, contributing to the variance between planned and evaluated values. Please reference section II.B.2 for a more detailed discussion of the variances by program within this sector.

Within the C&I sector, all the programs had lower than planned total resource costs, contributing to the variance between planned and evaluated values. Please reference section II.C.2 for a more detailed discussion of the variances by program within this sector.
II. PROGRAM PERFORMANCE

A. Residential Sector Programs

1. Summary
During 2010 the Company implemented the following residential programs and residential pilots:

Residential Programs:
- Residential New Construction & Major Renovation
- Residential Cooling & Heating Equipment
- Residential Multi-Family Retrofit
- Residential MassSAVE
- Residential ENERGY STAR® Lighting
- Residential ENERGY STAR® Appliances
- Residential Education
- Workforce Development
- OPOWER

Residential Pilot Programs:
- Deep Energy Retrofit
- Residential New Construction & Major Renovation - Major Renovation Statewide Pilot
- Residential New Construction - Multi-Family (4-8 story) Statewide Pilot
- Residential New Construction - Lighting Design Statewide Pilot
- Residential New Construction - V3 ENERGY STAR Homes Statewide Pilot
- Heat Pump Water Heating Pilot

Tables II.A.1 through II.A.3 provide summary information on the performance of the residential programs at the sector, end use, and program levels, respectively, while sections II.A.2 and II.A.3 provide detailed information on the performance of each residential program and pilot program.
<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value % Change from Planned</td>
<td>Value % Change from Preliminary % Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>43,185,660</td>
<td>40,059,035</td>
<td>-7%</td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>2,744,580</td>
<td>2,674,429</td>
<td>-3%</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td>MWh</td>
<td>607,214</td>
<td>776,354 28%</td>
<td>744,325 -4%  23%</td>
</tr>
<tr>
<td>Annual MWh</td>
<td>MWh</td>
<td>85,601</td>
<td>109,565 28%</td>
<td>98,276 -10% 15%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>kW</td>
<td>144,742</td>
<td>135,196 -100%</td>
<td>151,426 0% 5%</td>
</tr>
<tr>
<td>Annualized</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer kW</td>
<td>kW</td>
<td>11,709</td>
<td>12,287 5%</td>
<td>12,691 3% 8%</td>
</tr>
<tr>
<td>Winter kW</td>
<td>kW</td>
<td>17,625</td>
<td>23,094 31%</td>
<td>20,617 -11% 17%</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>80,364,537</td>
<td>50,672,226 -37%</td>
<td>54,158,878 7% -33%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>154,786,816</td>
<td>149,801,552 -3%</td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>54,281,853</td>
<td>54,053,949 0%</td>
<td></td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>100,504,963</td>
<td>95,747,603 -5%</td>
<td></td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>2.85</td>
<td>2.77 -3%</td>
<td></td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.
### Table II.A.2: Residential Sector Summary of End Uses

<table>
<thead>
<tr>
<th>End Uses</th>
<th>Units (Lifetime)</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
<th>% Change from Preliminary to Evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lighting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>568,941</td>
<td>545,248</td>
<td>-4%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>52,393</td>
<td>52,552</td>
<td>0%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>4,183,308</td>
<td>3,198,815</td>
<td>-24%</td>
</tr>
<tr>
<td><strong>HVAC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>108,519</td>
<td>117,977</td>
<td>9%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>73,212</td>
<td>89,551</td>
<td>22%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>40,466,597</td>
<td>46,038,321</td>
<td>14%</td>
</tr>
<tr>
<td><strong>Refrigeration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>60,448</td>
<td>49,623</td>
<td>-18%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>7,175</td>
<td>7,169</td>
<td>0%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>0</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Hot Water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>2,001</td>
<td>1,910</td>
<td>-5%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>182</td>
<td>174</td>
<td>-5%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>6,022,321</td>
<td>4,921,742</td>
<td>-18%</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>2,001</td>
<td>3,946</td>
<td>97%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>182</td>
<td>174</td>
<td>-5%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>6,022,321</td>
<td>4,921,742</td>
<td>-18%</td>
</tr>
<tr>
<td><strong>Behavior</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>32,500</td>
<td>25,622</td>
<td>-21%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>1,850</td>
<td>1,594</td>
<td>-14%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>0</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>776,354</td>
<td>744,325</td>
<td>-4%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>135,196</td>
<td>151,426</td>
<td>12%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>50,672,226</td>
<td>54,158,878</td>
<td>7%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.
### Table II.A.3: Residential Program Summary

<table>
<thead>
<tr>
<th>Program / Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td><strong>Residential New Construction &amp; Major Renovation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$5,024,797</td>
<td>4,769,946</td>
<td>-5%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$3,699,453</td>
<td>1,917,783</td>
<td>-48%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$1,325,344</td>
<td>2,852,164</td>
<td>115%</td>
</tr>
<tr>
<td>BCR</td>
<td>1.36</td>
<td>2.49</td>
<td>83%</td>
</tr>
<tr>
<td><strong>Residential Cooling &amp; Heating Equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$2,585,019</td>
<td>4,616,442</td>
<td>104%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$2,196,907</td>
<td>2,362,203</td>
<td>8%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$388,112</td>
<td>2,254,239</td>
<td>3589%</td>
</tr>
<tr>
<td>BCR</td>
<td>1.78</td>
<td>2.23</td>
<td>26%</td>
</tr>
<tr>
<td><strong>Multifamily Retrofit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$16,173,388</td>
<td>14,991,233</td>
<td>-7%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$9,108,852</td>
<td>6,722,395</td>
<td>-26%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$7,064,536</td>
<td>8,268,838</td>
<td>17%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.03</td>
<td>90%</td>
</tr>
<tr>
<td><strong>MassSave</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$2,258,019</td>
<td>4,616,442</td>
<td>104%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$2,196,907</td>
<td>2,362,203</td>
<td>8%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$61,113</td>
<td>2,254,239</td>
<td>3589%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.03</td>
<td>90%</td>
</tr>
<tr>
<td><strong>Deep Energy Retrofit Pilot</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$3,029,802</td>
<td>3,599,020</td>
<td>9%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$1,215,345</td>
<td>1,445,016</td>
<td>19%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$1,814,457</td>
<td>1,854,004</td>
<td>2%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.49</td>
<td>2.78</td>
</tr>
<tr>
<td><strong>ENERGY STAR Lighting</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$29,556,988</td>
<td>42,881,781</td>
<td>45%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$9,257,298</td>
<td>13,713,471</td>
<td>48%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$20,301,726</td>
<td>29,191,310</td>
<td>44%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>3.19</td>
<td>3.13</td>
</tr>
<tr>
<td><strong>ENERGY STAR Appliances</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$5,224,096</td>
<td>6,455,894</td>
<td>24%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$3,539,313</td>
<td>3,939,724</td>
<td>11%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$1,684,782</td>
<td>2,516,170</td>
<td>49%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.48</td>
<td>1.64</td>
</tr>
<tr>
<td><strong>Residential New Construction Multifamily (4-8 story) Statewide Pilot</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$308,745</td>
<td>121,943</td>
<td>-61%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$308,745</td>
<td>121,943</td>
<td>-61%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>n/a</td>
<td>n/a</td>
<td>-</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>n/a</td>
<td>-</td>
</tr>
<tr>
<td><strong>Residential New Construction Lighting Design Statewide Pilot</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$207,300</td>
<td>12,385</td>
<td>-94%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$207,300</td>
<td>12,385</td>
<td>-94%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>n/a</td>
<td>n/a</td>
<td>-</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>n/a</td>
<td>-</td>
</tr>
<tr>
<td><strong>Residential New Construction V3 Energy Star Homes Statewide Pilot</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$242,481</td>
<td>11,096</td>
<td>-95%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$242,481</td>
<td>11,096</td>
<td>-95%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>n/a</td>
<td>n/a</td>
<td>-</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>n/a</td>
<td>-</td>
</tr>
<tr>
<td><strong>Heat Pump Water Heater Pilot</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$35,440</td>
<td>34,235</td>
<td>-3%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$35,440</td>
<td>34,235</td>
<td>-3%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>n/a</td>
<td>n/a</td>
<td>-</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>n/a</td>
<td>-</td>
</tr>
<tr>
<td><strong>Hard-to-Measure Initiatives</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$3,035,027</td>
<td>4,212,206</td>
<td>-44%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$154,786,816</td>
<td>149,801,552</td>
<td>-3%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$54,281,853</td>
<td>54,053,949</td>
<td>0%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$100,504,963</td>
<td>95,747,603</td>
<td>-5%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>2.85</td>
<td>2.77</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.
During 2010, the Company built upon existing residential programs and significantly expanded initiatives to increase participation in all residential programs. Selected highlights are presented below:

- **Residential New Construction & Major Renovation** - In 2010, the Massachusetts New Homes with ENERGY STAR program faced a market in which energy codes were changing, single family development remained slow, and opportunities to capture future energy savings were becoming increasingly difficult. To address these barriers the program engaged in code support activities and introduced several new marketing efforts including a lumberyard outreach series, increased e-mail marketing and social media activity. The program launched four new pilots: multi-family new construction, major renovations, lighting design and ENERGY STAR Version 3 to aid in identifying the next generation of energy savings opportunities. The program also increased market penetration while providing energy savings for homeowners and reducing peak demand. These efforts resulted in the program receiving its fourth consecutive ENERGY STAR award for Sustained Excellence in Program Delivery.

- **Multi-Family Retrofit** - Implementation of the Multifamily Market Integrator (“MMI”) began in July 2010. The MMI is responsible for facilitating the delivery of program services, as well as acting as the conduit through which participant questions and concerns are directed to ensure that participants are not required to directly contact multiple parties during the project lifecycle. A data gathering form was developed and used at intake to identify key customer facility data and eligibility, and forwarded to the appropriate vendor for customer contact. In addition, monthly activity reports were developed and reviewed, to track program progress. Requests through the MMI increased as customers utilized the new single telephone number. Energy efficient lighting retrofits was high in demand from this market sector.

- **ENERGY STAR Lighting** - The lighting program had a strong year which produced savings which exceeded goals. The program focus shifted from bare spiral bulbs to specialty lighting and a new effort to market to hard-to-reach lighting customers. LED products were also introduced in 2010 but, due to the time it takes for LED products to be ENERGY STAR tested and qualified, there were only a limited number of qualified products available in 2010. Many qualified LEDs have since come on the market and 2011 has many more LED offerings.

- **ENERGY STAR Appliances** – The Company’s Appliance/Products Program had a successful year with the mail-in refrigerator rebates and the TV mid-stream promotion showing more activity than planned. The appliance recycling category provided the largest savings associated with this program in 2010. The lack of inventory of high efficiency room air conditioners during the summer of 2010 resulted in a much lower response to this portion of the program which put pressure on other components of the program to compensate for the lower room air conditioner savings achieved. Room air cleaners, computer, and monitor rebates; all new measures in 2010, got off to a very slow start.
- **MassSAVE** – In 2010, MassSAVE had the following program highlights:
  - New RCS Lead Vendor RFP initiated in 2010 and in place by the first quarter of 2011.
  - Rolled out new RCS market model; fully integrating Gas Weatherization program with RCS via mandatory audits.
  - Moved back to single audit model as a result of lessons learned.
  - Introduced new third party QA/QC into RCS program.
  - Expanded Heat Loan to include micro loans ($500-$2000), and increased the 0% interest loan cap up to $25,000 from $15,000.

- **Deep Energy Retrofit Pilot** - The Company has partnered with staff from the Building Science Corporation to ensure that all National Grid Deep Energy Retrofit projects not only save energy but are also safer and more durable. The Deep Energy Retrofit Pilot had a gradual increase in leads, work in progress and contracts signed. The growth rate for signed contracts is: 3 units in 2009, 9 units in 2010, and 13 units as of August 2011. The pipeline for planning to completion is long and many customers explore doing a DER but opt not to go forward. Fortunately, evaluation survey information shows that those who drop out still go on to complete a deeper retrofit than previously planned. The contracted projects span broad demographics; one quarter of participating units are low or moderate income including Habitat for Humanity projects.

A more detailed program-level discussion, as well as information about variances, can be found in Section II.A.2, below.
## 2. Residential Programs

<table>
<thead>
<tr>
<th>Residential New Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose / Goal of Program</td>
</tr>
<tr>
<td>The purpose and the goal of the program was to capture lost opportunities, encourage the construction of energy-efficient homes and drive the market to one in which new homes are moving towards net-zero energy.</td>
</tr>
<tr>
<td>Targeted Customers, And Definition Of Program Participants</td>
</tr>
<tr>
<td>▪ Homebuilders</td>
</tr>
<tr>
<td>▪ Contractors</td>
</tr>
<tr>
<td>▪ Architects/Designers</td>
</tr>
<tr>
<td>▪ Trade allies</td>
</tr>
<tr>
<td>▪ HERS raters</td>
</tr>
<tr>
<td>▪ Homebuyers</td>
</tr>
<tr>
<td>▪ Realtors</td>
</tr>
<tr>
<td>▪ Developers</td>
</tr>
<tr>
<td>▪ Low income and affordable housing developers</td>
</tr>
<tr>
<td>▪ Code officials</td>
</tr>
<tr>
<td>▪ Consumers (in the market for new homes and or major renovations)</td>
</tr>
<tr>
<td>Targeted End-Uses</td>
</tr>
<tr>
<td>▪ Energy-efficient building shell</td>
</tr>
<tr>
<td>▪ Proper duct and air sealing techniques</td>
</tr>
<tr>
<td>▪ Quality Installation of HVAC equipment</td>
</tr>
<tr>
<td>▪ Increased use of energy-efficient lighting</td>
</tr>
<tr>
<td>▪ Energy efficient water and heating upgrades</td>
</tr>
<tr>
<td>▪ Increased indoor air quality</td>
</tr>
<tr>
<td>Delivery Mechanism</td>
</tr>
<tr>
<td>The program was administered by a Program Administrator in each service territory and coordinated regionally through the Joint Management Committee (“JMC”). The JMC has a contractor that is responsible for tracking and reporting program activity. The contractor will also conduct quality assurance/quality control of field activities and advise the JMC on necessary program changes and enhancements. The JMC utilized a market-based network of trained contractors who offered energy-efficiency and rating services to homebuilders for a fee.</td>
</tr>
</tbody>
</table>
Significant Differences In Actual Program Design From Approved Program Design

There were no significant differences in actual program design from approved program design.

Docket Number And Exhibit Where Program Is Discussed And Approved

D.P.U. 09-116, Exhibit NG-1.

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>1,598,695</td>
<td>1,838,120</td>
<td>15%</td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>56,444</td>
<td>79,663</td>
<td>41%</td>
</tr>
<tr>
<td>Participants</td>
<td>Accounts</td>
<td>536</td>
<td>787</td>
<td>47%</td>
</tr>
<tr>
<td>Program Cost/ Participant</td>
<td>$</td>
<td>2,983</td>
<td>2,336</td>
<td>-22%</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td>MWh</td>
<td>14,826</td>
<td>29,554</td>
<td>99%</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td>MWh</td>
<td>1,170</td>
<td>2,179</td>
<td>86%</td>
</tr>
<tr>
<td>Average Measure Life Yrs</td>
<td>yrs</td>
<td>13</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>kW</td>
<td>9,416</td>
<td>3,725</td>
<td>-60%</td>
</tr>
<tr>
<td>Annualized Summer</td>
<td>kW</td>
<td>431</td>
<td>244</td>
<td>-44%</td>
</tr>
<tr>
<td>Winter</td>
<td>kW</td>
<td>243</td>
<td>432</td>
<td>78%</td>
</tr>
<tr>
<td>Average Measure Life Yrs</td>
<td>yrs</td>
<td>22</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>2,530,920</td>
<td>1,445,279</td>
<td>-43%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>5,024,797</td>
<td>4,769,946</td>
<td>-5%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>3,699,453</td>
<td>1,917,783</td>
<td>-48%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>1,325,344</td>
<td>2,852,164</td>
<td>115%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.36</td>
<td>2.49</td>
<td>83%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

The variances for energy and demand between the planned numbers and preliminary year end numbers are the result of three factors:

1) There were many more homes coming through the program whose primary heating fuel was electricity than was incorporated into the planning projections; planning incorporated an approximate electric fuel mix of 7%, while the actual mix in 2010 of electric homes was 26%. This contributed to a large increase in electric heating savings.

2) More lighting being installed than was planned, almost 80% more bulbs and fixtures were installed than were anticipated, approximately 25,400 vs. 14,000. This contributed to a large increase in electric savings.

3) Fewer homes having central air conditioning than was incorporated in the planning estimates. Planning incorporated a central Air Conditioning mix of 75% while only 57%
of the homes coming through the program had central AC. This contributed to a significant decrease in summer demand savings.

Evaluated savings are exactly the same as preliminary year-end estimates.

The variance in spending is due to the increased number of participants in the 2010 program. In addition, the increase in lighting installs over planned contributed to the variance in spending.

The following EM&V studies included in the Annual Report apply to this program:

**The Massachusetts New Homes with ENERGY STAR Program Estimated Maximum Potential Savings from Enhanced Compliance with the IECC 2009 Residential Building Code in Massachusetts**: This study estimated the maximum potential savings for the years 2011, 2012, and 2013 that might be achieved through promoting compliance with the newly-adopted IECC 2009 energy code for four measures—wall insulation, basement insulation, proper insulation of ducts in unconditioned spaces, and fifty percent high efficacy lamp requirement—in order to provide needed guidance to the PAs on the implementation and evaluation costs that might be justified. The results of this study did not impact the 2010 evaluated results. This study is discussed in more detail in section III.B.

**Massachusetts New Homes with ENERGY STAR Mystery Shopping**: This study provided insight into the current marketing strategies of real estate agents listing ENERGY STAR homes, and the effect of program-sponsored trainings on these marketing strategies. The results of this study did not impact the 2010 evaluated results. This study is discussed in more detail in section III.B.

**The Massachusetts New Homes with ENERGY STAR Program, 2011Baseline Phase 1: Completion of Planning**: This study describes the planning process for the 2011 Baseline Study and the work done to develop a sample of eligible homes. The results of this study did not impact the 2010 evaluated results. This study is discussed in more detail in section III.B.

Due to the variation of savings results generated by homes in the various tiers during 2010, the program changed the tier structure in 2011. The program now requires each qualifying home to obtain a minimum percent savings over the baseline for each of the incentive tiers. The intent of this change is to produce more consistency in the results.

At this point in time no mid-term modification is planned for this program.
### Residential ENERGY STAR HVAC Electric

<table>
<thead>
<tr>
<th>Purpose / Goal of Program</th>
<th>The purpose and the goal of the program is to raise residential consumer awareness and market share of properly installed high-efficiency cooling equipment and systems.</th>
</tr>
</thead>
</table>
| Targeted Customers, And Definition Of Program Participants | The program targets the following customers and participants:  
- Residential customers in the market to purchase new or replacement HVAC equipment.  
- New systems in existing and new homes (new systems).  
- Replacement systems in existing homes (new equipment/old systems), including the early retirement of existing equipment.  
- Improvements in operation of systems in existing homes (new equipment/old systems).  
- HVAC contractors and technicians.  
- Suppliers of HVAC equipment.  
- Manufacturers and distributors of HVAC equipment.  
- New-home builders and remodeling contractors. |
| Targeted End-Uses | Residential central cooling and heating equipment (ECM fan motors). |
| Delivery Mechanism | The program is administered by the Program Administrator in each service territory. Delivery is provided by a common vendor selected via a common RFP. Whenever possible, there is coordination with the related gas Program Administrator’s initiatives. To this end, the COOL Smart and Gas Networks’ High Efficiency Heating, Water Heating and Controls programs worked to procure and successfully contracted with a single, joint circuit rider to support both programs in the field. Program initiatives are also piggybacked onto the Residential New Construction and Mass Save programs:  
- Participating Residential New Construction program builders and their HVAC contractors are referred to the COOL SMART Program for training and QIV services. Whenever appropriate, COOL SMART training is coordinated with GasNetworks training.  
- Mass Save participants are referred to COOL SMART by Mass Save energy auditors who distribute COOL SMART literature.  
- Quality control/follow-up inspections are performed by independent inspectors on up to 10 percent of installations. |
The program continues to use equipment distributors to encourage contractor participation, sell high-efficiency equipment and QIV-related technology, and to provide indoor training labs for HVAC contractors.

Significant Differences In Actual Program Design From Approved Program Design

There were no significant differences in actual program design from approved program design.

Docket Number And Exhibit Where Program Is Discussed And Approved

D.P.U. 09-116, Exhibit NG-1.

---

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>$2,165,786</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>$17,325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants Accounts</td>
<td>$</td>
<td>$3,162</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Cost/ Participant</td>
<td>$</td>
<td>$685</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td>MWh</td>
<td>16,102</td>
<td>30,582</td>
<td>90%</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td>MWh</td>
<td>969</td>
<td>1,732</td>
<td>79%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>17</td>
<td>18</td>
<td>6%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>kW</td>
<td>9,750</td>
<td>17,320</td>
<td>78%</td>
</tr>
<tr>
<td>Annualized Summer kW</td>
<td>kW</td>
<td>798</td>
<td>1,016</td>
<td>27%</td>
</tr>
<tr>
<td>Winter kW</td>
<td>kW</td>
<td>157</td>
<td>404</td>
<td>158%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>12</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>NER (Lifetime)</td>
<td>$</td>
<td>(300,198)</td>
<td>(492,351)</td>
<td>64%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>2,258,019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>2,196,907</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>61,113</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.03</td>
<td>1.95</td>
<td>90%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end lifetime energy savings are 90% more than planned results. The primary driver of this increase in savings is the higher volume of ECM motors installed through the program during the past year.

Evaluated savings are the same as preliminary year-end estimates. No changes were made to the program impacts since no impact evaluation work was conducted for this program.

The following EM&V studies included in the Annual Report apply to this program:
Massachusetts 2010 Brushless Fan Motor Process Evaluation: The report presents the results of the process evaluation of the Brushless Fan Motor component of the 2010 Cool Smart program. The objectives of the study were to determine the following: program processes, implementation strengths, and areas for improvements; program tracking data sufficiency; contractor practices, perceptions, and participation barriers; customer behavior, motivations, awareness, and satisfaction; program outreach and recruitment efficacy; and participants’ potential changes in fan use, from pre- to post-installation.

By design, the results of this process evaluation did not have an impact on the evaluated results of this program. This study is discussed in more detail in section III.B.

To assist with future evaluation needs, the PAs will work with the implementation vendors and internal support groups to ensure that all appropriate data is collected. If the data is captured early on this could potentially minimize data requests and on-site visits to customer homes.

The PAs, together with the implementation vendor and other trade allies, including HVAC distributors, will explore market opportunities and implementation strategies to enhance contractor participation.

It is not expected that the program performance in 2010 or the results of the described evaluations will result in significant changes to the program design or implementation in future years.

Therefore, at this point in time, no mid-term modification is planned for this program.
## Multi-Family Retrofit Program

<table>
<thead>
<tr>
<th><strong>Purpose / Goal of Program</strong></th>
<th>The purpose and the goal of the program were to address the energy efficiency retrofit opportunities for the non-low income, five or more residential dwelling units and above market sector.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Targeted Customers, And Definition Of Program Participants</strong></td>
<td>Residential facilities with five or more dwelling units.</td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
<td>All cost-effective applications, systems, and building shell improvements that impact gas and electric consumption are assessed for incentives under this program. These include, but are not limited to, lighting, DHW, building shell improvements, appliances, motors, variable-speed drives, HVAC equipment, energy management systems and building controls, chillers and other site specific end-uses.</td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
<td>The program was administered cooperatively by the gas and electric Program Administrators. The Multi-Family Market Integrator, implemented in July 2010, was responsible for facilitating the delivery of program services, as well as acting as the conduit through which participant questions and concerns were directed to ensure that participants were not required to directly contact multiple parties during the project lifecycle.</td>
</tr>
<tr>
<td><strong>Significant Differences In Actual Program Design From Approved Program Design</strong></td>
<td>There were no significant differences in actual program design from the approved program design.</td>
</tr>
<tr>
<td><strong>Docket Number And Exhibit Where Program Is Discussed And Approved</strong></td>
<td>D.P.U. 09-116, Exhibit NG-1.</td>
</tr>
</tbody>
</table>
Table II.A.6: Multifamily Retrofit

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>7,169,528</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>1,791,094</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants</td>
<td>Units</td>
<td>8,625</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Cost/ Participant</td>
<td>$</td>
<td>831</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>MWh</td>
<td>146,596</td>
<td>129,736</td>
<td>-12%</td>
</tr>
<tr>
<td>Annualized</td>
<td>MWh</td>
<td>9,152</td>
<td>7,748</td>
<td>-15%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>16</td>
<td>17</td>
<td>5%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>kW</td>
<td>10,919</td>
<td>9,806</td>
<td>-10%</td>
</tr>
<tr>
<td>Annualized</td>
<td>kW</td>
<td>771</td>
<td>597</td>
<td>-23%</td>
</tr>
<tr>
<td>Winter</td>
<td>kW</td>
<td>2,225</td>
<td>1,859</td>
<td>-16%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>14</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>1,881,050</td>
<td>1,560,573</td>
<td>-17%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>16,173,388</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>9,108,885</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>7,064,503</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.78</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings are 12% less than planned results. This change is due to the different measure mix planned for the program and the actual measure mix installed during the program year. This change is within the expected variance.

Evaluated savings are the same as preliminary year-end estimates. There were no studies completed for the Multifamily Retrofit program.

It is not expected that the program performance in 2010 or the results of the described evaluations will result in significant changes to the program design or implementation in future years.

Therefore, at this point in time, no mid-term modification is planned for this program.
### Residential Conservation Services / MassSAVE

<table>
<thead>
<tr>
<th>Purpose / Goal of Program</th>
<th>The purpose and the goal of this program was to provide residential customers with energy efficiency recommendations that enable them to identify and initiate the process of installing cost-effective energy efficiency upgrades.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted Customers, And Definition Of Program Participants</td>
<td>The targeted customers of the program and defined program participants were all non-low-income residential customers living in single-family houses or one- to four-unit multi-family buildings, regardless of heating fuel, who are committed to making their homes more energy efficient.</td>
</tr>
</tbody>
</table>
| Targeted End-Uses | The program targets end-uses as follows:  
- Building Envelope  
- HVAC/Mechanical systems  
- Water heating  
- Energy saving appliances and lighting  
- Deeper retrofit measures  
- New technologies and renewables |
| Delivery Mechanism | The program is administered within each service territory by its Program Administrator and was coordinated statewide through the Residential Management Committee (“RMC”) that actively manages and steers the statewide MassSAVE program. The program was delivered by program vendors selected through a competitive bidding process.  

In order to increase the number of energy efficiency contractors, the program offered an incentive/rebate to contractors who installed retrofit weatherization measures such as insulation and air sealing.  

Customers were required to have an RCS site visit through the Program Administrator’s vendor to identify and prioritize all cost effective energy efficiency upgrades in order to receive an incentive or program rebate. All insulation work, whether performed by an authorized independent contractor or a vendor’s subcontractor, had a quality control inspection performed by the Program Administrator’s vendor when the work was completed. This ensured that, either through an authorized installer or the Program Administrator’s RCS vendor, installations met BPI standards or similar standards set by the Program Administrators.  

In addition, and consistent with the Green Communities Act, the |
HEAT Loan program provided qualified customers with 0 percent interest loans up to $15,000 with terms up to seven years.

The RMC members worked together toward a “best practices” approach and to provide a more coordinated statewide training as a means to ensure correct installation techniques for the RCS/MassSAVE Program.

Contractors must maintain a high level of customer satisfaction to continue in the program.

The RMC applied a “best practices” approach and worked together to make quality control an integral part of the RCS/MassSAVE Program. The Program Administrators issued an RFP and selected a third-party Quality Control (“QC”) vendor responsible for performing QC inspections of program implementation vendors, subcontractors, and contractors.

<table>
<thead>
<tr>
<th>Significant Differences In Actual Program Design From Approved Program Design</th>
<th>In 2010, the Company experimented with a two visit audit model, requiring a screening and diagnostic audit before weatherization implementation. In April 2010, the Company initiated a program model change, with the integration of the gas weatherization program into the MassSave Residential Conservation Services (RCS) program model.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Docket Number And Exhibit Where Program Is Discussed And Approved</td>
<td>D.P.U. 09-116, Exhibit NG-1.</td>
</tr>
</tbody>
</table>
Table II.A.7: MassSAVE

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td></td>
<td>$14,534,561</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Incentive</td>
<td></td>
<td>$247,004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants Audits</td>
<td></td>
<td>16,250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Cost/Participant</td>
<td></td>
<td>$894</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Savings &amp; Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td></td>
<td>105,083</td>
<td></td>
<td>19%</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td></td>
<td>10,819</td>
<td></td>
<td>41%</td>
</tr>
<tr>
<td>Average Measure Life yrs</td>
<td></td>
<td>10</td>
<td>8</td>
<td>-16%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td></td>
<td>78,960</td>
<td></td>
<td>-25%</td>
</tr>
<tr>
<td>Annualized Summer kW</td>
<td></td>
<td>3,964</td>
<td></td>
<td>41%</td>
</tr>
<tr>
<td>Winter kW</td>
<td></td>
<td>1,534</td>
<td></td>
<td>115%</td>
</tr>
<tr>
<td>Average Measure Life yrs</td>
<td></td>
<td>20</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td></td>
<td>$74,148,081</td>
<td></td>
<td>40%</td>
</tr>
<tr>
<td><strong>Cost-Effectiveness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td></td>
<td>$93,519,727</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td></td>
<td>$18,077,346</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Benefits</td>
<td></td>
<td>$75,442,381</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCR</td>
<td></td>
<td>n/a</td>
<td>5.17</td>
<td></td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end electric savings are 19% greater than planned results. This change is due to an increased quantity of CFLs and refrigerators installed relative to the plan.

The preliminary non-energy benefits are 41% lower than planned results. This change is due to two main factors. First, the average savings per measure calculated from 2010 year-end results were lower than the averages used to plan for 2010. Second, the mix of measures in the 2010 year-end results varied from the mix of measures initially planned for 2010.

Evaluated electric savings decreased 11% from preliminary year-end estimates. This decrease is due to the 2010 Net-to-Gross findings study described below. The majority of the electric savings for this program comes from compact fluorescent bulbs and refrigerators. The net-to-gross ratios for these measures decreased from the preliminary values, which decreased the program’s total savings.

The evaluated non-electric benefits are 15% higher than preliminary results. This increase is due to higher net-to-gross ratios for certain weatherization measures, such as insulation.

The following EM&V studies included in the Annual Report apply to this program:

*Massachusetts 2010 Residential Retrofit and Low Income Evaluation: MassSAVE:* This study assessed program processes with a particular focus on identifying similarities and differences in the perspectives and assumptions of program staff, implementation staff, and customers regarding program goals, design and implementation across the PAs.
The process evaluation has no impact on the evaluated results. This study is discussed in more detail in section III.B.

2010 Net-to-Gross Findings: Home Energy Assessment: This study evaluated the free-ridership and spillover rates for all customers participating in the Residential Conservation Services (RCS) program. Rates are determined for each of the following measures in the RCS program: Air Sealing, Insulation, Thermostats, Compact Fluorescent Lightbulbs (CFLs), Heating Systems, Refrigerators and Water Heaters.

The results of this study vary for each measure within the program. In some cases, the net effect of these results increased program savings and in other cases the net effect of these results decreased program savings. This study is discussed in more detail in section III.B.

Non-Electric Impact (NEI) Findings for the 2011 MassSAVE Home Energy Services (MassSAVE) Program: This memo reviews the non-electric impacts claimed for the Residential Conservation Services program. Non-electric impacts include the gas, oil, and propane savings claimed through the measures installed through the electric program.

The memo recommends that program administrators use vendor estimated data to calculate non-electric impacts. National Grid already uses vendor data to calculate its non-electric impacts, therefore no change is necessary. This study is discussed in more detail in section III.B.

The Company is still reviewing program performance and the results of the described evaluations to determine what, if any, changes to the program design or implementation may result in future years.

Similarly, it has not been determined whether any resulting changes would result in a 2012 mid-term modification.
| **OPOWER** |
|-----------------|-------------------------------------------------------------------------------------------------|
| **Purpose / Goal of Program** | To lower residential customer energy consumption by educating and motivating customers to take energy saving actions and behaviors by providing a home energy report with normative comparisons and recommendations. |
| **Targeted Customers, And Definition Of Program Participants** | The program targets residential customers with high energy usage. A participant is defined as one residential household. |
| **Targeted End-Uses** | The program targets all residential end-uses through either motivating customers to change their behavior to save energy or to take energy saving actions. |
| **Delivery Mechanism** | The program is administered independently by National Grid. The vendor is OPOWER. |
| **Significant Differences In Actual Program Design From Approved Program Design** | The program added 25,000 participants to the planned number of participants. |
| **Docket Number And Exhibit Where Program Is Discussed And Approved** | D.P.U. 09-116, Exhibit NG-2. |
Table IIA.8: OPOWER

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value % Change from Planned</td>
<td>Value % Change from Preliminary % Change from Planned</td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>1,166,038</td>
<td>1,391,790</td>
<td>19%</td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>49,307</td>
<td>53,226</td>
<td>8%</td>
</tr>
<tr>
<td>Participants Accounts</td>
<td></td>
<td>100,000</td>
<td>122,253</td>
<td>22%</td>
</tr>
<tr>
<td>Program Cost/ Participant</td>
<td>$</td>
<td>12</td>
<td>11</td>
<td>-2%</td>
</tr>
<tr>
<td><strong>Savings &amp; Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td>MWh</td>
<td>26,000</td>
<td>32,500 25%</td>
<td>25,622 -21% -1%</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td>MWh</td>
<td>26,000</td>
<td>32,500 25%</td>
<td>25,622 -21% -1%</td>
</tr>
<tr>
<td>Average Measure Life Yrs</td>
<td>yrs</td>
<td>1</td>
<td>1 0%</td>
<td>1 0% 0%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>kW</td>
<td>1,480</td>
<td>1,850 25%</td>
<td>1,594 -14% 8%</td>
</tr>
<tr>
<td>Annualized Summer kW</td>
<td>kW</td>
<td>1,480</td>
<td>1,850 25%</td>
<td>1,594 -14% 8%</td>
</tr>
<tr>
<td>Winter kW</td>
<td>kW</td>
<td>5,900</td>
<td>7,375 25%</td>
<td>6,357 -14% 8%</td>
</tr>
<tr>
<td>Average Measure Life Yrs</td>
<td>yrs</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>153</td>
<td>0 -100%</td>
<td>- 0% -100%</td>
</tr>
<tr>
<td><strong>Cost-Effectiveness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>3,029,802</td>
<td>3,299,020</td>
<td>9%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>1,215,345</td>
<td>1,445,016</td>
<td>19%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>1,814,457</td>
<td>1,854,004</td>
<td>2%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>2.49</td>
<td>2.28</td>
<td>-8%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings are 25% greater than planned results. The primary reason for the increased savings is because National Grid included 25,000 participants more than initially planned when the program became aware that savings per participant were lower than planned.

Evaluated savings per participant decreased 19% from preliminary year-end estimates. This decrease is due to the results of impact evaluation described below.

The following EM&V studies included in the Annual Report apply to this program:

2010 Massachusetts Cross-Cutting Behavioral Program Evaluation: This impact and process evaluation studied the 2009-2010 pilot participants of the OPOWER gas and electric programs. The impact evaluation includes a billing analysis to determine the net program savings and a channeling analysis to determine incremental savings from other programs. The results were combined to determine the average percent reduction in kWh or therms per participant and the average savings per household.

2010 was the first year that OPOWER was offered as program. There was a steep learning curve. During the program year, the vendor’s billing analysis indicated that the average savings per participant was lower than planned. Based on this information, the program added 25,000 participants in order to achieve the 2010 savings goals.

The statewide evaluation determined that the average savings per participant was indeed lower than planned. The statewide evaluation also indicated that there is a “ramp-up” period in the OPOWER program, and savings during the first year of implementation are expected to increase during the second year of implementation. The statewide evaluation also provided insights into the types of actions and behaviors that customers are taking.
within their homes, highlighted areas for additional research, and recommended process changes to increase savings.

For the OPOWER electric program, the evaluation found that participants in the pilot cohort were saving an average 1.61\%, or 184.1 kWh of their 11,433 kWh expected consumption. This study is discussed in more detail in section III.B.

Several of the process changes recommended in the study are being implemented in 2011. The study recommended specific ways to enhance the home energy report and those changes include: personalizing the home energy report, promoting the website, and increasing positive affirmations.

The Company anticipates making additional changes in 2012 based on the statewide evaluation impact and process evaluation. The changes are not determined at this time. The statewide Cross-cutting evaluation group is currently conducting an additional study task to assist in 2012 planning.

Any resulting changes will be described in the 2012 mid-term modification.
<table>
<thead>
<tr>
<th><strong>ENERGY STAR Lighting</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose / Goal of Program</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers, And Definition Of Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
</tbody>
</table>
| **Delivery Mechanism** | A manufacturer/retailer outreach contractor recruited and trained retailers to participate in the program; placed point-of-purchase materials in participating retail stores; oversaw the Negotiated Cooperative Program (NCP) process; and acted as a liaison for Program Administrators, manufacturers, and retailers. 

A rebate fulfillment contractor collected data and payment requests from manufacturers, retailers, and consumers; processed rebates from NCPs; and provide documentation to the Program Administrators for program tracking and evaluation purposes. 

An internet/mail-order sales channel contractor developed and distributed the catalog; purchased and stocked products offered through the catalog and the www.estarlights.com website; staffed a toll-free line for customers; and process catalog and website purchases. |
| **Significant Differences In Actual Program Design From Approved Program Design** | There are no significant differences in the actual program design from the approved program design. |
| **Docket Number And Exhibit Where Program Is Discussed And Approved** | D.P.U. 09-116, Exhibit NG-1. |
Table II.A.9: ENERGY STAR Lighting

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>7,244,797</td>
<td>6,336,937</td>
<td>-13%</td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>520,107</td>
<td>771,506</td>
<td>48%</td>
</tr>
<tr>
<td>Participants</td>
<td>Hholds</td>
<td>78,100</td>
<td>458,220</td>
<td>487%</td>
</tr>
<tr>
<td>Program Cost/Participant</td>
<td>$</td>
<td>93</td>
<td>14</td>
<td>-85%</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>MWh</td>
<td>254,550</td>
<td>366,328</td>
<td>44%</td>
</tr>
<tr>
<td>Annualized</td>
<td>MWh</td>
<td>32,257</td>
<td>43,192</td>
<td>34%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>8</td>
<td>8</td>
<td>7%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>kW</td>
<td>27,620</td>
<td>35,899</td>
<td>30%</td>
</tr>
<tr>
<td>Annualized</td>
<td>kW</td>
<td>3,467</td>
<td>4,447</td>
<td>28%</td>
</tr>
<tr>
<td>Summer</td>
<td>kW</td>
<td>6,937</td>
<td>8,894</td>
<td>28%</td>
</tr>
<tr>
<td>Winter</td>
<td>kW</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>2,102,747</td>
<td>3,364,350</td>
<td>60%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>29,556,988</td>
<td>42,881,781</td>
<td>45%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>9,257,298</td>
<td>13,713,170</td>
<td>48%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>20,299,689</td>
<td>29,168,610</td>
<td>44%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>3.19</td>
<td>3.13</td>
<td>-2%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings are 44% greater than planned results. Increased savings resulted from a larger number of rebates being offered than planned. National Grid rebated ninety-two times more LED bulbs than originally planned. LED fixtures also had 2.2 times more rebates than planned and standard CFL bulbs had 2.7 times more bulbs rebated than originally planned. These measures increased the preliminary savings over the planned savings. Year end savings were lower than preliminary savings due to evaluation results that lowered the net-to-gross rate for specialty and hard-to-reach bulbs. These changes are discussed in more detail in the evaluation section. Year end total program costs were 12% lower than anticipated. The implementation vendor was able to negotiate lower than anticipated pricing for specialty bulbs which contributed to the cost savings.

The following EM&V studies included in the Annual Report apply to this program:

Evaluation of Residential Lighting Program: The primary objectives of this impact evaluation was to estimate net-to-gross ratios (NTGR) for markdown compact fluorescent lamps (CFLs), including separate estimates for spiral and specialty bulbs and bulbs targeted at hard-to-reach (HTR) customers. The evaluators were also charged with assessing the Program Administrators’ (PAs) current working definition of HTR customers and understanding market segmentation related to HTR customers. The evaluators also described the current state of the market for CFLs and other efficient lighting technologies, comparing to results from prior years when possible. This study is discussed in more detail in section III.B.
2010 ENERGY STAR Lighting NTG Findings are presented below. This also complies with directive in D.P.U. Order 09-63, 2008 National Grid EEAR, which requires the Company to provide an analysis of the NTGR adjustment factor for lighting measures.

- CFL markdown spirals 0.43 NTGR from planned NTGR or 0.34
- Specialty markdown bulbs 0.60 NTGR from planned NTGR of 0.80
- HTR bulbs 0.60 NTGR from planned NTGR of 0.70

The Company is still reviewing program performance and the results of the described evaluations to determine what, if any, changes to the program design or implementation may result in future years.

Similarly, it has not been determined whether any resulting changes would result in a 2012 mid-term modification.
<table>
<thead>
<tr>
<th><strong>ENERGY STAR Appliances &amp; Products</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose / Goal of Program</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers, And Definition Of Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Significant Differences In Actual Program Design From Approved Program Design</strong></td>
</tr>
<tr>
<td><strong>Docket Number And Exhibit Where Program Is Discussed And Approved</strong></td>
</tr>
</tbody>
</table>
Table II.A.10: ENERGY STAR Appliances

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>2,710,764</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>63,299</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants</td>
<td>Rebates</td>
<td>23,425</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Cost/ Participant</td>
<td>$</td>
<td>116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td>MWh</td>
<td>44,057</td>
<td>62,866</td>
<td>43%</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td></td>
<td>5,234</td>
<td>6,972</td>
<td>33%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>8</td>
<td>9</td>
<td>7%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>kW</td>
<td>6,596</td>
<td>7,670</td>
<td>16%</td>
</tr>
<tr>
<td>Annualized</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer kW</td>
<td>kW</td>
<td>798</td>
<td>838</td>
<td>5%</td>
</tr>
<tr>
<td>Winter kW</td>
<td>kW</td>
<td>630</td>
<td>836</td>
<td>33%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>1,785</td>
<td>0</td>
<td>-100%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>5,224,096</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>3,539,313</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>1,684,782</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings are 43% greater than planned results. The increase in savings is due to a larger number of rebates being distributed in 2010 than originally planned. Evaluated savings were 18% above plan which is in line with the eleven percent increase in costs over plan. Evaluated savings declined 17% as compared to preliminary savings. The decrease resulted from lowered evaluated savings from the refrigerator recycling measure as discussed in section III.B.

The following EM&V studies included in the Annual Report apply to this program:

*Evaluation of Appliance Recycling Program:* The primary evaluation activities consisted of a participant survey, a process evaluation, and estimation of net program savings impacts derived by applying participant-reported decision behavior about program influence and usage patterns to gross savings estimates from studies conducted in other areas. These gross and net savings estimates were compared to ex ante savings estimates currently used by the Sponsors. A secondary focus of the evaluation effort included an exploration of the secondary market and disposal market that exists for appliances to provide insight about how the program functions in the overall appliance market.

The Company is still reviewing program performance and the results of the described evaluations to determine what, if any, changes to the program design or implementation may result in future years.

Similarly, it has not been determined whether any resulting changes would result in a 2012 mid-term modification.
3. **Residential Pilot Programs**

In its order approving the 2010-12 Energy Efficiency Plan, the Department directed the Program Administrators to provide further information regarding proposed 2011 and 2012 pilot budgets at the time the Program Administrators file their 2010 Annual Reports. The Company's budget for its 2011 electric pilots was included in its mid-term modification filing currently pending in Docket 10-148. The Company has not yet re-assessed its pilot budget for 2012.

The following section describes residential pilot program activities in 2010.

<table>
<thead>
<tr>
<th><strong>Deep Energy Retrofit Pilot</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Specific Activities The Pilot Program Was Intended To Study</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers And Definition Of Pilot Program Participants</strong></td>
</tr>
</tbody>
</table>
| **Targeted End-Uses** | To dramatically reduce the amount of energy used in existing residences consisting of:  
- Advanced building shell  
- High-performance lighting  
- High-efficiency heating and cooling systems  
- Advanced controls  
- High-efficiency appliances and products  
- Advanced energy use feedback and monitoring technology  
- Mechanical ventilation  
- Solar photovoltaic systems  
- Solar thermal systems |
| **Delivery Mechanism** | Project design details and assistance to the DER contractors doing the work was handled through technical specialist contractor, program manager and organizations under contract and/or utilizing DOE Building America funds. |
Any Significant Differences In Actual Pilot Program Design From Approved Pilot Program Design

No significant differences in the actual pilot program design from the approved pilot program design.

How The Program Administrator Measured Achievement Of The Pilot Program’s Stated Goal

Final evaluation and Building America Test Program in process.

Identify the Department docket (and exhibit within the docket) where the pilot program is discussed and approved

D.P.U. 09-116, Exhibit NG-1.

Table II.A.11: Deep Energy Retrofit Pilot

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
<th>Value</th>
<th>% Change from Planned</th>
<th>Value</th>
<th>% Change from Preliminary</th>
<th>% Change from Planned</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>909,849</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>249,166</td>
<td>-73%</td>
<td></td>
</tr>
<tr>
<td>Participants</td>
<td>TBD</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>-80%</td>
<td></td>
</tr>
<tr>
<td>Program Cost / Participant</td>
<td>$</td>
<td>45,492</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>62,292</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
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<td>n/a</td>
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<td>MWh</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<td>Demand</td>
<td></td>
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<tr>
<td>Summer</td>
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<td>n/a</td>
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<td>n/a</td>
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<td>n/a</td>
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<td>n/a</td>
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<tr>
<td>Winter</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Average Measure Life</td>
<td>yrs</td>
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<td>n/a</td>
<td>n/a</td>
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<tr>
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<td>n/a</td>
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<td>n/a</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
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<td>n/a</td>
<td>n/a</td>
<td>340,834</td>
<td>-69%</td>
<td>n/a</td>
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<tr>
<td>TRC Costs</td>
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<td>n/a</td>
<td>340,834</td>
<td>-69%</td>
<td>n/a</td>
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</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>BCR</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Though the very ambitious unit goals were not achieved, the continued growth in interest in the program holds a lot of promise. Though most potential applicants find that costs are prohibitive; web exposure, auditor referrals, word of mouth, open house events and stakeholder marketing in 2009 and 2010 brought in a growing number of applicants. The lengthy pipeline for planning and review meant that many 2010 projects won’t start (or finish) work until 2011. For the 2010 year there were the equivalent of nine (9) DER dwelling units. Four (4) units were accepted as candidates in the prestigious Thousand Homes Challenge. A higher percentage of 2 and 3 family buildings and moderate to low income projects came into the application process later than expected.
Contractor learning and project evolution isn’t happening at the pace expected. The work is complex and varied from project to project. Multiple projects for each contractor are needed to begin to move towards more consistency of quality of planning and work needed to achieve the optimal EE results without impacting building durability, health and/or safety. One indicator of this problem/opportunity is the degree to which most of these DER projects were tighter (approximately 85% air leakage reduction) than DERs done previously while others were not as tight as evidenced by blower door test results.

This program is a multi-year pilot. Many months are needed to plan, and many more to complete projects and then wait for savings results. In addition, time is needed to obtain a sufficient sample of the building types and retrofit approaches to test. The multi-year window also allows opportunity to best identify proper planning, installation, and verification methods as well as develop the infrastructure needed for potential wider scale deployment of deep envelope measures in DERs and across other residential programs. This infrastructure is also needed to guide project planning, and provide for strong quality control.

The company plans to:

- Conduct a Non Energy Benefits study of DERs.
- Review and consider recommendations from the process evaluation including exploration of options for designing the next phase of evaluation to be more research based.
- Assess impacts based on one year post completion data of a sufficient number of projects.
- Continue the collaborative assessment of pilot learning with the US DOE through the Building America Program, which partly funds the technical guidance for the pilot.
<table>
<thead>
<tr>
<th><strong>Residential Major Renovation Pilot</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Specific Activities The Pilot Program Was Intended To Study</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers And Definition Of Pilot Program Participants</strong></td>
</tr>
</tbody>
</table>
| **Targeted End-Uses** | • Energy-efficient building shell measures  
• Proper duct and air sealing techniques  
• HVAC quality installation  
• Mechanical ventilation to both the new-construction components and the existing home |
| **Delivery Mechanism** | The Program Administrators with the JMC included this pilot as an offering under the Massachusetts New Homes with ENERGY STAR Program. This pilot combines elements of the Residential New Construction Program (for the addition) and RCS program (for the existing portion) to provide a comprehensive whole-house approach. Each home in the program had a HERS analysis performed in order to better understand the existing structure. Recommendations were provided to the homeowner for the existing portion (under a Mass Save model) and also to increase the energy efficiency of the new addition by the market-based rater in the program |
| **Any Significant Differences In Actual Pilot Program Design From Approved Pilot Program Design** | There were no significant differences in the actual program design from the approved pilot program design. |
| **How The Program Administrator Measured Achievement Of The Pilot Program’s Stated Goal** | Final evaluation is in process. |
| **Identify the Department docket (and exhibit within the docket) where the pilot program is discussed and approved.** | D.P.U. 09-116, Exhibit NG-1. |
### Table II.A.12: New Construction & Major Renovation - Major Renovation Statewide Pilot

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
<th>% Change from Planned</th>
<th>% Change from Preliminary</th>
<th>% Change from Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>Value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>% Change from Preliminary</td>
<td></td>
<td>% Change from Preliminary</td>
<td>% Change from Planned</td>
<td></td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
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<tr>
<td>Participants</td>
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<td>-96%</td>
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<td>Program Cost / Participant</td>
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<tr>
<td>Average Measure Life</td>
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<tr>
<td>Demand</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>kW</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
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<td>n/a</td>
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<td>Summer</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
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<td>n/a</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
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<td>n/a</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cost-Effectiveness</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
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<td>n/a</td>
<td>34,968</td>
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<td>-87%</td>
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<td>TRC Costs</td>
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<tr>
<td>Net Benefits</td>
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<td>n/a</td>
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</tr>
<tr>
<td>BCR</td>
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<td>n/a</td>
<td>n/a</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Note:** The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Interest continues in this pilot as participants continue to call in. Total number of active projects is 33, of which twelve are National Grid Electric customers. The pipeline for prospective projects has approximately 27 leads still in the design and planning stage.

Because there were only a limited amount of completed homes, the Program Administrator intends to continue to monitor the homes that are currently in process to learn further how to morph the program into a more cost-effective prescriptive path program for those that are between the current residential retrofit program and the new construction program in the next three year plan.

The Program Administrators will continue to evaluate the pilot with greater numbers of participating homes that will be able to better represent the segment that currently is not served by the standard residential retrofit and new construction programs.
<table>
<thead>
<tr>
<th><strong>Multi-Family 4-8 Story New Construction Program</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Specific Activities The Pilot Program Was Intended To Study</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers And Definition Of Pilot Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
<tr>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
</tr>
<tr>
<td><strong>Any Significant Differences In Actual Pilot Program Design From Approved Pilot Program Design</strong></td>
</tr>
<tr>
<td><strong>How The Program Administrator Measured Achievement Of The Pilot Program’s Stated Goal</strong></td>
</tr>
<tr>
<td><strong>Identify the Department docket (and exhibit within the docket) where the pilot program is discussed and approved.</strong></td>
</tr>
</tbody>
</table>
The results of the pilot with regards to project and unit counts are just starting to accumulate. Five projects have completed their participation in the pilot at its half way point. Yet ~20 more projects are enrolled and expect to complete before the end of 2012. 292 housing units have been serviced to date with another 943 in the pilot pipeline. These participation numbers are with 95% of the Program Administrators assumed goals.

To date, the results differ from the PAs assumed expectations in that:

1. A greater amount of energy savings are coming from master metered systems
2. A 3 to 5 year project development cycle is the norm, not the 2 to 3 year that was assumed
3. Lighting and HVAC systems are more complicated than they were assumed to be.
4. Common area spaces comprise ~30% of the developed square footage.
5. With regards to capturing energy savings, the existing program structure falls short in the following three areas: Outdoor Lighting, Garage Lighting and Common Area spaces.

Because there were only a limited amount of completed projects and the project cycle is longer, the Program Administrators intend to continue to monitor the projects currently in process to learn further how to serve this segment of the new construction market and incorporate into a cost effective program component.
The Program Administrators will continue to evaluate the pilot with greater numbers of participating projects. This will be able to better represent the segment that currently is not served by the standard residential new construction program.
### Lighting Design Pilot

<table>
<thead>
<tr>
<th>The Specific Activities The Pilot Program Was Intended To Study</th>
<th>The PAs worked with lighting designers and build/design teams to identify creative ways to approach energy savings through proper lighting design on a portfolio level.</th>
</tr>
</thead>
</table>
| Targeted Customers And Definition Of Pilot Program Participants | Homebuilders  
Contractors  
Architects/Designers  
Trade allies  
HERS raters  
Homebuyers  
Realtors  
Developers  
Low income and affordable housing developers  
Consumers (in the market for new homes and or major renovations) |
| Targeted End-Uses | High efficiency lighting and controls. |
| Delivery Mechanism | The Electric Program Administrators with the JMC included this pilot as an offering under the Massachusetts New Homes with ENERGY STAR Program. |
| Any Significant Differences In Actual Pilot Program Design From Approved Pilot Program Design | There were no significant differences in the actual program design from the approved pilot program design. |
| How The Program Administrator Measured Achievement Of The Pilot Program’s Stated Goal | Final evaluation has not been completed. |
| Identify the Department docket (and exhibit within the docket) where the pilot program is discussed and approved. | D.P.U. 09-116, Exhibit NG-1. |
The initial results of the pilot program have been helpful to introduce and install new generation lighting into new construction. The results have been a little bit different from what was expected because in 2009, there was an assumption that the building market may rebound during the timeframe with more custom-built homes that generally overlight certain areas. Thus, design and controls have been less a focus in the initial pilot participant homes rather than the lighting technologies.

The Program intends to include qualified light-emitting diodes (LEDs) into the standard program as a measure as they become ENERGY STAR qualified.

The Program Administrators are considering discontinuing this pilot in 2012 and incorporating LEDs and controls into standard program design.
ENERGY STAR Version Three Pilot

<table>
<thead>
<tr>
<th>The Specific Activities The Pilot Program Was Intended To Study</th>
<th>The Program Administrators implemented the pilot to study many of the new specifications of Version 3 of the federal ENERGY STAR Homes program anticipated to go into effect in 2011.</th>
</tr>
</thead>
</table>
| Targeted Customers And Definition Of Pilot Program Participants | Homebuilders  
Contractors  
Architects/Designers  
Trade allies  
HERS raters  
Homebuyers  
Realtors  
Developers  
Low income and affordable housing developers  
Code officials  
Consumers (in the market for new homes and or major renovations) |
| Targeted End-Uses |  
• Energy-efficient building shell  
• Proper duct and air sealing techniques  
• Quality Installation of HVAC equipment  
• Increased use of energy-efficient lighting  
• Energy efficient water and heating upgrades  
• Increased indoor air quality |
<p>| Delivery Mechanism | The Program Administrators with the JMC included this pilot as an offering under the Massachusetts New Homes with ENERGY STAR Program. |
| Any Significant Differences In Actual Pilot Program Design From Approved Pilot Program Design | There were no significant differences in the actual program design from the approved pilot program design. |
| How The Program Administrator Measured Achievement Of The Pilot Program’s Stated Goal | Final evaluation is in process. |
| Identify the Department docket (and exhibit within the docket) where the pilot program is discussed and approved. | D.P.U. 09-116, Exhibit NG-1. |</p>
<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Participants</td>
<td>TBD</td>
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<td></td>
</tr>
<tr>
<td>Program Cost / Participant</td>
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<td>Savings &amp; Benefits</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
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<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Annualized MWh</td>
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<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Annualized kW</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
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<td>n/a</td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
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</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

The V3 Pilot Program Report was completed in the 4th quarter. It was recommended that the JMC continue to train and educate builders on proper building practices and encourage highest quality heating, cooling and insulation products. In addition, the Program decided it would not require builders to achieve ENERGY STAR compliance to receive incentives in 2011. The Program will educate on Version 3. The JMC will use 2011 to continue to evaluate Version 3 and modify the program to continue to seek broader and deeper energy savings.
### Heat Pump Water Heater Pilot

<table>
<thead>
<tr>
<th>The Specific Activities The Pilot Program Was Intended To Study</th>
<th>To study the reliability and energy savings of heat pump water heaters. To determine if Heat Pump Water Heaters will achieve their ENERGY STAR ratings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted Customers And Definition Of Pilot Program Participants</td>
<td>Residential customers with stand alone electric water heaters were targeted. Household size needed to be a minimum of 2 occupants. A minimum of 700 cubic ft. of area around the unit. Conditioned and unconditioned locations were used.</td>
</tr>
<tr>
<td>Targeted End-Uses</td>
<td>Electric hot water heaters</td>
</tr>
<tr>
<td>Delivery Mechanism</td>
<td>The PAs worked with a third party installation contractor for installing the units. A third party evaluation contractor installed monitoring equipment and is responsible for providing the evaluation, reporting and results.</td>
</tr>
<tr>
<td>Any Significant Differences In Actual Pilot Program Design From Approved Pilot Program Design</td>
<td>There were no significant differences in the actual pilot design from approved pilot design.</td>
</tr>
<tr>
<td>How The Program Administrator Measured Achievement Of The Pilot Program’s Stated Goal</td>
<td>We are measuring the equipment performance, customer satisfaction and the level of savings that are being achieved when compared to a standard electric water heating unit. Evaluation is continuing and the results will not be finalized until the pilot testing period has been completed. All measured results are being conducted by an independent evaluation contractor.</td>
</tr>
<tr>
<td>Identify the Department docket (and exhibit within the docket) where the pilot program is discussed and approved.</td>
<td>D.P.U. 09-116, Exhibit NG-2.</td>
</tr>
</tbody>
</table>
The pilot has progressed as anticipated. The National Grid pilot had planned for 4 units and the program achieved 4 participants in Massachusetts. A total of 8 units were planned and installed in Massachusetts as part of a collaborative statewide effort with the other Massachusetts program administrators.

The pilot is being evaluated by a third party evaluation contractor. The results will be reviewed and analyzed upon the completion of the study. The company anticipates more information will be available for the 2012 Mid Term Modification. When available, the evaluation results will be reviewed to determine whether the pilot should be continued. A decision will be made during the 2012 Mid Term Modification process as to how the Program Administrators will move forward with Heat Pump Water Heaters.

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
<th>% Change from Planned</th>
<th>% Change from Preliminary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
<td>Value</td>
<td>% Change from Preliminary</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>33,440</td>
<td></td>
<td>34,235</td>
<td></td>
<td>2%</td>
</tr>
<tr>
<td>Participants</td>
<td>TBD</td>
<td>4</td>
<td></td>
<td>4</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Program Cost / Participant</td>
<td>$</td>
<td>n/a</td>
<td></td>
<td>n/a</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Annualized kW</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Summer</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Winter</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>35,440</td>
<td></td>
<td>34,235</td>
<td></td>
<td>-3%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.
B. Low-Income Sector Programs

1. Summary

During 2010 the Company implemented the following low-income programs\textsuperscript{4}:
- Low-Income Residential New Construction
- Low-Income 1-4 Family Retrofit
- Low-Income Multi-Family Retrofit
- Hard-to-Measure Initiatives

Tables II.B.1 through II.B.3 provide summary information on the performance of the low-income programs at the sector, end use, and program levels, respectively. Section II.B.2 provides detailed information on the performance of each low-income program.

\textbf{Table II.B.1: Low-Income Sector Summary}

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>17,607,496</td>
<td>10,669,378</td>
<td>-39%</td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>1,101,348</td>
<td>1,134,156</td>
<td>3%</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td></td>
<td>174,800</td>
<td>95,787</td>
<td>-45%</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td></td>
<td>12,340</td>
<td>6,563</td>
<td>-47%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>kW</td>
<td>17,447</td>
<td>10,622</td>
<td>-39%</td>
</tr>
<tr>
<td>Annualized kW</td>
<td>kW</td>
<td>1,260</td>
<td>701</td>
<td>-44%</td>
</tr>
<tr>
<td>Summer kW</td>
<td>kW</td>
<td>3,091</td>
<td>1,274</td>
<td>-59%</td>
</tr>
<tr>
<td>Winter kW</td>
<td>kW</td>
<td>1,260</td>
<td>701</td>
<td>-44%</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>24,269,610</td>
<td>22,344,213</td>
<td>0%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>42,084,424</td>
<td>32,826,734</td>
<td>-22%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>18,773,708</td>
<td>11,812,795</td>
<td>-37%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>23,310,716</td>
<td>21,013,939</td>
<td>-10%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>2.24</td>
<td>2.78</td>
<td>24%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

\textsuperscript{4} The Company did not offer any pilot programs in the low-income sector during 2010.
### Table II.B.2: Low-Income Sector Summary of End Uses

<table>
<thead>
<tr>
<th>End Uses</th>
<th>Units (Lifetime)</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
<th>% Change from Preliminary to Evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lighting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>32,978</td>
<td>32,978</td>
<td>0%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>3,125</td>
<td>3,125</td>
<td>0%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>616,990</td>
<td>616,990</td>
<td>0%</td>
</tr>
<tr>
<td><strong>HVAC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>7,719</td>
<td>7,719</td>
<td>0%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>363</td>
<td>363</td>
<td>0%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>17,202,548</td>
<td>17,202,548</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Refrigeration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>54,476</td>
<td>54,476</td>
<td>0%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>7,076</td>
<td>7,076</td>
<td>0%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>3,129,302</td>
<td>3,129,302</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Hot Water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>615</td>
<td>615</td>
<td>0%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>59</td>
<td>59</td>
<td>0%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>1,173,334</td>
<td>1,173,334</td>
<td>0%</td>
</tr>
<tr>
<td><strong>End Use Behavior</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>MWh</td>
<td>95,787</td>
<td>95,787</td>
<td>0%</td>
</tr>
<tr>
<td>Demand</td>
<td>kW</td>
<td>10,622</td>
<td>10,622</td>
<td>0%</td>
</tr>
<tr>
<td>NEB</td>
<td>$</td>
<td>22,344,214</td>
<td>22,344,213</td>
<td>0%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.
### Table II.B.3: Low-Income Program Summary

<table>
<thead>
<tr>
<th>Program / Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Evaluated Results</th>
<th>% Change from Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td></td>
</tr>
<tr>
<td><strong>Low-Income Residential New Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>485,406</td>
<td>612,307</td>
<td>26%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>334,528</td>
<td>148,759</td>
<td>-56%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>150,878</td>
<td>463,548</td>
<td>207%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.45</td>
<td>4.12</td>
<td>184%</td>
</tr>
<tr>
<td><strong>Low-Income 1 to 4 Family Retrofit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>20,263,912</td>
<td>24,446,525</td>
<td>21%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>10,558,701</td>
<td>8,302,637</td>
<td>-21%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>9,705,211</td>
<td>16,143,888</td>
<td>66%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.92</td>
<td>2.94</td>
<td>53%</td>
</tr>
<tr>
<td><strong>Low-Income Multifamily Retrofit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>21,335,105</td>
<td>7,767,902</td>
<td>-64%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>7,373,651</td>
<td>3,091,139</td>
<td>-58%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>13,961,454</td>
<td>4,676,763</td>
<td>-67%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>2.89</td>
<td>2.51</td>
<td>-13%</td>
</tr>
<tr>
<td><strong>Hard-to-Measure Initiatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>7,777,114</td>
<td>270,260</td>
<td>-97%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>42,084,424</td>
<td>32,826,734</td>
<td>-22%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>18,773,708</td>
<td>11,812,795</td>
<td>-37%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>23,310,716</td>
<td>21,013,939</td>
<td>-10%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>2.24</td>
<td>2.78</td>
<td>24%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

During 2010, the Company built upon existing low-income programs. Selected highlights are presented below:

- **Low-Income Residential New Construction** - In 2010, the Massachusetts New Homes with ENERGY STAR program faced a market in which energy codes were changing, single family development remained slow, and opportunities to capture future energy savings were becoming increasingly difficult. To address these barriers the program engaged in code support activities and introduced several new marketing efforts including a lumberyard outreach series, increased e-mail marketing and social media activity. The program also increased market penetration while providing energy savings for homeowners and reducing peak demand. These efforts resulted in the program receiving its fourth consecutive ENERGY STAR award for Sustained Excellence in Program Delivery.

- **Low-Income 1-4 Family Retrofit** - The MA Residential Low Income 1-4 program achieved its savings goals for both the gas and electric program in 2010. The program operated in a successful manner in a time where resources were needed to complete...
• Low-Income Multi-Family Retrofit - Implementation of the LEAN Multi Family working group was new in 2010 and requests from non-profit facilities were prioritized by the LEAN group and implemented by National Grid. Electric savings activity lagged far behind the goals, as many low income multi family facilities already received energy savings installations in previous years. National Grid and LEAN continue to work together on ways to be aggressive in how to better capture electric savings in 2011 and beyond. Most of the savings realized in this program were seen on the gas side, with weatherization and new heating systems installed.
2. **Low-Income Programs**

<table>
<thead>
<tr>
<th><strong>Low-Income Residential New Construction</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose / Goal of Program</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers, And Definition Of Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
</tr>
<tr>
<td><strong>Significant Differences In Actual Program Design From Approved Program Design</strong></td>
</tr>
<tr>
<td><strong>Docket Number And Exhibit Where Program Is Discussed And Approved</strong></td>
</tr>
</tbody>
</table>
### Table II.B.4: Low Income Residential New Construction

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
<th>% Change from Planned</th>
<th>% Change from Preliminary</th>
<th>% Change from Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>Value</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>261,068</td>
<td></td>
<td>124,824</td>
<td>-52%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>8,595</td>
<td></td>
<td>23,935</td>
<td>178%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participants</td>
<td>Accounts</td>
<td>177</td>
<td></td>
<td>226</td>
<td>28%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program Cost / Participant</td>
<td>$</td>
<td>1,475</td>
<td></td>
<td>552</td>
<td>-63%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Savings &amp; Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td>MWh</td>
<td>1,436</td>
<td>2,884</td>
<td>101%</td>
<td>2,884</td>
<td>0%</td>
<td>101%</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td>MWh</td>
<td>162</td>
<td>222</td>
<td>37%</td>
<td>222</td>
<td>0%</td>
<td>37%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>9</td>
<td>13</td>
<td>46%</td>
<td>13</td>
<td>0%</td>
<td>46%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>kW</td>
<td>1,061</td>
<td>504</td>
<td>-52%</td>
<td>504</td>
<td>0%</td>
<td>-52%</td>
</tr>
<tr>
<td>Annualized Summer kW</td>
<td>kW</td>
<td>52</td>
<td>31</td>
<td>-42%</td>
<td>31</td>
<td>0%</td>
<td>-42%</td>
</tr>
<tr>
<td>Winter kW</td>
<td>kW</td>
<td>29</td>
<td>40</td>
<td>38%</td>
<td>40</td>
<td>0%</td>
<td>38%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>20</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>0%</td>
<td>16%</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>225,404</td>
<td>269,274</td>
<td>19%</td>
<td>269,273</td>
<td>0%</td>
<td>19%</td>
</tr>
<tr>
<td><strong>Cost Effectiveness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>485,406</td>
<td></td>
<td>612,307</td>
<td>26%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>334,528</td>
<td></td>
<td>148,759</td>
<td>-56%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>150,878</td>
<td></td>
<td>463,548</td>
<td>207%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.45</td>
<td></td>
<td>4.12</td>
<td>184%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

The variances for energy and demand between the planned numbers and preliminary year end numbers are the result of three factors.

There were more homes coming through the program whose primary heating fuel was electricity than was incorporated into the planning projections; planning incorporated an electric fuel mix of 0%, while the actual mix in 2010 of electric homes was 5%. This contributed to an increase in electric heating savings.

More lighting being installed than was planned, almost 20% more bulbs and fixtures were installed than were anticipated, approximately 3,100 vs. 2,600. This contributed to an increase in electric savings.

Fewer homes having central air conditioning than was incorporated in the planning estimates. Planning incorporated a central Air Conditioning mix of 45% while only 30% of the homes coming through the program had central AC. This contributed to a significant decrease in summer demand savings.

Evaluated savings are exactly the same as preliminary year-end estimates.

The variance in spending was due the following reasons. There were lower than expected expenditures in program planning and administration (PPA), as well as evaluation and marketing. Although there were increased participants served and an increase in lighting installations, fewer units came through the program in the higher tier levels than was projected, therefore a lower incentive was paid. In addition, more multi family units completed than planned, which have a lower incentive per unit than the single family units. Last, the actual number of central air conditioning incentives was less than planned.
The following EM&V studies included in the Annual Report apply to this program:

*The Massachusetts New Homes with ENERGY STAR Program Estimated Maximum Potential Savings from Enhanced Compliance with the IECC 2009 Residential Building Code in Massachusetts*: This study estimated the maximum potential savings for the years 2011, 2012, and 2013 that might be achieved through promoting compliance with the newly-adopted IECC 2009 energy code for four measures—wall insulation, basement insulation, proper insulation of ducts in unconditioned spaces, and fifty percent high efficacy lamp requirement—in order to provide needed guidance to the PAs on the implementation and evaluation costs that might be justified. The results of this study did not impact the 2010 evaluated results. This study is discussed in more detail in section III.B.

*Massachusetts New Homes with ENERGY STAR Mystery Shopping*: This study provided insight into the current marketing strategies of real estate agents listing ENERGY STAR homes, and the effect of program-sponsored trainings on these marketing strategies. The results of this study did not impact the 2010 evaluated results. This study is discussed in more detail in section III.B.

*The Massachusetts New Homes with ENERGY STAR Program, 2011 Baseline Phase 1: Completion of Planning*: This study describes the planning process for the 2011 Baseline Study and the work done to develop a sample of eligible homes. The results of this study did not impact the 2010 evaluated results. This study is discussed in more detail in section III.B.

Due to the variation of savings results generated by homes in the various tiers during 2010, the program changed the tier structure in 2011. The program now requires each qualifying home to obtain a minimum percent savings over the baseline for each of the incentive tiers. The intent of this change is to produce more consistency in the results.

At this point in time no mid-term modification is planned for this program.
<table>
<thead>
<tr>
<th><strong>Low Income 1 to 4 Family Retrofit</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose / Goal of Program</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers, And Definition Of Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
</tr>
<tr>
<td><strong>Significant Differences In Actual Program Design From Approved Program Design</strong></td>
</tr>
<tr>
<td><strong>Docket Number And Exhibit Where Program Is Discussed And Approved</strong></td>
</tr>
</tbody>
</table>
Table II.B.5: Low Income 1-4 Family Retrofit

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>10,866,884</td>
<td>7,445,762</td>
<td>-26%</td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>471,817</td>
<td>3,669</td>
<td>-15%</td>
</tr>
<tr>
<td>Participants</td>
<td>Hholds</td>
<td>4,310</td>
<td>2,340</td>
<td></td>
</tr>
<tr>
<td>Program Cost / Participant</td>
<td>$</td>
<td>2,340</td>
<td>2,029</td>
<td>-13%</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>MWh</td>
<td>46,708</td>
<td>54,597</td>
<td>17%</td>
</tr>
<tr>
<td>Annualized</td>
<td>MWh</td>
<td>4,523</td>
<td>4,102</td>
<td>-9%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>10</td>
<td>13</td>
<td>29%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>kW</td>
<td>4,667</td>
<td>6,113</td>
<td>31%</td>
</tr>
<tr>
<td>Annualized</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td>kW</td>
<td>441</td>
<td>439</td>
<td>-1%</td>
</tr>
<tr>
<td>Winter</td>
<td>kW</td>
<td>1,083</td>
<td>797</td>
<td>-26%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>11</td>
<td>14</td>
<td>29%</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>15,271,349</td>
<td>18,385,721</td>
<td>20%</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>20,263,912</td>
<td>24,446,525</td>
<td>21%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>10,558,701</td>
<td>8,302,637</td>
<td>21%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>9,705,211</td>
<td>16,143,888</td>
<td>66%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>1.92</td>
<td>2.94</td>
<td>53%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings are 17% more than planned results. The primary reason for this variation is changes in the mix of measures installed.

Evaluated savings are the same as preliminary year-end estimates.

Year-end program costs were 26% less than planned costs. This was primarily due to the lower number of participants than planned likely resulting from competition from ARRA funded programs which had to spend their monies by year-end.

The following EM&V studies included in the Annual Report apply to this program:

*Massachusetts 2010 Residential Retrofit and Low Income Evaluation - Low Income*: The 2010 process evaluation focused on assessing program processes and identifying similarities and differences between the perspectives and assumptions of program staff, implementation staff, and customers regarding program goals, design, and implementation. The evaluation team also reviewed the process by which program data are collected, managed, and reported, including an assessment of the quality and consistency of the program data across PAs. The study is discussed in more detail in Section II.C.

The Company is still reviewing program performance and the results of the described evaluations to determine what, if any, changes to the program design or implementation may result in future years.

Similarly, it has not been determined whether any resulting changes would result in a 2012 mid-term modification.
## Low Income Multifamily Retrofit

<table>
<thead>
<tr>
<th>Purpose / Goal of Program</th>
<th>The purpose of the Low-Income Multi-Family Retrofit program was to deliver energy efficient products and services directly to the dwellings of: 1) residential customers living in facilities (with five or more units) on the low-income rate or 2) eligible income-eligible residents living in multi-family non-institutional facilities (with five or more units) owned or operated by a non-profit entity or a public housing authority.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targeted Customers, And Definition Of Program Participants</td>
<td>Residential customers on the low-income rate or individuals living in non-institutional dwellings owned or operated by non-profit entities or public housing authorities with five or more units who are at 60 percent of median income level as well as landlords and property managers of these buildings were targeted by this program.</td>
</tr>
<tr>
<td>Targeted End-Uses</td>
<td>The following gas and electric end uses in both dwelling units and common areas were targeted under the program through a comprehensive, whole building audit approach: building shell, heating and cooling, domestic water heating, HVAC and other mechanical systems and controls; lighting and appliances; general waste heat; and all other cost-effective site-specific end uses that impact gas and electric consumption.</td>
</tr>
<tr>
<td>Delivery Mechanism</td>
<td>The program was administered cooperatively by the gas and electric Program Administrators in conjunction with interested stakeholders.</td>
</tr>
<tr>
<td>Significant Differences In Actual Program Design From Approved Program Design</td>
<td>There were no significant differences in actual program design from the approved program design.</td>
</tr>
<tr>
<td>Docket Number And Exhibit Where Program Is Discussed And Approved</td>
<td>D.P.U. 09-116, Exhibit NG-1.</td>
</tr>
</tbody>
</table>
### Table II.B.6: Low Income Multifamily Retrofit

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>6,752,716</td>
<td>2,828,533</td>
<td>-58%</td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>620,935</td>
<td>253,345</td>
<td>-59%</td>
</tr>
<tr>
<td>Participants</td>
<td>Units</td>
<td>7,200</td>
<td>3,172</td>
<td>-56%</td>
</tr>
<tr>
<td>Program Cost / Participant</td>
<td>$</td>
<td>938</td>
<td>892</td>
<td>-5%</td>
</tr>
<tr>
<td><strong>Savings &amp; Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td></td>
<td>126,656</td>
<td>38,305</td>
<td>-70%</td>
</tr>
<tr>
<td>Annualized MWh</td>
<td></td>
<td>7,655</td>
<td>2,239</td>
<td>-71%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>17</td>
<td>17</td>
<td>0%</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime kW</td>
<td></td>
<td>11,719</td>
<td>4,005</td>
<td>-66%</td>
</tr>
<tr>
<td>Annualized Summer kW</td>
<td>kW</td>
<td>767</td>
<td>231</td>
<td>-70%</td>
</tr>
<tr>
<td>Winter kW</td>
<td>kW</td>
<td>1,980</td>
<td>437</td>
<td>-78%</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>15</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>8,772,858</td>
<td>3,689,220</td>
<td>-58%</td>
</tr>
<tr>
<td><strong>Cost-Effectiveness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>21,335,105</td>
<td>7,767,902</td>
<td>-64%</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>7,373,651</td>
<td>3,091,139</td>
<td>-58%</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>13,961,454</td>
<td>4,676,763</td>
<td>-67%</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>2.89</td>
<td>2.51</td>
<td>-13%</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings are 70% less than planned results. Electric savings activity lagged far behind the goals, as many low income multi family facilities already received energy savings installations in previous years. National Grid and LEAN continue to work together on ways to be aggressive in how to better capture electric savings in 2011 and beyond. Most of the savings realized in this program were seen on the gas side, with weatherization and new heating systems installed.

Evaluated savings are the same as preliminary year-end estimates.

There were no evaluation studies completed for this program.

The Company is still reviewing program performance and the results of the described evaluations to determine what, if any, changes to the program design or implementation may result in future years.

Similarly, it has not been determined whether any resulting changes would result in a 2012 mid-term modification.
C. Commercial & Industrial Sector Programs

1. Summary

During 2010 the Company implemented the following Commercial and Industrial ("C&I") programs and C&I pilots:

C&I Programs:
- C&I New Construction and Major Renovation
- C&I Large Retrofit
- C&I Small Retrofit

C&I Pilot Programs:
- Community-Based Pilot

Tables II.C.1 through II.C.3 provide summary information on the performance of the C&I programs at the sector, end use, and program levels, respectively, while sections II.C.2 and II.C.3 provide detailed information on the performance of each C&I program and pilot program.
### C&I Program Implementation

#### Sector Summary

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
<th>% Change from Planned</th>
<th>% Change from Preliminary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
<td>Value</td>
<td>% Change from Planned</td>
<td></td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>61,956,884</td>
<td>-13%</td>
<td>53,903,937</td>
<td>-13%</td>
<td></td>
</tr>
<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>4,541,448</td>
<td>-3%</td>
<td>4,382,717</td>
<td>-3%</td>
<td></td>
</tr>
<tr>
<td><strong>Savings &amp; Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>MWh</td>
<td>2,462,639</td>
<td>-7%</td>
<td>2,402,698</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Annualized</td>
<td>MWh</td>
<td>191,833</td>
<td>-5%</td>
<td>190,072</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>kW</td>
<td>438,594</td>
<td>-14%</td>
<td>387,041</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Annualized</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td>kW</td>
<td>33,635</td>
<td>-11%</td>
<td>30,374</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>kW</td>
<td>23,511</td>
<td>5%</td>
<td>24,858</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>8,064,162</td>
<td>-328%</td>
<td>(18,388,447)</td>
<td>-4%</td>
<td></td>
</tr>
<tr>
<td><strong>Cost-Effectiveness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>310,046,388</td>
<td>-10%</td>
<td>279,036,690</td>
<td>-10%</td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>101,326,121</td>
<td>-24%</td>
<td>76,868,864</td>
<td>-24%</td>
<td></td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>208,720,266</td>
<td>-3%</td>
<td>202,167,826</td>
<td>-3%</td>
<td></td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>3.06</td>
<td>19%</td>
<td>3.63</td>
<td>19%</td>
<td></td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.
<table>
<thead>
<tr>
<th>End Uses</th>
<th>Units (Lifetime)</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
<th>% Change from Preliminary to Evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lighting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy MWh</td>
<td>1,302,045</td>
<td>1,340,671</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Demand kW</td>
<td>263,739</td>
<td>269,453</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>NEB $</td>
<td>(8,911,380)</td>
<td>(9,333,789)</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td><strong>HVAC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy MWh</td>
<td>469,160</td>
<td>502,730</td>
<td>7%</td>
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</tr>
<tr>
<td>Demand kW</td>
<td>52,304</td>
<td>52,254</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>NEB $</td>
<td>(9,476,846)</td>
<td>(8,445,532)</td>
<td>-11%</td>
<td></td>
</tr>
<tr>
<td><strong>Motors and Drives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy MWh</td>
<td>214,690</td>
<td>245,677</td>
<td>14%</td>
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<tr>
<td>Demand kW</td>
<td>26,690</td>
<td>29,604</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>NEB $</td>
<td>-</td>
<td>-</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td><strong>Refrigeration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy MWh</td>
<td>51,541</td>
<td>49,792</td>
<td>-3%</td>
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<tr>
<td>Demand kW</td>
<td>5,918</td>
<td>5,802</td>
<td>-2%</td>
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</tr>
<tr>
<td>NEB $</td>
<td>-</td>
<td>-</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td></td>
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<tr>
<td>Energy MWh</td>
<td>231,726</td>
<td>235,358</td>
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<tr>
<td>Demand kW</td>
<td>25,092</td>
<td>25,304</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>NEB $</td>
<td>-</td>
<td>(221)</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td><strong>End Use Behavior</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy MWh</td>
<td>3</td>
<td>3</td>
<td>-3%</td>
<td></td>
</tr>
<tr>
<td>Demand kW</td>
<td>-</td>
<td>-</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>NEB $</td>
<td>-</td>
<td>-</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td><strong>Compressed Air</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy MWh</td>
<td>32,072</td>
<td>28,467</td>
<td>-11%</td>
<td></td>
</tr>
<tr>
<td>Demand kW</td>
<td>5,215</td>
<td>4,624</td>
<td>-11%</td>
<td></td>
</tr>
<tr>
<td>NEB $</td>
<td>-</td>
<td>-</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy MWh</td>
<td>2,301,250</td>
<td>2,402,698</td>
<td>4%</td>
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<tr>
<td>Demand kW</td>
<td>378,957</td>
<td>387,041</td>
<td>2%</td>
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</tr>
<tr>
<td>NEB $</td>
<td>(18,388,447)</td>
<td>(17,561,553)</td>
<td>-4%</td>
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</table>
### Table II.C.3 C&I Program Summary

<table>
<thead>
<tr>
<th>Program / Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Evaluated Results</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
</tr>
<tr>
<td><strong>C&amp;I New Construction &amp; Major Renovation</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>69,469,106</td>
<td>44,031,842</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>18,188,985</td>
<td>11,492,334</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>51,280,121</td>
<td>32,539,508</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>3.82</td>
<td>3.83</td>
</tr>
<tr>
<td><strong>C&amp;I Large Retrofit</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>206,614,242</td>
<td>196,339,522</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>68,420,270</td>
<td>52,861,250</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>138,193,972</td>
<td>143,478,272</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>3.02</td>
<td>3.71</td>
</tr>
<tr>
<td><strong>C&amp;I Small Retrofit</strong></td>
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<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>33,963,039</td>
<td>38,665,326</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>12,803,829</td>
<td>11,816,452</td>
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<tr>
<td>Net Benefits</td>
<td>$</td>
<td>21,159,210</td>
<td>26,848,875</td>
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<td>BCR</td>
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<td>2.65</td>
<td>3.27</td>
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<tr>
<td><strong>Community Based Pilot</strong></td>
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</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>118,250</td>
<td>-</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Hard-to-Measure Initiatives</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>1,794,788</td>
<td>698,829</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>310,046,388</td>
<td>279,036,690</td>
</tr>
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<td>TRC Costs</td>
<td>$</td>
<td>101,326,121</td>
<td>76,868,864</td>
</tr>
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<td>Net Benefits</td>
<td>$</td>
<td>208,720,266</td>
<td>202,167,826</td>
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<tr>
<td>BCR</td>
<td>n/a</td>
<td>3.06</td>
<td>3.63</td>
</tr>
</tbody>
</table>

**Note:** The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

During 2010, the Company built upon existing C&I programs. Selected highlights are presented below:

- Combined Heat & Power: Implementation of the CHP program began in 2010. Many meetings and educational seminars were jointly conducted with other PAs, DOER, NECHPI to familiarize various stakeholders such as equipment vendors, C&I customers, engineers who provide technical assistance and perform feasibility studies, etc. with program requirements and processes for incentive application approval. In 2010 fifteen CHP projects were approved for incentives. These projects ranged from 5550 kW to 60 kW in size.
• **Codes and Standards Initiative:** Starting in September 2010, the C&I Management Committee took initial steps to establish a State-wide Codes and Standards (C&S) Initiative. This initiative will consist of program activities geared towards compliance and enhancement of building codes and equipment/appliance standards. The remainder of the year was spent researching needs and starting the program planning process.

• **Large Customer Based Initiative:** National Grid spent the last quarter of 2010 to establish parameters of an initiative that will target our top quartile customers for deeper energy savings through a portfolio level energy planning strategy. Through a multi-year MOU, this initiative will provide customers to plan long-term energy efficiency opportunities that map more closely to their budgeting process. This planning will make it possible to address the technical, financial and operational barriers customers face in trying to go “deeper and broader” into their energy reduction footprint.

• **Deep Energy Savings:** In 2010 National Grid delivered several programs to achieve deep energy savings in New Construction and Retrofit projects. In new construction, National Grid’s Advanced Building Core Performance program offers comprehensive prescriptive gas and electric energy savings without the cost of an energy model. In 2010 participants included college buildings, K-12 schools, banks, community centers and fire stations. In retrofit, National Grid offered enhanced incentives for projects that would result in greater than 15% gas and electric savings. In 2010, participants included water treatment plants, manufacturing plants, lab research buildings, office buildings, colleges, K-12 schools, and small retail customers.

• **Whole Building Assessment Initiative:** Early program refinements, marketing efforts, and support from the field helped Whole Building Assessment (“WBA”) serve more customers in 2010 and again contribute to the combined metric. A system for tracking projects implemented by WBA customers over time is in development. In addition, WBA staff led a Joint PA working group to develop a statewide whole building program. Mid-year, WBA initiated a joint working group consisting of the PAs and DOER to develop a process and serve municipalities enrolled in the state’s Energy Audit Program. We anticipate completing that effort by year-end 2011. WBA worked on two pilots - one focused on building occupant education (“See the Light”) and the other on serving the grocery sector, and partnered with the DOER to serve Merrimack Valley Chamber of Commerce members. The initiative achieved recognition for ENERGY STAR “Sustainable Excellence” at the ACEEE MT Symposium.
## 2. **C&I Programs**

<table>
<thead>
<tr>
<th>C&amp;I Lost Opportunity Program (New Construction &amp; Major Renovation)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose / Goal of Program</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers, And Definition Of Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
</tr>
<tr>
<td><strong>Significant Differences In Actual Program Design From Approved Program Design</strong></td>
</tr>
<tr>
<td><strong>Docket Number And Exhibit Where Program Is Discussed And Approved</strong></td>
</tr>
</tbody>
</table>
### Table II.C.4: C&I New Construction & Major Renovation

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
<td>Value</td>
<td>% Change from Preliminary</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>14,357,154</td>
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<td>9,994,027</td>
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<tr>
<td>Performance Incentive</td>
<td>$</td>
<td>1,062,132</td>
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<td>697,730</td>
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<td>Participants</td>
<td>Accounts</td>
<td>682</td>
<td></td>
<td>365</td>
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<tr>
<td>Program Cost / Participant</td>
<td>$</td>
<td>21,052</td>
<td></td>
<td>27,381</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
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<td></td>
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</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>MWh</td>
<td>555,205</td>
<td>282,813</td>
<td>364,067</td>
</tr>
<tr>
<td>Annualized</td>
<td>MWh</td>
<td>36,291</td>
<td>19,019</td>
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<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>kW</td>
<td>129,211</td>
<td>60,944</td>
<td>70,331</td>
</tr>
<tr>
<td>Annualized</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td></td>
<td>8,509</td>
<td>4,112</td>
<td>4,732</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td>4,611</td>
<td>2,692</td>
<td>3,163</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>211,685</td>
<td>(609,507)</td>
<td>(839,407)</td>
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<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>69,469,106</td>
<td></td>
<td>44,031,842</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>18,188,985</td>
<td></td>
<td>11,492,334</td>
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<tr>
<td>Net Benefits</td>
<td>$</td>
<td>51,280,121</td>
<td></td>
<td>32,539,508</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>3.82</td>
<td></td>
<td>3.83</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings are 49% less than planned results. Economic conditions in 2010 continued to dampen new construction activity, resulting in lower spending and savings being realized during the 2010 program year than originally planned.

Evaluated savings increased 29% from preliminary year-end estimates. This increase is due to the combined affects of the results of impact evaluations described below.

The following EM&V studies included in the Annual Report apply to this program:

**Impact Evaluation of 2008 and 2009 Custom CDA Installations:** This study evaluated the realization rates for annual kWh, summer on-peak kW and winter on-peak kW reductions for those Custom projects in the Comprehensive end-use category. The net effect of this study is to decrease demand savings for this program. There is no effect on energy savings as the resulting realization rate on energy equaled the realization rate from our previous studies. Please refer to section III.D for more information.

**C&I Unitary HVAC Load Shape Project:** This study evaluated the equivalent full load cooling hours used to estimate annual energy savings for unitary HVAC equipment. The net effect of this study is to increase energy savings and decrease demand savings for this program. Please refer to section III.D for additional information.

**Impact Evaluation of 2009 Custom HVAC Installations:** This study evaluated the realization rates for annual kWh, summer on-peak kW and winter on-peak kW reductions for those Custom projects in the HVAC end-use category. The net effect of this study is to increase both energy and demand savings for this program. Please refer to section III.D for additional information.
National Grid, NSTAR, Western Massachusetts Electric Company, Unitil, and Cape Light Compact 2010 Commercial and Industrial Electric Programs Free-ridership and Spillover Study: This study evaluated the free-ridership and spillover rates for all customers participating in the C&I energy efficiency programs. Rates are determined for each of the following end-use categories in the Large C&I Retrofit program: Custom, HVAC, Lighting, Variable Speed Drives and Compressed Air. The results of this study vary for each end-use category within the program. The net affect of these results is to increase program savings. Please refer to section III.D for additional information.

HBL Market Effects Study Project 1A New Construction Market Characterization - Massachusetts Energy Efficiency Programs’ Large Commercial & Industrial Evaluation: This study estimated the energy savings associated with the changes to a high bay lighting market in Massachusetts and assessed the attribution of these changes (i.e. market effects) to the Program Administrators’ energy efficiency programs. The net effect of this study is to increase both energy and demand savings for this program. Please refer to section III.D for additional information.

The Company is still reviewing program performance and the results of the described evaluations to determine what, if any, changes to the program design or implementation may result in future years.

Similarly, it has not been determined whether any resulting changes would result in a 2012 mid-term modification.
<table>
<thead>
<tr>
<th><strong>C&amp;I Large Retrofit</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose / Goal of Program</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers, And Definition Of Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
</tr>
<tr>
<td><strong>Significant Differences In Actual Program Design From Approved Program Design</strong></td>
</tr>
<tr>
<td><strong>Docket Number And Exhibit Where Program Is Discussed And Approved</strong></td>
</tr>
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</table>
Table II.C.5: C&I Large Retrofit

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
<td>Value</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
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<td></td>
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<td>Total Program Costs</td>
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<td>34,376,765</td>
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<td>3,092,379</td>
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<td>Participants</td>
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<td>Program Cost / Participant</td>
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</tr>
<tr>
<td>Energy</td>
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<td></td>
<td></td>
<td></td>
</tr>
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</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Lifetime</td>
<td>kW</td>
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</tr>
<tr>
<td>Annualized</td>
<td>kW</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Summer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
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<td></td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
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<td>12</td>
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</tr>
<tr>
<td>NEB (Lifetime)</td>
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<td>Cost-Effectiveness</td>
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</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>206,614,242</td>
<td></td>
<td>196,339,522</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>68,420,270</td>
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<td>52,861,250</td>
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<tr>
<td>Net Benefits</td>
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<td>138,193,972</td>
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<td>143,478,272</td>
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<td>3.02</td>
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<td>3.71</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings are 3% greater than planned results.

Evaluated savings increased 0.15% from preliminary year-end estimates. This increase is due to the combined affects of the results of impact evaluations described below.

The following EM&V studies included in the Annual Report apply to this program:

*Impact Evaluation of 2008 and 2009 Custom CDA Installations:* This study evaluated the realization rates for annual kWh, summer on-peak kW and winter on-peak kW reductions for those Custom projects in the Comprehensive end-use category. The net effect of this study is to decrease demand savings for this program. There is no effect on energy savings as the resulting realization rate on energy equaled the realization rate from our previous studies. Please refer to section III.D for additional information.

*Impact Evaluation of 2009 Custom HVAC Installations:* This study evaluated the realization rates for annual kWh, summer on-peak kW and winter on-peak kW reductions for those Custom projects in the HVAC end-use category. The net effect of this study is to increase both energy and demand savings for this program. Please refer to section III.D for additional information.

*National Grid, NSTAR, Western Massachusetts Electric Company, Unitil, and Cape Light Compact 2010 Commercial and Industrial Electric Programs Free-ridership and Spillover Study:* This study evaluated the free-ridership and spillover rates for all customers participating in the C&I energy efficiency programs. Rates are determined for each of the following end-use categories in the Large C&I Retrofit program: Custom, HVAC, Lighting, Variable Speed Drives and Compressed Air. The results of this study...
vary for each end-use category within the program. The net affect of these results is to decrease program savings. Please refer to section III.D for additional information.

**HBL Market Effects Study Project IA New Construction Market Characterization - Massachusetts Energy Efficiency Programs’ Large Commercial & Industrial Evaluation:** This study estimated the energy savings associated with the changes to a high bay lighting market in Massachusetts and assessed the attribution of these changes (i.e. market effects) to the Program Administrators’ energy efficiency programs. The net effect of this study is to increase both energy and demand savings for this program. Please refer to section III.D for additional information.

**C&I Lighting Load Shape Project:** This was a regional study facilitated by the NEEP EM&V Forum building upon a 2007 study done for the New England State Program Working Group to develop C&I lighting load shapes and coincidence. The net effect of this study was to slightly increase both summer and winter demand savings as the summer coincidence factor from this report was approximately 1% higher than the previous value and the winter coincidence factor was approximately 8% higher than the previous value. Please refer to section III.D for additional information.

The Company is still reviewing program performance and the results of the described evaluations to determine what, if any, changes to the program design or implementation may result in future years.

Similarly, it has not been determined whether any resulting changes would result in a 2012 mid-term modification.
<table>
<thead>
<tr>
<th><strong>C&amp;I Small Retrofit</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose / Goal of Program</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers, And Definition Of Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
</tr>
<tr>
<td><strong>Significant Differences In Actual Program Design From Approved Program Design</strong></td>
</tr>
<tr>
<td><strong>Docket Number And Exhibit Where Program Is Discussed And Approved</strong></td>
</tr>
<tr>
<td>Performance Category</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Expenses</strong></td>
</tr>
<tr>
<td>Total Program Costs</td>
</tr>
<tr>
<td>Performance Incentive</td>
</tr>
<tr>
<td>Participants Accounts</td>
</tr>
<tr>
<td>Program Cost / Participant</td>
</tr>
<tr>
<td><strong>Savings &amp; Benefits</strong></td>
</tr>
<tr>
<td>Energy</td>
</tr>
<tr>
<td>Lifetime</td>
</tr>
<tr>
<td>Annualized</td>
</tr>
<tr>
<td>Average Measure Life</td>
</tr>
<tr>
<td>Demand</td>
</tr>
<tr>
<td>Lifetime</td>
</tr>
<tr>
<td>Annualized</td>
</tr>
<tr>
<td>Average Measure Life</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
</tr>
<tr>
<td><strong>Cost-Effectiveness</strong></td>
</tr>
<tr>
<td>TRC Benefits</td>
</tr>
<tr>
<td>TRC Costs</td>
</tr>
<tr>
<td>Net Benefits</td>
</tr>
<tr>
<td>BCR</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

Preliminary year-end savings were greater than planned because the Company implemented new material and labor pricing in 2010 through a competitive bid process which reduced material costs. These efforts resulted in the Program being able to deliver greater savings for lower cost relative to what was originally forecasted.

Evaluated savings increased 6% for energy and less than 1% for summer demand from preliminary year-end estimates. The 6% increase in energy savings is mainly due to the increase in the energy realization rate for non-controlled lighting measures.

The following EM&V studies included in the Annual Report apply to this program:

2010 C&I Free-Ridership and Spillover Study: This study evaluated the free-ridership and spillover rates for all customers participating in the C&I energy efficiency programs. For the Small C&I Retrofit program two rates are determined, one for lighting measures and one for all other measures. The net effect of these results is negligible as there is virtually no change from previous free-ridership and spillover rates when both are applied together. This study is discussed in more detail in section III.D.

Non-Controls Lighting Evaluation for the Massachusetts Small Commercial Direct Install program: This study derived energy realization rates, demand realization rates and coincidence factors. The net affect of this study increased energy savings as the energy realization rate was higher than the previous estimate. This study is discussed in more detail in section III.D.

NEEP EM&V C&I Lighting Load Shape Project: This was a regional study facilitated by the NEEP EM&V Forum building upon a 2007 study done for the New England State Program Working Group to develop C&I lighting load shapes and coincidence factors.
The net effect of this study was to slightly decrease peak demand savings as the summer coincidence factor from this report was approximately 1% lower than the previous value. This study is discussed in more detail in section III.D.

It is not expected that the program performance in 2010 or the results of the described evaluations will result in significant changes to the program design or implementation in future years.

Therefore, at this point in time, no mid-term modification is planned for this program.
3. **C&I Pilot Programs**

In its order approving the 2010-12 Energy Efficiency Plan, the Department directed the Program Administrators to provide further information regarding proposed 2011 and 2012 pilot budgets at the time the Program Administrators file their 2010 Annual Reports. The Company's budget for its 2011 electric pilots was included in its mid-term modification filing currently pending in Docket 10-148. The Company has not yet re-assessed its pilot budget for 2012.

<table>
<thead>
<tr>
<th>Community Based Pilot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Specific Activities The Pilot Program Was Intended To Study</strong></td>
</tr>
<tr>
<td><strong>Targeted Customers And Definition Of Pilot Program Participants</strong></td>
</tr>
<tr>
<td><strong>Targeted End-Uses</strong></td>
</tr>
<tr>
<td><strong>Delivery Mechanism</strong></td>
</tr>
<tr>
<td><strong>Any Significant Differences In Actual Pilot Program Design From Approved Pilot Program Design</strong></td>
</tr>
<tr>
<td><strong>How The Program Administrator Measured Achievement Of The Pilot Program’s Stated Goal</strong></td>
</tr>
<tr>
<td><strong>Identify the Department docket (and exhibit within the docket) where the pilot program is discussed and approved.</strong></td>
</tr>
</tbody>
</table>
## Table II.C.7: Community Based Pilot

<table>
<thead>
<tr>
<th>Performance Category</th>
<th>Units</th>
<th>Planned Value</th>
<th>Preliminary Year-End Results</th>
<th>Evaluated Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Value</td>
<td>% Change from Planned</td>
</tr>
<tr>
<td>Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Program Costs</td>
<td>$</td>
<td>118,250</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Participants</td>
<td>TBD</td>
<td>-</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td>Program Cost / Participant</td>
<td>$</td>
<td>-</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td>Savings &amp; Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>MWh</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Annualized</td>
<td>MWh</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime</td>
<td>kW</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Annualized</td>
<td>kW</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Summer</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Winter</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Average Measure Life</td>
<td>yrs</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>NEB (Lifetime)</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Cost-Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRC Benefits</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>TRC Costs</td>
<td>$</td>
<td>118,250</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Net Benefits</td>
<td>$</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>BCR</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.
Note: Participants in this pilot were also counted as participants in the MassSAVE program.

The CMI pilot was designed to include the Direct Install Program, but after the failure to achieve cost-effective pricing for direct install measures in both Chinatown and Chelsea, the decision was made to proceed in Lynn with a residential only gas pilot.
D. Hard to Measure Initiatives

The Hard to Measure initiatives, which are key components of the program such as marketing and education, do not lend themselves to direct allocations to specific savings estimates but do incur costs. The initiatives include:

- Low Income Energy Affordability Network
- Residential Education Program
- Heat Loan Program
- Workforce Development
- Statewide Marketing & Education
- EEAC Consultants
- DOEER Assessments
- Sponsorships and Subscriptions

The costs for these initiatives are located in Table II.A.3 for residential programs; Table II.B.3 for low-income programs and Table II.C.3 for Commercial and Industrial programs.
**III. EVALUATION MEASUREMENT AND VERIFICATION ACTIVITIES**

It should be noted that the Evaluation, Measurement and Verification Activities section is the same for both the electric and gas annual reports. Therefore information may be referenced in this section but not included in this report.

**A. Summary**

Table III.A summarizes the EM&V studies included in the Annual Report that have not been included in previous Annual Reports.

<table>
<thead>
<tr>
<th>Studies</th>
<th>Location of Complete Study in Annual Report</th>
<th>Docket &amp; Exhibit Approving Planned Evaluation Studies</th>
<th>Implemented as Approved? (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Program Studies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massachusetts New Homes with ENERGY STAR Estimated Maximum Potential Savings from Enhanced Code Compliance with the IECC 2009 Residential Building Code in Massachusetts</td>
<td>App. C, Study 1</td>
<td>All Studies are pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010); some studies were initiated prior to the MTM filing</td>
<td>All Studies are implemented as described in the as yet unapproved 2011 MTM (filed Oct. 2010)</td>
</tr>
<tr>
<td>Massachusetts New Homes with ENERGY STAR Mystery Shopping</td>
<td>App. C, Study 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Massachusetts New Homes with ENERGY STAR Program 2011 Baseline Phase 1: Completion of Planning</td>
<td>App. C, Study 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massachusetts 2010 Residential Retrofit and Low-Income Evaluation - Brushless Fan Motors</td>
<td>App. C, Study 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cross-Cutting Net-to-Gross Methodology Study for Residential Programs – Suggested Approaches (Final)</td>
<td>App. C, Study 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Net-To-Gross (NTG) Factors for the Massachusetts Program Administrators (PAs) 2010 Residential New Construction Programs, Residential High Efficiency Heating Equipment (HEHE) and</td>
<td>App. C, Study 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Family Gas Programs, and Commercial and Industrial Gas Programs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEHE Process and Impact Evaluation</td>
<td>App. C, Study 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Pilot Studies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massachusetts New Homes with ENERGY STAR Process Evaluation of the Four to Eight Story Multi-Family New Construction Pilot Interim Findings</td>
<td>App. C, Study 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Massachusetts New Homes with ENERGY STAR Program Version 3 Pilot Evaluation</td>
<td>App. C, Study 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massachusetts Cross-Cutting Behavioral Process Evaluation</td>
<td>App. C, Study 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-Income Program Studies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massachusetts 2010 Residential Retrofit and Low Income Evaluation: Low Income</td>
<td>App. C, Study 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial &amp; Industrial Program Studies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Controls Lighting Evaluation for the Massachusetts Small Commercial Direct Install Program</td>
<td>App. C, Study 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Report HBL Market Effects Study Project 1A New Construction Market Characterization</td>
<td>App. C, Study 21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Commercial New Construction Customer Quantitative Profile Project 1A New Construction Market Characterization</td>
<td>App. C, Study 22</td>
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<td></td>
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<tr>
<td>Supply Chain Profile Project 1A New Construction Market Characterization</td>
<td>App. C, Study 23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Report Project 1B Chain &amp; Franchise Market Characterization</td>
<td>App. C, Study 24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All Studies are pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010); some studies were initiated prior to the MTM filing. All Studies are implemented as described in the as yet unapproved 2011 MTM (filed Oct. 2010).
<table>
<thead>
<tr>
<th>Study Title</th>
<th>Report/App. Study</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Report Project 1C Combined Heat &amp; Power Market Characterization</td>
<td>App. C, Study 26</td>
<td>All Studies are pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010); some studies were initiated prior to the MTM filing</td>
</tr>
<tr>
<td>Project 6B Comprehensive Design Approach Process Evaluation</td>
<td>App. C, Study 27</td>
<td>All Studies are implemented as described in the as yet unapproved 2011 MTM (filed Oct. 2010)</td>
</tr>
<tr>
<td>Project 7 General Process Evaluation Final Report</td>
<td>App. C, Study 29</td>
<td></td>
</tr>
<tr>
<td>C&amp;I Lighting Measure Life and Persistence Project</td>
<td>App. C, Study 31</td>
<td></td>
</tr>
<tr>
<td>C&amp;I Lighting Loadshape Project</td>
<td>App. C, Study 32</td>
<td></td>
</tr>
<tr>
<td>C&amp;I Unitary HVAC Loadshape Project Final Report</td>
<td>App. C, Study 33</td>
<td></td>
</tr>
<tr>
<td>Cross Cutting C&amp;I Free Ridership and Spillover Methodology Study Final Report</td>
<td>App. C, Study 34</td>
<td></td>
</tr>
<tr>
<td>Prescriptive Condensing Boiler Impact Evaluation Project 5 Prescriptive Gas</td>
<td>App. C, Study 35</td>
<td></td>
</tr>
<tr>
<td>Special &amp; Cross Sector Studies</td>
<td></td>
<td>All Studies are pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010); some studies were initiated prior to the MTM filing</td>
</tr>
<tr>
<td>Community Based Partnership Interim Process Evaluation</td>
<td>App. C, Study 37</td>
<td></td>
</tr>
</tbody>
</table>
B. Residential Program Studies

1. Massachusetts New Homes with ENERGY STAR Estimated Maximum Potential Savings from Enhanced Code Compliance with the IECC 2009 Residential Building Code in Massachusetts (Study 1)

Type of Study: Other

Objective of the Study: The objective of this study was to estimate the maximum potential savings for the years 2011, 2012, and 2013 that may be achieved through promoting compliance with the newly-adopted International Energy Conservation Code (IECC) 2009 energy code for four measures (wall insulation, basement insulation, proper insulation of ducts in unconditioned spaces, and meeting the fifty percent high efficacy lamp requirement) in order to provide needed guidance to the PAs on the implementation and evaluation costs that may be justified. Compliance enhancement efforts would focus on PAs’ trainings of builders, subcontractors, and code officials as the potential savings presented in the report focus on homes that do not participate in the Massachusetts New Homes with ENERGY STAR Program.

Programs to which the Results of the Study Apply:
- Residential New Construction & Major Renovation (Electric & Gas)
- Low-Income Residential New Construction (Electric & Gas)

Recommendations Derived from the Study: There are no recommendations from this study as the main purpose was to derive potential savings from code enhancement efforts for the measures mentioned above.

How the Study Came to the Recommended Conclusions: Not Applicable.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why: Not Applicable.

A copy of the complete study can be found in Appendix C, Study 1.
Type of Study: Other

Objective of the Study: This report presents the findings of ten mystery shopping visits to ENERGY STAR homes conducted in the summer of 2010. The results presented provide insight into the current marketing strategies of real estate and sales agents listing ENERGY STAR homes, and the effect of program-sponsored trainings on these marketing strategies.

Programs to which the Results of the Study Apply:
- Residential New Construction & Major Renovation (Electric & Gas)
- Low-Income Residential New Construction (Electric & Gas)

Recommendations Derived from the Study:

<table>
<thead>
<tr>
<th></th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Continue Be a Star with ENERGY STAR trainings.</strong> There was a noticeable difference in the knowledge of agents who had attended the training compared to those who had not. The agents who had attended training seemed to understand and market more aspects of their ENERGY STAR listings, and generally spent more time discussing the energy efficiency features of the home.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Expand trainings to include builders.</strong> Builders are well versed in their homes’ specific energy efficiency measures and the benefits of those measures, but that knowledge often was not passed on to the developments’ sales representatives. Builders might benefit from training that provides guidance on how to train their own sales representatives to fully market the benefits of ENERGY STAR homes.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Focus a portion of trainings on the HERS index and HERS ratings.</strong> All ENERGY STAR homes are not created equal, and agents should take advantage of the increased marketability of homes with low HERS ratings.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Encourage agents to attend all of the inspection stages of an ENERGY STAR home.</strong> This will ensure that agents have a better understanding of both the components (e.g., insulation and duct work) of an ENERGY STAR home, and the thoroughness of the certification process. In addition, by attending the various inspection stages, agents are likely to gain a better understanding of the technical terms (e.g., blower door and duct blaster) that are associated with ENERGY STAR homes.</td>
</tr>
</tbody>
</table>
Encourage agents to walk through an ENERGY STAR brochure or fact sheet with potential homebuyers. This simple step will guide potential buyers through the benefits of ENERGY STAR qualified homes, providing technical reference where needed, and it will ensure that the major bullet points of ENERGY STAR homes are covered during every showing.

Encourage agents to build on consumers’ preexisting knowledge of ENERGY STAR for appliances and electronics, emphasizing the value of the ENERGY STAR brand name. Agents might have better success marketing these homes by emphasizing to buyers that the ENERGY STAR label for homes is just an extension of the ENERGY STAR label they already know and trust, found on appliances, heating and cooling equipment, lighting and electronic products in their homes.

How the Study Came to the Recommended Conclusions: Recommendations are based on findings from ten mystery shopping visits to ENERGY STAR homes, conducted in the summer of 2010. Four of the real estate and sales agents visited had recently attended a program-sponsored Be a Star with ENERGY STAR training session (these were the only attendees that had suitable homes for sale at the time of the visits). All ten agents visited were ranked on a scale of zero to ten, where zero was “not at all willing or knowledgeable” and ten was “extremely willing or knowledgeable” in the following four areas: knowledge of energy efficiency, knowledge of ENERGY STAR certification, willingness to use energy efficiency as a selling point, and willingness to use ENERGY STAR certification as a selling point.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why: All recommendations above have been adopted and are being incorporated into the program through continuation and enhancement of various training efforts.

A copy of the complete study can be found in Appendix C, Study 2.
3. The Massachusetts New Homes with ENERGY STAR Program 2011 Baseline Phase 1: Completion of Planning (Study 3)

**Type of Study:** Baseline

**Objective of the Study:** This report describes the planning process for the 2011 Baseline Study and the work done to develop a sample of eligible homes to recruit from; on-site inspections will be conducted in the summer of 2011. This study will include on-site inspections of 100 non-ENERGY STAR homes built to meet the new IECC 2009 code, which became mandatory in Massachusetts on July 1, 2010. The results of this study will be used to update the baseline or User Defined Reference Home used in calculating Program savings and to assess building code compliance at the beginning of a code cycle.

**Programs to which the Results of the Study Apply:**
- Residential New Construction & Major Renovation (Electric & Gas)
- Low-Income Residential New Construction (Electric & Gas)

**Recommendations Derived from the Study:** There are no recommendations from this study as the main purpose was to document the planning process of the Baseline study.

**How the Study Came to the Recommended Conclusions:** Not Applicable.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:** Not Applicable.

A copy of the complete study can be found in Appendix C, Study 3.
4. Massachusetts 2010 Residential Retrofit and Low-Income Evaluation - Brushless Fan Motors (Study 4)

**Type of Study:** Process

**Objective of the Study:** The report presents the results of the process evaluation of the Brushless Fan Motor (BFM) component of the 2010 Cool Smart program. The objectives of the study were to determine the following: program processes, implementation strengths, and areas for improvements; program tracking data sufficiency; contractor practices, perceptions, and participation barriers; customer behavior, motivations, awareness, and satisfaction; program outreach and recruitment efficacy; and participants’ potential changes in fan use, from pre- to post-installation.

**Programs to which the Results of the Study Apply:**
- Residential Cooling and Heating Equipment (Electric)

**Recommendations Derived from the Study:**

<table>
<thead>
<tr>
<th></th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Consider including a unique participation identifier (such as an ID number), BFM manufacturer and model numbers (which would prove helpful for verification purposes); and add a parameter to capture numbers of motors incented per home (which would help indicate if contractors are paid for more than two motors per home).</td>
</tr>
<tr>
<td>2</td>
<td>Explore options for making program participation more cost-effective for contractors. For example, consider allowing contractors to bill customers for parts or labor that exceed a “typical” installation.</td>
</tr>
</tbody>
</table>

**How the Study Came to the Recommended Conclusions:** The process evaluation of the BFM included: in-depth telephone interviews with program administrator and implementer staff; qualitative in-depth interviews with participating and nonparticipating (in the Cool Smart BFM program component) HVAC contractors; and surveys with participating customers. In addition to the primary data collection the study reviewed BFM program materials addressing marketing, implementation, and the participant database. Based on the information obtained, the evaluation team used its professional judgment and evaluation experience to offer recommendations aimed at improving program processes where appropriate.
**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To assist with future evaluation needs, the PAs will work with the implementation vendors and internal support groups to ensure that all appropriate data is collected. If the data is captured early on this could potentially minimize data requests and on-site visits to customer homes.</td>
</tr>
<tr>
<td>2</td>
<td>The PAs, together with the implementation vendor and other trade allies, including HVAC distributors, will explore market opportunities and implementation strategies to enhance contractor participation.</td>
</tr>
</tbody>
</table>

A copy of the complete study can be found in Appendix C, Study 4.
5. Massachusetts 2010 Residential Retrofit and Low Income Evaluation: MassSAVE (Study 5)

Type of Study: Process

Objective of the Study: For the 2010 process evaluation, the evaluation team focused on assessing program processes and identifying similarities and differences between the perspectives and assumptions of program staff, implementation staff, and customers regarding program goals, design, and implementation. The evaluation team also reviewed the process by which program data are collected, managed, and reported, including an assessment of the quality and consistency of the program data across PAs.

Programs to which the Results of the Study Apply:
- MassSAVE (Electric & Gas)

Recommendations Derived from the Study:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Due to concerns among all stakeholders, the potential integration of Home Performance Contractors (HPCs) should occur slowly and in collaboration with PAs, vendors, and program contractors. Clear protocols for and expectations regarding program delivery by HPCs should be developed and disseminated.</td>
</tr>
<tr>
<td>2</td>
<td>Consider developing a standard set of tasks and responsibilities assigned to contractors installing measures in a customer’s home, uniform across all PA territories. These would include how jobs are presented to contractors, contractors’ responsibilities, and reports and invoices contractors are expected to submit to vendors upon completion of jobs.</td>
</tr>
<tr>
<td>3</td>
<td>Explore opportunities to assist customers in addressing health and safety issues, as well as knob and tube wiring removal, to further eliminate barriers and improve participation rates. The Evaluation team suggests expanding the existing financing options to cover these critical pre-participation issues.</td>
</tr>
<tr>
<td>4</td>
<td>Develop a standardized identification system for participants, premises, projects, and measures. The consistent use of customer and premise identification associated with the tracking record will allow tracking of historic program activity and activity in other programs. Ensure a minimum set of fields is collected and maintained for future evaluation work. Maintain a data dictionary for all critical program datasets that includes all field definitions, value definitions, and the sources of the data. The data dictionaries should be provided as part of all data requests, allowing evaluators (or any other third-party) to decode field names and data values efficiently. The data dictionaries would also ensure internal knowledge of the database is not lost in</td>
</tr>
</tbody>
</table>
the event of critical personnel turnover.

Develop and employ a standardized measure naming convention. The Technical Reference Manual (TRM) could be used as the basis for standard names. This convention would allow for improved evaluation and add transparency to the measure-tracking process. The evaluation team specifically recommends a four-part measure naming convention, which includes varying levels of detail for each program stakeholder, denoting the measure’s end-use, group, type, and detail. Such a measure naming convention would clearly relate each measure in the program tracking data to its TRM counterpart.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Revisit customer service and follow-up strategies. Although all vendors reported use of a rigorous follow-up procedure, and vendors ensure customer support is readily available when customers call, additional customer service in the form of outreach, regular check-ins, and follow-up phone calls could improve participation and satisfaction.</td>
</tr>
<tr>
<td>6</td>
<td>Consider offering incentives to auditors based on implementation percentages or another participation goal designed to increase follow-through participation.</td>
</tr>
</tbody>
</table>

**How the Study Came to the Recommended Conclusions:** The program evaluation included PA program manager interviews, program vendor staff interviews, program contractor interviews, PA data manager interviews, a data review, and participant interviews. Based on information obtained from these stakeholders, the evaluation team used its professional judgment and experience evaluating energy efficiency programs to offer recommendations aimed at improving program processes where appropriate.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The integration of HPCs began with a small pilot in 2010. In 2011, the introduction of additional HPCs is being rolled out using information gained from the 2010 pilot. Clear energy assessment, software use and reporting guidelines are in place.</td>
</tr>
<tr>
<td>2</td>
<td>The PAs have developed consistent statewide material and installation standards, as well as, Energy Assessment standards.</td>
</tr>
<tr>
<td>3</td>
<td>The PAs are also exploring the opportunity to expand financing to include the mitigation of health and safety barriers. This will require regulatory approval and will be addressed using proper regulatory avenues.</td>
</tr>
<tr>
<td>4</td>
<td>The PAs are working with the evaluation team to ensure they are better able to aggregate and/or compare measure savings in the future, where possible.</td>
</tr>
<tr>
<td>5</td>
<td>The PAs are developing concrete follow up strategies to ensure constant follow up communication with customers. Many PA lead vendors have already established follow up protocols.</td>
</tr>
</tbody>
</table>
The Company currently offers incentives to auditors. CSG auditors are compensated based on performance and the Company intends on providing a customer acquisition marketing bonus to independent installation contractors and HPCs who solicit a customer and facilitate a completed weatherization job.

A copy of the complete study can be found in Appendix C, Study 5.
6. 2010 Net to Gross Findings: Home Energy Assessment (Study 6)

**Type of Study:** Impact

**Objective of the Study:** The objective of the study was to develop Net-to-Gross (NTG) estimates for the Home Energy Services program at the measure level. The Home Energy Services program incorporates both MassSAVE and the gas Weatherization programs. The research was designed to include freeridership, participant spillover and non-participant spillover in the analysis.

**Programs to which the Results of the Study Apply:**
- MassSAVE (Electric & Gas)
- Weatherization (Gas)

**Results of the Study and How the Study Determined those Results:** The following table presents NTG findings, by measure and overall, for the 2010 Home Energy Services program.

<table>
<thead>
<tr>
<th>Measure Category</th>
<th>Measure</th>
<th>Participant Free-ridership</th>
<th>Participant Spillover</th>
<th>Non-participant Spillover</th>
<th>NTG</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFL Direct Installs</td>
<td>CFL</td>
<td>22%</td>
<td>19%</td>
<td>0%</td>
<td>97%</td>
</tr>
<tr>
<td>Direct Installs</td>
<td>Air Leak Sealing</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
<td>93%</td>
</tr>
<tr>
<td></td>
<td>Programmable Thermostat</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
<td>89%</td>
</tr>
<tr>
<td>Incented Measures</td>
<td>Heating System</td>
<td>28%</td>
<td>0%</td>
<td>0%</td>
<td>72%</td>
</tr>
<tr>
<td></td>
<td>Insulation</td>
<td>20%</td>
<td>8%</td>
<td>50%</td>
<td>138%</td>
</tr>
<tr>
<td></td>
<td>Refrigerator</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>Water Heater</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
<td>75%</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td><strong>18%</strong></td>
<td><strong>7%</strong></td>
<td><strong>23%</strong></td>
<td><strong>112%</strong></td>
</tr>
</tbody>
</table>

89
The 2010 Home Energy Services program NTG estimates are based on three combined approaches:

**Customer Self-Reports.** Customer self-reported Free Rider (FR) and Participant Spillover (SP) through surveys of 2010 RCS (electric) and gas Weatherization participants. As shown above, this analysis considered all program measures. A survey of 1,200 electric and 400 gas participants informed the analysis.

**Statistical Market Share Modeling.** Discrete choice modeling of FR and Non Participant Spillover (NPS) used 400 gas Weatherization participant and 400 nonparticipant surveys. This analysis did not include the 1,200 electric participants surveyed in fall 2010, as the questionnaire used was not designed for these models. The 2010 NTG analysis also focused on insulation and duct sealing/duct insulation (collectively referred to as insulation), the most important measures in terms of savings.

**Trade Ally Research.** Interviews with more than 30 insulation contractors focused on participant and nonparticipant insulation installations, and attribution of self-reported nonparticipant jobs as spillover.

Final participant FR, PS, NPS, and NTG values are composite estimates (rather than a simple average) of the various research methods employed. The estimates were developed using a triangulation process, incorporating the evaluation teams’ experience, professional judgment, and understanding of the programs.

**How the Results of the Study Impact each Identified Program’s Savings:** Please see Table II.A.7.


**If the Results of the Study are Not Adopted, Fully Explain Why:** The results of the study are adopted.

A copy of the complete study can be found in Appendix C, Study 6.
7. Non-Electric Impact (NEI) Findings for the 2010 MassSAVE Home Energy Services (MassSAVE) program (Study 7)

Type of Study: Impact

Objective of the Study: The study summarized the evaluation teams’ review of the non-electric impacts (NEIs) claimed by the PAs for the 2011 MassSAVE Home Energy Services (MassSAVE) program. For the purpose of this study, NEIs were defined as program-driven effects on the consumption of energy other than electricity, such as natural gas (not claimed by a gas PA), water, fuel oil and propane. The evaluation contractor’s review consisted of determining the source of the current NEI values and independently estimating measure-specific NEIs, using the best available PA program data and secondary sources to assess the reasonableness of the current values.

This report complies with the directive from the Department in its approval of the 2010-12 Energy Efficiency Plan. In its order, the Department directed the Program Administrators to develop updated and fully documented assumptions regarding the savings from heating oil efficiency measures in time for inclusion in their 2010 Annual Reports.

Programs to which the Results of the Study Apply:

- MassSAVE (Electric Only)

Results of the Study and How the Study Determined those Results: The review consisted of determining the source of the current NEI values and independently estimating measure-specific NEIs, using the best available PA program data and secondary sources to assess the reasonableness of the current values. It was determined that the current PA NEI values were generated based on summaries of audit tool outputs for each program home. These values were driven by inputs from MassSave vendors regarding home characteristics for participants realizing NEIs. These are primarily from program homes for which the primary space heating fuel is neither electricity nor natural gas. An independent assessment of NEI estimates was conducted and found the current vendor-provided values were reasonable.

How the Results of the Study Impact each Identified Program’s Savings: Please see Table II.A.7.

If The Results Of The Study Are Not Adopted, Fully Explain Why: Based on the results of the study the PAs continue to use the vendor supplied NEI estimates.

A copy of the complete study can be found in Appendix C, Study 7.
Type of Study: Impact

Objective of the Study: The primary objectives of this impact evaluation was to estimate net-to-gross ratios (NTGR) for all markdown compact fluorescent lamps (CFLs), including separate estimates for spiral and specialty bulbs and bulbs targeted at hard-to-reach (HTR) customers. The evaluators were also charged with assessing the PAs’ current working definition of HTR customers and understanding market segmentation related to HTR customers. The evaluators also described the current state of the market for CFLs and other efficient lighting technologies, comparing to results from prior years when possible.

Programs to which the Results of the Study Apply:
- Residential ENERGY STAR Lighting Program (Electric)

Results of the Study and How the Study Determined those Results: The evaluators recommend using a 0.43 NTGR for spiral CFLs and 0.60 for specialty CFLs, or 0.47 overall for the 2009 and 2010 program years. The evaluators came to this recommendation through the results of five different NTGR estimation methods completed for the 2009 and 2010 Massachusetts ENERGY STAR lighting program: 1) conjoint study, 2) multistate modeling, 3) revealed preference, 4) supplier interviews, and 5) willingness to pay study. The evaluators then convened a Delphi panel and provided each panelist with the results of these studies as well as background information on the history of the Massachusetts ENERGY STAR lighting program and trends in NTG ratios for Massachusetts and other states. The Delphi panel responded to an initial request to estimate NTG ratios for spiral, specialty, and overall CFLs, and then had the opportunity to revise their estimates after reviewing the responses of their fellow panelists. The final NTGR estimates from the Delphi panel serve as the evaluation-recommended NTGR values. The methods did not provide conclusive evidence to support a recommendation of a NTGR for HTR customers. The PAs and EEAC consultants have agreed to use the 0.60 specialty NTGR for HTR customers.

How the Results of the Study Impact each Identified Program’s Savings: Please see Table II.A.9.

If the Results of the Study are Not Adopted, Fully Explain Why: The results of the study are adopted.

A copy of the complete study can be found in Appendix C, Study 8.
Type of Study: Impact and Process

Objective of the Study: The Massachusetts Appliance Turn-in program collects and recycles working refrigerators and stand-alone freezers that are being used as second units from residential customers.

The primary evaluation activities consisted of a participant survey, a process evaluation, and estimation of net program savings impacts derived by applying participant-reported decision behavior about program influence and usage patterns to gross savings estimates from studies conducted in other areas. These gross and net savings estimates were compared to ex ante savings estimates currently used by the PAs. A secondary focus of the evaluation effort included an exploration of the secondary market and disposal market that exists for appliances to provide insight about how the program functions in the overall appliance market.

Programs to which the Results of the Study Apply:
- Residential ENERGY STAR Appliances (Electric)

Recommendations Derived from the Study:

<table>
<thead>
<tr>
<th></th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Use updated gross and net impact estimates for the program—Overall, the net savings estimate for refrigerators is 522 kWh/year and for freezers is 391 kWh/year. The ex ante estimates used by the Sponsors are 724 kWh for both refrigerators and freezers.</td>
</tr>
<tr>
<td>2</td>
<td>Weigh the value of removing primary refrigerators—The Sponsors should consider either reducing the number of primary fridges removed by the program by reinforcing the requirement (e.g., in marketing materials and verification of eligibility) or alternatively, opening up the program to include primary fridges.</td>
</tr>
<tr>
<td>3</td>
<td>Consider partnering with major retailers to market and implement the program. Major retailers could promote the program in their stores to customers who may be making a decision to keep or discard an existing unit. Using retailers would necessitate a shift in targeted appliances for the program—the program would be more likely to pick up primary refrigerators and nearly dead units.</td>
</tr>
<tr>
<td>4</td>
<td>Target missed appointments—Attempt to reschedule appointments with customers who have missed appointments for recycling pickup using post cards, phone calls, and emails. The program already offers Saturday pick-ups and choices for pick-up times based on schedule and geography, but additional</td>
</tr>
<tr>
<td></td>
<td>Effort should be made to give these customers priority for pick-up times that might include Saturdays, early mornings, evenings, next day pick-up, or small, one- to two-hour windows for pick-up times. Messaging with these customers should reinforce their good decision making for initiating the removal and recycling of an appliance through the program.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>5</td>
<td>Adjust goals to reflect demographics of the residential customer base for each Sponsor—Service areas in NSTAR and Western Massachusetts Electric have a large number of apartments and multifamily homes where residents typically do not have areas where they can keep second refrigerators, such as basements or garages. Adjusting the goals of the program to reflect the pool of single family homes may result in more realistic targets for these Sponsors.</td>
</tr>
<tr>
<td>6</td>
<td>Educate participants about the program goals—The program should emphasize that the primary goal of the program is to save energy and reduce demand on the electric grid by removing older, less efficient secondary refrigerators and stand-alone freezers. The program helps customers get rid of the appliances before they might do so on their own. Reductions in energy bills and the participation incentive are additional bonuses for customers.</td>
</tr>
<tr>
<td>7</td>
<td>Continue messaging about the ease of removal through the program—Physical and financial barriers may encourage some consumers to keep their secondary appliances, and marketing the program to residents faced with these barriers might allow the Sponsors to collect additional units that would not otherwise be removed from the grid.</td>
</tr>
<tr>
<td>8</td>
<td>Continue promoting the program through existing channels—The Sponsors’ communications network to customers through bill inserts, notations on bills, newsletters, and emails should continue to be used to promote the program on a continuous basis, or when a quick boost in participation is desired. Promotions through schools and community groups and options for rebate donations to these groups help to promote the program and provide a community service.</td>
</tr>
<tr>
<td>9</td>
<td>Reinforce the idea of saving energy by not using appliances that are not essential and buying products with the ENERGY STAR label—Tell participants how much energy and money they saved by getting rid of their inefficient model and will continue to save if they do not replace the appliance. If they must replace the appliance, encourage them to consider the more efficient ENERGY STAR labeled units.</td>
</tr>
<tr>
<td>10</td>
<td>Sponsors should consider reaching out to Craigslist sellers. Units offered on Craigslist are likely to be working units. The average listing price on Craigslist was $230 more than the program’s incentive. However, 10% of units were $50 or less, and 23% percent were $100 or less, and six postings offered their refrigerator for free. Although those with high-value refrigerators may not be dissuaded from selling them on Craigslist, sellers with low-priced units may prefer the ease and environmental benefits of the program.</td>
</tr>
<tr>
<td>11</td>
<td>Let participants know about the environmental benefits they generated—It</td>
</tr>
</tbody>
</table>
should also be emphasized that appliances will be recycled in a way that is less harmful to the environment than other disposal options. They will not be sold, donated to charity, or disposed of in a landfill.

**How the Process Study Came to the Recommended Conclusions:** Process related conclusions are based on the participant survey, depth interviews with Sponsors and the implementation contractor, and exploration of the secondary market and disposal market for appliances outside of the program.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Process Study, and Why:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The PAs have adopted the net savings estimates.</td>
</tr>
<tr>
<td>2</td>
<td>The PAs will look into the best approach for handling primary refrigerators in the future.</td>
</tr>
<tr>
<td>3</td>
<td>The PAs have looked into partnering with retailers in the past but have not had much success with retailers embracing this program as many/most retailers have pick-up/recycling programs of their own in which they charge customers for picking up appliances and, therefore, make a profit. The PAs will continue to investigate whether other retailers are willing to partner with us on this program.</td>
</tr>
<tr>
<td>4</td>
<td>JACO (the recycling vendor) currently has a missed appointment procedure where they follow up on all missed appointments via multiple phone calls and letters, if necessary. The PAs will work with JACO to see if setting a priority pick-up for these customers is possible.</td>
</tr>
<tr>
<td>5</td>
<td>Currently, each PA adjusts goals annually after assessing the previous year’s results.</td>
</tr>
<tr>
<td>6</td>
<td>All of the print marketing materials (the primary marketing outlet for this program) refers to “saving energy” and the first sentence of the ad’s body copy discusses how an “old refrigerator uses up to four times more electricity than a new one.” The PAs will highlight this benefit more often where possible.</td>
</tr>
<tr>
<td>7</td>
<td>Marketing materials do mention that “We’ll even haul it away for FREE.” There is potential to highlight this benefit more prominently and the PAs will look into that, where possible.</td>
</tr>
<tr>
<td>8</td>
<td>The PAs will continue to promote the program through existing channels. Some PAs have supplemented their program with additional marketing to help lift participation (NSTAR purchased billboards, transit advertising and sent out a direct mail piece to 50,000 customers. NSTAR &amp; National Grid are also purchasing radio advertising).</td>
</tr>
<tr>
<td>9</td>
<td>All of the PA’s advertising currently highlights energy savings more than once by having a specific call-out on ads with the savings message in a prominent...</td>
</tr>
</tbody>
</table>
spot as well as text in the ad that states “…you could save up to $150 a year on your electricity usage.” The PAs will continue to focus on this energy savings benefit with marketing efforts.

10 If reaching out to Craigslist sellers could be justified with a higher volume of units on the site, then it could be considered. It seems that the majority of listings on Craigslist are priced significantly higher than the program’s incentive and this may not be a good use of time and money.

11 Environmental benefits are currently highlighted in most of the PAs marketing materials as the ads state, “Plus, recycling that fridge will keep 10 tons of carbon dioxide out of the atmosphere, which means a lot more clean air for our future.” The PAs will continue to focus on this environmental message with marketing efforts.

Results of the Impact Study and How the Study Determined those Results: The updated gross and impact estimates derived in this study are based on two methodologies. The first methodology used unit energy consumption (UEC) estimates from the Association of Home Appliance Manufacturers. The second methodology applied Massachusetts refrigerator characteristics to the DOE-based model utilized by Cadmus in their 2010 evaluation of the California Appliance Recycling Program. Under each of the evaluation team methodologies, UECs were adjusted to account for partial use, equipment replacement, and free ridership; values that were derived from the participant survey. While the program targeted secondary units for recycling, three distinct types of units were identified in the study—secondary units that were replaced with another unit, secondary units that were not replaced, and primary units. The study revealed that each type of recycled unit had a different energy savings profile.

How the Results of the Study Impact each Identified Program’s Savings: Please see Table II.A.10.


If the Results of the Impact Study are Not Adopted, Fully Explain Why: The results of the study are adopted.

A copy of the complete study can be found in Appendix C, Study 9.
Type of Study: Process

Objective of the Study: The primary objective of this methodology study was to develop suggested approaches for consideration by the PAs for estimating net program impacts for the Massachusetts PAs’ residential programs by reviewing the revised methodology report for C&I programs (2010) and adapting the decision framework and methodology guidelines to programs targeted to residential customers. The study team particularly sought to identify residential programs for which market-level approaches to measuring net-to-gross effects, rather than standard self-report methods, might be appropriate and feasible.

Programs to which the Results of the Study Apply:
- Residential New Construction & Major Renovation (Electric & Gas)
- Residential Cooling & Heating Equipment (Electric)
- Multi-Family Retrofit (Electric & Gas)
- MassSave (Electric and Gas)
- Behavior/Feedback Program (Electric & Gas)
- ENERGY STAR Lighting (Electric)
- ENERGY STAR Appliances (Electric)
- Residential Heating and Water Heating (Gas)
- Weatherization Program (Gas)

Recommendations Derived from the Study: The study included suggested methodologies for PAs to consider in future NTG evaluations for the above programs.

How the Study Came to the Recommended Conclusions: The evaluation team first conducted a review of the PAs’ current residential programs, focusing on program elements most relevant to methodological decisions regarding the estimation of net effects. As part of the program review, the study team reviewed the three-year plans and information collected from the PAs by the evaluation team and interviewed PA staff about their residential programs. Based on the program information garnered from the program review, the Net Savings Scoping Paper, and the decision matrix from the C&I report (adapted to the context of the residential programs), the evaluation developed suggested approaches for consideration by the PAs for estimating net-to-gross effects for each residential program.
Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why: The Company will incorporate the findings of this study into the planning process for future evaluations of Net-to-Gross ratios for residential programs.

A copy of the complete study can be found in Appendix C, Study 10.
Type of Study: Impact

Objective of the Study: The object of the study was to assist the Massachusetts PAs in identifying a reasonable estimated NTG factor for the 2010 Residential New Construction programs; C&I programs; Multi-Family Retrofit and Residential High Efficiency Heating and Water Heating programs.

Programs to which the Results of the Study Apply:
- Residential New Construction and Major Renovation (Electric & Gas)
- Residential High Efficiency Heating and Water Heating (Gas)
- Multi-Family Retrofit (Gas)
- C&I New Construction & Major Renovation (Gas)
- C&I Retrofit (Gas)
- C&I Direct Install (Gas)

Results of the Study and How the Study Determined those Results:

<table>
<thead>
<tr>
<th>Program Type</th>
<th>Recommended NTGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential New Construction</td>
<td>1.00</td>
</tr>
<tr>
<td>C&amp;I Gas</td>
<td></td>
</tr>
<tr>
<td>Custom</td>
<td>0.96</td>
</tr>
<tr>
<td>Prescriptive</td>
<td>0.83</td>
</tr>
<tr>
<td>Residential HEHE and Multi-family</td>
<td></td>
</tr>
<tr>
<td>Boiler controls—HEHE</td>
<td>NTGR 1.0 (Residential)</td>
</tr>
<tr>
<td>Boilers—HEHE</td>
<td>Spillover: 0.14 (Residential)</td>
</tr>
<tr>
<td>Furnace/ECM furnace—HEHE</td>
<td>Spillover: 0.19 (Residential)</td>
</tr>
<tr>
<td>Insulation</td>
<td>NTGR 0.8 (Multifamily)</td>
</tr>
<tr>
<td>Programmable thermostats</td>
<td>NTGR 0.88 (Multifamily)</td>
</tr>
<tr>
<td></td>
<td>0.42 (Residential)</td>
</tr>
</tbody>
</table>
The evaluation contractors reviewed secondary literature including program impact evaluations, utility filings, and Market Effects studies to develop the above recommendations. Given the short time frame allotted for this work, they focused the search for information on a limited number of readily available sources.

<table>
<thead>
<tr>
<th>Product</th>
<th>NTGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc water heating equipment</td>
<td>0.63</td>
</tr>
<tr>
<td>Water saving devices</td>
<td>0.77</td>
</tr>
<tr>
<td>Windows</td>
<td>0.8</td>
</tr>
</tbody>
</table>

**How the Results of the Study Impact each Identified Program’s Savings:** Please refer to the tables in Sections II.A.2 and II.C.2 for each of the programs listed above.


**If the Results of the Study are Not Adopted, Fully Explain Why:** The results of the study are adopted.

A copy of the complete study can be found in Appendix C, Study 11.
12. **HEHE Process and Impact Evaluation (Study 12)**

**Type of Study:** Process and Impact

**Objective of the Study:** The objective of the process portion of this study was to assess the effectiveness of marketing efforts, program satisfaction and data tracking. The process evaluation focused on understanding the program: (1) from program implementation and delivery perspectives including program staff, implementation contractors, circuit riders, supply houses, rebate processors, and participating and nonparticipating heating and plumbing contractors; and (2) from end use customer perspectives including program participants and nonparticipants.

The objective of the impact portion of this study was to reexamine and update gas savings impacts and estimate freeridership for each type of equipment offered through the High Efficiency Heating and Water Heating Equipment Program.

**Programs to which the Results of the Study Apply:**
- Residential Heating and Water Heating (Gas)

**Recommendations Derived From The Process Study:**
The process portion of the study including the following recommendations:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drop all current rebates for furnaces, forced hot water boilers, steam boilers, and water heaters.</td>
</tr>
<tr>
<td>2</td>
<td>Assess the feasibility of working to effect a change in the state standards for forced hot water boilers to 90% AFUE.</td>
</tr>
<tr>
<td>3</td>
<td>Consider a new program for early replacement of newer, less efficient boilers.</td>
</tr>
<tr>
<td>4</td>
<td>Continue to nurture relationship with contractors because of the key role they play in customer education and energy-efficient equipment purchase and installation.</td>
</tr>
<tr>
<td></td>
<td>i. The program should evaluate the potential savings from offering an installation incentive to contractors for adhering to energy-efficient criteria for equipment sizing, duct testing, and duct sealing.</td>
</tr>
<tr>
<td></td>
<td>ii. The program should educate contractors and participants on correct usage of ECM furnace fans, and check settings during verification visits.</td>
</tr>
<tr>
<td></td>
<td>iii. The HEHE program can further increase its value to contractors by helping them grow their businesses through energy-efficient installations. Examples of approaches that would be attractive to them include offering co-op advertising and providing referrals.</td>
</tr>
<tr>
<td></td>
<td>iv. Make greater efforts to reach out to nonparticipating contractors.</td>
</tr>
</tbody>
</table>
Facilitating program participation by older contractors. Examples of approaches might be to have exhibits at trade shows that demonstrate installations of high-efficiency systems, and if possible, demonstrate how the installation practices are simply an extension of what techniques they are already familiar with.

Increasing the number and frequency of educational offerings.

5 Conduct a survey of distributors in HEHE states and elsewhere to get a better estimate of market-level sales by efficiency level, and the possible long-term spillover both within and outside the HEHE states.

How the Process Study Came to the Recommended Conclusions: The recommendations were based on information gathered during the data collection activities for the process evaluation. These included in-depth interviews with program staff, program implementer staff, program contractors, rebate processing contractors, circuit riders, and supply houses/big box stores; and telephone surveys of HEHE program participants from the 2007-08 and 2009 program years, oil-to-gas conversion customers including HEHE participants and nonparticipants, general population program nonparticipants, participating and nonparticipating contractors, and contractors attending the Fall 2009 HEHE Annual Conference.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Process Study, and Why:

1 Lower efficiency furnaces (92% without ECMs) and steam boilers were dropped from the program. Incentive levels for other furnaces (92% and 94% with ECM) and water heaters were dropped as a result of this study. The 85% boiler will no longer be offered starting in January 2012.

2 The Company as part of GasNetworks believes influencing federal standards is the priority since the state needs federal approval.

3 The Company reviewed the savings and costs for an early retirement program for newer (less than 20 year old) boilers and it was determined to not be cost effective.

4 Due to program budget constraints, the Company as part of GasNetworks decided not to offer an incentive to contractors. GasNetworks is exploring conducting ECM training in conjunction with CoolSmart. The Company already helps contractors grow their business through energy efficient installations via co-op advertising and though trainings offered through GasNetworks. The Company feels that utilities should not undertake the role of providing referrals.

The Company, as part of GasNetworks, already has exhibits at trade shows and demonstrates installation practices.
The Company usually increases the number of training it offers each year.

The Company plans to conduct the survey of distributors in 2011 as part of the Residential Retrofit research area.

Results of the Impact Study and How the Study Determined those Results:
The impact evaluation of the HEHE program focused on the 2007-08 program year. The impact evaluation used six billing analysis models to estimate savings for each of the program measures. The savings results from the models were averaged to obtain the final per-unit gross savings estimate. The gross per-unit savings for the 2007-08 program year are estimated to range from 72 therms for boilers with 85% to 89% AFUE to 137 therms for boilers with 90% or greater AFUE; estimated furnace savings are estimated to be 118 therms for furnaces with 92% or greater AFUE and 127 therms for ECM furnaces with 92% or greater AFUE; estimated water heater savings are estimated to be 80 therms for indirect water heaters and 97 therms for on-demand tankless water heaters.

Freeridership estimates were developed based on participant and participating contractor surveys. Respondents to the survey of participating contractors were asked to estimate the percentages of each type of high-efficiency equipment that they would have installed in the absence of the rebate. Respondents to the survey of HEHE participants were asked a series of questions related to the influence of program elements on their decision to purchase and install high-efficiency equipment instead of standard-efficiency equipment and whether they did research on their own or their contractor suggested what equipment to purchase.

<table>
<thead>
<tr>
<th>Equipment type</th>
<th>Adjusted free ridership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forced hot air furnace w/ AFUE of 92% or greater</td>
<td>67%</td>
</tr>
<tr>
<td>Forced hot air furnace w/ ECM and AFUE of 92% or greater</td>
<td>62%</td>
</tr>
<tr>
<td>Forced hot water boiler w/ AFUE of 90% or greater</td>
<td>60%</td>
</tr>
<tr>
<td>Forced hot water boiler w/ AFUE of 85%-89%</td>
<td>69%</td>
</tr>
<tr>
<td>Steam boiler w/ electronic ignition and an AFUE of 82% or greater</td>
<td>67%</td>
</tr>
<tr>
<td>Indirect water heaters</td>
<td>66%</td>
</tr>
<tr>
<td>On-demand tankless water heaters w/ an EF of 0.82 or greater</td>
<td>63%</td>
</tr>
<tr>
<td>Combined high-efficiency boiler and water heating units</td>
<td>50%</td>
</tr>
</tbody>
</table>

How the Results of the Study Impact each Identified Program’s Savings: Please see Table II.A.4 in the MA 2010 Gas Annual Report.

If the Results of the Impact Study are Not Adopted, Fully Explain Why: The results of this study have been adopted.

A copy of the complete study can be found in Appendix C, Study 12.
Type of Study: Process

Objective of the Study: The overarching goal of the 2010 Deep Energy Retrofit (DER) pilot evaluation was to provide the PAs/implementers with actionable findings and recommendations aimed at increasing customer and contractor participation, as well as refining pilot program’s delivery. As the investigations progressed, effort focused on identifying information to aid in formulating a consensus about the pilot’s mission and goals, rather than fine-tuning delivery mechanisms.

Programs to which the Results of the Study Apply:
- Deep Energy Retrofit Pilot (Electric & Gas)

Recommendations Derived from the Study:

<table>
<thead>
<tr>
<th></th>
<th>Restructure and refocus the pilot.</th>
<th>Seek to fill program gaps.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The pilot is primarily focused on completing projects. Though pilot performance will clearly fall short of the cost-effective energy savings goals, it is still valuable. The evaluation team recommends restructuring the pilot as a research effort with a voluntary board and implementation team (both of which could include PA members) and refocusing the research on activities that will lead to a scalable program. Resolving some inherent policy issues and establishing a pathway to lowering costs and improving overall cost-effectiveness should be a near term focus of the research effort.</td>
<td></td>
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<tr>
<td>2</td>
<td>Customers, as well as some stakeholders, have identified the need for energy efficiency services that fill the gap between basic PA programs (e.g., Home Energy Assessment) and comprehensive deep retrofits: Two possible solutions are:</td>
<td></td>
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<tr>
<td></td>
<td><strong>Partial deep retrofits.</strong> Identify a DER track that meets the needs of customers who are prepared for a major project but are not willing or able to commit to all the requirements of a comprehensive DER project. This could be accomplished by providing incentives for deep retrofits of one building system at a time, possibly when normal maintenance would take place, such as re-roofing, re-siding, or window replacements. Such partial deep retrofits, with much smaller up-front costs, might attract a larger number of homeowners, and would greatly reduce the size of an incentive provided to any one customer.</td>
<td></td>
</tr>
</tbody>
</table>
|   | **Deep (but not as deep) retrofits.** As reported by several PAs and also in the Massachusetts Clean Energy and Climate Plan for 2020, there is need for a middle ground between the level of savings provided by the current relatively low-cost programs and the very high savings achieved at a high cost in the DER
pilot homes. Customer re-roofing and re-siding events present opportunities for additional savings at a relatively low cost.

**How the Study Came to the Recommended Conclusions:** The process evaluation included interviews with 40 of the approximately 120 participating customers (including in process, completed and drop-out participants), fifteen contractors, and nine stakeholders. Pilot material was reviewed, including marketing material, websites, and project files. Based on the information obtained, the evaluation team used evaluation experience to offer recommendations aimed at improving program processes where appropriate.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:**

<table>
<thead>
<tr>
<th>1</th>
<th>It is both evident in this report and in practice that deep energy retrofits are extremely complex projects and require additional research and a cost-effectiveness study to be considered a viable initiative as a stand alone program or for the complex measures to be incorporated into existing programs going forward. The Company supports the idea of further research in this area to better quantify incremental costs of these deeper savings measures and to focus on what can be done to reduce the costs associated with complex efforts such as this. Future studies should provide PAs with data on the true incremental costs, as well as quantification of all the program benefits (energy, non-energy, and other resources) associated with these projects.</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>The Company is fully supportive of filling program gaps by implementing deeper measures within programs. However, the Company believes these measures need to be deemed cost-effective before they can be mainstreamed through programs such as the Home Energy Services program.</td>
</tr>
</tbody>
</table>

A copy of the complete study can be found in Appendix C, Study 13.
Type of Study:  Process

Objective of the Study:  This report presents preliminary findings from interviews with the two Sponsors of the Pilot, NSTAR and National Grid, the Pilot’s chief project manager, and two individuals representing the three projects that were completed in 2010. The objective of the interviews was to address several process evaluation issues including the Pilot’s goals and objectives, the process of signing up and completing verification, outreach and the types of projects served, the measures covered, the measures installed, barriers to energy efficient multi-family new construction, and satisfaction. The limited number of completed projects did not allow the report to address particular issues such as free-ridership and providing technical assistance for participants to consider the addition of all applicable measures in their projects.

Programs to which the Results of the Study Apply:
- Residential New Construction & Major Renovation (Electric)
- Low-Income Residential New Construction (Electric)

Recommendations Derived from the Study:  There are no recommendations from this study as it is an interim report issued until more projects complete the process.

How the Study Came to the Recommended Conclusions:  Not Applicable.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:  Not Applicable.

A copy of the complete study can be found in Appendix C, Study 14.
Type of Study: Process

Objective of the Study: The purpose of the Major Renovations Pilot, introduced in 2009, is to address the gap between the Home Energy Assessment Program for existing homes and the Massachusetts New Homes with ENERGY STAR Program. This report presents preliminary findings from interviews with seven homeowners and one builder who had projects eligible to participate in the pilot and considered enrolling in the pilot, but decided not to enroll. The objective of the interviews was to identify how these potential participants learned about the pilot, why they decided not to enroll in the pilot and get their suggestions for how to make participation in the pilot more user-friendly for homeowners.

Programs to which the Results of the Study Apply:
- Residential New Construction & Major Renovation (Electric)
- Low-Income Residential New Construction (Electric)

Recommendations Derived from the Study: There are no recommendations from this report as it is an interim report issued while the PAs wait for more projects to complete.

How the Study Came to the Recommended Conclusions: Not Applicable.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why: Not Applicable.

A copy of the complete study can be found in Appendix C, Study 15.
Objective of the Study: The focus of this report is on lessons learned from the Massachusetts New Homes with ENERGY STAR Program Version 3 Pilot and issues the program will face going forward to keep existing builders in the program, as well as recruit new builders, as ENERGY STAR Version 3 requirements take effect. Version 3 Guidelines for ENERGY STAR Homes become effective for all new homes, regardless of permit dates, starting January 1, 2012.

Programs to which the Results of the Study Apply:
- Residential New Construction & Major Renovation (Electric)
- Low-Income Residential New Construction (Electric)

Recommendations Derived from the Study:

<table>
<thead>
<tr>
<th></th>
<th>Keep training on code changes and Version 3 requirements separate, to the extent possible. Interviewed builders who attended training covering both topics found it confusing.</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>Focus builder training on the new Thermal Enclosure Checklist (TEC) section 3 and section 5 requirements that are expected to be the most challenging for builders: One example is the TEC section 5 requirement that sheetrock be sealed to the top plate at all attic/wall interfaces using caulk, foam, or equivalent material. HERS raters say builders are trying out different approaches for meeting this requirement. It may require the sheetrock crew to come back a second time, which is costly and impacts the construction schedule. EnergyComplete™ from Owens Corning is a spray on gasket that can be used at the same time the sheet rock is put up, but the cost is high.</td>
</tr>
</tbody>
</table>
3. Offer training in a variety of formats and use trainers with hands-on experience: Some builders and HVAC contractors prefer classroom training; others prefer more hands-on field training. They also like the idea of having webinar presentations or videos of training presentations available online to view at their convenience. For all training, interviewees stressed the importance of using trainers who have extensive hands-on experience. Also, encourage HVAC contractors to take advantage of other available training options: Air Conditioning Contractors of America and supply houses offer several training options to help contractors interested in being prepared to meet Version 3 requirements. HVAC contractors could also be encouraged to consider participating in the Cool Smart Program, which offers multiple training courses, including training to offer ENERGY STAR Quality Installations.

4. Include HERS raters in any program sponsored HVAC contractor training: The interviewed HVAC contractors and distributor say it would be useful to have a HERS rater at trainings to explain exactly what HVAC contractors are expected to do in a qualifying home, especially if they are going to guarantee in their contract with the builder that the home will meet program requirements.

5. Review the timeline for moving to an open HERS rater market: Assess the potential negative impact on Program participation of asking builders to assume the full cost of HERS rater services at the same time that builders interested in meeting Version 3 requirements will likely need more HERS rater support and need to pay more for HVAC contractors able to meet Version 3 requirements. Hitting builders with two cost increases at the same time may negatively affect participation.

**How the Study Came to the Recommended Conclusions:** Recommendations are based on findings from in-depth interviews conducted with 17 builders, 11 HERS raters, 10 HVAC contractors and one HVAC distributor. Interviewees included all six builders who participated in the Pilot and the HERS raters they worked with, as well as two of the HVAC contractors who worked on Pilot homes with ducted HVAC systems.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:** As this report was recently issued, the recommendations are currently under consideration. Version 3 is the latest version of the EPA ENERGY STAR Homes program, at this time a final decision has not been made as to whether Version 3 will be a requirement of the Massachusetts Residential New Construction program.

A copy of the complete study can be found in Appendix C, Study 16.
Type of Study: Process and Impact

Objective of the Study: This study is the first annual process and impact evaluation of Massachusetts behavioral programs under the three-year Massachusetts Cross-Cutting Program Evaluation plan. The primary objective of the process portion of the evaluation was to provide preliminary insights into the effectiveness of National Grid’s OPOWER program and the actions that residential customers may take to generate energy savings. The secondary objective of this study was to create a framework to evaluate all Massachusetts behavior programs in upcoming evaluations. Specific research objectives of the process portion of the evaluation include:

- Assess program characteristics that may lead to greater savings
- Determine specific actions taken as a result of the Home Energy Report – including conservation behaviors and direct measure installations
- Identify other effects from behavioral program efforts (increased awareness of energy efficiency options, changes in attitudes)
- Develop suggestions for improving the programs to increase savings

The primary objective of the impact portion of the study is to examine the National Grid Home Energy Report program’s ability to generate residential electric and gas savings among targeted Massachusetts customer households.

Programs to which the Results of the Study Apply:
- OPOWER (Electric & Gas)

Recommendations Derived from the Process Study:
The process evaluation identified a number of recommendations in three areas: (1) planning and policy, (2) program implementation, and (3) monitoring and evaluation.

<table>
<thead>
<tr>
<th>1</th>
<th>Planning and Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The PAs should continue to develop approaches for targeting different household types with different messages through the Home Energy Report program.</td>
</tr>
<tr>
<td></td>
<td>The PAs should conduct additional research to determine the effective useful life and persistence estimates for the Home Energy Report program.</td>
</tr>
<tr>
<td></td>
<td>The PAs should determine whether the Home Energy Report and other behavioral programs should aim to channel customers to other rebate and audit programs.</td>
</tr>
</tbody>
</table>
If cross-program promotion is desired, two-three months after the delivery of the first report may be the most appropriate time to do so.

2. Program implementation
   - The program should consider developing ways to personalize the experience further by providing customers with more household-specific information.
   - More actively promote the website and increase its prominence on the report.
   - Provide more explicit, positive affirmations to participants on the Home Energy Report.

3. Monitoring and Evaluation
   - Program savings forecasts should be developed based on ex post or market-specific findings from the implementers or evaluation.
   - Continue to employ empirical methods, such as billing analysis using panel data or treatment/control experimental design, to gauge the impact of the report on energy savings, awareness and attitudes.
   - Continue to incorporate channeling analysis to determine behavioral program impacts.
   - Enhance participant surveys to gather information on actions participants and non-participants have taken to save energy.

**How the Process Study Came to the Recommended Conclusions:** The process evaluation recommendations are based on a number of data collection efforts including:

1. In-depth interviews with PAs.

2. Telephone surveys with participants and control group members: Telephone survey research was conducted with 501 participant and 501 control group households. The telephone survey was designed to understand differences in energy efficiency and conservation behaviors among participants, compared with control group members, based on participant exposure to the Home Energy Report for approximately one year.

3. In-home ethnographic research: In-home ethnographic research was conducted with 11 participant households. The in-home ethnographic research was designed to supplement insights gained through survey research, and explored participants’ responses to the Home Energy Report, changes in behaviors or intentions in direct response to the report, and suggestions for report content and delivery.
Explain Whether or Not the PA Decided to Adopt Recommendations from the Process Study, and Why: The Company is adopting the recommendations from the study. The OPOWER program is relatively new, and the recommendations inform ways to enhance the program, increase savings, and continue evaluation best practices.

Results of the Impact Study and How the Study Determined those Results: OPOWER Electric Program: Electric pilot households averaged 184.1 net annual kWh savings per participant in the first program year, and 1.61% kWh savings from 11,433 kWh per participant expected consumption in the absence of the program. This equates to a total of 4,575 MWh savings across households in the pilot cohort.

OPOWER Gas Program: Gas pilot participants averaged 9.93 net annual therm savings per participant in the first program year, and 0.77% therm savings from 1,286 therms per participant expected consumption in the absence of the program. The billing analysis found that the average reduction in therms was 0.81% and the channeling analysis found that 0.04% of the average reduction was due to incremental savings from other programs. This equates to a total of 248,257 therm savings across all households in the pilot cohort.

Net program savings were determined by conducting billing analysis to estimate annual electric and therm savings. Average annual net savings attributable to the behavioral program were determined using a linear fixed effects regression analysis of customer billing data that included billing data from behavioral program participants (who received the Home Energy Reports), and a matched comparison group of residential customers. The billing analysis approach is described in Section 4.4 of “Massachusetts Cross-Cutting Behavioral Program Evaluation Volume I.” For the National Grid gas pilot, a channeling analysis was conducted where net program savings determined by billing analysis were adjusted by factoring out deemed savings values counted in other National Grid programs. The savings values cited here reflect only those program savings directly obtained by the OPOWER Program, factoring out savings jointly attributable to the OPOWER program and other energy efficiency programs. This adjustment is described in Section 4.5 of “Massachusetts Cross-Cutting Behavioral Program Evaluation Volume I.” Percent savings are determined by calculating average annual net program savings as a proportion of energy consumption expected in the absence of the program, described in Section 3.6 of “Massachusetts Cross-Cutting Behavioral Program Evaluation Volume II.”

How the Results of the Study Impact each Identified Program’s Savings: Please see Table II.A.8.


A copy of the complete study can be found in Appendix C, Study 17.
C. **Low-Income Studies**

1. **Final Report for Low Income Program – Massachusetts 2010 Residential Retrofit and Low Income Evaluation (Study 18)**

**Type of Study:** Process

**Objective of the Study:** For the 2010 process evaluation, the evaluation team focused on assessing program processes and identifying similarities and differences between the perspectives and assumptions of program staff, implementation staff, and customers regarding program goals, design, and implementation. The evaluation team also reviewed the process by which program data are collected, managed, and reported, including an assessment of the quality and consistency of the program data across PAs.

**Programs to which the Results of the Study Apply:**
- Low-Income 1-4 Family Retrofit (Electric and Gas)
- Low-Income Multifamily Retrofit (Electric and Gas)

**Recommendations Derived from the Study:**

<table>
<thead>
<tr>
<th></th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To address any concerns related to funding and resource management, PAs and the lead Community Action Program (CAP) agency could increase communication during the goal-setting processes, and track spending throughout implementation.</td>
</tr>
<tr>
<td>2</td>
<td>The PAs should schedule a meeting or series of meetings in coordination with LEAN for the express purpose of clearly defining standardization and integration objectives for the program. Once the definition of standardization is communicated and agreed upon, strategies should be determined for meeting those objectives over a specified time period. This will ensure all stakeholders work toward commonly agreed upon objectives, and enhance progress toward meeting objectives to be measured.</td>
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<tr>
<td>3</td>
<td>The PAs should strongly consider all options for creating a streamlined, independent, third-party QA/QC process that serves the needs of the PA-funded program, while minimizing participant intrusion. Such a process could reduce existing inefficiencies including the potential number of visits to participants’ homes, ensure CAPs do not perform quality control on their own projects, free up CAP auditors’ time to reach more low income customers, and align this program’s QA/QC process with that proposed for the Home Energy Assessment program. This does not necessarily have to be an additional QA/QC process, just a streamlined process that is collaborative in nature.</td>
</tr>
<tr>
<td>4</td>
<td>The PAs should maintain a data dictionary for all critical program datasets that includes all field definitions, value definitions, and the sources of the data. The data dictionaries should be provided as part of all data requests thereby allowing evaluators (or any other third-party) to decode field names and data values efficiently. The data dictionaries would also ensure internal knowledge of the database is not lost in the event of critical personnel turnover. Once created, draft data dictionaries should be circulated among the low income working group to ensure that all PAs are collecting the same data and using the same naming conventions whenever possible. If such data dictionaries do not exist, the Data Management Working Group established as part of the 2011 Residential Retrofit and Low Income evaluation could assist with their creation.</td>
</tr>
<tr>
<td>5</td>
<td>The PAs should ensure the collection and availability of a minimum set of critical data fields for current and future evaluation work.</td>
</tr>
<tr>
<td>6</td>
<td>The PAs should consider mandating that a standard set of critical audit data fields be entered into an electronic format and maintained/archived for future internal and external use. The PAs should collaborate with the CAPs and the evaluators to identify valuable audit information not currently maintained electronically.</td>
</tr>
<tr>
<td>7</td>
<td>The PAs should also explore the potential of having field technicians use electronic hardware (a PDA or laptop) to collect and enter onsite data whenever possible. This approach would minimize manual data entry, reduce program administrative costs, and improve data quality through the institution of unique keys, foreign key constraints, lookup tables, and other database design best practices.</td>
</tr>
<tr>
<td>8</td>
<td>The PAs should work collaboratively on integration of a common Measure ID system to allow tracking of each installed measure from the participant tracking database to the BCR input sheet and to the TRM. In addition, PAs should develop and maintain standardized ID fields (standardized internally, not across PAs) linking data across programs, customers, contractors, and billing data.</td>
</tr>
</tbody>
</table>
9 Through a collaborative process with the PAs and the TRM working group, continue to develop and employ a standardized measure naming convention for all PAs and CAPs. The TRM should be used as a basis to develop standard names and codes. A naming convention would allow for faster and more accurate statewide reporting, improve evaluation, and add transparency to the measure tracking process. The Evaluation team specifically recommends consideration of a four-part measure naming convention that includes varying levels of detail for each program stakeholder: denoting the measure’s end-use, group, type, and detail. Examples of several common program measures are provided in the report.

**How the Study Came to the Recommended Conclusions:** The Low Income Program evaluation included PA program manager interviews, CAP agency staff interviews, PA data manager surveys, a data review, and participant interviews. Based on information obtained from these stakeholders, the evaluation team used its professional judgment and experience evaluating low income programs to offer recommendations aimed at improving program processes where appropriate.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:**

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<tbody>
<tr>
<td>1</td>
<td>The PAs already track spending throughout the implementation. Starting in July 2011, for 2012 goal setting, PAs and LEAN will start discussions about budgets and savings goals in advance of the program year.</td>
</tr>
<tr>
<td>2</td>
<td>The PAs will use the Best Practice Meetings to clearly define standardization and integration objectives for the program and a timeline.</td>
</tr>
<tr>
<td>3</td>
<td>There is already a new QA/QC process being initiated that would minimize the number of visits to customer homes.</td>
</tr>
<tr>
<td>4</td>
<td>The PAs will explore the potential of having field technicians use electronic hardware to collect and enter onsite data. There is some current use of handheld devices for auditors. Due to the high cost and since some of the audits requiring the auditors to crawl into small spaces, it may not be feasible.</td>
</tr>
<tr>
<td>5</td>
<td>The PAs are working with the evaluation team to ensure in the future we are better able to aggregate and/or compare measure savings where possible.</td>
</tr>
</tbody>
</table>

A copy of the complete study can be found in Appendix C, Study 18.
D. Commercial & Industrial Program Studies

1. Non-Controls Lighting Evaluation for the Massachusetts Small Commercial Direct Install Program (Study 19)

Type of Study: Impact

Objective of the Study: Provide independent estimates of annual energy savings and peak demand impacts for a single type of installed measure: the replacement of lighting fixtures without controls.

Programs to which the Results of the Study Apply:
- C&I Small Retrofit (Electric)

Results of the Study and How the Study Determined those Results: Logged operating hours and installed measure survey data from 130, 2010 program participant sites throughout Massachusetts during the months of December through February were used to calculate summer and winter coincidence factors for ISO on-peak and seasonal peak performance hours, connected demand realization rates and energy realization rates which incorporated heating and cooling interactive effects.

How the Results of the Study Impact each Identified Program’s Savings: Please refer to Table II.C.6.

Formulas Necessary to Understand the Impact of the Study on the PA’s Programs: The formulas necessary to understand the impacts are described in the TRM.

If the Results of the Study are Not Adopted, Fully Explain Why: The study collected operating hour data during winter months only and a significant number of sampled sites exhibited seasonal variation in operating hours. PAs elected to not adopt the calculated summer coincidence factors at this time and are planning a follow on summer metering study to capture the seasonal variation. Updated summer demand results were derived from the C&I Lighting Loadshape Project FINAL Report (Study 32) described below.

A copy of the complete study can be found in Appendix C, Study 19.
Type of Study: Process

Objective of the Study: The main objective of the Multi-Tier Program Structure Assessment is to document progress towards statewide integration of the Commercial &Industrial Direct Install programs during 2010, and to gauge customer interest in different program design options such as varying incentive levels, zero interest financing, and on-bill financing options. The assessment is also designed to gather information related to program satisfaction and awareness. In particular, the evaluation sought to address the following research questions:

- What kind of program changes has each PA implemented? How is this process going? What are the challenges? How do customers and market actors view these changes?
- How is the integration of electric and gas progressing? What are the challenges? What is being done to overcome them?
- How has the workload of PA program staff and vendors changed as integration and standardization of the Small Business Direct Install program has moved forward?
- What is the level of program awareness and customer satisfaction with the program? What are the barriers to participation and what are the most important factors in participant decision making around participation.

Programs to which the Results of the Study Apply:
- C&I Small Retrofit (Electric and Gas)

Recommendations Derived from the Study:

| 1 | Use the Direct Install program facility audit as a way to disseminate information about other PA C&I programs. In the process, identify for customers the equipment or systems that may need replacement in the future. |

How the Study Came to the Recommended Conclusions: The recommendation presented above is based on results from quantitative telephone surveys with participating customers, as well as a review of program materials and in-depth interviews with PA program staff and vendors. In-depth interviews provided the evaluation team with a comprehensive understanding of the audit process while a review of program materials further contributed to knowledge of what the program currently provides onsite. The
survey with 2009 and 2010 program participants allowed the team to assess the degree to which participating customers receive information about other PA programs.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:** PAs began addressing the recommendation from this study in the second half of 2010, following an initial focus on integrating electric and gas measures during the first 8 months. An audit checklist was developed that program vendors use to note the existence and condition of energy consuming equipment outside the standard prescriptive measures offered. PAs and their vendors are using the information gathered to inform direct install program participants of other C&I programs that can be accessed.

A copy of the complete study can be found in Appendix C, Study 20.
3. Final Report High Bay Lighting Market Effects Study Project IA New Construction Market Characterization (Study 21)

Type of Study: Market Assessment

Objective of the Study: The principal research objectives of the High Bay Lighting (HBL) Market Effects Study are:

1. Estimate the energy savings associated with the changes to a high bay lighting market in Massachusetts.

2. Assess the attribution of these changes (i.e., market effects) to the PAs’ energy efficiency programs.

Programs to which the Results of the Study Apply:

- C&I New Construction and Major Renovation (Electric)
- C&I Large Retrofit (Electric)
- Small C&I Retrofit (Electric)

Recommendations Derived from the Study: The High Bay Lighting Market Effects Study recommendations are provided in the following table.

<table>
<thead>
<tr>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Based on the modeled approach and the preponderance of evidence presented in the market effects study, the evaluation team recommends the Massachusetts electric PAs claim untracked spillover energy savings associated with HBL measures. The evaluation team recommends the Scenario 2 energy savings estimate of 12.4 GWh per year or 39 percent of 2010 program tracked gross savings. This value is consistent with the untracked spillover estimate of 34 percent of program tracked savings estimated for Wisconsin in the 2010 Wisconsin HBL study. Several of the electric PAs are currently claiming low levels of participant and or non-participant energy savings for HBL measures. Prior to claiming the untracked spillover savings recommended by this report, the PAs must remove participant and or non-participant spillover energy savings for HBL measures already being claimed to avoid double counting.</td>
</tr>
</tbody>
</table>

122
How the Study Came to the Recommended Conclusions: The evaluation team estimated untracked spillover, then assessed the attribution of these savings to the PA’s energy efficiency programs based on a comparison of the level of adoption of energy efficient high bay lighting in Massachusetts to a comparison area lacking programs promoting energy efficient high bay lighting. The primary analytic steps include:

1. Estimate the volume of high bay lighting installed in Massachusetts and the comparison area.
2. Estimate the market share of energy efficient high bay lighting installed in Massachusetts and the comparison area.
3. Assess attribution of untracked spillover to the PA’s energy efficiency programs.

Primary data collected for this study included surveys with end users and lighting contractors and in-depth interviews with program staff, lighting distributors and lighting manufacturers. Additionally, the study used PA program tracking data, engineering data from various engineering databases, and survey data from a prior study.

How the Results of the Study Impact each Identified Program’s Savings: Please refer to the tables in Section II.C.2 for each of the programs listed above.


Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why: The results of this study have been adopted.

A copy of the complete study can be found in Appendix C, Study 21.
4. **Final Commercial New Construction Customer Quantitative Profile Project 1A New Construction Market Characterization (Study 22)**

**Type of Study:** Market Assessment

**Objective of the Study:** The principal research objectives of the Commercial New Construction Customer Quantitative Profile are:

1. Develop a comprehensive characterization of the large C&I new construction market in Massachusetts, in terms of building type, size, ownership, geographic location, chain or franchise status, and energy use.
2. Assess how the trends for large C&I projects have changed over the past 15 years.
3. Characterize the presence of the PAs new construction program in the market in terms of the number of projects that participated in them and the portion of floor space and energy use they represent in key commercial market segments.

**Programs to which the Results of the Study Apply:**
- C&I New Construction and Major Renovation (Electric and Gas)
- C&I Large Retrofit (Electric and Gas)

**Recommendations Derived from the Study:** None.

**How the Study Came to the Recommended Conclusions:** The evaluation team acquired and analyzed the entire F. W. Dodge Players Database for non-residential construction projects for the State of Massachusetts for the years 1996 through 2009. The Dodge Players database contains retrospective information on C&I construction projects that, according to Dodge, have begun construction. A sample of new construction projects from the Dodge Database were matched with PA billing data and program tracking data to characterize the new construction market and assess program penetration.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:** Not Applicable.

A copy of the complete study can be found in Appendix C, Study 22.
5. Supply Chain Profile Project 1A New Construction Market Characterization (Study 23)

**Type of Study:** Market Assessment

**Objective of the Study:** The principal research objectives of the New Construction Supply Chain Profile are:
- Characterize the design, engineering, and construction management firms involved with recent large commercial construction projects in Massachusetts.
- Characterize the design and specification practices with regard to energy efficiency.
- Assess changes in design and specification practices as a result of contact with the program.
- Assess awareness and participation in new construction programs offered by the PAs.

**Programs to which the Results of the Study Apply:**
- C&I New Construction and Major Renovation (Electric and Gas)
- C&I Large Retrofit (Electric and Gas)

**Recommendations Derived from the Study:**

<table>
<thead>
<tr>
<th></th>
<th>Consider alternative incentive approaches such as tiered incentives for higher levels of efficiency. Consider expanding financial or technical assistance offerings for life cycle cost analysis to demonstrate the longer term value of accepting higher first costs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Improve the value of technical assistance offerings by being consistently engaged with project design teams. The impact of the utility intervention is not fully realized because information about incentives and alternative technologies choice is not delivered on time to design teams. Modeling firms need to quickly upgrade models and turnaround results to customers.</td>
</tr>
<tr>
<td>3</td>
<td>Assist architects and engineers in understanding appropriate high performance building envelope design strategies for the Massachusetts climate. We suggest a two pronged approach to advance high performance envelope design: 1) Convene a working group consisting of stakeholders to study the challenges associated with high performance building envelope design, and 2) based on input from the working group, commission a study of advanced building envelope designs beyond what is required by code and provide examples of appropriate, high performance designs for Massachusetts.</td>
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<tr>
<td>4</td>
<td>Continue to build upon educational seminars, similar to Advanced Building seminars, to provide education and programmatic support on integrated design and whole building performance.</td>
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<tr>
<td>5</td>
<td>Streamline the application process by reducing the amount of paperwork that is required for participation.</td>
</tr>
<tr>
<td>6</td>
<td>Establish contacts within the top 25 architects, design engineers and construction management firms.</td>
</tr>
</tbody>
</table>

**How the Study Came to the Recommended Conclusions:** The New Construction Supply Chain Profile included an examination of the F. W. Dodge Players Database for non-residential construction projects in Massachusetts as well as in-depth Interviews with 31 architects, 11 design engineers, and 9 construction engineers.

**If the Results of the Study are Not Adopted, Fully Explain Why:** The Program Administrators are reviewing the results of the study and are considering how to implement the recommendations at this time. The recommendations resulting from this study are based on solely on interviews with market actors in the commercial new construction market and therefore do not necessarily provide a complete view of the program delivery.

A copy of the complete study can be found in Appendix C, Study 23.
6. **Final Report Project 1B Chain & Franchise Market Characterization (Study 24)**

**Type of Study:** Market Assessment

**Objective of the Study:** The principal research objectives of the Chain & Franchise ("C&F") Market Characterization are:

1. Characterize the C&F market in Massachusetts, including estimates of size and key segments (big box, retail, restaurant, etc).
2. Identify the key decision-maker at C&F customers and the major barriers to the adoption of energy efficiency measures.
3. Understand the decision-making process, in particular free-ridership, regarding energy efficiency at C&F businesses in Massachusetts and in comparable non-program states.
4. Assess the current level of program participation and methods to increase participation.
5. Identify the opportunities for increased energy efficiency through on-site inventories of building shell characteristics, end use technologies, and missed opportunities.

**Programs to which the Results of the Study Apply:**

- C&I New Construction and Major Renovation (Electric and Gas)
- C&I Large Retrofit (Electric and Gas)

**Recommendations Derived from the Study:** There are no recommendations for program changes resulting from the study.

**How the Study Came to the Recommended Conclusions:** This project included the follow research activities:

- Literature Review of existing C&F studies.
- Re-analysis of interview data from past NSTAR C&I program impact evaluations in order to investigate potential differences in free-ridership and spillover rates of C&F and non-C&F participants.
- A Customer Quantitative Profile of the C&F Market. This analysis characterizes the size and composition of the population of Massachusetts’ C&F customers.
- In-depth Interviews with PA National Account Managers and Chain & Franchise company managers.
**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:** There are no recommendations for program changes resulting from the study.

A copy of the complete study can be found in Appendix C, Study 24.
7. **Impact Evaluation of 2009 Custom HVAC Installations (Study 25)**

**Type of Study:** Impact

**Objective of the Study:** The objective of this impact evaluation is to provide verification or re-estimation of electric energy and demand savings estimates for 29 Custom HVAC projects through site-specific inspection, monitoring, and analysis. The results of this study are the final realization rates for Custom HVAC energy efficiency measures.

**Programs to which the Results of the Study Apply:**
- C&I New Construction and Major Renovation (Electric)
- C&I Large Retrofit (Electric)

**Results of the Study and How the Study Determined those Results:** The final Custom HVAC realization rates are calculated using statistical weightings of the results of the (29) studied Custom HVAC applications. This calculation is explained in detail in Section 3 of the “Impact Evaluation of 2009 Custom HVAC Installations” report.

The final Custom HVAC realization rates are calculated individually for National Grid and NSTAR, and at the statewide level. Site level evaluated results are determined through site inspection, data collection and engineering analysis. Analysis methods include spreadsheet and building simulation modeling.

**How the Results of the Study Impact each Identified Program’s Savings:** Please refer to the tables in Section II.C.2 for each of the programs listed above.


**If the Results of the Study are Not Adopted, Fully Explain Why:** The results of this study have been adopted.

A copy of the complete study can be found in Appendix C, Study 25.
8. **Final Report Project 1C Combined Heat & Power Market Characterization (Study 26)**

**Type of Study:** Market Assessment

**Objective of the Study:** The principal research objectives of the Combined Heat & Power (CHP) Market Characterization are:

1. Characterize the CHP market including key players and market segments.
2. Understand the decision making processes used by potential CHP customers including reasons customers elect to install CHP, selection of specific types or configurations of CHP, and the factors most influencing decisions to purchase CHP systems.
3. Identify the current mix of CHP technologies including the CHP systems types deployed, installed and operating costs of the technologies, and identify anticipated changes in the CHP market or improvements in the technologies.
4. Identify barriers impacting entry for customers including the key factors that dissuade potential customers from evaluating CHP technologies or have led customers who evaluated CHP technologies to decide not to install it.
5. Estimate CHP opportunities by key market segments and provide PAs with a list of customers likely suitable for CHP.

**Programs to which the Results of the Study Apply:**

- C&I New Construction and Major Renovation (Electric)
- C&I Large Retrofit (Electric)

**Recommendations Derived from the Study:** The CHP Market Characterization’s six short-term recommendations are provided in the following table. For a more detailed discussion please refer to the full report.

<table>
<thead>
<tr>
<th></th>
<th><strong>Recommendations</strong></th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td><strong>Determine realistically achievable targets.</strong> Energy-saving goals of the Program are tied to the time it takes to sell, install and commission CHP systems. The PAs can help insure the Program achieves these goals by taking into account the project development timeframes and establishing a “pipeline” approach that associates the different market segments to the anticipated timeframes.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Outreach to large sites.</strong> The PAs should identify and reach out to high-value large sites using the Account Executive (AE) teams from the different utilities.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Focused outreach for under 300 kW.</strong> For sites 60 – 300 kW, the PAs should work with partners to promote the incentive program. The PAs role with these</td>
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</table>
customers is to build the credibility of CHP technology and act as the role of energy advisor by providing customers with an integrated solution of energy efficiency measures including CHP systems.

<table>
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<tr>
<th>4</th>
<th><strong>Training Using Webinars.</strong> The evaluation team understands that planning for webinar training sessions is currently underway via the PA Implementers’ CHP Working Group. The evaluation team supports this endeavor and recommends training session in several areas.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td><strong>Program Stability-Coordination.</strong> The program should consider increased coordination with other CHP initiatives (i.e. Alternative Energy Portfolio Standards requirements) to leverage overlapping requirements for cost-effective execution of both programs. Specific areas of consideration include the development of consistent metering approaches.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Partners to collaborate.</strong> The program should consider collaborations with existing groups such as trade groups, vendor associations, and customer groups with the goal of leveraging existing mass marketing efforts.</td>
</tr>
</tbody>
</table>

**How the Study Came to the Recommended Conclusions:** The CHP Market Characterization included the follow research activities:

- Literature Review of existing major CHP support programs in the U.S.
- In-depth Interviews with CHP Program staff, 10 CHP vendors, 10 current users of CHP, and 10 potential users of CHP.
- Quantitative Market Assessment based on gas billing data. This task identified high-value CHP opportunities, in terms of number of customers, business types, and equipment size category in the service territories served by the PAs.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:** The PAs are reviewing all recommendations, but have not developed specific plans for adoption of each recommendation yet.

A copy of the complete study can be found in Appendix C, Study 26.
9. Project 6B Comprehensive Design Approach Process Evaluation (Study 27)

**Type of Study:** Process

**Objective of the Study:** This process evaluation had two research objectives. The first was to examine whether the Comprehensive Design Approach (CDA) track of the C&I New Construction programs being delivered by National Grid, Western Massachusetts Electric Company and NSTAR are meeting their primary goals. These primary goals are to: 1) maximize energy and demand reduction in new construction projects; and 2) influence energy efficiency best practices in the commercial design sector.

The second research objective was to conduct a comparative study of the Advanced Buildings (AB) track. This study compares the AB tracks delivered by the Massachusetts PAs to those delivered in Maine and Vermont.

**Programs to which the Results of the Study Apply:**
- C&I New Construction and Major Renovation (Electric and Gas)

**Recommendations Derived from the Study:**

<table>
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<tr>
<th>Recommendation Summaries for CDA Track</th>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
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</table>
3. Since AEs are usually the first to hear about new construction projects, the PAs should ensure that they are well informed about the CDA track so that they can explain the program requirements and benefits to customers when they are first in contact about a potentially qualifying project. AEs are in a unique position to guide customers with appropriate projects towards the use of the CDA track since they interact most directly with potential participants in the C&I sector.

4. Incorporate the tracking of project leads into a database so that program staff and AEs can learn about potentially qualifying CDA track projects in time for this approach to be used. AEs do look to new construction databases such as Reed Connect and Dodge, but a centralized repository of information does not exist. This type of database would assist AEs in the identification and monitoring of potential CDA participants and would potentially increase participation in this track.

5. By focusing on educating potential design team members about the CDA through workshops and “lunch and learn” events, in addition to informing customers via AEs, PAs are more likely to have their customers learn of CDA track benefits. According to the new construction PA program managers, customers usually hear about the CDA from AEs. Doing more outreach to the design community could increase the pool of CDA projects.

6. The PAs should increase their distribution of marketing materials to its customers and potential design team members to more effectively market the CDA track. It would be worthwhile to invest in the development of CDA-specific brochures to mail out to potential participants, architects, and engineers so they are aware of the track prior to developing building plans.

7. Create a database, or annual report, of past program participants to document all information about their CDA projects. This will allow AEs to actively follow up with these participants on a regular basis to make sure that they do not miss an opportunity to use the CDA track for future projects. If a database is created, it can also be used to track inquiries made by customers about new construction program approaches so that these customers can be actively marketed to as well.

8. Divide the rebate payment up into milestone payments over the course of the project. This recommendation was based on feedback from participants who said it would be beneficial to receive more of the incentive payments upfront, as they could be used to help finance construction costs and would be especially useful given the current state of the economy.
<p>| | |</p>
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<tr>
<td><strong>9</strong></td>
<td>Rather than assuming the CDA will provide the largest incentives to customers, the PAs should evaluate the total incentives customers would be eligible to receive under each of the approaches. During interviews with CDA non-participants, the evaluation team did find two cases where incentives were actually larger under the alternative program tracks (e.g., AB track and a combination of the prescriptive and custom tracks) than they were under CDA.</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Target CDA marketing towards the market segments that have historically used and benefited from the CDA as a way to increase participation in this track. Certain market sectors -- such as schools, universities, hospitals, supermarkets, and biotech/pharmaceutical companies -- participate in the CDA track more than others. Brochures describing projects specific to these sectors could be created and distributed to potential participants as a way to show how customers in the same lines of business benefited from addressing energy efficiency in a comprehensive manner.</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Designate a project champion to ensure clear communications among the various projects involved in a CDA project. This would be especially useful during the construction phases to minimize the chance that contractors would make an unwarranted equipment substitution.</td>
</tr>
<tr>
<td><strong>12</strong></td>
<td>Streamline the processes related to the implementation and delivery of the CDA track. The CDA processes were acknowledged to have improved over time, yet there were multiple observations indicating that they still need to be further streamlined. A key complaint was the time required to get the PA’s review and approval for a design plan and application. Some projects did not participate because necessary approvals could not be obtained in time to meet the project schedule.</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>PAs should offer more diverse applications of systems and technology opportunities through the CDA track. Fuel switching and the inclusion of renewable fuels were recommended applications. This provides customers with a variety of implementation possibilities and ensures incentives are not limited to a certain set of technologies.</td>
</tr>
<tr>
<td><strong>14</strong></td>
<td>Improve CDA tracking systems: The process evaluation had a number of recommendations for improving the CDA data tracking systems including storing electronic copies of project documentation, making CDA reporting more specific, allowing more accessible tracking of measure-level information, expanding the scope of data tracking, addressing the need for data-entry support, and incorporating the tracking of project leads.</td>
</tr>
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</table>
### Recommendation Summaries for AB Track

<p>|   | <strong>Foster personal relationships with design teams and customers:</strong> An effective implementation plan leverages the strong awareness among the design community to expand awareness at the customer level. A vital component of this strategy is an established rapport between the design community and specific individuals at the program office. The evaluation team recommends the intimate approach used by Efficiency Maine in which they assign 1-2 persons to a given project. This allows the program staff to develop personal relationships with program participants and encourages more proactive communications. |
|   | <strong>Take advantage of green marketing opportunities:</strong> An effective implementation plan takes advantage of the favorable environment of “green building.” Efficiency Vermont, for example, supports the construction of Advanced Buildings with press releases, letters of recognition and NBI certification plaques. These elements of green advertising are particularly attractive to institutional customers, such as universities, who place significant value upon their public image. In Massachusetts, however, none of these green marketing strategies were observed among the implementation activities. |
|   | <strong>Emphasize importance of long-term savings:</strong> While there is no remedy for the downturn in new construction, it is possible to mitigate the budgetary concerns of customers. A successful program design may benefit from shifting the emphasis from incentives to long-term savings. |
|   | <strong>Maintain interest with follow-up communications:</strong> It is important for program staff to take a proactive approach in maintaining customer and design team interest. Program staff can’t afford to wait for the owner or design firm to call when the critical steps are being made. Staff has to stay on top of the project and do its own duty to ensure that the owners and design team are staying on track. |
|   | <strong>Improve lead tracking:</strong> A cohesive system of documenting and monitoring the status of program leads is important to the success of program implementation. For example, Efficiency Maine employs Efficiency Reporting &amp; Tracking, an online database, to track project leads, contact and status descriptors. Among the PAs program staff did not use such a method of tracking prospective customers. In the case of National Grid and NSTAR, information such as customers contacted, outreach efforts, and lead status are not linked to their respective tracking system, InDemand or eTrack. According to program managers, the progress and status of project leads is documented in a spreadsheet, which is typically not shared among various levels of staff. |</p>
<table>
<thead>
<tr>
<th></th>
<th><strong>Minimize customer burden:</strong> One of the greatest deterrents to program participation has been apprehension regarding the application process. Therefore an effective implementation strategy should make it well known to customers and design firms that staff will be available to assist in filling out application forms and understanding program requirements. The Efficiency Maine staff said they made ease-of-use a selling point for potential customers.</th>
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<tbody>
<tr>
<td></td>
<td><strong>Take advantage of American Institute of Architects (“AIA”) continuing education requirements:</strong> An excellent method of engaging the design community is to take advantage of the AIA continuing education requirements. In order to attract design firms, some implementers offer Advanced Buildings seminars paired with continuing education courses valid for credit towards the continuing education requirement. Under the current MassSave platform, attendees may earn four AIA Learning Units but are required to pay $199 per session. PAs should consider waiving this fee in order to increase participation among harder-to-reach firms.</td>
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<td></td>
<td><strong>Anticipate advancements in code and standard practice:</strong> The National Building Institute (“NBI”) – which develops rules for the AB track -- has not been diligent in maintaining AB requirements that exceed building code to a satisfactory degree. The PAs have been active in pushing NBI to keep their product ahead of the model codes. The PA should continue to push NBI to maintain program requirements well ahead of recent code developments and standard building practices.</td>
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<tr>
<td></td>
<td><strong>Present the AB track as a learning opportunity for design firms:</strong> One interviewee suggested that the architects and engineers who work on AB projects are not necessarily of the same caliber as those who work on CDA projects. The program can advertise the expertise brought by experienced program staff as a means of attracting design teams to working with the program.</td>
</tr>
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<td></td>
<td><strong>Discuss ideas with design team before presenting them to the customer:</strong> The actions of program staff have shown that it is best to work out any suggestions or changes to the design plan prior to engaging the customer in significant decisions regarding energy efficiency measures. Such consideration is useful in maintaining the support and cooperation of the involved design firms.</td>
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<tr>
<td></td>
<td><strong>Maintain “soft cap” on building size:</strong> Program staff has been receptive towards accommodating a wide range of buildings types, regardless of whether or not the building exceeds stipulated size guidelines. The AB track is offered as an option even for those building greater than 100,000 square feet so that customers are never reluctantly pushed towards the CDA track as the result of size requirements. It is the responsibility of NBI to issue some guiding principles regarding how such offers or exceptions should be framed.</td>
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<td></td>
<td>Investigate “box” retail stores as a potential customer segment: It is recommended that NBI examine the designs of various large retailers with respect to code requirements to identify any buildings that are performing below their potential efficiency. If certain big box stores are not using an efficient building design, program staff should investigate the contributing factors and explore opportunities for program participation. Program implementers can exploit these inefficient building designs and possibly tap into a new customer segment.</td>
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<tr>
<td></td>
<td>Consider the benefits of a common platform: Under the MassSave initiative, the PAs have already taken the first steps in creating such a platform. It is unlikely, however, that various implementers will come to a consensus because there are obvious difficulties in making uniform the AB platform. While it is assumed that the MassSave platform is working with the PAs to attain uniformity in implementation, design and marketing, the evaluation team feels that this objective is worth restating in the specific context of program branding.</td>
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</tbody>
</table>

**How the Study came to the Recommended Conclusions:** Both the CDA and AB process evaluations relied primarily on in-depth interviews for their program findings. These evaluations completed 58 in-depth interviews with participating and non-participating customers; participating design teams; PA C&I new construction program managers and staff; PA Account Executives; PA technical staff; Technical assistance consultants; and AB program managers and staff in Massachusetts, Maine, and Vermont and other AB program actors. The evaluations also reviewed 24 new construction projects for a case study analysis. Finally the evaluators also reviewed program tracking databases, program marketing materials, and other program documents.

**Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why:** The PAs are reviewing all recommendations, but have not developed specific plans for adoption of each recommendation yet.

A copy of the complete study can be found in Appendix C, Study 27.
10. *Impact Evaluation of 2008 and 2009 Custom CDA Installations (Study 28)*

**Type of Study:** Impact

**Objective of the Study:** The objective of this impact evaluation is to provide verification or re-estimation of electric energy and demand savings estimates for five Custom CDA projects through site-specific inspection, monitoring, and analysis. The results of this study are the final realization rates for Custom Comprehensive energy efficiency measures.

**Programs to which the Results of the Study Apply:**
- C&I New Construction and Major Renovation (Electric)

**Results of the Study and How the Study Determined those Results:** The final realization rates are calculated using statistical weightings of the results of the five studied Custom CDA applications. This calculation is explained in detail in Section 3 of the report. Site level evaluated results are determined through site inspection, data collection and engineering analysis. Analysis methods included building simulation modeling. National Grid specific results were used for National Grid while other PAs used statewide results.

**How the Results of the Study Impact each Identified Program’s Savings:** Please refer to the tables in Section II.C.2 for each of the programs listed above.


**If the Results of the Study are Not Adopted, Fully Explain Why:** All results have been adopted by the PAs.

A copy of the complete study can be found in Appendix C, Study 28.
**Type of Study:** Process

**Objective of the Study:** The objective of this process evaluation was to look at ways to improve the design and delivery of Massachusetts C&I energy efficiency programs that would be applicable to multiple programs. Issues that the PAs and the EEAC were particularly interested in included how to increase program participation levels, how to obtain deeper energy savings from energy efficiency projects, how to improve the integration of electric and gas energy efficiency programs, and how to increase the general uniformity of program delivery across the state.

**Programs to which the Results of the Study Apply:**
- C&I New Construction and Major Renovation (Electric and Gas)
- C&I Large Retrofit (Electric and Gas)

**Recommendations Derived from the Study:**

<table>
<thead>
<tr>
<th></th>
<th>Increase AE and technical advisor staffing levels:</th>
<th>Increase program incentive levels and limits:</th>
<th>Offer turnkey financing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interviewees with nearly all the PAs cited the need for additional staff to help achieve the expanded program savings goals. Adding AEs will allow more face-to-face meetings with customers, which should yield more projects. Adding technical staff will speed up the project technical analysis process (which was too slow according to some interviewees) and will help make up for the lack of technical knowledge among some AEs.</td>
<td>Many interviewees recommended increasing incentives in order to recruit more projects and achieve deeper savings. Raising the limit on the cumulative incentive allowed per project would help C&amp;I customers overcome barriers to participation related to lack of capital. Raising the maximum $/unit (kWh or therms) will encourage customers to install longer-payback measures which are critical to achieving the expanded program savings goals.</td>
<td>Nearly all program staff and AEs cited the lack of capital as the primary barrier preventing customers from moving forward with projects. A turnkey financing program to provide financing for eligible efficiency projects would help C&amp;I customers overcome the important lack-of-capital barrier. In 2011 the PAs are preparing to launch several prescriptive loan products for C&amp;I customers that would buy down the interest rate to 0%.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Improve the design of marketing materials:</strong> The AEs recommended that program marketing materials be easier to understand and make greater use of case studies and testimonials.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>5</td>
<td><strong>Organize AEs by industry sector:</strong> At least for the larger PAs, it may be more productive to organize all AEs by industry sector (e.g., vs. by geography). If AEs are only responsible for understanding a few select industries, this should improve their level of technical and business knowledge for those industries.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>Tie AE performance to program energy savings:</strong> PAs should consider tying AE bonuses to the level of savings achieved by the projects completed by their customers. Although some PAs currently do consider energy efficiency programs in AE performance assessments, it is not tied to a specific energy savings goal. Only one third of the AEs reported that the current performance structure clearly motivates them.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><strong>Systematize the process for making requests for technical assistance:</strong> A common complaint among AEs was that technical staff members did not reply promptly to their requests for technical assistance. AEs suggested establishing a central email inbox that technical staff can access and respond to questions. It would also be useful to develop clear guidelines for responding to most technical requests within a certain timeframe so that AEs can notify their customers when to expect a response.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td><strong>Help large C&amp;I customers establish long-term commitments to energy efficiency:</strong> At least one PA is developing multi-year non-binding commitments with the corporate management of their large C&amp;I customers to establish specific energy-saving goals. An efficiency plan should lead to longer-term consistent budgeting for energy projects and draw the attention of higher-level management.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**How the Study Came to the Recommended Conclusions:** These conclusions and recommendations are primarily based on 28 in-depth interviews with C&I program staff, AEs, and utility technical staff. These interviews were conducted in September and October 2010 and included representatives from seven different PAs.

**Explain Why Or Why Not The Program Administrator Decided To Adopt Recommendations From The Study:** The PAs have reviewed the recommendations resulting from this study. As stated in recommendation three, the PAs are now offering financing mechanisms to help address our customer’s capital constraints. All other recommendations are being considered for adoption by the PAs at this time.

A copy of the complete study can be found in Appendix C, Study 29.
12. 2010 Commercial and Industrial Electric Programs Free-ridership and Spillover Study (Study 30)

**Type of Study:** Impact

**Objective of the Study:** The primary objective of the 2010 program year free-ridership and spillover study was to quantifying the net impacts of the C&I electric energy efficiency programs by estimating the extent of program free-ridership, early participant “like” and “unlike” spillover, and non-participant “like” spillover.

**Programs to which the Results of the Study Apply:**
- C&I New Construction and Major Renovation (Electric)
- C&I Large Retrofit (Electric)
- C&I Small Retrofit (Electric)

**Results of the Study and How the Study Determined those Results:** The study produced free-ridership, participant spillover and non-participant spillover rates for each PA by end use. The methodology used for this year’s study follows the standardized methodology developed in 2010 and 2011 for the Massachusetts PAs for use in situations where end-users are able to report on program impacts via self-report methods. This study used telephone surveys with samples of 2010 program participants in each of the PAs’ C&I electric programs and with design professionals and equipment vendors involved in these 2010 installations.

**How the Results of the Study Impact each Identified Program’s Savings:** Please refer to the tables in Section II.C.2 for each of the programs listed above.


**If the Results of the Study are Not Adopted, Fully Explain Why:** All results have been adopted by the PAs.

A copy of the complete study can be found in Appendix C, Study 30.
13. **C&I Lighting Measure Life and Persistence Project (Study 31)**

**Type of Study:** Impact

**Objective of the Study:** To determine measure lives of five categories of lighting measures installed over a ten year period from 1999 to 2009 using statistical analysis techniques.

**Programs to which the Results of the Study Apply:**
- C&I New Construction and Major Renovation (Electric)
- C&I Large Retrofit (Electric)
- C&I Small Retrofit (Electric)

**Results of the Study and How the Study Determined those Results:** This study determined the measure life of each of five categories of C&I lighting by estimating their mean retention times, defined as the time at which half the units of the measure installed during a program year are not retained. Data for the survival analysis was collected during on site visits to 224 projects in New England and New York. Estimates from the survival analysis were also compared with research of secondary sources. Measure lives for each category were also estimated for two other strata of interest, self-reported operating hours and building type. All results are presented with a two-tailed error range at the 80% confidence interval.

**How the Results of the Study Impact each Identified Program’s Savings:** Please refer to the tables in Section II.C.2 for each of the programs listed above.


**If the Results of the Study are Not Adopted, Fully Explain Why:** The Massachusetts PAs have not yet determined how to apply the results of this study going forward. Application of the results requires consensus on the types of measures in each category that will be affected, differences between new construction versus retrofit installations and necessary changes to tracking system databases.

A copy of the complete study can be found in Appendix C, Study 31.
Type of Study: Impact


Programs to which the Results of the Study Apply:
- C&I New Construction and Major Renovation (Electric)
- C&I Large Retrofit (Electric)
- C&I Small Retrofit (Electric)

Results of the Study and How the Study Determined those Results: Through the use of data from lighting logger studies conducted by various Program Administrators in New England and New York since 2000 that covered 775 projects and utilized 3,780 loggers, Summer and Winter Coincidence factors for C&I lighting were derived.

How the Results of the Study Impact each Identified Program’s Savings: Please refer to the tables in Section II.C.2 for each of the programs listed above.


If the Results of the Study are Not Adopted, Fully Explain Why: A separate study conducted in 2010 by the Non-Residential Small Retrofit research area, Study 19 discussed above, determined winter on-peak (CF<sub>WP</sub>) coincidence factors for the Small C&I Retrofit program. Results from that study, where metering was conducted during the on-peak winter months, have been adopted instead of the values produced by this study.

A copy of the complete study can be found in Appendix C, Study 32.
Type of Study: Impact

Objective of the Study: The primary goal of this project was to develop weather normalized 8,760 (representing every hour of the year) cooling end-use load shapes to be used in the calculation of hourly savings for the target population of efficient unitary HVAC equipment promoted by efficiency programs in New England, New York and mid-Atlantic regions.

Programs to which the Results of the Study Apply:
- C&I New Construction and Major Renovation (Electric)

Results of the Study and How the Study Determined those Results: The results of the study are hourly weather normalized load shape profiles for different weather regions in the northeast. These profiles are then used to calculate the Equivalent Full Load Hours (EFLH) for the equipment and the coincidence factors for the ISO New England summer peak periods.

Results were determined through four to five months of direct on site energy metering at 511 individual units from May through October 2010. Metering data and weather for the period was then processed to develop an hourly annual load shape normalized to a typical meteorological year.

How the Results of the Study Impact each Identified Program’s Savings: Please refer to the tables in Section II.C.2 for each of the programs listed above.


If the Results of the Study are Not Adopted, Fully Explain Why: All results of the study have been adopted by the Program Administrators as follows:

Cape Light Compact - This study represents the best available information regarding installations in the Cape Light Compact’s territory for this end use. The Cape Light Compact has used the results of the study to create realization rates on energy and demand for the measures studied. These realization rates will apply to results for the 2010 and 2011 program years. For program years starting in 2012, the equivalent full
load hours and coincidence factors determined through this study will be used to calculate gross savings for installations in the Cape Light Compact’s service territory.

To calculate gross energy savings in 2010, Cape Light Compact used an equivalent full load hours of 777 for all installations. The results of this study are equivalent full load hour estimations encompassing all installations in the three load zones within Massachusetts. Cape Light Compact exists entirely within the SEMA load zone and therefore used only the results from this zone to calculate all realization rates. This calculation is shown in the following table.

<table>
<thead>
<tr>
<th>Load Zone</th>
<th>Cape Light Compact Load Zone Weight</th>
<th>NEEP Result EFLH</th>
<th>NEEP Result ISO-NE On-Peak Summer Coincidence Factor (1-5PM, WDNH, Jun-Aug)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEMA</td>
<td>1.0000</td>
<td>1,172</td>
<td>0.448</td>
</tr>
<tr>
<td>NEMA</td>
<td>0.0000</td>
<td>1,172</td>
<td>0.448</td>
</tr>
<tr>
<td>WCMA</td>
<td>0.0000</td>
<td>719</td>
<td>0.332</td>
</tr>
<tr>
<td>Cape Light Compact Results</td>
<td></td>
<td>1,172</td>
<td>0.448</td>
</tr>
<tr>
<td>Gross Estimate</td>
<td></td>
<td>777</td>
<td>0.820</td>
</tr>
<tr>
<td>Realization Rate</td>
<td></td>
<td>150.08%</td>
<td>54.63%</td>
</tr>
</tbody>
</table>

Net Savings for each installation, before Freeridership and Spillover adjustment, is therefore calculated as:

$$\Delta kW_h = \left(\frac{k \text{Btu}}{h}\right) \left(\frac{\Delta I}{SEER}\right) \left(\frac{777h}{150.08\%}\right)$$

$$\Delta kW \text{ Summer} = \left(\frac{k \text{Btu}}{h}\right) \Delta kW \left(0.820\right) \left(54.63\%\right)$$

See the TRM for further discussion of this measure and details on the equations used.

**National Grid** - This study represents the best available information regarding installations in National Grid’s territory for this end use. National Grid has used the results of the study to create realization rates on energy and demand for the measures studied. These realization rates will apply to results for the 2010 and 2011 program years. For program years starting in 2012, the equivalent full load hours and coincidence factors determined through this study will be used to calculate gross savings for installations in National Grid’s service territory.

To calculate gross energy savings in 2010, National Grid used an equivalent full load hours of 777 for all installations. The results of this study are equivalent full load hour
estimations encompassing all installations in the three load zones within Massachusetts. National Grid has chosen to use its load zone peak demands to consolidate the three zones into one National Grid specific value. This calculation was also done for the summer coincidence factor. This calculation is shown in the following table.

<table>
<thead>
<tr>
<th>Load Zone</th>
<th>National Grid Load Zone Weight</th>
<th>NEEP Result ISO-NE On-Peak Summer Coincidence Factor (1-5PM, WDNH, Jun-Aug)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEMA</td>
<td>0.3234</td>
<td>1,172</td>
</tr>
<tr>
<td>NEMA</td>
<td>0.2378</td>
<td>1,172</td>
</tr>
<tr>
<td>WCMA</td>
<td>0.4388</td>
<td>719</td>
</tr>
<tr>
<td>National Grid Results</td>
<td>973</td>
<td>0.397</td>
</tr>
<tr>
<td>Gross Estimate</td>
<td>777</td>
<td>0.441</td>
</tr>
<tr>
<td>Realization Rate</td>
<td>125.23%</td>
<td>89.94%</td>
</tr>
</tbody>
</table>

Net Savings for each installation, before Freeridership and Spillover adjustment, is therefore calculated as.

\[
\Delta kWh = \left(\frac{kBtu}{h}\right)\left(\Delta t / \text{SEER}\right)\left(777h\right)\left(125.23\%\right)
\]

\[
\Delta kW \text{ Summer} = \left(\frac{kBtu}{h}\right)\left(\Delta kW\right)\left(0.441\right)\left(89.94\%\right)
\]

See the TRM for further discussion of this measure and details on the equations used.

**NSTAR** - This study represents the best available information regarding installations in NSTAR’s territory for this end use. NSTAR has used the results of the study to create realization rates on energy and demand for the measures studied. These realization rates will be applied to results for the 2010 program year. For program year 2011 and beyond, the equivalent full load hours and coincidence factors determined through this study will be used to calculate gross savings for installations in NSTAR’s service territory.

To calculate gross energy savings in 2010, NSTAR used several equivalent full load hour values, depending on the type of installation. The results of this study are equivalent full load hour estimations encompassing all installations in the three load zones within Massachusetts. NSTAR’s service territory is contained within the NEMA and SEMA load zones. The realization rate developed for 2010, as indicated in the table below, is based on an analysis of savings for all 2010 unitary HVAC equipment measures in the company’s tracking system.
Unitil - This study represents the best available information regarding installations in Unitil’s territory for this end use. Unitil has used the results of the study to create realization rates on energy and demand for the measures studied. These realization rates will apply to results for the 2010 and 2011 program years. For program years starting in 2012, the equivalent full load hours and coincidence factors determined through this study will be used to calculate gross savings for installations in Unitil’s service territory.

To calculate gross energy savings in 2010, Unitil used an equivalent full load hours of 777 for all installations. The results of the NEEP study are equivalent full load hour estimations encompassing all installations in the three load zones within Massachusetts. Unitil exists entirely within the WCMA load zone and therefore used only the results from this zone to calculate all realization rates. This calculation is shown in the following table.

<table>
<thead>
<tr>
<th>Load Zone</th>
<th>Unitil Load Zone Weight</th>
<th>NEEP Result EFLH</th>
<th>NEEP Result ISO-NE On-Peak Summer Coincidence Factor (1-5PM, WDNH, Jun-Aug)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEMA</td>
<td>0.0000</td>
<td>1,172</td>
<td>0.448</td>
</tr>
<tr>
<td>NEMA</td>
<td>0.0000</td>
<td>1,172</td>
<td>0.448</td>
</tr>
<tr>
<td>WCMA</td>
<td>1.0000</td>
<td>719</td>
<td>0.332</td>
</tr>
<tr>
<td><strong>Unitil Results</strong></td>
<td></td>
<td><strong>719</strong></td>
<td><strong>0.332</strong></td>
</tr>
<tr>
<td><strong>Gross Estimate</strong></td>
<td></td>
<td><strong>777</strong></td>
<td><strong>0.820</strong></td>
</tr>
<tr>
<td><strong>Realization Rate</strong></td>
<td></td>
<td><strong>92.53%</strong></td>
<td><strong>40.49%</strong></td>
</tr>
</tbody>
</table>

Net Savings for each installation, before Freeridership and Spillover adjustment, is therefore calculated as.
\[ \Delta kWh = \left(\frac{kBtu}{h}\right)\left(\Delta 1 / \text{SEER}\right)(777h)(92.53\%) \]

\[ \Delta kW \text{ Summer} = \left(\frac{kBtu}{h}\right)(\Delta kW)(0.82)(40.49\%) \]

See the TRM for further discussion of this measure and details on the equations used.

**WMECO** - The best available information for WMECo is the realization rates from the WMECo-specific Large C&I evaluation study completed in May 2011. That study provides one realization rate for all WMECo HVAC in its Large C&I programs.

Since WMECo uses site-specific operating hours in most cases, and default operating hours in just a few, the retrospective use of the NEEP Unitary HVAC study is problematic, since its use would require a substantial number of site-specific calculations instead of a blanket calculation. In addition, WMECo lacks a separate category for unitary HVAC; we group it in with all HVAC. Since unitary HVAC is only a few percent of all HVAC, reverse calculating a (residual) realization rate for all other WMECo HVAC, from the WMECo-specific study, would not be worth the cost of doing so.

However, for program years starting in 2012, the equivalent full load hours and coincidence factors determined through the NEEP study will be used as defaults to calculate gross savings for installations in the WMECo’s service territory.

A copy of the complete study can be found in Appendix C, Study 33.
Type of Study: Process

Objective of the Study: The focus of this study was on the general methods for estimating what would have happened absent C&I programs in Massachusetts. The net program effect is the observed effect, less the estimate of what would have happened absent the program. The objectives of this study were to develop a standardized methodology for situations where C&I end-users are able to report on program impacts via self-report methods, and to provide a decision framework and guidelines for when the standardized self-report methodology is appropriate and when other methods need to be used (e.g., upstream programs).

Programs to which the Results of the Study Apply:
- C&I New Construction and Major Renovation (Electric & Gas)
- C&I Large Retrofit (Electric & Gas)
- C&I Small Retrofit (Electric & Gas)

Recommendations Derived from the Study: There were no recommendations derived from this study, rather, the study suggested methodologies for PAs to consider in future NTG evaluations.

Explain Why Or Why Not The Program Administrator Decided To Adopt Recommendations From The Study: The Company will incorporate the findings of this study into the planning process for future evaluations of Net-to-Gross ratios for C&I programs.

A copy of the complete study can be found in Appendix C, Study 34.
Type of Study: Impact

Objective of the Study: The objective of this impact evaluation was to develop annual gas savings impacts for all five size categories of prescriptive condensing boilers installed through the C&I gas programs.

Programs to which the Results of the Study Apply:
- C&I New Construction and Major Renovation (Gas)
- C&I Large Retrofit (Gas)

Results of the Study and How the Study Determined those Results: The study produced impact estimates for condensing boilers in all size categories. The results were also presented as realization rates to apply to prescribed or deemed savings provided in the 2011 Program Year TRM. The results were developed using billing data with telephone and on-site sample interview results to update estimates of site-level savings. The updated results were combined in a ratio estimator framework to produce estimates of realization rates and impacts.

How the Results of the Study Impact each Identified Program’s Savings: Please refer to the tables in Section II.C.2 for each of the programs listed above.


If the Results of the Study are Not Adopted, Fully Explain Why: All results have been adopted by the Program Administrators.

A copy of the complete study can be found in Appendix C, Study 35.
E. Special and Cross Sector Studies

1. Industry Practices and Policies on Energy Efficiency Program Rebate/Incentives (Study 36)

Type of Study: Process

Objective of the Study: The research team conducted a high-level scoping study of statewide energy efficiency program incentive and rebate levels to help inform the policy debate for statewide programs in Massachusetts and to support fourth quarter 2010 programmatic planning.

Programs to which the Results of the Study Apply:
- ENERGY STAR Lighting (Electric)
- Residential Cooling and Heating Program (Electric)
- Residential Heating and Water Heating (Gas)
- Residential Weatherization (Gas)
- C&I Large Retrofit (Electric)
- C&I Small Retrofit (Electric)
- C&I Retrofit (Gas)
- C&I Direct Install (Gas)

Recommendations Derived from the Study: The study presented key findings without specific recommendations. The key findings indicated that residential incentives and rebates in Massachusetts were not consistently higher or lower than those in the other states programs. Those incentives that were not in the mid-range when compared to other industry programs included:

- Residential gas furnace incentives in Massachusetts are among the higher incentives offered and are currently under review. Massachusetts also ranked the highest for hot water boiler rebates.
- Massachusetts weatherization incentives fall in the upper half of offerings, but these are complex programs and difficult to compare.
- Massachusetts commercial rebates examined for lighting were on the low end of lighting rebates offered in other states.
• The Massachusetts small business incentive at 70 percent of installed cost of existing building projects is higher than two other state programs and higher than the cap on custom incentives for large commercial projects.

• Massachusetts rebates appear to be at the high end of offerings in other states for hot-air furnaces.

**Explain Why Or Why Not The Program Administrator Decided To Adopt Recommendations From The Study:** The PAs are reviewing all recommendations, but have not developed specific plans for adoption of each recommendation yet.

A copy of the complete study can be found in Appendix C, Study 36.
## 2. Community Based Partnership Interim Process Evaluation (Study 37)

**Type of Study:** Process

**Objective of the Study:** The overall objectives of the evaluation are to assess the effectiveness of each community-based partnership that falls within the scope of the evaluation and determine their potential for replication and/or full-scale implementation. As the evaluation of community-based partnerships is still ongoing, the *Interim Process Evaluation* provides an overview of each effort’s structure and performance against the goals and presents findings from the research activities already conducted with a goal of providing early feedback and identifying areas for program improvement early on. The report also presents comparative analysis of community-based efforts under evaluation with the goal of developing best practices for design and implementation of such efforts.

**Programs to which the Results of the Study Apply:**
- Renew Boston (Electric & Gas)
- Western Mass Saves Challenge (Electric)
- New Bedford Community Mobilization Initiative (Electric & Gas)

**Recommendations Derived from the Study:**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th><strong>Articulate program design to reflect the target market</strong> – when planning and designing a community outreach effort, it is important to lay out what each partnership is intending to accomplish, why such an effort is needed for a specific population, and how they fit into existing programs. This will help ensure that the target audience and barriers are clearly documented, and the most effective interventions are selected.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td><strong>Draw on the strengths of local and existing resources and ensure that the community group efforts align with partnership goals</strong> – while there is no right or wrong model for structuring a community engagement network, it is important to consider the existing infrastructure and the amount of resources required to engage the network when planning and designing a community-based effort. A full analysis of the financial and local resources may also enhance these efforts. In addition, program leaders or organizers should focus local organizations on their strengths and, where relevant, consider the sustainability of the effort if this is a desired outcome.</td>
</tr>
</tbody>
</table>
Understand the unique nature of the target market – community-based efforts could benefit from bringing together local knowledge on the front end and revisiting the existing program designs to ensure that they are anticipating unique characteristics in the population to the extent that they can prior to fielding the effort. This would include looking beyond the assumed cultural barriers to understand what other logistical or technical barriers may present a challenge to program implementation in the specific market (and finding resources to overcome these challenges). Pre-screening communities and their barriers will be useful to this effort.

Tracking information to help improve efforts and demonstrate success – tracking core performance metrics is integral to the success of any effort. Effective tracking is essential to measuring milestones and progress, as well as energy impacts of community-based efforts. When designing and implementing community-based efforts, stakeholders should carefully consider which performance metrics to track, and develop mechanisms to track them, while balancing this effort with resource constraints.

How the Study Came to the Recommended Conclusions: The findings presented in the study were developed through analysis of program materials and tracking databases, in-depth interviews with the PA staff, and in-depth interviews with program stakeholders and community groups. As part of the research, the evaluation team has also conducted a literature review of community-based programs implemented across the United States, and developed both partnership-specific logic models and an overarching theory of change for community-based partnerships. Additional primary research will be conducted in 2011.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study, and Why: These initial findings are targeted at future efforts, and will be considered by the PAs and interested stakeholders as additional efforts are launched.

A copy of the complete study can be found in Appendix C, Study 37.
F. Future Studies

Table III.B details the studies in each of the six research areas that are either ongoing, or planned for the next evaluation cycle. The list is not finalized, as discussions in each of the six research areas are still underway.

<table>
<thead>
<tr>
<th>Studies</th>
<th>Docket &amp; Exhibit Approving Planned Evaluation Studies</th>
<th>Expected to be Implemented as Approved? (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Products - Market assessment on CFL use, saturation and reported purchase behaviors</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential Products - Shelf stocking survey of MA retailers</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential Products - Lighting Exploratory Evaluation</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential Retrofit &amp; Low Income - Impact evaluation of Mass Save program</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential Retrofit &amp; Low Income - Potential Study of the Multifamily Program</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010). Study was initiated prior to the filing of the MTM.</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential Retrofit &amp; Low Income - Net-to-Gross study on Residential Cooling &amp; Heating Equipment (Cool Smart)</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential New Construction - Phase II: Baseline Study/Code Compliance Assessment</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential New Construction -</td>
<td>Study is pending approval</td>
<td>Yes</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Residential New Construction - Assessment of New Technologies</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential New Construction - Builder Focus Groups</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Low-Income Studies</strong></td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Commercial &amp; Industrial Studies</strong></td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Small C&amp;I - Lighting Fixture Summer Metering Impact Evaluation</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td>Small C&amp;I - Lighting Controls Impact Evaluation</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td>Large C&amp;I - Process Evaluation of the Large Commercial and Industrial Energy Efficiency Programs</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td>Large C&amp;I - Phase II: Non-Residential New Construction Market Assessment Study</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Large C&amp;I - Prescriptive Gas Measures Impact Evaluation</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Large C&amp;I - Custom Gas Measures Impact Evaluation</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Study Description</td>
<td>Status Details</td>
<td>Approval Status</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Large C&amp;I - Prescriptive Measure Impact Evaluation (Lighting, VSDs)</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Large C&amp;I - CHP Impact Evaluation</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Large C&amp;I – Impact of Gas Training</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Special &amp; Cross-Cutting Studies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase II: Behavioral Pilots</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Phase II: Community Based Pilots</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Phase II: Umbrella Marketing</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>C&amp;I Net-to-Gross Study</td>
<td>Study is pending approval of the 2011 MTM, D.P.U. 10-148, Exhibit C (filed Oct. 2010)</td>
<td>Yes</td>
</tr>
<tr>
<td>Non-Energy Impacts 2011 – Deep Energy Retrofit</td>
<td>Study is planned but not yet submitted for approval</td>
<td>Yes</td>
</tr>
</tbody>
</table>
IV. STATUTORY BUDGET REQUIREMENTS

A. Introduction

- The Green Communities Act requires that energy efficiency programs minimize administrative costs, utilize competitive procurement processes, and spend a certain amount on low-income programs. G.L. c. 25 §§ 19(a)-(c).

- For each sector, Tables VI.A through VI.C summarize and compare planned and actual program planning and administration (“PP&A”) costs, outsourced activities, and budget allocation, respectively.

B. Minimization of Administrative Costs

The most significant factor in the Company’s approach to controlling administrative costs is its active participation in the statewide planning process. While this participation requires a significant dedication of resources, over time, the benefits of collaborative planning, the adoption of consistent programs and processes and the coordination of program design, EM&V studies, and regulatory proceedings will outweigh the cost of participation and brings immense benefits to the Company’s customers. The extent and benefits of the statewide planning process were reflected in the Statewide Three-Year Electric/Gas Plans which created the over-arching framework for the Company’s individual Three-Year Plan filing. This included a significant commitment to competitive procurement and program integration, as well as other design features described in detail in both the Statewide and Company-specific Plans.

A second factor in the Company’s efforts to control administrative costs is its coordination of energy efficiency program delivery, where appropriate, with other customer service activities such as customer acquisition, key account management and trade ally relationships. For example, a key account manager may be in contact with a business customer to discuss electric or gas service or metering issues – at the same time they will seek to recruit the customer into the Company’s energy efficiency programs, and will then serve as a key point of contact through the process. Through this efficient use of staff resources, the Company is able to control the costs of delivering energy efficiency services to its customers.

The Company continues to be committed to managing its energy efficiency programs in the most cost-effective manner possible. This includes careful attention to controlling administrative costs. All of the Program Administrators recognize that high quality, effective administration at the lowest possible cost is essential to the delivery of quality programs and achievement of maximum benefits and savings to customers.
The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

The change from Planned to Actual percent of Total Program Costs was calculated as the difference of the other two percentages in the table above. The same calculation was performed at the sector level. No sector showed an increase greater than ten percent between planned and actual PP&A as a percent of total program costs.
C. Competitive Procurement

As shown in the right hand column in Table IV.B, "Total Activities," overall spending on combined PP&A, sales, technical assistance, and training, evaluation and marketing services were less than planned in each sector in 2010. The Company was able to perform these services and deliver energy savings while spending less than budgeted amounts. The difference from planned to actual spending on Total Outsource Activities and Total In House Activities generally tracked the difference in the spending on Total Activities for the same reason, with the exception of the Low Income sector, due to the unique characteristics of that program's administration.

The amounts shown for Competitively Procured services for 2010 are only those services that were procured in 2010 for which funds were expended; the amounts do not include expenditures in 2010 for services that were competitively procured in prior years. The Company is not able to say at this time whether outsourced services paid for in 2010 which were procured prior to 2010 were competitively procured or not. If no information was available on the competitive procurement of the services, the expenditures have been reported as "Non-Competitively Procured" in Table IV.B.
D. **Low-Income Spending**

<table>
<thead>
<tr>
<th>Customer Sector</th>
<th>Planned</th>
<th>Actual</th>
<th>Change from Planned to Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Program Costs</td>
<td>% of Total Program Costs</td>
<td>Total Program Costs</td>
</tr>
<tr>
<td>Residential</td>
<td>$43,185,660 $</td>
<td>35%</td>
<td>$40,059,035 $</td>
</tr>
<tr>
<td>Low-Income</td>
<td>$17,607,496 $</td>
<td>14%</td>
<td>$10,669,378 $</td>
</tr>
<tr>
<td>Commercial &amp; Industrial</td>
<td>$61,956,884 $</td>
<td>50%</td>
<td>$53,903,937 $</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$122,750,040 $</strong></td>
<td><strong>100%</strong></td>
<td><strong>$104,632,350 $</strong></td>
</tr>
</tbody>
</table>

Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

While lower than budgeted, National Grid’s actual low-income spending in 2010 met the statutory minimum of 10% of the amount expended for its electric energy efficiency programs.
V. PERFORMANCE INCENTIVES

Table VII summarizes the performance incentives earned by the Company for its successful delivery of energy efficiency programs in 2010.

<table>
<thead>
<tr>
<th>Incentive Components</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Actual Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings Mechanism</td>
<td>$2,721,304</td>
<td>$3,628,405</td>
<td>$4,535,507</td>
<td>$2,008,308</td>
</tr>
<tr>
<td>Value Mechanism</td>
<td>$2,060,827</td>
<td>$2,747,769</td>
<td>$3,434,711</td>
<td>$1,602,347</td>
</tr>
<tr>
<td>Performance Metrics</td>
<td>$1,508,401</td>
<td>$2,011,202</td>
<td>$2,514,002</td>
<td>$1,367,610</td>
</tr>
<tr>
<td>Total Incentive (before-tax)</td>
<td>$6,290,532</td>
<td>$8,387,376</td>
<td>$10,484,220</td>
<td>$8,191,302</td>
</tr>
<tr>
<td>Total Incentive (after-tax)</td>
<td>$3,823,071</td>
<td>$5,097,428</td>
<td>$6,371,785</td>
<td>$4,978,264</td>
</tr>
</tbody>
</table>

NOTES:
Tax rate used in calculations is 60.775%
Note: The Planned values are from the MA Three Year Plan 2012-2014, D.P.U. 09-116, Exhibit NG-6.

All supporting documentation for each performance incentive component can be found in Appendix D. There were no evaluation results that required the 25 percent EM&V impact bandwidth. For the Savings and Value Components of the performance incentive, the Company calculated its incentive as follows:

The Company calculated shareholder incentive per its approved Plan in D.P.U. 09-116. The Company achieved 91.1% of its planned benefits and 98.4% of its planned net benefits at the portfolio level, surpassing the 75% threshold required in order to earn both the savings and value portions of the shareholder incentive. Using evaluated results, the Company calculated the lifetime benefits and net benefits that each program achieved. The benefits were multiplied by the savings payout rate of $0.0072 and the net benefits were multiplied by the value payout rate of $0.0081, as approved in the Plan. This was done at the program level, as shown in Appendix D, to facilitate the allocation of earned performance incentives in the cost effectiveness calculations. The incentive dollars earned from performance metrics were aggregated at the sector level and allocated to each program based on the percentage of net benefits the program contributed to the sector total.

A table in Appendix D shows the application of this calculation methodology.

The table below shows a summary of the Company’s performance for each Performance Metric.
## National Grid 2010 Performance Metrics Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>National Grid Electric Final 2010 Production</th>
<th>National Grid Gas Final 2010 Production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESIDENTIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RES #1</td>
<td>Increase in # of Customers: Design</td>
<td>Increase in # of Customers: None -did not meet.</td>
</tr>
<tr>
<td>MassSAVE/Weatherization:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deeper Savings</td>
<td>Increase in Savings: Exemplary</td>
<td>Increase in Savings: Exemplary</td>
</tr>
<tr>
<td>RES #2</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>MassSAVE/Weatherization:</td>
<td>Increase Direct Installation (DI) bulb penetration</td>
<td>Exemplary</td>
</tr>
<tr>
<td>RES #3 CoolSmart</td>
<td>Threshold</td>
<td>N/A</td>
</tr>
<tr>
<td>RES #4 Community Initiatives</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>RES #5 MassSAVE:</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>Facilitate Inclusion of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent Energy Auditors</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LOW INCOME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Income #1. Hard to Reach Landlords</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>Low Income #2. New Measures</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>Low Income #3. Multi-family Building Inventory</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td><strong>COMMERCIAL AND INDUSTRIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I #1 Small Business Electric and Gas Integration</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>C&amp;I #2 Targeted Customer Segments</td>
<td>Exemplary</td>
<td>Threshold</td>
</tr>
<tr>
<td>C&amp;I #3 Combined Heat &amp; Power (CHP)</td>
<td>Exemplary</td>
<td>None -did not meet.</td>
</tr>
<tr>
<td>C&amp;I #4 Retrofit Depth of Savings</td>
<td>Exemplary</td>
<td>Threshold</td>
</tr>
<tr>
<td>C&amp;I #5 N/C Comprehensiveness and Depth of Savings</td>
<td>Exemplary</td>
<td>Design</td>
</tr>
<tr>
<td><strong>OTHER FUNDING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Program Funding</td>
<td>None -did not meet.</td>
<td>None -did not meet.</td>
</tr>
<tr>
<td>Other Financing Capital</td>
<td>Exemplary</td>
<td>None -did not meet.</td>
</tr>
</tbody>
</table>

163
Appendix D contains documentation supporting the Company’s performance, including a description of its role in each performance metric, especially for those designed on a statewide basis, and explain why the Program Administrator should earn the incentive associated with such metric.
VI. **AUDITS**

These reviews were completed by National Grid’s Internal Audit department between August 2006 and August 2011.

National Grid Audit Report No. 0223  
“Demand Side Management Program”  
Final Report January 12, 2007

**Covering:** New England (including Mass.) - electric

**Objective & Scope**
The overall objective of this review was to assess the adequacy of controls over the demand side management programs.  
The scope of our work focused on the incentive calculation and integrity of the underlying supporting data.  
Our work included the following steps:  
interviewed key personnel in the Energy Efficiency and P&P groups to gain an understanding of the processes supporting the incentive calculation  
documented existing controls over data maintained within the DSM program tracking systems  
assessed data integrity via sample testing of impact factors, avoided cost values and other pertinent data  
reviewed the incentive calculation process by interviewing and sampling of key components in the annual filings.

**Recommendations**
While we noted adequate controls in place overall, we noted the following opportunities for improvement:

[Blank space for recommendations]

165
Objective & Scope
The objective of this review was to assess the adequacy of controls over the DSM program expenditures for the Small Business Services (SBS) program.

The scope of this review included internal and external costs charged to SBS programs. Our work involved the following steps:
Interviewed key personnel to gain an understanding of the process.
Reviewed procedures/guidance supporting internal and external charges.
Tested a sample of SBS customer applications and vendor invoices for controls around expenditures.
Reviewed process by which actual expenditures are tracked and monitored against the budget.
Used a data mining tool (ACL) to identify invoice data variances.

Recommendations  We found the controls to be adequate overall, we did note some areas where they could be further strengthened.
### Appendix A.

#### Glossary of Terms and Abbreviations - Electric

<table>
<thead>
<tr>
<th>Term/Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual kWh Reduction</strong></td>
<td>Expected net annual energy savings after all impact factors have been taken into consideration.</td>
</tr>
<tr>
<td><strong>AAP</strong></td>
<td>Accelerated Application Process</td>
</tr>
<tr>
<td><strong>AMP</strong></td>
<td>Appliance Management Program</td>
</tr>
<tr>
<td><strong>BBRS</strong></td>
<td>Board of Building Regulations and Standards</td>
</tr>
<tr>
<td><strong>CAP</strong></td>
<td>Community Action Program</td>
</tr>
<tr>
<td><strong>CEE</strong></td>
<td>Consortium for Energy Efficiency</td>
</tr>
<tr>
<td><strong>CFL</strong></td>
<td>Compact Fluorescent Lamps</td>
</tr>
<tr>
<td><strong>Coincident Peak Demand</strong></td>
<td>Demand for electricity at the time of the Company’s peak demand.</td>
</tr>
<tr>
<td><strong>Customer Incentive</strong></td>
<td>Direct rebates to customers, upstream incentives paid to retailers and wholesalers, and rebates paid to vendors to reduce participant costs (see description of participant costs).</td>
</tr>
<tr>
<td><strong>Delta Watts</strong></td>
<td>The difference in the watts between pre-existing or baseline lighting equipment and energy efficient lighting equipment.</td>
</tr>
<tr>
<td><strong>Demand</strong></td>
<td>The amount of electric energy used by a customer or piece of equipment at a specific time, expressed in kilowatts.</td>
</tr>
<tr>
<td><strong>Demand Adjustment Factor</strong></td>
<td>This factor is a combination of one or more evaluation impact parameters applied to gross demand savings in the calculation of net demand savings.</td>
</tr>
<tr>
<td><strong>Diversity</strong></td>
<td>That characteristic of a variety of electric loads whereby individual maximum demands usually occur at different times.</td>
</tr>
<tr>
<td><strong>Diversity Factor</strong></td>
<td>Percent of savings available at the time of the Company’s peak demand.</td>
</tr>
<tr>
<td><strong>DOE</strong></td>
<td>Department of Energy</td>
</tr>
<tr>
<td><strong>DOER</strong></td>
<td>Massachusetts Department of Energy Resources</td>
</tr>
<tr>
<td><strong>D&amp;R</strong></td>
<td>D&amp;R International, the contractor to DOE and EPA that monitors sales of ENERGY STAR appliances.</td>
</tr>
<tr>
<td><strong>DRIPE</strong></td>
<td>Demand Response Induced Price Effect – the impact of efficiency and demand response programs on market prices. It is based on the economic theory that programs will reduce energy quantities in the future, resulting in lower prices for electric energy and capacity markets.</td>
</tr>
<tr>
<td><strong>DSM</strong></td>
<td>Demand Side Management</td>
</tr>
<tr>
<td><strong>D.T.E.</strong></td>
<td>Massachusetts Department of Telecommunications and Energy</td>
</tr>
<tr>
<td><strong>D.P.U.</strong></td>
<td>Massachusetts Department of Public Utilities</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>EFLH</td>
<td>Equivalent Full Load Hours</td>
</tr>
<tr>
<td>Energy Adjustment Factor</td>
<td>A factor made up of one or more evaluation impact parameters applied to gross kWh savings in the calculation of net kWh savings.</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>EPACT</td>
<td>Energy Policy Act</td>
</tr>
<tr>
<td>ENERGY STAR®</td>
<td>Brand name for the voluntary energy efficiency labeling initiative sponsored by the U.S. Environmental Protection Agency and Department of Energy.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Monies allocated for performing evaluation studies of projects, markets, etc., and the internal labor and expenses for staff that work within this category.</td>
</tr>
<tr>
<td>Free Riders</td>
<td>Customers who participate in an energy efficiency program but would have installed the same measure(s) on their own if the program had not been available.</td>
</tr>
<tr>
<td>Free-Ridership Rate</td>
<td>The percent of savings attributable to Free Riders.</td>
</tr>
<tr>
<td>FCM</td>
<td>Forward Capacity Market – ISO NE forecasts demand for the next three years and then conducts auctions, where both generation and demand resources may participate, to purchase sufficient capacity for reliable system operation at competitive prices.</td>
</tr>
<tr>
<td>Gross kW</td>
<td>Expected demand reduction based on a comparison of standard or replaced equipment, and equipment installed through an energy efficiency program.</td>
</tr>
<tr>
<td>Gross kWh</td>
<td>Expected kWh reduction based on a comparison of standard or replaced equipment, and equipment installed through an energy efficiency program.</td>
</tr>
<tr>
<td>GSHP</td>
<td>Ground Source Heat Pump</td>
</tr>
<tr>
<td>GWh</td>
<td>Gigawatt-hour – a measure of electricity usage over time equal to 1,000 megawatt-hours or 1,000,000 kilowatt-hours.</td>
</tr>
<tr>
<td>HEM</td>
<td>Home Energy Management</td>
</tr>
<tr>
<td>Hours of Use</td>
<td>The estimated number of hours per year that a measure operates.</td>
</tr>
<tr>
<td>Hours of Use Realization Rate</td>
<td>Ratio of actual metered hours of use data to estimated hours of use data.</td>
</tr>
<tr>
<td>Hp</td>
<td>Horsepower</td>
</tr>
<tr>
<td>HVAC</td>
<td>Heating Ventilation and Air Conditioning</td>
</tr>
<tr>
<td>Impact Factor</td>
<td>Generic term for persistence, realization rates, in-service rates, non-coincident connected demand factors, etc., developed during the evaluation of energy efficiency programs and used to calculate net savings.</td>
</tr>
<tr>
<td>ISO NE</td>
<td>Independent System Operator New England</td>
</tr>
<tr>
<td>ISOS</td>
<td>Industrial Systems Optimization Service</td>
</tr>
<tr>
<td>JMC</td>
<td>The Joint Management Committee of utility and non-utility parties that manages the ENERGY STAR Homes Program.</td>
</tr>
<tr>
<td>kWh</td>
<td>Kilowatt-hour – The basic unit of electric energy usage over time. One kWh is equal to one kW of power supplied to a circuit for a period of one hour.</td>
</tr>
<tr>
<td>kW</td>
<td>Kilowatt-A measure of electric demand - 1000 watts.</td>
</tr>
<tr>
<td>kW-Years</td>
<td>See: Lifetime kW</td>
</tr>
<tr>
<td>Lifetime</td>
<td>The expected length of time, in years, that an installed measure will be in service and producing savings.</td>
</tr>
<tr>
<td>Lifetime kW</td>
<td>The expected demand savings over the lifetime of an installed measure, calculated by multiplying the annual peak kW reduction associated with a measure by the expected lifetime of that measure. It is expressed in units of kW-years.</td>
</tr>
<tr>
<td>Lifetime MWh</td>
<td>The expected energy savings over the lifetime of an installed measure, calculated by multiplying the annual MWh reduction associated with a measure by the expected lifetime of that measure.</td>
</tr>
<tr>
<td>LIHEAP</td>
<td>Low-income Heating Assistance Program</td>
</tr>
<tr>
<td>Lost Base Revenue (LBR)</td>
<td>For companies not operating under decoupled rate structure, these costs account for revenues not collected by the Company’s distribution business as a result of the energy efficiency undertaken during the program year.</td>
</tr>
<tr>
<td>Marketing</td>
<td>Internal marketing and advertising costs, including labor and expenses for staff. External media costs for television, radio, billboards, brochures, telemarketing, web-sites, and mailings, as well as marketing association fees.</td>
</tr>
<tr>
<td>Maximum Annual kW Savings</td>
<td>Peak annual demand savings of a measure. At the program level, this equals the sum of the annual peak demand savings across all measures.</td>
</tr>
<tr>
<td>Measure</td>
<td>Specific technology or practice that produces energy and/or demand savings for which the Company provides financial incentives.</td>
</tr>
<tr>
<td>MOU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>MPER</td>
<td>Multi-Year Program Evaluation and Market Progress Reporting, or Market Progress and Evaluation Report, developed for various residential programs.</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt – a measure of electric demand equal to 1,000 kilowatts.</td>
</tr>
<tr>
<td>MWh</td>
<td>Megawatt-hour – a measure of energy use over time equal to 1,000 kilowatt-hours.</td>
</tr>
<tr>
<td>NATE</td>
<td>North American Technician Excellence Program</td>
</tr>
<tr>
<td>NEEP</td>
<td>Northeast Energy Efficiency Partnerships</td>
</tr>
<tr>
<td>NUP</td>
<td>Non-utility parties, who participate in some program planning activities.</td>
</tr>
<tr>
<td><strong>Net to Gross Ratio</strong></td>
<td>A factor representing net program savings divided by gross program savings that is applied to gross program impacts to convert them into net program load impacts.</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>O&amp;M</strong></td>
<td>Operation and Maintenance</td>
</tr>
<tr>
<td><strong>Off-Peak energy kWh</strong></td>
<td>The kWh reduction that occurs during the Company’s off-peak hours for energy (Monday-Friday, 9 p.m. to 8 a.m. and all day on weekends and holidays).</td>
</tr>
<tr>
<td><strong>On-Peak Energy kWh</strong></td>
<td>The kWh reduction that occurs during the Company’s on-peak hours for energy (Monday-Friday, 8 a.m. to 9 p.m., except holidays).</td>
</tr>
<tr>
<td><strong>Participant Cost</strong></td>
<td>Is the total cost of a project or measure less the customer incentive.</td>
</tr>
<tr>
<td><strong>Performance Incentive (PI)</strong></td>
<td>Compensation for the Company’s successful execution of the energy efficiency programs during the program year as determined by Massachusetts Department of Public Utilities.</td>
</tr>
<tr>
<td><strong>Persistence Rate</strong></td>
<td>Percentage of first year energy or demand savings expected to persist over the life of the installed energy efficiency equipment; developed by conducting surveys of installed equipment several years after installation to determine presence and operational capability of the equipment.</td>
</tr>
<tr>
<td><strong>PMR</strong></td>
<td>Performance Measurement Report</td>
</tr>
<tr>
<td><strong>PRISM</strong></td>
<td>Princeton scorekeeping Method- tool that analyzes DSM savings for large samples of buildings or homes.</td>
</tr>
<tr>
<td><strong>Program Planning &amp; Administration (PP&amp;A)</strong></td>
<td>Day to day administration of programs including: employee labor, benefits, expenses, materials, supplies, taxes, overhead, and internal administrative and general expenses. Also included are external expenses such as consultant fees, legal activities, and external administrative and general expenses.</td>
</tr>
<tr>
<td><strong>RCS</strong></td>
<td>Residential Conservation Services. Formerly Energy Conservation Service or ECS.</td>
</tr>
<tr>
<td><strong>Sales Technical Assistance &amp; Training (STAT)</strong></td>
<td>Internal labor and expenses for field personnel delivering programs, vendor administration fees, vendor sales costs (rebate processing fees, contractor installation fees), technical assessment study costs paid to vendors for engineering studies of potential energy efficiency projects.</td>
</tr>
<tr>
<td><strong>SBS</strong></td>
<td>Small Business Services program, formerly known as Small C&amp;I Program.</td>
</tr>
<tr>
<td><strong>Seasonal (Winter/Summer) kW</strong></td>
<td>The net demand reduction during either the Winter or Summer seasons.</td>
</tr>
</tbody>
</table>
Spillover additional energy efficient equipment installed by customers that was influenced by the Company’s sponsored program, but without direct financial or technical assistance from the program. Spillover is separated into Participant and Non-participant factors. Non-participating customers may be influenced by product availability, publicity, education and other factors that are affected by the program.

Spillover Rate Estimate of energy savings attributable to spillover effects expressed as a percent of savings installed by participants through an energy efficiency program.

VSD Variable Speed Drive

WAP Weatherization Assistance Program

Watt The basic electrical unit of power.

Additional details about The Company’s costs are described below.

Types of Costs in each Budget Category

Please see the following descriptions of budget cost categories. The categories described below are generally consistent among all Program Administrators, with the exception of the categorization of employee salaries and related expenses. This difference is due to different historical practices and differing staff sizes and staff assignments, as well as internal tracking mechanisms. The Company has accounted for

[all employee labor costs and related expenses in the PP&A category]

or

[employee labor and related expenses in the PP&A, Marketing-Advertising, Sales, Technical Assistance & Training, and Evaluation & Market Research categories, depending on the employee’s responsibility].

The Company and the other electric and gas Program Administrators have worked together to develop consistent cost categories to the extent that they are efficient and appropriate for each Program Administrator, and the Program Administrators will continue to strive for consistency in this area.

Costs that cannot be assigned directly to a program are allocated among relevant programs on an appropriate basis and tracked accordingly.

Planning and Administration include costs associated with developing program plans, including market transformation plans, research and development (excluding R&D assigned to Evaluation & Market Research), and day-to-day program administration, including labor, benefits, expenses, materials, supplies, and overhead costs, and any regulatory costs associated with energy efficiency activities. Also includes costs for energy efficiency services contracted to
non-affiliated companies such as outside consultants used to prepare plans, screen programs, improve databases, and perform legal services.

**Marketing and Advertising** includes costs to advertise, through television, radio, billboards, brochures, telemarketing, web-sites, and mailings, the existence and availability of energy efficiency programs or technologies, and to induce customers or trade allies to participate in energy efficiency programs.

**Participant Incentives** are funds paid by the reporting Program Administrator to customers or trade allies as rebates or in other forms.

**Sales, Technical Assistance & Training** are administration, sales technical assistance and training costs to motivate (1) customers to install energy efficiency products and services, (2) retailers to stock energy efficiency products, (3) trade professionals to offer energy efficiency services, (4) manufactures to make energy efficiency products; and (5) vendor services and supplies that demonstrate benefits of energy efficiency.

**Evaluation and Market Research** include costs associated with evaluation activities, including costs related to cost-effectiveness evaluation, market research (e.g., baseline studies, market assessments, surveys), impact and process evaluation reports, tracking and reporting program inputs and outputs, funding studies, and other costs clearly associated with evaluating the program.

**Performance Incentives** are funds earned by a Program Administrator based on its performance in implementing its Energy Efficiency Programs and shall be determined pursuant to § 3.6 of the Department’s Energy Efficiency Guidelines.
Appendix B
DPU 08-50 Tables
### IV.C. Electric PA Budgets

#### 1. Summary Table

<table>
<thead>
<tr>
<th>Program Costs</th>
<th>Program Planning and Administration</th>
<th>Marketing and Advertising</th>
<th>Participant Incentive</th>
<th>Sales, Technical Assistance &amp; Training</th>
<th>Evaluation and Market Research</th>
<th>Total Program Costs</th>
<th>Performance Incentive</th>
<th>TOTAL PA Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential (total)</td>
<td>$3,613,187</td>
<td>$3,687,896</td>
<td>$25,782,826</td>
<td>$1,496,560</td>
<td>$43,185,660</td>
<td>$2,744,580</td>
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<td>Residential New Construction &amp; Major Renovation</td>
<td>$278,547</td>
<td>$146,228</td>
<td>$278,814</td>
<td>$50,500</td>
<td>$1,598,605</td>
<td>$36,444</td>
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<td>O Power</td>
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<td>ENERGY STAR Appliances</td>
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<td>Residential Education Program</td>
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<td>Heat Pump Water Heater Pilot</td>
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<td>Sponsorships &amp; Subscriptions</td>
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<td>Low-Income (total)</td>
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<td>$12,401,673</td>
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<td>Low-Income Residential New Construction</td>
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<td>Low-Income MultiFamily Retrofit</td>
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<td>$4,173,156</td>
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<td>Low-Income Energy Affordability Network Funding</td>
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<td>Commercial &amp; Industrial (total)</td>
<td>$6,907,938</td>
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<td>$44,291,521</td>
<td>$10,760,450</td>
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<tr>
<td>C&amp;I New Construction and Major Renovation</td>
<td>$1,309,708</td>
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<td>$10,525,000</td>
<td>$650,100</td>
<td>$14,357,154</td>
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<tr>
<td>C&amp;I New Construction and Major Renovation - Government</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td>C&amp;I Large Retrofit</td>
<td>$3,289,290</td>
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<td>$800,000</td>
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<tr>
<td>C&amp;I Large Retrofit - Government</td>
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<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td>C&amp;I Small Retrofit</td>
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<td>$8,175,360</td>
<td>$800,000</td>
<td>$9,462,592</td>
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<tr>
<td>C&amp;I Small Retrofit - Government</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Community-based Pilot</td>
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<td>$0</td>
<td>$50,000</td>
<td>$0</td>
<td>$115,250</td>
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<td>Statewide Marketing &amp; Education</td>
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<td>EEAC Consultants</td>
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<tr>
<td>Sponsorships &amp; Subscriptions</td>
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<td>$0</td>
<td>$250,000</td>
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<tr>
<td>GRAND TOTAL</td>
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<td>$18,242,990</td>
<td>$8,460,310</td>
<td>$131,137,419</td>
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</table>
### Program Administrator Budget, Actual (1)

<table>
<thead>
<tr>
<th>Program Costs</th>
<th>Residential (total)</th>
<th>Commercial &amp; Industrial (total)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program Planning and Administration</strong></td>
<td>$2,067,640</td>
<td>$4,949,896</td>
</tr>
<tr>
<td><strong>Marketing and Advertising</strong></td>
<td>$2,240,180</td>
<td>$866,763</td>
</tr>
<tr>
<td><strong>Participant Incentive</strong></td>
<td>$27,953,878</td>
<td>$42,079,267</td>
</tr>
<tr>
<td><strong>Sales, Technical Assistance &amp; Training</strong></td>
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<tr>
<td><strong>Evaluation and Market Research</strong></td>
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<td><strong>Total Program Costs</strong></td>
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<tr>
<td><strong>Residential (total)</strong></td>
<td>$2,674,429</td>
<td>$4,382,717</td>
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<tr>
<td><strong>Commercial &amp; Industrial (total)</strong></td>
<td>$112,823,653</td>
<td>$56,286,654</td>
</tr>
<tr>
<td><strong>Total Program Costs</strong></td>
<td>$2,674,429</td>
<td>$53,903,937</td>
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#### Participant Incentive (2)

<table>
<thead>
<tr>
<th>Program Costs</th>
<th>Residential (total)</th>
<th>Commercial &amp; Industrial (total)</th>
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<tbody>
<tr>
<td><strong>Total PA Budget (4)</strong></td>
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#### Performance Incentive (2)

<table>
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<th>Program Costs</th>
<th>Residential (total)</th>
<th>Commercial &amp; Industrial (total)</th>
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<tbody>
<tr>
<td><strong>Total PA Budget (4)</strong></td>
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<td>$4,382,717</td>
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</table>

#### TOTAL PA Budget (4)

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<th>Program Costs</th>
<th>Residential (total)</th>
<th>Commercial &amp; Industrial (total)</th>
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</thead>
<tbody>
<tr>
<td><strong>Total PA Budget (4)</strong></td>
<td>$112,823,653</td>
<td>$56,286,654</td>
</tr>
<tr>
<td>Program Costs</td>
<td>Program Planning and Administration</td>
<td>Marketing and Advertising</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Residential (total)</td>
<td>-43%</td>
<td>-23%</td>
</tr>
<tr>
<td>Residential New Construction &amp; Major Renovation</td>
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<td>-87%</td>
</tr>
<tr>
<td>Residential Cooling &amp; Heating Equipment</td>
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<td>Multi-Family Retrofit</td>
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<tr>
<td>MassSAVE</td>
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<td>-29%</td>
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<tr>
<td>O Power</td>
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<td>0%</td>
</tr>
<tr>
<td>ENERGY STAR Lighting</td>
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<tr>
<td>ENERGY STAR Appliances</td>
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<tr>
<td>Residential New Construction &amp; Major Renovation - Major Renovation statewide pilot</td>
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<tr>
<td>Residential New Construction Multi Family (4-8 story) statewide pilot</td>
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<td>Residential New Construction V3 Energy Star Homes statewide pilot</td>
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<tr>
<td>Home Automation</td>
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<tr>
<td>Community based Pilot</td>
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<tr>
<td>Statewide Marketing &amp; Education</td>
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<tr>
<td>EEAC Consultants</td>
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<td>0%</td>
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<tr>
<td>Sponsorships &amp; Subscriptions</td>
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<td>Low Income (total)</td>
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<td>Low-Income 1 &amp; 4 Family Retrofit</td>
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<td>Statewide Marketing &amp; Education</td>
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<td>Low-Income Energy Affordability Network Funding</td>
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<td>Commercial &amp; Industrial (total)</td>
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<tr>
<td>C&amp;I New Construction and Major Renovation</td>
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<td>-21%</td>
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<tr>
<td>C&amp;I New Construction and Major Renovation - Government</td>
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<td>C&amp;I Large Retrofit</td>
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<tr>
<td>Large C&amp;I Retrofit - Government</td>
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<td>C&amp;I Small Retrofit</td>
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<td>-44%</td>
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<td>C&amp;I Small Retrofit - Government</td>
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<td>0%</td>
</tr>
<tr>
<td>Community based Pilot</td>
<td>-100%</td>
<td>0%</td>
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<tr>
<td>Statewide Marketing &amp; Education</td>
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<td>0%</td>
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<tr>
<td>EEAC Consultants</td>
<td>-100%</td>
<td>0%</td>
</tr>
<tr>
<td>DOER Assessment</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>Sponsorships &amp; Subscriptions</td>
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<td>0%</td>
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<tr>
<td>GRAND TOTAL</td>
<td>-37%</td>
<td>-26%</td>
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</table>

Notes:
(1) All parties would refer to common definitions (in Appendix) for allocation of costs.
(2) Values listed in this table represent pre-tax performance incentive amounts. See Section IV.H. Shareholder Performance Incentives for supporting calculations.
(3) The Total PA Budget is the sum of Total Program Costs and Performance Incentives.
(4) EEAC Consultants charges are shown as zero to reflect that those funds were paid with RGGI dollars for 2010.
(5) Actual PPA amounts were adjusted across all gas and electric programs to reflect approximately $300,000 that was incorrectly attributed to the 2009 actual PPA costs.
## IV.D. Cost Effectiveness

### 1. Summary Table

#### Total Resource Cost Test, Planned

<table>
<thead>
<tr>
<th>Customer Sector</th>
<th>B/C Ratio</th>
<th>Net Benefits</th>
<th>Benefits</th>
<th>Costs ($)</th>
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<tbody>
<tr>
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<td></td>
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<td>$286,817,053</td>
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<tr>
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<td>$2,126,004</td>
<td>$94,310</td>
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<tr>
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<td>2.97</td>
<td>$5,477,164</td>
<td>$5,318,490</td>
<td>$158,674</td>
</tr>
<tr>
<td>1/2 Power</td>
<td>2.54</td>
<td>$3,871,205</td>
<td>$3,694,738</td>
<td>$176,467</td>
</tr>
<tr>
<td>ENERGY STAR Lighting</td>
<td>3.42</td>
<td>$22,299,680</td>
<td>$20,295,926</td>
<td>$2,003,754</td>
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<tr>
<td>ENERGY STAR Appliances</td>
<td>3.38</td>
<td>$1,681,783</td>
<td>$1,534,835</td>
<td>$146,948</td>
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<tr>
<td>Residential Education Program</td>
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<td>Workforce Development</td>
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<td>$254,000</td>
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<tr>
<td>Heat Loan Program</td>
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<td>$3,338,251</td>
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<tr>
<td>Deep R &amp; Retrofit</td>
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<td>n/a</td>
<td>$1,069,243</td>
</tr>
<tr>
<td>Power Monitor Pilot</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>$417,600</td>
</tr>
<tr>
<td>Residential New Construction &amp; Major Renovation - Major Renovation statewide pilot</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>$265,464</td>
</tr>
<tr>
<td>Residential New Construction Multi-Family 4-8 story statewide pilot</td>
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<td>n/a</td>
<td>n/a</td>
<td>$385,745</td>
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<tr>
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<td>n/a</td>
<td>$35,460</td>
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<tr>
<td>Residential Technical Development</td>
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<tr>
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<td>$22,604,659</td>
<td>$7,162,043</td>
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<td>$334,548</td>
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<td>$7,147,946</td>
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<td>$58,210</td>
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<td>$163,395</td>
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<td>$101,317,622</td>
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<td>C&amp;I New Construction and Major Renovation</td>
<td>3.87</td>
<td>51,256,121</td>
<td>59,455,176</td>
<td>$18,196,985</td>
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<tr>
<td>C&amp;I Large Retrofit</td>
<td>3.92</td>
<td>136,181,972</td>
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<tr>
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<td>33,983,707</td>
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</tr>
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<td>n/a</td>
<td>n/a</td>
<td>$241,184</td>
</tr>
<tr>
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</table>

#### Total Resource Cost Test, Evaluated

<table>
<thead>
<tr>
<th>Customer Sector</th>
<th>B/C Ratio</th>
<th>Net Benefits</th>
<th>Benefits</th>
<th>Costs ($)</th>
</tr>
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<tbody>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential New Construction &amp; Major Renovation</td>
<td>3.27</td>
<td>$5,477,164</td>
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<td>Residential Heating &amp; Cooling Equipment</td>
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<td>$2,250,314</td>
<td>$2,126,004</td>
<td>$124,310</td>
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<td>n/a</td>
<td>$461,251</td>
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<td>n/a</td>
<td>$254,000</td>
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<tr>
<td>Power Monitor Pilot</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>$417,600</td>
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<td>Residential New Construction &amp; Major Renovation - Major Renovation statewide pilot</td>
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<td>n/a</td>
<td>n/a</td>
<td>$265,464</td>
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<tr>
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<td>n/a</td>
<td>n/a</td>
<td>$385,745</td>
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<td>Statewide Marketing &amp; Education</td>
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<td>$7,147,946</td>
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<td>n/a</td>
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<td>$58,210</td>
</tr>
<tr>
<td>Low-Income Energy Affordability Network Funding</td>
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<td>n/a</td>
<td>$349,249</td>
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<td>n/a</td>
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<tr>
<td>Commercial &amp; Industrial</td>
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<td>208,728,766</td>
<td>310,046,388</td>
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<td>59,455,176</td>
<td>$18,196,985</td>
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<tr>
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<td>2.61</td>
<td>21,569,218</td>
<td>33,983,707</td>
<td>$12,414,489</td>
</tr>
<tr>
<td>Community based Pilot</td>
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<td>$118,250</td>
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<tr>
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<td>$382,095</td>
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<td>n/a</td>
<td>$241,184</td>
</tr>
<tr>
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## Total Resource Cost Test, Percent Variance

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<th>Benefits</th>
<th>Costs (1)</th>
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<td>45%</td>
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<td>0%</td>
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<tr>
<td>Community based Pilot</td>
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<td>n/a</td>
<td>n/a</td>
<td>0%</td>
</tr>
<tr>
<td>Statewide Marketing &amp; Education</td>
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<tr>
<td>DOER Assessment</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>17%</td>
</tr>
<tr>
<td>Sponsorships &amp; Subscriptions</td>
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<td>Low Income</td>
<td></td>
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<tr>
<td>Low Income Residential New Construction</td>
<td>184%</td>
<td>207%</td>
<td>25%</td>
<td>-56%</td>
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<tr>
<td>Low Income 1 to 4 Family Retrofit</td>
<td>52%</td>
<td>67%</td>
<td>31%</td>
<td>-21%</td>
</tr>
<tr>
<td>Low Income Multi-Family Retrofit</td>
<td>13%</td>
<td>17%</td>
<td>36%</td>
<td>58%</td>
</tr>
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<td>n/a</td>
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<td>Commercial &amp; Industrial</td>
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<tr>
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<td>-3%</td>
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<td>23%</td>
<td>4%</td>
<td>9%</td>
<td>-23%</td>
</tr>
<tr>
<td>C&amp;I Small Retrofit</td>
<td>23%</td>
<td>27%</td>
<td>16%</td>
<td>3%</td>
</tr>
<tr>
<td>Community based Pilot</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>-100%</td>
</tr>
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<td>Stateide Marketing &amp; Education</td>
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<td>n/a</td>
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<td>-14%</td>
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<tr>
<td>C&amp;I New Construction and Major Renovation - Government</td>
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<td>n/a</td>
<td>-99%</td>
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<tr>
<td>Large C&amp;I Retrofit - Government</td>
<td>n/a</td>
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<td>n/a</td>
<td>0%</td>
</tr>
<tr>
<td>C&amp;I Small Retrofit - Government</td>
<td>n/a</td>
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<td>n/a</td>
<td>-99%</td>
</tr>
<tr>
<td>EEAC Consultants</td>
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<td>n/a</td>
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<td>-100%</td>
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<tr>
<td>DOER Assessment</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>2%</td>
</tr>
<tr>
<td>Sponsorships &amp; Subscriptions</td>
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<td>n/a</td>
<td>n/a</td>
<td>2%</td>
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<tr>
<td>GRAND TOTAL</td>
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<td>-4%</td>
<td>-9%</td>
<td>-18%</td>
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</table>

Notes:
1. See Table IV.D.2.1 Total Resource Costs Summary for more information regarding TRC Test Costs.
2. For purpose of determining cost-effectiveness, the benefits and costs of "hard to measure programs" are taken into account at the customer sector level. See DPU 08-50-A at 30-31.
3. For the purpose of determining cost-effectiveness, General Support costs are taken into account at the customer sector level.
National Grid
Electric Energy Efficiency Annual Report
Appendix B
Page 6 of 15

IV.D. Cost Effectiveness
2.1. Cost Summary Table

TRC Costs Summary, Planned
PA Costs
Performance Incentive
(2)
$43,185,660
$2,744,580
$1,598,695
$56,444
$2,165,786
$17,325
$7,169,528
$1,791,094
$14,534,561
$247,004
$1,166,038
$49,307
$7,244,797
$520,107
$2,710,764
$63,299
$401,251
$0
$125,000
$0
$3,238,221
$0
$909,849
$0
$0
$0
$265,650
$0
$294,745
$0
$25,300
$0
$31,481
$0
$33,440
$0
$0
$0
$0
$0
$0
$0
$0
$0
$614,649
$0
$379,721
$0
$241,184
$0
$35,000
$0
$17,607,496
$1,101,348
$261,068
$8,595
$10,086,884
$471,817
$6,752,716
$620,935
$58,218
$0
$345,245
$0
$103,365
$0
$61,956,884
$4,541,448
$14,357,154
$1,062,132
$0
$0
$36,224,101
$3,002,719
$0
$0
$9,462,592
$476,597
$0
$0
$118,250
$0
$183,979
$0
$832,217
$0
$528,591
$0
$250,000
$0
$122,750,040
$8,387,376

Program Costs (1)
Residential (total)
Residential New Construction & Major Renovation
Residential Cooling & Heating Equipment
Multi-Family Retrofit
MassSAVE
O Power
ENERGY STAR Lighting
ENERGY STAR Appliances
Residential Education Program
Workforce Development
Heat Loan Program
Deep Energy Retrofit
Power Monitor Pilot
Residential New Construction & Major Renovation - Major Renovation statewide pilot
Residential New Construction Multi Family (4-8 story) statewide pilot
Residential New Construction Lighting Design statewide pilot
Residential New Construction V3 Energy Star Homes statewide pilot
Heat Pump Water Heater Pilot
Residential Technical Development
Hot Roofs
Home Automation
Community based Pilot
Statewide Marketing & Education
EEAC Consultants
DOER Assessment
Sponsorships & Subscriptions
Low Income (total)
Low-Income Residential New Construction
Low-Income 1 to 4 Family Retrofit
Low-Income MultiFamily Retrofit
Statewide Marketing & Education
Low-Income Energy Affordability Network Funding
DOER Assessment
Commercial & Industrial (total)
C&I New Construction and Major Renovation
C&I New Construction and Major Renovation - Government
C&I Large Retrofit
Large C&I Retrofit - Government
C&I Small Retrofit
C&I Small Retrofit - Government
Community based Pilot
Statewide Marketing & Education
EEAC Consultants
DOER Assessment
Sponsorships & Subscriptions
GRAND TOTAL

Participant Costs
$8,351,613
$2,044,314
$13,796
$148,264
$3,295,781
$0
$1,492,394
$765,250
$0
$0
$0
$180,000
$0
$2,814
$14,000
$182,000
$211,000
$2,000
$0
$0
$0
$0
$0
$0
$0
$0
$64,865
$64,865
$0
$0
$0
$0
$0
$34,827,789
$2,769,700
$0
$29,193,449
$0
$2,864,640
$0
$0
$0
$0
$0
$0
$43,244,267

TOTAL Resource
Costs (3)
$54,281,853
$3,699,453
$2,196,907
$9,108,885
$18,077,346
$1,215,345
$9,257,298
$3,539,313
$401,251
$125,000
$3,238,221
$1,089,849
$0
$268,464
$308,745
$207,300
$242,481
$35,440
$0
$0
$0
$0
$614,649
$379,721
$241,184
$35,000
$18,773,708
$334,528
$10,558,701
$7,373,651
$58,218
$345,245
$103,365
$101,326,121
$18,188,985
$0
$68,420,270
$0
$12,803,829
$0
$118,250
$183,979
$832,217
$528,591
$250,000
$174,381,683

TRC Costs Summary, Actual
PA Costs
Performance Incentive
(2)
$40,059,035
$2,674,429
$1,838,120
$79,663
$2,171,780
$69,117
$6,424,556
$239,408
$14,232,324
$1,374,586
$1,391,790
$53,226
$6,336,937
$771,806
$2,987,529
$86,622
$115,709
$0
$79,543
$0
$3,163,184
$0
$249,166
$0
$0
$0
$34,968
$0
$121,943
$0
$12,385
$0
$11,096
$0
$34,235
$0
$0
$0
$0
$0
$0
$0
$0
$0
$570,285
$0
$0
$0
$281,975
$0
$1,511
$0
$10,669,378
$1,134,156
$124,824
$23,935
$7,445,762
$856,875
$2,828,533
$253,345
$51,403
$0
$85,523
$0
$133,333
$0
$53,903,937
$4,382,717
$9,994,027
$697,730
$0
$0
$34,376,765
$3,092,379
$0
$0
$8,834,316
$592,609
$0
$0
$0
$0
$158,177
$0
$0
$0
$539,099
$0
$1,552
$0
$104,632,350
$8,191,302

Program Costs (1)
Residential (total)
Residential New Construction & Major Renovation
Residential Cooling & Heating Equipment
Multi-Family Retrofit
MassSAVE
O Power
ENERGY STAR Lighting
ENERGY STAR Appliances
Residential Education Program
Workforce Development
Heat Loan Program
Deep Energy Retrofit
Power Monitor Pilot
Residential New Construction & Major Renovation - Major Renovation statewide pilot
Residential New Construction Multi Family (4-8 story) statewide pilot
Residential New Construction Lighting Design statewide pilot
Residential New Construction V3 Energy Star Homes statewide pilot
Heat Pump Water Heater Pilot
Residential Technical Development
Hot Roofs
Home Automation
Community based Pilot
Statewide Marketing & Education
EEAC Consultants
DOER Assessment
Sponsorships & Subscriptions
Low Income (total)
Low-Income Residential New Construction
Low-Income 1 to 4 Family Retrofit
Low-Income MultiFamily Retrofit
Statewide Marketing & Education
Low-Income Energy Affordability Network Funding
DOER Assessment
Commercial & Industrial (total)
C&I New Construction and Major Renovation
C&I New Construction and Major Renovation - Government
C&I Large Retrofit
Large C&I Retrofit - Government
C&I Small Retrofit
C&I Small Retrofit - Government
Community based Pilot
Statewide Marketing & Education
EEAC Consultants
DOER Assessment
Sponsorships & Subscriptions
GRAND TOTAL

Participant Costs
$11,320,484
$0
$121,306
$58,431
$3,578,779
$0
$6,604,727
$865,573
$0
$0
$0
$91,668
$0
$0
$0
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$0
$0
$0
$0
$0
$0
$0
$9,261
$0
$0
$9,261
$0
$0
$0
$18,582,210
$800,577
$0
$15,392,106
$0
$2,389,527
$0
$0
$0
$0
$0
$0
$29,911,955

TOTAL Resource
Costs (3)
$54,053,949
$1,917,783
$2,362,203
$6,722,395
$19,185,689
$1,445,016
$13,713,471
$3,939,724
$115,709
$79,543
$3,163,184
$340,834
$0
$34,968
$121,943
$12,385
$11,096
$34,235
$0
$0
$0
$0
$570,285
$0
$281,975
$1,511
$11,812,795
$148,759
$8,302,637
$3,091,139
$51,403
$85,523
$133,333
$76,868,864
$11,492,334
$0
$52,861,250
$0
$11,816,452
$0
$0
$158,177
$0
$539,099
$1,552
$142,735,607


## TRC Costs Summary, Percent Variance

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<th></th>
<th>Program Costs (1)</th>
<th>Performance Incentive (2)</th>
<th>Participant Costs</th>
<th>TOTAL Resource Costs (3)</th>
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</thead>
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<td>-3%</td>
<td>36%</td>
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<tr>
<td>Major Renovation</td>
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<td>Residential Cooling &amp; Heating</td>
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<td>22%</td>
<td>77%</td>
<td>5%</td>
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<td>Equipment</td>
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<td>Multi-Family Rent Wifi</td>
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<td>8%</td>
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<td>8%</td>
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<td>8%</td>
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<tr>
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<td>-1%</td>
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<td>343%</td>
<td>48%</td>
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<td>13%</td>
<td>11%</td>
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<td>-11%</td>
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<td>Heat Loan Program</td>
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<td>9%</td>
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<td>Residential New Construction &amp;</td>
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<td>-1%</td>
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<td>-55%</td>
</tr>
<tr>
<td>Large Energy Efficiency</td>
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<td>0%</td>
<td>12%</td>
</tr>
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<td>0%</td>
<td>-100%</td>
</tr>
<tr>
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<td>0%</td>
<td>0%</td>
<td>17%</td>
</tr>
<tr>
<td>Low Income (total)</td>
<td>-29%</td>
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<td>26%</td>
<td>-27%</td>
</tr>
<tr>
<td>Low-Income Residential New</td>
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<td>3%</td>
<td>26%</td>
<td>-27%</td>
</tr>
<tr>
<td>Construction - Major Renovation</td>
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<tr>
<td>Low-Income 1 to 4 Family Rentifl</td>
<td>-26%</td>
<td>82%</td>
<td>0%</td>
<td>-21%</td>
</tr>
<tr>
<td>Low Income MBR with Pre-Pay</td>
<td>18%</td>
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<td>0%</td>
<td>18%</td>
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<td>0%</td>
<td>0%</td>
<td>-12%</td>
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<tr>
<td>Low Income Energy Affordability</td>
<td>-75%</td>
<td>0%</td>
<td>0%</td>
<td>-75%</td>
</tr>
<tr>
<td>Network Funding</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Commercial &amp; Industrial (total)</td>
<td>-13%</td>
<td>-2%</td>
<td>-31%</td>
<td>-18%</td>
</tr>
<tr>
<td>C&amp;I New Construction and Major</td>
<td>30%</td>
<td>34%</td>
<td>1%</td>
<td>-27%</td>
</tr>
<tr>
<td>Renovation</td>
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<td></td>
</tr>
<tr>
<td>C&amp;I New Construction and Major</td>
<td>0%</td>
<td>9%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Renovation - Government</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I Large Retail</td>
<td>-9%</td>
<td>26%</td>
<td>9%</td>
<td>-23%</td>
</tr>
<tr>
<td>C&amp;I Small Retail</td>
<td>7%</td>
<td>24%</td>
<td>17%</td>
<td>-8%</td>
</tr>
<tr>
<td>C&amp;I Small Retail - Government</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Community Based Pilot</td>
<td>-100%</td>
<td>0%</td>
<td>0%</td>
<td>-100%</td>
</tr>
<tr>
<td>Statewide Marketing &amp; Education</td>
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<td>24%</td>
</tr>
<tr>
<td>EEAC Consultants</td>
<td>-100%</td>
<td>0%</td>
<td>0%</td>
<td>-100%</td>
</tr>
<tr>
<td>DOER Assessment</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Sponsorships &amp; Subscriptions</td>
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<tr>
<td>GRAND TOTAL</td>
<td>-15%</td>
<td>-2%</td>
<td>-31%</td>
<td>-18%</td>
</tr>
</tbody>
</table>

Notes:
1. Program Costs include Program Planning and Administration, Marketing and Advertising, Program Incentive, Sales, Technical Assistance & Training, Evaluation and Market Research (See Table IV.C.1, Budget Summary).
2. Values listed in this table represent pre-tax performance incentive amounts. See Section IV.H. Shareholder Performance Incentives for supporting calculations.
3. This represents the total TRC Test costs, which does not include LBR.
## IV.D  Cost Effectiveness 3.1.i. Benefits Summary Table

<table>
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<th></th>
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<tbody>
<tr>
<td><strong>Residential New Construction &amp; Major Renovation</strong></td>
<td>402,419</td>
<td>204,959</td>
<td>411,310</td>
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<tr>
<td><strong>MassSAVE</strong></td>
<td>3,209,088</td>
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<td>1,713,994</td>
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Notes:
(2) Includes any hard to measure programs with quantifiable benefits.

**Notes:**
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(2) Includes any hard to measure programs with quantifiable benefits.
### 3.2. Savings Summary Table

#### Gallons

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<th>Summer (Annualized)</th>
<th>Winter (Annualized)</th>
<th>Lifetime</th>
<th>Total Annualized</th>
<th>Assisted Natural Gas</th>
<th>Propane</th>
<th>Wood</th>
<th>Kerosene</th>
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### IV.D. Cost Effectiveness

#### 3.3.i. Avoided Cost Factors Summary Table

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<th>Non-Electric (1)</th>
<th>Distribution ($/kW) (2)</th>
<th>Transmission ($/kW) (2)</th>
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**Notes:**

2. Distribution and transmission avoided cost factors are calculated consistent with the calculations in the 3 Year Plan.
## Outsourced/Competitive Procured Services

### 1. Summary Table

<table>
<thead>
<tr>
<th>Program</th>
<th>Total Outsourced Activities</th>
<th>I-House Activities</th>
<th>Non-Competitively Procured</th>
<th>Competitively Procured</th>
<th>Outsource</th>
<th>$</th>
<th>% of Total</th>
<th>$</th>
<th>% of Total</th>
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<th>% of Total</th>
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<tbody>
<tr>
<td>Low Income (total)</td>
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<tr>
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## Residential

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<th>Program</th>
<th>In-Home Solutions</th>
<th>Competitively Procured</th>
<th>Non-Competitively Procured</th>
<th>Total Outsourced Activities</th>
<th>Planned Outcomes</th>
<th>Outsource Total</th>
<th>% of Total</th>
<th>Outsource Total</th>
<th>% of Total</th>
<th>Outsource Total</th>
<th>% of Total</th>
<th>Percent Variance</th>
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<tr>
<td>Residential New Construction</td>
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## Commercial & Industrial

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<th>In-Home Solutions</th>
<th>Competitively Procured</th>
<th>Non-Competitively Procured</th>
<th>Total Outsourced Activities</th>
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<th>Outsource Total</th>
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<th>Percent Variance</th>
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<td>$141%</td>
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<td>Commercial &amp; Industrial - Multi Family statewide pilot</td>
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<td>Residential New Construction V3 Energy Star Homes</td>
<td>$3,056</td>
<td>$12,719</td>
<td>$15,775</td>
<td>$19%</td>
<td>$12,719</td>
<td>$15,775</td>
<td>$3,056</td>
<td>$12,719</td>
<td>$15,775</td>
<td></td>
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<tr>
<td>Heat Pump Water Heater Pilot</td>
<td>$18,888</td>
<td>$4,152</td>
<td>$23,040</td>
<td>$82%</td>
<td>$4,152</td>
<td>$23,040</td>
<td>$18,888</td>
<td>$4,152</td>
<td>$23,040</td>
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<td></td>
</tr>
<tr>
<td>Low-Income (total)</td>
<td>$514,106</td>
<td>$2,708,475</td>
<td>$3,222,581</td>
<td>$16%</td>
<td>$86,385</td>
<td>$940,270</td>
<td>$311,645</td>
<td>$2,708,475</td>
<td>$3,020,120</td>
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<td></td>
<td></td>
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<tr>
<td>Low-Income 1 to 4 Family Retrofit</td>
<td>$267,485</td>
<td>$547,940</td>
<td>$815,425</td>
<td>$13%</td>
<td>$547,940</td>
<td>$815,425</td>
<td>$267,485</td>
<td>$547,940</td>
<td>$815,425</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Low-Income Multifamily Retrofit</td>
<td>$158,562</td>
<td>$2,131,735</td>
<td>$2,290,300</td>
<td>$6%</td>
<td>$2,131,735</td>
<td>$2,290,300</td>
<td>$158,562</td>
<td>$2,131,735</td>
<td>$2,290,300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial &amp; Industrial (total)</td>
<td>$8,521,052</td>
<td>$6,967,372</td>
<td>$15,488,424</td>
<td>$48%</td>
<td>$6,967,372</td>
<td>$15,488,424</td>
<td>$8,521,052</td>
<td>$6,967,372</td>
<td>$15,488,424</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I Large Retrofit</td>
<td>$4,987,636</td>
<td>$4,188,273</td>
<td>$9,175,909</td>
<td>$48%</td>
<td>$4,188,273</td>
<td>$9,175,909</td>
<td>$4,987,636</td>
<td>$4,188,273</td>
<td>$9,175,909</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I High Efficiency Retrofit</td>
<td>$334,098</td>
<td>$145,042</td>
<td>$479,140</td>
<td>$51%</td>
<td>$145,042</td>
<td>$479,140</td>
<td>$334,098</td>
<td>$145,042</td>
<td>$479,140</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I Multifamily 1-4 Story Retrofit</td>
<td>$15,425</td>
<td>$58,532</td>
<td>$73,957</td>
<td>$10%</td>
<td>$58,532</td>
<td>$73,957</td>
<td>$15,425</td>
<td>$58,532</td>
<td>$73,957</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I Multifamily 5-8 Story Retrofit</td>
<td>$6,492</td>
<td>$27,438</td>
<td>$33,930</td>
<td>$19%</td>
<td>$27,438</td>
<td>$33,930</td>
<td>$6,492</td>
<td>$27,438</td>
<td>$33,930</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I Commercial Office Equipment</td>
<td>$588,908</td>
<td>$1,141,790</td>
<td>$1,730,698</td>
<td>$5%</td>
<td>$1,141,790</td>
<td>$1,730,698</td>
<td>$588,908</td>
<td>$1,141,790</td>
<td>$1,730,698</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I Small Office Equipment</td>
<td>$1,654</td>
<td>$7,066</td>
<td>$8,720</td>
<td>$21%</td>
<td>$7,066</td>
<td>$8,720</td>
<td>$1,654</td>
<td>$7,066</td>
<td>$8,720</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL (low income)</td>
<td>$2,890,222</td>
<td>$2,622,090</td>
<td>$5,512,312</td>
<td>$4%</td>
<td>$2,622,090</td>
<td>$5,512,312</td>
<td>$2,890,222</td>
<td>$2,622,090</td>
<td>$5,512,312</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL (commercial)</td>
<td>$10,841,127</td>
<td>$21,542,439</td>
<td>$32,383,566</td>
<td>$28%</td>
<td>$21,542,439</td>
<td>$32,383,566</td>
<td>$10,841,127</td>
<td>$21,542,439</td>
<td>$32,383,566</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL (TOTAL)</td>
<td>$13,731,349</td>
<td>$24,164,934</td>
<td>$37,906,283</td>
<td>$30%</td>
<td>$24,164,934</td>
<td>$37,906,283</td>
<td>$13,731,349</td>
<td>$24,164,934</td>
<td>$37,906,283</td>
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<td></td>
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</table>
### Electric PA's Master Summary of Energy Efficiency Activities

<table>
<thead>
<tr>
<th>Customer Sector</th>
<th>Benefits ($)</th>
<th>TRC Costs ($)</th>
<th>TRC B/C Ratio</th>
<th>Net Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planned</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>13,794,885</td>
<td>60,627,394</td>
<td>14,652,476</td>
<td>77,846,070</td>
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<tr>
<td>Low Income</td>
<td>1,422,052</td>
<td>16,392,762</td>
<td>2,924,840</td>
<td>6,519,931</td>
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<tr>
<td>C&amp;I</td>
<td>48,181,427</td>
<td>253,800,799</td>
<td>54,089,622</td>
<td>369,536</td>
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<tr>
<td>TOTAL</td>
<td>63,398,364</td>
<td>330,820,955</td>
<td>71,667,138</td>
<td>84,535,537</td>
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<tr>
<td><strong>Evaluated</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>16,787,050</td>
<td>57,430,243</td>
<td>21,425,380</td>
<td>50,931,729</td>
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<tr>
<td>Low Income</td>
<td>1,131,369</td>
<td>7,439,264</td>
<td>1,911,888</td>
<td>7,508,986</td>
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<tr>
<td>TOTAL</td>
<td>58,429,648</td>
<td>258,419,042</td>
<td>85,874,747</td>
<td>35,035,265</td>
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### Percent Variance

<table>
<thead>
<tr>
<th>Customer Sector</th>
<th>Benefits (%)</th>
<th>TRC Costs (%)</th>
<th>TRC B/C Ratio</th>
<th>Net Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>22% -5% 46% -34% 19% -3%</td>
<td>3% -7% 36% 0%</td>
<td>-3% -5%</td>
<td></td>
</tr>
<tr>
<td>Low Income</td>
<td>-20% -55% -35% 15% -16% -22%</td>
<td>-3% -37% -8% -37% -10%</td>
<td>24% -10%</td>
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</tr>
<tr>
<td>C&amp;I</td>
<td>-16% -24% 16% -6434% -24% -12% -47% -24%</td>
<td>19% 11%</td>
<td>-3% -3%</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>-8% -22% 20% -59% -15% -9%</td>
<td>-14% -31% -18% 11%</td>
<td>-4%</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

1. GHG for information purposes only; it is not included in TRC test
### Electric PA’s Master Summary of Energy Efficiency Activities

<table>
<thead>
<tr>
<th>Customer Sector</th>
<th>Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Capacity (kW)</td>
</tr>
<tr>
<td></td>
<td>Annualized</td>
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<tr>
<td>Residential</td>
<td>11,709</td>
</tr>
<tr>
<td>Low Income</td>
<td>1,260</td>
</tr>
<tr>
<td>C&amp;I</td>
<td>33,635</td>
</tr>
<tr>
<td>TOTAL</td>
<td>46,605</td>
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<tr>
<td>Evaluated</td>
<td>12,691</td>
</tr>
<tr>
<td>Low Income</td>
<td>701</td>
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<tr>
<td>C&amp;I</td>
<td>30,374</td>
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<td>TOTAL</td>
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### Percent Variance

<table>
<thead>
<tr>
<th>Customer Sector</th>
<th>Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NOx</td>
</tr>
<tr>
<td>Residential</td>
<td>8%</td>
</tr>
<tr>
<td>Low Income</td>
<td>-4%</td>
</tr>
<tr>
<td>C&amp;I</td>
<td>-10%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>-6%</td>
</tr>
</tbody>
</table>

**Notes:**
1. GHG for information purposes only; it is not included in TRC test
## Competitive Procurement in 2010

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>WINNER OF BID</th>
<th>NUMBER OF VENDORS RECEIVING RFP</th>
<th>NUMBER OF RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Statewide QA/QC for Residential Programs</td>
<td>Competitive Resources, Inc.</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>2. Large Commercial &amp; Industrial Evaluations</td>
<td>KEMA, Inc.</td>
<td>67</td>
<td>4</td>
</tr>
<tr>
<td>3. Residential New Construction (Energy Star Homes) Evaluations</td>
<td>NMR Group, Inc.</td>
<td>67</td>
<td>1</td>
</tr>
<tr>
<td>4. Non-Residential Small Retrofit Area Evaluations</td>
<td>Cadmus Group, Inc.</td>
<td>73</td>
<td>5</td>
</tr>
<tr>
<td>5. Residential Retail Product Evaluations</td>
<td>NMR Group, Inc.</td>
<td>84</td>
<td>2</td>
</tr>
<tr>
<td>6. Residential Retrofit &amp; Low Income Area Evaluations</td>
<td>Cadmus Group, Inc.</td>
<td>73</td>
<td>5</td>
</tr>
<tr>
<td>7. Multi-Family Market Integrator</td>
<td>RISE Engineering</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>8. Special and Cross-Cutting Multi-Evaluation Tasks</td>
<td>Tetra Tech MA, Inc. &amp; Opinion Dynamics</td>
<td>65</td>
<td>2</td>
</tr>
<tr>
<td>9. Statewide Outreach, Education, and Marketing</td>
<td>Cadmus Group, Inc.</td>
<td>21</td>
<td>12</td>
</tr>
</tbody>
</table>
Quality Control / Quality Assurance Inspection Services
Massachusetts, Rhode Island, and New Hampshire
Energy Efficiency

2010-2012

REQUEST FOR PROPOSAL
Information and Instructions
RFP 052-10

June 30th 2010

Prepared by:

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National Grid
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Waltham, MA 02451
781-907-3011
Philippe.montillier@us.ngrid.com
# TABLE OF CONTENTS

INFORMATION and INSTRUCTIONS FOR BIDDERS

1.0 BACKGROUND 3
2.0 PROGRAM ADMINISTRATOR SPONSOR LIST 3
3.0 UNAUTHORIZED DISCLOSURE 3
4.0 CONFLICT OF INTEREST RULES 4
5.0 SCOPE OF WORK 4
6.0 LIMITATIONS 4
7.0 PROGRAM ADMINISTRATORS DISCRETION 4
8.0 PRICING 5
9.0 PAYMENT FOR SERVICES & INVOICING 5
10.0 PROPOSAL SUBMISSION 5
11.0 EXCEPTIONS & CLARIFICATIONS 6
12.0 NOTICE OF INTENT TO DECLINE 6
13.0 PRE-BID INFORMATIONAL MEETING 6
14.0 COMMUNICATIONS & FORM OF RESPONSE 6
15.0 PROPOSAL FORMAT 7
16.0 TERMS & CONDITIONS and SPECIMEN AGREEMENT 8
17.0 SAFETY, ENVIRONMENTAL & BACKGROUND CHECK REQUIREMENTS 9
18.0 SUMMARY OF RFP DOCUMENTS 9
19.0 SCHEDULE 10

ATTACHMENTS

- **Attachment 1:** Information and Instructions for Vendors
- **Attachment 2:** Scope of Work
- **Attachment 3:** RFP 052-10 Cost Estimate Bid Form
- **Attachment 4:** National Grid Terms & Conditions for Service Firms, Document 0300 (06/25/09)
- **Attachment 5:** NSTAR’s Requirements Prior to Contract Award
- **Attachment 6:** Cape Light Compact Terms and Conditions
- **Attachment 7:** Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
- **Attachment 8:** Berkshire Gas Consulting Services Agreement
- **Attachment 9:** Nisource Corporate Services Company General Services Agreement for Construction, Maintenance, Services and Materials (Bay State Gas)
- **Attachment 10:** New England Gas Company Terms & Conditions
- **Attachment 11:** Unitil Contract and Certificates of Insurance Requirements
- **Attachment 12:** National Grid Contractor Safety Requirements (10/31/08)
- **Attachment 13:** National Grid Environmental Requirements (12/15/08)
- **Attachment 14:** National Grid Background Check Requirements for Contracted Service Providers - Contractor Employee Background Checks, (04/02/09)
QUALITY CONTROL / QUALITY ASSURANCE INSPECTION SERVICES
REQUEST FOR PROPOSAL
RFP 052-10

QA/QC INSPECTION SERVICES FOR PROGRAMS IN MASSACHUSETTS, RHODE ISLAND AND NEW HAMPSHIRE

OCTOBER 2010 – December 2012

INFORMATION AND INSTRUCTIONS FOR BIDDERS

1.0 BACKGROUND

The Massachusetts Program Administrators for the Massachusetts Energy Efficiency programs in the Residential area request proposals to perform inspection services, as described in this Request for Proposal (RFP). The RFP will also include these services for the select Rhode Island and New Hampshire programs in the National Grid Territories.

This RFP covers the service period beginning October 1st 2010 through December 31st 2012 with an option to renew for 1 additional year at the discretion of the Program Administrators.

National Grid will be taking the lead in this RFP to coordinate the solicitation, and results, as well as together with the other Program Administrators, select a supplier for the program.

2.0 SPONSOR LIST

The list of Program Administrators for this RFP includes:

- Bay State Gas
- Berkshire Gas
- Cape Light Compact
- New England Gas Company
- National Grid (Electric & Gas)
- NSTAR Electric and Gas Corporation
- Western Massachusetts Electric
- Unitil/Fitchburg Gas & Electric

3.0 UNAUTHORIZED DISCLOSURE

3.1 The Program Administrators, consider any information provided to Vendors in the course of business to be privileged and confidential between Vendor and the Program Administrators. This includes, but is not limited to, written data of any kind, business information, request for quotation, specifications, engineering data and any and all technologies and data either obtained or observed while supplying the commodity/service required by the contract. Unauthorized disclosure of information to third parties by Vendor may lead to cancellation of the contract, loss of future business opportunities and/or the effects of any other remedies which may be available to the Program Administrators.
3.2 Vendor’s proposal will be considered as being in full compliance with all documents, specifications, drawings and engineering data included in this RFP unless specific exceptions or clarifications are separately stated.

4.0 CONFLICT OF INTEREST RULES

Bidders who are an implementation contractor administrating implementation work in any of the residential programs listed in this RFP, you may not bid on that portion of the RFP. Vendors bidding should be aware they cannot perform inspections on programs where they are providing services.

The Program Administrators will screen potential bidders who may be ineligible to perform evaluation services based on the above criteria. Nevertheless, bidders are under obligation to disclose to the Program Administrators when it is apparent to them that such situations may exist.

5.0 SCOPE OF WORK

Scope of Work

- See Attachment 2 Scope of Work (with Appendix A-H) for a description of the Services to be provided.

6.0 LIMITATIONS

Bidder shall mean those firms/vendors acting in the role of Supplier when responding with a Proposal to this RFP. Proposal shall mean the Bidder's formal response indicating their committed solutions that meet or exceed the requirements of the RFP. Subcontractors, or subs, can be defined as any Supplier under Contract or in the RFP response that are considered financially independent of the Bidder in any other business or accounting relationship.

This RFP does not constitute an offer by the Program Administrators to enter into a contract, nor does any response to this RFP constitute an acceptance of an offer, nor does any response to this RFP bind the Program Administrators in any way. This document shall not be construed as a request or authorization to perform work at the Program Administrators' expense. Any work performed by a Bidder in connection with evaluating and responding to the RFP and, if selected, negotiating a definitive Agreement will be at the Bidder's own discretion and expense. This RFP does not represent a commitment to purchase or lease. The Program Administrators reserve the right to reject any and all proposals at its absolute discretion.

Submission of a bid constitutes acknowledgment that the Bidder has read and agrees to be bound by such terms. The information in this document will enable the recipient to formulate a proposal to meet the workload requirements as described in this RFP. The numbers, volumes, run rates, etc. provided in this RFP are based upon the most recent data available and should serve as estimates to Bidders for pricing and response purposes.

7.0 PROGRAM ADMINISTRATORS DISCRETION

National Grid is issuing this RFP on behalf of the Program Administrators who at their discretion may:

- Select a Proposal other than the lowest priced, if the Program Administrators determine, at its sole and absolute discretion that the Program Administrators interests will best be served by doing so.

- Seek clarification from any Bidder regarding Proposal information and may do so without notification to any other Bidder.

- Continue the review procedure until a Bidder is selected successfully or until the Program Administrators choose to reject all Proposals.
• Accept any Proposal or alternate as submitted without negotiations.
• Select for negotiations only the overall best Proposal or negotiate all Proposals submitted which fall within a competitive range.
• Perform a complete financial review as well as an on-site investigation of any of the Bidders facilities to ensure it is capable of meeting the demands of Program Administrators and the needs identified in this RFP.
• May not award any Contract(s) as a result of this RFP.
• Reserves the right to accept or reject any or all proposals received, or to cancel this RFP in part or in its entirety, if in doing so is in the best interests of the Program Administrators.

8.0 PRICING

The Program Administrators seek to procure Services at the most cost effective rates possible. All pricing will be effective for the duration of the contract.

Bidders must complete and submit Attachment 3: Cost Estimate Bid Forms. The bid form contains three (3) tabs.

The First tab (Administration) contains a form with five (5) tasks. Pricing should be provided as hourly rates for various levels of experience and expertise as noted in the sheet. Please fill out all tasks. It is essential that Bidders complete the bid form detailing estimated costs, by key program tasks, indicating hourly rates for personnel, travel, total hours, and total cost.

The Second tab is for Residential New Construction (RNC) Single Family and Multi Family Pricing. Please note for Residential New Construction Multi Family; the base price is for seven (7) units, and one (1) additional unit is added per each additional seven (7) units in the building. Please provide pricing for additional units.

The Third tab is for Residential Retrofit (Retrofit) Single Family and Multi Family Pricing. Please note for Residential Retrofit Multi Family; the base price is for five (5) units and additional units are for 10% of the remaining units in the building. Please provide pricing for additional units (per unit).

9.0 PAYMENT FOR SERVICES and INVOICING

No up-front payments will be made to vendors. Invoices shall be submitted to each Program Administrators on a monthly basis. Bidder should identify on the Attachment 3 Cost Estimate Bid forms, if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered. Discounts will be factored into the evaluation of the bids and their acceptance is at Program Administrators option.

10.0 PROPOSALS SUBMISSION

National Grid is using an electronic software package called Ariba. Ariba Sourcing is an internet application designed to facilitate the collection of business information. All of the relevant RFP information including: Scope of Work, Terms & Conditions and other required documents are contained in this electronic RFP. You are required to submit your proposal response via Ariba, as well as send two hard copies of your proposal as specified in Section 14 below. For more information about Ariba, you may refer to their website at www.ariba.com.

Bidders are invited to prepare a detailed response to this proposal. This response should address all the requirements outlined in the Scope of Work, as well as any additional strategies and creativity regarding how the website will be branded. After review, the Program Administrators may invite Bidders in to present examples of the firm’s work that demonstrates their capabilities, as well as to provide more details on their plans and budget for the proposed branding of the website. Following the proposal review and any requested presentations, the Program Administrators will select a company to provide these services. A pre-
bid meeting will also take place, as outlined below to answer any questions Bidders may have before submitting their final bid.

11.0 EXCEPTIONS AND CLARIFICATIONS

11.1 The Vendor agrees to all the provisions contained in this RFP and all enclosed Bid Documents unless exceptions are specifically and clearly listed in the Vendor’s proposal. All exceptions must be listed separately as either commercial or technical in nature and specifically identified as EXCEPTIONS. Any exceptions submitted by Vendor does not constitute acceptance by any of the Program Administrators. Exceptions will be negotiated and agreed to by each Program Administrator and will be part of an exclusive contract between the parties, which will be independent of any other associated contract with another Sponsoring organization.

11.2 Vendors preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Vendor’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

11.3 All material submitted, produced, data collected, reports, designs and documentation will become the exclusive property of the Massachusetts Sponsors at the end of the contract. The Vendor may not share program materials, customer data, industry or program participant contact information, etc. unless explicitly authorized by each Program Administrators to do so.

11.4 Should a Vendor find any ambiguity, discrepancy or omission in the RFP, or should the Vendor have any questions, the Vendor shall notify National Grid through Ariba to afford the National Grid the opportunity to send any instructions or interpretations to other Vendors who have received an Invitation to Bid. The Program Administrators will not be responsible for any oral instructions or interpretations.

12.0 NOTICE OF INTENT TO DECLINE

If the Vendor declines to submit a proposal, all RFP documents must be deleted and/or destroyed and a message in Ariba must be submitted to National Grid with a brief explanation as to why your bid will not be submitted.

13.0 PRE-BID INFORMATIONAL MEETING

No pre-bid meeting is planned at this time. We will present a program overview and answer any final questions you may have regarding this RFP. In the meantime, if you have any specific questions, they should be sent via Ariba. All questions and answers will be posted through Ariba.

14.0 COMMUNICATIONS AND FORM OF RESPONSE

14.1. During the RFP process, all questions must be submitted via Ariba before July 12, 2010 5:00 PM EST. Answers to Bidder’s inquiries will be distributed within a 48 hours period through Ariba. In order to ensure fairness, until the time an award is made, Bidders shall have no direct communication regarding this RFP with any of the Program Administrators or any other personnel within the Sponsors’ organization. After the decision to award is announced, the successful Bidder may contract the Program Administrators and work with each Program Administrators’ Procurement contact to provide certificates of insurance and sign final contract documents. Failure to comply with these communications guidelines may disqualify the Bidder from further consideration.

14.2 Supplier's proposal MUST include two separate VOLUMES. Volume I must address all commercial issues, while Volume II must address all technical requirements. Volumes I and II shall not be bound or otherwise joined together. VOLUME II MUST NOT CONTAIN ANY
COST OR PRICE INFORMATION. The organization of the cost proposal **MUST** conform to the organization enumerated in **Attachment 3, Cost Estimate Bid Form**, and as described in Section 8.

14.3 With the exception of sample reports and staff resumes, proposals must not exceed thirty pages.

14.4 A complete proposal must be sent via Ariba and two original hardcopies either hand delivered or sent via commercial carrier postmarked NO LATER THAN 5pm, Monday, July 26, 2010 at the following address:

Philippe Montillier  
Procurement Specialist  
National Grid  
40 Sylvan Rd  
Waltham, MA 02451

Note: In the event of problems with Ariba in loading bids, the Program Administrators reserve the right to extend the bidding due date time only to the extent the problem was fixed by Ariba.

**PLEASE NOTE THAT PROPOSALS MAY NOT BE SUBMITTED VIA FAX UNDER ANY CIRCUMSTANCES.**

15.0 PROPOSAL FORMAT

15.1 **Volume I: Commercial Proposal**

15.1.1 Commercial Exceptions: This section of the proposal **MUST** state clearly any exceptions which are being taken to the commercial requirements of this RFP. Exceptions must state what the exception is, the reason for the exception and proposed alternatives, and be organized sequentially in accordance with the organization of the RFP. Commercial exceptions **MUST** be clearly defined only in this section of the proposal. Bidder’s preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Bidder’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP, unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

15.1.2 All proposals must be properly dated and executed by an authorized representative of the Vendors organization. Failure to provide the required hard copy and electronic version of the proposal or all required information may result in rejection of the proposal.

15.1.3 Bid security procedures requires that bid information shall not to be shared with, or provided to, any PA employee, or any other outside firm prior to award of contract(s).

15.1.4 All responses to this RFP, whether or not in compliance with the terms of this RFP, shall be considered unconditional offers by the Bidder, which, if accepted, shall create a binding obligation upon the Bidder. Any limited duration offers shall be explicitly noted.

15.1.5 Bidders should identify if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered or not. Discounts will be factored into the evaluation of the bids and their acceptance is at the Sponsors’ option.

15.1.6 **EEOC Compliance:** If not previously submitted, please provide a statement that your company is in compliance with EEOC requirements.
15.1.7 Insurance Certificate(s): Include with your Bid a Certificate(s) of Insurance evidencing compliance with at least the minimum levels of insurance required in Section 11.0 Insurance of National Grid Terms & Conditions, which is contained in this document. If you are awarded the work, you will be required to submit certificates to each Program Administrator identifying them as an additional insured and complying with their insurance levels.

15.1.8 All Bidders must conform to National Grid’s Background Check policy as specified in Ariba. The other Program Administrators may have similar commercial requirements that you may have to comply with as well.

15.1.8 Vendor Information: Bidders shall provide a letter of introduction and a statement of qualifications, which details the Bidder’s experience, especially with energy efficiency projects. The Bidder’s statements should emphasize their (1) knowledge and understanding of energy efficiency programs, and (2) the requirements of this RFP. In addition, provide a description of the legal status of respondent (e.g., sole proprietorship, partnership, limited partnership, joint venture, or corporation) and state of residency. Some of the other key points are as follows:

A. General description of all the services and products your company offers with a brief description of its general history.

B. Discussion of the companies staff to be assigned, and how they will be organized to deliver the services requested in the most efficient and expedient manner. Include a brief discussion of your firm’s internal quality control and review procedures.

C. Include a list of other similar Services contracts in force nationally

D. Provide the name, title, and contact information for three (3) references familiar with respondent’s business organization, finances and operational style. Provide resumes of key individuals in the firm providing the services to the Program Administrators.

15.2 Volume II - Technical Proposal

The Supplier’s technical proposal, addressing all technical requirements MUST be included in this section. THIS VOLUME MAY NOT INCLUDE ANY COST OR PRICING INFORMATION. In addition to the Supplier's technical proposal, the following items must be addressed, in the order listed:

15.2.1 Title Page: This section of the proposal should include a title page, which identifies the RFP Title, vendor’s name and the volume.

15.2.2 Table of Contents: The vendor’s proposal should include a Table of Contents, which lists the titles and page numbers for each major topic and sub-topic.

15.2.3 Executive Summary: This section should include a summary of the key points and highlights of the vendor’s response.

15.2.4 Technical Requirements: This section of the proposal must include a completed copy of the Technical Response with responses provided to each of the requirements. Every item should have a response, including any exceptions. Bidders should also include a description of all assumptions used to develop their response to this RFP.

16.0 TERMS AND CONDITIONS and SPECIMEN AGREEMENT

The successful Vendor’s services shall be provided in accordance with the following terms and conditions from each Sponsor:

• Attachment 5 - NSTAR’s Requirements Prior to Contract Award  
• Attachment 6 - Cape Light Compact Terms & Conditions.  
• Attachment 7 - Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions  
• Attachment 8 - Berkshire Gas Consulting Services Agreement  
• Attachment 9 - NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials  
• Attachment 10 - New England Gas Company Terms & Conditions  
• Attachment 11 - Unitil Contract and Certificates of Insurance Requirements

17.0 SAFETY, ENVIRONMENTAL and BACKGROUND CHECK REQUIREMENTS

The successful Vendor’s services shall be provided in accordance with each Program Administrators commercial requirements. National Grid’s commercial requirements are as follows:

• Contractor Safety Requirements dated 10/31/08 (Attachment 12)  
  o You are required to fill out the Safety form in the RFP and submit it with your proposal.
• Contractor Environmental Requirements dated 12/15/09 (Attachment 13)
• Contractor Employee Background Check Requirements dated 4/02/09 (Attachment 14)  
  o You are required to fill out the background Check form in the RFP and return it with your proposal.

18.0 SUMMARY RFP DOCUMENTS

This RFP is comprised of the following documents:

• Attachment 1: - Information and Instructions for Vendors
• Attachment 2: - Scope of Services (with Appendix A-H)
• Attachment 3: - RFP 052-10 Bid Forms
• Attachment 4: - National Grid Terms & Conditions for Services Firms, Document 0300 (06/25/09)
• Attachment 5: - NSTAR’s Requirements Prior to Contract Award
• Attachment 6: - Cape Light Compact Terms and Conditions
• Attachment 7: - Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
• Attachment 8: - Berkshire Gas Consulting Services Agreement
• Attachment 9: - NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services and Materials (Bay State Gas)
• Attachment 10: - New England Gas Company Terms & Conditions
• Attachment 11: - Unitil Contract and Certificates of Insurance Requirements
• Attachment 12: - National Grid Contractor Safety Requirements (10/31/08)
• Attachment 13: - National Grid Environmental Requirements (12/15/09)
• Attachment 14: - National Grid Background Check Requirements for Contracted Service Providers - Contractor Employee Background Checks, (04/02/09)
19.0 **SCHEDULE**

The following dates are critical to this RFP.

- **Request for Proposal Issued via Ariba**: June 30, 2010
- **Bidder’s Conference Call**: TBD
- **Last Date for Questions from Bidders**: July 12, 2010 @ 5:00 p.m. EST
- **Q&A to Bidders**: July 16, 2010
- **Proposals Due via Ariba**: July 26, 2010 @ 5:00 p.m. EST via Ariba
- **Contract Awarded**: August 31, 2010 - Estimated
- **Kick-off Meeting**: September 3, 2010 or as soon as conveniently possible after the selection of contractor.
Attachment 2

Scope of Services for RFP 052-10

Quality Assurance/Quality Control Inspection Services

June 2010

CONFIDENTIAL – DO NOT DISTRIBUTE
I. Background

Gas and electric distribution companies and municipal aggregators (together “Program Administrators” or “PAs”) collectively serving close to 2.7 million electric customers and nearly 1.6 million gas customers efficiency, have been historically ambitious and recognized nationally as leaders in market transformation and energy efficiency. The Program Administrators have been engaged in a collaborative process to demonstrate a strong commitment to the broad distribution of innovative, high quality energy efficiency services. In Massachusetts, An Act Relative to Green Communities, Chapter 169 of the Acts of 2008 (“Green Communities Act”) was signed into law on July 2, 2008. With the passing of Green Communities Act, the existing energy efficiency programs were significantly expanded. Program Administrators recognize that in order to ensure that high quality services continue to be provided to customers requires rigorous Quality Assurance (“QA”)/ Quality Control (“QC”). The Program Administrators listed below seek this Request for Proposal (“RFP”) to provide assurances that programs continue to deliver, improve, and further develop high quality energy efficiency programs.

Bay State Gas Company
Berkshire Gas Company
Cape Light Compact
National Grid Electric and Gas
New England Gas Company
NSTAR Electric and Gas
Uniteil
Western Massachusetts Electric Company

II. Overview

The purpose of this RFP is to seek qualified Vendors to provide third party quality control inspection services in support of the statewide Mass SaveSM Energy Efficiency Residential Programs (the “Programs”) offered in Massachusetts. In addition, the RFP seeks to include, as a separate addendum, National Grid’s Rhode Island EnergyWise program, and National Grid’s New Hampshire Home Performance with ENERGY STAR® and Energy Audit with Home Performance programs, as outlined in Section III-A “Scope of Work”.

Respondents may be qualified individuals, companies, or teams and must have demonstrated experience in successful completion of projects on time and within budget. Respondents must demonstrate an understanding of residential energy efficiency. Respondents must demonstrate the ability to work effectively with a diverse group of stakeholders and as an effective member of a team. Respondents should be flexible and responsive to changing program needs.

The full suite of services solicited in this RFP are to be provided through December 31, 2012, with the option to extend one year beyond this period at the discretion of the PAs. The delivery of specific services will be scheduled as discussed in this RFP or as outlined by contract.
Third party quality control inspections may include, but are not limited to randomly selected participants of the various energy efficiency programs described below, customer requests for independent third party verification, and a specified percentage of all independent contractors approved to deliver services in certain Programs.

Vendors must submit proposals for all of the indicated programs in Massachusetts. Proposals for individual programs in Rhode Island and New Hampshire will be negotiated solely with National Grid. See Appendix C for pricing details.

The PAs may accept (1) an entire proposal submitted by a Vendor or (2) portions of proposals submitted by multiple Vendors. The Company will not return proposals or materials submitted in response to this RFP. The PAs encourage Vendors to collaborate. If you are an implementation contractor administrating implementation work in any of the residential programs listed in this RFP, you may not bid on that portion of the RFP. Vendors bidding should be aware they cannot perform inspections on programs where they are providing services.

The PAs reserve the right to modify this RFP. In the event that this RFP is modified prior to the bid due date, Vendors will have an equal opportunity to modify their proposals accordingly. Further, after the selection of a Vendor(s), the PAs may modify programs and QA/QC requirements by changing, as examples: customer participation targets, energy efficiency measures, funding or add and remove programs as necessary. In such event, the PAs will negotiate any appropriate adjustment to its contract with the chosen Vendor(s).

All proposals received by the PAs will be evaluated and selected based on price, quality and comprehensiveness, prior experience, ability and resources to provide the services within the specified time period, and the demonstrated skills and financial viability of the Vendor, among other factors. The selected Vendor(s) will play a crucial role in the PAs achieving customer satisfaction, quality installations, verifiable savings, regulatory requirements, and energy savings goals. The PAs may disqualify any proposal for any reason and may accept a proposal other than the lowest bid-price offering.

**III Program Terms - Specific**

**III - A. Scope of Work**

**Third Party Quality Assurance/Quality Control (QA/QC) Process**

The purpose of the third party QA/QC inspection includes, but is not limited to, verification of program standards, measure installations, improve customer satisfaction, and provide feedback to PAs. The vendor will provide monthly reporting of QA/QC results to each individual PA, as well as appropriate statewide working groups and regulators upon request. Details of this service and inspection criteria are as follows:

**Site Visit Selection Criteria**

The Vendor will inspect approximately 5-10% of jobs completed annually but may vary by program.
The following is the percentage guidelines by Program:

**Massachusetts**
- RCS/MassSave (Electric and Gas) – 10%
- Multi Family Retrofit (Electric and Gas) – 10%
- Low Income Single Family and Multi Family (Electric and Gas) - 5%
- Residential New Construction (Market Rate and Low Income-Electric and Gas) – 10%

**Rhode Island**
- National Grid EnergyWise (Electric and Gas) – 10%

**New Hampshire**
- National Grid Home Performance with ENERGY STAR(Electric) and Energy Audit with Home Performance (Gas) – 5%

Inspections will be randomly selected, for each PA, by the QA/QC vendor(s) based on the installation of major measures.

The QA/QC vendor will act as mediator should there be a conflict with the quality of work performed by a weatherization contractor and the PA’s lead vendor’s assessment of the work performed.

By the 20th of each month, each Program implementation vendor will provide an electronic transmission of customers who have participated and/or are scheduled to participate in all active energy efficiency programs to the Quality Control (QC) vendor(s). All potential site inspection data from the Programs will be sent to the third party QA/QC vendor(s) at a minimum will include:

- Customer name
- Service address
- Phone number
- Email address (if provided)
- Assessment or Scheduled audit date

Program Specific Information (as applicable)

- All recommended energy efficiency measures from initial visit
- All installed energy efficiency measures and number of units
- Installed cost
- Description of work completed
- Date of Installation
- Test in and test out scores for duct and air sealing measures
- Home Energy Rating System (“HERS”) rating
- Date of scheduled assessment

**Inspection Scheduling Process**
QA/QC Vendor will create a database to track all data uploaded from the Programs. QA/QC Vendor will choose the customers at random from the list.

As new Inspection files are received by QA/QC Vendor, the newly added customers are given “Active Status”. Representative will schedule all Verification Inspections based on customer availability and inspector location / routing.

QA/QC Vendor will attempt to schedule the QC visit within 3 working days of receiving program data. QA/QC Vendor is required to document date and time of attempted contacts. QV Vendor will attempt to reach the customer a minimum of 3 times via telephone to schedule an inspection appointment at various times of the day. During the scheduling process, the vendor will determine if access will be uninhibited or if special equipment (e.g. ladders) will be required to conduct the inspection. Inspections will be scheduled at a reasonable time that is convenient to the customer.

QA/QC Vendor will coordinate with Lead Vendor to attend on-site In-Process inspections. All inspections that QA/QC Vendor cannot schedule and complete within 21 days will be assigned “Abandoned” status and reported to the appropriate PA.

When an inspection is scheduled and the customer is not home at the scheduled appointment time, the QA/QC Vendor Customer Service Representative will immediately attempt to contact the customer.

If the customer and inspector are able to reschedule the appointment, the inspection will be placed on the QA/QC Vendor inspector’s schedule for a subsequent date/time.

If the customer is not interested in rescheduling, the appointment is removed from the inspector’s schedule and the customer status is changed to “Not Interested”. In certain programs, incentives may need to be withheld in order to get random QA/QC. This is important to ensure we have no intentional fraud in the programs.

If the customer is not available, another “Active Status” customer is immediately given the available appointment date/time.

If the customer cannot be reached, the customer goes back into “Active Status” for additional scheduling attempts until all avenues are exhausted, at which point, they will be reported as “Abandoned”. If a customer requests an inspection they will be contacted by phone within three (3) business days of receipt of the inspection request and the quality control inspection will be performed within 10 business days of receipt of the inspection request.

**Inspection Process**

Upon arrival, inspectors will identify themselves and provide customers with identification. Inspectors should explain the purpose of the visit. The QA/QC Vendor will develop a script to be used by inspectors, which will be approved by PAs. Inspectors are expected to have all necessary
equipment and materials required to perform the inspection. The inspector will ask the customer to accompany them on the inspection. Inspections will only be completed if there is an adult present (18 year or older) in the home. The QA/QC inspection process will ensure that installations were completed according to individual program guidelines and standards.

Customers will be afforded additional opportunities to have questions answered. The QA/QC Vendor will document and track accordingly the customer’s level of satisfaction with the services they received from the Program(s) or of an independent contractor’s work.

QA/QC inspections will identify and document missed opportunities for all energy efficiency measures identified during the QC visit compared to the documented opportunities presented to the customer at the time of the energy assessment.

See Appendix B for QA/QC Site Visit Protocols.

**Completed Inspections**

Once Verification appointments are completed the QA/QC Vendor is required to maintain a database that compiles the results of the QA/QC. The QA/QC Vendor will send completed inspection files to PAs by the 15th of the following month. The QA/QC Vendor will develop reports and required documentation formats with the PAs.

If “Pass” status is assigned, the QA/QC process is considered complete.

If the Work completed “Fails” the inspection the QA/QC Vendor will notify the installation contractor within 2 working days of the failed inspection to begin corrective action.

The installation contractor will respond to the complaint within 48 business hours of initial notification from the QA/QC vendor.

The QA/QC vendor will follow up with the customer and report on the status of the remediation.

Hazardous situations will be reported within 24 business hours.

QA/QC Vendor will report inspection results to PAs with monthly inspection information reports.

QA/QC Vendor will provide inspection invoices to each PA monthly.

**Reporting**

QA/QC inspection results will be reported on a monthly basis by the 15th of each month. A status report of all scheduled, complete, remediation, and abandoned inspections will be submitted to each PA providing satisfactory detail agreed upon by the PAs. For inspections with
overlapping gas and electric territories, a report will be generated for each PA for their specific territory.

Hazardous situations will be identified and the appropriate vendor and PA will be notified.

The QA/QC Vendor will note and record any discrepancies identified in the scope of work as it appears on the Program Installation Agreement when compared to the actual conditions at the location where the work was performed.

Maintain and make available upon request, duplicate copies of invoices, supporting documentation, which are generated in the delivery of the services provided.

All measures will be inspected during the QA/QC site visit. If the inspection results in the identification of missed opportunities those will be noted and forwarded to the appropriate PA, vendor and the installation contractor for remediation.

Reports should be aggregated by PA and by implementation/weatherization contractor. The reporting of work performed by implementation contractors will be provided to all PAs.

The QA/QC should identify and report to PAs on any training needs indentified through the QA/QC process.

All failed QC inspections will be re-inspected after completion of the required work and/or as directed by the Program Administrators. Only failed criteria will be re-inspected.

**IV. TIME LINE**

<table>
<thead>
<tr>
<th>Issue RFP to Vendors</th>
<th>06-30-10</th>
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</thead>
<tbody>
<tr>
<td>Deadline for Vendor Questions</td>
<td>07-12-10</td>
</tr>
<tr>
<td>Deadline for the Sponsors to respond to Vendor Questions</td>
<td>07-16-10</td>
</tr>
<tr>
<td>Proposals Due (Close of Business)</td>
<td>07-26-10</td>
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<tr>
<td>Vendor Interviews</td>
<td>TBD</td>
</tr>
<tr>
<td>Project Award (Close of Business)</td>
<td>08-31-10</td>
</tr>
</tbody>
</table>
V. APPENDICES

Appendix A

Program Participant Goals (2010-2012) and number of Residential Customers Served by PA.

Appendix B

QA/QC Site Visit Protocols/Qualifications:

General
1. QA/QC Vendors will use inspectors that, meet the qualifications of the program being inspected i.e., inspectors who inspect weatherization measures must be BPI certified to complete a QA/QC of the MassSave Home Energy Program, Multi Family Retrofit, and Low Income Single Family and Multi Family programs. Building Envelope and Analyst certification is required, Infrared scan certification is highly desired. Inspections of the Residential New Construction program must be HERS certified and be currently working under a HERS provider.
2. QA/QC Vendors must document if HERS ratings are accurate and BPI standards were followed.
3. At all site visits, the inspector will collect customer satisfaction information.

A) Residential New Construction Site Visit Protocols

There are 3 tiers of inspections for New Construction:
Tier 1 - Appliances and thermal
Tier 2 – Appliance and Thermal and HVAC without Quality Installation Verification (QIV)
Tier 3 – Appliance and Thermal and HVAC with Quality Installation Verification (QIV)

Verification of proper installation of measures by a qualified representative:

Appliance Package
- Verify installation and efficiency standard of appliances
- Record manufacturer and model information
- Verify wattage and number of Compact Fluorescent Lamps (“CFL”) and/or fixtures installed

Thermal Package
Verify and record compliance with air sealing requirement using blower door test
Verify and record compliance with insulation requirements.
Verify and record presence and correct installation of mechanical ventilation system when incentive is offered.

HVAC Package - Heating, Ventilating, and Air Conditioning
Verify and record compliance with duct sealing requirement using duct blaster test
Verify installation, record manufacturer and model information and verify compliance with appropriate efficiency requirement when equipment incentive is offered for water heaters, heating systems, and air conditioning.
If required: Perform Quality Installation Verification (“QIV”) inspection and record data on all air conditioning systems where an equipment incentive is offered.

For all packages a sampling protocol consistent with national RESNET sampling procedures will be used for multi-unit projects

Provide results from verification tests (QA/QC) and construction improvement recommendations.

**B Retrofit Program Site Visit Protocols**

There are 3 tiers of inspections for the Retrofit programs.

Tier 1 – Visually inspect in-process audits to ensure the energy specialist is offering all cost effective PA approved measures.
Tier 2 – Visually inspect post audit installed measures (such as lighting, appliances, domestic hot water (“DHW” such as low flow water faucets/showerheads, pipe wrap, door sweeps), thermostats, excluding insulation and air sealing).
Tier 3 - Inspect post audit installed measures, including insulation and air sealing utilizing blower door and/or infrared camera.

At times, Quality Installation Verification (“QIV”) will be required

**Insulation/Ventilation**
- Verify post installation R-values
- Verify quantity/Square Footage installed via visual inspection
- Verify appropriateness of ventilation – via blower door
- Assess structure for damages caused by installation
- Thermal scan of structure when possible
- Take digital photographs of any problem areas

**Air Sealing**
- Visual verification of air sealing- confirm blower door readings when appropriate
Heating/AC/DHW Equip. Verify manufacturer, model number and efficiency rating of equipment.

Thermostats Verify make and model number.
Confirm Thermostat is in Program Mode. If not, provide educational and instructional information and support.

DHW Measures Verify that materials are installed properly.
Verify quantity installed.

Lighting Verify wattage and number of Compact Fluorescent Lamps (CFL) and/or fixtures installed.

Custom Measures Visual inspection to verify manufacturer, model number and efficiency rating of equipment where applicable.
Verify that equipment is operating.

Appendix C - PRICING

Pricing should be based assuming that all PAs will meet their participation goals (Appendix A), but this could increase or decrease at the discretion of each PA or based upon any program design changes during the length of this contract.

Pricing for these services should be presented on a tiered basis using the listed options as follows:

New Construction:

<table>
<thead>
<tr>
<th>Tier 1</th>
<th>Appliance &amp; Thermal (without Blower Door included)</th>
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</thead>
<tbody>
<tr>
<td>Tier 2</td>
<td>Appliance, Thermal &amp; HVAC (w.out QIV necessary)</td>
</tr>
<tr>
<td>Option 1</td>
<td>Duct Blaster</td>
</tr>
<tr>
<td>Option 2</td>
<td>Infrared</td>
</tr>
<tr>
<td>Option 3</td>
<td>QIV</td>
</tr>
<tr>
<td>Option 4</td>
<td>Blower Door</td>
</tr>
<tr>
<td>Option 5</td>
<td>Revisit Charge if any</td>
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</table>

Retrofit Programs:

<table>
<thead>
<tr>
<th>Tier 1</th>
<th>Visual inspection- in process audits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 2</td>
<td>Visual inspection- post audit (no insulation &amp; air sealing)</td>
</tr>
<tr>
<td>Tier 3</td>
<td>Post inspection of all installed measures including insulation, air sealing &amp;/or infrared</td>
</tr>
<tr>
<td>Option 1</td>
<td>QIV</td>
</tr>
<tr>
<td>----------</td>
<td>---------------</td>
</tr>
<tr>
<td>Option 2</td>
<td>Duct Blasting</td>
</tr>
<tr>
<td>Option 3</td>
<td>Infrared</td>
</tr>
<tr>
<td>Option 4</td>
<td>Revisit Charge if any</td>
</tr>
</tbody>
</table>

Also note any discount for Multi Family inspections when sample inspecting multi family facilities (both new construction and retrofit). See Bid sheet instructions for details.

Pricing should include an overall program management fee component and a per unit component based on tiers listed above.

Pricing must be designed to reflect costs for MA only, RI only, and NH only.

Note: selected vendor will be required to invoice MA costs and fees separately from RI and NH. These invoices should be billed to each PA. RI and NH will require separate invoicing directly to National Grid.

Appendix D
MA – Three Year Electric Plan – Program descriptions included

Appendix E
MA – Three Year Gas Plan – Program descriptions included

Appendix F
RI – Residential Program Descriptions - EnergyWise begins on page 4

Appendix G
NH – Home Performance with Energy Star

Appendix H
NH – Energy Audit with Home Performance
EVALUATION TASKS FOR MASSACHUSETTS ENERGY EFFICIENCY PROGRAMS IN LARGE COMMERCIAL & INDUSTRIAL EVALUATION CONTRACTOR (LCIEC)

2010-2012

REQUEST FOR PROPOSAL
RFP 007-10

January 25, 2010

Prepared by:

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RFP 007-10 Large Commercial & Industrial Evaluation Contractor (LCIEC)
TABLE OF CONTENTS

INFORMATION and INSTRUCTIONS FOR BIDDERS
1.0 BACKGROUND 3
2.0 PROGRAM ADMINISTRATOR SPONSOR LIST 3
3.0 UNAUTHORIZED DISCLOSURE 4
4.0 CONFLICT OF INTEREST RULES 4
5.0 SCOPE OF WORK 4
6.0 LIMITATIONS 4
7.0 PROGRAM ADMINISTRAORS DISCRETION 4
8.0 PRICING 5
9.0 PAYMENT FOR SERVICES & INVOICING 5
10.0 PROPOSAL SUBMISSION 5
11.0 EXCEPTIONS & CLARIFICATIONS 6
12.0 NOTICE OF INTENT TO DECLINE 6
13.0 PRE-BID INFORMATIONAL MEETING 6
14.0 COMMUNICATIONS & FORM OF RESPONSE 6
15.0 PROPOSAL FORMAT 7
16.0 TERMS & CONDITIONS and SPECIMEN AGREEMENT 9
17.0 SAFETY, ENVIRONMENTAL & BACKGROUND CHECK REQUIREMENTS 9
18.0 SUMMARY OF RFP DOCUMENTS 9
19.0 SCHEDULE 10

ATTACHMENTS
- Attachment 1: - Information and Instructions for Consultants
- Attachment 2: - Scope of Services (with Appendices 1-7 & Attachments)
- Attachment 3: - RFP 007-10 Bid Forms (Appendix 8)
- Attachment 5: - NSTAR’s Requirements Prior to Contract Award
- Attachment 6: - Cape Light Compact Terms and Conditions
- Attachment 7: - Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
- Attachment 8: - NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials
- Attachment 9: - New England Gas Terms & Conditions
- Attachment 10: - National Grid Contractor Safety Requirements (8/1/08)
- Attachment 11: - National Grid Environmental Requirements (02/29/08)
- Attachment 12: - National Grid Background Check Requirements for Contracted Service (1/10/08)

RFP 007-10 Large Commercial & Industrial Evaluation Contractor (LCIEC)
1.0 BACKGROUND

The Massachusetts Program Administrators for the Massachusetts Energy Efficiency programs in the Large Commercial & Industrial area request proposals to perform various evaluation tasks addressing the state of Massachusetts, as described in this Request for Proposal.

National Grid will be taking the lead in this RFP to coordinate the solicitation, and results, as well as together with the other Program Administrators, select a supplier for the program.

2.0 SPONSOR LIST

The list of Program Administrators for this RFP includes:

- Bay State Gas
- Berkshire Gas
- Cape Light Compact
- New England Gas
- National Grid (Electric & Gas)
- NSTAR Electric and Gas Corporation
- Western Massachusetts Electric
- Unitil/Fitchburg Gas & Electric

3.0 UNAUTHORIZED DISCLOSURE

3.1 The Program Administrators, consider any information provided to Consultants in the course of business to be privileged and confidential between Consultant and the Program Administrators. This includes, but is not limited to, written data of any kind, business information, request for quotation, specifications, engineering data and any and all technologies and data either obtained or observed while supplying the commodity/service required by the contract. Unauthorized disclosure of information to third parties by Consultant may lead to cancellation of the contract, loss of future business opportunities and/or the effects of any other remedies which may be available to the Program Administrators.

3.2 Consultant’s proposal will be considered as being in full compliance with all documents, specifications, drawings and engineering data included in this RFP unless specific exceptions or clarifications are separately stated.
4.0 CONFLICT OF INTEREST RULES

Bidders who have provided feasibility studies, savings estimates, application preparation assistance, design services, installation services, Rater services, commissioning services on projects for the Massachusetts New Homes with Energy Star program are not eligible to provide evaluation services. In addition any bidder who has contracts with other entities that may impact the bidder’s ability to perform evaluation services as an independent body are also not eligible. In particular any potential bidder who is providing consulting or implementation services to the Massachusetts EEAC, MA DOER, or it consultants for any energy efficiency programs is ineligible to bid on this contract.

5.0 SCOPE OF WORK

Scope of Work

- See Attachment Document 2 Scope of Work (with Appendices 1-7 & Attachments) for a description of the Services to be provided.

6.0 LIMITATIONS

Bidder shall mean those firms/vendors acting in the role of Supplier when responding with a Proposal to this RFP. Proposal shall mean the Bidder's formal response indicating their committed solutions that meet or exceed the requirements of the RFP. Subcontractors, or subs, can be defined as any Supplier under Contract or in the RFP response that are considered financially independent of the Bidder in any other business or accounting relationship.

This RFP does not constitute an offer by the Program Administrators to enter into a contract, nor does any response to this RFP constitute an acceptance of an offer, nor does any response to this RFP bind the Program Administrators in any way. This document shall not be construed as a request or authorization to perform work at the Program Administrators' expense. Any work performed by a Bidder in connection with evaluating and responding to the RFP and, if selected, negotiating a definitive Agreement will be at the Bidder's own discretion and expense. This RFP does not represent a commitment to purchase or lease. The Program Administrators reserve the right to reject any and all proposals at its absolute discretion. Submission of a bid constitutes acknowledgment that the Bidder has read and agrees to be bound by such terms. The information in this document will enable the recipient to formulate a proposal to meet the workload requirements as described in this RFP. The numbers, volumes, run rates, etc. provided in this RFP are based upon the most recent data available and should serve as estimates to Bidders for pricing and response purposes.

7.0 PROGRAM ADMINISTRATORS DISCRETION

National Grid is issuing this RFP on behalf of the Program Administrators who at their discretion may:

- Select a Proposal other than the lowest priced, if the Program Administrators determine, at its sole and absolute discretion that the Program Administrators interests will best be served by doing so.
- Seek clarification from any Bidder regarding Proposal information and may do so without notification to any other Bidder.
- Continue the review procedure until a Bidder is selected successfully or until the Program Administrators choose to reject all Proposals.
• Accept any Proposal or alternate as submitted without negotiations.
• Select for negotiations only the overall best Proposal or negotiate all Proposals submitted which fall within a competitive range.
• Perform a complete financial review as well as an on-site investigation of any of the Bidders facilities to ensure it is capable of meeting the demands of Program Administrators and the needs identified in this RFP.
• May not award any Contract(s) as a result of this RFP.
• Reserves the right to accept or reject any or all proposals received, or to cancel this RFP in part or in its entirety, if in doing so is in the best interests of the Program Administrators.

8.0 PRICING
The Program Administrators seek to procure Services at the most cost effective rates possible. Bidders must complete and submit Attachment 3: Cost Bid Forms (Appendice 8). Pricing should be provided as hourly rates for various levels of experience and expertise as noted in the sheet. Bidders shall include personnel names, who will be working on the project, that fall into the various labor categories. Bidders shall include personnel names, who will be working on the project, that fall into the various labor categories.

It is essential that Bidders complete the bid form detailing estimated costs, by key program tasks, indicating hourly rates for personnel, travel, total hours and total cost for completing the project. The Program Administrators will enter into individual negotiations each subsequent year regarding any potential price increases, which must be justified by the Bidder.

9.0 PAYMENT FOR SERVICES and INVOICING
No up-front payments will be made to vendors. Invoices shall be submitted to each Program Administrators on a monthly basis. A minimum 10% of the total invoice amount may be retained until the final project is completed and accepted by the Program Administrators. Bidder should identify on the Attachment 3: Cost Bid forms (Appendice 8), if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered. Discounts will be factored into the evaluation of the bids and their acceptance is at Program Administrators option.

10.0 PROPOSALS SUBMISSION
National Grid is using an electronic software package called Ariba. Ariba Sourcing is an internet application designed to facilitate the collection of business information. All of the relevant RFP information including: Scope of Work, Terms & Conditions and other required documents are contained in this electronic RFP. You are required to submit your proposal response via Ariba, as well as send two hard copies of your proposal as specified in Section 14 below. For more information about Ariba, you may refer to their website at www.ariba.com.

Bidders are invited to prepare a detailed response to this proposal. This response should address all the requirements outlined in the Scope of Work, as well as any additional strategies and creativity regarding how the website will be branded. After review, the Program Administrators may invite Bidders in to present examples of the firm’s work that demonstrates their capabilities, as well as to provide more details on their plans and budget for the proposed branding of the website. Following the proposal review and any requested presentations, the Program Administrators will select a company to provide these services. A pre-bid meeting will also take place, as outlined below to answer any questions Bidders may have before submitting their final bid.
11.0 EXCEPTIONS AND CLARIFICATIONS

11.1 The Consultant agrees to all the provisions contained in this RFP and all enclosed Bid Documents unless exceptions are specifically and clearly listed in the Consultant’s proposal. All exceptions must be listed separately as either commercial or technical in nature and specifically identified as EXCEPTIONS. Any exceptions submitted by Consultant does not constitute acceptance by any of the Program Administrators. Exceptions will be negotiated and agreed to by each Program Administrator and will be part of an exclusive contract between the parties, which will be independent of any other associated contract with another Sponsoring organization.

11.2 Consultants preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Consultant’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

11.3 All material submitted, produced, data collected, reports, designs and documentation will become the exclusive property of the Massachusetts Sponsors at the end of the contract. The Consultant may not share program materials, customer data, industry or program participant contact information, etc. unless explicitly authorized by each Program Administrators to do so.

11.4 Should a Consultant find any ambiguity, discrepancy or omission in the RFP, or should the Consultant have any questions, the Consultant shall notify National Grid through Ariba to afford the National Grid the opportunity to send any instructions or interpretations to other Consultants who have received an Invitation to Bid. The Program Administrators will not be responsible for any oral instructions or interpretations.

12.0 NOTICE OF INTENT TO DECLINE

If the Consultant declines to submit a proposal, all RFP documents must be deleted and/or destroyed and a message in Ariba must be submitted to National Grid with a brief explanation as to why your bid will not be submitted.

13.0 PRE-BID INFORMATIONAL MEETING

A pre-bid informational meeting is scheduled for Friday, February 5, 2010 at 10:00 AM via conference call by National Grid. Phone # 866-561-4997 access # 9674198. Please dial in to the conference call at the designated time. At this time, we will present a program overview and answer any final questions you may have regarding this RFP. In the meantime, if you have any specific questions, they should be sent via Ariba. All questions and answers will be posted through Ariba.

14.0 COMMUNICATIONS AND FORM OF RESPONSE

14.1. During the RFP process, all questions must be submitted via Ariba before February 19, 2010 5:00 PM EST. Answers to Bidder’s inquiries will be distributed within a 48 hours period through Ariba. In order to ensure fairness, until the time an award is made, Bidders shall have no direct communication regarding this RFP with any of the Program Administrators or any other personnel within the Sponsors’ organization. After the decision to award is announced, the successful Bidder may contract the Program Administrators and work with each Program Administrators’ Procurement contact to provide certificates of insurance and sign final contract documents. Failure to comply with these communications guidelines may disqualify the Bidder from further consideration.

14.2 Supplier’s proposal MUST include two separate VOLUMES. Volume I must address all commercial issues, while Volume II must address all technical requirements. Volumes I and II shall not be bound or otherwise joined together. VOLUME II MUST NOT CONTAIN ANY...
COST OR PRICE INFORMATION. The organization of the cost proposal **MUST** conform to the organization enumerated in Appendix 3, Cost Estimate Bid Form (Appendix 8).

14.3 With the exception of sample reports and staff resumes, proposals must not exceed thirty pages.

14.4 A complete proposal must be sent via Ariba and two original hardcopies either hand delivered or sent via commercial carrier postmarked NO LATER THAN 5pm, Thursday, February 26, 2010 at 5:00pm to the following address:

Donald J. Pacheco  
Sr. Procurement Specialist  
National Grid  
40 Sylvan Rd  
Waltham, MA 02451

Note: In the event of problems with Ariba in loading bids, the Program Administrators reserve the right to extend the bidding due date time only to the extent the problem was fixed by Ariba.

**PLEASE NOTE THAT PROPOSALS MAY NOT BE SUBMITTED VIA FAX UNDER ANY CIRCUMSTANCES.**

**15.0 PROPOSAL FORMAT**

15.1 **Volume I: Commercial Proposal**

15.1.1 Commercial Exceptions: This section of the proposal **MUST** state clearly any exceptions which are being taken to the commercial requirements of this RFP. Exceptions must state what the exception is, the reason for the exception and proposed alternatives, and be organized sequentially in accordance with the organization of the RFP. Commercial exceptions **MUST** be clearly defined only in this section of the proposal. Bidder’s preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Bidder’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP, unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

15.1.2 All proposals must be properly dated and executed by an authorized representative of the Consultants organization. Failure to provide the required hard copy and electronic version of the proposal or all required information may result in rejection of the proposal.

15.1.3 Bid security procedures requires that bid information shall not to be shared with, or provided to, any PA employee, or any other outside firm prior to award of contract(s).

15.1.4 All responses to this RFP, whether or not in compliance with the terms of this RFP, shall be considered unconditional offers by the Bidder, which, if accepted, shall create a binding obligation upon the Bidder. Any limited duration offers shall be explicitly noted.

15.1.5 Bidders should identify if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered or not. Discounts will be factored into the evaluation of the bids and their acceptance is at the Sponsors’ option.

15.1.6 **EEOC Compliance**: If not previously submitted, please provide a statement that your company is in compliance with EEOC requirements.
15.1.7 **Insurance Certificate(s):** Include with your Bid a Certificate(s) of Insurance evidencing compliance with at least the minimum levels of insurance required in Section 11.0 Insurance of National Grid Terms & Conditions, which is contained in this document. If you are awarded the work, you will be required to submit certificates to each Program Administrator identifying them as an additional insured and complying with their insurance levels.

15.1.8 All Bidders must conform to National Grid’s Background Check policy as specified in Ariba. The other Program Administrators may have similar commercial requirements that you may have to comply with as well.

15.1.8 **Vendor Information:** Bidders shall provide a letter of introduction and a statement of qualifications, which details the Bidder’s experience, especially with energy efficiency projects. The Bidder’s statements should emphasize their (1) knowledge and understanding of energy efficiency programs, and (2) the requirements of this RFP. In addition, provide a description of the legal status of respondent (e.g., sole proprietorship, partnership, limited partnership, joint venture, or corporation) and state of residency. Some of the other key points are as follows:

A. General description of all the services and products your company offers with a brief description of its general history.

B. Discussion of the companies staff to be assigned, and how they will be organized to deliver the services requested in the most efficient and expedient manner. Include a brief discussion of your firm’s internal quality control and review procedures.

C. Include a list of other similar Services contracts in force nationally

D. Provide the name, title, and contact information for three (3) references familiar with respondent’s business organization, finances and operational style. Provide resumes of key individuals in the firm providing the services to the Program Administrators.

15.2 **Volume II - Technical Proposal**

The Supplier's technical proposal, addressing all technical requirements MUST be included in this section. **THIS VOLUME MAY NOT INCLUDE ANY COST OR PRICING INFORMATION.** In addition to the Supplier's technical proposal, the following items must be addressed, in the order listed:

15.2.1 **Title Page:** This section of the proposal should include a title page, which identifies the RFP Title, vendor’s name and the volume.

15.2.2 **Table of Contents:** The vendor’s proposal should include a Table of Contents, which lists the titles and page numbers for each major topic and sub-topic.

15.2.3 **Executive Summary:** This section should include a summary of the key points and highlights of the vendor’s response.

15.2.4 **Technical Requirements:** This section of the proposal must include a completed copy of the Technical Response with responses provided to each of the requirements. The Response must follow the outline provided in Document 2: Section 4. For each project to start in 2010, the response must follow the outline provided at the conclusion of each Scope of Work (Appendices 1 – 7). Every item should have a response, including any exceptions. Bidders should also include a description of all assumptions used to develop their response to this RFP.

16.0 **TERMS AND CONDITIONS and SPECIMEN AGREEMENT**
The successful Consultant’s services shall be provided in accordance with the following terms and conditions from each Massachusetts Sponsor:

- **Attachment 4**: National Grid Terms & Conditions for Consulting Services, Document 0400 (06/25/09)
- **Attachment 5**: NSTAR’s Requirements Prior to Contract Award
- **Attachment 6**: Cape Light Compact Terms and Conditions
- **Attachment 7**: Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
- **Attachment 8**: NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials
- **Attachment 9**: New England Gas Terms & Conditions

17.0 **SAFETY, ENVIRONMENTAL and BACKGROUND CHECK REQUIREMENTS**

The successful Consultant’s services shall be provided in accordance with each Program Administrators commercial requirements. National Grid’s commercial requirements are as follows:

- Contractor Safety Requirements dated 8/1/08 (**Attachment 10**)
  - You are required to fill out the Safety form in the RFP and submit it with your proposal.
- Contractor Environmental Requirements dated 2/29/08 (**Attachment 11**)
- Contractor Employee Background Check Requirements dated 1/10/08 (**Attachment 12**)
  - You are required to fill out the background Check form in the RFP and return it with your proposal.

18.0 **SUMMARY RFP DOCUMENTS**

This RFP is comprised of the following documents:

- **Attachment 1**: Information and Instructions for Consultants
- **Attachment 2**: Scope of Services (with Appendices 1-7 & Attachments)
- **Attachment 3**: RFP 007-10 Bid Forms (Appendice 8)
- **Attachment 4**: National Grid Terms & Conditions for Consulting Services, Document 0400 (06/25/09)
- **Attachment 5**: NSTAR’s Requirements Prior to Contract Award
- **Attachment 6**: Cape Light Compact Terms and Conditions
- **Attachment 7**: Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
- **Attachment 8**: NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials
- **Attachment 9**: New England Gas Terms & Conditions
- **Attachment 10**: National Grid Contractor Safety Requirements (8/1/08)
- **Attachment 11**: National Grid Environmental Requirements (02/29/08)
- **Attachment 12**: National Grid Background Check Requirements for Contracted Service (1/10/08)

19.0 **SCHEDULE**

The following dates are critical to this RFP.

- Request for Proposal Issued via Ariba January 25, 2010

RFP 007-10 Large Commercial & Industrial Evaluation Contractor (LCIEC)
• Bidder’s Conference Call
  February 5, 2010 10:00 a.m.- 11:00a.m

• Last Date for Questions from Bidders
  February 19, 2010 @ 5:00 p.m. EST

• Proposals Due via Ariba
  February 26, 2010 @ 5:00 p.m. EST via Ariba

• Contract Awarded
  April 15, 2010

• Kick-off Meeting
  TBD- as soon as conveniently possible after the selection of contractor.
National Grid

Request for Proposal

2010 – 2012 Massachusetts

Large Commercial & Industrial Evaluation Contractor (LCIEC)

DOCUMENT 2: General Scope of Work

The Sponsors participating in this joint request are Bay State Gas, Berkshire Gas, Cape Light Compact, Fall River Gas, National Grid (Electric & Gas), NSTAR Electric and Gas Corporation, Western Massachusetts Electric, and Unitil/Fitchburg Gas & Electric (referred to hereafter as the “Sponsors”). All Sponsors are Program Administrators (“PAs”) of energy efficiency programs in the Commonwealth of Massachusetts.

1.0 BACKGROUND

MASSACHUSETTS EVALUATION FRAMEWORK

On September 8, 2009, the Massachusetts Energy Efficiency Advisory Council (EEAC or Council) unanimously approved a resolution developed collaboratively by the Program Administrators (PAs) and the EEAC Consultants, setting forth a new administrative framework for the performance of Evaluation, Measurement and Verification (EM&V) in Massachusetts. The full Resolution is presented verbatim in Document 3; the following is a summary of the Resolution, its effects, and its relevance to the current RFP.

Under the Resolution, the EEAC will assume an oversight role over the EM&V activities of the PAs to ensure the objectivity and independence of those activities, and the perception of such, and to help ensure consistency, timeliness, and credibility. While the PAs and EEAC Consultants (acting on behalf of the EEAC) will continue to work diligently to reach a consensus on evaluation issues, where there are areas of difference that may arise that cannot be resolved through consensus during the on-going interactive process between the EEAC Consultant and the PA evaluation staff, authority for decision-making will reside with the EEAC or its Designee. This arrangement is subject to a system of appeals in the event of any disputes that cannot be resolved collaboratively.

The Resolution also restructures EM&V in Massachusetts so that most studies are to be performed at a statewide rather than a PA-specific level. It specifies that the range of evaluation activities be divided into 5 to 7 semi-permanent statewide Research Areas, oriented primarily to specific target markets. Each Research Area is to have an assigned Study Manager from the PAs, an assigned EEAC Evaluation Consultant, and an independent evaluation contractor who conducts the studies under a long-term contract with the individual PA companies.
Consistent with the Resolution, the PAs and the EEAC Consultants subsequently developed a system of six statewide Research Areas, as follows:

1. **Residential Retrofit and Low Income.** This category includes residential cooling and heating equipment, residential heating and water heating, residential and low-income retrofit, weatherization, and most aspects of multi-family programs.

2. **Residential Retail Products.** This includes residential lighting and appliance programs.

3. **Residential New Construction.** This includes residential and low-income new construction and major renovations programs, as well as codes and standards and compliance efforts. This Research Area also includes baseline studies of construction practices for both single- and multi-family homes.

4. **Non-Residential Large Retrofit and New Construction.** This includes C&I new construction (small and large) and major renovation, as well as large C&I retrofit programs.

5. **Non-Residential Small Retrofit.** This includes the current C&I small retrofit, direct install programs. This category would also include any future programs that may target small non-residential customers.

6. **Special and Cross-Sector Studies.** This includes those studies that do not fit readily into any of the five market-oriented Research Areas above, as well as those studies that are cross-sector in nature, including: cross-sector free ridership and spillover studies; non-energy benefits; behavioral programs; community-based pilots; and marketing, public education, and outreach activities.

Massachusetts’ evaluation planning and implementation schedule calls for selecting contractors, and finalizing contracts, for all six Research Areas by April 15, 2010. Evaluation activities under each contract are to be conducted subject to the terms of the EEAC Resolution. **The purpose of this RFP is to select an independent evaluation contractor for the fourth Research Area, Non-Residential Large Retrofit and New Construction.**

The program administrators currently providing energy efficiency programs to large commercial and industrial customers in the State of Massachusetts are seeking proposals from qualified entities (“Respondent(s)” or “Bidder(s)”) regarding the completion of all evaluation activities relating to the Large Commercial and Industrial (“LC&I”) energy efficiency programs planned for implementation from January 2010 through December 2012. For the purposes of this proposal, the selected entity will be referred to as the Large Commercial & Industrial Evaluation Contractor or “LCIEC”.

This document outlines the scope of work for performance of process evaluation, impact evaluation, and market assessment services associated with all Large Commercial and Industrial Energy Efficiency programs to be conducted from the time of the award of this contract until the end of 2012.
2.0 INTRODUCTION

The specific evaluation activities associated with this RFP are laid out for the first year. The scopes of work for the first year are to be bid as presented. Those scopes may be revised after bids are received. Work in years two and three of the contract period will be developed toward the end of 2010 and will be updated throughout the term of the contract. Three expected activities which all respondents must be prepared to complete are as follows:

- Assess the current large commercial and industrial energy consumption market conditions in the State of Massachusetts.
- Accurately and effectively determine the energy and demand savings of the large commercial and industrial measures covered in the RFP throughout the state.
- Assess the effectiveness of marketing efforts, program satisfaction and data tracking for the associated programs.

Most of the Evaluation activities commencing in 2010 will be performed by the LCIEC according to Scopes of Work listed below though additional work in 2010 not included in those scope is likely. Evaluation activities commencing in 2011 and 2012 will be planned by the LCIEC and the plans will be subject to approval by the Sponsors; the MA Energy Efficiency Advisory Council(EEAC) and their consultants; and the MA DPU.

Included in this RFP are details regarding currently planned evaluation activities to be performed in 2010. Respondents to this RFP are requested to complete specific evaluation proposals and bid forms for these planned activities.
# TABLE OF CONTENTS

## 1.0 BACKGROUND

## 2.0 INTRODUCTION

## 3.0 TABLE OF CONTENTS

## 4.0 DESCRIPTION OF WORK

4.1 Initial Tasks

4.2 Further Process Evaluation Information

4.3 Evaluation Planning

4.4 Other Evaluation Work

4.5 Final Reports

4.6 Contractor Responsibilities

4.7 Sponsor Responsibilities

4.8 General Guidelines

4.9 Electrician Requirements

## 5.0 REQUIRED FORMAT FOR PROPOSALS

5.1 Introduction, Corporate Qualifications and Experience

5.2 Billing Analysis Qualifications

5.3 Sampling Qualifications

5.4 Personnel Qualifications

5.5 Resumes of Key Personnel

5.6 Approach

5.7 Writing Sample

5.8 References

5.9 Proposed Schedule

5.10 Metering Equipment Inventory

5.11 Appendices

### ATTACHMENTS

A – Guidelines for Methodology Development

B – Guidelines for Customer and PA Contact

C – Guidelines for Calculation of Peak KWH and KWF

D – Miscellaneous Guidelines

E/F – Guidelines on Reporting

G – Example Application Documentation for Response Development


### APPENDICES

1 – Market Characterization Scope of Work

2 – Prescriptive VSD Impact Evaluation Scope of Work

3 – Custom Electric HVAC Impact Evaluation Scope of Work

4 – Custom Gas Measures Impact Evaluation Scope of Work

5 – Prescriptive Gas Measures Impact Evaluation Scope of Work

6A – Comprehensive Design Approach Impact Evaluation Scope of Work

6B – Comprehensive Design Approach Process Evaluation Scope of Work

7 – Expedited General Process Evaluation Scope of Work

8 – Bid Form (MS Excel File)

9 – Terms & Conditions (One for Each Participating Sponsor)

10 - Contractor Environmental Requirements

11 – Examples of Previous Evaluation Studies
DESCRIPTION OF WORK

3.1. Initial Tasks

Market Characterization will be undertaken by the LCIEC and is expected to require multiple years to complete. The purpose of this activity is to determine attitude and awareness of market actors, measure market indicators, identify market barriers, conduct baseline studies (as necessary), and update baseline for energy efficient products (if necessary). Please see APPENDIX 1 for a full scope of work and respondent requirements.

In the Summer of 2010, Massachusetts will be undertaking a mid-course adjustment process to consider whether any changes to program approaches are required for 2011-2012. Given the sharp increase in program budgets that is planned for these years and the potential magnitude of the programming and resource allocation decisions that may be made as part of the mid-course adjustment process, it is critical that timely information be available regarding key program process issues and initial market response to new and expanded program services. The Massachusetts PAs are therefore committed to completing a global process and marketing evaluation by July 15, 2010. A small targeted process evaluation is planned for this research area (APPENDIX 7).

Impact Evaluation activities will take place every year. Not all programs are expected to be evaluated each calendar year. The goal of every impact evaluation is to accurately determine the actual savings achieved for the program and its measures. The results of each impact evaluation update the impact factors used for planning and reporting for the program. The following impact evaluations will commence in 2010. Please see each associated appendix for the scope of work for each evaluation as well as respondent requirements.

- Prescriptive Variable Speed Drives (APPENDIX 2)
- Custom HVAC (APPENDIX 3)
- Custom Gas (APPENDIX 4)
- Prescriptive Gas (APPENDIX 5)
- Comprehensive Design Approach (APPENDIX 6A)

Evaluation activities in 2011 and 2012 may involve analysis techniques that may not be required in the above five tasks. For this reason we ask that all respondents demonstrate their ability to perform econometric billing analysis as part of future evaluation activities. Please see APPENDIX 11 for examples of the level of work expected and Section 5.2 for instructions submitting qualifications.

Process Evaluation activities will take place every year. Not all programs will have a process evaluation every year. The goal of process evaluations is to assess how efficiently a program was or is being implemented. This is done by evaluating the operational efficiencies of the program administrators and contractors. Process evaluations shall also assess the customer satisfaction in every aspect, use of new practices and best practices and the effectiveness of marketing and/or any program outreach activities. The following process evaluations will
commence in 2010. Please see each associated appendix for the scope of work for each evaluation as well as respondent requirements.

- Comprehensive Design Approach (APPENDIX 6B)

### 3.2. Further Process Evaluation Information

In addition to the process evaluations above, all Program Administrators in MA will be undertaking a global process and marketing evaluation which will cover:

1. Customer and market response to new or expanded or revised marketing efforts;
2. A review of sales techniques that are effective;
3. An early review of electric and gas integration efforts and single point of contact/cross PA integration in MA as well as comparison to selected other states
4. An early review of projects that are comprehensive, whole building, or otherwise targeted to deeper savings; and
5. Process evaluation and design review of community-based projects.

This project is NOT included in this RFP as it goes across all research areas, but in 2011 and 2012 such topics are likely to be covered under this RFP for large commercial programs. Therefore, the team that responds to this RFP must have the expertise required to complete the five items listed above.

### 3.3. Evaluation Planning

In a typical year, an evaluation plan will be developed somewhere between the last quarter of the previous year and the first quarter of the year to be evaluated. It is expected that each year’s evaluation activities will contain market characterization studies, impact evaluations, and process evaluations. Certain activities may be done on a regular basis (annually, semi-annually, etc.). Other activities may be done only when deemed necessary.

The selected Evaluation Contractor will be responsible for running conference calls to discuss evaluation activities for the coming year, producing a draft plan and a final Evaluation Plan. It is expected that at least 5 calls will be required to finalize a plan for this sector. Bidders should include this activity in their proposed budgets.

The provided bid form (Appendix 8) contains a tab in which each bidder must provide hourly rates by personnel type for activities to be completed in 2011 and 2012.

### 3.4. Other Evaluation Work

In addition to the items mentioned above, different types of activities are conducted on an ad-hoc basis as program changes dictate. Bidders should be prepared to provide this ad-hoc evaluation work and in their proposals should demonstrate their ability to meet such requests. Bidders should not include a cost for this other evaluation work in their proposals.
3.5. **Final Reports**

Full reports will be expected for each evaluation task completed. Full reports will also be expected for each site included in custom measure impact evaluations. These reports will be subject to Sponsor review and will be used for reporting purposes. All reports require EEAC approval before finalization. See Attachment E/F for details regarding reporting requirements.

3.6. **Contractor Responsibilities**

It will be the contractor’s responsibility to develop the following items for each study performed under this contract. These items will be subject to Sponsor approval.

1. Project Plan and Timeline
2. Project Methodology
3. Sample Selection plan (when applicable).
4. Data analysis plan.

Once approval has been received for the above items, it becomes the responsibility of the contractor to complete the project in a timely manner. During the completion of each project, the contractor will complete the following:

1. Provide the research area manager with a Monthly project updates of what has been accomplished over the previous month and what is planned in the following month.
2. Participate in weekly teleconferences with the research area manager and other sponsors. Agendas for each teleconference will be created such that each project is discussed at least once per month.

In addition to the above noted work tasks, Respondents should take into consideration, as they are developing their proposal, that they will be under the direction of the Sponsors’ Large Commercial & Industrial evaluation study teams and EEAC evaluation consultants and solely responsible for:

1. Keeping all data, work products, information provided by the Sponsors or discovered by the contractor confidential;
2. Providing the Sponsors’ study team with updates on the work progress as requested by the Sponsors’ study team;
3. Providing the Sponsors’ study team with draft copies of all final survey instruments, inventory forms, checklists, and protocols for review and approval; and
4. Providing the Sponsors with a comprehensive annual report consisting of:
   5. A detailed report and Executive Summary that summarizes all evaluation studies conducted by the Respondent by March 31 of each year of the contract – i.e., 2011, 2012, 2013.
   6. Providing the Sponsors with electronic copies of all survey instruments, inventory forms, data collected, and evaluation results at the end of each study for the Sponsors’ records.
   7. Providing all metering equipment required to complete all tasks associated with this contract.

Please see the scope of work appendices for responsibilities specific to each scope.
3.7. Sponsor Responsibilities

It will be the responsibility of each sponsor (program administrator, PA) to provide the contractor with data associated with the evaluated programs and participating customers. This may include billing data, consumption data, contact information, and program data.

In addition, it will be the responsibility of each sponsor to provide the contractor with application materials for each custom project site selected for evaluation. This information will include all utility held documentation associated with the measure to be evaluated.

Please see the scope of work appendices for responsibilities specific to each scope.

3.8. General Guidelines

- In order to avoid conflicts of interest during evaluation, no entity involved in the original installation, TA analysis, application, or commissioning of a measure may be involved in the evaluation of the installed measure. This provision does not exclude any entity from responding to this RFP. However, should a conflict arise during the course the contract, it is expected that any visits to the site, metering, analysis, and reporting for measures found to be in conflict will be performed by a subcontracted non-conflicting entity.

- All measurement and verification electrical measures must meet the requirements set forth by ISO New England in “ISO New England Manual for Measurement and Verification of Demand Reduction Value from Demand Resources-Manual M-MVDR, Revision: 1, Effective Date: October 1, 2007”, provided as Attachment H to this RFP. The bidders should carefully study the entire attached document and address any issues relevant to meeting those requirements. Particular attention should be paid to:
  - Sections 5.2.4 Measurement and Verification Approach, Calibrated Simulation
  - Section 5.5 Measurement and Verification Approach, Requirements, Subsection (1)
  - Section 6.2 Establishing Baseline Conditions, Requirements for All Demand Resources
  - Section 9.2 Monitoring Parameters and Variables, Requirements
  - Section 10.2 Measurement Equipment Specification, Requirements
  - Section 11.2 Monitoring Frequency and Duration, Requirements
  - Section 12.2 Data Validation, Retention and Management, Requirements
If respondents have any questions about complying with these rules they should submit them before submitting their bid.

- Respondents must also review the report “Review of ISO New England Measurement and Verification Equipment Requirements” completed by RLW (now KEMA) in April 2008. All metering equipment used for activities covered under this RFP must comply with the ISO New England equipment requirements. Demonstration of fulfillment of all requirements for each meter model to be sent into the field must be submitted before metering begins with that model.

- Demand savings should be calculated using the ISO forward capacity market (FCM) definition. More specifics are provided on the definition of peak demand in Attachment C.
3.9. Electrician Requirements

It is a requirement that electrical measurements taken in a customer’s electrical panel must be done by an electrician licensed in the state of Massachusetts. Spot power measurements on equipment must also be made by licensed electricians. Lighting or motor runtime loggers not installed in an electrical panel can be installed without an electrician.

It is recognized that requiring the selected contractor to hire licensed electricians may present logistical difficulties and financial risk to the contractor. As a result, Sponsors will make its third-party electrical contractor available to the selected bidder(s). Additionally, Sponsors will be billed directly by our contractor for licensed electrician services utilized for the Custom Process Installations Impact Evaluation project, and therefore the cost of licensed electricians should not be included in the RFP bid price.

Many customers will elect to utilize their own in-house electricians to perform electrical measurements. Please refer to the following "hierarchy" for utilizing licensed electricians:

1. Customer In-House Electrician. Customer should be asked by evaluation team if they have an in-house licensed electrician who can be made available to connect measurement equipment at the electrical panel or equipment during the site visit.
   a. If the Customer does not have an in-house electrician and chooses to bring in an outside electrician, the evaluation contractor should offer to have the customer utilize the Sponsor contracted electrician (see 2 below), or to have the customer engage their outside electrician (option 3 below) and then invoice their Sponsor for the cost of the outside electrician.

2. Sponsor Contracted Electricians. The evaluation contractor may utilize the Sponsor's third-party contracted electricians located in MA, and shall be responsible for scheduling electrician services. The customer’s Sponsor will be billed directly by the contracted electricians. Contact information will be provided upon RFP award.

3. Customer-Selected Third-Party Electrician. The least-preferred option is for the customer to utilize their preferred third-party licensed electrician. The evaluation contractor shall coordinate electrician services with the Customer and the third-party electrician, and the customer may invoice their Sponsor for the cost of the electrician.

Bidders should not include the cost of licensed electricians from their project cost estimate since the cost will be borne directly by the customer or by Sponsor.
4.0 REQUIRED FORMAT FOR PROPOSALS

Proposals shall contain the following information and shall be formatted as described below. Proposals must also be signed in longhand in accordance with the instructions stated in Appendix 12 - Bidder’s Submission Statement. Additional information may be supplied under separate cover but is not required, encouraged, nor likely to be read. Bidder adherence to these instructions for proposal format will be a factor in evaluation of proposals.

4.1. Introduction, Corporate Qualifications and Experience

Provide a letter of introduction and a statement of qualifications which details the bidder’s experience in evaluating Large Commercial & Industrial energy efficiency projects including building simulations using Trace and eQuest/DOE2, Custom EE Projects, Market Assessment, and Process Evaluation. The bidder’s statements should emphasize their (1) knowledge and understanding of large energy efficiency projects, (2) experience with performing site work and instrumentation for similar purposes in a diversity of settings, and (3) experience with similar types of data analysis (exclude Billing Analysis & Sampling from this section). Section must not exceed four (4) pages.

4.2. Billing Analysis Qualifications

Provide a short discussion, not exceeding two (2) pages, specifically focused on the respondent’s previous experience with utility billing analysis. Provide a list of personnel who will be responsible for billing analysis should it be required. Please include their resumes per Section 5.5.

4.3. Sampling Qualifications

Provide a short discussion, not exceeding one (2) pages, specifically focused on the respondent’s previous experience with utility sample determination, such as drawing samples to meet specific precision requirements. Provide a list of personnel who will be responsible for sampling throughout the period of the contract and include a description of their specific experience. Please include their resumes per Section 5.5.

4.4. Personnel Qualifications

Provide a listing, not exceeding ten (10) pages (not including resumes), of all staff proposed to provide indicated services (excluding Billing Analysis and Sampling) and a summary of their qualifications, including technical training and licensing. If subcontractors are to be used, include a summary of qualifications and references for each. Bidders must proclaim the availability of resources to devote to the project to ensure completion by the desired milestones. If the Bidder intends to hire additional staff in order to provide the proposed services, a description of its approach to hiring and the experience it will require of perspective employees should be included. If licenses are required, Bidder shall provide verification of each license holder.
4.5. **Resumes of Key Personnel**

Respondents must include resumes of key personnel who will be directly involved on a daily basis with this project. If the Respondent intends to hire additional staff in order to provide the proposed services, the required and preferred qualifications for the position must be submitted along with a proposed timeline for hiring. Resumes of key subcontractors must also be submitted. Number of resumes included must not exceed thirty (30). All resumes must be submitted in APPENDIX 13, do not submit resumes in the main body of the response.

4.6. **Approach**

A separate approach must be submitted for each scope of work provided in Appendices 1 through 7. These approaches must be submitted as appendices to the overall submission. Each approach must be labeled with the same appendix index as its associated SOW. Each document must provide a description of the evaluation approach and techniques (including methodology and data sources) which may be used for the associated task. Each scope of work may ask for additional information specific to the scope’s tasks. If the Bidder is able to provide relevant additional and/or alternative services, a clear and concise description of the additional services should be provided. Additional and/or alternative services shall be identified as such and shall be provided in addition to a description of the services to be provided in meeting the requirements set forth in the Scope of Services.

4.7. **Writing Sample**

Bidders who have not participated in Sponsor evaluations over the past 5 years must submit a brief writing sample of no more than ten pages.

4.8. **References**

Bidders who have not participated in Sponsor evaluations in the past 5 years must submit at least five and no more than ten references relating to previous work that falls within the scope of this contract. References should include: Name, Title, Organization, Phone, Email, & Up to three sentences regarding their interaction with the Respondent’s previous work.

Bidders who have participated in Sponsor evaluations in the past 5 years may submit at least five and no more than ten references relating to previous work that falls within the scope of this contract.

Do not use a Sponsor organization as a reference.

4.9. **Proposed Schedule**

A potential schedule is included at the end of this document. If modifications are recommended, include a modified schedule. If no schedule is submitted, then it will be assumed that the potential work plan is accepted. The schedule for the Expedited Process Evaluation and CDA Process Evaluation cannot be modified.
4.10. Metering Equipment Inventory

Given the number of projects that will be undertaken simultaneously under this contract, contractors must own or have access to a significant amount of metering equipment. In this section please list the type of meter (kW spot meter, kW long term meter, data logger, etc.), the volume of meters of each type that are proposed for the first 12 months of the contract, and whether the meters are owned or will be rented. If the meters will be rented, please list the organization that the meters will be rented from.

4.11. Appendices

The following appendices must be received with the submission. Each appendix can be submitted as a separate document or appendices may be grouped together.

1 – MARKET CHARACTERIZATION SCOPE OF WORK
2 – PRESCRIPTIVE VSD IMPACT EVALUATION SCOPE OF WORK
3 – CUSTOM ELECTRIC HVAC IMPACT EVALUATION SCOPE OF WORK
4 – CUSTOM GAS MEASURES IMPACT EVALUATION SCOPE OF WORK
5 – PRESCRIPTIVE GAS MEASURES IMPACT EVALUATION SCOPE OF WORK
6A – COMPREHENSIVE DESIGN APPROACH IMPACT EVALUATION SCOPE OF WORK
6B – COMPREHENSIVE DESIGN APPROACH PROCESS EVALUATION SCOPE OF WORK
7 – EXPEDITED GENERAL PROCESS EVALUATION
8 – BID FORM (MS EXCEL FILE)
13 – RESUMES OF KEY PERSONNEL
The following work plan is provided as an example to bidders. Not all projects are expected to start or end on the same date.

<table>
<thead>
<tr>
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<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
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<td>05/15/2010</td>
<td>08/01/2010</td>
<td>09/01/2010</td>
<td></td>
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<td>06/20/2010</td>
<td>05/31/2010</td>
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<td>01/15/11*</td>
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<td>10/20/2010</td>
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<td>09/01/2011</td>
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</tbody>
</table>

Project Updates

Teleconferences will be scheduled for every week, but will focus on one or two of the current projects and pressing issues only. Discussion will be strictly held to a 1 hour maximum.

Notes:

* Date occurs before date(s) above
EVALUATION TASKS FOR MASSACHUSETTS ENERGY EFFICIENCY PROGRAMS IN THE RESIDENTIAL NEW CONSTRUCTION AREA

2010-2012

REQUEST FOR PROPOSAL
RFP 006-10

January 22, 2010

Prepared by:

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# TABLE OF CONTENTS

INFORMATION and INSTRUCTIONS FOR BIDDERS

1.0 BACKGROUND 3

2.0 PROGRAM ADMINISTRATOR SPONSOR LIST 3

3.0 UNAUTHORIZED DISCLOSURE 3

4.0 CONFLICT OF INTEREST RULES 4

5.0 SCOPE OF WORK 4

6.0 LIMITATIONS 4

7.0 PROGRAM ADMINISTRATORS DISCRETION 4

8.0 PRICING 5

9.0 PAYMENT FOR SERVICES & INVOICING 5

10.0 PROPOSAL SUBMISSION 5

11.0 EXCEPTIONS & CLARIFICATIONS 6

12.0 NOTICE OF INTENT TO DECLINE 6

13.0 PRE-BID INFORMATIONAL MEETING 6

14.0 COMMUNICATIONS & FORM OF RESPONSE 6

15.0 PROPOSAL FORMAT 7

16.0 TERMS & CONDITIONS and SPECIMEN AGREEMENT 9

17.0 SAFETY, ENVIRONMENTAL & BACKGROUND CHECK REQUIREMENTS 9

18.0 SUMMARY OF RFP DOCUMENTS 9

19.0 SCHEDULE 10

ATTACHMENTS

- Attachment 1: Information and Instructions for Consultants
- Attachment 2: Scope of Work (with Appendix A-I)
- Attachment 3: RFP 006-10 Bid Form (Appendix J)
- Attachment 4: National Grid Terms & Conditions for Consulting Services, Document 0400 (06/25/09)
- Attachment 5: NSTAR’s Requirements Prior to Contract Award
- Attachment 6: Cape Light Compact Terms and Conditions
- Attachment 7: Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
- Attachment 8: NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials
- Attachment 9: New England Gas Company Terms & Conditions
- Attachment 10: National Grid Contractor Safety Requirements (8/1/08)
- Attachment 11: National Grid Environmental Requirements (02/29/08)
- Attachment 12: National Grid Background Check Requirements for Contracted Service Providers - Contractor Employee Background Checks, (1/10/08)

RFP 006-10
Evaluation Tasks for Massachusetts Energy Efficiency Programs in the Residential New Construction Area

2 of 10 01/25/2010
1.0 BACKGROUND

The Massachusetts Program Administrators for the Massachusetts Energy Efficiency programs in the Residential New Construction area request proposals to perform various evaluation tasks addressing the state of Massachusetts, as described in this Request for Proposal.

This RFP covers the time period 2010 through 2012 and all programs and pilots that are administered within the Residential New Construction area. Currently the only program within this area is the Energy Star Homes program, although it has a number of pilots that are occurring in 2009 and 2010 that will need to be evaluated.

National Grid will be taking the lead in this RFP to coordinate the solicitation, and results, as well as together with the other Program Administrators, select a supplier for the program.

2.0 SPONSOR LIST

The list of Program Administrators for this RFP includes:

- Bay State Gas
- Berkshire Gas
- Cape Light Compact
- New England Gas Company
- National Grid (Electric & Gas)
- NSTAR Electric and Gas Corporation
- Western Massachusetts Electric
- Unitil/Fitchburg Gas & Electric

3.0 UNAUTHORIZED DISCLOSURE

3.1 The Program Administrators, consider any information provided to Consultants in the course of business to be privileged and confidential between Consultant and the Program Administrators. This includes, but is not limited to, written data of any kind, business information, request for quotation, specifications, engineering data and any and all technologies and data either obtained or observed while supplying the commodity/service required by the contract. Unauthorized disclosure of information to third parties by Consultant may lead to cancellation of the contract, loss of future business opportunities and/or the effects of any other remedies which may be available to the Program Administrators.
3.2 Consultant’s proposal will be considered as being in full compliance with all documents, specifications, drawings and engineering data included in this RFP unless specific exceptions or clarifications are separately stated.

4.0 CONFLICT OF INTEREST RULES

Bidders who have provided feasibility studies, savings estimates, application preparation assistance, design services, installation services, Rater services, commissioning services on projects for the Massachusetts New Homes with Energy Star program are not eligible to provide evaluation services. In addition any bidder who has contracts with other entities that may impact the bidder’s ability to perform evaluation services as an independent body are also not eligible. In particular any potential bidder who is providing consulting or implementation services to the Massachusetts EEAC, MA DOER, or it consultants for any energy efficiency programs is ineligible to bid on this contract.

The Program Administrators will screen potential bidders who may be ineligible to perform evaluation services based on the above criteria. Nevertheless, bidders are under obligation to disclose to the Program Administrators when it is apparent to them that such situations may exist.

5.0 SCOPE OF WORK

Scope of Work

- See Attachment 2 Scope of Work (with Appendix A-I) for a description of the Services to be provided.

6.0 LIMITATIONS

Bidder shall mean those firms/vendors acting in the role of Supplier when responding with a Proposal to this RFP. Proposal shall mean the Bidder's formal response indicating their committed solutions that meet or exceed the requirements of the RFP. Subcontractors, or subs, can be defined as any Supplier under Contract or in the RFP response that are considered financially independent of the Bidder in any other business or accounting relationship.

This RFP does not constitute an offer by the Program Administrators to enter into a contract, nor does any response to this RFP constitute an acceptance of an offer, nor does any response to this RFP bind the Program Administrators in any way. This document shall not be construed as a request or authorization to perform work at the Program Administrators' expense. Any work performed by a Bidder in connection with evaluating and responding to the RFP and, if selected, negotiating a definitive Agreement will be at the Bidder's own discretion and expense. This RFP does not represent a commitment to purchase or lease. The Program Administrators reserve the right to reject any and all proposals at its absolute discretion. Submission of a bid constitutes acknowledgment that the Bidder has read and agrees to be bound by such terms. The information in this document will enable the recipient to formulate a proposal to meet the workload requirements as described in this RFP. The numbers, volumes, run rates, etc. provided in this RFP are based upon the most recent data available and should serve as estimates to Bidders for pricing and response purposes.

7.0 PROGRAM ADMINISTRATORS DISCRETION

National Grid is issuing this RFP on behalf of the Program Administrators who at their discretion may:

- Select a Proposal other than the lowest priced, if the Program Administrators determine, at its sole and absolute discretion that the Program Administrators interests will best be served by doing so.
• Seek clarification from any Bidder regarding Proposal information and may do so without notification to any other Bidder.
• Continue the review procedure until a Bidder is selected successfully or until the Program Administrators choose to reject all Proposals.
• Accept any Proposal or alternate as submitted without negotiations.
• Select for negotiations only the overall best Proposal or negotiate all Proposals submitted which fall within a competitive range.
• Perform a complete financial review as well as an on-site investigation of any of the Bidders facilities to ensure it is capable of meeting the demands of Program Administrators and the needs identified in this RFP.
• May not award any Contract(s) as a result of this RFP.
• Reserves the right to accept or reject any or all proposals received, or to cancel this RFP in part or in its entirety, if in doing so is in the best interests of the Program Administrators.

8.0 PRICING
The Program Administrators seek to procure Services at the most cost effective rates possible. Bidders must complete and submit Attachment 3: Cost Estimate Bid Forms. Pricing should be provided as hourly rates for various levels of experience and expertise as noted in the sheet. Bidders shall include personnel names, who will be working on the project, that fall into the various labor categories. Bidders shall include personnel names, who will be working on the project, that fall into the various labor categories.

It is essential that Bidders complete the bid form detailing estimated costs, by key program tasks, indicating hourly rates for personnel, travel, total hours and total cost for completing the project. The Program Administrators will enter into individual negotiations each subsequent year regarding any potential price increases, which must be justified by the Bidder.

9.0 PAYMENT FOR SERVICES and INVOICING
No up-front payments will be made to vendors. Invoices shall be submitted to each Program Administrators on a monthly basis. A minimum 10% of the total invoice amount may be retained until the final project is completed and accepted by the Program Administrators. Bidder should identify on the Attachment 3 Cost Estimate Bid forms, if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered. Discounts will be factored into the evaluation of the bids and their acceptance is at Program Administrators option.

10.0 PROPOSALS SUBMISSION
National Grid is using an electronic software package called Ariba. Ariba Sourcing is an internet application designed to facilitate the collection of business information. All of the relevant RFP information including: Scope of Work, Terms & Conditions and other required documents are contained in this electronic RFP. You are required to submit your proposal response via Ariba, as well as send two hard copies of your proposal as specified in Section 14 below. For more information about Ariba, you may refer to their website at www.ariba.com.

Bidders are invited to prepare a detailed response to this proposal. This response should address all the requirements outlined in the Scope of Work, as well as any additional strategies and creativity regarding how the website will be branded. After review, the Program Administrators may invite Bidders in to present examples of the firm’s work that demonstrates their capabilities, as well as to provide more details.
on their plans and budget for the proposed branding of the website. Following the proposal review and any requested presentations, the Program Administrators will select a company to provide these services. A pre-bid meeting will also take place, as outlined below to answer any questions Bidders may have before submitting their final bid.

11.0 EXCEPTIONS AND CLARIFICATIONS

11.1 The Consultant agrees to all the provisions contained in this RFP and all enclosed Bid Documents unless exceptions are specifically and clearly listed in the Consultant’s proposal. All exceptions must be listed separately as either commercial or technical in nature and specifically identified as EXCEPTIONS. Any exceptions submitted by Consultant does not constitute acceptance by any of the Program Administrators. Exceptions will be negotiated and agreed to by each Program Administrator and will be part of an exclusive contract between the parties, which will be independent of any other associated contract with another Sponsoring organization.

11.2 Consultants preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Consultant’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

11.3 All material submitted, produced, data collected, reports, designs and documentation will become the exclusive property of the Massachusetts Sponsors at the end of the contract. The Consultant may not share program materials, customer data, industry or program participant contact information, etc. unless explicitly authorized by each Program Administrators to do so.

11.4 Should a Consultant find any ambiguity, discrepancy or omission in the RFP, or should the Consultant have any questions, the Consultant shall notify National Grid through Ariba to afford the National Grid the opportunity to send any instructions or interpretations to other Consultants who have received an Invitation to Bid. The Program Administrators will not be responsible for any oral instructions or interpretations.

12.0 NOTICE OF INTENT TO DECLINE

If the Consultant declines to submit a proposal, all RFP documents must be deleted and/or destroyed and a message in Ariba must be submitted to National Grid with a brief explanation as to why your bid will not be submitted.

13.0 PRE-BID INFORMATIONAL MEETING

A pre-bid informational meeting is scheduled for Friday, January 29, 2010 at 10:00 AM via conference call by National Grid. Phone # 866-561-4997 access # 401094. Please dial in to the conference call at the designated time. At this time, we will present a program overview and answer any final questions you may have regarding this RFP. In the meantime, if you have any specific questions, they should be sent via Ariba. All questions and answers will be posted through Ariba.

14.0 COMMUNICATIONS AND FORM OF RESPONSE

14.1. During the RFP process, all questions must be submitted via Ariba before February 5, 2010 5:00 PM EST. Answers to Bidder’s inquiries will be distributed within a 48 hours period through Ariba. In order to ensure fairness, until the time an award is made, Bidders shall have no direct communication regarding this RFP with any of the Program Administrators or any other personnel within the Sponsors’ organization. After the decision to award is announced, the successful Bidder may contact the Program Administrators and work with each Program Administrators’ Procurement contact to provide certificates of insurance and sign final contract documents. Failure
to comply with these communications guidelines may disqualify the Bidder from further consideration.

14.2 Supplier's proposal MUST include two separate VOLUMES. Volume I must address all commercial issues, while Volume II must address all technical requirements. Volumes I and II shall not be bound or otherwise joined together. VOLUME II MUST NOT CONTAIN ANY COST OR PRICE INFORMATION. The organization of the cost proposal MUST conform to the organization enumerated in Attachment 3, Cost Estimate Bid Form, and as described in Section 8.

14.3 With the exception of sample reports and staff resumes, proposals must not exceed thirty pages.

14.4 A complete proposal must be sent via Ariba and two original hardcopies either hand delivered or sent via commercial carrier postmarked NO LATER THAN 5pm, Thursday, February 22, 2010 at the following address:

    John Spring
    Procurement Specialist
    National Grid
    40 Sylvan Rd
    Waltham, MA 02451

Note: In the event of problems with Ariba in loading bids, the Program Administrators reserve the right to extend the bidding due date time only to the extent the problem was fixed by Ariba.

PLEASE NOTE THAT PROPOSALS MAY NOT BE SUBMITTED VIA FAX UNDER ANY CIRCUMSTANCES.

15.0 PROPOSAL FORMAT

15.1 Volume I: Commercial Proposal

15.1.1 Commercial Exceptions: This section of the proposal MUST state clearly any exceptions which are being taken to the commercial requirements of this RFP. Exceptions must state what the exception is, the reason for the exception and proposed alternatives, and be organized sequentially in accordance with the organization of the RFP. Commercial exceptions MUST be clearly defined only in this section of the proposal. Bidder’s preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Bidder’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP, unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

15.1.2 All proposals must be properly dated and executed by an authorized representative of the Consultants organization. Failure to provide the required hard copy and electronic version of the proposal or all required information may result in rejection of the proposal.

15.1.3 Bid security procedures requires that bid information shall not to be shared with, or provided to, any PA employee, or any other outside firm prior to award of contract(s).

15.1.4 All responses to this RFP, whether or not in compliance with the terms of this RFP, shall be considered unconditional offers by the Bidder, which, if accepted, shall create a binding obligation upon the Bidder. Any limited duration offers shall be explicitly noted.
15.1.5 Bidders should identify if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered or not. Discounts will be factored into the evaluation of the bids and their acceptance is at the Sponsors’ option.

15.1.6 EEOC Compliance: If not previously submitted, please provide a statement that your company is in compliance with EEOC requirements.

15.1.7 Insurance Certificate(s): Include with your Bid a Certificate(s) of Insurance evidencing compliance with at least the minimum levels of insurance required in Section 11.0 Insurance of National Grid Terms & Conditions, which is contained in this document. If you are awarded the work, you will be required to submit certificates to each Program Administrator identifying them as an additional insured and complying with their insurance levels.

15.1.8 All Bidders must conform to National Grid’s Background Check policy as specified in Ariba. The other Program Administrators may have similar commercial requirements that you may have to comply with as well.

15.1.8 Vendor Information: Bidders shall provide a letter of introduction and a statement of qualifications, which details the Bidder’s experience, especially with energy efficiency projects. The Bidder’s statements should emphasize their (1) knowledge and understanding of energy efficiency programs, and (2) the requirements of this RFP. In addition, provide a description of the legal status of respondent (e.g., sole proprietorship, partnership, limited partnership, joint venture, or corporation) and state of residency. Some of the other key points are as follows:

   A. General description of all the services and products your company offers with a brief description of its general history.

   B. Discussion of the companies staff to be assigned, and how they will be organized to deliver the services requested in the most efficient and expedient manner. Include a brief discussion of your firm’s internal quality control and review procedures.

   C. Include a list of other similar Services contracts in force nationally

   D. Provide the name, title, and contact information for three (3) references familiar with respondent’s business organization, finances and operational style. Provide resumes of key individuals in the firm providing the services to the Program Administrators.

15.2 Volume II - Technical Proposal

The Supplier’s technical proposal, addressing all technical requirements MUST be included in this section. **THIS VOLUME MAY NOT INCLUDE ANY COST OR PRICING INFORMATION.** In addition to the Supplier’s technical proposal, the following items must be addressed, in the order listed:

15.2.1 Title Page: This section of the proposal should include a title page, which identifies the RFP Title, vendor’s name and the volume.

15.2.2 Table of Contents: The vendor’s proposal should include a Table of Contents, which lists the titles and page numbers for each major topic and sub-topic.

15.2.3 Executive Summary: This section should include a summary of the key points and highlights of the vendor’s response.

15.2.4 Technical Requirements: This section of the proposal must include a completed copy of the Technical Response with responses provided to each of the requirements. Every item should have a response, including any exceptions. Bidders should also include a description of all assumptions used to develop their response to this RFP.
16.0 TERMS AND CONDITIONS and SPECIMEN AGREEMENT

The successful Consultant’s services shall be provided in accordance with the following terms and conditions from each Massachusetts Sponsor:

- **Attachment 5** - NSTAR’s Requirements Prior to Contract Award
- **Attachment 6** - Cape Light Compact Terms & Conditions.
- **Attachment 7** - Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
- **Attachment 8** - NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials
- **Attachment 9** - New England Gas Company Terms & Conditions

17.0 SAFETY, ENVIRONMENTAL and BACKGROUND CHECK REQUIREMENTS

The successful Consultant’s services shall be provided in accordance with each Program Administrators commercial requirements. National Grid’s commercial requirements are as follows:

- Contractor Safety Requirements dated 8/1/08 (**Attachment 10**)
  - You are required to fill out the Safety form in the RFP and submit it with your proposal.
- Contractor Environmental Requirements dated 2/29/08 (**Attachment 11**)
- Contractor Employee Background Check Requirements dated 1/10/08 (**Attachment 12**)
  - You are required to fill out the background Check form in the RFP and return it with your proposal.

18.0 SUMMARY RFP DOCUMENTS

This RFP is comprised of the following documents:

- **Attachment 1**: Information and Instructions for Consultants
- **Attachment 2**: Scope of Services (with Appendix A-I)
- **Attachment 3**: RFP 006-10 Bid Forms
- **Attachment 4**: National Grid Terms & Conditions for Consulting Services, Document 0400 (06/25/09)
- **Attachment 5**: NSTAR’s Requirements Prior to Contract Award
- **Attachment 6**: Cape Light Compact Terms and Conditions
- **Attachment 7**: Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
- **Attachment 8**: NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials
- **Attachment 9**: New England Gas Company Terms & Conditions
- **Attachment 10**: National Grid Contractor Safety Requirements (8/1/08)
- **Attachment 11**: National Grid Environmental Requirements (02/29/08)
- **Attachment 12**: National Grid Background Check Requirements for Contracted Service Providers - Contractor Employee Background Checks, (1/10/08)
19.0 **SCHEDULE**

The following dates are critical to this RFP.

- **Request for Proposal Issued via Ariba**: January 22, 2010
- **Bidder’s Conference Call**: January 29, 2010 10:00 a.m.- 11:00 a.m
- **Last Date for Questions from Bidders**: February 5, 2010 @ 5:00 p.m. EST
- **Q&A to Bidders**: February 10, 2010
- **Proposals Due via Ariba**: February 22, 2010 @ 5:00 p.m. EST via Ariba
- **Contract Awarded**: TBA- estimated late March/early April
- **Kick-off Meeting**: TBD- as soon as conveniently possible after the selection of contractor.
REQUEST FOR PROPOSALS
EVALUATION TASKS FOR MASSACHUSETTS ENERGY EFFICIENCY PROGRAMS
IN THE RESIDENTIAL NEW CONSTRUCTION AREA
2010 – 2012

The Massachusetts Program Administrators (PAs) for the Massachusetts Energy Efficiency programs in the Residential New Construction area request proposals to perform various evaluation tasks addressing the state of Massachusetts, as described in this Request for Proposals. The PAs include Bay State Gas, Berkshire Gas, Cape Light Compact, Fall River Gas, National Grid (Electric & Gas), NSTAR Electric and Gas Corporation, Western Massachusetts Electric, and Unitil/Fitchburg Gas & Electric. This RFP covers the time period 2010 through 2012 and all programs and pilots that are administered within the Residential New Construction area. Currently the only program within this area is the ENERGY STAR Homes program, although it has a number of pilots that are occurring in 2009 and 2010 that will need to be evaluated.

BACKGROUND

MASSACHUSETTS EVALUATION FRAMEWORK

On September 8, 2009, the Massachusetts Energy Efficiency Advisory Council (EEAC or Council) unanimously approved a resolution developed collaboratively by the Program Administrators (PAs) and the EEAC Consultants, setting forth a new administrative framework for the performance of Evaluation, Measurement and Verification (EM&V) in Massachusetts. The full Resolution is presented verbatim in Appendix A; the following is a summary of the Resolution, its effects, and its relevance to the current RFP.

Under the Resolution, the EEAC will assume an oversight role over the EM&V activities of the PAs to ensure the objectivity and independence of those activities, and the perception of such, and to help ensure consistency, timeliness, and credibility. While the PAs and EEAC Consultants (acting on behalf of the EEAC) will continue to work diligently to reach a consensus on evaluation issues, where there are areas of difference that may arise that cannot be resolved through consensus during the on-going interactive process between the EEAC Consultant and the PA evaluation staff, authority for decision-making will reside with the EEAC or its Designee. This arrangement is subject to a system of appeals in the event of any disputes that cannot be resolved collaboratively.

The Resolution also restructures EM&V in Massachusetts so that most studies are to be performed at a statewide rather than a PA-specific level. It specifies that the range of evaluation activities be divided into 5 to 7 semi-permanent statewide Research Areas, oriented primarily to specific target markets. Each Research Area is to have an assigned Study Manager from the PAs, an assigned EEAC Evaluation Consultant, and an independent evaluation contractor who conducts the studies under a long-term contract with the individual PA companies.

Consistent with the Resolution, the PAs and the EEAC Consultants subsequently developed a system of six statewide Research Areas, as follows:
1. **Residential Retrofit and Low Income.** This category includes residential cooling and heating equipment, residential heating and water heating, residential and low-income retrofit, weatherization, and most aspects of multi-family programs.

2. **Residential Retail Products.** This includes residential lighting and appliance programs.

3. **Residential New Construction.** This includes residential and low-income new construction and major renovations programs, as well as codes and standards and compliance efforts. This Research Area also includes baseline studies of construction practices for both single- and multi-family homes.

4. **Non-Residential Large Retrofit and New Construction.** This includes C&I new construction (small and large) and major renovation, as well as large C&I retrofit programs.

5. **Non-Residential Small Retrofit.** This includes the current C&I small retrofit, direct install programs. This category would also include any future programs that may target small non-residential customers.

6. **Special and Cross-Sector Studies.** This includes those studies that do not fit readily into any of the five market-oriented Research Areas above, as well as those studies that are cross-sector in nature, including: cross-sector free ridership and spillover studies; non-energy benefits; behavioral programs; community-based pilots; and marketing, public education, and outreach activities.

Massachusetts’ evaluation planning and implementation schedule calls for selecting contractors, and finalizing contracts, for all six Research Areas by April 15, 2010. Evaluation activities under each contract are to be conducted subject to the terms of the EEAC Resolution. The purpose of this RFP is to select an evaluation contractor for the third Research Area, Residential New Construction.

RESIDENTIAL NEW CONSTRUCTION BACKGROUND

Residential new construction programs in Massachusetts began in 1991 with The Energy Crafted Homes (ECH) Program. The ECH Program, sponsored by a consortium of New England electric utilities and the Joint Management Committee\(^1\) (JMC), promoted state-of-the-art construction for electrically heated homes. The ECH Program provided leading edge technical information to builders and was successful in getting participating builders to incorporate the best building science and energy efficiency approaches in their homes. However, the market for new electrically heated homes in New England is small, and the potential for a program focused on only electrically heated homes to produce significant and sustainable energy-efficiency advances in the broader residential new construction market was negligible.

\(^1\) The JMC is made up of the following sponsoring utilities or groups; Bay State Gas, Berkshire Gas, Cape Light Compact, Fall River Gas, National Grid (Electric & Gas), NSTAR Electric and Gas Corporation, Western Massachusetts Electric, and Unitil/Fitchburg Gas & Electric.
In April of 1998 the ECH Program was retired and the ENERGY STAR Homes Program was introduced. Opening the Program to multi-family building projects and switching to fuel-neutral incentives greatly increased the number of new construction projects eligible to participate. In addition, fuel neutral based incentives enabled gas utility participation. Greater emphasis on energy-efficient lighting and the introduction of incentives for installing energy-efficient appliances increased potential savings per home. Use of the national ENERGY STAR name and logo took advantage of existing brand name recognition. Basing ENERGY STAR certification criteria on the Home Energy Rating System (HERS) performance made the Program accessible to all builders. See Appendix B for a more in-depth analysis of both the historic and recent trends of the program. See Appendix C for a description of the 2010 – 2012 plans for the program excerpted from the “2010 – 2012 Massachusetts Joint Statewide Three-Year Electric Energy Efficiency Plan, October 29, 2009.” To see the full Three Year Plan bidders should visit the EEAC’s website at www.ma-eeac.org. See Appendix D for a copy of the Program Theory for the program.

With respect to the ENERGY STAR Homes Program, it is important that the selected Evaluation Contractor understand all of the key players involved. There are six main groups who will be involved in the evaluation activities; they are as follows.

The JMC – This is the committee who manages the ENERGY STAR Homes Program. It is made up of representatives from the sponsoring PAs (usually the program manager responsible for the implementation of the program) and representatives from other interested parties such as regulatory agencies.

The JMC Evaluation Subcommittee – A subcommittee of the JMC responsible for evaluation activities. There is a lead person on this committee who will be the point person for all contact with the committee.

Implementation Contractor – The contractor who implements the program in the field, i.e. interacts with the builders, manufacturers, general public and is responsible for all implementation and marketing activities.

The Energy Efficiency Advisory Council (EEAC) and its Consultants – The EEAC has been set up as an advisory group to oversee the creation, implementation, and evaluation of energy efficiency programs in Massachusetts.

Market Progress Reporting Contractor – An independent contractor that has been hired by the JMC who will be producing an annual report detailing all activities and accomplishments for the program.

Evaluation Contractor – The winning bidder of this RFP responsible for completing the tasks described herein.
OBJECTIVE

The purpose of this RFP is to seek a qualified bidder or a team of bidders to complete an assorted array of evaluation activities for the Massachusetts Residential New Construction sector over a multi-year period. The winning bidder will be the sole evaluation contractor for the Residential New Construction research area. These activities will include an assortment of evaluation work including, but not limited to such things as market assessment, baseline studies, process evaluation, and development of incremental cost information. The winning bidder will be expected to handle all evaluation issues and to either team with or sub contract out work where specific skill sets are required that the evaluation contractor may not possess.

This will be a multi-year effort covering the years 2010 through 2012. Some of the main areas of focus over the next three years will be on the following areas.

- ENERGY STAR Homes Program (Baseline & general evaluation work)
- Codes and Standards
- Code Compliance
- Pilot areas (Major Renovation, Lighting Design, 4 – 8 story multi-family, Version 3 ENERGY STAR Homes specs)
- Evaluation Planning
- Other Undetermined Evaluation Issues

The table listed below is designed to give bidders an idea of evaluation activities the PAs are contemplating and an approximate timeline. Details of each project including both Scope and Timeline will be determined once an Evaluation Contractor is selected.

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<thead>
<tr>
<th>PLANNED EVALUATION ACTIVITIES BY QUARTER</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tr>
<td>ES Homes Baseline Study</td>
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<td>Codes and Standards</td>
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<td>Code Compliance</td>
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<td>Major Renovation - Pilot</td>
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<td>Lighting Design - Pilot</td>
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<td>4-8 Story Multi-Family - Pilot</td>
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<td>Evaluation Planning</td>
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<td>Other Eval Issues</td>
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Responsibilities of the Evaluation Contractor will include managing the various individual evaluation tasks, hiring and managing sub-contractors as necessary, collecting data, analyzing data, providing individual formal reports and presenting results to the JMC for the various evaluation tasks, providing an annual report which summarizes the year’s evaluation activities, and assisting in and developing an annual evaluation plan at the start of each program year.

SCOPE OF WORK

PLANNED ACTIVITIES

Since the ENERGY STAR Homes Program is the only energy efficiency program currently operating in the Residential New Construction area, all of the evaluation areas listed above have been initiated and are currently being administered through the Homes program. This may change as time goes forward. Certain areas may become programs on their own or may be incorporated into other research areas.

ES Homes Baseline Study

A baseline study for the ENERGY STAR Homes program was last conducted in 2005 (see Appendix E for a copy of the report). A new baseline study was slated for 2010, but due to the fact that Massachusetts is slated to adopt a new Energy Code on Jan 1, 2010 with it becoming the sole Energy Code on July 1, 2010, a delay may be appropriate. The Massachusetts PAs have been contemplating different options for conducting a new baseline study. These options include the following ideas:

Delaying the baseline study until 2011.
Conducting a mini-baseline in 2010 as a precursor to a full baseline study in 2011.
Conducting a mini-baseline in 2010 as a precursor to a full baseline study in 2012.

Below is a description of the PAs current view of the baseline study based on the last one conducted. The PAs would like the bidders to propose a process for the baseline study, consisting of a high level timeline, methodology and scope (all items would be worked out in detail with the winning bidder). With respect to timeline and process, the bidders should not limit themselves to the three timelines listed above or the process described below, but rather propose a timeline and methodology that they feel would work the best. Keeping in mind the time and expense involved in a baseline study, the bidders should consider the other activities listed above and what information might be necessary (e.g. see the description for Codes and Standards and Code Compliance below) and incorporate that into their proposal so as to make the most efficient use possible of time and resources.

Baseline Study description

Currently the baseline study is slated for just Massachusetts, but there has been interest expressed by other states about possibly joining the effort. For purposes of this RFP just plan on Massachusetts, if other states would like to join in we will negotiate that at that time. The main purpose of the baseline study is to provide updated input data for the Massachusetts User
Defined Reference Home (UDRH), which is used in the calculation of savings for the program (see pages 7 and 8 of the Baseline report, Appendix E, for a copy of the current UDRH).

The data collection will involve basic on-site visits to at least 100 newly constructed and newly occupied homes in Massachusetts to measure and record key data on materials and equipment used in home construction. In addition a short survey will be administered to all homeowners participating in the baseline study to elicit demographic information and their views on energy efficiency.

The previous baseline study looked only at single family homes. Multi-family units were excluded from the study. In their proposals, bidders’ should have a base proposal assuming only 100 single family homes will be in the study and an add-on cost proposal for including your recommended number of multi-family units. For this study single family homes are all 1 – 4 unit buildings, five units and above are considered multi-family.

All basic on-site visits will include conducting blower door tests. All on-site visits to homes with ductwork will also include conducting a duct blaster test. If the on-site visit identifies any health or safety issues, the homeowner must be notified at the time of the visit, followed by a written notification. See Appendix B of the Baseline report, Appendix E of this RFP, for a copy of the data input form used for the 2005 baseline study. The information on the draft input form can be used for bidding purposes. Once the winning bidder has been selected the design and final data collection form will be finalized with input from the JMC, implementation contractor, and the winning bidder.

The winning bidder will be responsible for designing a sampling strategy, recruitment of participants, scheduling of on-sites, conducting on-sites, data collection, data analysis (including derivation of appropriate UDRH components), and producing a final report.

Optional Baseline Components
An optional component of the project is HVAC performance testing. The program sponsors may decide either not to conduct HVAC performance testing as part of this study, or to conduct HVAC performance testing on a sample of the homes with central air conditioning. A final decision will not be made until after all bids have been received and reviewed. The overall objective of the HVAC performance testing is establishing a performance baseline for central air conditioning systems against which market changes could be measured. Information on system manufacturer, model, size and rated SEER and EER will be collected as part of the basic on-site visits. A Manual J sizing assessment will also be part of the basic on-site. The optional HVAC testing would involve identifying the actual performance efficiency and capacity, and levels of refrigerant and air flow rates across the coil. Performance testing would have to be performed at a minimum outdoor temperature of 60 degrees F and measured air flow. Duct leakage would not be part of the HVAC testing component since duct blaster tests will be conducted as part of the basic inspection. Specific HVAC data collection requirements include:

- Liquid pressure and temperature,
- Suction pressure and temperature,
- Ambient air temperature entering condenser,
• Return air wet and dry bulb temperature,
• Supply air wet and dry bulb temperature, and
• Altitude/barometric pressure at the time of the testing
• Measured air flow at coil using flow plate.

Personnel conducting the basic on-site visits must have proper training and experience to conduct a comprehensive assessment of the home. Completion of RCS, HERS, or BPI training programs or an equivalent is acceptable. HVAC performance testing may be conducted only by EPA-certified technicians who are permitted by law to access the refrigerant side of these systems to measure the charge.

For this proposal provide a detailed description of your team’s baseline methodology and pricing for 100 single-family on-sites across Massachusetts. The 100 sample site number is for comparative purposes, final sample size will be determined with the final bidder. Please also include an incremental cost per site. Make sure to describe sampling strategy, recruitment, on-site protocol and analysis. In addition, bids should discuss any differences in approach and associated costs in adding a multi-family component to the baseline study. Bidders should detail the costs associated with the baseline study for each year.

**Codes and Standards and Code Compliance**

In 2009, the JMC has been researching the relationship between program efforts to get builders to utilize more efficient building materials and techniques, code upgrades, and savings claimed by the program. This research resulted in a report detailing the process used by California to promote code upgrades and claim savings (see Appendix F), also the JMC issued a memo to the EEAC Consultants on Dec. 22, 2009 outlining a framework to promote code upgrades and claim savings (see Appendix G). Researching this area and refining the framework will be an ongoing effort. The selected Evaluation Contractor will play a key role in this area.

If the process outlined in the codes memo is adopted, the PAs will be credited for activities they engage in that help change energy codes or promote their compliance. The evaluator chosen will be responsible for providing documentation of the amount of energy saved by the change in codes, and to a lesser extent evidence of the PAs role in affecting the changes. While it is not clear yet what activities the PAs will institute to promote new codes and standards; and compliance with these codes and standards; baseline values for some elements such as current compliance need to be established. It is anticipated that the PAs will develop programs that among their features promote the development of new code and standards, train builders and code officials in code requirements, promote the development of stretch code communities and other pilots, and/or develop new compliance approaches.

There are a number of factors that need to be considered in developing a research plan.

• The proposed methodology uses Delphi panels to establish the amount of energy saved. Code changes may not be an absolute change, but may have the effect of accelerating a code change.
• The proposed method also establishes Delphi panels to assess the PAs’ contribution to affecting the change.
• A new residential code is being developed and expected to be enacted by 1/1/2010 and take effect by 7/1/2010. Bidders should address issues regarding timing of baseline issues. Assume that some code promotion and compliance activities will start in 2010 before the code is enacted. Under your proposed plan, at what point(s) would data be collected. How can this plan blend with the general new construction baseline?

• The PAs are already supporting the development of stretch codes in three communities in Massachusetts. With respect to HERS Index these stretch codes exceed Energy Star Homes requirements. The EEAC requires that the PAs offer incentives to participants of the ENERGY STAR Homes program built in stretch code communities. For now it has been decided to count homes built in stretch code communities as participants in the ENERGY STAR Homes program. Further, it has been determined that these stretch code communities should not be included in the statewide baseline, as their inclusion will raise baseline levels. It may be in the future that we need to treat stretch code communities differently if the stretch code and Energy Star program significantly diverge from one another. If more communities adopt stretch codes, it may be necessary to establish a baseline value for stretch code communities that are different from the statewide baseline.

• One concern of the evaluation is to make sure that there is no double counting of benefits between code impacts and ENERGY STAR Home impacts. All proposed methods need to identify where there may be double counting and identify how their approach avoids double counting.

• PAs may corroborate with regional or national efforts to affect change.

• Code enforcement is currently implemented at the local level in Massachusetts and level of compliance and enforcement varies significantly across the state.

Bidders should propose a strategy/methodology and timeline for examining code compliance and associated costs with carrying out the strategy knowing that a baseline need be established and that other activities can be anticipated. In the proposal, outline in detail the plan that can be used to fully provide evaluation support for future residential code activities. In the proposal, provide detailed costs for establishing code compliances. Bidders should consider ways to coordinate this compliance baseline with the construction baseline in previous section.

**Major Renovation Pilot**
The PAs are currently investigating Major Renovation as an area to implement energy efficiency. In 2009 a pilot was initiated within the ENERGY STAR Homes program. To qualify for the pilot an addition must be at least 500 square feet. Both the existing structure and the new structure must meet certain guidelines to be eligible for incentives. Please see the following website for further details, [http://www.energystarhomes.com/homebuyers/programs.htm](http://www.energystarhomes.com/homebuyers/programs.htm)

The PAs have created this pilot in order to capture lost opportunities within the major renovation market. One of the challenges of creating this pilot was determining how savings would be calculated. The Implementation vendor for the program has devised a method to calculate savings. This method has not been utilized yet as no major renovation projects have actually reached the completion stage. The evaluation contractor will be responsible for completing both a process and impact evaluation of this pilot. The process evaluation will look at both the implementation portion of the pilot as well as the process used to determine savings. The impact portion will look at the methodology used to calculate savings and make any necessary
recommendations for improvement. A brief description of the savings methodology is included as Appendix H.

In 2009 there were 17 Major Renovation projects participating in the pilot. In 2010 approximately 130 are planned, with the bulk of these occurring on the Cape.

For comparative purposes the PAs’ would like the Bidders to put together two plans dealing with the evaluation of the Major Renovation Pilot. One plan should assume a budget of $50,000 and the other should assume a budget of $100,000.

Bidders must provide a detailed description of the evaluation plan for this renovation pilot. Bidders should propose what they feel is the best method, as well as timeline, for investigating these issues. Proposed costs for this area should be split between process and impact areas.

Other Pilot Areas
As mentioned above, multiple pilots have been initiated through the ENERGY STAR Homes program. It is expected that all of these pilots will need evaluation efforts, although they are not all on the same timeline. The pilots are: Major Renovation, which was addressed above; Lighting Design which was initiated in 2009 (see Appendix I for a description); 4-8 story Multi-Family; and ENERGY STAR Homes V3. All of these pilots will need process evaluations and possibly impact evaluations as well.

Bidders should provide in their responses a paragraph or two on the strategies they might use to evaluate these pilots. Do not include costs; the PAs are just looking for the Bidders thoughts on evaluation strategies for the Other Pilots.

Process Related Issues
Outside of the Residential New Construction research area the Massachusetts PAs will be conducting a global process/market evaluation focused on customer and market responses to all major new and changed program initiatives. This global process/market evaluation may require input from individual research areas to feed into this study. This study has a date of having preliminary findings by July 15, 2010. Therefore, the selected Evaluation Contractor for the Residential New Construction area may need to be prepared to have some preliminary information to feed into this process evaluation.

Bidders should not include these global process related items in their proposed budgets.

Evaluation Planning
In a typical year, an evaluation plan will be developed somewhere between the last quarter of the previous year and the first quarter of the year to be evaluated. The activities will be made up of a number of things such as surveys of Home Builders, Home Buyers, Sub Contractors and studies to look at various impact and process issues. Certain activities such as Home Buyer Surveys, Builder Interviews, and Sub-Contractor Interviews will be done on a regular basis (annually, semi-annually, etc.). Other activities such as Incremental Cost Studies, Baseline Studies, Billing Analysis, etc. may be done every 5 years or as deemed necessary.
The selected Evaluation Contractor will be responsible for running conference calls to discuss evaluation activities for the coming year, producing a draft plan and a final Evaluation Plan per the timeline indicated above in the Objective section. Typically, about 3 calls are required to finalize a plan. Bidders should include this activity in their proposed budgets.

**Other Evaluation Work**

In addition to the items mentioned above, different types of activities are conducted on an ad-hoc basis as program changes dictate. Bidders should be prepared to provide this ad-hoc evaluation work and in their proposals should demonstrate their ability to meet such requests. Bidders should not include a cost for this other evaluation work in their proposals.

**GENERAL DELIVERABLES**

Work is anticipated to commence by **April 1, 2010.** In general, the selected evaluation contractor will be expected to deliver the following items during the course of this effort.

- Work plan (covering the first 12 months), due at the outset of the project. This is to include a schedule and an allocation of evaluation staff resources amongst the various evaluation tasks described under the Scope of Work. It should also detail how and when the evaluation contractor will make use of sub-contractors. In addition, the plan should indicate when and what reports will be issued.
- Draft Questionnaires and/or interview guides, on-site protocols, and or other data collection instruments, one month before any scheduled surveying activities.
- Sample Selection
  - For any activity that requires a sample to be drawn, the contractor should suggest the number of participants necessary. Due to various constraints on sample sizes, the achievement of statistical significance within certain parameters may not be realistic, but where it is possible, the sample should be sized to provide results with a 90% confidence, plus or minus 10% precision. Should this not be attainable, the proposal should suggest an appropriate sample size and estimate the associated level of confidence and precision. Any sampling techniques will need to ensure appropriate representation from Massachusetts’s populations. Additional groups (municipal building inspectors, realtors, retailers, utility staff, etc.) whose input may have value to the evaluation results may be proposed for consideration. The PAs and EEAC Consultants will have final approval of the sample selection process.
- Formal report on each task or activity as it is completed (this may entail a first draft, final draft, and final report).
- Draft Annual Report, due **January 31, 2011.** This will be a report summarizing all of the evaluation activities completed by the evaluation contractor through the end of the previous calendar year. An Annual Report will be due for each program year of evaluation activities.
- Final Annual Report, due upon completion of each calendar year’s evaluation activities including all supporting documentation, due **March 1, 2011.**
The contractor will be required to present the study findings to members of the JMC, and respond to questions. In addition, an optional briefing session for outside interested parties may be required. The cost proposal should present the costs for these tasks separately.

**SCHEDULE**

- RFP e-mailed to potential bidders: January 22, 2010
- Bidder’s Conference call: January 29, 2010, 10 a.m. – 11 a.m.
- Final Questions submitted: February 5, 2010
- Final Responses returned: February 10, 2010
- All proposals due: February 22, 2010
- Evaluation Contractor selected: March 5, 2010
- Kick-off Meeting: TBD, as soon as conveniently possible after the selection of the contractor.

**Information Requested**

The Massachusetts PAs request that interested evaluation organizations respond to this RFP no later than 5 p.m. **February 22, 2010** with the following information.

All detailed information in the proposals should cover the first 12 months of evaluation activities (**March 2010** through **March 2011**).

1. A detailed description of the complete scope of work including a schedule, flowchart and organizational management structure for the years 2010 – 2012 (Years 2011 and 2012 need not be as detailed as 2010). This should not be a re-statement of the scope described here, but a carefully thought out plan of how, when, and where the various tasks will take place using example questions wherever possible. This plan should give a reasonably detailed description of how the contractor plans to complete each of the tasks described in the scope of work with a concentration on the baseline work, code and standards and code compliance, and major renovation. For any survey work, a sample of questions and how they would be analyzed should be included. No more than half a page to a page for each task should be dedicated to this effort, exclusive of any additional pages required to detail some of the questions and how they would be analyzed. For Years 2 and 3, the bidder should provide a strategic discussion that explains in a broad sense how the evaluation activities will be approached.

2. Statements of qualification that detail the bidder’s experience and ability to provide multi-year evaluation support should be included. The bidder’s statements should emphasize their expertise and knowledge with regards to market assessment and evaluation of market effects, their ability to design and carry out extensive interviewing and survey analysis, as well as their technical expertise and qualifications to undertake technical studies dealing in the area of building science.

3. Summary of Study costs. Please use the attached Cost Estimation Table (Appendix J) to
provide a summary of costs for the first 12 months. Labor costs should be broken out by task and personnel type (e.g., project management, supervision, clerical support, analyst, etc.). Estimates of miscellaneous additional costs should be indicated. Since the initial scope of work will only cover the first year, please provide a billing rate for years 2 and 3. The PAs will determine the allocation of total costs to individual sponsors after a contractor has been selected.) (Please note that the selected contractor will be required to contract with and bill each of the PAs separately.)

4. One representative example of experience and documentation skills, such as a report.

5. Names, affiliations, and telephone numbers of at least two individuals or organizations for which similar services have been provided for Prime Contractor and all sub-contractors on team. The Massachusetts PAs and EEAC Consultants reserve the right to contact these individuals to ascertain the quality and timeliness of previous performance. Details of qualifications of personnel who will be utilized.

With the exception of sample report and staff resumes, limit your response to thirty pages. All material submitted will be treated confidentially.

**Response**

Respondents should submit an electronic copy of the proposal on or before 5 p.m. **February 22, 2010**.

**Evaluation of proposals and selection of contractor**

The PAs and their related personnel will confidentially review proposals. The PAs reserve the right not to select any submitted bid. The PAs are not responsible for costs incurred by bidders to develop proposals. Proposals will be judged on the following criteria.

- **Cost**, both the total cost and whether overall proposal offers good value will be considered;
- **Reasonableness of Approach**, does the proposal offer good creative solutions to the evaluation issues presented in the RFP;
- **Dedicated Resources**, has the bidder shown that they have the resources to provide the services requested within the expected timeframe;
- **Comprehension**, has the bidder shown that they understand the issues involved and have responded accordingly;
- **Documentation Quality**, is the proposal itself clear, concise, and well written;
- **Demonstrated Experience**, whether the bidder has demonstrated that their firm has the experience and expertise or the ability to provide subcontractors having the appropriate knowledge to perform the requested tasks.
REQUEST FOR PROPOSAL – RFP #1890

Massachusetts Energy Efficiency Programs

Evaluation Tasks in the Non-Residential Small Retrofit Areas

2010 - 2012

January 29, 2010

Response Deadline:
March 4, 2010 by Noon EST

PLEASE NOTE: The information contained within this Request for Proposal (RFP) is confidential and proprietary to the Sponsors, and is to be used by the recipient solely for the purpose of responding to this RFP.
TABLE OF CONTENTS

1.0 General Information

1.1 NSTAR
1.2 Program Administrators and Sponsors
1.3 Unauthorized Disclosure
1.4 Definitions
1.5 Sponsors’ Discretion
1.6 Bid Evaluation
1.7 Discrepancies or Omissions
1.8 Payments for Services and Invoicing
1.9 Pre-Bid Conference Call
1.10 RFP Recipient List

2.0 Specifications

2.1 Statement of Work
2.2 Terms and Conditions
2.3 Safety, Environmental, and Background Check Requirements

3.0 Communications and Form of Response

3.1 Volume I: Commercial Proposal
  3.1.1 Commercial Exceptions
  3.1.2 Pricing
  3.1.3 Options and Alternates
  3.1.4 EEOC Compliance
  3.1.5 Insurance Certificate(s)
  3.1.6 Execution of Proposal by Officer of Supplier
  3.1.7 Vendor Information

3.2 Volume II: Technical Proposal
  3.2.1 Title Page
  3.2.2 Table of Contents
  3.2.3 Executive Summary
  3.2.4 Technical Requirements
  3.2.5 Examples of Experience
  3.2.6 References
  3.2.7 Statements of Qualifications
  3.2.8 Resumes
  3.2.9 Sample Reports

4.0 Proposal Forms

  4.1 Form A - Bid Receipt Acknowledgment Form
  4.2 Form B - Supplier Bid Proposal Form (Cover Sheet)
  4.3 Form C - Execution of Proposal by Officer of Supplier
  4.4 Form D - Project Cost Estimate Bid Form
**IMPORTANT DATES - RFP #1890**

RFP Emailed to Potential Bidders: January 29, 2010

Pre-Bid Conference Call: February 11, 2010 at 1pm - 2pm

Last Date for Questions: February 18, 2010

Responses to Questions: February 25, 2010

Proposals Due: March 4, 2010 by Noon EST

Supplier Selected: March 19, 2010

Contracts Signed with all Sponsors April 8, 2010

Kick-Off Meeting: TBD, as soon as possible after signing

**Correspondence**

During the Request for Proposal, up to and including contract award, all correspondence must be directed via email to:

Patricia.Latimer@NSTAR.com

Should it be determined that any vendor is conversing with or directing questions related to this RFP to anyone other than the individual identified above, then at the discretion of the Program Administrators and Sponsors that vendor may be immediately disqualified from bidding on this project.
1.0 GENERAL INFORMATION

1.1 Background

Headquartered in Boston, MA, NSTAR provides regulated electric and gas utility services and is also engaged in telecommunications and other non-regulated activities. NSTAR, through its subsidiaries and operating companies, Boston Edison Company, Cambridge Electric Company, Commonwealth Electric Light Company and NSTAR Gas Company, serves approximately 1.3 million customers throughout Massachusetts, including approximately 1,040,000 electric customers in 81 communities and 240,000 gas customers in 51 communities. The Operating Companies are supported through the NSTAR Electric & Gas Corporation (the Company).

NSTAR is pleased to present this Request for Proposal (RFP) for Evaluation Tasks in the Non-Residential Small Retrofit Areas on behalf of the Program Administrators and Sponsors of the Massachusetts Energy Efficiency Programs. In support of the Green Communities Act of 2008, this RFP is being solicited on behalf of seven Massachusetts utilities (the Sponsors). The goal of this RFP is to select one successful bidder to provide services to the Sponsors’ Massachusetts customers.

1.2 Program Administrators and Sponsors

This Request for Proposal has been issued by NSTAR on behalf of the Program Administrators (PAs) for the Massachusetts Energy Efficiency Programs in the Non-Residential Small Retrofit Areas. These PAs are comprised of representatives from the following electric and gas companies in the Commonwealth of Massachusetts. These companies are referred to herein as the Sponsors:

- Bay State Gas (NiSource)
- Berkshire Gas
- Cape Light Compact
- National Grid USA
- New England Gas
- NSTAR
- Unitil/Fitchburg Gas & Electric
- Western Massachusetts Electric

1.3 Unauthorized Disclosure

The information contained within this Request for Proposal (RFP) is confidential and proprietary to the Sponsors, and is to be used by the recipient solely for the purpose of responding to this RFP. Additionally, the Sponsors consider any information provided to Bidders in the course of business to be privileged and confidential between Consultant and the Sponsors. This includes, but is not limited to, written data of any kind, business information, request for quotation, specifications, engineering data and any and all technologies and data either obtained or observed while supplying the commodity/service required by the contract. Unauthorized disclosure of information to third parties by Consultant may lead to cancellation of the contract, loss of future business opportunities and/or the effects of any other remedies which may be available to the Sponsors.

All material submitted, produced, data collected, reports, designs and documentation will become the exclusive property of the Sponsors at the end of the contract. The awarded
bidder may not share program materials, customer data, industry or program participant contact information, etc. unless explicitly authorized by each Sponsor to do so.

1.4 Definitions

Bidder shall mean those firms/vendors acting in the role of Supplier when responding with a Proposal to this RFP. Proposal shall mean the Bidder's formal response indicating their committed solutions that meet or exceed the requirements of the RFP. Subcontractors, or subs, can be defined as any Supplier under Contract or in the RFP response that are considered financially independent of the Bidder in any other business or accounting relationship.

This RFP does not constitute an offer by the Sponsors to enter into a contract, nor does any response to this RFP constitute an acceptance of an offer, nor does any response to this RFP bind the Sponsors in any way. This document shall not be construed as a request or authorization to perform work at the Sponsors' expense. Any work performed by a Bidder in connection with evaluating and responding to the RFP and, if selected, negotiating a definitive Agreement will be at the Bidder's own discretion and expense. This RFP does not represent a commitment to purchase or lease. The Sponsors reserve the right to reject any and all proposals at its absolute discretion. Submission of a bid constitutes acknowledgment that the Bidder has read and agrees to be bound by such terms. The information in this document will enable the recipient to formulate a proposal to meet the workload requirements as described in this RFP. The numbers, volumes, run rates, etc. provided in this RFP are based upon the most recent data available and should serve as estimates to Bidders for pricing and response purposes.

1.5 Sponsors’ Discretion

The Sponsors are not responsible and will not reimburse Bidders for costs incurred to develop proposals.

NSTAR is issuing this RFP on behalf of the Sponsors who at their discretion may:

- Select a Proposal other than the lowest priced, if the Sponsors determine, at its sole and absolute discretion that the Sponsors interests will best be served by doing so.
- Seek clarification from any Bidder regarding Proposal information and may do so without notification to any other Bidder.
- Continue the review procedure until a Bidder is selected successfully or until the Sponsors choose to reject all Proposals.
- Accept any Proposal or alternate as submitted without negotiations.
- Select for negotiations only the overall best Proposal or negotiate all Proposals submitted which fall within a competitive range.
- Perform a complete financial review as well as an on-site investigation of any of the Bidders facilities to ensure it is capable of meeting the demands of Sponsors and the needs identified in this RFP.
- May not award any Contract(s) as a result of this RFP.
- Reserves the right to accept or reject any or all proposals received, or to cancel this RFP in part or in its entirety, if in doing so is in the best interests of the Sponsors.
1.6 **Bid Evaluation**

The PAs and their related personnel will confidentially review proposals. A cross-functional evaluation committee representing each of the Sponsors will rate all Proposals based on the evaluation criteria provided below and may reduce the number of Bidders being considered to a "short list" of finalists based upon this objective analysis. The Sponsors may elect to meet with finalists for interviews. After all responses have been thoroughly reviewed and negotiations completed with finalists, the Sponsors will award the Contract(s) to the Bidder(s) who offers the best overall value. The Sponsors reserves the right not to award any Contract(s) as a result of this RFP.

All bids will remain active for ninety (90) days, and no bid materials will be returned. Each proposal will be evaluated on technical and commercial merits. All proposals will be opened on or after the due date.

Proposals will be evaluated on the following criteria:

- **Cost** - both the total cost and whether overall proposal offers good value will be considered
- **Reasonableness of Approach** - does the proposal offer good creative solutions to the evaluation issues presented in the RFP
- **Dedicated Resources** - has the bidder shown that they have the resources to provide the services requested within the expected timeframe
- **Comprehension** - has the bidder shown that they understand the issues involved and have responded accordingly
- **Documentation Quality** - is the proposal itself clear, concise, and well written
- **Demonstrated Experience** - whether the bidder has demonstrated that their firm has the experience and expertise or the ability to provide subcontractors having the appropriate knowledge to perform the requested tasks

1.7 **Discrepancies or Omissions**

Should a Bidder find any ambiguity, discrepancy or omission in the RFP, or should the Bidder have any questions, the Bidder shall notify NSTAR via e-mail to Patricia.Latimer@NSTAR.com. Such information must be received no later than the “Last Date for Questions”, which is indicated on Page 3 of this RFP, to afford NSTAR the opportunity to send any instructions or interpretations to other Bidders who have received an Invitation to Bid. The Sponsors will not be responsible for any oral instructions or interpretations.

1.8 **Payment for Services and Invoicing**

No up-front payments will be made to vendors. Invoices shall be submitted to each Sponsor on a monthly basis.

1.9 **Pre-Bid Conference Call**

A pre-bid conference call will be held on day and time indicated on Page 3 of this RFP. The call is scheduled for one hour. At that time, a brief program overview will be provided, followed by questions and answers. Information shared on the call will be emailed to all prospective bidders within a week. Dial in number is National Grid’s conference line: 866-561-4997 access# 9674198. Please dial into the conference call line at the designated time.
1.10 **RFP Recipient List**

Attached is a list of parties to whom this RFP bid package is being sent. Normally, such lists are not made available to potential bidders; however, due to the scope of services requested, timeline for responses, and in anticipation of vendors contemplating collaborative bids, this list is provided to facilitate the RFP process in a fair and efficient manner. This list is to be used only for such purpose, and is not for any other use or solicitation. The list is to be considered and treated as confidential information by the recipient.

2.0 **SPECIFICATIONS**

2.1 **Statement of Work**

The purpose of this RFP is to seek a qualified bidder or a team of bidders to complete an array of evaluation activities as defined in the attached statement of work over a three year period. The winning bidder will be the sole evaluation contractor for this research area. Activities will include, but not be limited to, market assessment and segmentation, impact and process evaluation, electric and gas measure integration assistance, and evaluation of new statewide incentive and financing models. The winning bidder will be expected to handle all evaluation issues and either team with or subcontract out work where specific skill sets are required that the evaluation contractor may not possess. A copy of the statement of work and related appendices are provided below.

2.2 **Terms and Conditions**

The successful Contractor’s services shall be provided in accordance with each Sponsors’ terms and conditions, which are provided below. Any exceptions to these requirements must be clearly stated in the Bidder’s RFP response.

Any exceptions submitted by a Bidder does not constitute acceptance by any of the Sponsors. Exceptions will be negotiated and agreed to by each Sponsor and will be part of an exclusive contract between the parties, which will be independent of any other associated contract with another Sponsoring organization.

Bay State Gas (NiSource)  
Berkshire Gas  
Cape Light Compact  
National Grid USA  
New England Gas  
NSTAR  
Unitil/Fitchburg Gas & Electric
Western Massachusetts Electric

- Bay State Gas - NiSource Corporate Services Company General Services Agreement and Data Security Requirements

- Berkshire Gas – Berkshire Gas’ requires Suppliers’ adherence to National Grid’s T&Cs for Consulting Services

- Cape Light Compact Terms & Conditions.

- National Grid Terms & Conditions for Consulting Services

- New England Gas Consultant Terms & Conditions

- NSTAR’s Terms & Conditions and Insurance Requirements

- Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions

- Unitil Terms & Conditions
2.3 Safety, Environmental, and Background Check Requirements

The successful Consultant’s services shall be provided in accordance with each Sponsors’ safety, environmental, and background check requirements. Copies of National Grid’s requirements for these areas are attached. Any exceptions must be clearly stated in the Bidder’s RFP response.

- National Grid’s Contractor Safety Requirements dated 8/1/08

- National Grid’s Contractor Environmental Requirements dated 2/29/08

- National Grid’s Employee Background Check Requirements dated 1/10/08

3.0 COMMUNICATIONS AND FORM OF RESPONSE

During the RFP process, all questions must be submitted via e-mail and addressed to Patricia Latimer at Patricia.Latimer@NSTAR.com, on or before the “Last Date for Questions” as specified on Page 3 of this RFP. Answers to Bidder’s inquiries will be distributed to all Bidders via email no later than the “Responses to Questions” date provided on Page 3 of this RFP. In order to ensure fairness, until the time an award is made, Bidders shall have no direct communication regarding this RFP with any of the Program Administrators or any other personnel within the Sponsors’ organization. After the decision to award is announced, the successful Bidder may contact the Program Administrators and work with each Sponsors’ Procurement contact to provide certificates of insurance and sign final contract documents. Failure to comply with these communications guidelines may disqualify the Bidder from further consideration.

Supplier’s proposal MUST include two SEPARATE VOLUMES. Volume I must address all commercial requirements, while Volume II must address all technical requirements. Volumes I and II shall not be bound or otherwise joined together. VOLUME II MUST NOT CONTAIN ANY COST OR PRICE INFORMATION. The organization of the proposal MUST conform to the organization enumerated in Form B, SUPPLIER BID PROPOSAL FORM, and as described in this section. The first page of the Supplier proposal MUST be Form B-Supplier Bid Proposal Form (cover sheet).

This RFP has been sent in electronic format to facilitate the completion of proposals. A complete proposal must be sent via e-mail to Patricia.Latimer@NSTAR.com, and an original hardcopy, electronic copy on CD, and 4 (four) hardcopies either hand delivered or sent via commercial carrier for receipt NO LATER THAN the “Proposals Due” date and time specified on Page 3 of this RFP to the following address:
3.1  Volume I: Commercial Proposal

3.1.1 Commercial Exceptions: This section of the proposal MUST state clearly any exceptions which are being taken to the commercial requirements of this RFP, for example terms and conditions, insurance requirements, etc. Exceptions must state what the exception is, the reason for the exception and proposed alternatives, and be organized sequentially in accordance with the organization of the RFP. Commercial exceptions MUST be clearly defined only in this section of the proposal. Bidder’s preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Bidder’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP, unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

3.1.2 Pricing: The Sponsors seek to procure Services at the most cost effective rates possible. Pricing for the first 12 months is to be provided on the Project Cost Estimate Bid Form D, which is included at the end of this document. Labor costs should be broken out by task and personnel type (e.g., project management, supervision, clerical support, analyst, etc.). Bidders shall include personnel names, who will be working on the project, that fall into the various labor categories, if known. Estimates of miscellaneous additional costs should be indicated. Since the initial scope of work will only cover the first year, please provide a billing rate for years 2 and 3. The Sponsors will enter into individual negotiations each subsequent year regarding any potential price increases, which must be justified by the Contractor. The PAs will determine the allocation of total costs to individual PA’s after a Contractor has been selected. (Please note that the selected contractor will be required to contract with and bill each of the PAs separately.)

All responses to this RFP, whether or not in compliance with the terms of this RFP, shall be considered unconditional offers by the Bidder, which, if accepted, shall create a binding obligation upon the Bidder.

Bidders should identify if a payment discount for early invoice payment (e.g., 2% 15, Net 30) is offered or not. Discounts will be factored into the evaluation of the bids and their acceptance is at the Sponsors’ option.

3.1.3 Options and Alternates: This section of the proposal would include options or alternates (commercial considerations) which the Sponsors could consider. Suppliers are encouraged to submit alternate proposals in addition to the requirements defined in Section 2.1, Statement of Work, if such alternate proposals will result in lower price, higher reliability, or improved schedule.
3.1.4 **EEOC Compliance:** If not previously submitted, please provide a statement that your company is in compliance with EEOC requirements.

3.1.5 **Insurance Certificate(s):** Include with your Bid a Certificate(s) of Insurance evidencing compliance with at least the minimum levels of insurance required in Section 6.0 Insurance of NSTAR’s Consulting Services Agreement, which is contained in NSTAR’s requirements document in Section 2.2 above. If you are awarded the work, you will be required to submit certificates to each Sponsor identifying them as an additional insured and complying with their insurance levels.

3.1.6 **Execution of Proposal By officer of Supplier:** Form C MUST be completed and executed by an Officer of the Supplier.

3.1.7 **Vendor Information:** Bidders shall provide:
   - Federal TaxID number
   - Business type, i.e., sole proprietorship, partnership, joint venture, etc. and state of residency
   - Number of employees
   - Financial statements for the last 24 months

   This information is not considered part of the 30 page response limitation and should be provided as a separate tab in Volume 1 of the Commercial Proposal.

3.2 **Volume II - Technical Proposal**

With the exception of the staff resumes and sample reports, Volume II must not exceed twenty pages.

The Supplier's technical proposal, addressing all technical requirements MUST be included in this section. **This volume may not include any cost or pricing information.** In addition to the Supplier's technical proposal, the following items must be addressed, in the order listed:

3.2.1 **Title Page:** This section of the proposal should include a title page, which identifies the RFP Title, vendor’s name and the volume.

3.2.2 **Table of Contents:** The vendor’s proposal should include a Table of Contents, which lists the titles and page numbers for each major topic and sub-topic.

3.2.3 **Executive Summary:** This section should include a summary of the key points and highlights of the vendor’s response.

3.2.4 **Technical Requirements:** All detailed information in the proposals should cover the first 12 months of evaluation activities (May 2010 through May 2011). A detailed description of the complete scope of work including a schedule, flowchart and organizational management structure for the years 2010 – 2012. Years 2011 and 2012 need not be as detailed as 2010. This should not be a re-statement of the scope described here, but a carefully thought out plan of how the contractor plans to complete each of the tasks described in the scope of work. For any survey work, a sample of questions and how they would be analyzed should be included. For Years 2011 and 2012, the bidder should provide a strategic discussion that explains in a broad sense how the evaluation activities will be approached.
Bidders should also include a description of all assumptions used to develop their response to this RFP.

3.2.5 Example of Experience: Provide one representative example of experience and documentation skills, such as a report.

3.2.6 References: Provide names, affiliations, and telephone numbers of at least two individuals or organizations for which similar services have been provided for Prime Contractor and all sub-contractors on team. The Massachusetts PAs and EEAC Consultants reserve the right to contact these individuals to ascertain the quality and timeliness of previous performance.

3.2.7 Statements of Qualifications: Statements of qualifications that detail the bidder’s experience and ability to provide multi-year evaluation support should be included. The bidder’s statements should emphasize their expertise and knowledge with regards to market assessment, process and impact evaluation, their ability to design and carry out extensive interviewing and survey analysis, as well as their technical expertise and qualifications dealing with the issues outlined in the Scope of Work.

3.2.8 Resumes: Provide details of qualifications of personnel who will be utilized and copies of resumes as requested in the Statement of Work.

3.2.9 Sample Reports: Provide sample reports as requested in the Statement of Work.

4.0 PROPOSAL FORMS

The following forms must be completed and submitted with Supplier Proposal.

4.1 Form A - Bid Receipt Acknowledgment Form

This form is used by the Supplier to confirm to Company receipt of the bid package and intent to bid. This form should be completed upon receipt of the RFP and returned as soon as possible via email (Patricia.Latimer@NSTAR.com).

4.2 Form B - Supplier Bid Proposal Form (Cover Sheet)

Form B - Supplier Bid Proposal Form (Cover Sheet) MUST be the first page of the Supplier proposal.

4.3 Form C - Execution of Proposal by Officer of Supplier

The Supplier MUST complete this form and include it in Volume I of the proposal. The form is used to:
- Indicate how long the proposal is valid.
- Confirm in writing that Supplier's proposal represents a complete offering and includes all exceptions to the RFP.

4.4 Form D - Project Cost Estimate Bid Form

Pricing must be provided on the Project Cost Estimate Bid Form and included in Volume I – Commercial Response only.
FORM A – BID RECEIPT ACKNOWLEDGMENT FORM

RFP # 1890 - Evaluation Tasks in the Non-Residential Small Retrofit Areas

COMPLETE AND RETURN UPON RECEIPT TO:

Patricia.Latimer@NSTAR.com

The ________________________ Company hereby:

1. __ I acknowledge receipt of the above listed Bid Documents.

__________________________________________________________________________

And

2. __ My proposal will be submitted on the required due date.
   __ I choose to not bid, as fully explained in letter to be transmitted under separate cover.

Our Proposal shall list the following companies as joint venture partners or subcontractors:

__________________________________________________________________________

Please address future inquiries on this work (if different from original mailing) to:

Name: __________________________________________

Company: _______________________________________

Address: _______________________________________

Phone: ___________ Fax: ______________

by: _______________________________________

(Signature)

Title: _______________________________________

Date: _______________________________________
FORM B - SUPPLIER BID PROPOSAL FORM

RFP #1890 - Evaluation Tasks in the Non-Residential Small Retrofit Areas

(COVER SHEET)

NAME OF SUPPLIER: ____________________________________________

ADDRESS: ______________________________________________________

NAME OF AUTHORIZED REPRESENTATIVE: _________________________

TITLE OF ABOVE: ________________________________________________

PHONE NUMBER OF THE ABOVE: _________________________________

Direction: This sheet must be the first page of all submittals. The remainder of the proposal must follow the following format with no exceptions. Additional sections may be added at the Supplier's discretion. Volumes I & II must be separate documents.

<table>
<thead>
<tr>
<th>Volume I: Commercial Proposal</th>
<th>Volume II: Technical proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TABLE OF CONTENTS OF VOLUME I</strong></td>
<td><strong>TABLE OF CONTENTS OF VOLUME II</strong></td>
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<tr>
<td>Section</td>
<td>Description</td>
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<td>1.0</td>
<td>Commercial Exceptions</td>
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<td>EEOC Compliance Verification</td>
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<td>5.0</td>
<td>Insurance Certificate(s)</td>
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<tr>
<td>6.0</td>
<td>Execution of Proposal by Officer of Supplier</td>
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<td>7.0</td>
<td>Vendor Information</td>
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</table>

Proposal Prepared by (Signed): ________________________________

(Typed): ________________________________

Title: _________________________________________

Date: _________________________________________
Supplier represents that this proposal is its complete offering and includes all exceptions to this RFP. Supplier agrees that this proposal will be valid for a minimum period of 90 days from date of submittal.

________________________________________
Supplier

By:

________________________________________
(Signature)

________________________________________
(Name)

________________________________________
(Title), a duly authorized representative of the Supplier

________________________________________
Date
FORM D - Project Cost Estimate Bid Form
REQUEST FOR PROPOSALS (RFP)

STATEMENT OF WORK

EVALUATION TASKS FOR MASSACHUSETTS ENERGY EFFICIENCY IN THE NON-RESIDENTIAL SMALL RETROFIT AREA 2010-2012

1.0 INTRODUCTION

The Massachusetts Program Administrators (PAs) for the Massachusetts Energy Efficiency programs in the Non-Residential Small Retrofit Area request proposals to perform various evaluation tasks addressing requirements of the Commonwealth of Massachusetts, as described herein. The PAs include Bay State Gas, Berkshire Gas, Cape Light Compact, New England Gas, National Grid (Electric & Gas), NSTAR Electric and Gas Corporation, Western Massachusetts Electric, and Unitil/Fitchburg Gas & Electric. This RFP covers the program years 2010 through 2012 for all programs and pilots that are administered within the Non-Residential Small Retrofit Area. Currently the only program within this area is the Direct Install (DI) program, although there are several pilots that are continuing or being planned during 2010 that will need to be evaluated.

2.0 BACKGROUND

2.1 Massachusetts Evaluation Framework

On September 8, 2009, the Massachusetts Energy Efficiency Advisory Council (a.k.a. EEAC or the Council) unanimously approved a resolution developed collaboratively by the Program Administrators (PAs) and the EEAC Consultants. This resolution set forth a new administrative framework for the performance of Evaluation, Measurement and Verification (EM&V) in Massachusetts for Energy Efficiency Programs. The full resolution is presented verbatim in Appendix A. Below is a summary of the resolution, its effects, and its relevance to the current RFP.

Under the resolution, EEAC will oversee the EM&V activities of the PAs to ensure objectivity and independence of those activities, and perception of such, and to help ensure consistency, timeliness, and credibility. While the PAs and EEAC Consultants (acting on behalf of the EEAC) will continue to work diligently to reach a consensus on evaluation issues, there may be areas of difference which cannot be resolved. In these instances, authority for decision-making will reside with the EEAC or its designee. This arrangement is subject to a system of appeals in the event of any disputes that cannot be resolved collaboratively.

The resolution also restructures EM&V in Massachusetts so that most studies are to be performed on a statewide rather than PA-specific level. It specifies that the range of evaluation
activities be divided into 5 to 7 semi-permanent statewide research areas, oriented primarily to specific target markets. Each research area is to have an assigned study manager from the PAs, an assigned EEAC Evaluation Consultant, and an independent evaluation contractor who conducts the studies under a long-term contract with the individual PA companies.

Consistent with the resolution, the PAs and the EEAC Consultants subsequently developed a system of six statewide research areas, as follows:

1. **Residential Retrofit and Low Income.** This category includes residential cooling and heating equipment, residential heating and water heating, residential and low-income retrofit, weatherization, and most aspects of multi-family programs.

2. **Residential Retail Products.** This includes residential lighting and appliance programs.

3. **Residential New Construction.** This includes residential and low-income new construction and major renovations programs, as well as codes and standards and compliance efforts. This research area also includes baseline studies of construction practices for both single- and multi-family homes.

4. **Non-Residential Large Retrofit and New Construction.** This includes C&I new construction (small and large) and major renovation, as well as large C&I retrofit programs.

5. **Non-Residential Small Retrofit.** This includes the current C&I small retrofit, direct install programs. This category would also include any future programs that may target small non-residential customers.

6. **Special and Cross-Sector Studies.** This includes those studies that do not fit readily into any of the five market-oriented research areas above, as well as those studies that are cross-sector in nature, including: cross-sector free ridership and spillover studies; non-energy benefits; behavioral programs; community-based pilots; and marketing, public education, and outreach activities.

Massachusetts’ evaluation planning and implementation schedule calls for selecting contractors, and finalizing contracts, for all six research areas by April 15, 2010. Evaluation activities under each contract are to be conducted subject to the terms of the EEAC Resolution. The purpose of this RFP is to select an evaluation contractor for the fifth research area, Non-Residential Small Retrofit.

### 2.2 Non-Residential Small Retrofit

Electric companies began offering some kind of specialized services for hard-to-reach small business customers in the 1990s. The “direct install” turnkey model was first offered by National Grid and Commonwealth Electric for customers 50 kW and smaller. With experience, it evolved and improved over time and was subsequently adopted, with some variations, by all
Massachusetts electric companies, except for FG&E. Gas companies have no history of offering a direct install option.

The Massachusetts direct install model has been recognized by many national “best practices” studies and awards as the best delivery mechanism to comprehensively and cost effectively address this market. To date, this model has been replicated by programs in New Hampshire, Rhode Island, Vermont, and Nova Scotia.

With the direct install model, PAs solicit competitive bids for the labor and materials costs of installing improved lighting equipment, lighting controls and, in some cases, improved refrigeration measures for walk-in coolers. Through a turnkey process, a single contractor conducts an audit to identify better lighting options and installs recommended measures. Some PAs offer on and/or off-bill financing options to help customers finance their share of the cost of installing improvements. PAs offer incentives ranging from 35% to 80%. Over time, PAs have learned that, depending on the financing mechanism, it is possible to alter the mix of incentives and financing, while maintaining attractive customer penetration rates.

3.0 OBJECTIVES

The purpose of this RFP is to seek a qualified bidder or team of bidders to complete an array of evaluation activities for the Massachusetts Non-Residential Small Retrofit sector over a multi-year period. The winning bidder will be the sole evaluation contractor for this research area. Activities will include, but not be limited to, market assessment and segmentation, impact and process evaluation, electric and gas measure integration assistance, and evaluation of new statewide incentive and financing models. The winning bidder will be expected to handle all evaluation issues and either team with or sub-contract out work where specific skill sets are required that the evaluation contractor may not possess.

Responsibilities of the Evaluation Contractor will include managing the various individual evaluation tasks, hiring and managing sub-contractors as necessary, collecting data, analyzing data, providing individual formal reports, presenting results to the PAs for the various evaluation tasks, providing an annual report which summarizes the year’s evaluation activities, and assisting in and developing an annual evaluation plan at the start of each program year.

4.0 PLANNED AND ANTICIPATED EVALUATION ACTIVITIES

During the first year of the three year evaluation period, the PAs have initially identified two areas of evaluation work, each potentially involving several tasks. The first area centers on a pilot effort investigating a multi-tier approach to delivering energy efficiency programs to small business customers. The second area involves an impact study to update outdated energy savings and peak period demand savings, and/or supplement current regional studies aimed at expanding short term metering data to annual hourly results and disaggregating the data by facility type. Both of these projects are described below in the Scope of Work.
Although Non-Residential Small Retrofit DI electric programs are similar statewide, there are a number of differences among individual PAs. The objective of program changes being undertaken in 2010 is to provide cost-effective, comprehensive electric and gas retrofit services to small business customers on a turnkey basis using the same delivery model throughout Massachusetts. A principal task is the integration of measures offered under the current electric programs with existing rebated gas measures offered by the gas utilities. Other tasks involve the development of innovative and/or standardized incentive and financing mechanisms in support of the creation and piloting of a multi-tier approach to identifiable segments of the small business market.

In light of the 2010 program changes described in the preceding paragraph and activities in other energy efficiency programs, Massachusetts will be undertaking a mid-course adjustment process to consider whether any changes to program approaches are required for 2011-2012. Given the sharp increase in program budgets that is planned for these years and the potential magnitude of the programming and resource allocation decisions that may be made as part of the mid-course adjustment process, it is critical that timely information be available regarding key program process issues and initial market response to new and expanded program services. The PAs are therefore committed to completing a global process and marketing evaluation by July 15, 2010. This evaluation is expected to cover:

(1) Customer and market response to new or expanded or revised marketing efforts;
(2) A review of sales techniques that are effective;
(3) An early review of electric and gas integration efforts and single point of contact/cross PA integration in MA as well as comparison to selected other states
(4) An early review of projects that are comprehensive, whole building, or otherwise targeted to deeper savings; and
(5) Process evaluation and design review of community-based projects.

More information on the tentative scope and focus of this evaluation is provided in Appendix B.

The global process and marketing evaluation is envisioned as a single effort encompassing a number of program areas. However, individual pieces of the evaluation are expected to be performed by the members of the contractor teams for four research areas: Residential Retrofit, Large C&I, Small C&I, and Special/Cross-Cutting. The Special/Cross-Cutting contractor team will play a leading role, with overall direction and coordination provided by the PAs and the EEAC Consultants. Each contractor team will be responsible for covering those topics shown in Appendix B that are specific to its assigned research area.

Because of uncertainties over which particular 2010 program changes will be implemented in time to be productively studied by July 15, this RFP does not request a specific technical or cost proposal for the winning bidder’s contribution to the global process and marketing evaluation. Instead, bidders are asked to commit to making available a minimum of 200 hours of staff time by qualified staff members between the dates of April 15 and July 15, 2010. Bidders are asked to specify which staff members will be assigned to this task, and the total number of hours for which each assigned staff member will be available. The specific scope of the global process and market evaluation will then be negotiated after contractor selection.
In the second and third years, 2011 and 2012, the PAs anticipate a need for a process evaluation of the new integrated statewide program delivery model. Depending on the success of this approach, there may also be a need for an impact evaluation to assess the magnitude, comprehensiveness and depth of energy savings. However, the shape and scope of such evaluation work will only be determined following an initial period of experience.

The PAs expect there may be some overlap during planning and/or implementation of the new program delivery model, with concurrent work in the Non-Residential Large Retrofit and New Construction research area. The successful bidder for this RFP, along with the PAs, will monitor and coordinate evaluation activities with that research area to enhance work in both areas and avoid unnecessary duplication.

The table below presents an approximate timeline for the evaluation tasks and activities described above. Details of each task and activity within this RFP, including scope of work and timeline, will be determined once the evaluation contractor for this research area is selected. The timeline assumes that piloting of the integrated statewide delivery model is successful and continues more or less intact during 2012. Several evaluation studies currently underway are also identified. Results from these studies are expected to inform a detailed work plan for 2010 as the PAs develop the new comprehensive delivery model and ascertain the final scope of lighting impact evaluation.

### PROSPECTIVE EVALUATION ACTIVITIES BY QUARTER

<table>
<thead>
<tr>
<th>Studies Underway Impacting This RFP</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<td>EM&amp;V Forum C&amp;I Lighting Persistence</td>
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<td>GasNetworks Space/Water Heating Impact</td>
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<td>EM&amp;V C&amp;I Lighting Load Shape - Phase 2</td>
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<td><strong>2010-2012 Studies</strong></td>
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<td>Global Process and Marketing Evaluation</td>
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<td>Market Assessment &amp; Segmentation</td>
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<td>Statewide Delivery Model Process</td>
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<td>Integrated Program Impact</td>
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1 One definite point of contact between the Small and Large C&I research areas is that the latter will be conducting a multi-year C&I market assessment that will include the small commercial market, reflecting the fact that for broad-based C&I market assessment activities it can be difficult to draw clean boundaries by size of customer. Initial components of this market assessment include a non-residential new construction baseline study, and studies of the chain and franchise and Combined Heat and Power (CHP) markets.
Information about the GasNetworks impact study can be found in Appendix C. The two Northeast Energy Efficiency Partnership (NEEP) EM&V Research and Evaluation studies, B1-Phase 2 and B2, can be accessed through the following link:


The following sub-sections in the Scope of Work outline the tasks to be accomplished in the two 2010 evaluation projects and the general approach to other evaluation work in 2011 and 2012. As described below, bidders are requested to provide detailed budgets for the 2010 evaluation tasks, and time and materials billing rates for the latter years.

5.0 SCOPE OF WORK

5A. First Year – 2010 (approximately the 12 month period beginning April, 2010)

5A.1 Task 1 - Market and Segmentation Assessment

Current Massachusetts electric DI programs vary in their eligibility requirements, ranging from <100kW to <300kW average monthly demand. In 2010 the PAs are testing the upper kW limit to determine the viability of a so called “mid-tier” DI option, with an expanded portfolio of measures to address this customer segment, as well as additional opportunities found for implementation in 2011. The possible target band for this mid-tier option is 200/300kW – 750 kW. Addition of a DI option to this range will overlap existing retrofit programs and varying delivery models for serving these customers. Whether this option complements existing programs by increasing participation and savings will be evaluated. PAs are also developing and piloting a “Main Street” DI retrofit project for very small (<50kW) customers, eligibility and delivery mechanism to be defined.

In this task the selected contractor will support the testing and development of this proposed multi-tier approach to the small business market. The support will initially focus on assisting in the preliminary Global Process and Marketing Evaluation, by gathering information about program changes in the Non-Residential Small Retrofit research area for inclusion in the July 15, 2010 report. Subsequent work will include the subtasks below.

5A.1.1 Global Process and Marketing Evaluation

Appendix B to this RFP outlines the research areas addressed and tasks in each area. The information needs are tentative and may be modified once the contractor for this research area begins work. Bidders should include 200 hours and appropriate staffing for this subtask in their proposals as described in 4.0 above. The results of this evaluation may modify the direction of the following subtasks, but bidders should base their bids on each subtask as stated.
5A.1.2 Market Assessment
Compile and segment the PA’s 2008-2009 electronic C&I program participant tracking databases, and similarly all of each PA’s small business customers, by average monthly demand and other potentially useful parameters that may be suggested by the available data. One outcome of this review and analysis might be the identification of differences in customer response to the varying program designs among PAs. Essentially this will be a data mining exercise.

5A.1.3 Additional Energy Efficiency Opportunities
Develop, test and implement a telephone survey for a sample of 2008-2009 program participants to assess additional cost-effective electric measures beyond those installed, and potential gas measures. This survey will be performed during recruitment for on-site work in Task 2. The purpose is to test both awareness and interest in measures PAs are or will offer, and to uncover other energy related needs of customers. Sample size will follow that determined in 5A.2.2 for the desired statistical accuracy and precision.

5A.1.4 Non-Participant Survey
Develop, test and implement a telephone survey of program non-participants. For purposes of proposal preparation and comparison, assume the number of interviews is equal to the participant sample in 5A.2.2. Composition of this sample will be informed by results of subtasks 5A.1.1 through 5A.1.3. The goal will be similar to 5A.1.3, plus an objective around reasons for not participating.

5A.2 Task 2 - Lighting Impact Evaluation
Lighting measures constitute as much as 90% of energy savings in the Non-Residential Small Retrofit program. Individual programs generally have low free-rider and spillover rates. A recent (2007) statewide billing analysis evaluated realized savings among program participants. Two current studies (see table above and link) being performed by the NEEP EM&V Forum are addressing C&I lighting measure persistence and the development of 8760 load shapes from historical data. Both studies should be complete by mid-2010 and are anticipated to include information applicable to the small business market. Results from these studies will inform the final scope of work performed in this task.

For planning purposes, the initial scope of work for this task assumes that the primary data required from this task is an update of lighting annual energy savings and average demand reduction during ISO New England on-peak performance hours. Data collection and analysis requirements are detailed in the following sub-tasks.

5A.2.1 Lighting Measures Addressed
This task will address lighting measures with and without controls. Lighting measures with controls will be a subset of the sample in 5A.2.2. Lighting measures without controls will be taken from the PAs’ 2009 projects. Lighting measures with controls will potentially be drawn from 2010 projects to enable the possibility of pre and post monitoring. In their proposals, prospective bidders should plan for an extended period of data collection, pending a final decision on the method chosen for evaluating controlled lighting measures.
In preparing their proposals, bidders should discuss their approach to either a pre/post or post
only evaluation of controlled lighting measures. The discussion should include the pros and cons
of both approaches and the expected increase in costs associated with the pre/post option.

5A.2.2 Sample Size and Metering
The contractor selected under this RFP will perform lighting logger metering and the site survey
work described in Task 1 at 140 or more program participants across Massachusetts. For ease of
comparison among submitted proposals, prospective bidders should base their cost estimates on
100 sites for lighting fixtures only, and 40 sites for controlled lighting measures. Prepare and
submit pricing for two options, one involving only post monitoring of the 40 controlled lighting
sites and one involving pre and post monitoring of those sites. Bidders should also provide an
incremental per site cost for both options, assuming that any additional sites may be similarly
distributed across the state.

5A.2.3 Sampling Plan
Statistical accuracy and precision of estimated energy savings should be 90%±10%. Demand
reduction at the metered sites will meet ISO requirements of 80%±10%. A detailed sample plan
and any additional sites to meet statistical requirements will be developed after contract award,
taking into consideration results from the two NEEP EM&V studies currently underway. Depending on the approach taken to evaluation of controlled lighting measures, precision
requirements may be relaxed. Bidders should comment on statistical precision in their
discussion of pre/post and post only evaluation options in 5A.2.1. To the extent possible, the
selected site sample will be stratified by customer segments defined by average demand, in order
to provide useful information to the multi-tier planning and piloting efforts.

5A.3 Task 3 – Participant Survey and Site Work
The purpose of this task is to outline the field data necessary to support the computation of
lighting impacts and other analysis for Tasks 1 and 2.

5A.3.1 Site Recruitment and Scheduling
Once sites have been selected for surveys or as alternates, the contractor will prepare and mail a
letter to the primary and secondary sample, notifying them that they may be contacted to
participate in a survey. Shortly thereafter, the contractor will telephone participants, administer
the survey developed in Task 1 and recruit the participant for site metering.

5A.3.2 Metering and Site Surveys
In addition to site metering, the contractor will prepare a field data collection instrument to
support the assessment of installed lighting measures and to confirm results of the telephone
survey. Possible data collection activities include:
a) Verifying tracking system data including quantity and technology
b) Identifying if and when measures were removed
c) Collecting current reported hours of operation from the participant
d) Collecting select business characteristics, such as business type, building type, HVAC
details, and seasonal operation
e) Identifying the timing and extent of any changes to the facility affecting energy consumption since the installation date
f) Asking a limited set of customer satisfaction questions
g) Clarifying any inconsistencies between the telephone recruitment survey and observed conditions

5A.3.3 Auditor Training
While auditors are expected to be experienced field data collectors, the contractor must train the auditors in the use of the particular surveys and protocols specific to this study. Prospective bidders who plan to use subcontractors for any telephone survey and recruiting work should describe the qualifications of those firms.

5A.4 Task 4 – Analysis, Recommendations and Reporting
The purpose of this task is to conduct any remaining analysis, make recommendations, and document all findings. The contractor will analyze all results, identify issues and make actionable implementation recommendations concerning the proposed multi-tiered market approach to be piloted in 2011. A Final Report will present all methodologies, analysis, findings and recommendations from tasks 1 through 3.

5A.4.1 Analysis
The contractor shall conduct additional required and other useful analysis suggested by the data, including disaggregation by:
Required
a) company service territory
Suggested by data
b) lighting technology type
c) facility or business type
d) controlled lighting versus fixture only measures, including hours of use reduction, actual occupancy profile and a usage reduction factor for controlled lighting

The contractor will note any discrepancies from tracking database records, and describe the impact on calculated demand reductions during performance hours for:
e) installed technologies and quantities
f) reported and monitored hours of operation

5A.4.2 Reporting, Recommendations and Planning
The contractor will prepare a draft final report, including a table which tabulates the following weighted statewide and individual utility values of:
a) kWh savings loadshape
b) kWh realization rate
c) % savings on-peak energy
d) connected kW realization rate
e) summer and winter diversified coincidence
f) hours of use
g) kWh and kW interactive effects factors
The draft final report will:

h) include an executive summary
i) describe methods and algorithms employed in the impact analysis
j) include the sample plan and final achieved precisions
k) summarize results of the telephone recruitment and site surveys, including:
   i. number of total program participants
   ii. number of changed or inactive accounts among participants
   iii. number of participants successfully recruited for both telephone surveys and site work
   iv. number of participants not successfully recruited, surveyed and analyzed, and reasons why
l) include in an appendix copies of the telephone recruitment, site assessment, and non participant survey instruments
m) provide a discussion of all analysis from Task 5.1
n) include recommendations as to whether a multi-tier service model approach should be implemented.

Prospective bidders should budget for bi-weekly conference calls during 2010 with the research area Study Manager and other PA participants as needed, including review and revision of survey instruments, the sampling plan, draft and final lighting impact reports, and for in-person meetings with PA staff at the following times:
o) kick-off work planning meeting following contract award
p) preparation and presentation of an Annual Summary Report, including the tasks described above as well as any additional 2010 ad-hoc activities, this report due during the first quarter of 2011

Following completion of the Final Impact Report and the Annual Summary Report the contractor will deliver hard cover and electronic copies in MS Word and pdf format to all PA’s. The Annual Summary Report of all 2010 evaluation activities will serve as a preliminary planning document for 2011.

Additional work identified and executed during 2010, beyond the tasks described above, will be performed at the standard billing rates provided as part of the bidder’s response to this RFP.

5B. 2011 - 2012 Program Years
Evaluation activities covering these later program years are anticipated to begin around the end of the first quarter of 2011 and continue through the first or second quarters of 2013. Specific activities and tasks are not known at this time. All evaluation work planned and executed during this time period will be performed at the standard billing rates provided as part of the bidder’s response to this RFP. The following paragraphs outline the general areas of work the PA’s expect to evaluate. Prospective bidders should not include this work in their proposed first year budgets.

5B.1 Electric/Gas Measure Integration Process Evaluation
To date, gas companies have served the small business sector by means of rebates for prescriptive measures similar to those offered to residential customers. As part of their 2010
program design process, PAs will identify and add prescriptive gas measures and potentially more prescriptive electric measures. They will also need to adjust their screening methods and tools to allow for custom gas measures.

Integration with electric DI programs will require close cooperation and coordination. Investigation of a multi-tiered delivery approach to the sector with different measure offerings needs a clear understanding of each tier’s needs. This evaluation will initially assess the PAs progress toward achieving an integrated program that addresses each new tier with a workable statewide administrative model. A subsequent process evaluation will investigate customer experience and satisfaction with the new structure and offerings.

5B.2 Incentive and Financing Mechanisms Review
During 2010 all PA’s will move toward a common 70% customer incentive for 2011. Gas PAs will commence actions to provide on-the-bill-financing by 2011 or, in the alternative, negotiate arrangements with the electric PAs servicing their areas to bill gas measures through the electric bill, with a reimbursement to the electric PA for measure and financing costs. All PAs that offer financing will offer a common discount for single customer payments, and will explore flexible repayment terms to produce a positive cash flow for customers, beyond 24 months.

The contractor will conduct a review of the new incentive and financing mechanisms, either independently or as one or more tasks in the process evaluations above.

5B.3 Integrated DI Program Impact
Towards the end of the three year planning period, the PAs anticipate a need to evaluate the savings and reach of the new program structure. This study may look at electric, gas and non-resource benefits, effectiveness in engaging targeted customer groups, types of and success with custom projects, and other issues that may arise during program implementation.

5B.4 Evaluation Planning
In each year, an evaluation plan will be developed during the last quarter of the previous year and the first quarter of the year to be evaluated. Each year’s activities may be comprised of surveys of program participants, implementation contractors and PA staff, reviews of incentives and customer financing arrangements, and studies to look at various impact and process issues. Other activities related to such things as measure interaction effects, baselines, billing analysis, etc. may be done as deemed necessary.

The selected evaluation contractor will be responsible for running conference calls to discuss evaluation activities for the coming year and producing a draft and a final evaluation plan.

6.0 GENERAL DELIVERABLES
Work is anticipated to commence no later than April 15, 2010. In general, the selected evaluation contractor will be expected to deliver the following items during the course of this effort.
6.1 Work plan (covering the first 12 months), due at the outset of the project. This is to include a schedule and an allocation of evaluation staff resources amongst the various evaluation tasks described under the Scope of Work. It should also detail how and when the evaluation contractor will make use of sub-contractors. In addition, the plan should indicate when and what reports will be issued.

6.2 Draft Questionnaires and/or interview guides, on-site protocols, and or other data collection instruments, one month before any scheduled surveying activities.

6.3 For any activity that requires a sample to be drawn, the contractor should suggest the number of participants necessary. Due to various constraints on sample sizes, the achievement of statistical significance within certain parameters may not be realistic, but where it is possible, the sample should be sized to provide results with a 90% confidence, plus or minus 10% precision, unless specified otherwise in the Scope of Work. Should this not be attainable, the proposal should suggest an appropriate sample size and estimate the associated level of confidence and precision. Any sampling techniques will need to ensure appropriate representation from individual PA service territories. The PAs and EEAC Consultants will have final approval of the sample selection process.

6.4 Preparation of initial and final draft reports of the 2010 tasks, and a final report as described in 5A.4.2.

6.5 Draft and final annual report of all evaluation activities and any ad-hoc work performed during the preceding year. The final 2010 Annual Summary Report will be due by March 1, 2011.

6.6 In person presentation of all activities in the Annual Summary Report to PAs, EEAC consultants and other interested parties.
Appendices

Appendix A – EEAC Resolution on Evaluation, Measurement, and Verification

Document included in RFP Package as “Appendix A – EMV” in pdf format.

Appendix B – Global Process and Marketing Evaluation Tentative Scope and Focus

Document included in RFP Package as “Appendix B - Global Process” in pdf format.


Document included in RFP Package as “Appendix C – National Grid RFP 241-09” in pdf format.
REQUEST FOR PROPOSAL – RFP #1889

Massachusetts Energy Efficiency Programs

Evaluation Tasks in the Residential Retail Products Areas

2010 - 2012

January 29, 2010

Response Deadline:
March 3, 2010 by Noon EST

PLEASE NOTE: The information contained within this Request for Proposal (RFP) is confidential and proprietary to the Sponsors, and is to be used by the recipient solely for the purpose of responding to this RFP.
# TABLE OF CONTENTS

1.0 General Information

1.1 NSTAR
1.2 Program Administrators and Sponsors
1.3 Unauthorized Disclosure
1.4 Definitions
1.5 Sponsors’ Discretion
1.6 Bid Evaluation
1.7 Discrepancies or Omissions
1.8 Payments for Services and Invoicing
1.9 Pre-Bid Conference Call
1.10 RFP Recipient List

2.0 Specifications

2.1 Statement of Work
2.2 Terms and Conditions
2.3 Safety, Environmental, and Background Check Requirements

3.0 Communications and Form of Response

3.1 **Volume I: Commercial Proposal**
   3.1.1 Commercial Exceptions
   3.1.2 Pricing
   3.1.3 Options and Alternates
   3.1.4 EEOC Compliance
   3.1.5 Insurance Certificate(s)
   3.1.6 Execution of Proposal by Officer of Supplier
   3.1.7 Vendor Information

3.2 **Volume II: Technical Proposal**
   3.2.1 Title Page
   3.2.2 Table of Contents
   3.2.3 Executive Summary
   3.2.4 Technical Requirements
   3.2.5 Examples of Experience
   3.2.6 References
   3.2.7 Statements of Qualifications
   3.2.8 Resumes
   3.2.9 Summary of Availability

4.0 Proposal Forms

4.1 Form A - Bid Receipt Acknowledgment Form
4.2 Form B - Supplier Bid Proposal Form (Cover Sheet)
4.3 Form C - Execution of Proposal by Officer of Supplier
4.4 From D - Project Cost Estimate Bid Form
January 29, 2010

IMPORTANT DATES - RFP #1889

RFP Emailed to Potential Bidders: January 29, 2010
Pre-Bid Conference Call: February 9, 2010 at 1pm - 2pm
Last Date for Questions: February 16, 2010
Responses to Questions: February 23, 2010
Proposals Due: March 2, 2010 by Noon EST
Supplier Selected: March 9, 2010
Contracts Signed with all Sponsors April 6, 2010
Kick-Off Meeting: TBD, as soon as possible after signing

Correspondence

During the Request for Proposal, up to and including contract award, all correspondence must be directed via email to:

Patricia.Latimer@NSTAR.com

Should it be determined that any vendor is conversing with or directing questions related to this RFP to anyone other than the individual identified above, then at the discretion of the Program Administrators and Sponsors that vendor may be immediately disqualified from bidding on this project.
1.0 GENERAL INFORMATION

1.1 Background

Headquartered in Boston, MA, NSTAR provides regulated electric and gas utility services and is also engaged in telecommunications and other non-regulated activities. NSTAR, through its subsidiaries and operating companies, Boston Edison Company, Cambridge Electric Company, Commonwealth Electric Light Company and NSTAR Gas Company, serves approximately 1.3 million customers throughout Massachusetts, including approximately 1,040,000 electric customers in 81 communities and 240,000 gas customers in 51 communities. The Operating Companies are supported through the NSTAR Electric & Gas Corporation (the Company).

NSTAR is pleased to present this Request for Proposal (RFP) for Evaluation Tasks in the Residential Retrofit & Low Income Areas on behalf of the Program Administrators and Sponsors of the Massachusetts Energy Efficiency Programs. In support of the Green Communities Act of 2008, this RFP is being solicited on behalf of seven Massachusetts utilities (the Sponsors). The goal of this RFP is to select one successful bidder to provide services to the Sponsors’ Massachusetts customers.

1.2 Program Administrators and Sponsors

This Request for Proposal has been issued by NSTAR on behalf of the Program Administrators (PAs) for the Massachusetts Energy Efficiency Programs in the Residential Retrofit & Low Income Areas. These PAs are comprised of representatives from the following electric and gas companies in the Commonwealth of Massachusetts. These companies are referred to herein as the Sponsors:

Bay State Gas (NiSource)
Berkshire Gas
Cape Light Compact
National Grid USA
New England Gas
NSTAR
Unutil/Fitchburg Gas & Electric
Western Massachusetts Electric

1.3 Unauthorized Disclosure

The information contained within this Request for Proposal (RFP) is confidential and proprietary to the Sponsors, and is to be used by the recipient solely for the purpose of responding to this RFP. Additionally, the Sponsors consider any information provided to Bidders in the course of business to be privileged and confidential between Consultant and the Sponsors. This includes, but is not limited to, written data of any kind, business information, request for quotation, specifications, engineering data and any and all technologies and data either obtained or observed while supplying the commodity/service required by the contract. Unauthorized disclosure of information to third parties by Consultant may lead to cancellation of the contract, loss of future business opportunities and/or the effects of any other remedies which may be available to the Sponsors.

All material submitted, produced, data collected, reports, designs and documentation will become the exclusive property of the Sponsors at the end of the contract. The awarded
bidder may not share program materials, customer data, industry or program participant contact information, etc. unless explicitly authorized by each Sponsor to do so.

1.4 Definitions

Bidder shall mean those firms/vendors acting in the role of Supplier when responding with a Proposal to this RFP. Proposal shall mean the Bidder's formal response indicating their committed solutions that meet or exceed the requirements of the RFP. Subcontractors, or subs, can be defined as any Supplier under Contract or in the RFP response that are considered financially independent of the Bidder in any other business or accounting relationship.

This RFP does not constitute an offer by the Sponsors to enter into a contract, nor does any response to this RFP constitute an acceptance of an offer, nor does any response to this RFP bind the Sponsors in any way. This document shall not be construed as a request or authorization to perform work at the Sponsors' expense. Any work performed by a Bidder in connection with evaluating and responding to the RFP and, if selected, negotiating a definitive Agreement will be at the Bidder's own discretion and expense. This RFP does not represent a commitment to purchase or lease. The Sponsors reserve the right to reject any and all proposals at its absolute discretion. Submission of a bid constitutes acknowledgment that the Bidder has read and agrees to be bound by such terms. The information in this document will enable the recipient to formulate a proposal to meet the workload requirements as described in this RFP. The numbers, volumes, run rates, etc. provided in this RFP are based upon the most recent data available and should serve as estimates to Bidders for pricing and response purposes.

1.5 Sponsors' Discretion

The Sponsors are not responsible and will not reimburse Bidders for costs incurred to develop proposals.

NSTAR is issuing this RFP on behalf of the Sponsors who at their discretion may:

- Select a Proposal other than the lowest priced, if the Sponsors determine, at its sole and absolute discretion that the Sponsors interests will best be served by doing so.

- Seek clarification from any Bidder regarding Proposal information and may do so without notification to any other Bidder.

- Continue the review procedure until a Bidder is selected successfully or until the Sponsors choose to reject all Proposals.

- Accept any Proposal or alternate as submitted without negotiations.

- Select for negotiations only the overall best Proposal or negotiate all Proposals submitted which fall within a competitive range.

- Perform a complete financial review as well as an on-site investigation of any of the Bidders facilities to ensure it is capable of meeting the demands of Sponsors and the needs identified in this RFP.

- May not award any Contract(s) as a result of this RFP.

- Reserves the right to accept or reject any or all proposals received, or to cancel this RFP in part or in its entirety, if in doing so is in the best interests of the Sponsors.
1.6 Bid Evaluation

The PAs and their related personnel will confidentially review proposals. A cross-functional evaluation committee representing each of the Sponsors will rate all Proposals based on the evaluation criteria provided below and may reduce the number of Bidders being considered to a "short list" of finalists based upon this objective analysis. The Sponsors may elect to meet with finalists for interviews. After all responses have been thoroughly reviewed and negotiations completed with finalists, the Sponsors will award the Contract(s) to the Bidder(s) who offers the best overall value. The Sponsors reserves the right not to award any Contract(s) as a result of this RFP.

All bids will remain active for ninety (90) days, and no bid materials will be returned. Each proposal will be evaluated on technical and commercial merits. All proposals will be opened on or after the due date.

Proposals will be evaluated on the following criteria:

- **Cost** - both the total cost and whether overall proposal offers good value will be considered
- **Reasonableness of Approach** - does the proposal offer good creative solutions to the evaluation issues presented in the RFP
- **Dedicated Resources** - has the bidder shown that they have the resources to provide the services requested within the expected timeframe
- **Comprehension** - has the bidder shown that they understand the issues involved and have responded accordingly
- **Documentation Quality** - is the proposal itself clear, concise, and well written
- **Demonstrated Experience** - whether the bidder has demonstrated that their firm has the experience and expertise or the ability to provide subcontractors having the appropriate knowledge to perform the requested tasks

1.7 Discrepancies or Omissions

Should a Bidder find any ambiguity, discrepancy or omission in the RFP, or should the Bidder have any questions, the Bidder shall notify NSTAR via e-mail to Patricia.Latimer@NSTAR.com. Such information must be received no later than the "Last Date for Questions", which is indicated on Page 3 of this RFP, to afford NSTAR the opportunity to send any instructions or interpretations to other Bidders who have received an Invitation to Bid. The Sponsors will not be responsible for any oral instructions or interpretations.

1.8 Payment for Services and Invoicing

No up-front payments will be made to vendors. Invoices shall be submitted to each Sponsor on a monthly basis.

1.9 Pre-Bid Conference Call

A pre-bid conference call will be held on day and time indicated on Page 3 of this RFP. The call is scheduled for one hour. At that time, a brief program overview will be provided, followed by questions and answers. Information shared on the call will be emailed to all prospective bidders within a week. Dial in number is National Grid’s conference line: 866-561-4997 access# 9674198. **Please dial into the conference call line at the designated time.**
1.10 RFP Recipient List

Attached is a list of parties to whom this RFP bid package is being sent. Normally, such lists are not made available to potential bidders; however, due to the scope of services requested, timeline for responses, and in anticipation of vendors contemplating collaborative bids, this list is provided to facilitate the RFP process in a fair and efficient manner. This list is to be used only for such purpose, and is not for any other use or solicitation. The list is to be considered and treated as confidential information by the recipient.

2.0 SPECIFICATIONS

2.1 Statement of Work

The purpose of this RFP is to seek a qualified bidder or a team of bidders to complete an array of evaluation activities as defined in the attached statement of work over a three year period. The winning bidder will be the sole evaluation contractor for this research area. Activities will include an assortment of evaluation work including, but not limited to such things as market assessment, baseline studies, process evaluation, and development of incremental cost information. The winning bidder will be expected to handle all evaluation issues and either team with or subcontract out work where specific skill sets are required that the evaluation contractor may not possess. A copy of the Statement of Work and related appendices are provided below.

2.2 Terms and Conditions

The successful Consultant’s services shall be provided in accordance with each Sponsors’ terms and conditions, which are provided below. Any exceptions to these requirements must be clearly stated in the Bidder’s RFP response.

Any exceptions submitted by a Bidder does not constitute acceptance by any of the Sponsors. Exceptions will be negotiated and agreed to by each Sponsor and will be part of an exclusive contract between the parties, which will be independent of any other associated contract with another Sponsoring organization.

Bay State Gas (NiSource)
Berkshire Gas
Cape Light Compact
National Grid USA
New England Gas
NSTAR
Unitil/Fitchburg Gas & Electric
Western Massachusetts Electric
• Bay State Gas - NiSource Corporate Services Company General Services Agreement and Data Security Requirements

• Berkshire Gas – Berkshire Gas’ requires Suppliers’ adherence to National Grid’s T&Cs for Consulting Services

• Cape Light Compact Terms & Conditions.

• National Grid Terms & Conditions for Consulting Services

• New England Gas Consultant Terms & Conditions

• NSTAR’s Terms & Conditions and Insurance Requirements

• Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions

• Unitil Terms & Conditions

2.3 Safety, Environmental, and Background Check Requirements

The successful Consultant’s services shall be provided in accordance with each Sponsors’ safety, environmental, and background check requirements. Copies of National Grid’s requirements for these areas are attached. Any exceptions must be clearly stated in the Bidder’s RFP response.
3.0 COMMUNICATIONS AND FORM OF RESPONSE

During the RFP process, all questions must be submitted via e-mail and addressed to Patricia Latimer at Patricia.Latimer@NSTAR.com, on or before the “Last Date for Questions” as specified on Page 3 of this RFP. Answers to Bidder’s inquiries will be distributed to all Bidders via email no later than the “Responses to Questions” date provided on Page 3 of this RFP. In order to ensure fairness, until the time an award is made, Bidders shall have no direct communication regarding this RFP with any of the Program Administrators or any other personnel within the Sponsors’ organization. After the decision to award is announced, the successful Bidder may contact the Program Administrators and work with each Sponsors’ Procurement contact to provide certificates of insurance and sign final contract documents. Failure to comply with these communications guidelines may disqualify the Bidder from further consideration.

Supplier's proposal MUST include two SEPARATE VOLUMES. Volume I must address all commercial requirements, while Volume II must address all technical requirements. Volumes I and II shall not be bound or otherwise joined together. VOLUME II MUST NOT CONTAIN ANY COST OR PRICE INFORMATION. The organization of the proposal MUST conform to the organization enumerated in Form B, SUPPLIER BID PROPOSAL FORM, and as described in this section. The first page of the Supplier proposal MUST be Form B-Supplier Bid Proposal Form (cover sheet).

This RFP has been sent in electronic format to facilitate the completion of proposals. A complete proposal must be sent via e-mail to Patricia.Latimer@NSTAR.com, and an original hardcopy, electronic copy on CD, and 4 (four) hardcopies either hand delivered or sent via commercial carrier for receipt NO LATER THAN the “Proposals Due” date and time specified on Page 3 of this RFP to the following address:

NSTAR Electric & Gas Corporation
Attn: Patricia Latimer, Principal Contracts Agent
One NSTAR Way, SE-250
Westwood, MA 02090-9230
Phone: 781-441-8841

PLEASE NOTE THAT PROPOSALS MAY NOT BE SUBMITTED VIA FAX.
3.1 Volume I: Commercial Proposal

3.1.1 Commercial Exceptions: This section of the proposal MUST state clearly any exceptions which are being taken to the commercial requirements of this RFP, for example terms and conditions, insurance requirements, etc. Exceptions must state what the exception is, the reason for the exception and proposed alternatives, and be organized sequentially in accordance with the organization of the RFP. Commercial exceptions MUST be clearly defined only in this section of the proposal. Bidder’s preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Bidder’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP, unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

3.1.2 Pricing: The Sponsors seek to procure Services at the most cost effective rates possible. Pricing for the first 12 months is to be provided on the Project Cost Estimate Bid Form D, which is included at the end of this document. Labor costs should be broken out by task and personnel type (e.g., project management, supervision, clerical support, analyst, etc.). Bidders shall include personnel names, who will be working on the project, that fall into the various labor categories, if known. Estimates of miscellaneous additional costs should be indicated. Since the initial scope of work will only cover the first year, please provide a billing rate for years 2 and 3. The Sponsors will enter into individual negotiations each subsequent year regarding any potential price increases, which must be justified by the Contractor. The PAs will determine the allocation of total costs to individual PA’s after a Contractor has been selected. (Please note that the selected contractor will be required to contract with and invoice each of the PAs separately.)

All responses to this RFP, whether or not in compliance with the terms of this RFP, shall be considered unconditional offers by the Bidder, which, if accepted, shall create a binding obligation upon the Bidder.

Bidders should identify if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered or not. Discounts will be factored into the evaluation of the bids and their acceptance is at the Sponsors’ option.

3.1.3 Options and Alternates: This section of the proposal would include options or alternates (commercial considerations) which the Sponsors could consider. Suppliers are encouraged to submit alternate proposals in addition to the requirements defined in Section 2.1, Statement of Work, if such alternate proposals will result in lower price, higher reliability, or improved schedule.

3.1.4 EEOC Compliance: If not previously submitted, please provide a statement that your company is in compliance with EEOC requirements.

3.1.5 Insurance Certificate(s): Include with your Bid a Certificate(s) of Insurance evidencing compliance with at least the minimum levels of insurance required in Section 6.0 Insurance of NSTAR’s Consulting Services Agreement, which is contained in NSTAR’s requirements document in Section 2.2 above. If you are awarded the work, you will be required to submit certificates to each Sponsor identifying them as an additional insured and complying with their insurance levels.
3.1.6 **Execution of Proposal By officer of Supplier:** Form C MUST be completed and executed by an Officer of the Supplier.

3.1.7 **Vendor Information:** Bidders shall provide:
- Federal TaxID number
- Business type, i.e., sole proprietorship, partnership, joint venture, etc. and state of residency
- Number of employees
- Financial statements for the last 24 months

This information is not considered part of the 30 page response limitation and should be provided as a separate tab in Volume 1 of the Commercial Proposal.

3.2 **Volume II - Technical Proposal**

With the exception of the staff resumes and sample reports, Volume II **must not exceed thirty pages.**

The Supplier's technical proposal, addressing all technical requirements MUST be included in this section. **THIS VOLUME MAY NOT INCLUDE ANY COST OR PRICING INFORMATION.** In addition to the Supplier's technical proposal, the following items must be addressed, in the order listed:

3.2.1 **Title Page:** This section of the proposal should include a title page, which identifies the RFP Title, vendor’s name and the volume.

3.2.2 **Table of Contents:** The vendor’s proposal should include a Table of Contents, which lists the titles and page numbers for each major topic and sub-topic.

3.2.3 **Executive Summary:** This section should include a summary of the key points and highlights of the vendor’s response.

3.2.4 **Technical Requirements:** All detailed information in the proposals should cover the first 12 months of evaluation activities (**May 2010 through May 2011**). A detailed description of the complete scope of work including a schedule, flowchart and organizational management structure for the years 2010 – 2012. Years 2011 and 2012 need not be as detailed as 2010. This should not be a re-statement of the scope described here, but a carefully thought out plan of how, when, and where the various tasks will take place using example questions wherever possible. This plan should give a reasonably detailed description of how the contractor plans to complete each of the tasks described in the scope of work with a concentration on the CFL net-to-gross study. For any survey work, a sample of questions and how they would be analyzed should be included. No more than half a page to a page for each task should be dedicated to this effort, exclusive of any additional pages required to detail some of the questions and how they would be analyzed. For Years 2 and 3, the bidder should provide a strategic discussion that explains in a broad sense how the evaluation activities will be approached.

Bidders should also include a description of all assumptions used to develop their response to this RFP.

3.2.5 **Example of Experience:** Provide one representative example of experience and documentation skills, such as a report.
3.2.6 References: Provide names, affiliations, and telephone numbers of at least two individuals or organizations for which similar services have been provided for Prime Contractor and all sub-contractors on team. The Massachusetts PAs and EEAC Consultants reserve the right to contact these individuals to ascertain the quality and timeliness of previous performance.

3.2.7 Statements of Qualifications: Statements of qualifications that detail the bidder’s experience and ability to provide multi-year evaluation support should be included. The bidder’s statements should emphasize their expertise and knowledge with regards to market assessment and evaluation of market effects, their ability to design and carry out extensive interviewing and survey analysis, as well as their technical expertise and qualifications to undertake technical studies dealing in the area of residential retail products, notably residential lighting and applicant turn-in programs.

3.2.8 Resumes: Provide details of qualifications of personnel who will be utilized and copies of resumes as requested in the Statement of Work here.

3.2.9 Summary of Availability: For each professional staff member considered available and qualified to work on this contract, please state the maximum number of labor hours the bidder can provide assuming these hours are contractually committed to specific activities by April 15, 2010. Please provide this information on availability both for the periods June 1 – December 31 2010, and January 1 – June 30 2011.

4.0 PROPOSAL FORMS

The following forms must be completed and submitted with Supplier Proposal.

4.1 Form A - Bid Receipt Acknowledgment Form

This form is used by the Supplier to confirm to Company receipt of the bid package and intent to bid. This form should be completed upon receipt of the RFP and returned as soon as possible via email (Patricia.Latimer@NSTAR.com).

4.2 Form B - Supplier Bid Proposal Form (Cover Sheet)

Form B - Supplier Bid Proposal Form (Cover Sheet) MUST be the first page of the Supplier proposal.

4.3 Form C - Execution of Proposal by Officer of Supplier

The Supplier MUST complete this form and include it in Volume I of the proposal. The form is used to:
- Indicate how long the proposal is valid.
- Confirm in writing that Supplier's proposal represents a complete offering and includes all exceptions to the RFP.

4.4 Form D - Project Cost Estimate Bid Form

Pricing must be provided on the Project Cost Estimate Bid Form and included in Volume I – Commercial Response only.
FORM A – BID RECEIPT ACKNOWLEDGMENT FORM

RFP # 1889 - Evaluation Tasks in the Residential Retail Products Areas

COMPLETE AND RETURN UPON RECEIPT TO:

Patricia.Latimer@NSTAR.com

The ________________________________ Company hereby:

1. ___ I acknowledge receipt of the above listed Bid Documents.

And

2. ___ My proposal will be submitted on the required due date.
   ___ I choose to not bid, as fully explained in letter to be transmitted under separate cover.

Our Proposal shall list the following companies as joint venture partners or subcontractors:

______________________________________

Please address future inquiries on this work (if different from original mailing) to:

Name: __________________________________________________________

Company: _______________________________________________________

Address: _________________________________________________________

Phone: ______________ Fax: ________________

by: ____________________________________________________________

(Signature)

Title: __________________________________________________________

Date: __________________________________________________________
FORM B - SUPPLIER BID PROPOSAL FORM

RFP #1889 - Evaluation Tasks in the Residential Retail Products Areas

(COVER SHEET)

NAME OF SUPPLIER: ________________________________

ADDRESS: _______________________________________

NAME OF AUTHORIZED REPRESENTATIVE: ________________

TITLE OF ABOVE: __________________________________

PHONE NUMBER OF THE ABOVE: _______________________

Direction: This sheet must be the first page of all submittals. The remainder of the proposal must follow the following format with no exceptions. Additional sections may be added at the Supplier's discretion. Volumes I & II must be separate documents.

<table>
<thead>
<tr>
<th>Volume I: Commercial Proposal</th>
<th>Volume II: Technical Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE OF CONTENTS OF VOLUME I</td>
<td>TABLE OF CONTENTS OF VOLUME II</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>1.0</td>
<td>Commercial Exceptions</td>
</tr>
<tr>
<td>2.0</td>
<td>Pricing</td>
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<tr>
<td>3.0</td>
<td>Options and Alternates</td>
</tr>
<tr>
<td>4.0</td>
<td>EEOC Compliance Verification</td>
</tr>
<tr>
<td>5.0</td>
<td>Insurance Certificate(s)</td>
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<tr>
<td>6.0</td>
<td>Execution of Proposal by Officer of Supplier</td>
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<tr>
<td>7.0</td>
<td>Vendor Financial Information</td>
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</table>

Proposal Prepared by  (Signed): __________________________

(Typed): __________________________

Title: __________________________

Date: __________________________
FORM C - EXECUTION OF PROPOSAL BY OFFICER OF SUPPLIER

RFP #1889 - Evaluation Tasks in the Residential Retail Products Areas

Supplier represents that this proposal is its complete offering and includes all exceptions to this RFP. Supplier agrees that this proposal will be valid for a minimum period of 90 days from date of submittal.

__________________________________________
Supplier

By:

__________________________________________
(Signature)

__________________________________________
(Name)

__________________________________________, a duly authorized representative of the Supplier

__________________________________________
(Date)
FORM D - Project Cost Estimate Bid Form
REQUEST FOR PROPOSALS (RFP)

STATEMENT OF WORK

EVALUATION TASKS FOR MASSACHUSETTS ENERGY EFFICIENCY
IN THE
RESIDENTIAL RETAIL PRODUCTS AREAS
2010 – 2012

The Massachusetts Program Administrators (PAs) for the Massachusetts Energy Efficiency programs in the Residential Retail Products area request proposals to perform various evaluation tasks addressing the state of Massachusetts, as described in this Request for Proposals. The PAs include Bay State Gas, Berkshire Gas, Cape Light Compact, New England Gas, National Grid (Electric & Gas), NSTAR Electric and Gas Corporation, Western Massachusetts Electric, and Unitil/Fitchburg Gas & Electric. This RFP covers program years 2010 through 2012 and all programs and pilots that are administered within the Residential Retail Products area. This program consists of the Energy Star Lighting and Energy Star Appliances and Products as well as any other Residential Retail Products programs that may be developed over the three year period. In order to streamline processes, maximize retailer and manufacture relationships and minimize vendor costs, these two Energy Star programs are being administered jointly.

1.0 BACKGROUND

1.1 MASSACHUSETTS EVALUATION FRAMEWORK

On September 8, 2009, the Massachusetts Energy Efficiency Advisory Council (EEAC or Council) unanimously approved a resolution developed collaboratively by the Program Administrators (PAs) and the EEAC Consultants, setting forth a new administrative framework for the performance of Evaluation, Measurement and Verification (EM&V) in Massachusetts. The full Resolution is presented verbatim in Appendix A; the following is a summary of the Resolution, its effects, and its relevance to the current RFP.

Under the Resolution, the EEAC will assume an oversight role over the EM&V activities of the PAs to ensure the objectivity and independence of those activities, and the perception of such, and to help ensure consistency, timeliness, and credibility. While the PAs and EEAC Consultants (acting on behalf of the EEAC) will continue to work diligently to reach a consensus on evaluation issues, where there are areas of difference that may arise that cannot be resolved through consensus during the on-going interactive process between the EEAC Consultant and the PA evaluation staff, authority for decision-making will reside with the EEAC or its Designee. This arrangement is subject to a system of appeals in the event of any disputes that cannot be resolved collaboratively.

The Resolution also restructures EM&V in Massachusetts so that most studies are to be performed at a statewide rather than a PA-specific level. It specifies that the range of
evaluation activities be divided into 5 to 7 semi-permanent statewide Research Areas, oriented primarily to specific target markets. Each Research Area is to have an assigned Study Manager from the PAs, an assigned EEAC Evaluation Consultant, and an independent evaluation contractor who conducts the studies under a long-term contract with the individual PA companies.

Consistent with the Resolution, the PAs and the EEAC Consultants subsequently developed a system of six statewide Research Areas, as follows:

1. **Residential Retrofit and Low Income.** This category includes residential cooling and heating equipment, residential heating and water heating, residential and low-income retrofit, weatherization, and most aspects of multi-family programs.

2. **Residential Retail Products.** This includes residential lighting and appliance programs.

3. **Residential New Construction.** This includes residential and low-income new construction and major renovations programs, as well as codes and standards and compliance efforts. This Research Area also includes baseline studies of construction practices for both single- and multi-family homes.

4. **Non-Residential Large Retrofit and New Construction.** This includes C&I new construction (small and large) and major renovation, as well as large C&I retrofit programs.

5. **Non-Residential Small Retrofit.** This includes the current C&I small retrofit, direct install programs. This category would also include any future programs that may target small non-residential customers.

6. **Special and Cross-Sector Studies.** This includes those studies that do not fit readily into any of the five market-oriented Research Areas above, as well as those studies that are cross-sector in nature, including: cross-sector free ridership and spillover studies; non-energy benefits; behavioral programs; community-based pilots; and marketing, public education, and outreach activities.

Massachusetts’ evaluation planning and implementation schedule calls for selecting contractors, and finalizing contracts, for all six Research Areas by April 15, 2010. Evaluation activities under each contract are to be conducted subject to the terms of the EEAC Resolution. *The purpose of this RFP is to select an evaluation contractor for the second Research Area, Residential Retail Products.*

### 1.2 RESIDENTIAL RETAIL PRODUCTS BACKGROUND

Residential Retail Products program in Massachusetts began in 1998 with The Energy Star Lighting program and the Energy Star Appliances and Products program. Both
programs were sponsored by a consortium of New England electric utilities. Initially, the Energy Star Lighting program focused on retail sales of energy efficient lighting through in-store coupons as well as a mail order channel. Over the years, the program evolved to utilize upstream incentives, which dramatically increased sales and lowered costs of products for the customer. Additionally, lighting technology has now extended beyond just the basic CFL spirals to more specialty products and SSL.

The Energy Star Appliances and Products program historically focused on major appliances such as refrigerators, clothes washers, room air conditioners, and dishwashers. In recent years electronic devices, additional appliances and other ancillary equipment have become increasingly significant drivers of energy use and require additional consideration.


With respect to the Residential Retail Products program, it is important that the selected Evaluation Contractor understand all of the key players involved. There are three main groups who may be involved in the evaluation activities; they are as follows:

The Program Administrators – This is the committee who manages the Residential Retail Products Program. It is made up of representatives from the sponsoring PAs (usually the program manager responsible for the implementation of the program).

Implementation Contractor – The contractor who implements the program in the field, i.e. interacts with the builders, manufacturers, general public and is responsible for all implementation and marketing activities.

The Energy Efficiency Advisory Council (EEAC) and its Consultants – The EEAC has been set up as an advisory group to oversee the creation, implementation, and evaluation of energy efficiency programs in Massachusetts.
2.0 OBJECTIVE

The purpose of this RFP is to seek a qualified bidder or a team of bidders to complete an assorted array of evaluation activities for the Massachusetts Residential Retail Products sector over a multi-year period. The winning bidder will be the sole evaluation contractor for the Residential Lighting and Residential Appliance research area. These activities will include an assortment of evaluation work including, but not limited to such things as market assessment, baseline studies, process evaluation, and development of incremental cost information. The winning bidder will be expected to handle all evaluation issues and to team with other firms where specific skill sets are required that the evaluation contractor may not possess.

This will be a multi-year effort covering program years 2010 through 2012. This contract will commence in Spring 2010 and terminate in Spring 2013. Some of the main initial areas of focus will be on the following areas.

- A new net-to-gross (NTG) impact study, potentially including a CFL saturation study to get more recent data
- As study to develop and verify applicable net-to-gross methods for specialty and hard-to-reach bulbs
- A process evaluation to assess changes and re-design efforts made to the lighting program;
- Research on various market characteristics, such as pricing, retailer stocking, and promotional practices
- Market research on appliance and consumer electronics categories
- Evaluation Planning
- Other Undetermined Evaluation Issues

Other areas of focus over the three year period may include the evaluation of appliance turn-in programs, an ARRA-funded appliance rebate program, and consumer electronics programs.

The table listed below is designed to give bidders an idea of evaluation activities the PAs are contemplating and an approximate timeline. Details of each project including both Scope and Timeline will be determined once an Evaluation Contractor is selected.

<table>
<thead>
<tr>
<th>PLANNED EVALUATION ACTIVITIES BY QUARTER</th>
<th>2010</th>
<th>2011</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
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<tr>
<td>NTG Impact Study - CFL</td>
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<td>NTG Impact Study - Specialty</td>
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<td>Process Evaluation - Lighting</td>
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<tr>
<td>Market Characteristics Study</td>
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Responsibilities of the Evaluation Contractor will include managing the various individual evaluation tasks, managing sub-contractors as necessary, collecting data, analyzing data, providing individual formal reports and presenting results to the Program Administrators for the various evaluation tasks, providing an annual report which summarizes the year’s evaluation activities, and assisting in and developing an annual evaluation plan in the last quarter of each year, covering the next program year.

3.0 SCOPE OF WORK

3.1 NTG IMPACT STUDY – SPIRAL CFL, HARD TO REACH & SPECIALTY

A Net-to-Gross (NTG) study for the Residential Retail Products program was last conducted in 2009 (see Appendix C for a draft copy of the report). Historically, the Energy Star Lighting program has accounted for approximately 65% of the residential sector kWh savings. In the past several years, with the introduction of the Negotiated Cooperative Program, the influx and sales of plain spiral CFLs in Massachusetts have grown such that 75% of homes have at least 1 CFL and approximately 20% of the sockets have CFL. A recent multi-state evaluation study of the current program design also suggests a high level of market transformation for the plain spiral CFLs in Massachusetts as well as other states across the country. Additionally, with the commencement of the Energy Independence Securities Act, which requires higher wattage incandescent lighting to have a maximum wattage per lumen, there is a belief that a further reduction in base savings will be likely. Studies from the past years have been highly variable in their NTG impact outcome. A new study is sought to develop a new NTG ratio for the 2010 and/or 2009 program periods to determine net savings from the PA sponsored programs considering the changing environment, technology and legislation.

The PAs would like the bidders to propose a process for the NTG study, consisting of a high level timeline, methodology and scope (all items would be worked out in detail with the winning bidder). With respect to timeline and process, the bidders should not limit themselves to the timelines listed above or the process described below, but rather propose a timeline and methodology that they feel would work the best. Keeping in mind the time and expense involved in a NTG study, the bidders should consider the other activities listed above and what information might be necessary and incorporate that into their proposal so as to make the most efficient use possible of time and resources.

3.1.1 NTG IMPACT STUDY DESCRIPTION

Currently the NTG study is slated for just Massachusetts, but there is interest in possibly joining an ongoing multi-state evaluation study effort. For purposes of this RFP just plan on Massachusetts, if we make a decision on joining the multi-
state study we will negotiate the specific terms at that time. The main purpose of the NTG study is to provide updated NTG ratios for determining the net savings from the Program Administrators’ sponsored programs. The results will be used in measuring savings for Program Administrator performance incentives.

For planning purposes, the Program Administrators’ and the EEAC Council have agreed on using settled NTG ratios of .3 (spirals), 0.8 (specialties) and 0.7 (hard to reach)\(^1\) for the 2010 program year. This approach is transitional and reflects the results from the current multi-state interim draft evaluation, being used for the 2009 program year, and the unique issues of a lighting program that is in transition. Because of this move toward category-specific NTG assumptions, it would be highly desirable for the study to derive separate NTG results for standard spirals, specialty bulbs, and hard-to-reach customers. Bidders are asked to discuss whether they believe this is technically feasible and to propose a specific approach if they believe it is.

Potential approaches to the analysis of residential lighting NTG ratios include, but are not limited to, quasi-experimental methods, multi-state modeling, self-reports from upstream actors, analysis of shipment data, and revealed and/or observed preference modeling. Bidders may propose multiple methods with triangulation of the results if they believe this is advisable. Bidders may also propose multiple alternative approaches to the NTG study if they believe multiple alternatives should be considered. However, each proposed alternative should include a specific cost proposal.

To the extent that preliminary data from this Massachusetts specific evaluation is made available prior to the end of July, it may be used to evaluate the 2009 program year as well.

### 3.1.2 OPTIONAL STUDY COMPONENTS

In addition to the NTG Impact Study, additional assessments may be required such as:

- CFL Saturation Study
- Research support to help refine the definition of hard to reach
- Market segmentation study for hard to reach customers
- Studies of other CFL impact factors such as operating hours, installation rate, and delta watts.

Bidders should not include any optional study component items in their proposed budgets. For the purpose of this RFP, only the NTG Impact Study should be reflected. However, Bidders should be prepared to provide this ad-hoc evaluation.

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\(^1\) Hard to reach customers are defined broadly as categories of customers that have not historically purchased CFLs in significant numbers. Efforts to develop a more specific definition of this term are in progress.
work should such requests be made. Please see Section 3.6 – Other Evaluation Work for more detail.

3.2 PROCESS EVALUATION

The direction for the Lighting program faces some unknowns in the upcoming three-year period. First, the per-unit savings may experience a decrease due to the net-to-gross ratios and how to evaluate lighting program savings. Second, federal lighting efficiency standards will begin to phase in starting in 2012. At this time it is unclear how industry will respond to this federal mandate. The standard may accelerate the adoption of CFLs for many applications, or industry may promote a less efficient technology such as infrared halogen. Finally, the proposed lighting program also assumes limited savings from SSL based on estimates of future product availability and price. However, this technology is evolving very rapidly and cost competitive screw-in replacement lamps may become readily available within the three year implementation timeframe.

For the three-year deployment, the Program Administrators will focus on:

- Expansion of the mix of product available in retail
- Increased focus on specialty products to reach “deeper” savings for each customer with more options for each socket
- Expansion of retailers and other channels for the sale and distribution of efficient lighting
- Continuous program offerings over longer horizon periods at retail to assure year-round product availability to consumers
- Innovative approaches to community and corporate events (including hard-to-reach communities)
- Phasing-in of qualified products for new technologies that require new entrants and implementation strategies

The Program Administrators expect that they will begin to modify their program design and implementation activities in the near term, so that they may address the changing residential lighting market and ensure that the program’s goals are achieved.

Currently 90% of bulb sales are from the plain spiral CFLs, any program redesign may have a large impact on the Program Administrators historical sales performance. The selected Evaluation Contractor will be responsible for assessing the changes and redesign efforts made to the lighting program. Since the program is currently in the process of redesign, the Program Administrators do not have enough detail to request a specific proposal at this time. Therefore, Bidders should not include this item in their proposed budgets. However, Bidders should be prepared to provide this ad-hoc evaluation work should such requests be made. Please see Section 3.6 – Other Evaluation Work for more detail.
3.3 PROCESS RELATED ISSUES

Outside of the Residential Retail Products research area the Massachusetts Program Administrators will be conducting a global process/market evaluation focused on customer and market responses to major new and changed program initiatives. This study has a date of having preliminary findings by **July 15, 2010**. Therefore, the selected Evaluation Contractor for the Residential Retail Products area may need to be prepared to have some preliminary information to feed into this process evaluation.

Bidders should not include these global process related items in their proposed budgets. However, Bidders should be prepared to provide this ad-hoc evaluation work should such requests be made. Please see Section 3.6 – Other Evaluation Work for more detail.

3.4 MARKET CHARACTERISTICS STUDY

Multiple marketing approaches are being used to increase general awareness among consumers of the benefits of using lighting products, appliances and consumer electronics promoted through the Residential Retail Products program. In addition to direct advertising targeting consumers, marketing campaigns and working with industry partners at all levels of the retail supply chain are also being employed. Specific marketing activities targeting consumers include the following:

- Retail marketing and point-of-purchase displays
- Print and radio advertising
- School/educational fundraising outreach efforts
- Internet/mail order sales channel
- Coordination with the Integrated Massachusetts website
- Public relations

Work with industry partners at all levels of the retail supply chain includes the following:

- Leveraging marketing budgets through cooperative promotions with retailers, distributors, and manufacturers, including marketing promotions, cooperative advertising, and special events at retail stores and in communities
- Training and supporting retail sales staffs so they are able to educate consumers about the benefits of using Energy Star qualified products and to help them choose the best products to meet their particular needs

The selected Evaluation Contractor will be responsible for conducting research and producing studies on market characteristics, such as pricing, retailer stocking, and promotional practices. Since many Residential Retail Products programs are currently in the process of redesign, the Program Administrators do not have enough detail to request a specific proposal at this time. Therefore, Bidders should not include this item in their proposed budgets. However, to the extent that market characteristics research is needed to support the bidder’s proposed approach to the NTG study, that should be highlighted and the costs should be included in the cost proposal for the NTG study. Furthermore,
Bidders should be prepared to provide ad-hoc market characteristics evaluation work for other areas of the Residential Retail Products program should such requests be made. Please see Section 3.6 – Other Evaluation Work for more detail.

3.5 APPLIANCE MARKET RESEARCH AND EVALUATION

The ongoing collection of data on overall market conditions, product availability, market share, and pricing keeps Program Administrators up-to-date on changes in the residential appliances and consumer electronics market. That awareness, in turn, enables Program Administrators to adapt program offerings as needed to maintain momentum in increasing the market share of energy-efficient products.

The winning bidder will be responsible for market research on appliance categories.

3.5.1 APPLIANCE TURN-IN PROGRAM

The Appliance Turn-in Program started as a pilot refrigerator/freezer recycling program in one of the Program Administrator territory from June through December 2009. The program specifically targeted secondary refrigerators/freezers only. Customers were given $50.00 for recycling their old secondary fridge. This was not a one-for-one program, where a customer was granted $50.00 for replacing an old fridge with a new efficient one. Due to the success of the program, all Massachusetts Program Administrators are implementing this appliance-turn in model starting in early 2010 through program year 2012.

Bidders should not include this assessment in their proposed budgets. However, Bidders should be prepared to provide this evaluation. Furthermore, Bidders are asked to discuss methodology and evaluation approaches that may be employed for assessing appliance turn-in programs. Please include your qualifications and discuss any appliance turn-in evaluations done in the past.

3.5.2 OPTIONAL RESEARCH COMPONENTS

In addition to the Market Research on Appliances, additional assessments may be required such as:

- American Recovery & Reinvestment Act funded appliance rebate program

Bidders should not include any optional study component items in their proposed budgets. However, Bidders should be prepared to provide this ad-hoc evaluation work should such requests be made. Please see Section 3.6 – Other Evaluation Work for more detail.
3.6 OTHER EVALUATION WORK

In addition to the items mentioned above, different types of activities are conducted on an ad-hoc basis as program changes dictate. Bidders should be prepared to provide this ad-hoc evaluation work and in their proposals should demonstrate their ability to meet such requests. Bidders should not include a cost for this other evaluation work in their proposals.

4.0 GENERAL DELIVERABLES

Work is anticipated to commence by no later than April 15, 2010. In general, the selected evaluation contractor will be expected to deliver the following items during the course of this effort.

- Work plan (covering the first 12 months), due at the outset of the project. This is to include a schedule and an allocation of evaluation staff resources amongst the various evaluation tasks described under the Scope of Work. It should also detail how and when the evaluation contractor will make use of sub-contractors. In addition, the plan should indicate when and what reports will be issued.

- Draft Questionnaires and/or interview guides, on-site protocols, and/or other data collection instruments, one month before any scheduled surveying activities.

- Sample Selection
  - For any activity that requires a sample to be drawn, the contractor should suggest the number of participants necessary. Due to various constraints on sample sizes, the achievement of statistical significance within certain parameters may not be realistic, but where it is possible, the sample should be sized to provide results with a 90% confidence, plus or minus 10% precision. Should this not be attainable, the proposal should suggest an appropriate sample size and estimate the associated level of confidence and precision. Any sampling techniques will need to ensure appropriate representation from Massachusetts’s populations. Additional groups (municipal building inspectors, realtors, retailers, utility staff, etc.) whose input may have value to the evaluation results may be proposed for consideration. The PAs and EEAC Consultants will have final approval of the sample selection process.

- Formal report on each task or activity as it is completed (this may entail a first draft, final draft, and final report).

- Draft Annual Report, due January 31, 2011. This will be a report summarizing all of the evaluation activities completed by the evaluation contractor through the end of the previous calendar year. An Annual Report will be due for each program year of
evaluation activities.

- Final Annual Report, due upon completion of each calendar year’s evaluation activities including all supporting documentation, due March 1, 2011.
  - The contractor will be required to present the study findings to members of the Program Administrators and EEAC Consultants, and respond to questions. In addition, an optional briefing session for outside interested parties may be required. The cost proposal should present the costs for these tasks separately.
Appendices

Appendix A – EEAC Resolution on Evaluation, Measurement, and Verification

Document included in RFP Package as “Appendix A – EMV” in pdf format.

Appendix B – Energy Star Lighting

Document included in RFP Package as “Appendix B – Energy Star Lighting” in pdf format.

Appendix C – Results of the MultiState CFL Modeling Effort

Document included in RFP Package as “Appendix C – Multi-State Modeling” in pdf format.

Appendix D – The Market for CFLs in Massachusetts

Document included in RFP Package as “Appendix D – Market for CFLs” in pdf format.
REQUEST FOR PROPOSAL – RFP #1888

Massachusetts Energy Efficiency Programs

Evaluation Tasks in the Residential Retrofit & Low Income Areas

2010 - 2012

January 29, 2010

Response Deadline:
March 3, 2010 by Noon EST

PLEASE NOTE: The information contained within this Request for Proposal (RFP) is confidential and proprietary to the Sponsors, and is to be used by the recipient solely for the purpose of responding to this RFP.
TABLE OF CONTENTS

1.0 General Information

1.1 NSTAR
1.2 Program Administrators and Sponsors
1.3 Unauthorized Disclosure
1.4 Definitions
1.5 Sponsors’ Discretion
1.6 Bid Evaluation
1.7 Discrepancies or Omissions
1.8 Payments for Services and Invoicing
1.9 Pre-Bid Conference Call
1.10 RFP Recipient List

2.0 Specifications

2.1 Statement of Work
2.2 Terms and Conditions
2.3 Safety, Environmental, and Background Check Requirements

3.0 Communications and Form of Response

3.1 Volume I: Commercial Proposal
   3.1.1 Commercial Exceptions
   3.1.2 Pricing
   3.1.3 Options and Alternates
   3.1.4 EEOC Compliance
   3.1.5 Insurance Certificate(s)
   3.1.6 Execution of Proposal by Officer of Supplier
   3.1.7 Vendor Information

3.2 Volume II: Technical Proposal
   3.2.1 Title Page
   3.2.2 Table of Contents
   3.2.3 Executive Summary
   3.2.4 Technical Requirements
   3.2.5 Examples of Experience
   3.2.6 References
   3.2.7 Statements of Qualifications
   3.2.8 Resumes
   3.2.9 Sample Reports

4.0 Proposal Forms

4.1 Form A - Bid Receipt Acknowledgment Form
4.2 Form B - Supplier Bid Proposal Form (Cover Sheet)
4.3 Form C - Execution of Proposal by Officer of Supplier
4.4 From D - Project Cost Estimate Bid Form
**IMPORTANT DATES - RFP #1888**

- **RFP Emailed to Potential Bidders:** January 29, 2010
- **Pre-Bid Conference Call:** February 10, 2010 at 1pm - 2pm
- **Last Date for Questions:** February 17, 2010
- **Responses to Questions:** February 24, 2010
- **Proposals Due:** March 3, 2010 by Noon EST
- **Supplier Selected:** March 10, 2010
- **Contracts Signed with all Sponsors**
- **Kick-Off Meeting:** TBD, as soon as possible after signing

**Correspondence**

During the Request for Proposal, up to and including contract award, all correspondence must be directed via email to:

Patricia.Latimer@NSTAR.com

Should it be determined that any vendor is conversing with or directing questions related to this RFP to anyone other than the individual identified above, then at the discretion of the Program Administrators and Sponsors that vendor may be immediately disqualified from bidding on this project.
1.0 GENERAL INFORMATION

1.1 Background

Headquartered in Boston, MA, NSTAR provides regulated electric and gas utility services and is also engaged in telecommunications and other non-regulated activities. NSTAR, through its subsidiaries and operating companies, Boston Edison Company, Cambridge Electric Company, Commonwealth Electric Light Company and NSTAR Gas Company, serves approximately 1.3 million customers throughout Massachusetts, including approximately 1,040,000 electric customers in 81 communities and 240,000 gas customers in 51 communities. The Operating Companies are supported through the NSTAR Electric & Gas Corporation (the Company).

NSTAR is pleased to present this Request for Proposal (RFP) for Evaluation Tasks in the Residential Retrofit & Low Income Areas on behalf of the Program Administrators and Sponsors of the Massachusetts Energy Efficiency Programs. In support of the Green Communities Act of 2008, this RFP is being solicited on behalf of seven Massachusetts utilities (the Sponsors). The goal of this RFP is to select one successful bidder to provide services to the Sponsors’ Massachusetts customers.

1.2 Program Administrators and Sponsors

This Request for Proposal has been issued by NSTAR on behalf of the Program Administrators (PAs) for the Massachusetts Energy Efficiency Programs in the Residential Retrofit & Low Income Areas. These PAs are comprised of representatives from the following electric and gas companies in the Commonwealth of Massachusetts. These companies are referred to herein as the Sponsors:

Bay State Gas (NiSource)
Berkshire Gas
Cape Light Compact
National Grid USA
New England Gas
NSTAR
Unitil/Fitchburg Gas & Electric
Western Massachusetts Electric

1.3 Unauthorized Disclosure

The information contained within this Request for Proposal (RFP) is confidential and proprietary to the Sponsors, and is to be used by the recipient solely for the purpose of responding to this RFP. Additionally, the Sponsors consider any information provided to Bidders in the course of business to be privileged and confidential between Consultant and the Sponsors. This includes, but is not limited to, written data of any kind, business information, request for quotation, specifications, engineering data and any and all technologies and data either obtained or observed while supplying the commodity/service required by the contract. Unauthorized disclosure of information to third parties by Consultant may lead to cancellation of the contract, loss of future business opportunities and/or the effects of any other remedies which may be available to the Sponsors.

All material submitted, produced, data collected, reports, designs and documentation will become the exclusive property of the Sponsors at the end of the contract. The awarded
bidder may not share program materials, customer data, industry or program participant contact information, etc. unless explicitly authorized by each Sponsor to do so.

1.4 Definitions

Bidder shall mean those firms/vendors acting in the role of Supplier when responding with a Proposal to this RFP. Proposal shall mean the Bidder's formal response indicating their committed solutions that meet or exceed the requirements of the RFP. Subcontractors, or subs, can be defined as any Supplier under Contract or in the RFP response that are considered financially independent of the Bidder in any other business or accounting relationship.

This RFP does not constitute an offer by the Sponsors to enter into a contract, nor does any response to this RFP constitute an acceptance of an offer, nor does any response to this RFP bind the Sponsors in any way. This document shall not be construed as a request or authorization to perform work at the Sponsors' expense. Any work performed by a Bidder in connection with evaluating and responding to the RFP and, if selected, negotiating a definitive Agreement will be at the Bidder's own discretion and expense. This RFP does not represent a commitment to purchase or lease. The Sponsors reserve the right to reject any and all proposals at its absolute discretion. Submission of a bid constitutes acknowledgment that the Bidder has read and agrees to be bound by such terms. The information in this document will enable the recipient to formulate a proposal to meet the workload requirements as described in this RFP. The numbers, volumes, run rates, etc. provided in this RFP are based upon the most recent data available and should serve as estimates to Bidders for pricing and response purposes.

1.5 Sponsors' Discretion

The Sponsors are not responsible and will not reimburse Bidders for costs incurred to develop proposals.

NSTAR is issuing this RFP on behalf of the Sponsors who at their discretion may:

- Select a Proposal other than the lowest priced, if the Sponsors determine, at its sole and absolute discretion that the Sponsors interests will best be served by doing so.

- Seek clarification from any Bidder regarding Proposal information and may do so without notification to any other Bidder.

- Continue the review procedure until a Bidder is selected successfully or until the Sponsors choose to reject all Proposals.

- Accept any Proposal or alternate as submitted without negotiations.

- Select for negotiations only the overall best Proposal or negotiate all Proposals submitted which fall within a competitive range.

- Perform a complete financial review as well as an on-site investigation of any of the Bidders facilities to ensure it is capable of meeting the demands of Sponsors and the needs identified in this RFP.

- May not award any Contract(s) as a result of this RFP.
1.6 Bid Evaluation

The PAs and their related personnel will confidentially review proposals. A cross-functional evaluation committee representing each of the Sponsors will rate all Proposals based on the evaluation criteria provided below and may reduce the number of Bidders being considered to a "short list" of finalists based upon this objective analysis. The Sponsors may elect to meet with finalists for interviews. After all responses have been thoroughly reviewed and negotiations completed with finalists, the Sponsors will award the Contract(s) to the Bidder(s) who offers the best overall value. The Sponsors reserves the right not to award any Contract(s) as a result of this RFP.

All bids will remain active for ninety (90) days, and no bid materials will be returned. Each proposal will be evaluated on technical and commercial merits. All proposals will be opened on or after the due date.

Proposals will be evaluated on the following criteria:

- **Cost** - both the total cost and whether overall proposal offers good value will be considered
- **Reasonableness of Approach** - does the proposal offer good creative solutions to the evaluation issues presented in the RFP
- **Dedicated Resources** - has the bidder shown that they have the resources to provide the services requested within the expected timeframe
- **Comprehension** - has the bidder shown that they understand the issues involved and have responded accordingly
- **Documentation Quality** - is the proposal itself clear, concise, and well written
- **Demonstrated Experience** - whether the bidder has demonstrated that their firm has the experience and expertise or the ability to provide subcontractors having the appropriate knowledge to perform the requested tasks

1.7 Discrepancies or Omissions

Should a Bidder find any ambiguity, discrepancy or omission in the RFP, or should the Bidder have any questions, the Bidder shall notify NSTAR via e-mail to Patricia.Latimer@NSTAR.com. Such information must be received no later than the “Last Date for Questions”, which is indicated on Page 3 of this RFP, to afford NSTAR the opportunity to send any instructions or interpretations to other Bidders who have received an Invitation to Bid. The Sponsors will not be responsible for any oral instructions or interpretations.

1.8 Payment for Services and Invoicing

No up-front payments will be made to vendors. Invoices shall be submitted to each Sponsor on a monthly basis.

1.9 Pre-Bid Conference Call

A pre-bid conference call will be held on day and time indicated on Page 3 of this RFP. The call is scheduled for one hour. At that time, a brief program overview will be
provided, followed by questions and answers. Information shared on the call will be emailed to all prospective bidders within a week. Dial in number is NationalGrid’s conference line: 866-561-4997 access# 9674198. **Please dial into the conference call line at the designated time.**

1.10 **RFP Recipient List**

Attached is a list of parties to whom this RFP bid package is being sent. Normally, such lists are not made available to potential bidders; however, due to the scope of services requested, timeline for responses, and in anticipation of vendors contemplating collaborative bids, this list is provided to facilitate the RFP process in a fair and efficient manner. This list is to be used only for such purpose, and is not for any other use or solicitation. The list is to be considered and treated as confidential information by the recipient.

**RFP Recipient List**

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2.0 **SPECIFICATIONS**

2.1 **Statement of Work**

The purpose of this RFP is to seek a qualified bidder or a team of bidders to complete an array of evaluation activities as defined in the attached statement of work over a three year period. The winning bidder will be the sole evaluation contractor for this research area. Activities will include, but not be limited to, market assessment and segmentation, impact and process evaluation, electric and gas measure integration assistance, and evaluation of new statewide incentive and financing models. The winning bidder will be expected to handle all evaluation issues and either team with or subcontract out work where specific skill sets are required that the evaluation contractor may not possess. A copy of the Statement of Work and related appendices are provided below.

![Resid Retrofit and Low Income SOW](#)  
![Appendix A - EMV](#)  
![Appendix B - Deep Retrofit](#)  
![Appendix C - Global Process](#)

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2.2 **Terms and Conditions**

The successful Consultant’s services shall be provided in accordance with each Sponsors’ terms and conditions, which are provided below. Any exceptions to these requirements must be clearly stated in the Bidder’s RFP response.

Any exceptions submitted by a Bidder does not constitute acceptance by any of the Sponsors. Exceptions will be negotiated and agreed to by each Sponsor and will be part of an exclusive contract between the parties, which will be independent of any other associated contract with another Sponsoring organization.

Bay State Gas (NiSource)  
Berkshire Gas
Cape Light Compact
National Grid USA
New England Gas
NSTAR
Unitil/Fitchburg Gas & Electric
Western Massachusetts Electric

• Bay State Gas - NiSource Corporate Services Company General Services Agreement and Data Security Requirements

• Berkshire Gas – Berkshire Gas’ requires Suppliers’ adherence to National Grid’s T&Cs for Consulting Services

• Cape Light Compact Terms & Conditions.

• National Grid Terms & Conditions for Consulting Services

• New England Gas Consultant Terms & Conditions

• NSTAR’s Terms & Conditions and Insurance Requirements

• Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions

• Unitil Terms & Conditions
2.3 Safety, Environmental, and Background Check Requirements

The successful Consultant’s services shall be provided in accordance with each Sponsors’ safety, environmental, and background check requirements. Copies of National Grid’s requirements for these areas are attached. Any exceptions must be clearly stated in the Bidder’s RFP response.

- National Grid’s Contractor Safety Requirements dated 8/1/08

- National Grid’s Contractor Environmental Requirements dated 2/29/08

- National Grid’s Employee Background Check Requirements dated 1/10/08

3.0 COMMUNICATIONS AND FORM OF RESPONSE

During the RFP process, all questions must be submitted via e-mail and addressed to Patricia Latimer at Patricia.Latimer@NSTAR.com, on or before the “Last Date for Questions” as specified on Page 3 of this RFP. Answers to Bidder’s inquiries will be distributed to all Bidders via email no later than the “Responses to Questions” date provided on Page 3 of this RFP. In order to ensure fairness, until the time an award is made, Bidders shall have no direct communication regarding this RFP with any of the Program Administrators or any other personnel within the Sponsors’ organization. After the decision to award is announced, the successful Bidder may contact the Program Administrators and work with each Sponsors’ Procurement contact to provide certificates of insurance and sign final contract documents. Failure to comply with these communications guidelines may disqualify the Bidder from further consideration.

Supplier's proposal MUST include two SEPARATE VOLUMES. Volume I must address all commercial requirements, while Volume II must address all technical requirements. Volumes I and II shall not be bound or otherwise joined together. VOLUME II MUST NOT CONTAIN ANY COST OR PRICE INFORMATION. The organization of the proposal MUST conform to the organization enumerated in Form B, SUPPLIER BID PROPOSAL FORM, and as described in this section. The first page of the Supplier proposal MUST be Form B-Supplier Bid Proposal Form (cover sheet).

This RFP has been sent in electronic format to facilitate the completion of proposals. A complete proposal must be sent via e-mail to Patricia.Latimer@NSTAR.com, and an original hardcopy, electronic copy on CD, and 4 (four) hardcopies either hand delivered or sent via commercial
carrier for receipt NO LATER THAN the “Proposals Due” date and time specified on Page 3 of this RFP to the following address:

NSTAR Electric & Gas Corporation  
Attn: Patricia Latimer, Principal Contracts Agent  
One NSTAR Way, SE-250  
Westwood, MA 02090-9230  
Phone: 781-441-8841

PLEASE NOTE THAT PROPOSALS MAY NOT BE SUBMITTED VIA FAX UNDER ANY CIRCUMSTANCES.

3.1 Volume I: Commercial Proposal

3.1.1 Commercial Exceptions: This section of the proposal MUST state clearly any exceptions which are being taken to the commercial requirements of this RFP, for example terms and conditions, insurance requirements, etc. Exceptions must state what the exception is, the reason for the exception and proposed alternatives, and be organized sequentially in accordance with the organization of the RFP. Commercial exceptions MUST be clearly defined only in this section of the proposal. Bidder’s preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Bidder’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP, unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

3.1.2 Pricing: The Sponsors seek to procure Services at the most cost effective rates possible. Pricing for the first 12 months is to be provided on the Project Cost Estimate Bid Form D, which is included at the end of this document. Labor costs should be broken out by task and personnel type (e.g., project management, supervision, clerical support, analyst, etc.). Bidders shall include personnel names, who will be working on the project, that fall into the various labor categories, if known. Estimates of miscellaneous additional costs should be indicated. Since the initial scope of work will only cover the first year, please provide a billing rate for years 2 and 3. The Sponsors will enter into individual negotiations each subsequent year regarding any potential price increases, which must be justified by the Contractor. The PAs will determine the allocation of total costs to individual PA’s after a Contractor has been selected. (Please note that the selected contractor will be required to contract with and bill each of the PAs separately.)

All responses to this RFP, whether or not in compliance with the terms of this RFP, shall be considered unconditional offers by the Bidder, which, if accepted, shall create a binding obligation upon the Bidder.

Bidders should identify if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered or not. Discounts will be factored into the evaluation of the bids and their acceptance is at the Sponsors’ option.

3.1.3 Options and Alternates: This section of the proposal would include options or alternates (commercial considerations) which the Sponsors could consider. Suppliers are encouraged to submit alternate proposals in addition to the requirements defined in Section 2.1, Statement of Work, if such alternate proposals will result in lower price, higher reliability, or improved schedule.
3.1.4 **EEOC Compliance:** If not previously submitted, please provide a statement that your company is in compliance with EEOC requirements.

3.1.5 **Insurance Certificate(s):** Include with your Bid a Certificate(s) of Insurance evidencing compliance with at least the minimum levels of insurance required in Section 6.0 Insurance of NSTAR’s Consulting Services Agreement, which is contained in NSTAR’s requirements document in Section 2.2 above. If you are awarded the work, you will be required to submit certificates to each Sponsor identifying them as an additional insured and complying with their insurance levels.

3.1.6 **Execution of Proposal By officer of Supplier:** Form C MUST be completed and executed by an Officer of the Supplier.

3.1.7 **Vendor Information:** Bidders shall provide:
- Federal TaxID number
- Business type, i.e., sole proprietorship, partnership, joint venture, etc. and state of residency
- Number of employees
- Financial statements for the last 24 months

This information is not considered part of the 30 page response limitation and should be provided as a separate tab in Volume 1 of the Commercial Proposal.

3.2 **Volume II - Technical Proposal**

With the exception of the staff resumes and sample reports, Volume II must not exceed thirty pages.

The Supplier's technical proposal, addressing all technical requirements MUST be included in this section. **THIS VOLUME MAY NOT INCLUDE ANY COST OR PRICING INFORMATION.** In addition to the Supplier's technical proposal, the following items must be addressed, in the order listed:

3.2.1 **Title Page:** This section of the proposal should include a title page, which identifies the RFP Title, vendor’s name and the volume.

3.2.2 **Table of Contents:** The vendor’s proposal should include a Table of Contents, which lists the titles and page numbers for each major topic and sub-topic.

3.2.3 **Executive Summary:** This section should include a summary of the key points and highlights of the vendor’s response.

3.2.4 **Technical Requirements:** All detailed information in the proposals should cover the first 12 months of evaluation activities (May 2010 through May 2011). A detailed description of the complete scope of work including a schedule, flowchart and organizational management structure for the years 2010 – 2012. Years 2011 and 2012 need not be as detailed as 2010. This should not be a re-statement of the scope described here, but a carefully thought out plan of how, when, and where the various tasks will take place using example questions wherever possible. This plan should give a reasonably detailed description of how the contractor plans to complete each of the tasks.
described in the scope of work with a concentration on the baseline work, code and standards and code compliance, and major renovation. For any survey work, a sample of questions and how they would be analyzed should be included. No more than half a page to a page for each task should be dedicated to this effort, exclusive of any additional pages required to detail some of the questions and how they would be analyzed. For Years 2 and 3, the bidder should provide a strategic discussion that explains in a broad sense how the evaluation activities will be approached.

Bidders should also include a description of all assumptions used to develop their response to this RFP.

3.2.5 Example of Experience: Provide one representative example of experience and documentation skills, such as a report.

3.2.6 References: Provide names, affiliations, and telephone numbers of at least two individuals or organizations for which similar services have been provided for Prime Contractor and all sub-contractors on team. The Massachusetts PAs and EEAC Consultants reserve the right to contact these individuals to ascertain the quality and timeliness of previous performance.

3.2.7 Statements of Qualifications: Statements of qualifications that detail the bidder’s experience and ability to provide multi-year evaluation support should be included. The bidder’s statements should emphasize their expertise and knowledge with regards to market assessment and evaluation of market effects, their ability to design and carry out extensive interviewing and survey analysis, as well as their technical expertise and qualifications to undertake technical studies dealing in the area of building science.

3.2.8 Resumes: Provide details of qualifications of personnel who will be utilized and copies of resumes as requested in the Statement of Work here.

3.2.9 Sample Reports: Provide sample reports requested in the Statement of Work here.

4.0 PROPOSAL FORMS

The following forms must be completed and submitted with Supplier Proposal.

4.1 Form A - Bid Receipt Acknowledgment Form

This form is used by the Supplier to confirm to Company receipt of the bid package and intent to bid. This form should be completed upon receipt of the RFP and returned as soon as possible via email (Patricia.Latimer@NSTAR.com).

4.2 Form B - Supplier Bid Proposal Form (Cover Sheet)

Form B - Supplier Bid Proposal Form (Cover Sheet) MUST be the first page of the Supplier proposal.

4.3 Form C - Execution of Proposal by Officer of Supplier
The Supplier MUST complete this form and include it in Volume 1 of the proposal. The form is used to:
- Indicate how long the proposal is valid.
- Confirm in writing that Supplier's proposal represents a complete offering and includes all exceptions to the RFP.

4.4 Form D - Project Cost Estimate Bid Form

Pricing must be provided on the Project Cost Estimate Bid Form and included in Volume I – Commercial Response only.
FORM A – BID RECEIPT ACKNOWLEDGMENT FORM

RFP # 1888 - Evaluation Tasks in the Residential Retrofit & Low Income Areas

COMPLETE AND RETURN UPON RECEIPT TO:

Patricia.Latimer@NSTAR.com

The ____________________________ Company hereby:

1. __  I acknowledge receipt of the above listed Bid Documents.

__________________________________________________________________________

And

2. __  My proposal will be submitted on the required due date.
__  I choose to not bid, as fully explained in letter to be transmitted under separate cover.

Our Proposal shall list the following companies as joint venture partners or subcontractors:

__________________________________________________________________________

Please address future inquiries on this work (if different from original mailing) to:

Name: __________________________________________
Company: ________________________________________
Address: _________________________________________

Phone: _______________ Fax: _______________

by: ________________________________

(Signature)

Title: _______________________________

Date: _______________________________
FORM B - SUPPLIER BID PROPOSAL FORM

RFP #1888 - Evaluation Tasks in the Residential Retrofit & Low Income Areas

(COVER SHEET)

NAME OF SUPPLIER: ____________________________________________________________

ADDRESS: ___________________________________________________________________

______________________________________________________________________________

NAME OF AUTHORIZED REPRESENTATIVE: _________________________________________

TITLE OF ABOVE: __________________________________________________________________

PHONE NUMBER OF THE ABOVE: __________________________________________________

Direction: This sheet must be the first page of all submittals. The remainder of the proposal must follow the following format with no exceptions. Additional sections may be added at the Supplier's discretion. Volumes I & II must be separate documents.

<table>
<thead>
<tr>
<th>Volume I: Commercial Proposal</th>
<th>Volume II: Technical proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TABLE OF CONTENTS OF VOLUME I</strong></td>
<td><strong>TABLE OF CONTENTS OF VOLUME II</strong></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>1.0</td>
<td>Commercial Exceptions</td>
</tr>
<tr>
<td>2.0</td>
<td>Pricing</td>
</tr>
<tr>
<td>3.0</td>
<td>Options and Alternates</td>
</tr>
<tr>
<td>4.0</td>
<td>EEOC Compliance Verification</td>
</tr>
<tr>
<td>5.0</td>
<td>Insurance Certificate(s)</td>
</tr>
<tr>
<td>6.0</td>
<td>Execution of Proposal by Officer of Supplier</td>
</tr>
<tr>
<td>7.0</td>
<td>Vendor Information</td>
</tr>
<tr>
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Proposal Prepared by (Signed): __________________________________________

(Typed): __________________________________________

Title: __________________________________________

Date: __________________________________________
FORM C - EXECUTION OF PROPOSAL BY OFFICER OF SUPPLIER

RFP #1888 - Evaluation Tasks in the Residential Retrofit & Low Income Areas

Supplier represents that this proposal is its complete offering and includes all exceptions to this RFP. Supplier agrees that this proposal will be valid for a minimum period of 90 days from date of submittal.

________________________________________
Supplier

By:

________________________________________
(Signature)

________________________________________
(Name)

________________________________________, a duly authorized representative of the Supplier

________________________________________
(Date)
FORM D - Project Cost Estimate Bid Form

RFP #1888 - Project Cost Est Bid Form
REQUEST FOR PROPOSALS (RFP)

STATEMENT OF WORK

EVALUATION TASKS FOR MASSACHUSETTS ENERGY EFFICIENCY
IN THE
RESIDENTIAL RETROFIT AND LOW INCOME AREAS
2010 – 2012

The Massachusetts Program Administrators (PAs) for the Massachusetts Energy Efficiency programs in the Residential Retrofit and Low Income areas request proposals to perform various evaluation tasks addressing requirements of the Commonwealth of Massachusetts, as described herein. The PAs include Bay State Gas, Berkshire Gas, Cape Light Compact, New England Gas, National Grid (Electric & Gas), NSTAR Electric and Gas Corporation, Western Massachusetts Electric, and Unitil/Fitchburg Gas & Electric. This RFP covers the program years 2010 through 2012 and all programs and pilots that are administered within the Residential Retrofit and Low Income areas. The programs within these areas are the Residential Energy Star HVAC, Residential High Efficiency Heating, Water Heating & Controls, MassSAVE, Multi-family new construction and retrofit, Low income residential new construction, Low income 1 to 4 family retrofit and the Low Income multi-family retrofit programs.

1.0 BACKGROUND

MASSACHUSETTS EVALUATION FRAMEWORK

On September 8, 2009, the Massachusetts Energy Efficiency Advisory Council (EEAC or Council) unanimously approved a resolution developed collaboratively by the Program Administrators (PAs) and the EEAC Consultants. This resolution set forth a new administrative framework for the performance of Evaluation, Measurement and Verification (EM&V) in Massachusetts for Energy Efficiency Programs. The full Resolution is presented verbatim in Appendix A. Below is a summary of the Resolution, its effects, and its relevance to the current RFP.

Under the Resolution, the EEAC will assume an oversight role over the EM&V activities of the PAs to ensure the objectivity and independence of those activities, and the perception of such, and to help ensure consistency, timeliness, and credibility. While the PAs and EEAC Consultants (acting on behalf of the EEAC) will continue to work diligently to reach a consensus on evaluation issues, where there are areas of difference that may arise that cannot be resolved through consensus during the on-going interactive process between the EEAC Consultant and the PA evaluation staff, authority for decision-making will reside with the EEAC or its Designee. This arrangement is subject to a system of appeals in the event of any disputes that cannot be resolved collaboratively.

The Resolution also restructures EM&V in Massachusetts so that most studies are to be performed at a statewide rather than a PA-specific level. It specifies that the range of evaluation activities be divided into 5 to 7 semi-permanent statewide Research Areas, oriented primarily to
specific target markets. Each Research Area is to have an assigned Study Manager from the PAs, an assigned EEAC Evaluation Consultant, and an independent evaluation contractor who conducts the studies under a long-term contract with the individual PA companies.

Consistent with the Resolution, the PAs and the EEAC Consultants subsequently developed a system of six statewide Research Areas, as follows:

1. **Residential Retrofit and Low Income.** This category includes residential cooling and heating equipment, residential heating and water heating, residential and low-income retrofit, weatherization, and most aspects of multi-family programs.

2. **Residential Retail Products.** This includes residential lighting and appliance programs.

3. **Residential New Construction.** This includes residential and low-income new construction and major renovations programs, as well as codes and standards and compliance efforts. This Research Area also includes baseline studies of construction practices for both single- and multi-family homes.

4. **Non-Residential Large Retrofit and New Construction.** This includes C&I new construction (small and large) and major renovation, as well as large C&I retrofit programs.

5. **Non-Residential Small Retrofit.** This includes the current C&I small retrofit, direct install programs. This category would also include any future programs that may target small non-residential customers.

6. **Special and Cross-Sector Studies.** This includes those studies that do not fit readily into any of the five market-oriented Research Areas above, as well as those studies that are cross-sector in nature, including: cross-sector free ridership and spillover studies; non-energy benefits; behavioral programs; community-based pilots; and marketing, public education, and outreach activities.

Massachusetts’ evaluation planning and implementation schedule calls for selecting contractors, and finalizing contracts, for all six Research Areas by April 15, 2010. Evaluation activities under each contract are to be conducted subject to the terms of the EEAC Resolution. The purpose of this RFP is to select an evaluation contractor for the first Research Area, Residential Retrofit and Low Income.

**1.1 RESIDENTIAL RETROFIT AND LOW INCOME PROGRAM BACKGROUND**

There are several programs included within the Residential Retrofit and Low Income research area; they are the Residential Energy Star HVAC, Residential High Efficiency Heating, Water Heating & Controls Program, MassSAVE, Multi-family new construction and retrofit, Low income residential new construction, Low income 1 to 4 family retrofit and the Low Income multi-family retrofit programs. Background information for these programs are provided below.
1.1a Residential Energy Star HVAC

The Program Administrators introduced their rebate program for ENERGY STAR-labeled central air conditioning units, which is now called COOL SMART, on April 1, 2004. The heating component of the program, a joint electric and gas offering, was initially offered in 2003.

The ENERGY STAR HVAC Program is an initiative designed to increase consumer awareness and the market share of ENERGY STAR-labeled furnaces, central air conditioning units, and air source heat pumps and to promote quality cooling installations by HVAC technicians and contractors.

The primary objective of this program is to raise residential consumer awareness and market share of properly installed high-efficiency cooling equipment and systems, and to similarly increase the market share of ENERGY STAR-labeled warm-air furnaces equipped with an electronically commutated motor (“ECM”) or equivalent advanced furnace fan system. In addition, the program will place increased emphasis on cost effective savings opportunities from duct sealing, digital tune-ups, improved installation practices, maintenance, and specification of HVAC systems in coordination with gas Heating, Ventilation, and Air Conditioning (HVAC) programs. Where appropriate the COOL SMART program will work with GasNetworks on joint program offerings, marketing, and trade ally outreach and training.

During the period 2010-2012, the COOL SMART Program will be offered by all Program Administrators. (Please note that Western Massachusetts Electric, Unitil, and Cape Light Compact did not offer the program in 2007 through mid 2009). The heating component of the program will also be offered jointly in 2010-2012 by the Program Administrators.

With respect to the Energy Star HVAC Program there are several target markets:

- New systems in existing and new homes (new systems)
- Replacement systems in existing homes (new equipment/old systems), including the early retirement of existing equipment.
- Improvements in operational systems in existing homes (new equipment/old systems)

In addition the program targets the following market actors:

- Residential customers in the market to purchase HVAC equipment
- HVAC contractors and technicians
- Suppliers of HVAC equipment
- Manufacturers and distributors of HVAC equipment
- New-home builders and remodeling contractors
- Big-box stores

Program Marketing, highlighted by the regional program’s COOL SMART initiative, is designed to promote the purchase and proper installation of ENERGY STAR residential central air conditioning and heat pump systems at multiple levels. In addition, it will increasingly emphasize the importance of proper installation and sizing practices as well as the promotion of
duct sealing and enhanced air distribution system efficiency. The COOL SMART initiative will work with the GasNetworks’ High Efficiency Heating and Hot Water Program to develop and implement joint marketing activities.

The primary recommended cooling technology for the COOL SMART Program is high-efficiency residential central air conditioner equipment, including air source heat pump condensers that meet or exceed the prevailing ENERGY STAR qualifications.

The recommended minimum heating technology is a natural gas furnace with an AFUE of 92 percent or greater, equipped with an advanced ECM or equivalent energy-saving furnace fan (blower) motor.

The COOL Smart Program has conducted a pilot installation project to determine if furnace fan retrofits with Brushless Fan Motors (“BFM”) will produce sufficient savings to justify full implementation in 2010. The pilot proved that there are enough savings to justify full implementation of a measure.

1.1b Residential High Efficiency Heating, Water Heating & Controls Program

The Residential High Efficiency Heating, Water Heating, and Controls Program is designed to promote the installation in residential applications of high efficiency gas furnaces and hot water boilers, energy efficient steam boilers; energy efficient indirect, tankless on demand, and stand alone water heating equipment; programmable thermostats, and boiler reset controls. The program offers rebates for equipment in both new construction and the replacement/retrofit market. The program was initially offered in 1997.

Incentives and rebates are administered via the GasNetworks collaborative and coordinated with the electric heating, ventilation and air conditioning program (HVAC), Cool Smart. The objective of the program is to encourage consumers to install the most efficient gas heating technologies available when replacing older, less efficient equipment and when considering equipment in new construction. The program seeks to overcome market barriers and increase program awareness among consumers, plumbing/heating contractors, and home builders/developers, through rebates, incentives, education, and training opportunities.

In collaboration with the Cool Smart electric efficiency program, GasNetworks also offers a dual electric/natural gas rebate program for high-efficiency furnaces equipped with Electronically Commutated Motor (“ECM”) or equivalent advanced furnace fan systems.

The Residential High Efficiency Heating, Water Heating & Controls Program Targets several markets.

Residential Target Markets include:

- New Construction - Heating Equipment / Systems
- Existing Homes - Replacement of Existing Heating Equipment (new equipment/old systems)
The program targets these market segments:

- Residential Home Owners with natural gas heating equipment
- Home Designers and Architects
- Engineers
- Plumbing and HVAC Contractors and Technicians
- Suppliers of High Efficiency Heating equipment and related parts/accessories
- Manufacturers and Distributors of High Efficiency Heating equipment
- New Home Builders and Remodeling Contractors

The program is administered by each gas Program Administrator and coordinated regionally through GasNetworks collaborative. GasNetworks utilizes a third-party administrative contractor, secured through a competitive bid process, to administer the rebates to customers. This contractor is responsible for tracking and reporting program activity to gas Program Administrators.

The Program Administrators plan to take advantage of additional delivery mechanisms such as MassSAVE to promote high efficiency equipment installations as part of a comprehensive whole house approach to achieve broader and deeper energy savings. This scenario also supports seamless integration opportunities as well as the ability to develop “packaged” incentive offerings to drive consumer participation and adoption of new technologies.

The program will be promoted through a variety of marketing and educational campaigns including, but not limited to: upstream outreach, direct mail, radio and print media, bill inserts, trade ally events, PA’ships, and program brochures.

The program will also be promoted via individual Program Administrator websites, and the GasNetworks collaborative website, (www.gasnetworks.com), where consumers and contractors can learn about the programs, download rebate applications, and obtain other valuable energy efficiency information. All of these functions will be integrated into the unified, statewide website scheduled to be completed by the first quarter of 2010.

A process and impact evaluation of this program began in late 2009 and is expected to be completed by May 2010. The process evaluation will assess barriers to participation, satisfaction, awareness of high efficiency equipment, contractor current practices, programs effect on market share, importance of rebate, free ridership and spillover. The impact evaluation will provide savings estimates for equipment offered in the 2007-2008 program year.

1.1c Residential Conservation Services/MassSAVE

During the period 1980-2000, the RCS/MassSAVE program was an educational program encouraging customers to upgrade the efficiency of their homes.

Beginning in 2001, the RCS/MassSAVE program began to change its emphasis from education only to education and measure implementation. Customers are now offered incentives to implement energy saving measures in their homes. The program has continued to increase cost effective incentive packages each year leading to greater energy savings and increased implementation.
The program is set up to provide residential customers with energy efficiency recommendations that enable them to identify and initiate the process of installing cost-effective energy efficiency upgrades. The Residential Conservation Services (RCS)/MassSAVE Program makes it easy, clear, and compelling for customers to participate in all comprehensive energy efficiency programs by providing information through bold outreach mechanisms, incentives, and multiple financing options. The program exemplifies a program-as-a-system approach where all components work together to support the success of achieving deeper energy savings per customer. The Program Administrators plan to increase the number of energy efficiency vendors and contractors while raising the level of quality control.

The program is committed to a comprehensive whole-house approach and seeks to maximize both electric and gas energy savings (including fuel neutral incentives). The program plans to fully integrate the RCS/MassSAVE and Gas weatherization programs, so that customers experience “one program” as opposed to multiple offerings. Through the intake process, the customer’s primary heat source will be identified. The purpose of the screening is to steer customers using natural gas for space heating to the gas Program Administrators and customers using electric, oil or propane for space heating to the electric Program Administrators. Exceptions to this guideline may occur (e.g., specialized high bill complaints, community outreach programs, and/or prior mutual agreements), and in these cases, the electric Program Administrators will seek to negotiate in good faith with the gas Program Administrators to achieve a resolution that serves the best interest of the consumer, maximizes savings opportunities on a fuel-neutral basis, and allows the overseeing Program Administrator to claim savings.

The program is committed to achieving maximum program success and deeper energy savings. This is a significant leap forward, making distinctions between programs indiscernible to consumers. The program clearly defines the process and expectations of the customers up front and identifies those customers interested in investing in controlling their future energy costs.

The level of service is intended to be flexible, providing information to a broad group of customers, with information regarding deeper retrofit services and renewable opportunities supplied to interested parties. All customers who call the MassSAVE toll-free number to learn about the program are asked several questions to determine their need for and general interest in making energy-efficient improvements. The Program Administrators are dedicated to providing prompt customer service; the goal is to limit the response time between the initial customer call and the first visit of 30 days or less. The Program Administrators wish to provide an even quicker response time and will strive to achieve that outcome while recognizing factors outside of the Program Administrators control that create a demand for services. Customers are guided to appropriate program services provided by energy efficiency vendors including targeted energy efficiency information, advanced diagnostics, efficiency rebates, and deep energy retrofit support. (Low-income customers are referred to appropriate low-income programs.) When appropriate, a series of home visits are offered to further engage the customer and proceed in a logical and methodical process of identifying and informing customers of all available energy savings opportunities.
The home visits include:

- The first visit, referred to as the Screening Visit, is scheduled by a PA-approved vendor promptly after the initial customer phone call and is available at a variety of times to encourage maximum customer participation. This is an in-home visit designed to provide general information and education about energy efficiency and identify opportunities and challenges for energy saving installations. Identification of opportunities may include estimating time and labor needs for subsequent direct installation measures and a solar site assessment during the second or Diagnostic Visit. The Screening Visit will identify customers’ specific needs and direct them to other energy-efficiency resources as appropriate. Should a customer choose not to proceed with the Diagnostic Visit, the initial assessment allows Program Administrators to collect customer data for future targeted marketing efforts. Instant energy savings are realized during the Screening Visit. With the customer’s permission, CFLs and, when applicable, Light Emitting Diodes ("LEDs") are installed for free in all appropriate locations, as are low-flow shower heads and faucet aerators. The value of the instant savings measures installed during the Screening Visit are intended, on average, to exceed the expected average cost to deliver this initial visit. Wherever appropriate, the Screening Visit may be bypassed (e.g., when a previous audit information for a residence is already documented) and the audit process for the customer will proceed with a Diagnostic Visit.

- The Diagnostic Visit includes a comprehensive energy assessment including a variety of diagnostic techniques such as blower door tests, infrared scanning, and duct leakage testing (based on vendor determination). Wherever feasible, full installation of air sealing, duct sealing, and programmable thermostats are provided at no cost to the customer. The savings derived from the direct install measures are designed to cover the cost of the visit. This visit will also identify and recommend specific energy-efficient upgrades that require professional contractors, as well as, a customer contribution. The energy advisor explains the contractor services required to install recommended measures, as well as all available energy efficiency financial incentives.

- The Quality Assurance Visit allows all work to be inspected through a combination of methods including phone survey, postcard, e-mail or actual site visit by a third-party PA-approved vendor. This ensures that contractor-installed measures are accurate, professional, and safely installed based on program standards and ensures program savings.

Program Administrators strive to maximize energy savings by promoting and supporting contractor training and education in an effort to establish a broader workforce knowledgeable of proper installation techniques. The goal is to have a sustainable and experienced workforce that is focused on achievable maximum energy savings ready and able to meet customer demand.

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1 There are several vendors implementing home visits for each of the PA’s. Conservation Service Group (CSG) is the vendor for National Grid and NSTAR; Center for Ecological Technology (CET) for Berkshire Gas and Western Massachusetts Electric Company; Honeywell for Bay State Gas and New England Gas and Cape Light Compact uses Rise Engineering.
The MassSAVE program targets all non-low-income residential customers living in single-family houses or one- to four-unit multi-family buildings, regardless of heating fuel, who are committed to making their homes more energy efficient. Program Administrators plan to shift more attention toward targeting trades that influence homeowners’ decisions. The Program Administrators are currently discussing and addressing the major program design modifications needed to bring in new contractors. The PA’s plan to have a structure in place for bringing new contractors into the program by January 1, 2010. Program Administrators are also exploring ways to identify and reach landlords to make them aware of the program benefits that increase property value and provide energy savings to tenants.

Outreach and marketing efforts will be expanded to include building relationships with realtors, home improvement contractors, architects and others involved in renovations of one-to-four family homes. Marketing efforts will be designed to meet the objectives of reaching more customers (going broader into the customer base) and maximizing energy savings opportunities (going deeper into each home to find ways to save energy). The program’s multi-media outreach campaign will focus on strategic television partnerships with local affiliate or cable programming providers, radio, print advertising, web-based marketing through various social media sites, and through part of a new consolidated website planned for the first quarter of 2010 that integrates all the Massachusetts energy efficiency programs and websites into a single portal.

Current forms of multi-media outreach include:

- MassSAVE website (enhanced via the Statewide Integrated Energy Efficiency Website)
- Bill inserts
- Radio, print and visual media advertising
- New media advertising (advanced online options)
- Targeted marketing through community outreach initiatives such as Cambridge Energy Alliance, Marshfield Energy Challenge, and the Energy Smack-Down program.
- Targeted marketing through the use of data collected during the screening visits

The program targets any cost-effective energy-saving improvement using a comprehensive whole house approach including but not limited to:

- Building Envelope
- HVAC/Mechanical systems
- Water heating
- Energy saving appliances and lighting
- Deeper retrofit measures
- New technologies and renewables

Recommended technologies include air sealing, duct sealing, insulation, refrigerators, thermostats, ventilation, and heating/cooling systems. The program also provides general information about energy efficiency and solar domestic hot water systems (“DHW”) to consumers on request. Other measures may include heating system controls, super-insulation, CHP technologies, solar DHW systems and opportunities for piloting “deep energy retrofit” enhancements of major renovation projects. Customers will see these offerings as an integrated program.
The RCS/MassSAVE program provides on site customer-specific information at no cost to the customer, free installation of instant savings measures, and an educational experience including information regarding all statewide program incentives, financing options, and where to find information about Federal and State tax credits. The Program currently offers free direct installation measures; and incentives of 75 percent of the installed cost of contractor-installed measures, up to $2,000. The Program Administrators are exploring the possibility of increasing or eliminating the $2,000 cap.

The Technical Evaluation Working Group is in the process of conducting a cost-effectiveness evaluation of new measures, measures packages, and a ‘pay for savings’ rebate approach to go after deeper savings per house. This program will coordinate with other programs such as GasNetworks and Cool Smart by educating customers about rebates and financial incentives available to them through the Comprehensive Education Package in part with marketing materials providing a roadmap to achieving whole-house energy savings.

Consistent with the Green Communities Act, the HEAT Loan program provides qualified customers with 0 percent interest loans up to $15,000 with terms up to seven years and can be applied towards the following energy efficiency upgrades:

- Insulation
- Duct System Improvements
- High-efficiency heating systems
- High-efficiency DHW systems
- Solar DHW systems (standardized incentive amount across all Program Administrators.)
- ENERGY STAR-labeled thermostats
- ENERGY STAR-labeled windows
- ENERGY STAR-labeled water heaters
- Other renewable technologies on a pre-approved basis

A portion of the HEAT Loan may be used to finance the mitigation of barriers preventing the installation of energy efficient measures. In the past, safety barriers have been a significant obstacle in maximizing energy savings. Using HEAT Loan funds to manage safety issues will allow Program Administrators to access a broader spectrum of efficiency in the future. To address renewables, Program Administrators may look towards possibly expanding the HEAT Loan to allow for installation of renewables.

1.1d Multi-family

The multi-family market has historically been considered one of the most challenging for Program Administrators throughout the country to serve. Studies produced over the past decade indicate that traditional barriers in this sector fall into one of the following four categories: a.) economic; b.) institutional; c.) technical; and 4.) legal/regulatory.

The objective of the MF program is to maximize the acquisition of cost-effective gas and electric energy and demand savings by addressing the informational, economic, institutional, and
technical barriers that historically have made the Multi-family market a “hard-to-reach” sector. Moreover, the program aims to broaden participation and achieve deeper savings per participant through an incentive structure that encourages such action. The Massachusetts Program Administrators have offered energy efficiency services to the Multi-family sector, through various program designs, since the 1980s. The Program Administrators are offering a common statewide program with the goal of having a consistent customer experience throughout the state.

The program design was developed based upon the following guiding principles:

- Participants will be able to initiate a request for all program services through one party, without the need to directly contact multiple Program Administrators or multiple parties within the same Program Administrator. Throughout the project life cycle, the participant will have access to a single point-of-contact that will facilitate all programmatic communication and coordination.

- Eligibility for program measures and services will be based on cost-effectiveness and will not be restricted by the rate class associated with the meter(s) for the facility.

- The program will be structured to ensure that participants are provided with a “whole building” fully integrated offering; targeting both gas and electric end-uses. While on-site, however, all opportunities, regardless of fuel source, will be identified and documented for the customer.

The program targets, through a comprehensive energy assessment, gas and electric end-uses for residential facilities with five or more dwelling units. Instant savings measures such as energy efficient lighting upgrades and DHW saving devices as well as major measures are included. Under the program re-design, participants will have access to both those measures that are traditionally deemed “residential” and those that are considered “commercial” without any limitations imposed by their rate class/metering.

The primary end uses targeted through this program are: all cost-effective applications, systems, and building shell improvements that impact gas and electric consumption are eligible for incentives under this program. These include, but are not limited to, lighting, DHW, building shell improvements, refrigerators, motors and drives, HVAC equipment and controls, energy management systems and building controls, chillers, compressed air, and other site specific end-uses.

The PAs developed a program through which participants may have access to both gas and electric measures (as well as residential and C&I measures within each fuel type). Depending upon the measures to be installed, and the number of PAs servicing a facility, there could be multiple vendors involved in delivering the program. Under the existing program rules, a participant would need to contact each of these multiple parties to obtain the needed services. In order to provide the participant with a “seamless” experience, the PAs are in the process of contracting for Multi-family Market Integrator (MMI) services where the primary function will be to ensure that program participants have access to cost-effective, whole building and fuel blind, energy efficiency services regardless of whether there will be one or more PAs involved in serving the customer. Additionally, the MMI will be responsible for acting as the conduit.
through which questions and concerns are directed to ensure that participants are not required to contact multiple parties during the project lifecycle. Providing customers with a seamless experience is a key success factor for the delivery of these programs. The MMI is to facilitate the initiation of a project and will serve as the project manager by coordinating and tracking the status of the various services required for a job. While the scope of work for the MMI includes additional tasks, the integration function allowing for a seamless customer experience is the primary role of the MMI.

1.1e Residential Low-Income Single Family Retrofit Program

Some Program Administrators’ low-income programs date back to the early nineties.

Since 1998, Program Administrators have been working with the Low Income Affordability Network\(^2\) (LEAN) to improve the low-income program and increase funding. From this emerged the Best Practices Working Group, as a vehicle to provide a more coordinated statewide low-income program and to ensure correct installation techniques for the program.

Working with the Best Practices Working Group, the Program Administrators have broadly expanded the measures offered in the program and have arranged for contractor training to implement such measures.

A 2002 Low-Income Market Research Study recommended the following strategies to minimize barriers: statewide marketing of programs through a central source; extend outreach to more areas such as health services, social service agencies, and rental offices at apartment complexes; expand marketing efforts to regional and local newspapers; and offer marketing in languages not currently available.

To address some of these barriers, the program has: 1) broadened from Program Administrators and Low-income Weatherization and Fuel Assistance Program Network (“Network”) agencies’ outreach and mailings to a statewide coordinated approach to help increase awareness and customer education regarding technologies and benefits including local media; 2) increased the guidelines for participation to include households with annual incomes at or below 60% of the state median income levels to assist customers with limited funds with the cost of energy saving improvements; and 3) increased efforts to serve low-income renters.

The objective of the program is to deliver energy efficient products and services directly to the homes of income eligible customers to help them lower their energy bills to achieve deeper and broader energy savings.

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\(^2\) G.L. c.25, sec. 19 (St. 1997, c. 164, sec. 37) provides that The Low Income demand-side management and education programs shall be implemented through the low-income weatherization and fuel assistance program network and shall be coordinated with all gas distribution companies in the commonwealth with the objective of standardizing implementation. The Low-Income Energy Affordability Network was established among the member agencies of the low-income weatherization and fuel assistance program network to provide the services required for implementing the coordination requirements.
The Program Administrators, in collaboration with LEAN, state organizations such as the Department of Housing and Community Development (DHCD) and Network agencies, make up the Best Practices Working Group. The working group’s objective is to collaborate and coordinate on all aspects of the low-income program, including but not limited to planning, delivery, implementation, standardization, education, marketing, training, cost effectiveness, evaluation, and quality assurance.

This program piggybacks on the current DHCD low-income energy efficiency program. Once customers are deemed eligible, they will receive an in-home energy assessment from their local Network agency. The Network agency will then arrange for weatherization and other services to be performed by a qualified contractor. Savings will be deepened by installing additional efficiency measures, to the extent cost-effective, such as indirect water heaters with heating systems, exterior doors, front load clothes washers, smart strips, and repairs to make efficiency measures possible. Other measures will be investigated, such as solar water heaters and usage monitoring systems. In addition, a change in rules as a result of the American Recovery and Reinvestment Act (ARRA) makes it possible to spend more federal money in each home which will allow Program Administrator funding to help address more items on the cost effective priority list for each customer. Savings will be distributed more broadly by treating additional homes, including mobile homes (including contractor training if needed) and rental homes where tenants pay for heat. Relatedly, a change in rules as a result of the Recovery Act makes it possible to spend more federal money in each home. As a final step the Network agency will perform a final quality assurance inspection to ensure that all work is performed to program guidelines.

Education and information are included in all Program Administrators’ energy efficiency programs. The low-income program plans to develop/improve education materials and material distribution which will include:

- Customer Education packages: Common leave behinds in customer audit packs
- Materials for outreach workers (e.g. hospital intake people, senior centers)
- A web link on unemployment website
- Other outreach opportunities

The target markets for this program are residential customers living in 1-4 unit dwellings who are at 60 percent of the state median income level. In the case of multi-unit dwellings, 50 percent of the occupants must qualify as low-income in order to be served by the low income program.

Target end uses include but are not limited to:
- Comprehensive, whole house approach
- Building shell
- Heating
- Domestic water heating
- HVAC/Mechanical systems
- Lighting and Appliances
- General waste heat
• New technologies and renewable

Current measures offered through the low-income program include but are not limited to:

• Attic insulation
• Wall insulation
• Pipe insulation
• Duct insulation
• Air sealing
• DHW measures
• CFLs /Low mercury CFLs
• Heating system repair and replacement
• Major weatherization repairs (e.g., electrical repairs, roofs, etc.)
• Refrigerators
• Freezers (PA-specific)
• Landlord heating system retirement pilot (PA-specific)
• Air conditioners
• “Smart” power strips
• Health and safety

This program is designed to minimize or eliminate co-payments, integrate gas and electric program delivery, and integrate funding across all sectors that serve low-income multi-family facilities to the greatest extent possible.

Eligibility for program measures and services will be based on the established program cost-effectiveness test, which include agreed non-energy benefits, and will not be restricted by rate class associated with the meter(s) for the facility to the greatest extent possible.

The program will be structured to ensure that participants are provided with a “whole building”, fully integrated offering that targets both gas and electric end uses. While on-site, all opportunities, regardless of fuel source will be identified and documented for the customer. All efforts to deliver a fully integrated offer to a participant will be performed in a manner that will result in a seamless participant experience.

The Program Administrators in collaboration with LEAN, state organizations such as the DHCD, public housing authorities (PHAs), community development corporations (CDCs), other non-profit entities that own or operate low-income non-institutional multi-family housing (non-profits), and Community Action Program (“CAP”) agencies, will make up the Best Practices Working Group. The working group’s objective will be to collaborate and coordinate on all aspects of the low-income multi-family program, including but not limited to, planning, delivery, implementation, standardization, education, marketing, training, cost effectiveness, evaluation, and quality assurance.

This program will piggyback on the current DHCD low-income energy efficiency programs and all other eligible funding sources (i.e., federal and state) to enhance program services. The LEAN
Lead Vendor with respect to each PA service territory will be the same as the LEAN Lead Vendor for other low-income efficiency programs, or such other arrangement as is agreed with LEAN (hereinafter “LEAN Lead Vendor”). Sub-contracting will be appropriate to the complexity of the work required and will be based on the same audit tool as in the market rate multi-family retrofit program. Low-income customers will be referred to the LEAN Lead Vendor by the Multi-Family Market Integrator (MMI), as defined in the multi-family retrofit program. Low-income customers may also apply directly through the LEAN network. An essential element of this program is that interested customers also have the option, at their discretion, of electing to participate in the market rate multi-family retrofit program. This approach helps ensure that there are multiple paths to participation in energy efficiency programs in this unique market sector which has also been served over many years by skilled contractors and engineering firms. These firms will continue to be eligible to provide services in this sector, both through the market rate multi-family retrofit program (and its terms and conditions) and, where qualified, as providers for the LEAN network under the terms and conditions of this program.

This program is for Residential customers on the low-income rate or individuals living in non-institutional dwellings owned or operated by non-profit entities or public housing authorities with five or more units. These are customers who are at 60 percent of median income level as well as landlords and property managers of these buildings.

Fifty percent of the occupants must qualify as low-income in order to be served by the low-income multi-family program.

2.0 OBJECTIVE OF THIS EVALUATION RFP

The purpose of this RFP is to seek a qualified bidder or a team of bidders to complete an assorted array of evaluation activities for the Massachusetts Residential and Low Income sector over a multi-year period. The winning bidder will be the sole principal evaluation contractor for the Residential and Low Income research area. These activities will include an assortment of evaluation work including, but not limited to such things as market assessment, baseline studies, process evaluation, impact evaluation and development of incremental cost information. The winning bidder will be expected to handle all evaluation issues and to either team with other firms or sub contract out work where specific skill sets are required that the evaluation contractor may not possess. In addition there are several pilots which have been initiated through these programs and will need evaluation efforts.
This will be a multi-year effort covering the program years 2010 through 2012, with the evaluation contract running until the Spring of 2013. Some of the main areas of focus in 2010 and beyond will be on the following areas.

- Mass Save Program – Process Evaluation, impact evaluation, review savings to determine appropriate values for statewide consistency (other general evaluation)
- Residential HVAC – Impact evaluation of the Brushless Fan Motor pilot; systematic review of HVAC EM&V conducted both in MA, as well as other New England States in order to develop a research plan
- Multifamily – Potential study
- Low Income – Process evaluation, scoping study of data being collected, impact evaluation
- Other Pilot areas – Deep Energy Retrofit pilot
- Evaluation Planning
- Other Undetermined Evaluation Issues

Responsibilities of the Evaluation Contractor will include managing the various individual evaluation tasks, hiring and managing sub-contractors as necessary, collecting data, analyzing data, providing individual formal reports and presenting results to the PA’s for the various evaluation tasks, providing an annual report which summarizes the year’s evaluation activities, and assisting in and developing an annual evaluation plan at the start of each program year.

3.0 SCOPE OF EVALUATION WORK

Since there are several programs currently operating in the Residential Retrofit and New Construction area, all of the evaluation areas listed above will be initiated and administered through the specific program they fall under. There are some evaluation activities planned for 2010 in which the PA’s of this study want specific proposals including cost proposal; for the later years we are looking for ideas on the bidders approach with no cost information but would like to see billing rates. The PA’s would also like to note that it is possible the other activities beyond those listed for 2010 will end up being done, or that some activities listed for 2010 may be canceled.

The scope of work for each program is defined below.

3.1 PLANNED ACTIVITIES

3.1a MassSAVE Program

During 2010 the PA’s would like the bidder to do a process evaluation. This would focus on the statewide marketing effort, the new vendor delivery structure, including a review of the statewide vendor standardized report, and other adjustments to the program that have occurred over the past few years. In addition, the winning bidder will look into what is being done for vendor consistency and how vendor savings compare to what PA’s are using in the cost effectiveness model in order to standardize impacts statewide. Bidders should provide a detailed
description and budget for this process evaluation task. The process evaluation will need to examine services across the PA territories and involving the vendors now supplying MassSave services. The process evaluation needs to address issues of coordination of program across PAs and vendors. One particular challenge will be to develop a uniform set of energy saving assumptions used in planning and energy saving calculations.

With ongoing changes to the program it was determined an impact evaluation would be better suited as a later phase of this evaluation effort. In the future we would also like to perform a baseline study. For this proposal, we are asking bidders to briefly (no more than 2 pages) outline their approaches to addressing these types of studies: baseline and impact, however, no specific budgets need be supplied. Bidders should provide a strategy that maximizes the value of the information collected while minimizing overall costs.

### 3.1b Deep Energy Retrofit Pilot

The PAs are currently investigating Deep Energy Retrofits as an area to implement energy efficiency. The Deep Energy Retrofit pilot was initially offered as a pilot in 2009. This “deep energy efficiency” pilot is to be consistent with the Governor’s Zero Energy Task Force recommendations and will at a minimum explore 1) a new Deep Energy Retrofit Pilot Program of existing buildings achieving 50% energy reductions or more as compared to baseline energy usage and 2) a Zero Energy Pilot program that encourages diverse paths to Zero Energy, including Passive House or similar programs. This pilot includes a wide range of projects such as single family homes, affordable housing, mid to large multifamily and include a substantial amount of square footage.

The design includes a plan to support deep retrofits and to gather information on customer satisfaction, behavior modification, and energy savings. The pilot was developed to help develop information on appropriate measures for deep retrofits, the correct way to model potential energy savings for deep retrofits, approaches for different housing types, training energy –retrofit contractors, customer education and marketing materials along with financing and incentive levels. Ongoing program evaluation and case study review of the homes treated will substantially inform the expanded effort in subsequent years.

In 2010 there needs to be a process evaluation of the Deep Energy Retrofit Pilot (“DER”). The DER explores the potential for achieving 50% energy reductions or more in existing residential building. The DER was initially offered as a pilot in 2009 with 3 projects. The 2010 pilot projects 130 participants including a wide range of projects such as single family homes, affordable housing, mid to large multifamily and will include a substantial amount of square footage.

The DER includes a plan to gather information on customer satisfaction, behavior modification, and energy savings. The pilot is designed to develop information on:

- Appropriate measures
- Design and modeling retrofits
• Develop approaches for different housing types
• Determine training needs
• Educate customers
• Marketing strategies to accomplish goals
• Financing and incentive levels needed to attract participants

The complete DER program description and program requirements are attached as Appendix B.

The process evaluation must first recommend how to set the baseline energy use to be used in the pilot. A concern of the program is that most of the early adopters may have already taken some conservation steps, maintain lower indoor temperatures, and use large amounts of supplemental fuels. A straight billing analysis would provide the current occupant’s saving, but not one generalized to the average homeowner in Massachusetts. In calculating the savings, bidders should discuss if the baseline should reflect a typical residential customer or a baseline reflecting the individual participant.

The initial 2009 pilot provided information in identifying some of the barriers that need to be overcome in order to reach the desired level of participation. The process evaluation for the DER should identify strategies to seek out potential participants and how best to reach them; determine factors why customers initially interested in the program chose not to participate; and what can be done to make the process easier. Affordability has been identified as the major barrier, the process should assess if different financing strategies will generate more participants.

Bidders must provide a detailed description of the evaluation plan for this retrofit pilot. In designing the impact component of this bid, bidders should gear impact strategy to answering primarily the research impact issue. What is the savings attributable to various types of deep retrofit measures and combinations of measures? Program Administrators are interested in strategies that also provide early feedback on energy saved. Bidders should propose what they feel is the best method, as well as timeline, for investigating these issues. One of the other concerns of this pilot is that many of the largest benefits are of a non-energy type and not included in current cost-effectiveness tests. A large all-encompassing Non-Energy Benefits study is being included in the Cross-cutting Groups RFP. For this RFP, we are asking proposers to suggest what data they would recommend be collected and how, to support that broader study. Proposed costs for this area should include process and impact in an allocation that the bidder believes will best satisfy both research objectives over the 3-year program. For comparative purposes the PAs’ would like the Bidders to put together two plans dealing with the evaluation of the Deep Energy Retrofit Pilot. One plan should assume a budget of $100,000 and the other should assume a budget of $200,000.

3.1c Residential HVAC Program

PA’s would like to perform an evaluation of the Brushless Fan Motor pilot. This pilot was created to develop and implement a pilot effort to demonstrate the cost and savings associated with the installation and operation of retrofit high efficiency furnace blower fan motors. The pilot was for residential homes in Massachusetts and Rhode Island with existing, operational
forced warm air heating and central cooling systems in the NSTAR Electric and National Grid electric service territories, where COOL SMART Program is offered. Qualifying Equipment are the Concept 3 and Evergreen ½ horsepower retrofit furnace fan motors.

An incentive is paid by program PA’s to the participating HVAC installation contractor upon the installation of qualifying equipment and receipt of required project documentation and information. In 2009 the PA’s provided a $225 incentive to the contractor, and also provided the contractor with the motor. (This is approximately a $400 value in total. In 2010, we plan to provide a $450 incentive to the contractor. The contractor is responsible for purchasing the motor. In 2009 there were 104 installed statewide in Massachusetts (21 NSTAR + 83 National Grid). An additional 16 were installed in Rhode Island-National Grid. In 2010 plans are to install 200 statewide in Massachusetts (100 NSTAR + 100 National Grid).

The PA’s would like the bidder to perform a process evaluation to assess the installation process, review program implementation (vendors role, what data is being collected, do we need additional data. etc), look at barriers to participation, and interview customers who participated, and those who opted not, to determine why not.

Additional questions we would like answered are:

- Depending on the type of furnace the customer has non-condensing or condensing, what savings are attributed? Are they different?
- Does the BFM provide full time ventilation?
- Do savings vary based on static pressure to be over come in the system?
- Do BFMs increase or decrease static pressure or just perform differently depending on the pressure they need to overcome?
- What is the fan runtime?
- What is the heating performance? Cooling performance?

Bidders should provide a detailed description and budget for this process evaluation task. The process evaluation will need to examine services across the PA territories and involving the vendors now supplying Residential HVAC services through the Cool Smart Program. The process evaluation needs to address issues of coordination of program across PAs and vendors.

### 3.1d Multi-Family

In 2010 the PA’s would like the bidders to perform a study to determine what potential there is in the market. We would like to find out how much energy apartment common and tenant areas can save, what kind of buildings and measures are out there, barriers to participation, cost and what the best approach to getting at savings would be.

A process evaluation of the redesigned multi-family program is expected to be done in 2011, however, that study may be moved forward or back depending on needs. Impact related tasks such as support of deemed savings values, designed and implementation of billing analysis and or metering studies, and other support will be needed especially in years two and three.
The evaluation efforts required to support these programs over the three-year period include:

- Conducting a market potential study in 2010, so that the program’s impact on the multi-family market rate sector can be determined (to include market rate as well as low-income/affordable housing). The primary objective of the assessment is to obtain a view of the current state of the Massachusetts multi-family retrofit market. This will include using primary and secondary data sources to help size the market. Both common areas and tenant spaces will be included. Opportunities for both electric and gas savings will need to be identified.

- A process evaluation of the redesigned multi-family program is expected to be done in 2011. However, that study may be moved forward or back depending on needs.
  - This will include assessing the extent of the split incentive issue. Specific changes to existing program designs, including offering comprehensive services and educating building owners/managers on the benefits of energy efficiency, were designed to address the split incentive barriers. Using program data on measures adopted, and those not opted for, will be used to determine if additional programmatic changes are needed (such as changes to the incentive structure and levels) to encourage owners/managers to go deeper with respect to implementing energy efficiency measures. (This applies to the market rate program and those low-income/affordable housing projects where a customer contribution is required).

- Impact related tasks such as support of deemed savings values, designed and implementation of billing analysis and or metering studies, and other support will be needed especially in years two and three.

Bidders must provide a detailed description of the evaluation plan for the multi-family program. Bidders should propose what they feel is the best method, as well as timeline, for investigation of these issues. The budget bid should include detailed costs for the scoping study, but not for other tasks.

### 3.1e Low Income

During 2010, the PA’s would like bidders to do a process evaluation of the low income programs. We would like the bidder to review data being collected by each of the 28 statewide low income agencies, look at detail provided with invoices, and determine ways to streamline reporting statewide and recommend ways we can improve the internal/external process. We would like the bidder to determine if there was any leveraging of weatherization funds; what work was done through PA’s weatherization programs and what was done through the low income program. This may involve working with our low income advocates. The PA’s would potentially like an impact evaluation in the future. Bidder should provide description of methodology proposed for a future impact study. Bidder should provide evidence of ability to
conduct such a study. Budget bid for this low income section should, however, only include the process evaluation conducted in 2010.

### 3.1f Other Pilot Areas

There may be additional pilots not noted above initiated through the Residential Retrofit and Low Income Programs. It is expected that all of these pilots will need evaluation efforts. All of these pilots will need process evaluations and possibly impact evaluations as well.

### 3.1g Early Global Process and Marketing Evaluation

In the Summer of 2010, Massachusetts will be undertaking a mid-course adjustment process to consider whether any changes to program approaches are required for 2011-2012. Given the sharp increase in program budgets that is planned for these years, and the potential magnitude of the programming and resource allocation decisions that may be made as part of the mid-course adjustment process, it is critical that timely information be available regarding key program process issues and initial market response to new and expanded program services. The Massachusetts PAs are therefore committed to completing a global process and marketing evaluation by July 15, 2010. This evaluation is expected to cover:

1. Customer and market response to new, expanded or revised marketing efforts;
2. A review of sales techniques that are effective;
3. An early review of electric and gas integration efforts and single point of contact / cross PA integration in MA, as well as comparison to selected other states;
4. An early review of projects that are comprehensive, whole building, or otherwise targeted to deeper savings; and
5. Process evaluation and design review of community-based projects.

More information on the tentative scope and focus of this evaluation is provided in Appendix C.

The global process and marketing evaluation is envisioned as a single effort encompassing a number of program areas. However, individual pieces of the evaluation are expected to be performed by the members of the contractor teams for four research areas: Residential Retrofit, Large C&I, Small C&I, and Special/Cross-Cutting. The Special/Cross-Cutting contractor team will play a leading role, with overall direction and coordination provided by the PAs and the EEAC Consultants. Each contractor team will be responsible for covering those topics, as shown in Appendix B, that are specific to its assigned research area.

Because of uncertainties over which particular 2010 program changes will be implemented in time to be productively studied by July 15, this RFP does not request a specific technical or cost proposal for the winning bidder’s contribution to the global process and marketing evaluation. Instead, bidders are asked to commit to making available about 200 hours of staff time by qualified staff members between the dates of April 15 and July 15, 2010. Bidders are asked to specify which staff members will be assigned to this task, and the total number of hours for
which each assigned staff member will be available. The specific scope of the global process and market evaluation will then be negotiated after contractor selection.

4.0 EVALUATION PLANNING

In a typical year, an evaluation plan will be developed somewhere between the last quarter of the previous year and the first quarter of the year to be evaluated. The activities will consist of a number of things such as surveys and studies to look at various impact and process issues. We may request that certain activities and updates be done on a regular basis (annually, semi-annually, etc.). Other activities such as Incremental Cost Studies, Baseline Studies, Billing Analysis, etc. may be done every 5 years or as deemed necessary.

The selected Evaluation Contractor will be responsible for participating in conference calls to discuss evaluation activities for the coming year, producing a draft plan and a final Evaluation Plan per the timeline indicated above in the Objective section. Typically, about 3 calls are required to finalize a plan. Bidders should include this activity in their proposed budgets.

5.0 OTHER EVALUATION WORK

In addition to the items mentioned above, different types of activities are conducted on an ad-hoc basis as program changes dictate. Bidders should be prepared to provide this ad-hoc evaluation work and in their proposals should demonstrate their ability to meet such requests. Bidders should not include a cost for this other evaluation work in their proposals.

6.0 GENERAL DELIVERABLES

Work is anticipated to commence no later than April 20, 2010. In general, the selected evaluation contractor will be expected to deliver the following items during the course of this effort.

- Work plan (covering the first 12 months), due at the outset of the project. This is to include a schedule and an allocation of evaluation staff resources amongst the various evaluation tasks described under the Scope of Work. It should also detail how and when the evaluation contractor will make use of sub-contractors. In addition, the plan should indicate when and what reports will be issued.

- Draft Questionnaires and/or interview guides, on-site protocols, and or other data collection instruments, one month before any scheduled surveying activities.

- Sample Selection
  - For any activity that requires a sample to be drawn, the contractor should suggest the number of participants necessary. Due to various constraints on sample sizes, the achievement of statistical significance within certain parameters may not be
realistic, but where it is possible, the sample should be sized to provide results with a 90% confidence, plus or minus 10% precision. Should this not be attainable, the proposal should suggest an appropriate sample size and estimate the associated level of confidence and precision. Any sampling techniques will need to ensure appropriate representation from Massachusetts’s populations. Additional groups (municipal building inspectors, realtors, retailers, utility staff, etc.) whose input may have value to the evaluation results may be proposed for consideration. The PAs and EEAC Consultants will have final approval of the sample selection process.

- Formal report on each task or activity as it is completed (this may entail a first draft, final draft, and final report).

- Draft Annual Report, due January 31, 2011. This will be a report summarizing all of the evaluation activities completed by the evaluation contractor through the end of the calendar year. An Annual Report will be due for each program year of evaluation activities.

- Final Annual Report, due upon completion of each calendar year’s evaluation activities including all supporting documentation, due March 1, 2011.
  - The contractor will be required to present the study findings to the PA’s, and respond to questions. In addition, an optional briefing session for outside interested parties may be required. The cost proposal should present the costs for these tasks separately.
Appendices

Appendix A – EEAC Resolution on Evaluation, Measurement, and Verification

Document included in RFP Package as “Appendix A – EMV” in pdf format.

Appendix B – Deep Retrofit 1-4 Family Pilot

Document included in RFP Package as “Appendix B - Deep Retrofit” in pdf format.

Appendix C – Global Process and Marketing Evaluation Tentative Scope and Focus

Document included in RFP Package as “Appendix C - Global Process” in pdf format.
REQUEST FOR PROPOSAL – RFP #1905

Massachusetts Energy Efficiency Programs

Multi-Family Market Integrator

February 16, 2010

Response Deadline:
March 31, 2010 by Noon EST

PLEASE NOTE: The information contained within this Request for Proposal (RFP) is confidential and proprietary to the Sponsors, and is to be used by the recipient solely for the purpose of responding to this RFP.
## TABLE OF CONTENTS

1.0 General Information

1.1 NSTAR
1.2 Program Administrators and Sponsors
1.3 Unauthorized Disclosure
1.4 Definitions
1.5 Sponsors’ Discretion
1.6 Bid Evaluation
1.7 Discrepancies or Omissions
1.8 Payments for Services and Invoicing

2.0 Specifications

2.1 Statement of Work
2.2 Terms and Conditions
2.3 Safety, Environmental, and Background Check Requirements

3.0 Communications and Form of Response

3.1 **Volume I: Commercial Proposal**
3.1.1 Commercial Exceptions
3.1.2 Pricing
3.1.3 Options and Alternates
3.1.4 EEOC Compliance
3.1.5 Insurance Certificate(s)
3.1.6 Execution of Proposal by Officer of Supplier
3.1.7 Vendor Information

3.2 **Volume II: Technical Proposal**
3.2.1 Title Page
3.2.2 Table of Contents
3.2.3 Summary
3.2.4 Organization(s) or Team Description
3.2.5 Statement of Work
3.2.6 Resumes of Key Personnel
3.2.7 Alternate Approaches
3.2.8 Sample Reports
3.2.9 References
3.2.10 Additional Information

4.0 Proposal Forms

4.1 Form A - Bid Receipt Acknowledgment Form
4.2 Form B - Supplier Bid Proposal Form (Cover Sheet)
4.3 Form C - Execution of Proposal by Officer of Supplier
**IMPORTANT DATES - RFP #1905**

- **RFP Emailed to Potential Bidders:** February 16, 2010
- **Last Date for Questions:** March 10, 2010
- **Responses to Questions:** March 17, 2010
- **Proposals Due:** March 31, 2010 by Noon EST
- **Selected Supplier Presentations:** April 15, 2010
- **Anticipated Contract Award Announcement:** May 5, 2010
- **Contracts Signed with Individual Program Administrators:** June 1, 2010
- **Kick-Off Meeting:** June 2, 2010
- **All Program Materials Prepared:** July 5, 2010
- **Vendor Training:** July 5, 2010
- **Commence Program Implementation:** July 15, 2010

**Correspondence**

During the Request for Proposal, up to and including contract award, all correspondence must be directed via email to:

Patricia.Latimer@NSTAR.com

Should it be determined that any vendor is conversing with or directing questions related to this RFP to anyone other than the individual identified above, then at the discretion of the Program Administrators and Sponsors that vendor may be immediately disqualified from bidding on this project.
1.0 GENERAL INFORMATION

1.1 Background

Headquartered in Boston, MA, NSTAR provides regulated electric and gas utility services and is also engaged in telecommunications and other non-regulated activities. NSTAR, through its subsidiaries and operating companies, Boston Edison Company, Cambridge Electric Company, Commonwealth Electric Light Company and NSTAR Gas Company, serves approximately 1.3 million customers throughout Massachusetts, including approximately 1,040,000 electric customers in 81 communities and 240,000 gas customers in 51 communities. The Operating Companies are supported through the NSTAR Electric & Gas Corporation (the Company).

NSTAR is pleased to present this Request for Proposal (RFP) for services related to the implementation of a newly redesigned statewide energy efficiency program for the Multi-Family Market Integrator Sector. In support of the Green Communities Act of 2008, nine Massachusetts utilities came together to sponsor and promote the Massachusetts Energy Efficiency Programs. The goal of this RFP is to select one successful bidder to provide services to their Massachusetts multi-family customers.

1.2 Program Administrators and Sponsors

This Request for Proposal has been issued by NSTAR on behalf of the Program Administrators (PAs) for the Massachusetts Energy Efficiency Programs in the Residential Retrofit & Low Income Areas. These PAs are comprised of representatives from the following electric and gas companies in the Commonwealth of Massachusetts. These companies are referred to herein as the Sponsors:

Bay State Gas (NiSource)
Berkshire Gas
Blackstone Gas
Cape Light Compact
National Grid Electric and Gas
New England Gas
NSTAR
Unitil Gas & Electric
Western Massachusetts Electric

1.3 Unauthorized Disclosure

The information contained within this Request for Proposal (RFP) is confidential and proprietary to the Sponsors, and is to be used by the recipient solely for the purpose of responding to this RFP. Additionally, the Sponsors consider any information provided to Bidders in the course of business to be privileged and confidential between Consultant and the Sponsors. This includes, but is not limited to, written data of any kind, business information, request for quotation, specifications, engineering data and any and all technologies and data either obtained or observed while supplying the commodity/service required by the contract. Unauthorized disclosure of information to third parties by Consultant may lead to cancellation of the contract, loss of future business opportunities and/or the effects of any other remedies which may be available to the Sponsors.
All material submitted, produced, data collected, reports, designs and documentation will become the exclusive property of the Sponsors at the end of the contract. The awarded bidder may not share program materials, customer data, industry or program participant contact information, etc. unless explicitly authorized by each Sponsor to do so.

1.4 Definitions

“Bidder” shall mean those firms/vendors acting in the role of Supplier when responding with a Proposal to this RFP. “Proposal” shall mean the Bidder's formal response indicating their committed solutions that meet or exceed the requirements of the RFP. “Subcontractors”, or “subs”, can be defined as any Supplier under Contract or in the RFP response that are considered financially independent of the Bidder in any other business or accounting relationship.

This RFP does not constitute an offer by the Sponsors to enter into a contract, nor does any response to this RFP constitute an acceptance of an offer, nor does any response to this RFP bind the Sponsors in any way. This document shall not be construed as a request or authorization to perform work at the Sponsors' expense. Any work performed by a Bidder in connection with evaluating and responding to the RFP and, if selected, negotiating a definitive Agreement will be at the Bidder's own discretion and expense. This RFP does not represent a commitment to purchase or lease. The Sponsors reserve the right to reject any and all proposals at its absolute discretion. Submission of a bid constitutes acknowledgment that the Bidder has read and agrees to be bound by such terms. The information in this document will enable the recipient to formulate a proposal to meet the workload requirements as described in this RFP. The numbers, volumes, run rates, etc. provided in this RFP are based upon the most recent data available and should serve as estimates to Bidders for pricing and response purposes.

1.5 Sponsors’ Discretion

The Sponsors are not responsible and will not reimburse Bidders for costs incurred to develop proposals.

NSTAR is issuing this RFP on behalf of the Sponsors who at their discretion may:

• Select a Proposal other than the lowest priced, if the Sponsors determine, at its sole and absolute discretion that the Sponsors interests will best be served by doing so.

• Seek clarification from any Bidder regarding Proposal information and may do so without notification to any other Bidder.

• Continue the review procedure until a Bidder is selected successfully or until the Sponsors choose to reject all Proposals.

• Accept any Proposal or alternate as submitted without negotiations.

• Select for negotiations only the overall best Proposal or negotiate all Proposals submitted which fall within a competitive range.

• Perform a complete financial review as well as an on-site investigation of any of the Bidders facilities to ensure it is capable of meeting the demands of Sponsors and the needs identified in this RFP.
1.6 Bid Evaluation

The PAs and their related personnel will confidentially review proposals. A cross-functional evaluation committee representing each of the Sponsors will rate all Proposals based on the evaluation criteria provided below and may reduce the number of Bidders being considered to a "short list" of finalists based upon this objective analysis. The Sponsors may elect to meet with finalists for interviews. After all responses have been thoroughly reviewed and negotiations completed with finalists, the Sponsors will award the Contract(s) to the Bidder(s) who offers the best overall value. The Sponsors reserves the right not to award any Contract(s) as a result of this RFP.

All bids will remain active for ninety (90) days, and no bid materials will be returned. Each proposal will be evaluated on technical and commercial merits. All proposals will be opened on or after the due date.

Proposals will be evaluated on the following criteria:

- **Cost** - both the total cost and whether overall proposal offers good value will be considered
- **Reasonableness of Approach** - does the proposal offer good creative solutions to the evaluation issues presented in the RFP
- **Dedicated Resources** - has the bidder shown that they have the resources to provide the services requested within the expected timeframe
- **Comprehension** - has the bidder shown that they understand the issues involved and have responded accordingly
- **Documentation Quality** - is the proposal itself clear, concise, and well written
- **Demonstrated Experience** - whether the bidder has demonstrated that their firm has the experience and expertise or the ability to provide subcontractors having the appropriate knowledge to perform the requested tasks

1.7 Discrepancies or Omissions

Should a Bidder find any ambiguity, discrepancy or omission in the RFP, or should the Bidder have any questions, the Bidder shall notify NSTAR via e-mail to Patricia.Latimer@NSTAR.com. Such information must be received no later than the “Last Date for Questions”, which is indicated on Page 3 of this RFP, to afford NSTAR the opportunity to send any instructions or interpretations to other Bidders who have received an Invitation to Bid. The Sponsors will not be responsible for any oral instructions or interpretations.

1.8 Payment for Services and Invoicing

No up-front payments will be made to vendors. Invoices shall be submitted to each Sponsor on a monthly basis.
2.0 SPECIFICATIONS

2.1 Statement of Work

The purpose of this RFP is to seek a qualified bidder or a team of bidders to assist with the implementation of a newly redesigned statewide energy efficiency program for the Multi-Family Market Sector for up to a three year period. A copy of the Statement of Work and related appendices are provided below.

2.2 Terms and Conditions

The successful Consultant’s services shall be provided in accordance with each Sponsors’ terms and conditions, which are provided below. Any exceptions to these requirements must be clearly stated in the Bidder’s RFP response.

Any exceptions submitted by a Bidder does not constitute acceptance by any of the Sponsors. Exceptions will be negotiated and agreed to by each Sponsor and will be part of an exclusive contract between the parties, which will be independent of any other associated contract with another Sponsoring organization.

Bay State Gas (NiSource)
Berkshire Gas
Blackstone Gas
Cape Light Compact
National Grid USA
New England Gas
NSTAR
Unitil/Fitchburg Gas & Electric
Western Massachusetts Electric

- Bay State Gas - NiSource Corporate Services Company General Services Agreement and Data Security Requirements
- Berkshire Gas – Berkshire Gas’ requires Suppliers’ adherence to National Grid’s T&Cs for Consulting Services
- Blackstone Gas – T&C’s to be provided
• Cape Light Compact Terms & Conditions
  Capelight 2010
  Template Contract bc

• National Grid Terms & Conditions for Consulting Services
  00400 Ts and Cs for Consulting Services 2

• New England Gas Consultant Terms & Conditions
  New England Gas Consultant TCs...

• NSTAR’s Terms & Conditions and Insurance Requirements
  NSTAR CSA & Insurance Requirements

• Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
  Western Electric CL&P General Terms &

• Unitil Terms & Conditions
  Unitil T&C
2.3 Safety, Environmental, and Background Check Requirements

The successful Consultant’s services shall be provided in accordance with each Sponsors’ safety, environmental, and background check requirements. Copies of National Grid’s requirements for these areas are attached. Any exceptions must be clearly stated in the Bidder’s RFP response.

- National Grid’s Contractor Safety Requirements dated 8/1/08
- National Grid’s Contractor Environmental Requirements dated 2/29/08
- National Grid’s Employee Background Check Requirements dated 1/10/08

3.0 COMMUNICATIONS AND FORM OF RESPONSE

During the RFP process, all questions must be submitted via e-mail and addressed to Patricia Latimer at Patricia.Latimer@NSTAR.com, on or before the “Last Date for Questions” as specified on Page 3 of this RFP. Answers to Bidder’s inquiries will be distributed to all Bidders via email no later than the “Responses to Questions” date provided on Page 3 of this RFP. In order to ensure fairness, until the time an award is made, Bidders shall have no direct communication regarding this RFP with any of the Program Administrators or any other personnel within the Sponsors’ organization. After the decision to award is announced, the successful Bidder may contact the Program Administrators and work with each Sponsors’ Procurement contact to provide certificates of insurance and sign final contract documents. Failure to comply with these communications guidelines may disqualify the Bidder from further consideration.

Supplier’s proposal MUST include two SEPARATE VOLUMES. Volume I must address all commercial requirements, while Volume II must address all technical requirements. Volumes I and II shall not be bound or otherwise joined together. VOLUME II MUST NOT CONTAIN ANY COST OR PRICE INFORMATION. The organization of the proposal MUST conform to the organization enumerated in Form B, SUPPLIER BID PROPOSAL FORM, and as described in this section. The first page of the Supplier proposal MUST be Form B-Supplier Bid Proposal Form (cover sheet).
This RFP has been sent in electronic format to facilitate the completion of proposals. One original copy of the proposal, along with an electronic copy on CD, and 4 (four) hardcopies must be either hand delivered or sent via commercial carrier for receipt NO LATER THAN the “Proposals Due” date and time specified on Page 3 of this RFP to the following address:

NSTAR Electric & Gas Corporation  
Attn: Patricia Latimer, Principal Contracts Agent  
One NSTAR Way, SE-250  
Westwood, MA 02090-9230  
Phone: 781-441-8841

PLEASE NOTE THAT PROPOSALS MAY NOT BE SUBMITTED VIA FAX OR EMAIL UNDER ANY CIRCUMSTANCES.

3.1 Volume I: Commercial Proposal

3.1.1 Commercial Exceptions: This section of the proposal MUST state clearly any exceptions which are being taken to the commercial requirements of this RFP, for example terms and conditions, insurance requirements, etc. Exceptions must state what the exception is, the reason for the exception and proposed alternatives, and be organized sequentially in accordance with the organization of the RFP. Commercial exceptions MUST be clearly defined only in this section of the proposal. Bidder’s preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Bidder’s proposal will be considered as being in full conformance with all documents, specifications, and commercial terms included in this RFP, unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

3.1.2 The Sponsors seek to procure Services at the most cost effective rates possible. Pricing for the first 12 months must be provided. A Project Cost Estimate Bid Form will be provided to all bidders by February 19, 2010. Labor costs should be broken out by task and personnel type (e.g., project management, supervision, clerical support, analyst, etc.). Bidders shall include personnel names, who will be working on the project, that fall into the various labor categories, if known. Estimates of miscellaneous additional costs should be indicated. Since the initial scope of work will only cover the first year, please provide projected billing rates for years 2 and 3. The Sponsors will enter into individual negotiations each subsequent year regarding any potential price increases, which must be justified by the Contractor. The PAs will determine the allocation of total costs to individual PA’s after a Contractor has been selected. (Please note that the selected contractor will be required to contract with and bill each of the PAs separately.)

All responses to this RFP, whether or not in compliance with the terms of this RFP, shall be considered unconditional offers by the Bidder, which, if accepted, shall create a binding obligation upon the Bidder.

Bidders should identify if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered or not. Discounts will be factored into the evaluation of the bids and their acceptance is at the Sponsors’ option.

3.1.3 Options and Alternates: This section of the proposal would include options or alternates (commercial considerations) which the Sponsors could consider. Suppliers are encouraged to submit alternate proposals in addition to the
requirements defined in Section 2.1, Statement of Work, if such alternate proposals will result in lower price, higher reliability, or improved schedule.

3.1.4 EEOC Compliance: If not previously submitted, please provide a statement that your company is in compliance with EEOC requirements.

3.1.5 Insurance Certificate(s): Include with your Bid a Certificate(s) of Insurance evidencing compliance with at least the minimum levels of insurance required in Section 6.0 Insurance of NSTAR’s Consulting Services Agreement, which is contained in NSTAR’s requirements document in Section 2.2 above. If you are awarded the work, you will be required to submit certificates to each Sponsor identifying them as an additional insured and complying with their insurance levels.

3.1.6 Execution of Proposal By officer of Supplier: Form C MUST be completed and executed by an Officer of the Supplier.

3.1.7 Vendor Information: Bidders shall provide:
- Federal TaxID number
- Business type, i.e., sole proprietorship, partnership, joint venture, etc. and state of residency
- Number of employees
- Financial statements for the last 24 months
This information is not considered part of the fifteen (15) page response limitation and should be provided as a separate tab in Volume 1 of the Commercial Proposal.

3.2 Volume II - Technical Proposal

Volume II must not exceed fifteen (15) pages, excluding the information requested in sections 3.2.6 thru 3.2.10 below.

The Supplier's technical proposal, addressing all technical requirements MUST be included in this section. **THIS VOLUME MAY NOT INCLUDE ANY COST OR PRICING INFORMATION.** In addition to the Supplier's technical proposal, the following items must be addressed, in the order listed:

3.2.1 Title Page: This section of the proposal should include a title page, which identifies the RFP Title, vendor’s name and the volume.

3.2.2 Table of Contents: The vendor’s proposal should include a Table of Contents, which lists the titles and page numbers for each major topic and sub-topic.

3.2.3 Summary: This section should include a:
- 3.2.3.1 Description of the organization’s team
- 3.2.3.2 Outline of the approach to the program services to be provided
- 3.2.3.3 Description of the team’s experience and qualifications

3.2.4 Organization(s) or Team Description:
- 3.2.4.1 Describe the organization(s)
  - 3.2.4.1.1 Describe current services provided for the energy efficiency industry.
3.2.4.1.2 Describe the organization(s) qualifications for providing the services outlined in the Scope of Work.

3.2.4.1.3 Provide summaries of on-going similar service engagements that have occurred within the past 3 years.

3.2.4.2 Describe the Project Team, especially the Program Leads and any key personnel who would be working on the project. Resumes of key personnel should be provided as an attachment. Include brief biographies of Program Leads and other key personnel demonstrating related program experience and qualifications with regard to their ability to understand the multi-family market. Include the number of FTEs included in the bid and whether or not there will be dedicated staff to each PA or possible PA combination (1 gas & 1 electric). Go to [http://www.mass.gov/mgis/pubutil.htm](http://www.mass.gov/mgis/pubutil.htm) for PA service territory maps.

3.2.4.3 Provide an organizational chart of project team and relationships.

3.2.4.4 Provide a Contact Sheet, listing contact information, including email and phone numbers for key personnel who can answer questions regarding the proposal and regarding the services to be provided. This Contact Sheet should provide contact information for key personnel for any sub-contractors.

3.2.5 Statement of Work: Describe the organization or team’s approach to providing the services for which the organization(s) or team wished to be considered. The statement of work will include the following:

3.2.5.1 An Implementation Plan detailing tasks, milestones and the dates associated with these items. Dates included in the plan must align with the schedule provided in the “Important Dates” listed on Page 3 above. Responsibility for each task/milestone must be included as well.

3.2.5.2 Samples of proposed marketing and other program materials for the program.

3.2.5.3 Explanation of data security measures employed by the bidder regarding confidential participant information that may be shared with firm (participant name and one of the following: social security number or financial account number or utility account number) and confirmation that security measures comply with applicable federal, state laws covering protection or Personal Information of residents of the applicable state. (In Massachusetts the applicable Regulation is 201 CMR 17.00 – STANDARDS FOR THE PROTECTION OF PERSONAL INFORMATION OF RESIDENTS OF THE COMMONWEALTH [Effective date of Mass Regulation is 3/1/10].)

3.2.6 Resumes for Key Personnel: Provide resumes or brief professional histories for key personnel who will provide services, including resumes from key personnel from sub-contractors.

3.2.7 Alternate Approaches: Respondents are encouraged to submit alternate cost-effective approaches and creative solutions for providing services described in the work scope.

3.2.8 Sample Reports: Provide any samples of program reports that may be helpful to implement and manage the programs.
3.2.9 References: Provide references from other service engagements that best demonstrate the proposed services with an explanation of individual or team roles in each project, a description of the services and key energy efficiency or renewable energy achievements from the engagements, and client contact information for reference purposes.

3.2.10 Additional Information: Respondents are encouraged to include any information deemed relevant to demonstrating their capacity to meet the requirements outlined in the Scope of Work section of the Statement of Work, in addition to providing the information required in the sections above.

4.0 PROPOSAL FORMS

The following forms must be completed and submitted with Supplier Proposal.

4.1 Form A - Bid Receipt Acknowledgment Form

This form is used by the Supplier to confirm to Company receipt of the bid package and intent to bid. This form should be completed upon receipt of the RFP and returned as soon as possible via email (Patricia.Latimer@NSTAR.com).

4.2 Form B - Supplier Bid Proposal Form (Cover Sheet)

Form B - Supplier Bid Proposal Form (Cover Sheet) MUST be the first page of the Supplier proposal.

4.3 Form C - Execution of Proposal by Officer of Supplier

The Supplier MUST complete this form and include it in Volume 1 of the proposal. The form is used to:

- Indicate how long the proposal is valid.
- Confirm in writing that Supplier's proposal represents a complete offering and includes all exceptions to the RFP.
FORM A – BID RECEIPT ACKNOWLEDGMENT FORM

RFP #1905 - Multi-Family Market Integrator

COMPLETE AND RETURN UPON RECEIPT TO:

Patricia.Latimer@NSTAR.com

The __________________________ Company hereby:

1. __ I acknowledge receipt of the above listed Bid Documents.

_________________________________________________________________________

And

2. __ My proposal will be submitted on the required due date.
   __ I choose to not bid, as fully explained in letter to be transmitted under separate cover.

Our Proposal shall list the following companies as joint venture partners or subcontractors:

_________________________________________________________________________

Please address future inquiries on this work (if different from original mailing) to:

Name: ________________________________

Company: ______________________________

Address: ______________________________

_________________________________________________________________________

Phone: ________________ Fax: ____________

by: ________________________________

(Signature)

Title: ______________________________

Date: ______________________________
FORM B - SUPPLIER BID PROPOSAL FORM

RFP #1905 – Multi-Family Market Integrator

(COVER SHEET)

NAME OF SUPPLIER: __________________________________________________________

ADDRESS: _________________________________________________________________

NAME OF AUTHORIZED REPRESENTATIVE: ______________________________________

TITLE OF ABOVE: ___________________________________________________________

PHONE NUMBER OF THE ABOVE: _________________________________

Direction: This sheet must be the first page of all submittals. The remainder of the proposal must follow the following format with no exceptions. Additional sections may be added at the Supplier's discretion. Volumes I & II must be separate documents.

<table>
<thead>
<tr>
<th>Volume I: Commercial Proposal</th>
<th>Volume II: Technical proposal</th>
</tr>
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<tbody>
<tr>
<td>TABLE OF CONTENTS OF VOLUME I</td>
<td>TABLE OF CONTENTS OF VOLUME II</td>
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<tr>
<td>Section</td>
<td>Description</td>
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<td>1.0</td>
<td>Commercial Exceptions</td>
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<td>2.0</td>
<td>Pricing</td>
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<td>3.0</td>
<td>Options and Alternates</td>
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<tr>
<td>4.0</td>
<td>EEOC Compliance Verification</td>
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<tr>
<td>5.0</td>
<td>Insurance Certificate(s)</td>
</tr>
<tr>
<td>6.0</td>
<td>Execution of Proposal by Officer of Supplier</td>
</tr>
<tr>
<td>7.0</td>
<td>Vendor Information</td>
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<tr>
<td>8.0</td>
<td>Sample Reports</td>
</tr>
<tr>
<td>9.0</td>
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</tbody>
</table>

Proposal Prepared by (Signed): ________________________________________________

(Typed): ___________________________________________________________________

Title: _____________________________________________________________________

Date: _____________________________________________________________________
FORM C - EXECUTION OF PROPOSAL BY OFFICER OF SUPPLIER

RFP #1905 – Multi-Family Market Integrator

Supplier represents that this proposal is its complete offering and includes all exceptions to this RFP. Supplier agrees that this proposal will be valid for a minimum period of 90 days from date of submittal.

________________________________________________________________________

Supplier

By:

________________________________________________________________________

(Signature)

________________________________________________________________________

(Name)

________________________________________________________________________

(Title), a duly authorized representative of the Supplier

________________________________________________________________________

Date
REQUEST FOR PROPOSALS (RFP)

Multi-Family Market Integrator

Statement of Work

1.0 Summary of Request

This Statement of Work requests bids to assist the Massachusetts utilities and energy efficiency providers [Program Administrators or (PAs)] in Massachusetts in implementing newly re-designed statewide energy efficiency programs for the multi-family market sector. Specifically, the PAs will be contracting for Multi-Family Market Integrator (MMI) services where the primary function is to ensure that program participants have access to cost-effective, whole building and fuel blind energy efficiency products and services regardless of whether there will be one or more PAs involved in serving the participant. Additionally, the MMI will be responsible for acting as the conduit through which requests, questions and concerns are directed to ensure that participants are not required to contact multiple parties during the project lifecycle. Providing participants with a seamless experience is a key success factor for the delivery of these programs.

2.0 Background

The Massachusetts Green Communities Act was signed into law on July 2, 2008. This legislation was designed to promote enhanced energy efficiency throughout the Commonwealth. Specifically, the Green Communities Act requires gas and electric distribution companies and municipal aggregators (together “Program Administrators”) to develop energy efficiency plans that will “provide for the acquisition of all available energy efficiency and demand reduction resources that are cost effective or less expensive than supply”. In connection with these energy efficiency plans, the Green Communities Act established a new advisory body, the Energy Efficiency Advisory

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1 A multi-family building is described as having 5 or more units. The program design will include services for retrofit and new construction.

2 The definition of fuel-blind includes gas and electric energy efficiency services.
Council (“Council”), consisting of eleven voting members of diverse backgrounds and expertise, and a non-voting member from each Program Administrator. Pursuant to the Act, the electric and gas Program Administrators, respectively, were required to provide a statewide electric efficiency investment plan and a statewide natural gas efficiency investment plan was submitted on October 30, 2009 for the Department of Public Utilities (DPU) approval and comment.

3.0 Multi-family Program Designs

The program designs being implemented will serve both the retrofit and new construction multi-family (five or more dwelling units) segments, and within these categories, energy efficiency products and services will be offered to market rate and low-income participants. Please see http://www.ma-eeac.org/docs/DPU-filing/ElectricPlanFinalOct09.pdf and http://www.ma-eeac.org/docs/DPU-filing/GasPlanFinalOct09.pdf for the following program design templates filed by the PAs.

- Multi-family Retrofit Program
- Multi-family New Construction Program
- Low Income Multi-family Retrofit Program

4.0 Multi-Family Program Administration

The programs will be administered cooperatively by the Massachusetts natural gas and electric Program Administrators. Collectively, the Program Administrators will form a Multi-family Steering Committee which will be responsible for program oversight, direction, and promoting continuous improvement/best practices with regard to the multi-family market.

Program Sponsors

- Bay State Gas
- Berkshire Gas
- Blackstone Gas
- Cape Light Compact
New England Gas
- National Grid Electric and Gas
- NSTAR Electric and Gas
- Unitil Gas and Electric
- Western Massachusetts Electric Company

5.0 Scope of Work
As stated in Section 2.0 above, the PAs are developing a program through which participants may have access to both gas and electric energy efficiency measures and services, as well as residential, commercial and industrial measures within each fuel type. Depending upon the measures and services to be provided and installed, and the number of PAs serving a facility, there could be multiple vendors involved in delivering the program. Under the existing program rules, a participant would need to contact each of these multiple parties to obtain the needed services. In order to provide the participant with a “seamless” experience, the MMI will facilitate the initiation of a project and will serve as the project manager by coordinating and tracking the status of the various services required for a job. While the scope of work for the MMI includes additional tasks, as described below, the integration function allowing for a seamless participant experience is the primary role of the MMI.

Please see Appendix A for planned participation numbers for all PAs for years 2010 through 2012.

The full scope of work for the MMI function includes the tasks described below.

Task 1 – Multi-family Market Integrator Services

5.1 Allowing for Multiple Points of Entry
Because of the diversity within the multi-family sector and the various market actors that will be involved in lead generation, the programs provide for multiple points of entry that will all ultimately provide participants with a comprehensive program offering and a
seamless experience. Participants may enroll in the program through a variety of entry points: use of a toll-free number or their request for services may be initiated by other parties such as a PA, a PA’s Account Executive, a contractor, a consultant or engineer and a newly designed statewide energy efficiency website.

5.2 Staffing Toll-free Telephone Line
The marketing strategy for the Multi-family programs will include establishing, maintaining, and advertising a toll-free telephone number which participants may use to enroll in the programs. Staffing for this telephone line will be the responsibility of the MMI. Personnel answering the telephone will be expected to conduct participant screening as described below. The hours of operation will include 8:00 a.m. to 5:00 p.m., Monday through Friday, excluding major holidays. There could also be the possibility of some weekend hours. After-hours calls will be answered electronically to ensure all incoming calls and inquiries are captured and returned within the next business day.

5.3 Participant Screening
The goal of the screening process is to obtain answers to specific questions in order to ensure that the appropriate resources can be assigned to perform a whole-building assessment (WBA) of the facility. A preliminary list of the screening questions for the Retrofit and New Construction Programs is included in Appendix B.

Requests may come to the MMI through various avenues. The initial contact, whether vendor, account executive, PA Program Manager, or other entity will obtain the participant information from a potential participant and forward to the MMI for screening purposes. If the request comes directly to the MMI, whatever data that is readily available can be collected during the call, recognizing that an additional discussion may need to take place to gather additional data.

After obtaining the responses to the screening questions, the MMI will have the ability to determine whether or not the facility qualifies for the program. If the participant is eligible for a program other than Multi-family, the MMI will provide the appropriate contact information.
In the event that a Multi-family retrofit project consisting of 50% or more residential participants living in facilities are on a Low-income rate or are an income-eligible resident living in a Multi-family non-institutional facility with five or more units owned or operated by a non-profit entity or a public housing authority, the MMI should screen the participant and refer the lead to the appropriate LEAN (Low Income Energy Affordability Network) Lead Vendor for eligibility confirmation. If a project is not eligible under the income eligible program, LEAN will forward the request back to the MMI. For statewide tracking purposes, the LEAN network will report back to the MMI when a facility is complete.

Unless otherwise noted, the remainder of the process refers to market rate retrofit projects only.

5.4 Whole Building Assessment (WBA)

One of the key program goals is to encourage participants to implement all cost-effective energy savings opportunities. To encourage such action, the MMI will offer a fuel-blind\(^3\), whole-building assessment (WBA). Depending upon the interest expressed by the participant, the MMI will arrange to have a PA auditor review the screening information collected from the participant along with usage data for the past year. If the PA auditor determines that there is potential for savings, the PA auditor will arrange for the appropriate party to conduct an assessment and promptly notify the MMI that the assessment has been scheduled. The PA’s audit vendors will be assigned by geographic location or by a pre-approved methodology developed by the appropriate PA. Each PA will provide their individual vendor information to the MMI.

In the event that a participant declines the WBA and requests treatment of a single or a limited number of end-uses, the MMI will follow the “Measure Specific” path described below.

\(^3\) Fuel-blind assessment consists of providing information on all energy saving opportunities. Incentives for natural gas and electricity are offered at this time.
5.5 Measure Specific Path

Despite attempts to encourage a whole building fuel-blind assessment, there may be situations where participants will accept nothing more than treatment of a single or a limited number of end-uses. In these instances, the MMI will follow the Measure Specific path. Depending on the services requested, the MMI will work with the participant to arrange for any site visits or analysis required and will then work in conjunction with appropriate PA vendor (see section titled “Delivery of Measures and Services”) to arrange for measure installation.

5.6 Coordinate Integrated Proposal for Energy Efficiency Services

After the appropriate audits/analyses have been completed, the PA vendors will submit their respective recommendations (measures and incentives) for the facility to the MMI. Once PA approval is obtained, the offer will be packaged by the MMI for presentation by the appropriate parties (may be measure and PA-specific) in order to assist the participant to fully understand the offer. This may include, but is not limited to, PA-specific vendors or PA staff. The parties authorized to approve the participant offer will be required to sign the appropriate form(s) in order for the project to progress to the installation phase of the program.

5.7 Delivery of Program Measures and Services

Once the authorization forms are signed by the appropriate party(ies), the MMI will work closely with the PA installation vendors (each PA will provide a list for its service territory) in scheduling the work. The MMI and the PA vendor will ensure, to the extent possible, that the units will be treated in a single visit to minimize disruption to occupants. In the instance where services for common areas or major measures are being installed that may require multiple visits, the MMI and the PA vendors will work to minimize the number of site visits, particularly where the facility owner/manager is required to provide access. Although the designated PA vendors may employ sub-

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4 If a customer does not opt for all of the eligible measures at once, they will have up to one year to pursue the remainder of the offer.
contractors, the MMI will coordinate all schedules with the PA primary vendor as opposed to scheduling directly with the sub-contractors.

There will be instances when a participant may want to use their own vendor or in-house maintenance staff. These requests will be brought to the attention of the appropriate PA or PA Vendor for approval prior to scheduling the required work. PA approval may be granted provided that personnel recommended to perform the services meet all applicable municipal, local, state, and federal codes, standards, and regulations, as well as program requirements. Once a project is approved, the MMI will schedule the work with the participant vendor/staff. In the event that the participant vendor/staff can only perform a portion of the work, the MMI will coordinate the schedule for the remaining work with the PA-specific vendor(s). Participants opting to use their own vendors will be required to sign documentation stating that they assume complete responsibility for the work being performed.

5.8 Track Project Milestones
Once the required work (including both audit and measure installation) is scheduled, the MMI will track the completion milestones associated with program services. This will allow the MMI to perform the following functions:

- responding to participant inquiries on scheduling
- proactively follow-up with vendors on any schedule changes (including notifying the appropriate PAs)
- providing monthly, quarterly, and yearly performance statistics to the PAs (described in detail in the section on Administration)

5.9 Response to Participant Inquiries throughout Project Lifecycle
In addition to facilitating the delivery of program services, the MMI will be responsible for acting as the conduit through which participant questions and concerns are directed. This will prevent customers from having to contact multiple parties during the project lifecycle. There will be some inquiries that the MMI may respond to directly. If this is not the case, the MMI is expected to work with the PAs and/or their vendors (as
appropriate) to achieve resolution. Depending on the complexity of the issue, responses
directly from the PA staff or vendor may be required. Under these circumstances the
MMI will be informed in writing of the resolution so that there is complete understanding
of the project status.

5.10 Complaint Resolution
The MMI is expected to work with the PAs to develop a complaint resolution procedure
to ensure professionalism, participant satisfaction and program compliance. The nature
of the complaint will determine whether or not the PA(s) needs to be involved in the
resolution process. The appropriate PAs will be notified of all complaints from
participants within their service territories. All complaints, whether requiring PA
intervention or not, shall be documented, archived, and forwarded to the particular PA
within 24 business hours of its occurrence.

5.11 Participation in Statewide Multi-family Steering Committee
A Multi-family Steering Committee will be established with the goal of promoting
continuous improvement/best practices with regard to the multi-family market including
both retrofit and new construction. The MMI will coordinate monthly meeting agendas
and locations. In addition, the MMI will be an active participant in the Steering
Committee. In this role, the MMI will provide input based on its experience with
participants and the PA vendor staff.

5.12 Participate in Program Evaluations and Quality Assurance/Quality Control as
Required
Once sufficient experience with the statewide Multi-family program has been obtained,
the PAs may contract with a third-party vendor to perform a process and/or impact
evaluation. The MMI will provide support for the evaluation, quality assurance and
quality control (QA/QC) efforts. MMI participation may include, but is not limited to,
responding to interview questions and providing data collected though the program. The
evaluation vendor, QA/QC vendor and MMI will work to develop data transfer protocols
as required.
5.13 *Program Administration*

The MMI will perform the following administrative functions:

- Develop and print standard forms and materials needed to implement the program (using PA logos)
- Detailed invoicing will be provided to each PA based on the services provided in their territory. In the instance where a PA has both gas and electric service territory, separate invoices will be generated for both. Invoice processing will conform to each PA’s terms and conditions.
- Reporting must fill the PA requirements for all regulatory bodies in Massachusetts, including the following categories:
  - *Statewide Statistics*: Assemble project level statistics for statewide reporting. Each PA receives data from either their installation vendor or a rebate form to indicate what measures were installed in their service territory. The MMI will receive data files from the PAs or PA vendor(s) so that project-level statistics (i.e. total savings per project) can be compiled for quarterly and annual reporting periods.
  - *Status Reporting*: Quarterly and annual status reporting include data such as, but not limited to, number of projects initiated during the period and number of projects in each of the project statuses as of the closing date of a reporting period. The PAs will also want to obtain statistics on participants who opted for only some of the measures offered (did the participant complete other recommended measures within a year?).
  - *Barrier Code Reporting*: While the PA vendors will track the actual measures installed, it is also important for the PAs to determine which measures included in a project offering were not opted by the participant along with the reasons. The reasons will be recorded in terms of a “barrier code”. The PAs will use this data to understand why certain measures are not being selected and then modify the program design accordingly. Reports will be provided on a quarterly and annual basis.

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5 Barrier tracking pertains to retrofit programs only.
Ad hoc Reporting: The Multi-family Steering Committee may request data to help inform programmatic decisions. While the MMI will not be involved in scheduling services for projects with only one vendor, new construction, and low-income Multi-family projects, data from these projects will be tracked and included in the reporting.

5.14 Marketing Services:

- The MMI will perform the following marketing functions: Develop and maintain basic program marketing materials (print) for statewide program (e.g., program brochure(s), letterhead, and offer forms). Additional marketing services may be requested by individual PAs.
- Work with Steering Committee to develop a participant satisfaction survey and then implement the survey and report results (by PA and for state as a whole).

5.15 Post-Participation Follow-up⁶:

The PAs believe that it is important to reinforce energy efficiency-related actions with feedback for the participant. The feedback for this program involves informing the participant of the change in energy usage one year after participation. Upon request, the information will be provided to program participants either via email or regular mail based on post-implementation data provided by the appropriate Program Administrators⁷.

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⁶ Post-participation follow-up pertains to retrofit projects only.
⁷ The MMI will be required to sign Non-public Information disclosure agreements with each PA before participant data may be released.
Appendices

Appendix A – Program Administrators’ Program Participation Goals for 2010-2012

Document included in RFP Package as “Appendix A – PA Participant Projection” in pdf format.

Appendix B – Participant Questionnaire

Document included in RFP Package as “Appendix B – Data Gathering Form” in pdf format.
REQUEST FOR PROPOSALS
MULTI-EVALUATION TASKS FOR MASSACHUSETTS ENERGY EFFICIENCY PROGRAMS IN THE SPECIAL AND CROSS-SECTOR STUDIES AREA
2010 – 2012

The Massachusetts Program Administrators¹ (PAs) for the Massachusetts Energy Efficiency (EE) programs in the Special and Cross-Sector Studies area request proposals to perform various evaluation tasks addressing the state of Massachusetts, as described in this Request for Proposals. This RFP covers work for program years 2010 through 2012.

BACKGROUND

MASSACHUSETTS EVALUATION FRAMEWORK

On September 8, 2009, the Massachusetts Energy Efficiency Advisory Council (EEAC or Council) unanimously approved a resolution developed collaboratively by the Program Administrators (PAs) and the EEAC Consultants. This resolution set forth a new administrative framework for the performance of Evaluation, Measurement and Verification (EM&V) in Massachusetts for Energy Efficiency Programs. The full Resolution is presented verbatim in Appendix A. Below is a summary of the Resolution, its effects, and its relevance to the current RFP.

Under the Resolution, the EEAC will assume an oversight role over the EM&V activities of the PAs to ensure the objectivity and independence of those activities, and the perception of such, and to help ensure consistency, timeliness, and credibility. While the PAs and EEAC Consultants (acting on behalf of the EEAC) will continue to work diligently to reach a consensus on evaluation issues, where there are areas of difference that may arise that cannot be resolved through consensus during the ongoing interactive process between the EEAC Consultant and the PA evaluation staff, authority for decision-making will reside with the EEAC or its Designee. This arrangement is subject to a system of appeals in the event of any disputes that cannot be resolved collaboratively.

The Resolution also restructures EM&V in Massachusetts, so that most studies are to be performed at a statewide rather than a PA-specific level. It specifies that the range of evaluation activities be divided into 5 to 7 semi-permanent statewide Research Areas, oriented primarily to specific target markets. Each Research Area is to have an assigned Study Manager from the PAs, an assigned EEAC Evaluation Consultant, and an independent evaluation contractor who conducts the studies under a long-term contract with the individual PA companies.

¹ The PAs include Bay State Gas, Berkshire Gas, Cape Light Compact (CLC), New England Gas, National Grid (Electric & Gas) - NGrid, NSTAR Electric and Gas Corporation (NSTAR), Western Massachusetts Electric (WMECo), and Unitil/Fitchburg Gas & Electric (Unitil).
Consistent with the Resolution, the PAs and the EEAC Consultants subsequently developed a system of six statewide Research Areas, as follows:

1. **Residential Retrofit and Low Income.** This category includes home cooling and heating equipment, home heating and water heating, residential and low-income retrofit, weatherization, and most aspects of multi-family programs.

2. **Residential Retail Products.** This includes home lighting and appliance programs.

3. **Residential New Construction.** This includes residential and low-income new construction and major renovations programs, including baseline studies, as well as codes and standards and compliance efforts. This Research Area also includes baseline studies of construction practices for both single- and multi-family homes.

4. **Non-Residential Large Retrofit and New Construction.** This includes C&I new construction (small and large) and major renovation, plus large C&I retrofit programs.

5. **Non-Residential Small Retrofit.** This includes the current C&I small retrofit, direct install programs. This category would also include any future programs that may target small non-residential customers.

6. **Special and Cross-Sector Studies.** This includes those studies that do not fit readily the other Research Areas above, as well as those studies that are cross-sector in nature. So far, they include cross-sector free ridership and spillover studies; non-energy benefits; behavioral programs; community-based pilots; and marketing, public education, and outreach activities. They may come to include other subjects.

Massachusetts’ evaluation planning and implementation schedule calls for selecting contractors and finalizing contracts for all six Research Areas by April 15, 2010. Evaluation activities under each contract are to be conducted subject to the terms of the EEAC Resolution. *The purpose of this RFP is to select an evaluation contractor for the sixth Research Area, Special and Cross-Sector Studies.*

**EARLIER CROSS-CUTTING STUDIES**

Massachusetts has a history of conducting many non-program specific and program cross-cutting evaluations. Programs that do not fit easily into one of the other five Research Areas are likely to be included in this cross-cutting Research Area. Some of the topic areas that are known to be assigned to this Research Area include:

- Cross-cutting free rider and spillover studies -- PAs have commissioned several
free-rider and spillover studies over the past 15 years.

- Non-energy Benefit studies — The PAs have sponsored more than one study of non-energy benefits, one focused on commercial & industrial benefits in 2007, and one focused on benefits for residential new construction during 2007-08.
- Social marketing and cross-cutting behavioral studies—A behavioral program, where large blocks of residential customers are provided access to real time billing and support and encouragement in reducing energy use, has just begun at one PA and will soon be followed by similar programs at other PAs.
- Cross-cutting area-focused programs – community-based pilots – have begun in several locations (e.g. Cambridge and Marshfield) and among some groups (e.g., Portuguese and Chinese speakers).

OBJECTIVE

This RFP seeks a qualified bidding team to complete an assorted array of evaluation activities for Massachusetts energy efficiency programs over a multi-year period. The winning bidder will be the evaluation contractor for Special and Cross-Sector research. Given the diversity of subjects to be researched, the PAs cannot rule out the possibility that more than one winning bidder could be selected, or that some tasks might require special RFPs, depending on the arrays of subcontractors proposed with the bids. The winning bidder will be expected to handle all evaluation issues, with the help of its proposed sub-contractors where specific skill sets are required that the evaluation contractor alone may not possess.

This will be a multi-year contract, covering program years 2010 through 2012. Main focus areas over the next three years will include

- Free ridership and spillover studies that cover multiple program areas;
- Non-energy benefits;
- Behavioral programs; and
- Community-based programs (pilots so far).

They will also include
- Umbrella marketing, public education, and outreach activities; and
- Various other undetermined evaluation issues.

This RFP presents some tasks for which we request specific technical and cost proposals. For other less defined tasks, we seek only billing rates, qualifications, and general approaches.

In addition, the selected contractor will co-ordinate an early report to guide mid-course program corrections during the late summer and early fall of 2010. The report must be completed and filed by July 15. The contractor will co-ordinate sub-reports due July 1 from this Research Area and three other Research Areas, under direction by the PAs.
The table listed below gives bidders an idea of definite and possible evaluation activities, with approximate timelines. Details of each project, including both Scope and Timeline, will be determined once an Evaluation Contractor is selected. Definite projects are shaded darkly, while possible projects are shaded lightly. Timelines may vary a bit from those shown for 2011 and especially 2012.

<table>
<thead>
<tr>
<th>PLANNED EVALUATION ACTIVITIES BY QUARTER</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td>Coordinate Mini-Global Process &amp; Marketing Evaluation</td>
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<td>C&amp;I Free Riders &amp; Spillover</td>
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<tr>
<td>Other Evaluation Issues</td>
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Responsibilities of the Evaluation Contractor will include managing the various individual evaluation tasks, managing sub-contractors as necessary, collecting data, analyzing data, providing individual formal reports and presenting results to the PAs and the EEAC for the various evaluation tasks, providing an annual report that summarizes the year’s evaluation activities, and assisting in and developing an annual evaluation plan at the start of each program year.

SCOPE OF WORK

PLANNED ACTIVITIES

Early Global Process and Marketing Evaluation

In the Summer of 2010, Massachusetts will be undertaking a mid-course adjustment process to consider whether any changes to program approaches are required for 2011-2012. Given the sharp increase in program budgets that is planned for these years, and the potential magnitude of the programming and resource allocation decisions that may be made as part of the mid-course adjustment process, it is critical that timely information be available regarding key program process issues and initial market response to new and expanded program services. The Massachusetts PAs are therefore committed to completing a global process and marketing evaluation by July 15, 2010 to file with the EEAC. Given the short time, the report will be short and may be viewed in some ways as preliminary. It will emphasize qualitative information more than quantitative. This evaluation is expected to cover:
(1) Customer and market response to new, expanded or revised marketing efforts;
(2) A review of sales techniques that are effective;
(3) An early review of electric and gas integration efforts and single point of contact / cross PA integration in MA, as well as comparison to selected other states
(4) An early review of projects that are comprehensive, whole building, or otherwise targeted to deeper savings; and
(5) Process evaluation and design review of community-based projects.

More information on the tentative scope and focus of this evaluation is provided in Appendix B.

The global process and marketing evaluation is envisioned as a single effort encompassing several program areas. Individual pieces of the evaluation are expected to be performed by the members of the contractor teams for four research areas: Residential Retrofit, Large C&I, Small C&I, and Special/Cross-Cutting.

The Special/Cross-Cutting contractor team will play a leading role in melding the results from the four research areas, with overall direction and coordination provided by the PAs and the EEAC Consultants. Each of the four contractor teams will be responsible for covering those topics shown in Appendix B that are specific to its assigned research area. The Special/Cross-Cutting contractor should allow at least 50 hours, specifying particular staff, to meld these four resulting mini-reports into one, from July 1 to July 15.

For the research team pursuant to this RFP, this means a mini-report by July 1 on community-based pilots, umbrella marketing efforts, and (in conjunction with other research areas) program integration across PAs and between electric and gas companies. See discussion further below, under those three topics.

**Cross-Cutting Free Ridership and Spillover Research**

A commercial-industrial (C&I) free rider and spillover (FR/SO) study was last conducted for the PAs in 2007. See Appendix C for a report for one PA. It used a statewide methodology established in 2003 to estimate full and partial free riders. Spillover was divided between participants and non-participants. Non-participant spillover was based on a survey of suppliers, designers, and various trade allies. It produced separate free-rider and participant spillover estimates by program for each PA, by end use. It produced statewide estimates by end use for non-participant spillover.

A new C&I FR/SO study is being conducted in early to mid-2010, using the methodology from 2003. However, that study is not pursuant to this RFP. The study will be based on interviews, primarily by telephone, with small business and large business customers, equipment suppliers, and design professionals. It will account for varying degrees of partial free ridership. It will produce free-rider and spillover estimates by program, by technology, by PA.

**METHODOLOGY STUDY**
A FR/SO study to be completed in October or early November 2010 should review the methodology of how to count free riders and spillover. It might adopt the current methodology in its entirety. Or it could recommend changes for pre-approval by the PAs and the EEAC. Issues to consider include how partial free-ridership is calculated, handling of acceleration issues, whether out-of-state spillover should be considered, and whether spillover into similar but not identical equipment should be counted.

The cost of this study, with proposed tasks, and hours by task, and a proposed timeline during 2010, should be included in the bid. Limit the discussion of issues, description of tasks, and timeline to 4 pages.

C&I FREE RIDER/SPILLOVER STUDY

The winning bidder should plan to conduct a similar study in 2011 and perhaps in 2012, depending on how much the PAs need fresh data.

Based on the most recent C&I FR/SO study, the bidder should assume it will survey 1,500 business customers who participated in the various programs at the PAs during 2009. The majority of them will be National Grid and NSTAR participants, but many will be participants from the other PAs. Assume 35% will be small business customers. For estimating non-participant SO, the bidder should assume it will interview 100 equipment suppliers, design professionals, and other trade allies. The proposal should specify an incremental cost per participant and trade ally interviewed.

The costs for one such study should be included in the bid, but, as stated above, the study pursuant to this RFP will occur in 2011 and perhaps another one in 2012, not 2010. The bid should include a suggested timeline of the tasks to be done. Tasks (associated with dates) should include at least a kick-off meeting, a work plan, sample plan development, general interview schedule, analysis, draft report, final report, and presentation(s). Limit the discussion, description of tasks, hours by task, and timeline to 5 pages or fewer.

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A residential FR/SO study is not contemplated under this research area at this time. One may target, for example, residential new construction only, and be administered via that research area. However, a residential FR/SO study that targets residential new construction and retrofits jointly, under this research area, cannot be ruled out.

Non-Energy Benefits

Over the course of this contract, the Contractor will be responsible for developing estimates of Non-Energy Benefits for both residential and C&I sectors as described below.

As background to current values, estimation, and considerations in Massachusetts regarding the estimation of Non-Energy Benefits, a paper that focused on a wide range of low-income benefits was filed in D.P.U. 98-100. Among the many benefits were
reduced arrearages, uncollectibles, and terminations; and improved maintenance and property values. See Appendix D. A 2007-08 study focused on seven non-energy benefits of Energy Star Homes, including such things as increased property values and comfort. See Chapter 3 in Appendix E. Another 2007-8 study assessed non-energy benefits that result from large business program projects, such as increased sales and reduced costs for water, O&M, and spoilage. See Appendices F and F1. Although all of these address Non-Energy Benefits from the electric energy efficiency programs, the PAs are interested in the work for this study to cover both gas and electric programs/measures.

Non-energy benefits now being considered but not quantified for the residential Deep Retrofit Pilot include
- Increased Housing Property Value.
- Much higher comfort levels (at given air temperatures) during heating and cooling seasons.
- Ease of maintaining healthy relative humidity.
- Far fewer colds and viruses than in homes, with average/high air leakage levels.
- Keeps money in the local economy, with green jobs.
- Buffers potentially dramatic energy price increases.
- Reduced climate disruption costs from CO2 emissions.
- Reduced SOx, NOx, VOCs, and particulate emissions.
- Increased electricity system reliability (and avoided brown/blackouts) from dramatically lower electric usage (including on-site peak solar generation).
- Decreased utility costs associated with: carrying costs on arrearages, bad debt write-offs, customer calls/notices, shut-offs, reconnections, collections.
- More durable home: No ice dams and less maintenance (with new building exterior)
- Wide window sills.
- Much quieter interior environment.

Note that some of these benefits may be captured elsewhere (e.g., in emission abatement costs), and so would not valued again (twice) in the final report.

A new residential non-energy benefits study or studies to be conducted in 2010 should focus on non-energy benefits for homes. Many benefits will be concentrated among low-income households, but will extend to other households. A few may apply mostly to new construction, while others may apply mostly to retrofit opportunities. Given the substantial differences between low-income and non-low-income residential customers, separate studies may well be warranted for the two groups. Bidder should assume that it will produce separate reports for the two groups.

The residential non-energy benefits study(ies) should begin when the contract is awarded and be completed by September 2010. They should use a literature review, which should include a California study to be completed soon. They may also gather data from PA customers, at the bidder’s option. They should produce separate estimates of benefits by measure, for PA use. They should distinguish between
estimates that can reasonably be applied at a program-wide level and those to be
determined on a site-specific basis.

The costs, with hours and a timeline for the proposed tasks, should be included in the
bid. Limit the discussion, description of tasks, and timeline to 7 pages in all.

There will be an updated C&I non-energy benefits study, to be conducted in 2011 and
possibly again in 2012 (focusing perhaps on a different set of programs, or custom
projects one year and prescriptive ones the other year). The PAs expect that the
methodology would be similar to that used in Appendix F, but with a larger sample than
99, since it would be for several PAs, not just National Grid, and might cover multiple
programs. The bidder should discuss in 1-2 pages generally how it would handle such
a study. The cost of such a study should not be included in the bid. It will be on a time-
and-materials basis.

Behavioral Programs
Behavioral programs are new to Massachusetts. Targeted customers are provided with
information about the energy usage of their neighbors, as well as energy saving tips, all
designed to motivate them to reduce their consumption. So far, 20 utility companies
across the country have initiated these programs. Among the many changed behaviors
suggested are shorter showers, altered thermostat settings and adding power strips.

National Grid began a behavioral pilot program for gas and electric customers in late
2009. NSTAR and WMCo are likely to initiate similar pilots in the near future.

Impact evaluations in other states have analyzed energy bills of participants and non-
participants before and during the program. See Appendix G for an example. They
have found appreciable systematic differences by season, as well as cumulative effects.
Simulation models or interval (smart) meters to estimate demand savings are a
possibility.

Previous evaluations have not focused on gas savings or combined electric and gas
savings, two impacts that need to be evaluated in MA. The evaluation scope will also
include analyzing survey data. The utilities are interested in testing customers’
frequency of use, recall of material, changes in knowledge about energy efficiency and
how they incorporate that knowledge in their actions.

IMPACT EVALUATION

The selected contractor will work with the PAs in third quarter 2010 to design program
data tracking to facilitate evaluation thereafter. Impact evaluation will follow, beginning
near the end of 2010 or in early 2011. It will be repeated at least annually. In fact,
impact evaluations may be conducted targeting the winter peak period and again
targeting the summer peak period. The initial evaluation will focus on National Grid, but
later evaluations will cover multiple PAs, producing different estimates by PA.
The bidder should assume it will conduct its first billing analysis will include 10,000 participants and a like number of non-participants. (The actual number of participants is speculative at this time.) The bidder should also assume that it will survey a smaller number of participants to shed more light on the actions taken in response to the program, which in aggregated result in the observed savings (if any). If the bidder proposes an alternative method, it should explain why. The bidder should assume that it will be the one to clean the billing data. The costs of this initial impact evaluation, including input into data tracking system design, with a timeline and hours for the proposed tasks, should be included in the bid. Limit the discussion, description of tasks, and timeline to 6 pages.

PROCESS AND BEHAVIORAL RESPONSE EVALUATION

A first process evaluation for the program should be conducted starting in the third quarter of 2010. One question to look at would be “What exactly are people doing in response to the information received?” The answer would be %s engaging in each of the recommended behaviors. A second question would be “How persistent are the behavioral changes?” A third would be “To what extent does this information draw people into other programs? That is, how much double counting is going on?” The contractor would use PA program participant records in tallying double counting and subtracting its effects. There will be other questions.

The costs of this initial process and behavioral response evaluation, with a timeline and hours for the proposed tasks, should be included in the bid. Limit the discussion, description of tasks, and timeline to 4 pages.

The selected contractor must demonstrate experience with impact evaluations, behavioral research, and energy billing analysis, or the ability to sub-contract in order to fill experience gaps.

Community-Based Pilots

BACKGROUND

Community-based programs target homes and businesses in particular cities or towns. They use an integrated approach, with publicity directed at all residents and businesses, often coordinated with local government. They often focus on reducing greenhouse gas emissions as well as saving energy.

When thoughtfully designed and executed, community-based efforts can be a key tool in effecting deep, comprehensive penetration of energy efficiency in a neighborhood, city or town. Specifically, community-based programs can achieve deeper penetration by adding a “pull” component to the “push” of traditional marketing efforts.

To this end, Program Administrators in Massachusetts have implemented several community-based pilots recently. These include:
Energy Smack Down (NGRID/NSTAR)
Marshfield Energy Challenge (NSTAR)
MAPS Pilot (NSTAR) on-going
Cambridge Energy Alliance (NSTAR) on-going
Western Mass Saves (WMECo)

Most of these are described in more detail in Appendix H.

The Massachusetts Three-Year Energy Efficiency Plan provides for continuing these efforts. The PAs can work with not only city/town officials but also community organizations that have existing influential relationships within cities, towns, regions, and within demographic and special interest groups. Some of these organizations have already promoted energy efficiency to their members, while others have strong networks but have not yet focused on energy issues. The PAs will seek to develop enhanced strategies to reach out to non-English speaking consumers, low-income customers, and groups that have historically low participation, and to explore the potential for partnerships with representative community organizations.

The PAs will select the communities with the greatest opportunities for success, based on an assessment of the proposals submitted. Because community-based efforts require a substantial and focused effort by both the PA and the community, the PAs must focus their energies by limiting their initiatives to a few communities at a time.

So far, there are three models for community-based pilots in the Three-Year Plan. Two are community-based outreach, one led by the PA, the other by the community. The Marshfield Energy Challenge is an example of the first type and Renew Boston will be another. The MAPS program is an example of the second type and the Main Street Program will be another. For the third type, community mobilization initiatives (CMIs) include a labor component (green jobs with a career path) to deliver the energy efficiency measures and services. The Chinatown and New Bedford CMIs will both start in 2010, beginning this type. More community-based projects of all three types may be added during 2010-12.

2010-2012 EVALUATION ACTIVITIES

2010 TASKS
2. Provide Support to Develop Content and Format for Initial Review of 2010 Pilots

1. Complete Process Evaluation and Assessment of Cost-effectiveness for Efforts Before 2010: completed pilots or pilots with enough history to support this effort. Because each pilot is somewhat unique, the process evaluation will need to be tailored to each effort. Evaluated savings for individual measures from other programs could be used in assessing cost-effectiveness. The evaluation should
support attribution of effects (or partial lack thereof) to the pilots.

Questions to consider in the process evaluation include:

a. Did the pilot meet its objectives?

b. Which pilot components worked well and which ones did not achieve the expected benefits? To what can these relative successes and failures be attributed?

c. How did the inclusion of the community group affect the participation rates?

d. Targeted outreach efforts generally require a separate process (outside the existing intake process) to transfer customer jobs to the appropriate vendor. How was this accomplished and were any specific process issues encountered in this area?

e. If pilot participants had questions or concerns once their application was completed by the outreach partner, who did the customer call and how were these contacts handled? What were the successes and challenges encountered in this area?

f. Were there non-resource savings, such as job creation, that need to be quantified to determine the pilot’s cost-effectiveness?

g. Was the pilot cost-effective? (It is important to note that some pilots may not be cost-effective, because of limited size, but an assessment of whether the program is likely to be cost-effective on a larger scale is required.)

h. How does the BCR for the customer group participating in the pilot compare to the BCR for customers who received the same measures/services outside of the pilot?

A few of these and other questions may be suitable for a mini-report July 1, but some of them await assessment in a later, fuller report.

Pilots to be evaluated include:

- Marshfield Energy Challenge (NSTAR)
- Energy Smack Down (NGRID/NSTAR)
- MAPS Pilot (NSTAR)
- Cambridge Energy Alliance (NSTAR)
- Western Mass Saves (WMECo)

A preliminary mini-report should be completed by July 1, 2010. It should include the Marshfield pilot and may include other pilots. It, and reports from three other Research Areas, will feed into the global process and marketing evaluation report. A more in-depth report, based on further (and updated) research, including more pilots, should be completed late in 2010.

Bidders should describe a plan to address the issues raised above for this project. Bids should include discussion, a list of tasks with hours and a timeline, and a full budget to complete this project. Limit this to 5 pages.

2. Provide Support to Develop Content and Format for Initial Review of 2010 Pilots

2 An evaluation of the Marshfield Energy Challenge will be completed by the end of February. The evaluation effort for this proposal will be limited to comparing/contrasting the effectiveness of this outreach approach with others which have been implemented.
The PAs must complete a report documenting the results of an initial assessment of the 2010 pilots by September 30, 2010. This document will inform the planning process for 2011. This time frame does not allow for a formal evaluation; however, the data collected and assessments performed need to support the formal evaluation that will be completed in 2011. This will ensure that these efforts are performed cost-effectively and address any equity issues deemed appropriate by the PAs and the EEAC. The evaluation contractor will be required to work with the PA and EEAC consultant staff to develop the content and structure for this report, on a tie and materials basis.


This task is similar to (1) above, except that any equity metrics adopted by the PAs and EEAC must be included in the evaluation of programs which begin after the metrics have been established. In addition, the CMI pilots to be conducted in 2010 have a labor component that was not included in any of the 2009 initiatives.

It is also important that any other non-energy benefits (such as the ability of the community group in conjunction with local government to leverage ARRA funds to provide gap financing or gap funding) should be assessed. The ability of the community group to identify qualifying low income customers who are currently not receiving LI benefits should be assessed as well.

Pilots Identified to Date:
CMI Chinatown (NSTAR/NGGrid)
CMI New Bedford (NSTAR/NGrid)
Community-based efforts – community lead (NSTAR)
MAPS Program (NSTAR)
Cambridge Energy Alliance

A full report on these pilots should be completed late in 2010 or early in 2011.

Bidders should describe a plan to address the issues raised above for this project. Bids should include a set of tasks, with hours and associated timeline, and a full budget to complete this task. Limit this to 5 pages.

2011 TASKS

Evaluations begun in 2010, but not finished in 2010, should be completed.
Provide support to assess programs implemented in 2011, by September 30, 2011.

2012 TASKS

1. Complete evaluations for 2011 program year. (While the evaluation of the 2010 programs focuses on process issues, the study of 2011 programs may include a comparison of the savings from participants in the pilot to the savings of participants
being offered the same measures through a program operating outside of the pilot.)


Bidders should not provide a detailed plan or specific cost proposal for 2011 or 2012 tasks at this time.

**Umbrella Marketing**

The PAs have undertaken a number of umbrella marketing efforts, including a joint website. Bidders should provide a plan to assess the effectiveness of the website for customers: how well it engages customers (potential participants). Limit the discussion, tasks, schedule, and costs to 1-2 pages.

Initial assessment should be completed as a mini-report by July 1, 2010. Further update assessments and/or assessments of other marketing efforts should be expected, later in 2010, in 2011, and in 2012. Bidders should not address the updates in detail in their bids.

**Program Integration**

During the course of the Three-Year Plan, the PAs are moving to integrate programs in two dimensions. First, gas and electric programs need to be integrated, so a customer who uses electricity and gas can interface with one program instead of two. This process has begun. Second, PAs in adjoining geographic areas should be able to offer their customers basically the same program, with the same marketing, measures, and incentives. PAs have made progress in this direction in recent years, but the process is not complete.

The bidder should perform an assessment of these integration efforts to date, especially during the first half of 2010. The assessment should be made in light of similar integration efforts in other states. The assessment may be done in interaction with contractors in other Research Areas, such as the integration of residential HVAC (Res Retrofit) in CoolSmart and Gas Networks, as well as integration of gas and electric offerings to large businesses. Among other things, the assessment should analyze determinants of success.

Bidders should provide a plan to assess program integration efforts. Limit the discussion, tasks, schedule, and costs to 2 pages. This assessment is likely to be repeated more than once during the 3-year period, but should not be costed in the bid.

A preliminary micro-report should be completed by July 1, 2010. Updates, based on further research as integration efforts have had time to proceed, should be completed late in 2010 or early in 2011, and again in 2012.

**OTHER EVALUATION WORK**

**Other Evaluation Issues**
In addition to the items mentioned above, different types of activities are conducted on an ad-hoc basis as program changes and other needs dictate.

**Evaluation Planning**
In a typical year, an evaluation plan will be developed somewhere between the last quarter of the previous year and the first quarter of the year to be evaluated. The contractor will assist the PAs and the EEAC in developing the plan, as needed.

**SUMMARY of STUDIES / TASKS**

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<td>Early Global Process and Marketing</td>
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<td>5</td>
<td>Community-Based Pilots Mostly Complete</td>
</tr>
<tr>
<td>late 10-early 11</td>
<td>5</td>
<td>Community-Based Pilots Starting Up</td>
</tr>
<tr>
<td>7/1/10, later</td>
<td>2</td>
<td>Umbrella Marketing</td>
</tr>
<tr>
<td>7/1/10, later</td>
<td>2</td>
<td>Program Integration</td>
</tr>
</tbody>
</table>

**GENERAL DELIVERABLES**

Work should begin by **April 15, 2010**. Earlier work on reports due by July 1 is encouraged. In general, the selected evaluation contractor will be expected to deliver the following items during the course of this effort.

- Work plan (covering the first 12 months), due at the outset of the project. This is to include a schedule and an allocation of evaluation staff resources among the various evaluation tasks described under the Scope of Work. It should also detail how and when the evaluation contractor will make use of sub-contractors. In addition, the plan should indicate what reports will be issued when.
- Draft Questionnaires and/or interview guides, one month before any scheduled surveying activities, as relevant.
- Sample Selection
  - For any activity that requires a sample to be drawn, the contractor should suggest the number of participants necessary. Due to various constraints on sample sizes, the achievement of statistical significance within certain parameters may not be realistic, but where it is possible, the sample should be sized to provide results ±10% precision, with 90% confidence. Should this not be attainable, the proposal should suggest an appropriate sample size and estimate the associated level of confidence and precision. Steps should be taken to minimize or avoid statistical bias. Any sampling techniques will
need to ensure appropriate representation from Massachusetts’s populations. Additional groups whose input may have value to the evaluation results may be proposed for consideration. The PAs and EEAC Consultants will have final approval of the sample selection process.

- Formal report on each task or activity as it is completed. This may entail a first draft, final draft, and final report.
- Draft Annual Report, due **January 31, 2011** and succeeding January 31’s. This will be a report summarizing all of the evaluation activities completed by the evaluation contractor through the end of the calendar year. An Annual Report will be due for each program year of evaluation activities.
- Final Annual Report, due upon completion of each calendar year’s evaluation activities, including all supporting documentation, due **March 1, 2011** and subsequent March 1’s.
  - The contractor will present the study findings to representatives of the PAs and EEAC, and respond to questions. An optional briefing session for outside interested parties may also be required. The cost proposal should present the costs for these tasks separately.

**SCHEDULE**

- RFP posted to potential bidders: **January 29, 2010**
- Final questions submitted: **February 19, 2010**
- Final responses posted: **February 24, 2010**
- All proposals due: **March 1, 2010**
- Evaluation Contractor selected: **March 15, 2010**
- Kick-off Meeting: TBD, as soon as conveniently possible after the selection of the contractor.

**Information Requested**

The Massachusetts PAs request that interested evaluation organizations respond to this RFP, jointly or separately, no later than 5 p.m. March 1, 2010 with the following information.

Detailed information in the proposals should cover the first 12 months of evaluation activities (**March 2010** through **March 2011**).

1. A detailed description of the complete scope of work including project schedules, a flowchart and an organizational management structure for the program years 2010 – 2012 (actually, March 2010 through March 1, 2013). Years 2011 and 2012 should be less detailed than 2010. This should be a carefully thought out plan of how, when, and where the various tasks will take place using example questions wherever possible.

This plan should give a reasonably detailed description of how the contractor plans...
to complete each of the tasks described in the scope of work. The descriptions should be most detailed for those studies which are most definitely planned and whose timelines are most definite. For any survey work, a sample of questions and how they would be analyzed may be included in the pertinent appendix.

In addition to the individual page limits for each of the projects specified, the proposal for them jointly should be no longer than 40 pages, exclusive of budgets.

For Years 2 and 3, the bidder should provide a strategic discussion that explains in a broad sense how the evaluation activities will be approached. This should be no more than 5 pages. It is in addition to the 40 page limit for projects primarily in 2010.

Bidders should put their budget and hours details in a separate section, following the sections about the projects and the out years. Within each project section, bidders may include just a single total project budget number, or no number.

If one or more subcontractors will perform a study for one of the projects in its entirety, please indicate which subcontractors will perform which studies.

Any additional pages with examples of survey questions, and possibly how they would be analyzed, should go in an appendix. Such an appendix may address multiple studies, but should be no more than 10 pages. Such an appendix is allowed but not required.

2. Statements of qualification that detail the bidder’s experience and ability to provide multi-year evaluation support should be included. The bidder’s statements should emphasize their expertise and knowledge in surveys; evaluation of marketing, behavioral programs, community-based programs; non-energy benefits; impact studies; billing analysis; process evaluations; cost-effectiveness studies; modeling; and market analyses, including their ability to design and carry out extensive interviewing and survey analysis. Because other, not yet known, evaluation tasks may be required, the bidder’s statement should mention other possibly relevant expertise as well. These statements should be about 5 pages or less.

3. Summary of Study costs. Please use the attached Cost Estimation Table (Appendix I) to provide a summary of costs for 2010. Labor costs should be broken out by project, task and personnel type (e.g., project management, supervision, clerical support, analyst, etc.) Estimates of miscellaneous additional costs should be indicated. **Provide billing rates for years 2 and 3.** The PAs will determine the allocation of total costs to individual sponsors after a contractor has been selected. *(Please note that the selected contractor will be required to contract with and bill each PA separately.)*

4. Two representative examples of experience and documentation skills, such as reports.
5. Names, affiliations, and telephone numbers of 2-5 individuals or organizations for which some similar services have been provided by people and organizations in the bidding team. The Massachusetts PAs and EEAC Consultants may contact these individuals to ascertain the quality and timeliness of previous performance.

6. Details of qualifications of personnel who will be utilized. Summaries of staff experience limited to 2 pages each are preferred, but not required.

Except for sample report, staff resumes, cost table, and any appendix of survey questions, please limit your response to 50 pages. This includes 40 pages for the specific projects, plus 10 pages for a general discussion of bidder's approach to 2011-12 and for discussion of bidder's qualifications, experience, and references. All material submitted will be treated confidentially.

Response

Respondents should submit an electronic copy of the proposal by e-mail, via Northeast Utilities' Frictionless system, on or before 5 p.m. March 1, 2010.

Questions regarding this RFP or any material in the RFP documents package must be submitted in Frictionless, not later than February 19, 2010.

TERMS AND CONDITIONS

The successful Bidder’s services shall be provided in accordance with the terms and conditions of the PAs, attached as Appendices J-P. Proposed exceptions should be stated in writing with the bid.

Winning bidder must comply with the Environmental Requirements of the PAs. The winning bidder should also expect to sign confidentiality (non-disclosure) agreements with each PA.

Evaluation of proposals and selection of contractor

The PAs and EEAC, and their related personnel, will confidentially review proposals. They reserve the right not to select any submitted bid. They are not responsible for costs incurred by bidders to develop proposals. Proposals will be judged on the following criteria.

- **Cost.** Both the total cost and whether overall proposal offers good value will be considered.
- **Reasonableness of Approach.** Does the proposal offer good creative solutions to the evaluation issues presented in the RFP?
- **Dedicated Resources.** Has the bidder shown that they have the resources to provide the services requested within the expected timeframe?
• **Comprehension.** Has the bidder shown that they understand the issues involved and have responded accordingly?

• **Documentation Quality.** Is the proposal itself clear, concise, and well written?

• **Demonstrated Experience.** Has the bidder demonstrated that their firm has the experience and expertise, or the ability to provide subcontractors having the appropriate knowledge, to perform the requested tasks?

**Specific Evaluation Requirements:**
The selected contractor will be required to submit a detailed draft evaluation Work Plan for approval before starting the evaluations. The Plan must include a detailed description for how each task will be performed, and any further recommendations. The proposal should clearly state the methodologies and quality assurance controls that will be employed to conduct this set of evaluations. The Plan may be in two phases, the first for tasks to be completed by July 15, 2010 and the second phase for tasks to be completed later. Evaluations pursuant to an approved phase 1 Plan may begin before a phase 2 Plan is approved.
Request for Proposal

Massachusetts Statewide Education, Marketing, and Outreach Working Coalition

RFP Information & Instructions

ATTACHMENT I

1.0 BACKGROUND

The Massachusetts Statewide Education, Outreach, and Marketing Working Coalition (hereinafter referred to as the “Massachusetts Sponsors”) requests proposals to provide public education, outreach, marketing, and public relations services in support of the Green Communities Act of 2008 (GCA), and the Massachusetts utilities and energy efficiency providers’ three-year energy efficiency plan (the Plan). The proposed contract period is for one full year of services beginning on the date of the contract award with an option to renew.

The Massachusetts Sponsors of this program consists of several utility companies listed below seeking to develop and implement a range of marketing activities that include public education, outreach, and public relations. National Grid will be taking the lead in this RFP to coordinate the solicitation, and results, as well as together with the other Massachusetts Sponsors, select a supplier for the program.

2.0 SPONSOR LIST

- National Grid
- NSTAR Electric & Gas
- Bay State Gas (NiSource)
- Berkshire Gas
- New England Gas
- Unitil
- Northeast Utilities, Western Massachusetts Electric Company

3.0 SCOPE OF WORK

The Massachusetts Sponsors’ overarching priority is to create powerful, engaging, and motivating strategies that will increase Massachusetts customers’ awareness of the benefits of energy efficiency, and will also increase their subsequent actions to reduce usage. These efforts should build on the brand created through the integrated energy efficiency website project and establish that brand as the recognized, reliable source for all things about energy efficiency in Massachusetts. Also, to encourage and facilitate customers’ subsequent participation in energy efficiency programs, and foster behavioral changes that lead to energy savings, the reduction of greenhouse gas emissions, and monetary savings. The bidder will need to create a strategy to
integrate and complement existing energy efficiency programs and individual Sponsor identities. See Attachment 2: Scope of Work for a description of Marketing Services to be provided.

4.0 PAYMENT FOR SERVICES and INVOICING

No up-front payments will be made to vendors. Invoices shall be submitted to each Massachusetts Sponsors on a monthly basis. A minimum 10% of the total invoice amount may be retained until the final project is completed and accepted by the Massachusetts Sponsors. Consultants should identify on the Attachment 3 Bid form, if a payment discount for early invoice payment (e.g. 2% 15, Net 30) is offered. Discounts will be factored into the evaluation of the bids and their acceptance is at Massachusetts Sponsors’ option.

5.0 PROPOSALS SUBMISSION

National Grid is using an electronic software package called Ariba. Ariba Sourcing is an internet application designed to facilitate the collection of business information. You were invited to participate in this online RFP event by National Grid regarding this marketing campaign. All of the relevant RFP information including: Scope of Work, Terms & Conditions and other required documents are contained in this electronic RFP. You are required to submit your proposal response via Ariba, as well as send two hard copies of your proposal as specified in Section 11 below. For more information about Ariba, you may refer to their website at www.ariba.com.

Bidders are invited to prepare a detailed response to this proposal. This response should address all the requirements outlined in the Scope of Work, as well as any additional strategies and creativity regarding how the website will be branded. After review, Massachusetts Sponsors may invite Consultants in to present examples of the firm’s work that demonstrates their capabilities, as well as to provide more details on their plans and budget for the proposed branding of the website. Following the proposal review and any requested presentations, the Massachusetts Sponsors will select a company to provide these services. The successful firm will then be required to develop a detailed Scope of Work in concert with Massachusetts Sponsors. A pre-bid meeting will also take place, as outlined below to answer any questions Consultants may have before submitting their final bid.

6.0 COMPANY INTRODUCTION

In the proposal, Consultants shall provide a letter of introduction and a statement of qualifications, which details the Consultant’s experience, especially with energy efficiency projects. The Consultant’s statements should emphasize their (1) knowledge and understanding of energy efficiency programs, and (2) the requirements of this RFP, including developing a strategy in how we will market our energy efficiency programs on the web site. In addition, provide a description of the legal status of respondent (e.g., sole proprietorship, partnership, limited partnership, joint venture, or corporation) and state of residency. This section should include:

A. Answering the required company information in Ariba.
B. General description of all the services and products your company offers with a brief description of its general history.

C. Discussion of your company’s typical approach to web site development.

D. Discussion of the companies staff to be assigned, and how they will be organized to deliver the services requested in the most efficient and expedient manner. Include a brief discussion of your firm’s internal quality control and review procedures.

E. Include a list of other similar Services contracts in force nationally

F. Provide the name, title, and contact information for three (3) references familiar with respondent’s business organization, finances and operational style. Provide resumes of key individuals in the firm providing the services to the Massachusetts Sponsors.

7.0 PRICING

The Massachusetts Sponsor’s seek to procure Services at the most cost effective rates possible. Consultants must complete and submit Attachment 3: Bid Form. Pricing should be provided as hourly rates for various levels of experience and expertise as noted in the sheet. Consultants shall include personnel names, who will be working on the project, that fall into the various labor categories.

It is essential that Consultants complete the bid form detailing estimated costs, by key program tasks, indicating hourly rates for personnel, travel, total hours and total cost for completing the project. Pricing submitted on the Bid Form Labor Rates Table shall be firm and effective from March 2010 to December 31, 2010. The Massachusetts Sponsors will enter into individual negotiations each subsequent year regarding any potential price increases, which must be justified by the Consultant.

7.0 ASSUMPTIONS & EXCEPTIONS

Consultants should include a description of all assumptions used to develop the response to this RFP, including exceptions to the Terms and Conditions of each Massachusetts Sponsor listed below. Any exceptions submitted by Consultant does not constitute acceptance by any of the Massachusetts Sponsors. Exceptions will be negotiated and agreed to by each Massachusetts Sponsor and will be part of an exclusive contract between the parties, which will be independent of any other associated contract with another Sponsoring organization.

All material submitted, produced, data collected, reports, designs and documentation will become the exclusive property of the Massachusetts Sponsors at the end of the contract. The Consultant may not share program materials, customer data, industry or program participant contact information, etc. unless explicitly authorized by each Massachusetts Sponsors to do so.

8.0 INSURANCE

Please provide a certificate of insurance confirming at least the minimum levels of insurance coverage required by Article 11.0 (Insurance) of National Grid’s Terms and Conditions. A copy of your current insurance certificate is required with your proposal. If you are the chosen supplier, you will be required to include a new certificate stipulating National Grid, its Affiliates
and Subsidiaries as the added insured. In addition, you must also provide insurance coverage to each Massachusetts Sponsor, contracting independently according to their requirements.

6.0 TERMS AND CONDITIONS and SPECIMEN AGREEMENT

The successful Consultant’s services shall be provided in accordance with the following terms and conditions from each Massachusetts Sponsor:

- **Attachment 5** – NSTAR’s Requirements Prior to Contract Award
- **Attachment 6** – Cape Light Compact Terms & Conditions.
- **Attachment 7** - Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
- **Attachment 8** - NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials

7.0 SAFETY, ENVIRONMENTAL and BACKGROUND CHECK REQUIREMENTS

The successful Consultant’s services shall be provided in accordance with each Massachusetts Sponsor’s Safety Requirements. National Grid’s commercial requirements are as follows:

- Contractor Safety Requirements dated 8/1/08 (**Attachment 9**)
  - You are required to fill out the Safety form in the RFP and submit it with your proposal.
- Contractor Environmental Requirements dated 2/29/08 (**Attachment 10**)
- Contractor Employee Background Check Requirements dated 1/10/08 (**Attachment 11**)
  - You are required to fill out the background Check form in the RFP and return it with your proposal.

8.0 PRE-BID INFORMATIONAL MEETING

A pre-bid informational meeting is scheduled for **Friday, January 15, 2010 at 10:00 AM via conference call by National Grid.** 866-561-4997 access # 9674198. **Please dial in to the conference call at the designated time.** At this time, we will present a program overview and answer any final questions you may have regarding this RFP. In the meantime, if you have any specific questions, they should be sent via Ariba. All questions and answers will be posted through Ariba.

9.0 EXCEPTIONS AND CLARIFICATIONS

The Consultant agrees to all the provisions contained in this RFP and all enclosed Bid Documents unless exceptions are specifically and clearly listed in the Consultant’s proposal. All exceptions must be listed separately as either commercial or technical in nature and specifically identified as EXCEPTIONS. Consultants preprinted terms and conditions are not considered specific conditions and are considered null and void in their entirety. The Consultant’s proposal will be considered as being in full conformance with all documents, specifications, and
commercial terms included in this RFP unless specific exceptions or clarifications are separately stated and identified in the bid submittal.

Should a Consultant find any ambiguity, discrepancy or omission in the RFP, or should the Consultant have any questions, the Consultant shall notify National Grid via email at the email address shown in Section 10.0 below. Such information must be received at least seven (7) working days prior to the date set forth for receipt of the Proposals in the Invitation to Bid, to afford the National Grid the opportunity to send any instructions or interpretations to other Consultants who have received an Invitation to Bid. The Massachusetts Sponsors will not be responsible for any oral instructions or interpretations.

10.0 RFP CONTACT PERSONNEL

Donald J. Pacheco
Sr Procurement Agent
National Grid
40 Sylvan Rd
Waltham, MA 02451
phone: (781)907-3012
email: don.pacheco@us.ngrid.com

11.0 BID SUBMITTAL

11.1 Bids must be submitted via e-mail not later than 5:00 PM Friday, January 29, 2010. Proposals received after the bid due date and time will not be accepted.

11.2 Consultants shall be responsible for submitting their bid via Ariba

11.3 In addition to electronic submittal of bids, two (2) original of the proposal must be mailed to Donald J. Pacheco, Sr. Procurement Agent, National Grid, 40 Sylvan Rd, Waltham, MA 02451. The mailed proposals must be postmarked no later than January 29, 2010. The hard copy proposals are for our records only and therefore need only be postmarked by the date above; the Ariba proposals are the Bid of Record.

11.4 All proposals must be properly dated and executed by an authorized representative of the Consultants organization. Failure to provide the required hard copy and electronic version of the proposal or all required information may result in rejection of the proposal.

11.5 Bid security procedures requires that bid information shall not to be shared with, or provided to, any National Grid or Sponsor employee outside the National Grid, or any other outside firm prior to award of contract(s).

11.6 Telecopies (faxes) of proposals will not be accepted.
11.7 All bids will remain active for ninety (90) days, and no bid materials will be returned. Each proposal will be evaluated on technical and commercial merits. All proposals will be opened on or after the due date. The Massachusetts Sponsors are under no obligation to award the work on a single factor, or to award the work at all. All information provided to Consultants as part of the RFP process is considered confidential and shall be maintained as confidential by all Consultants.

11.8 All responses to this RFP, whether or not in compliance with the terms of this RFP, shall be considered unconditional offers by the Consultant, which, if accepted, shall create a binding obligation upon the Consultant. The pricing in any response shall remain valid for one year. Any limited duration offers shall be explicitly noted.

12.0 UNAUTHORIZED DISCLOSURE

12.1 The Massachusetts Sponsors, consider any information provided to Consultants in the course of business to be privileged and confidential between Consultant and the Massachusetts Sponsors. This includes, but is not limited to, written data of any kind, business information, request for quotation, specifications, engineering data and any and all technologies and data either obtained or observed while supplying the commodity/service required by the contract. Unauthorized disclosure of information to third parties by Consultant may lead to cancellation of the contract, loss of future business opportunities and/or the effects of any other remedies which may be available to the Massachusetts Sponsors.

12.2 Consultant’s proposal will be considered as being in full compliance with all documents, specifications, drawings and engineering data included in this RFP unless specific exceptions or clarifications are separately stated.

13.0 NOTICE OF INTENT TO DECLINE

If the Consultant declines to submit a proposal, all RFP documents must be deleted and/or destroyed and a message in Ariba must be submitted to National Grid with a brief explanation as to why your bid will not be submitted.

14.0 LIMITATIONS

This RFP does not commit any Massachusetts Sponsors to award a contract, to pay any costs incurred in the preparation of the proposal, nor to procure or contract for services and or supplies. The Massachusetts Sponsors reserve the right to accept or reject any or all proposals received, or to cancel this RFP in part or in its entirety, if in doing so is in the best interests of the Massachusetts Sponsors.

15.0 RFP DOCUMENTS

This RFP is comprised of the following documents:
• Attachment 1: Information and Instructions for Consultants
• Attachment 2: Scope of Services
• Attachment 3: RFP 303-09 Bid Form
• Attachment 4: National Grid Terms & Conditions for Consulting Services, Document 0400 (06/25/09)
• Attachment 5: NSTAR’s Requirements Prior to Contract Award
• Attachment 6: Cape Light Compact Terms and Conditions
• Attachment 7: Northeast Utilities, Western Massachusetts Electric & Connecticut Light & Power Terms & Conditions
• Attachment 8: NiSource Corporate Services Company General Services Agreement for Construction, Maintenance, Services, and Materials
• Attachment 9: National Grid Contractor Safety Requirements (8/1/08)
• Attachment 10: National Grid Environmental Requirements (02/29/08)
• Attachment 11: National Grid Background Check Requirements for Contracted Service Providers - Contractor Employee Background Checks, (1/10/08)

16.0 **TENTATIVE SCHEDULE**

The following dates are critical to this RFP.

- Request for Proposal Issued to Consultants 1/6/10
- Pre-Bid Meeting 1/15/10
- Proposals Due 1/29/10
- Hardcopies must be Postmarked by 1/29/10
- Interviews / Discussions with Consultants 2/8/10/2/12/10
- Supplier Award (predicated on successful contract negotiations) 3/1/10
- Begin Contract Negotiation Process 3/1/10 – 3/19/10
Request for Proposal

Massachusetts Statewide Education, Marketing, and Outreach Working Coalition

Scope of Work

January 5, 2010

Introduction
The Statewide Education, Outreach, and Marketing Working Group (Sponsors), in anticipation of the approval of the Massachusetts 3 year statewide energy efficiency plan on or before January 31, 2010, requests proposals to provide public education, outreach, marketing, and public relations services in support of the Green Communities Act of 2008 (GCA) and the Massachusetts utilities and energy efficiency providers’ three-year energy efficiency plan (the Plan, [see Att. 1]).

Background
The Sponsors of this program, including Bay State Gas, Berkshire Gas, Cape Light Compact, National Grid USA, NSTAR, New England Gas, Unitil and Western Massachusetts Electric, seek to develop and implement a range of marketing activities that include public education, outreach, and public relations. The objective is to

- Increase consumer awareness of energy efficiency and its benefits (“Consumers” include residential, low-income, commercial, industrial and municipal customer sectors as well as trade/industry professionals).
- Encourage and facilitate consumers’ subsequent participation in energy efficiency programs
- Foster behavioral changes that lead to energy savings, the reduction of greenhouse gas emissions, and monetary savings.
- Initiate research in coordination with statewide Evaluation, Measurement and Verification (EM&V) contractors, to better understand the unique drivers, demographics, economic parameters, and behavioral differences among residential customers and among various key subsectors of non-residential customers, then design and deliver messaging accordingly.

An effective statewide education and marketing plan is central to the statewide three-year plan, and will help transform markets for energy efficiency. The table below lays out the market size for this campaign:

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Number of Residential Consumers</th>
<th>Number of Commercial, Industrial, and Municipal Consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>2,642,144</td>
<td>392,784</td>
</tr>
<tr>
<td>Gas</td>
<td>1,361,470</td>
<td>141,643</td>
</tr>
</tbody>
</table>
Program Benefits
The Sponsors’ expect this public energy efficiency campaign to:

- Use messaging that clearly describes for residential and the various non-residential customer segments the benefits and importance of energy efficiency
- Reach the maximum number of consumers possible
- Market to differentiated consumer types and communities throughout the state (including communities where English is not the primary language)
- Utilize multiple media (e.g. Internet, social media, bill inserts, television, radio, billboards, public transit, trade, business, and professional associations), choosing those that are most effective for the targeted audiences
- Blend statewide and program marketing strategies together to achieve deeper and broader savings.
- Carry the value proposition and look and feel from the statewide website into other marketing
- Recognize that commercial and industrial customers respond differently to various channels used in traditional marketing. For instance C&I programs rely heavily on personal business contacts through PA key account managers for their large managed accounts and use other cross channels for their mid- non-managed commercial accounts. These would include trade allies and other design professionals engaged in promoting better building design and construction practices.

Program Strategy
The strategies and messages developed for statewide energy efficiency education, outreach and marketing will set the stage for efforts across the Commonwealth, including ongoing program marketing. Program marketing will be consistent with the statewide efforts and the statewide efforts will complement program marketing wherever possible, to leverage program and individual Sponsors’ efforts.

The education, outreach, and marketing efforts should move consumers from awareness to action.

Program Objectives
To realize the potential for public education, community outreach, and marketing, the Sponsors have identified the following steps in the process:

- Identify consumers’ values related to energy efficiency, what will motivate them to take action, and whether there are any barriers to taking action. These values are different in the two markets of residential and commercial customers. For instance commercial customers respond to messaging that targets improvements in their business environment as it relates to energy cost containments and reductions, enhancing their ability to compete more effectively through productivity improvements, to messaging that enables their ability to address investments in energy efficiency in financial terms, to actions that promote thermal and visual comfort in their buildings.
• Develop and test tactics to bridge the gap between awareness and action
• Make public education a priority and provide information that clearly outlines the benefits of energy efficiency and the value of going beyond simple actions to deeper savings
• Encourage behavioral changes that will conserve energy, manage costs, and reduce greenhouse gas emissions.
• Broaden awareness of available resources and actions
• As requested, support targeted PA efforts to develop partnerships with local community-based organizations, as potential allies to increase the cost-effective delivery of comprehensive energy efficiency benefits close to home
• Maximize the number of individuals, organizations, and businesses that take action to reduce energy use

Scope of Work

The Sponsors’ overarching priority is to create powerful, engaging, and motivating strategies that will increase Massachusetts consumer and business awareness of the benefits of energy efficiency and will also increase their subsequent actions to reduce usage, primarily through the sponsors’ available energy efficiency programs. These efforts should build on the brand created through the integrated energy efficiency website project and establish that brand as the recognized, reliable source for all things about energy efficiency in Massachusetts. The bidder will need to create a strategy to integrate and complement existing energy efficiency programs and individual Sponsor identities and facilitate consumers’ seamless transition from statewide to individualized programs. The strategies will take into account the unique motivational differences between residential and the various subsets of non-residential customers. While these actions may include commonly recognized multi channel campaigns for residential customers, such as direct response, telemarketing, bill inserts among others, it is expected that the bidders will engage in primary research to identify the most effective touch points for non-residential customer targets, sectors and motivations. In addition it will be important that the different tactics used for these sectors will be measurable so that feedback will inform changes to deployment of the marketing and communication campaigns.

Consultant Responsibilities:

The Sponsors request proposals from firms that can plan and execute an integrated education, outreach and marketing strategy. The successful bidder will develop an overarching program to submit to the Sponsors for approval prior to implementation. Then, as part of a collaborative effort, the successful bidder, and any prospective sub-contractors, will be expected to provide at least the following services:

Task 1 Gathering and Analysis of Market Information

This task includes:
• Identification of baseline residential and business consumer awareness of energy efficiency and its benefits in the Commonwealth of Massachusetts.
• Primary and secondary market research to identify distinguishing residential and business consumer needs and characteristics (e.g., demographics, building stock, socioeconomic status, and motivating values) that will enable audience segmentation and tailored approaches for reaching these audiences most effectively.
• Tracking, monitoring, and evaluation of subsequent initiatives to determine campaign effectiveness and ROI of specific tactics and strategies implemented.

In gathering and analyzing market information, the marketing contractor will need to coordinate with several statewide EM&V contractors who will also be involved in this function. This RFP distinguishes between three different categories of information gathering and analysis activities. For each category the role of the marketing contractor will be somewhat different, and will require different types of coordination with EM&V contractors.

1. *Real-time tracking of market response.* This category includes activities such as tracking web-site statistics, ad responses, or other forms of data that can be monitored in real time. The marketing contractor will have primary responsibility for this set of activities.

2. *Primary market research.* This category includes collection and analysis of market data that cannot be tracked in real time, such as surveys, focus groups, and interviews. The marketing contractor will share responsibility for these activities with the statewide EM&V contractors, and will need to coordinate with those contractors. EM&V contractors will be conducting a substantial amount of on-site visits with customers, which the marketing contractor may be able to leverage in order to gain efficiencies. In developing their cost proposals, bidders responding to this RFP should discuss the specific assumptions they have made regarding the scope of primary market research activities they will perform.

3. *Evaluation of marketing effectiveness.* The statewide EM&V contractors will have primary responsibility for this function. Exceptions may be made (i.e., the marketing contractor may have some role) for the short-term assessment of the effectiveness of specific campaigns where particularly fast turnaround is needed, or in cases where having the marketing contractor perform the work would offer particular economies or efficiencies.

**Task 2  Statewide Brand Building and Messaging**

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1 Under a new administrative framework for EM&V developed in 2009, virtually all EM&V activities in Massachusetts are to be performed by one of six different statewide contractors teams, each covering a specific Research Area and each operating under a three-year contract. Five of these Research Areas are oriented to specific target markets (Residential Retrofit, Residential Lighting and Appliances, Residential New Construction, Large C&I, and Small C&I) and the last one covers Special/Cross-Cutting studies. The EM&V contractor for each market-oriented Research Area is charged with conducting market assessment activities specific to that market. Evaluation of the effectiveness of umbrella marketing activities (i.e., those not tied to specific programs) is one of the EM&V functions included in the Special/Cross-Cutting Research Area. RFPs to select the six Research Area EM&V contractors are on roughly the same timeline as this RFP.
• Creation of collateral and support materials, including creative concepts (e.g., themes, slogans, design, layout, copy writing, graphics) for attractive, plain language publications such as brochures, tip strips, posters and other printed materials

• Development and execution of integrated media strategy, including a mass media (television, radio, print, “out of home” [e.g. billboards, bus cards, subway platform posters], web, social media, organic and paid online search) communications plan, including creative development, production and placement

• Creation, maintenance, storage and transport of exhibit and display materials (including maintenance, storage and transport), and educational materials branded with campaign messages

• All elements of the campaign must consider the following:
  ▪ Materials must be appropriate for widely diverse consumer groups in the Commonwealth as well as specific targeted groups.
  ▪ The influence and importance of trade allies on program success.
  ▪ Language must be simple, non-technical, and accessible to laypersons (while understanding motivational distinctions between diverse customer classes).
  ▪ Materials must be delivered, where applicable, in large print format for elderly and vision-impaired consumers and translated by the bidder, or a subcontractor, into additional languages (e.g., Spanish, Portuguese, Cantonese) for non-English speaking target audiences.

Task 3 Public Relations
• Development and execution of public relations plan designed to extend the reach of priority messages

• Outreach strategy, that may include geographic and/or community-based partners, outreach opportunities such as grassroots outreach events and presentations (e.g., fairs and home shows, business or trade conferences, etc.), participation in special events, sponsorships/advertisements at arenas and sporting venues(where feasible), community events, and newspaper supplements

Task 4 Community-based Outreach and Education
• Develop tasks outlined above with special attention to incorporating centers of influence in local communities or business subsectors when research or experience dictates that incremental efficiency can be leveraged through such efforts. (This may include not-for-profits, chambers of commerce, community-based organizations, service organizations and local governments, etc.). Include an emphasis on training and leadership development in the business community to identify and encourage core behavioral change in the business environment.
• Identify potential partner organizations as well as opportunities for joint/coordinated outreach and education through such efforts that can produce the reasonable promise of more or deeper savings in communities or buildings.

• Develop and train business spokespeople who have had a good experience and proven savings from using EE programs for public outreach. Written, auditory and video testimonials can be used in all promotional materials locally and state-wide. “Program Ambassadors” can also attend local and state events or speak to media and share experiences and encourage participation on a business peer-to-peer level.

Task 5 Other Contractor Responsibilities

In addition to completing the tasks above, the selected marketing contractor will need to accomplish the following:

• From campaign tactics and initiatives performed, perform appropriate consumer facilitation to sponsor partner programs (i.e., phone, Web, etc.)

• Maintain weekly communications with the Sponsors and their contractors to ensure that statewide and program needs are being met and to identify additional marketing and public relations opportunities.

• Seek sponsor approval before undertaking any significant planning, development or implementation tasks.

• Attend scheduled Working Group meetings as requested by the Sponsors.

• Attend selected conferences as directed by Sponsors.

• Develop, produce and execute electronic and print mass mailings as needed.

• Provide monthly billing to each sponsor within 15 days of the close of the month. Each sponsor will be billed individually, and each bill will detail both joint and any sponsor specific charges. The Sponsors will establish a billing allocation system during contract negotiations.

• As directed by the Sponsors, review campaigns and recommend changes for marketing efforts for 2011 and 2012.
Evaluations Process

Successful proposals should include the following elements:

1. A one-year (12 months) draft education, outreach and marketing plan and schedule. This plan shall include the full mix of media types as described above, as well as others that the respondent may suggest, for the different consumer segments - residential, low-income, and the various commercial/industrial segments.

2. Completed bid form detailing estimated costs, by key program tasks, on a time and material basis, indicating hourly rates for personnel, travel, total hours and total cost for completing the project.

3. Description of capabilities and results achieved in behavior changes, social media, market research and segmentation, including examples of prior work.

4. Experience marketing energy efficiency programs, if any.

5. A description of the personnel who would be assigned to the project and their specific project responsibilities including:
   i. A project staff organization chart
   ii. Statement of qualifications of the bidding firm and team members
   iii. Statement of qualifications of any proposed sub-contractors and their assigned project personnel

6. References specific to the proposal submitted.

7. Explanation of data security measures employed by the bidder regarding confidential consumer information that may be shared with firm (consumer name and one of the following: social security number or financial account number or utility account number) and confirmation that security measures comply with applicable federal, state laws covering protection of Personal Information of residents of the applicable state. (In Massachusetts the applicable Regulation is 201 CMR 17.00 - STANDARDS FOR THE PROTECTION OF PERSONAL INFORMATION OF RESIDENTS OF THE COMMONWEALTH [Effective date of Mass Regulation is 3/1/10.])

Proposals are limited to 15 pages of text describing the bidder’s approach and draft plan.

Selection of the successful proposal will be made by the Sponsors based upon the bidder’s:

1. Responsiveness to work scope and program needs
2. Proven ability to meet schedules
3. Cost effectiveness
4. Comprehensiveness
5. Relevant experience
6. Oral Presentation, if requested

After review, Sponsors may invite selected bidders to present examples of the firm’s work that demonstrate their capabilities as well as to provide more details on their plans and budget for the campaign. This meeting will be scheduled, if needed, following the review of proposals received in response to this RFP. Following the proposal review and any requested presentations, the
Sponsors will select a company to provide these services. The successful firm will then be required to develop a detailed scope of work in concert with Sponsors. The detailed scope of work will address the development and the implementation of the education, outreach and marketing plan and will reflect the expected results. This scope of work will be included in the contract with the selected firm.

The Sponsors reserve the right to refuse any proposal or to negotiate the specifics of any submitted proposal.
ATTACHMENT I

Excerpt from 2010 – 2012 Massachusetts Joint Statewide Three-Year Energy Efficiency Plan

G. Special Public Education and Action Activities

1. Introduction
In order to achieve the aggressive goals set forth in this Plan, the Program Administrators will undertake a comprehensive energy efficiency public education and awareness outreach campaign. The core goals of the Program Administrators in any public education and promotion campaign include: reaching the maximum level of residential and business customers possible; providing messages that are not overly technical and that clearly describe the benefits of energy efficiency; exploring targeted marketing to unique or specific communities throughout the state (including communities where English is not the primary language); utilizing diverse media (e.g., internet, bill inserts, television, radio, billboards, public transit) to disseminate consistent and clear messages; and ensuring that the various strategies work together to ultimately achieve deeper and broader savings. The Program Administrators are aware that, in addition to their efforts, the Commonwealth seeks to promote energy efficiency and the Program Administrators will look to coordinate activities with applicable governmental initiatives, such as the efforts contemplated under Section 108 of the Green Communities Act, which provides for a collaborative pilot effort by the DOER and the University of Massachusetts at Boston to establish an educational outreach program, that includes programs to be provided at community colleges and community centers. The Program Administrators will look to the DOER for further guidance with respect to this pilot effort. The Program Administrators will also continue to work with local schools, including technical vocational high schools and community colleges, to support comprehensive standards-based education in order to promote a more energy-conscious and educated society. These efforts are discussed in more detail below.

2. Updated Statewide Education and Outreach Efforts
During the summer of 2009, the Program Administrators commenced collaborative efforts with the DOER to address public education and participation-oriented efforts in more detail, with a particular focus on statewide efforts. The overall purpose of energy efficiency education, community outreach, and marketing efforts will be to increase residential and business customer awareness and encourage customers’ subsequent participation in energy efficiency programs, while fostering behavioral changes that lead to energy savings, the reduction of greenhouse gas emissions, and increased customer savings. A successful and effective statewide education and marketing plan is fundamental for the Statewide three-year Plan, and will play an important role in achieving the goal of transforming markets for energy efficiency. In addition to the current program level education and marketing efforts, the Program Administrators will undertake the development of a comprehensive statewide energy efficiency campaign in order to achieve the savings goals proposed in this updated Plan. The Program Administrators will develop strategies to deliver this campaign to targeted
customer profiles. While much of the educational focus has been on residential markets, the Program Administrators will also consider specific strategies targeting the business sector. Ultimately, the educational and marketing effort should move residential and business customers through a process of awareness, attitude change, and finally action.

In order to realize their public education, community outreach, and marketing potential, the Program Administrators have identified the following goals:

• Prioritizing public education.

• Providing information that clearly outlines the benefits of energy efficiency and a path to a Zero Net Energy future.

• Broadening awareness of available resources and actions to all potential audiences, including residential and business customers.

• Identifying and understanding the barriers to action, and developing potential motivators to bridge the gap between awareness and action.

• Communicating with the general public and with targeted audiences in the most effective ways possible to reach those audiences.

• Maximizing the number of individuals, organizations, and businesses that take action to reduce their energy consumption.

• Educating customers on the benefits of, and ways to achieve, deeper savings through deep energy retrofits.

• Educating service providers and equipment suppliers on the benefits of, and ways to deliver energy efficient products and services to achieve savings across their broader customer base.

• Encouraging behavioral change to conserve energy, save money, and reduce greenhouse gas emissions.

The Program Administrators will expand and develop outreach strategies while creating seamless customer experiences that offer integrated portfolios of energy efficiency information and program options that are clear, relevant to the customer, and available to all Massachusetts residents, businesses, and other organizations. Some of the expanded statewide energy efficiency efforts currently underway that will assist in implementing this education and marketing plan include the following:

i. Education & Training

The Program Administrators continue to participate in existing and burgeoning efforts to create a standardized energy curriculum where one does not already exist. Some Program Administrators currently offer curriculum and educational information and guidance to schools; these efforts will be expanded to Program Administrators through collaboration with
the DOER, Massachusetts Department of Education, the University of Massachusetts, and with local community colleges to create and disseminate additional educational curriculum. The Program Administrators are considering developing a standard introduction to energy and energy efficiency that will be common to all education and training efforts. Further, the Program Administrators will continue to support ongoing efforts to reach targeted audiences (e.g., teachers, schools, contractors, architects, realtors, building inspectors).

The Program Administrators have learned over the years that trade ally relationships, events, and training sessions prove to be a critical and effective means of promoting energy efficiency. Thus, the Program Administrators will expand the promotion of programs through various PA-sponsored training events, trade shows, and trade ally events in conjunction with large-scale, statewide GasNetworks training seminars, which to date have proven very successful. For example, over 360 HVAC professionals attended the September 24, 2009 conference in Randolph, which featured a myriad of expert trainers and speakers who explored subjects such as high efficiency natural gas heating equipment and installation practices, hydronic heating, on demand water heating, and condensing and modulating boilers, and which also included 25 equipment manufacturers and suppliers who displayed new products and technology, and a trade show. To date, GasNetworks has provided expert training to over 7,300 HVAC contractors. The Program Administrators recently established an education and training center in Fitchburg. In this “hands-on” classroom environment, contractors experienced in energy efficiency installations are trained in the proper techniques of air sealing and insulation installation in order to ensure consistency across service providers. The Program Administrators have plans to open a second center in Springfield. In addition, the MassSAVE team is currently creating a comprehensive education package designed as a tool to inform all residents about how to contemplate energy savings in their homes over the long-term, and to direct them on a path of energy efficiency that could lead to Zero Net Energy.

Moreover, the Program Administrators are joining with the Massachusetts Energy Efficiency Partnership (“MAEEP”) to present US DOE-sponsored energy efficiency workshops on various technologies. The Program Administrators have also joined with the Northeast Energy Efficiency Council (“NEEC”) Building Operator Certification (“BOC”) regional training program that focuses on how O&M procedures and processes impact energy costs. The Program Administrators also offer Advanced Building™ (“AB”) seminars as a suite of technical and training resources to improve the way buildings are designed, built and used. Using whole building patterns, design process tools, and education, this AB effort provides designers with the resources to incorporate integrated design strategies on their next project to reduce energy usage and improve indoor environmental quality. In addition, the Program Administrators will work with the Massachusetts Clean Energy Center (“CEC”), a quasi-public agency that serves as a clearinghouse and support center for the clean energy sector and focuses in part on workforce development and training.

ii. Energy Efficiency “Brands”
Building upon successful regional and statewide energy efficiency brands, the Program Administrators are currently working towards developing a complementary, statewide energy efficiency brand (or brands) with the expectation that once adopted, it will have created a
clear, consistent, and recognizable message about the individual and social value of energy efficiency. This “branding” will serve as the foundation for all residential and business customer information on energy efficiency products and incentive programs, and will encourage customers to strive for deeper savings. In addition, as the electric and gas programs become more integrated and “fuel blind,” joint branding will allow the Program Administrators to further pool resources and create targeted educational and marketing collateral materials that will provide residential and business customers with an increased understanding of the full array of energy efficiency options available in Massachusetts.

iii. Mass Media
Newspaper articles, radio, and television news reports highlighting energy efficiency programs have consistently increased activity in the relevant spotlighted program. Consequently, the Program Administrators have utilized limited mass media advertising to educate and promote their energy efficiency program offerings. As the branding efforts described above are finalized, a larger scale, more frequent, mass media advertising plan will be implemented to create the desired effect of increased and broader customer awareness for available programs, while striving to encourage deeper customer savings. Moreover, the ability to promote a common, integrated website to a mass market will allow for further economies of scale and, in turn, more frequent, cost-effective mass media advertising in order to increase customer awareness.

iv. Community Based Outreach/Social Education and Marketing
The Program Administrators see an important opportunity to expand and develop relationships with community organizations that have existing influential relationships within cities, towns, regions, and demographic and special interest groups. Some of these organizations have already promoted efficiency to their members, while others have strong networks but have not yet focused on energy issues. The Program Administrators will seek to develop enhanced strategies to reach out to non-English speaking customers, low-income customers, and groups that have historically low participation, and explore increased efforts with representative community organizations. The potential to leverage community-based organizations to educate and promote energy efficiency actions is significant and will be developed in the “community mobilization initiatives” being launched as pilot programs. The Program Administrators can learn from, and build upon, successful programs such as the Marshfield Energy Challenge (NSTAR), the MAPS Pilot which included outreach to the Portuguese-speaking community (NSTAR), and Energy Smack Down (National Grid/NSTAR), and will take note of positive developments experienced with the Western Mass Saves (WMECO) launch in August. The lessons learned from these community outreach programs will be the catalyst to the creation of future similar educational outreach efforts throughout the Commonwealth.

The Program Administrators will also explore a new pilot collaboration with community-based organizations that have long-standing relationships with homeowners, tenants and small businesses in economically marginalized communities, to assess the feasibility of a “community mobilization outreach model” that implements a neighborhood approach to energy efficiency service. This model has the potential to offer effective and appropriate
energy education to underserved communities, including limited English speakers and economically marginalized groups.

The Program Administrators will also explore how “word of mouth” contact can be tapped to heighten motivation towards energy efficiency action. The Program Administrators will explore offering “incentives” for referrals that lead to other customers participating in energy efficiency programs.

v. Internet—“Integrated Website”

The Program Administrators are engaged in developing a single point of entry for all residential and business audiences through a new integrated website. The Internet offers a powerful, cost-effective platform to provide energy efficiency information, promote programs, and inspire action. The integrated website will provide a point of access to a multitude of residential and commercial energy efficiency programs in a user-friendly environment. The statewide “brands” will be prominently featured throughout the website. The increase in program participation levels over time indicates that the traditional education, outreach, and marketing efforts (such as direct mail, ethnic outreach, radio and print media, bill inserts, trade ally relationships, and training events, sponsorships, educational seminars, and program brochures) have been successful to a significant degree. In order to create even broader energy efficiency public awareness, however, and establish even deeper participation in the programs offered, additional methods of market defining techniques and barrier identification should be implemented, and the Program Administrators believe that an integrated website provides a distinct opportunity to reach a broader audience, increase energy efficiency awareness, and encourage deeper savings.

vi. Behavioral Research

Program Administrators understand that identifying the motivational factors that cause residential and business customers to take action and participate in programs is important in developing energy efficiency programs capable of achieving long-term sustainable success. Equally important is the ability to identify those barriers that could potentially block a motivated customer from participating in energy efficiency programs. The Program Administrators will research successful motivational actions that have worked in other states, determining which motivational strategies have succeeded, and which might be best suited for application with the Plan. Additionally, the Program Administrators will sponsor primary market research in Massachusetts in order to answer critical questions regarding behavior related to energy efficiency. The Program Administrators will solicit input, through the Council and its Consultants, on existing barriers involving non-English speaking groups and members of communities in the state which have historically low rates of participation in energy efficiency programs. The Program Administrators will then incorporate the successful methods determined by the research in Massachusetts and other states into their education, outreach, and marketing programs.

One successful organization upon whose work the Program Administrators would like to build is Positive Energy, a corporation that is committed to persuading customers to save energy through a combination of technology, analytic direct marketing, and behavioral science. Several Program Administrators have engaged the services of Positive Energy to “rate” customers’ energy usage in comparison to their neighbors. This “normative
information” approach has been successful in California and will be considered for implementation in Massachusetts. In addition, focus groups, such as the recent series of meetings organized as part of the MassSAVE RCS effort, will be expanded to include all market segments, including residential, C&I, and low-income, to garner as much customer information as possible to further identify barriers to participation and to assist the Program Administrators in formulating outreach efforts.

vii. Segmentation Research
Recently, through the use of the Warren Group Report, the Program Administrators have initiated an effort to better understand the demographics in each service territory. The Warren Group Report identifies the population of single homes, multi-family properties, and low-income residences that exist in each of the service areas. Other internal and external resources to identify the characteristics and demographics of customer populations—such as information that can be provided by local community groups—will be examined to assist in further identifying consumption, motivations, and barriers to positive action. Such reports and information will be used to identify specific customer profiles and will facilitate targeted outreach to these groups.

viii. Message Development
In creating energy efficiency messages, both high level and targeted, the ultimate goal is to have customers understand the many benefits of energy efficiency and then take action. Further, to engage customers who have already implemented energy efficiency measures, the message will include and highlight the additional benefits and importance of going “deeper” by implementing additional energy efficiency measures, such as deep retrofits. Traditional messages focusing on self interest (“save money”), the environment (“help the planet”), and social responsibility (“do your part”) used in previous education and marketing campaigns have been effective to an important degree, but new messages need to be developed to help foster broader and deeper participation. In addition to the overall message, the Program Administrators will also develop messaging at the program level and at the sector level, in order to engage varied customers and other important market actors (contractors, equipment suppliers, opinion leaders) with differing motivations. The Program Administrators plan to conduct qualitative and quantitative research to identify what customers believe to be conservation and energy efficiency behaviors, and to determine what motivates customers to practice more energy efficient behavior. This research will lead to the creation of a “call to action” for the residents and businesses of Massachusetts.

ix. Maintenance of Complementary Individual Efforts
While working diligently on the statewide public education efforts, the Program Administrators will also continue to maintain customer awareness, satisfaction, and participation goals. As the Program Administrators have noted in Section II.A.7.iii, consistency is a high priority and the Program Administrators will also continue outreach efforts utilizing customer representatives and company-specific efforts that complement and are consistent with statewide efforts.

x. Next Steps and Conclusion
The Program Administrators will be optimizing the budget for the statewide education action plan, and will continue to collaborate with the DOER, the Council, and its Consultants, and other interested parties as the budget is developed. The Program Administrators will explore how the rules governing cost-effectiveness could present challenges to this effort, despite the importance of the education and outreach campaign to the saving goals in the Plan, and are confident that these issues can be resolved and that overall program cost-effectiveness, even including increased public education and marketing costs, will remain robust. Additionally, the Program Administrators will be developing and issuing RFPs for partners in some or all of the following areas: market research; segmentation research; message development; community-based education; and integrated education/behavior change campaigns. As noted in the following “Evaluation and Monitoring Section,” applicable RFPs (e.g. behavioral research) will be addressed under the Special Cross-Sector Studies area.

By way of example, the Program Administrators are reviewing including outreach efforts in the “hard to measure” category. See D.P.U. 08-50-A, at 24-31; see also G.L.c.25, §21(b)(2)(iv)(I). The DOER has noted in its memorandum titled Guidance on the Impact of 08-50 on Public Education Efforts for Energy Efficiency, dated June 30, 2009, that there is clear regulatory support to develop and implement public education programs on energy efficiency. The DOER specifically stated that market research to assess, inter alia, customer attitudes is allowed and strongly encouraged within the scope of education efforts.

The ultimate goal of these educational, community outreach, and marketing efforts is to develop a broad system of communication with Massachusetts citizens and businesses and deliver comprehensive energy efficiency programs. Through an array of effective messages and valuable information resources, the Program Administrators will engage with a large portion of the population to assist in delivering value to residential and business customers and achieving the aggressive energy efficiency goals set forth in this Plan.
Table of Contents

TABLE OF CONTENTS ......................................................................................................................... 3

INTRODUCTION ................................................................................................................................. 6

MEASURE CHARACTERIZATION STRUCTURE .................................................................................. 7

IMPACT FACTORS FOR CALCULATING ADJUSTED GROSS AND NET SAVINGS .............................. 10

RESIDENTIAL ELECTRIC EFFICIENCY MEASURES ........................................................................ 15

<table>
<thead>
<tr>
<th>Measure Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting – CFL Bulbs (Markdown)</td>
<td>16</td>
</tr>
<tr>
<td>Lighting – CFL Bulbs</td>
<td>18</td>
</tr>
<tr>
<td>Lighting – CFL Indoor Fixtures</td>
<td>21</td>
</tr>
<tr>
<td>Lighting – Outdoor Fixtures</td>
<td>23</td>
</tr>
<tr>
<td>Lighting – Torchières</td>
<td>25</td>
</tr>
<tr>
<td>Lighting – Light-Emitting Diode Lights</td>
<td>27</td>
</tr>
<tr>
<td>Process – Computer Monitors</td>
<td>29</td>
</tr>
<tr>
<td>Process – Desktop Computers</td>
<td>31</td>
</tr>
<tr>
<td>Process – Room Air Cleaner</td>
<td>33</td>
</tr>
<tr>
<td>Process – Smart Strips</td>
<td>35</td>
</tr>
<tr>
<td>Process – Televisions</td>
<td>37</td>
</tr>
<tr>
<td>Refrigeration – Refrigerators (Lost Opportunity)</td>
<td>39</td>
</tr>
<tr>
<td>Refrigeration – Refrigerators (Retrofit)</td>
<td>41</td>
</tr>
<tr>
<td>Refrigeration – Freezers (Lost Opportunity)</td>
<td>44</td>
</tr>
<tr>
<td>Refrigeration – Freezers (Retrofit)</td>
<td>46</td>
</tr>
<tr>
<td>Refrigeration – Refrigerator/Freezer Recycling</td>
<td>48</td>
</tr>
<tr>
<td>Refrigeration – Appliance Removal</td>
<td>50</td>
</tr>
<tr>
<td>Refrigeration – Basic Educational Measures</td>
<td>52</td>
</tr>
<tr>
<td>HVAC – Central Air Conditioning</td>
<td>54</td>
</tr>
<tr>
<td>HVAC – Air Source Heat Pump</td>
<td>56</td>
</tr>
<tr>
<td>HVAC – Ductless Mini Split Heat Pump</td>
<td>58</td>
</tr>
<tr>
<td>HVAC – Central AC Quality Installation Verification (QIV)</td>
<td>60</td>
</tr>
<tr>
<td>HVAC – Heat Pump Quality Installation Verification (QIV)</td>
<td>62</td>
</tr>
<tr>
<td>HVAC – Central AC Digital Check-up/Tune-up</td>
<td>64</td>
</tr>
<tr>
<td>HVAC – Heat Pump Digital Check-up/Tune-up</td>
<td>66</td>
</tr>
<tr>
<td>HVAC – Duct Sealing</td>
<td>68</td>
</tr>
<tr>
<td>HVAC – Down Size ½ Ton</td>
<td>70</td>
</tr>
<tr>
<td>HVAC – Right Sizing</td>
<td>72</td>
</tr>
<tr>
<td>HVAC – Early Replacement of Central AC or Heat Pump Unit</td>
<td>74</td>
</tr>
<tr>
<td>HVAC – Quality Installation with Duct Sealing</td>
<td>76</td>
</tr>
<tr>
<td>HVAC – Warm Air Furnace Electronically Commutated Motor (ECM)</td>
<td>78</td>
</tr>
<tr>
<td>HVAC – Brushless Furnace Fan Motor</td>
<td>80</td>
</tr>
<tr>
<td>HVAC – Room AC (Lost Opportunity)</td>
<td>82</td>
</tr>
<tr>
<td>HVAC – Window AC Replacement (Retrofit)</td>
<td>84</td>
</tr>
<tr>
<td>HVAC – Electric Weatherization</td>
<td>86</td>
</tr>
<tr>
<td>HVAC – Oil Weatherization</td>
<td>88</td>
</tr>
<tr>
<td>HVAC – Heating System Replacement (Oil)</td>
<td>90</td>
</tr>
<tr>
<td>HVAC/Hot Water – ENERGY STAR® Homes Heating, Cooling, and DHW Measures</td>
<td>92</td>
</tr>
<tr>
<td>Hot Water – Domestic Hot Water Measures (Electric)</td>
<td>94</td>
</tr>
<tr>
<td>Hot Water – Domestic Hot Water Measures (Oil and Gas)</td>
<td>96</td>
</tr>
<tr>
<td>Hot Water – Dishwashers</td>
<td>98</td>
</tr>
</tbody>
</table>

August 2011
<table>
<thead>
<tr>
<th>Measure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Water – Pool Pump</td>
<td>100</td>
</tr>
<tr>
<td>Hot Water – Waterbed Mattress Replacement</td>
<td>102</td>
</tr>
<tr>
<td>MassSave – Vendor Measures</td>
<td>104</td>
</tr>
<tr>
<td>Multifamily – Insulation (Walls, Roof, Floor)</td>
<td>107</td>
</tr>
<tr>
<td>Multifamily – DHW (Showerheads and Aerators)</td>
<td>109</td>
</tr>
<tr>
<td>Multifamily – DHW (Tank and Pipe Wrap)</td>
<td>111</td>
</tr>
<tr>
<td>Multifamily – Thermostats</td>
<td>113</td>
</tr>
<tr>
<td>Multifamily – Heat Pump Tune-Up</td>
<td>115</td>
</tr>
<tr>
<td>Multifamily – Air Sealing</td>
<td>117</td>
</tr>
<tr>
<td>Multifamily – Refrigerators and Freezers</td>
<td>119</td>
</tr>
<tr>
<td>Multifamily – Fixtures and CFLs</td>
<td>121</td>
</tr>
<tr>
<td>Behavior – OPower Electric</td>
<td>123</td>
</tr>
<tr>
<td><strong>Commercial and Industrial Electric Efficiency Measures</strong></td>
<td>125</td>
</tr>
<tr>
<td>Lighting – Advanced Lighting Design (Performance Lighting)</td>
<td>126</td>
</tr>
<tr>
<td>Lighting – Lighting Systems</td>
<td>129</td>
</tr>
<tr>
<td>Lighting – Lighting Controls</td>
<td>133</td>
</tr>
<tr>
<td>Lighting – Freezer/Cooler LEDs</td>
<td>136</td>
</tr>
<tr>
<td>HVAC – Single-Package and Split System Unitary Air Conditioners</td>
<td>138</td>
</tr>
<tr>
<td>HVAC – Single Package or Split System Heat Pump Systems</td>
<td>141</td>
</tr>
<tr>
<td>HVAC – Dual Enthalpy Economizer Controls (DEEC)</td>
<td>144</td>
</tr>
<tr>
<td>HVAC – Demand Control Ventilation (DCV)</td>
<td>146</td>
</tr>
<tr>
<td>HVAC – ECM Fan Motors</td>
<td>148</td>
</tr>
<tr>
<td>HVAC – Energy Management System</td>
<td>150</td>
</tr>
<tr>
<td>HVAC – High Efficiency Chiller</td>
<td>152</td>
</tr>
<tr>
<td>HVAC – Hotel Occupancy Sensors</td>
<td>155</td>
</tr>
<tr>
<td>HVAC – Programmable Thermostats</td>
<td>157</td>
</tr>
<tr>
<td>Refrigeration – Door Heater Controls</td>
<td>159</td>
</tr>
<tr>
<td>Refrigeration – Novelty Cooler Shutoff</td>
<td>161</td>
</tr>
<tr>
<td>Refrigeration – ECM Evaporator Fan Motors for Walk–in Coolers and Freezers</td>
<td>163</td>
</tr>
<tr>
<td>Refrigeration – Case Motor Replacement</td>
<td>165</td>
</tr>
<tr>
<td>Refrigeration – Evaporator Fan Controls</td>
<td>167</td>
</tr>
<tr>
<td>Refrigeration – Vending Misers</td>
<td>169</td>
</tr>
<tr>
<td>Compressed Air – High Efficiency Air Compressors</td>
<td>171</td>
</tr>
<tr>
<td>Compressed Air – Refrigerated Air Dryers</td>
<td>173</td>
</tr>
<tr>
<td>Motors/Drives – Premium Efficiency Motors</td>
<td>175</td>
</tr>
<tr>
<td>Motors/Drives – Variable Frequency Drives</td>
<td>177</td>
</tr>
<tr>
<td>Custom Measures</td>
<td>180</td>
</tr>
<tr>
<td><strong>Residential Natural Gas Efficiency Measures</strong></td>
<td>183</td>
</tr>
<tr>
<td>HVAC – Boiler (Forced Hot Water)</td>
<td>184</td>
</tr>
<tr>
<td>HVAC – Boiler Reset Controls (Retrofit Only)</td>
<td>186</td>
</tr>
<tr>
<td>HVAC – Early Replacement Boiler</td>
<td>188</td>
</tr>
<tr>
<td>HVAC – Programmable Thermostats</td>
<td>190</td>
</tr>
<tr>
<td>HVAC – Furnace (Forced Hot Air) with ECM</td>
<td>192</td>
</tr>
<tr>
<td>HVAC – Heat Recovery Ventilator</td>
<td>194</td>
</tr>
<tr>
<td>HVAC – Stand Alone Storage Water Heater</td>
<td>196</td>
</tr>
<tr>
<td>HVAC – Gas Heating System Replacement (Low Income)</td>
<td>198</td>
</tr>
<tr>
<td>HVAC – Gas Weatherization (Low Income)</td>
<td>200</td>
</tr>
<tr>
<td>HVAC – Gas Insulation</td>
<td>202</td>
</tr>
<tr>
<td>HVAC – Gas Air Sealing</td>
<td>204</td>
</tr>
<tr>
<td>HVAC/Hot Water – Integrated Water Heater/Condensing Boiler</td>
<td>206</td>
</tr>
<tr>
<td>HVAC/Hot Water – Integrated Water Heater/Non-Condensing Boiler</td>
<td>208</td>
</tr>
<tr>
<td>Hot Water – Condensing Water Heater</td>
<td>210</td>
</tr>
<tr>
<td>Hot Water – Indirect Water Heater</td>
<td>212</td>
</tr>
<tr>
<td>Hot Water – Tankless Water Heaters</td>
<td>214</td>
</tr>
</tbody>
</table>
### COMMERCIAL AND INDUSTRIAL NATURAL GAS EFFICIENCY MEASURES

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC – PROGRAMMABLE THERMOSTAT</td>
<td>220</td>
</tr>
<tr>
<td>HVAC – BOILER RESET CONTROLS (RETROFIT ONLY)</td>
<td>222</td>
</tr>
<tr>
<td>HVAC – CONDENSING UNIT HEATER</td>
<td>224</td>
</tr>
<tr>
<td>HVAC – GAS-FIRED LOW INTENSITY INFRARED HEATING</td>
<td>226</td>
</tr>
<tr>
<td>HVAC – HIGH EFFICIENCY NATURAL GAS BOILER</td>
<td>228</td>
</tr>
<tr>
<td>HVAC – HIGH EFFICIENCY NATURAL GAS WARM AIR FURNACE</td>
<td>231</td>
</tr>
<tr>
<td>HVAC/HOT WATER – COMBINED HIGH EFFICIENCY BOILER AND WATER HEATER</td>
<td>234</td>
</tr>
<tr>
<td>HOT WATER – CONDENSING STAND-ALONE WATER HEATER</td>
<td>236</td>
</tr>
<tr>
<td>HOT WATER – PRE-RINSE SPRAY VALVE</td>
<td>238</td>
</tr>
<tr>
<td>HOT WATER – REPAIR/REPLACE MALFUNCTIONING STEAM TRAP</td>
<td>240</td>
</tr>
<tr>
<td>HOT WATER – LOW FLOW SHOWER HEADS</td>
<td>242</td>
</tr>
<tr>
<td>HOT WATER – FAUCET AERATOR</td>
<td>244</td>
</tr>
<tr>
<td>HOT WATER – HIGH EFFICIENCY INDIRECT WATER HEATER</td>
<td>246</td>
</tr>
<tr>
<td>HOT WATER – HIGH EFFICIENCY TANKLESS WATER HEATER</td>
<td>248</td>
</tr>
<tr>
<td>HOT WATER – HIGH EFFICIENCY FREE STANDING WATER HEATER</td>
<td>250</td>
</tr>
<tr>
<td>FOOD SERVICE – COMMERCIAL GAS-FIRED OVEN</td>
<td>252</td>
</tr>
<tr>
<td>FOOD SERVICE – COMMERCIAL GAS-FIRED GRIDDLE</td>
<td>254</td>
</tr>
<tr>
<td>FOOD SERVICE – COMMERCIAL FRYER</td>
<td>256</td>
</tr>
<tr>
<td>FOOD SERVICE – COMMERCIAL GAS-FIRED STEAMER</td>
<td>258</td>
</tr>
<tr>
<td>CUSTOM MEASURES</td>
<td>260</td>
</tr>
</tbody>
</table>

### APPENDICES

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPENDIX A: COMMON LOOKUP TABLES</td>
<td>264</td>
</tr>
<tr>
<td>APPENDIX B: NET TO GROSS IMPACT FACTORS</td>
<td>271</td>
</tr>
<tr>
<td>APPENDIX C: ACRONYMS</td>
<td>279</td>
</tr>
<tr>
<td>APPENDIX D: GLOSSARY</td>
<td>280</td>
</tr>
</tbody>
</table>
Introduction

This Massachusetts Technical Reference Manual for Estimating Savings from Energy Efficiency Measures ("TRM") documents for regulatory agencies, customers, and other stakeholders how National Grid consistently, reliably, and transparently calculate savings from the installation of efficient equipment or the installation of efficient equipment, collectively called “measures,” over the course of the 2010 program year. This reference manual provides methods, formulas and default assumptions for estimating energy, peak demand and other resource impacts from efficiency measures.

Within this TRM, efficiency measures are organized by the sector for which the measure is eligible and by the primary energy source associated with the measure. The two sectors are Residential and Commercial & Industrial (“C&I”).1 The primary energy sources addressed in this TRM are electricity and natural gas.

Each measure is presented in its own section as a “measure characterization.” The measure characterizations provide mathematical equations for determining savings (algorithms), as well as default assumptions and sources, where applicable. In addition, any descriptions of calculation methods or baselines are provided as appropriate. The parameters for calculating savings are listed in the same order for each measure.

Algorithms are provided for estimating annual energy and peak demand impacts for primary and secondary energy sources if appropriate. In addition, algorithms or calculated results may be provided for other non-energy impacts (such as water savings or operation and maintenance cost savings). Data assumptions are based on Massachusetts PA data where available. Where Massachusetts-specific data is not available, assumptions may be based on, 1) manufacturer and industry data, 2) a combination of the best available data from jurisdictions in the same region, or 3) engineering judgment to develop credible and realistic factors.

---

1 In this document, the Residential and Low Income programs are represented in a single “Residential” sector due to the degree of overlap in savings assumptions for similar measures in the standard income programs.
Measure Characterization Structure

This section describes the common entries or inputs that make up each measure characterization. A formatted template follows the descriptions of each section of the measure characterization.

Measure Name

A single device or behavior may be analyzed as a range of measures depending on a variety of factors which largely translate to where it is and who is using it. Such factors include hours of use, location, and baseline (equipment replaced or behavior modified). For example, the same screw-in compact fluorescent lamp will produce different savings if installed in an emergency room waiting area than if installed in a bedside lamp.

Measure Overview

This section will include a plain text description of the efficient and baseline technology and the benefit(s) of its installation, as well as subfields of supporting information including:

- **Description:** <Description of the energy efficiency measure>
- **Primary Energy Impact:** <Electric or Natural Gas>
- **Secondary Energy Impact:** <e.g., Natural Gas, Propane, Oil, Electric, None>
- **Non-Energy Impact:** <e.g., Water Resource, O&M, Non-Resource, None>
- **Sector:** <Residential, Low Income or Commercial and Industrial>
- **Market:** <Lost Opportunity, Retrofit and/or Products and Services>
- **End-Use:** <Per PARIS database definition – see list below>
- **Program:** <Per PA definition>

The PARIS database includes the following possible End-Uses:

- Lighting
- HVAC
- Motors /Drives
- Refrigeration
- Hot Water
- Compressed Air
- Behavior
- Insulation
- Combined Heat and Power
- Solar Hot Water
- Demand Response
- Photovoltaic Panels
- Process

Notes

This is an optional section for additional notes regarding anticipated changes going forward. For example, this section would not if there were upcoming statewide evaluations affecting the measure, or any plans for development of statewide tool for calculating measure savings.

Algorithms for Calculating Primary Energy Impacts

This section will describe the method for calculating the primary energy savings in appropriate units, i.e., kWh for electric energy savings or MMBtu for natural gas energy savings. The savings algorithm will be provided in a form similar to the following:

\[ \Delta kWh = \Delta kW \times Hours \]
Similarly, the method for calculating electric demand savings will be provided in a form similar to the following:

$$\Delta kW = \left(\frac{Watts_{BASE} - Watts_{EE}}{1000}\right)$$

Below the savings algorithms, a table contains the definitions (and, in some cases, default values) of each input in the equation(s). The inputs for a particular measure may vary and will be reflected as such in this table (see example below).

- \(\Delta kWh\) = gross annual kWh savings from the measure
- \(\Delta kW\) = gross connected kW savings from the measure
- Hours = average hours of use per year
- Watts\(_{BASE}\) = baseline connected kW
- Watts\(_{EE}\) = energy efficient connected kW

### Baseline Efficiency

This section will include a statement of the assumed equipment/operation efficiency in the absence of program intervention. Multiple baselines will be provided as needed, e.g., for different markets. Baselines may refer to reference tables or may be presented as a table for more complex measures.

### High Efficiency

This section will describe the high efficiency case from which the energy and demand savings are determined. The high efficiency case may be based on specific details of the measure installation, minimum requirements for inclusion in the program, or an energy efficiency case based on historical participation. It may refer to tables within the measure characterization or in the appendices or efficiency standards set by organizations such as ENERGY STAR® and the Consortium for Energy Efficiency.

### Hours

This section will note operating hours for equipment that is either on or off, or equivalent full load hours for technologies that operate at partial loads, or reduced hours for controls. Reference tables will be used as needed to avoid repetitive entries.

### Measure Life

Measure Life includes equipment life and the effects of measure persistence. Equipment life is the number of years that a measure is installed and will operate until failure. Measure persistence takes into account business turnover, early retirement of installed equipment, and other reasons measures might be removed or discontinued.

### Secondary Energy Impacts

This section described any secondary energy impacts associated with the energy efficiency measure, including all assumptions and the method of calculation.
Non-Energy Impacts

This section describes any non-energy impacts associated with the energy efficiency measure, including all assumptions and the method of calculation.

Impact Factors for Calculating Adjusted Gross Savings

The section includes a table of impact factor values for adjusting gross savings. Impact factors for calculating net savings (free ridership, spillover and/or net-to-gross ratio) are in Appendix B: Net to Gross Impact Factors. Further descriptions of the impacts factors and the sources on which they are based are described below the table.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
</table>

Abbreviated program names may be used in the above table. The mapping of full program names to abbreviated names is given below:

<table>
<thead>
<tr>
<th>Full Program Name</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential New Construction &amp; Major Renovation</td>
<td>RNC</td>
</tr>
<tr>
<td>Residential Cooling &amp; Heating Equipment</td>
<td>RHVAC</td>
</tr>
<tr>
<td>Multi-Family Retrofit</td>
<td>MF Retrofit</td>
</tr>
<tr>
<td>MassSAVE</td>
<td>MassSAVE</td>
</tr>
<tr>
<td>OPOWER Program</td>
<td>Behavior/Feedback</td>
</tr>
<tr>
<td>ENERGY STAR Lighting</td>
<td>ES Lighting</td>
</tr>
<tr>
<td>ENERGY STAR Appliances</td>
<td>ES Appliances</td>
</tr>
<tr>
<td>Low-Income Residential New Construction</td>
<td>LI RNC</td>
</tr>
<tr>
<td>Low-Income 1-4 Family Retrofit</td>
<td>LI Retrofit 1-4</td>
</tr>
<tr>
<td>Low-Income Multi-Family Retrofit</td>
<td>LI MF Retrofit</td>
</tr>
<tr>
<td>C&amp;I New Construction and Major Renovation</td>
<td>NC</td>
</tr>
<tr>
<td>C&amp;I Large retrofit</td>
<td>Large Retrofit</td>
</tr>
<tr>
<td>C&amp;I Small retrofit</td>
<td>Small Retrofit</td>
</tr>
<tr>
<td>Residential Heating and Water Savings</td>
<td>RNC</td>
</tr>
<tr>
<td>Residential Heating and Water Savings</td>
<td>Residential Heating and Water Savings</td>
</tr>
<tr>
<td>MassSAVE</td>
<td>MassSAVE</td>
</tr>
<tr>
<td>Multifamily Retrofit</td>
<td>MF Retrofit</td>
</tr>
<tr>
<td>OPOWER Program</td>
<td>Behavior/Feedback</td>
</tr>
<tr>
<td>Low-Income Single Family Retrofit</td>
<td>LI Retrofit 1-4</td>
</tr>
<tr>
<td>C&amp;I New Construction &amp; Major Renovation</td>
<td>C&amp;I NC</td>
</tr>
<tr>
<td>C&amp;I Retrofit</td>
<td>C&amp;I Retrofit</td>
</tr>
<tr>
<td>C&amp;I Direct Install</td>
<td>C&amp;I Direct Install</td>
</tr>
</tbody>
</table>
Impact Factors for Calculating Adjusted Gross and Net Savings

National Grid uses the algorithms in the Measure Characterization sections to calculate the gross savings for energy efficiency measures. Impact factors are then applied to make various adjustments to the gross savings estimate to account for the performance of individual measures or energy efficiency programs as a whole in achieving energy reductions as assessed through evaluation studies. Impacts factors address both the technical performance of energy efficiency measures and programs, accounting for the measured energy and demand reductions realized compared to the gross estimated reductions, as well as the programs’ effect on the market for energy efficient products and services.

This section describes the types of impact factors used to make such adjustments, and how those impacts are applied to gross savings estimates. Definitions of the impact factors and other terms are also provided in the Glossary (see Appendix D: Glossary).

Types of Impact Factors

The impact factors used to adjust savings fall into one of two categories:

Impact factors used to adjust gross savings:

- In-Service Rate (“ISR”)
- Savings Persistence Factor (“SPF”)
- Realization Rate (“RR”)
- Summer and Winter Peak Demand Coincidence Factors (“CF”).

Impact factors used to calculate net savings:

- Free-Ridership (“FR”) and Spillover (“SO”) Rates
- Net-to-Gross Ratios (“NTG”).

The in-service rate is the actual portion of efficient units that are installed. For example, efficient lamps may have an in-service rate less than 1.00 since some lamps are purchased as replacement units and are not immediately installed. The ISR is 1.00 for most measures.

The savings persistence factor is the portion of first-year energy or demand savings expected to persist over the life of the energy efficiency measure. The SPF is developed by conducting surveys of installed equipment several years after installation to determine the actual operational capability of the equipment. The SPF is 1.00 for most measures.

In contrast to savings persistence, measure persistence takes into account business turnover, early retirement of installed equipment, and other reasons the installed equipment might be removed or discontinued. Measure persistence is generally incorporated as part of the measure life, and therefore is not included as a separate impact factor.

The realization rate is used to adjust the gross savings (as calculated by the savings algorithms) based on impact evaluation studies. The realization rate is equal to the ratio of measure savings developed from an
impact evaluation to the estimated measure savings derived from the savings algorithms. The realization rate does not include the effects of any other impact factors. Depending on the impact evaluation study, there may be separate realization rates for energy (kWh), peak demand (kW), or fossil fuel energy (MMBtu).

A coincidence factor adjusts the connected load kW savings derived from the savings algorithm. A coincidence factor represents the fraction of the connected load reduction expected to occur at the same time as a particular system peak period. The coincidence factor includes both coincidence and diversity factors combined into one number, thus there is no need for a separate diversity factor in this TRM.

Coincidence factors are provided for the on-peak periods as defined by the ISO New England for the Forward Capacity Market (“FCM”), and are calculated consistently with the FCM methodology. Electric demand reduction during the ISO New England peak periods is defined as follows:

- **Summer On-Peak**: average demand reduction from 1:00-5:00 PM on non-holiday weekdays in June, July, and August
- **Winter On-Peak**: average demand reduction from 5:00-7:00 PM on non-holiday weekdays in December and January

A free-rider is a customer who participates in an energy efficiency program (and gets an incentive) but who would have installed some or all of the same measure(s) on their own, with no change in timing of the installation, if the program had not been available. The free-ridership rate is the percentage of savings attributable to participants who would have installed the measures in the absence of program intervention.

The spillover rate is the percentage of savings attributable to a measure or program, but additional to the gross (tracked) savings of a program. Spillover includes the effects of 1) participants in the program who install additional energy efficient measures outside of the program as a result of participating in the program, and 2) non-participants who install or influence the installation of energy efficient measures as a result of being aware of the program. These two components are the participant spillover (SO_p) and non-participant spillover (SO_NP).

The net savings value is the final value of savings that is attributable to a measure or program. Net savings differs from gross savings because it includes the effects of the free-ridership and/or spillover rates.

The net-to-gross ratio is the ratio of net savings to the gross savings adjusted by any impact factors (i.e., the “adjusted” gross savings). Depending on the evaluation study, the NTG ratio may be determined from the free-ridership and spillover rates, if available, or it may be a distinct value with no separate specification of FR and SO values.
Standard Net–to–Gross Formulas

The TRM measure entries provide algorithms for calculating the gross savings for those efficiency measures. The following standard formulas show how the impact factors are applied to calculate the adjusted gross savings, which in turn are used to calculate the net savings. These are the calculations used by the PAs to track and report gross and net savings. The gross savings reported by the PAs are the unadjusted gross savings without the application of any impact factors.

Calculation of Net Annual Electric Energy Savings

\[
\text{adj\_gross\_kWh} = \text{gross\_kWh} \times RR_E \times SPF \times ISR \\
\text{net\_kWh} = \text{adj\_gross\_kWh} \times NTG
\]

Calculation of Net Summer Electric Peak Demand Coincident kW Savings

\[
\text{adj\_gross\_kW}_{SP} = \text{gross\_kW} \times RR_{SP} \times SPF \times ISR \times CF_{SP} \\
\text{net\_kW}_{SP} = \text{adj\_gross\_kW}_{SP} \times NTG
\]

Calculation of Net Winter Electric Peak Demand Coincident kW Savings

\[
\text{adj\_gross\_kW}_{WP} = \text{gross\_kW} \times RR_{WP} \times SPF \times ISR \times CF_{WP} \\
\text{net\_kW}_{WP} = \text{adj\_gross\_kW}_{WP} \times NTG
\]

Calculation of Net Annual Natural Gas Energy Savings

\[
\text{adj\_gross\_MMBtu} = \text{gross\_MMBtu} \times RR_E \times SPF \times ISR \\
\text{net\_MMBtu} = \text{adj\_gross\_MMBtu} \times NTG
\]

Depending on the evaluation study methodology:

- NTG is equal to \((1 – FR + SO_P + SO_{NP})\), or
- NTG is a single value with no distinction of FR, \(SO_P\), \(SO_{NP}\), and/or other factors that cannot be reliably isolated.

Where:

- Gross\_kWh = Gross Annual kWh Savings
- adj\_gross\_kWh = Adjusted Gross Annual kWh Savings
- net\_kWh = Net Annual kWh Savings
- Gross\_kW_{SP} = Gross Connected kW Savings (summer peak)
- adj\_gross\_kW_{SP} = Adjusted Gross Connected kW Savings (summer peak)
- Gross\_kW_{WP} = Gross Connected kW Savings (winter peak)
- adj\_gross\_kW_{WP} = Adjusted Gross Connected kW Savings (winter peak)
- net\_kW_{SP} = Net Coincident kW Savings (summer peak)
- net\_kW_{WP} = Net Coincident kW Savings (winter peak)
- Gross\_MMBtu = Gross Annual MMBtu Savings
- adj\_gross\_MMBtu = Adjusted Gross Annual MMBtu Savings
- net\_MMBtu = Net Annual MMBtu Savings
- SPF = Savings Persistence Factor
- ISR = In-Service Rate
\[ \text{CF}_{SP} \quad = \quad \text{Peak Coincidence Factor (summer peak)} \\
\text{CF}_{WP} \quad = \quad \text{Peak Coincidence Factor (winter peak)} \\
\text{RR}_E \quad = \quad \text{Realization Rate for electric energy (kWh)} \\
\text{RR}_{SP} \quad = \quad \text{Realization Rate for summer peak kW} \\
\text{RR}_{WP} \quad = \quad \text{Realization Rate for winter peak kW} \\
\text{NTG} \quad = \quad \text{Net-to-Gross Ratio} \\
\text{FR} \quad = \quad \text{Free-Ridership Factor} \\
\text{SO}_P \quad = \quad \text{Participant Spillover Factor} \\
\text{SO}_{NP} \quad = \quad \text{Non-Participant Spillover Factor} \]
Residential Electric Efficiency Measures
Lighting – CFL Bulbs (Markdown)

Measure Overview

**Description:** This measure covers the installation of ENERGY STAR® screw-in compact fluorescent lamps (CFLs) purchased through the PAs markdown programs. Compact fluorescent lamps offer comparable luminosity to incandescent lamps at significantly less wattage and significantly longer lamp lifetimes.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** One Time Non-Resource

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** Lighting

**Program:** ENERGY STAR Lighting

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms, which use averaged inputs:

\[ \Delta kWh = \Delta kW \times Hours \]
\[ \Delta kW = \Delta kW \]

Where:

- **Unit** = Rebated CFL Bulb Spiral
- **\( \Delta kWh \)** = Average annual kWh reduction: 47 kWh
- **\( \Delta kW \)** = Average annual kW reduction: 0.0457 kW
- **Hours** = Average annual operating hours

Baseline Efficiency

The baseline efficiency case is an incandescent bulb.

High Efficiency

The high efficiency case is an ENERGY STAR® rated CFL spiral bulb.

Hours

Average annual operating hours are 1,022 hours/year (2.8 hours/day \(^3\) * 365 days/year).

Measure Life

The measure life is 7 years for markdown bulbs and 5 years for coupon bulbs.\(^4\)

---


\(^3\) Ibid.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Time Non-Resource</td>
<td>O&amp;M Cost Impacts⁵</td>
<td>$3.00/Bulb</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-in Bulbs</td>
<td>ES Lighting</td>
<td>0.42</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Screw-in Bulbs (Hard to Reach)</td>
<td>ES Lighting</td>
<td>0.60</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Screw-in Bulbs (School Fundraiser)</td>
<td>ES Lighting</td>
<td>0.50</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>Screw-in Bulbs (Specialty)</td>
<td>ES Lighting</td>
<td>0.60</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are based on Study 8, Evaluation of Residential Lighting Program, for Screw-in-Bulbs, hard to reach, and specialty measures.⁶ Note- these are NTG values shown here to remain consistent with the National Grid tracking system.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are 100% since savings estimates are based on evaluation results.

Coincidence Factors

Coincidence factors are from the 2009 Lighting Markdown Study.⁷

---


Lighting – CFL Bulbs

Measure Overview

**Description:** The installation of ENERGY STAR® screw-in compact fluorescent lamps (CFLs). Compact fluorescent lamps offer comparable luminosity to incandescent lamps at significantly less wattage and significantly longer lamp lifetimes.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** One Time O&M Cost Reduction, Low Income only: Annual Discounted Rate Cost Reduction

**Sector:** Residential, Low Income

**Market:** Lost Opportunity, Retrofit

**End Use:** Lighting

**Program:** Residential New Construction & Major Renovation, MassSAVE, Low-Income Residential New Construction, Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and averaged inputs:

For Residential New Construction & Major Renovation, MassSAVE, and Low-Income Residential New Construction:

\[ \Delta kWh = \Delta kW \times \text{Hours} \]
\[ \Delta kW = \Delta kJ \]

**Unit** = Installed CFL bulb

\[ \Delta kWh = \text{Average annual kWh reduction: 57 kWh} \]

\[ \Delta kW = \text{Average reduction in connected kW: 0.049 kW}^8 \]

**Hours** = Average annual operating hours

For Low-Income 1-4 Family Retrofit:

\[ \Delta kWh = \Delta kJ \]
\[ \Delta kW = \Delta kJ \]

**Where:**

**Unit** = Installed CFL bulb

\[ \Delta kWh = \text{Average annual kWh savings per unit: 41 kWh}^9 \]

\[ \Delta kW = \text{Max kW reduction: 0.011 kW}^{10} \]

---


Baseline Efficiency

The baseline efficiency case is an incandescent bulb.

High Efficiency

The high efficiency case is an ENERGY STAR® qualified compact fluorescent light bulb that uses 75% less energy and lasts about 10 times longer than an incandescent bulb.

Hours

The annual operating hours are 1,168 hours/year (3.2 hours/day$^{11} \times 365$ days/year).

Measure Life

For Residential New Construction & Major Renovation, MassSAVE, and Low-Income Residential New Construction installations, the measure life is 7 years.$^{12}$

For Low-Income 1-4 Family Retrofit installations the measure life is 9 years.$^{13}$

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impact

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction$^{14}$</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>O&amp;M Cost Reduction$^{15}$</td>
<td>$3/Bulb</td>
<td></td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR$^E$</th>
<th>RR$^{SP}$</th>
<th>RR$^{WP}$</th>
<th>CF$^{SP}$</th>
<th>CF$^{WP}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-in Bulbs</td>
<td>RNC, LI RNC</td>
<td>0.99</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
</tr>
<tr>
<td>Screw-in Bulbs</td>
<td>MassSAVE</td>
<td>0.90</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.076</td>
<td>0.286</td>
</tr>
<tr>
<td>Screw-in Bulbs (piggyback)</td>
<td>MassSAVE</td>
<td>0.90</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.076</td>
<td>0.286</td>
</tr>
<tr>
<td>CFL Bulb</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.35</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In-Service Rate

- RNC, LI RNC: 2006 ENERGY STAR® Homes New Homebuyer Survey Report.$^{16}$

---

$^{11}$ Ibid.


$^{13}$ Massachusetts Common Assumption: In the Low Income program there is no limit on the number of CFLs installed per home; a longer lifetime is assumed to account for the shorter hours per day.


- MassSAVE: Impact evaluation of the MA, RI, VT 2003 Residential Lighting Programs\textsuperscript{17}
- LI 1-4 Retrofit: Assume 100% installation rate.

**Savings Persistence Factor**
All PAs use 100% savings persistence factors.

**Realization Rates**
Realization rates are set to 100% since deemed savings are based on evaluation results.

**Coincidence Factors**
- RNC, LI RNC, MassSAVE: Coincidence factors are based on the 2009 Lighting Markdown Study.\textsuperscript{18}
- LI 1-4 Retrofit: Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.\textsuperscript{19}


Lighting – CFL Indoor Fixtures

Measure Overview

Description: The installation of ENERGY STAR® compact fluorescent (CFL) indoor fixtures. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly less wattage and significantly longer lifetimes. Hardwired fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer lifespan.

Primary Energy Impact: Electric

Secondary Energy Impact: None

Non-Energy Impact: One-Time O&M Cost Reduction, Annual Discounted Rate Cost Reduction (Low Income only)

Sector: Low Income, Residential

Market: Lost Opportunity, Retrofit

End Use: Lighting

Program: ENERGY STAR Lighting, Residential New Construction & Major Renovation, Low-Income Residential New Construction,

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta kWh = \Delta kW \times Hours \]

\[ \Delta kW = \Delta kW \]

Where:

Unit = Rebated indoor fixture

\( \Delta kWh \) = Average annual kWh reduction: 44 kWh

\( \Delta kW \) = Average reduction in connected kW: 0.049 kW

Hours = Average annual operating hours

Baseline Efficiency

The baseline efficiency case is an incandescent, screw-based fixture with an incandescent lamp.

High Efficiency

The high efficiency case is an ENERGY STAR® qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.

Hours

The average annual operating hours are 912.5 hours/year (2.5 hours/day \( * \) 365 days/year).

---

Measure Life

The measure life is 20 years.\textsuperscript{22}

Secondary Energy Impact

There are no secondary energy impacts for this measure.

Non-Energy Impact

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction\textsuperscript{23}</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>O&amp;M Cost Reduction\textsuperscript{24}</td>
<td>$3.50/Fixture</td>
<td></td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor Fixture</td>
<td>ES Lighting</td>
<td>0.95</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
</tr>
<tr>
<td>Indoor Fixture</td>
<td>RNC, LI RNC</td>
<td>0.96</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
</tr>
</tbody>
</table>

In-Service Rates

- ES Lighting: 2004 Impact Evaluation of MA, RI, VT Residential Lighting Program\textsuperscript{25}
- RNC, LI RNC: 2006 ENERGY STAR® Homes New Homebuyer Survey Report\textsuperscript{26}

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors

Coincidence factors for CFL fixtures are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.\textsuperscript{27} Coincidence factors for indoor fixtures are based on the 2009 Lighting Markdown Study.\textsuperscript{28}

\textsuperscript{23} Oppenheim, Jerry (2000). \textit{Memo - Low Income DSM Program non-energy benefits.}
\textsuperscript{26} Nexus Market Research & Dorothy Conant (2006). \textit{Massachusetts ENERGY STAR ® Homes: 2005 Baseline Study: Part II: Homeowner Survey Analysis Incorporating Inspection Data Final Report}. Prepared for Joint Management Committee; Table 8.1
Lighting – Outdoor Fixtures

Measure Overview

**Description:** The installation of hardwired ENERGY STAR® fluorescent outdoor fixtures with pin-based bulbs. Savings for this measure are attributable to high efficiency outdoor lighting fixtures and are treated similarly to indoor fixtures.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** One-time Non-Resource

**Sector:** Residential

**Market:** Lost Opportunity, Retrofit

**End Use:** Lighting

**Program:** ENERGY STAR Lighting

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms which use averaged inputs:

\[ \Delta kWh = \Delta kW \times Hours \]
\[ \Delta kW = \Delta kW \]

Where:

- **Unit** = Rebated outdoor fixture
- **\( \Delta kWh \)** = Average annual kWh reduction: 156 kWh
- **\( \Delta kW \)** = Average connected kW reduction: 0.095 kW
- **Hours** = Average annual operating hours

Baseline Efficiency

The baseline efficiency case is an incandescent, screw-based fixture with an incandescent bulb.

High Efficiency

The high efficiency case is an ENERGY STAR® fixture wired for exclusive use with a pin based CFL bulb.

Hours

The average annual operating hours are 1,642.5 hours/year (4.5 hours per day \(^{30}\) \(*\) 365 days per year).

---


Measure Life

The measure life is 6 years for markdown outdoor fixtures and 5 years for coupon outdoor fixtures.\(^{31}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Time Non-Resource</td>
<td>O&amp;M Cost Impacts(^{32})</td>
<td>$3.50/Bulb</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Fixture</td>
<td>ES Lighting</td>
<td>0.87</td>
<td>1.00</td>
<td>100</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
</tr>
</tbody>
</table>

In-Service Rates

2004 Impact Evaluation of MA, RI, VT Residential Lighting Program.\(^{33}\)

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on the 2009 Lighting Markdown Study.\(^{34}\)

---


Lighting – Torchieres

Measure Overview

Description: The installation of high-efficiency ENERGY STAR® torchieres. High efficiency torchieres use fluorescent in place of halogen or incandescent bulbs to provide comparable luminosity at significantly reduced wattage.

Primary Energy Impact: Electric

Secondary Energy Impact: None

Non-Energy Impact: Annual Discounted Rate Cost Reduction (Low Income only)

Sector: Residential, Low Income

Market: Lost Opportunity, Retrofit

End Use: Lighting

Program: ENERGY STAR Lighting

Algorithms for Calculating Primary Energy Impact

Unit savings are based on the following algorithms which use averaged inputs:

\[ \Delta kWh = \Delta kW \times \text{Hours} \]
\[ \Delta kW = \Delta kW \]

Where:

Unit = Rebated ENERGY STAR® Torchiere

\( \Delta kWh \) = Average annual kWh reduction: 106 kWh

\( \Delta kW \) = Average connected kW reduction: 0.088 kW\(^{35}\)

Hours = Average annual operating hours

Baseline Efficiency

The baseline efficiency case is a halogen (or incandescent) torchiere fixture.

High Efficiency

The high efficiency case is a fluorescent torchiere fixture.

Hours

The average annual operating hours are 1,204.5 hours/year (3.3 hours/day\(^{36} \times 365\) days/year).

Measure Life

The measure life is 8 years.\(^{37}\)


Secondary-Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torchieres</td>
<td>ES Lighting</td>
<td>0.83</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
</tr>
</tbody>
</table>

In-Service Rates

2004 Impact Evaluation of MA, RI, VT Residential Lighting Program\(^{38}\)

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Staff Assumptions.

Coincidence Factors

Coincidence factors are based on the 2009 Lighting Markdown Study.\(^{39}\)

---

\(^{37}\) Ibid.


Lighting – Light– Emitting Diode Lights

Measure Overview

Description: The installation of Light-Emitting Diode (LED) screw-in bulbs. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Annual Discounted Rate Cost Reduction (Low Income only)
Sector: Residential
Market: Lost Opportunity
End Use: Lighting
Program: ENERGY STAR Lighting, Residential New Construction & Major Renovation, Low-Income Residential New Construction

Algorithms for Calculating Primary Energy Impact

Unit savings are based on the following algorithms which use averaged inputs:

$$
\Delta kWh = (kW_{BASE} - kW_{LED}) \times Hours
$$

Where:

- Unit = Rebated LED lamp or fixture
- $\Delta kWh$ = Average annual energy savings: 48 kWh\(^{40}\)
- $\Delta kW$ = Average connected kW reduction: 0.013 kW\(^{41}\)
- $kW_{BASE}$ = Average connected kW of baseline bulb
- $kW_{LED}$ = Average connected kW of LED bulb
- Hours = Average annual operating hours

Baseline Efficiency

The baseline efficiency case is a 65-watt incandescent bulb in a screw-based socket or fluorescent under cabinet light.

High Efficiency

The high efficiency case is an 18-watt LED downlight.

Hours

The average annual operating hours are 1,022 hours/year (2.8 hours/day\(^{42}\) * 365 days/year).

---


Measure Life

The measure life is 20 years.\(^{43}\)

Secondary-Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{44})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

No operations and maintenance cost adjustments are claimed for this measure. At this time, the incremental cost is unclear given the continual changes in LED technology. In addition, the measure life savings from not replacing incandescent bulbs are also unclear.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_{SP})</th>
<th>RR(_{WP})</th>
<th>CF(_{SP})</th>
<th>CF(_{WP})</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Lamp</td>
<td>ES Lighting</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
</tr>
<tr>
<td>LED Fixture</td>
<td>ES Lighting</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.11</td>
<td>0.22</td>
</tr>
<tr>
<td>LED Fixture</td>
<td>RNC, LI RNC</td>
<td>1.00</td>
<td>1.00</td>
<td>0.73</td>
<td>0.73</td>
<td>0.73</td>
<td>0.11</td>
<td>0.22</td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are set to 100% based on the assumption that all purchased units are installed.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are from the 2009 Lighting Markdown Study.\(^{45}\)

\(^{43}\) Expected lifetime form ENERGY STAR ®.


Process – Computer Monitors

Measure Overview

Description: Rebates for ENERGY STAR® Computer Monitors
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: Process
Program: ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta kW = \Delta kW \\
\Delta kWh = \Delta kWh
\]

Where:
Unit = Rebated ENERGY STAR® computer monitor
\(\Delta kWh\) = Average annual kWh savings per unit: 35 kWh\(^{46}\)
\(\Delta kW\) = Average annual kW savings per unit: 0.010 kW\(^{47}\)

Baseline Efficiency

The baseline efficiency case is a conventional computer monitor.

High Efficiency

The high efficiency case is an ENERGY STAR® rated LCD monitor.

Hours

Not applicable.

Measure Life

The measure life is 6 years.\(^{48}\)

---

\(^{46}\) Deemed savings developed based on assumptions in CEE (2008). Consumer Electronics Program Guide: Information on Voluntary Approaches for the Promotion of Energy Efficient Consumer Electronics - Products and Practices; Page 9, Table 1.


Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Monitors</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.35</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are set to 100% based on the assumption that all purchased units are installed.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.
Process – Desktop Computers

Measure Overview

Description: Rebates for ENERGY STAR® Desktop Computers
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: Process
Program: ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are based on engineering estimate of delta kW between computers that are idle, in sleep mode, or off:

\[
\Delta kW = \Delta kW \\
\Delta kW = \Delta kW
\]

Where:

Unit = Rebated ENERGY STAR® desktop computer
\(\Delta kWh\) = Average annual kWh reduction per unit: 76 kWh
\(\Delta kW\) = Average kW savings per unit: 0.01 kW

Baseline Efficiency

The baseline efficiency case is a conventional desktop computer.

High Efficiency

The high efficiency case is an ENERGY STAR® rated desktop computer.

Hours

The operational hours include: 3,322 annual idle hours, 399 annual sleep hours, and 5,039 annual off hours.

Measure Life

The measure life is 4 years.


\[50\] Ibid.

\[51\] Ibid.

\[52\] Ibid.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC Computers</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.35</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are set to 100% based on the assumption that all purchased units are installed.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.
Process – Room Air Cleaner

Measure Overview

**Description:** Rebates provided for the purchase of an ENERGY STAR® qualified room air cleaner. ENERGY STAR® air cleaners are 40% more energy-efficient than standard models.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** Process

**Program:** ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed and based on the following algorithms which use averaged inputs:

\[
\Delta kWh = \Delta kWh \\
\Delta kW = \Delta kWh / \text{Hours}
\]

Where:
- Unit = Rebated room air cleaner
- \(\Delta kWh\) = Average annual kWh savings per unit: 268 kWh
- \(\Delta kW\) = Average connected load reduction: 0.032 kW
- Hours = Annual operating hours

**Baseline Efficiency**

The baseline efficiency case is a conventional unit with clean air delivery rate (CADR) of 51-100.

**High Efficiency**

The high efficiency case is an ENERGY STAR® qualified air cleaner with a CADR of 51-100.

**Hours**

The savings are based on 8,760 operating hours per year.

**Measure Life**

The measure life is 9 years.55

---


54 Ibid.

55 Ibid.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room Air Cleaner</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.
Process – Smart Strips

Measure Overview

Description: Switches off plug load using current sensors and switching devices which turn off plug load when electrical current drops below threshold low levels. Smart Strips can be used on electrical home appliances or in the workplace.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Annual Discounted Rate Cost Reduction (Low Income only)
Sector: Residential, Low Income
Market: Lost Opportunity, Retrofit
End Use: Process
Program: ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta k\text{Wh} = \Delta k\text{Wh} \\
\Delta kW = \Delta kW
\]

Unit = Rebated smart strip
\(\Delta k\text{Wh} =\) Average annual kWh savings per unit: 75 kWh
\(\Delta kW =\) Max kW savings per unit: 0.060 kW

Baseline Efficiency

The baseline efficiency case is no power strip and leaving peripherals on or using a power surge protector.

High Efficiency

The high efficiency case is a Smart Strip Energy Efficient Power Bar.

Hours

The savings are based on 8,760 hours per year.

Measure Life

The measure life is 5 years.\(^57\)

Secondary-Energy Impacts

There are no secondary energy impacts for this measure.

\(^56\) ECOS 2008 Entertainment Center and DVDs.
\(^57\) Massachusetts Common Assumptions.
Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Strips ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.35</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Smart Strips MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.35</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Smart Strips LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.35</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
In-service rates are set to 100% based on the assumption that all purchased units are installed.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors
Coincidence factors are based on Massachusetts Common Assumptions.
Process – Televisions

Measure Overview

**Description:** Rebates for televisions that meet ENERGY STAR® version 4.1 and 5.1 specifications.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** Process

**Program:** ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta \text{kWh} = \text{kWh}_{\text{BASE}} - \text{kWh}_{\text{EE}} \\
\Delta \text{kW} = \text{kW}_{\text{BASE}} - \text{kW}_{\text{EE}}
\]

Where:

- **Unit** = Rebated television
- **\( \text{kWh}_{\text{BASE}} \)** = Average kW consumption of baseline models
- **\( \text{kWh}_{\text{EE}} \)** = Average kWh consumption of energy efficient models
- **\( \text{kW}_{\text{BASE}} \)** = Average kW load of baseline models
- **\( \text{kW}_{\text{EE}} \)** = Average kW load of energy efficient models

Baseline Efficiency

The baseline efficiency case is a CEE Tier 1 television.

High Efficiency

The high efficiency case is an ENERGY STAR® qualified television, which uses about 40% less energy than standard units. Qualifying ENERGY STAR® TV products include standard TVs, HD-ready TVs, and the large flat-screen plasma TVs. The savings, which are weighted between on and standby modes, are given in the following table.

<table>
<thead>
<tr>
<th>Television Size</th>
<th>Weighted kW Savings</th>
<th>( \Delta \text{kWh/Unit} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD/TV</td>
<td>0.022</td>
<td>194</td>
</tr>
</tbody>
</table>

Hours

Since the TV is assumed to be plugged in all year, the savings are based on 8,760 operational hours per year. The weighted savings are based on 5 hours on and 19 hours standby each day.

---


Measure Life

The measure life is 6 years.\textsuperscript{59}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impact

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD/TV</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.50</td>
<td>0.85</td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are set to 100\% based on the assumption that all purchased units are installed.

Savings Persistence Factor

All PAs use 100\% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.

Refrigeration – Refrigerators (Lost Opportunity)

Measure Overview

**Description:** Rebates for purchase of ENERGY STAR® qualified refrigerators. ENERGY STAR® qualified refrigerators use at least 20% less energy than new, non-qualified models.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** Annual Discounted Rate Cost Reduction (Low Income only)

**Sector:** Residential, Low Income

**Market:** Lost Opportunity

**End Use:** Refrigeration

**Program:** ENERGY STAR Appliances, Residential New Construction & Major Renovation, Low-Income Residential New Construction

Algorithms for Calculating Primary Energy Impact

Unit savings are based on the following algorithms which use averaged inputs:

\[
\Delta k\text{Wh} = \Delta k\text{Wh}_{\text{BASE}} - \Delta k\text{Wh}_{\text{ES}}
\]

\[
\Delta kW = \Delta kW
\]

Where:

- **Unit** = Installed ENERGY STAR® refrigerator
- **\( \Delta k\text{Wh} \)** = Annual savings over non-ES refrigerators averaged by model type: 107 kWh\(^{60}\)
- **\( \Delta kW \)** = Average kW reduction over non-ES refrigerator: 0.014 kW\(^{61}\)

Baseline Efficiency

The baseline efficiency case is a residential refrigerator that meets the Federal minimum standard for energy efficiency.

High Efficiency

The high efficiency case is an ENERGY STAR® residential refrigerator that uses 20% less energy than models not labeled with the ENERGY STAR® logo.

Hours

Not applicable.

---


Measure Life

The measure life is 12 years.\textsuperscript{62}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction\textsuperscript{63}</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerator Rebate</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.92</td>
</tr>
<tr>
<td>Refrigerators</td>
<td>RNC, LI RNC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.92</td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are set to 100% based on the assumption that all purchased units are installed.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.


\textsuperscript{63} Oppenheim, Jerry (2000). \textit{Memo - Low Income DSM Program non-energy benefits}.
Refrigeration – Refrigerators (Retrofit)

Measure Overview

**Description:** This measure covers the replacement of an existing inefficient refrigerator with a new ENERGY STAR® rated refrigerator. ENERGY STAR® qualified refrigerators use at least 20% less energy than non-qualified models.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** Low Income only: Annual Discounted Rate Cost Reduction, One-Time Avoided Refrigerator Purchase

**Sector:** Residential, Low Income

**Market:** Retrofit

**End Use:** Refrigeration

**Program:** MassSAVE, Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

In order to determine the primary energy impact, the following algorithms are used:

\[
\Delta kWh = \Delta kWh_{\text{retire}} + \Delta kWh_{\text{ES}} \\
\Delta kW = \Delta kW_{\text{retire}} + \Delta kW_{\text{ES}}
\]

Where:

- **Unit** = Replacement of existing refrigerator with new ENERGY STAR® Refrigerator
- **\(\Delta kWh_{\text{retire}}\)** = Annual energy savings over remaining life of existing equipment: 884 kWh
- **\(\Delta kWh_{\text{ES}}\)** = Annual energy savings over full life of new ES refrigerator: 80 kWh
- **\(\Delta kW_{\text{retire}}\)** = Average demand reduction over remaining life of existing equipment: 0.030 kW
- **\(\Delta kW_{\text{ES}}\)** = Average demand reduction over full life of new ES refrigerator: 0.010 kW

For MassSAVE:

Unit savings are deemed based on the following algorithms and averaged inputs:

For Low-Income 1-4 Family Retrofit:

Unit savings are deemed based on study results:

\[
\Delta kWh = \Delta kWh \\
\Delta kW = \Delta kW
\]

---

66 NSTAR uses the Lost Opportunity savings of 107 kWh as the annual savings over the life of the new ES refrigerator. See Refrigerator (Lost Opportunity) section.
68 Ibid.
Where:
Unit = Removal of existing refrigerator and installation of new efficient refrigerator
$\Delta \text{kWh} = $ Average annual kWh savings per unit: 1,122 kWh\(^{69}\)
$\Delta \text{kW} = $ Max kW Reduction: 0.148 kW\(^{70}\)

**Baseline Efficiency**

*For MassSAVE:*
The baseline efficiency case is an existing refrigerator for savings over the remaining life of existing equipment. The baseline efficiency case is a full-sized refrigerator (7.75 cubic feet) that meets the Federal minimum standard for energy efficiency for savings for the full life.\(^{71}\)

*For Low-Income 1-4 Family Retrofit:*
The baseline efficiency case for both the replaced and baseline new refrigerator is an existing refrigerator. It is assumed that low-income customers would otherwise replace their refrigerators with a used inefficient unit.

**High Efficiency**

The high efficiency case is an ENERGY STAR® rated refrigerator that meets the ENERGY STAR® criteria for full-sized refrigerators (7.75 cubic feet), using at least 20% less energy than models meeting the minimum Federal government standard.

**Hours**

Savings are based on 8,760 operating hours per year.

**Measure Life**

For MassSAVE the remaining life of the existing refrigerator is 1 year, and the measure life for the new refrigerator is 12 years.\(^{72}\) For Low-Income 1-4 Family Retrofit the measure life is 19 years.\(^{73}\)

**Secondary Energy Impacts**

There are no secondary energy impacts for this measure.

---


\(^{73}\) Massachusetts Common Assumption.
Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction^74</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Avoided Refrigerator Purchase^75</td>
<td>$200/Unit</td>
<td>Low Income 1-4 Family Retrofit only</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerators</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>Refrigerator Replacement</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.92</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are 100% as it is assumed all refrigerators are in-use.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

- MassSAVE: Realization rates are based on Massachusetts Common Assumptions.
- LI 1-4 Retrofit: Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors

Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.^76

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^75 Ibid.

Refrigeration – Freezers (Lost Opportunity)

Measure Overview

- **Description:** Rebates provided for the purchase of ENERGY STAR® freezers. ENERGY STAR® qualified freezers use at least 10% less energy than new, non-qualified models and return even greater savings compared to old models.
- **Primary Energy Impact:** Electric
- **Secondary Energy Impact:** None
- **Non-Energy Impact:** None
- **Sector:** Residential
- **Market:** Lost Opportunity
- **End Use:** Refrigeration
- **Program:** ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are based on the following algorithms which use averaged inputs:

\[ \Delta kWh = \Delta kWh_{\text{BASE}} - \Delta kWh_{\text{ES}} \]
\[ \Delta kW = \Delta kW \]

Where:
- Unit = Installed ENERGY STAR® freezer
- \( \Delta kWh \) = Annual savings over non-ES freezers averaged by model type: 136 kWh\(^77\)
- \( \Delta kW \) = Average kW reduction over non-ES freezer: 0.018 kW\(^78\)

Baseline Efficiency

The baseline efficiency case is a residential freezer that meets the Federal minimum standard for energy efficiency.

High Efficiency

The high efficiency case is based on an ENERGY STAR® rated freezer that uses 10% less energy than models not labeled with the ENERGY STAR® logo.

Hours

Not applicable.

Measure Life

The measure life is 12 years.\(^79\)

---

\(^77\) NEEP. *Refrigerator and Freezer Screening Tool;* average savings of all given models.


\(^79\) Massachusetts Common Assumption: it has been assumed that LI customers would replace with a used inefficient unit so the full savings are counted for the full lifetime.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impact

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freezer Rebate</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.92</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are set to 100% based on the assumption that all purchased units are installed.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.
Refrigeration – Freezers (Retrofit)

Measure Overview

Description: This measure covers the replacement of an existing inefficient freezer with a new energy efficient model.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Low Income only: Annual Discounted Rate Cost Reduction, One-Time Avoided Refrigerator Purchase
Sector: Low Income
Market: Retrofit
End Use: Refrigeration
Program: Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta kW h = \Delta kW h \]
\[ \Delta kW = \Delta kW \]

Where:
Unit = Removal of existing freezer and installation of new efficient freezer
\( \Delta kW h \) = Average annual kWh savings per unit: 637 kWh\(^{80}\)
\( \Delta kW \) = Max kW Reduction: 0.084 kW\(^{81}\)

Baseline Efficiency

The baseline efficiency case for both the replaced and baseline new freezer is represented by the existing freezer. It is assumed that low-income customers would replace their freezers with a used inefficient unit.

High Efficiency

The high efficiency case is a new high efficiency freezer.

Hours

Not applicable.

Measure Life

The measure life is 19 years.\(^{82}\)

---


Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction&lt;sup&gt;83&lt;/sup&gt;</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Avoided Refrigerator Purchase&lt;sup&gt;84&lt;/sup&gt;</td>
<td>$200/Unit</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR&lt;sub&gt;E&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;WP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;WP&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freezer Replacement</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.92</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors
Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.<sup>85</sup>

---

<sup>82</sup> Massachusetts Common Assumption: it has been assumed that LI customers would replace with a used inefficient unit so the full savings are counted for the full lifetime.


<sup>84</sup> Ibid.

Refrigeration – Refrigerator/Freezer Recycling

Measure Overview

Description: The retirement of old, inefficient secondary refrigerators and freezers.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Retrofit
End Use: Refrigeration
Program: ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed and are obtained from the referenced study.

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kW \]

Where:
Unit = Removed secondary refrigerator or freezer
\( \Delta kWh \) = Average annual kWh savings per unit: 490 kWh\(^{86}\)
\( \Delta kW \) = Average kW reduction per unit: 0.08 kW\(^{87}\)

Baseline Efficiency

The baseline efficiency case is an old, inefficient secondary working refrigerator or freezer. Estimated average usage is based on combined weight of freezer energy use and refrigerator energy use.

High Efficiency

The high efficiency case assumes no replacement of secondary unit.

Hours

Refrigerator and freezer operating hours are 8,760 hours/year.

Measure Life

The measure life is 8 years.\(^{88}\)

---


\(^{87}\) Ibid.

\(^{88}\) Ibid.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ref Frz Recycling</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.92</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.
Refrigeration – Appliance Removal

Measure Overview

Description: Removal of second working refrigerator or freezer.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Annual Discounted Rate Cost Reduction
Sector: Low Income
Market: Retrofit
End Use: Refrigeration
Program: Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kW \]

Where:
Unit = Removal of secondary refrigerator or freezer with no replacement
\( \Delta kWh \) = Average annual kWh savings per unit: 1,321 kWh\(^89\)
\( \Delta kW \) = Max kW reduction: 0.174 kW\(^90\)

Baseline Efficiency

The baseline efficiency case is the old, inefficient secondary working refrigerator or freezer.

High Efficiency

The high efficiency case assumes no replacement of secondary unit.

Hours

Not applicable.

Measure Life

The measure life is 5 years.\(^91\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

\(^91\) Massachusetts Common Assumption.
Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appliance Removal</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.92</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors
Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.\(^\text{93}\)


Refrigeration – Basic Educational Measures

Measure Overview

- **Description**: Installation of basic educational measures during an audit to help customers become more aware of energy efficiency.
- **Primary Energy Impact**: Electric
- **Secondary Energy Impact**: None
- **Non-Energy Impact**: Annual Discounted Rate Cost Reduction, One-Time Arrearage Reduction
- **Sector**: Low Income
- **Market**: Retrofit
- **End Use**: Behavior
- **Program**: Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta kWh = \Delta kWh \\
\Delta kW = \max(\Delta kW_{sp}, \Delta kW_{wp})
\]

Where:
- Unit = Completed audit
- \(\Delta kWh\) = Average annual kWh savings per unit: 138 kWh\(^{94}\)
- \(\Delta kW\) = Max kW Reduction: 0.038 kW\(^{95}\)

Baseline Efficiency

The baseline efficiency case assumes no measures installed.

High Efficiency

The high efficiency case includes basic educational measures such as CFLs, low flow showerheads, pool and air conditioner timers, torchieres, and programmable thermostats.

Hours

Not applicable.

Measure Life

The measure life is 5 years.\(^{96}\)


\(^{96}\) Massachusetts Common Assumption.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{97})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Fire, Illness and Moving Avoidance Benefits(^{98})</td>
<td>$100.48 /Participant</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Arrearage Reduction(^{99})</td>
<td>$70/Participant</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_{SP})</th>
<th>RR(_{WP})</th>
<th>CF(_{SP})</th>
<th>CF(_{WP})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseload</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.35</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors

Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.\(^{100}\)

---

\(^{97}\) Oppenheim, Jerry (2000). **Memo - Low Income DSM Program non-energy benefits.**

\(^{98}\) Ibid.

\(^{99}\) Ibid.

HVAC – Central Air Conditioning

Measure Overview

**Description:** The installation of high efficiency Central AC systems.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta kWh = \text{Tons} \times \frac{12 \text{ kBtu/hr}}{\text{Tons}} \times \left( \frac{1}{\text{SEER}_\text{BASE}} - \frac{1}{\text{SEER}_\text{EE}} \right) \times \text{Hours}
\]

\[
\Delta kW = \text{Tons} \times \frac{12 \text{ kBtu/hr}}{\text{Tons}} \times \left( \frac{1}{\text{EER}_\text{BASE}} - \frac{1}{\text{EER}_\text{EE}} \right)
\]

Where:

- **Unit** = Installation of central AC system
- **Tons** = Cooling capacity of AC equipment; Current default is 3 tons\(^{101}\)
- **SEER\(_\text{BASE}\)** = Seasonal Energy Efficiency Ratio of baseline AC equipment
- **SEER\(_\text{EE}\)** = Seasonal Energy Efficiency Ratio of new efficient AC equipment
- **EER\(_\text{BASE}\)** = Energy Efficiency Ratio of base AC equipment
- **EER\(_\text{EE}\)** = Energy Efficiency Ratio of new efficient AC equipment
- **Hours** = Equivalent full load hours

The savings for this measure are given in the table below.\(^{102}\)

<table>
<thead>
<tr>
<th>Measure</th>
<th>kW Savings</th>
<th>kWh Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart AC (SEER 14.5 / EER 12)</td>
<td>0.273</td>
<td>103</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case is a 13 SEER Central AC system with an EER of 11.

High Efficiency

The high efficiency case is an ENERGY STAR® qualified Central AC system. The high efficiency case has a 14.5 SEER and 12 EER.

---


\(^{102}\) The PAs are looking into abilities to track and calculate savings based on actual installed efficiencies for each project.
Hours

The equivalent full load cooling hours are 360 hours per year.\(^{103}\)

Measure Life

The measure life is 18 years.\(^{104}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_{SP})</th>
<th>RR(_{WP})</th>
<th>CF(_{SP})</th>
<th>CF(_{WP})</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart AC</td>
<td>HVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.


HVAC – Air Source Heat Pump

Measure Overview

**Description:** The installation of high efficiency Air Source Heat Pumps.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** Residential Cooling & Heating Equipment

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta kW_h = \text{Tons} \times \frac{12 \text{ kBtu/hr}}{\text{Ton}} \times \left( \frac{1}{\text{SEER}_{\text{BASE}}} - \frac{1}{\text{SEER}_{\text{EE}}} \right) \times \text{Hours}_c + \left( \frac{1}{\text{HSPF}_{\text{BASE}}} - \frac{1}{\text{HSPF}_{\text{EE}}} \right) \times \text{Hours}_h
\]

\[
\Delta kW = \max(\Delta kW_{\text{COOL}}, \Delta kW_{\text{HEAT}})
\]

\[
\Delta kW_{\text{COOL}} = \text{Tons} \times \frac{12 \text{ kBtu/hr}}{\text{Ton}} \times \left( \frac{1}{\text{EER}_{\text{BASE}}} - \frac{1}{\text{EER}_{\text{EE}}} \right)
\]

\[
\Delta kW_{\text{HEAT}} = \text{Tons} \times \frac{12 \text{ kBtu/hr}}{\text{Ton}} \times \left( \frac{1}{\text{HSPF}_{\text{BASE}}} - \frac{1}{\text{HSPF}_{\text{EE}}} \right)
\]

Where:

- **Unit** = Installation of heat pump system
- **Tons** = Capacity of HP equipment: Current default is 3 tons
- **SEER_{BASE}** = Seasonal efficiency of baseline HP equipment
- **SEER_{EE}** = Seasonal efficiency of new efficient HP equipment
- **EER_{BASE}** = Peak efficiency of base HP equipment
- **EER_{EE}** = Peak efficiency of new efficient HP equipment
- **HSPF_{BASE}** = Heating efficiency of baseline HP equipment
- **HSPF_{EE}** = Heating efficiency of new efficient HP equipment
- **Hours_c** = EFLH for cooling
- **Hours_h** = EFLH for heating

Deemed savings for 2010:

<table>
<thead>
<tr>
<th>Measure</th>
<th>SEER_{EE}</th>
<th>EER_{EE}</th>
<th>HSPF_{EE}</th>
<th>kW Savings</th>
<th>kWh Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart HP (SEER 14.5 / EER 12)</td>
<td>14.5</td>
<td>12</td>
<td>8.2</td>
<td>0.347</td>
<td>519</td>
</tr>
<tr>
<td>CoolSmart HP (SEER &gt;= 15.0 / EER 12)</td>
<td>15</td>
<td>12</td>
<td>8.5</td>
<td>0.502</td>
<td>735</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case is a heat pump with a HSPF of 7.6, SEER of 13, and EER of 11.

High Efficiency

The high efficiency case is an ENERGY STAR® qualified Air Source Heat Pump.

Hours

Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling.

Measure Life

The measure life is 18 years.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart HP</td>
<td>HVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.67</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.

---

106 Massachusetts Common Assumption.
HVAC – Ductless Mini Split Heat Pump

Measure Overview

**Description:** The installation of a more efficient ENERGY STAR® rated Ductless Mini Split HP system.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta \text{kWh} = \Delta \text{kWh}_{HP} + \Delta \text{kWh}_{DuctSealing}
\]

\[
\Delta \text{kW} = \max(\Delta \text{kW}_{COOL}, \Delta \text{kW}_{HEAT}) + \Delta \text{kW}_{DuctSealing}
\]

\[
\Delta \text{kWh}_{HP} = Tons \times \frac{12 \text{ kBtu/hr}}{Ton} \times \left[ \left( \frac{1}{\text{SEER}_{BASE}} - \frac{1}{\text{SEER}_{EE}} \right) \times \text{Hours}_C + \left( \frac{1}{\text{HSPF}_{BASE}} - \frac{1}{\text{HSPF}_{EE}} \right) \times \text{Hours}_H \right]
\]

\[
\Delta \text{kW}_{COOL} = Tons \times \frac{12 \text{ kBtu/hr}}{Ton} \times \left( \frac{1}{\text{EER}_{BASE}} - \frac{1}{\text{EER}_{EE}} \right)
\]

\[
\Delta \text{kW}_{HEAT} = Tons \times \frac{12 \text{ kBtu/hr}}{Ton} \times \left( \frac{1}{\text{HSPF}_{BASE}} - \frac{1}{\text{HSPF}_{EE}} \right)
\]

Where:

- **Unit** = Installation of high efficiency ductless Mini Split System
- **\( \Delta \text{kWh}_{HP} \)** = Reduction in annual kWh consumption of HP equipment
- **\( \Delta \text{kW}_{HP} \)** = Reduction in electric demand of HP equipment
- **\( \Delta \text{kWh}_{DuctSealing} \)** = Annual energy savings from duct sealing: See HVAC – Duct Sealing
- **\( \Delta \text{kW}_{DuctSealing} \)** = Annual demand reduction from duct sealing: See HVAC – Duct Sealing
- **Tons** = Capacity of HP equipment: Current default is 3 tons
- **SEER\_BASE** = Seasonal efficiency of baseline HP equipment
- **SEER\_EE** = Seasonal efficiency of new efficient HP equipment, assumed to be 15 SEER
- **EER\_BASE** = Peak efficiency of base HP equipment
- **EER\_EE** = Peak efficiency of new efficient HP equipment, assumed to be 12.5 EER
- **HSPF\_BASE** = Heating efficiency of baseline HP equipment
- **HSPF\_EE** = Heating efficiency of new efficient HP equipment, assumed to be 8.2 EER
- **Hours\_C** = EFLH for cooling
- **Hours\_H** = EFLH for heating

---

Baseline Efficiency

The baseline efficiency case is a non-ENERGY STAR® rated ductless mini split heat pump.

High Efficiency

The high efficiency case is an ENERGY STAR® qualified Ductless Mini Split System. The savings for 2010 are listed in the table below.  

<table>
<thead>
<tr>
<th>Measure</th>
<th>kW Savings</th>
<th>kWh Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart HP Mini Split (SEER 15/EER 12.5)</td>
<td>0.693</td>
<td>761</td>
</tr>
</tbody>
</table>

Hours

The equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling.

Measure Life

The measure life is 18 years.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ductless Mini Split</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.67</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.

---

110 These numbers are late correction and are not reflected in the reported savings. The reported savings are based on 1.039 kW and 720 kWh.
111 Massachusetts Common Assumptions.
HVAC – Central AC Quality Installation Verification (QIV)

Measure Overview

**Description:** The verification of proper charge and airflow during installation of new Central AC system.

**Primary Energy Impact:** Electric  
**Secondary Energy Impact:** None  
**Non-Energy Impact:** None  
**Sector:** Residential  
**Market:** Lost Opportunity  
**End Use:** HVAC  
**Program:** Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta k\text{W} = Tons \times \frac{12 \text{ kBtu/hr}}{\text{Ton}} \times \frac{1}{\text{SEER}} \times \text{Hours} \times 5\% \\
\Delta W = Tons \times \frac{12 \text{ kBtu/hr}}{\text{Ton}} \times \frac{1}{\text{EER}} \times 5\%
\]

Where:
- **Units** = Completed QIV
- **Tons** = Cooling capacity of AC equipment: Current default is 3 tons
- **SEER** = Seasonal efficiency of AC equipment
- **EER** = Peak efficiency of AC equipment
- **Hours** = Equivalent full load hours
- **5%** = Average percent demand reduction: 5.0%

Baseline Efficiency

The baseline efficiency case is a system whose installation is inconsistent with manufacturer specifications.

High Efficiency

The high efficiency case is a system whose installation is consistent with manufacturer specifications. The measure savings for 2010 are listed in the table below:

<table>
<thead>
<tr>
<th>Measure</th>
<th>kW Savings</th>
<th>kWh Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart AC QIV ES and NES</td>
<td>0.164</td>
<td>50</td>
</tr>
</tbody>
</table>

Massachusetts Common Assumption.
Hours

Equivalent full load cooling hours are 360 hours per year.\textsuperscript{116}

Measure Life

The measure life is 18 years.\textsuperscript{117}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart AC QIV ES</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>CoolSmart AC QIV NES</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.


HVAC – Heat Pump Quality Installation Verification (QIV)

Measure Overview

**Description:** The verification of proper charge and airflow during installation of new Heat Pump systems.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** Residential Cooling & Heating Equipment

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta kWh = Tons \times \frac{12 \text{ Btu} / \text{hr}}{\text{Tons}} \times \left( \frac{1}{\text{SEER}} \times \text{Hours}_{\text{C}} + \frac{1}{\text{HSPF}} \times \text{Hours}_{\text{H}} \right) \times 5\%
\]

\[
\Delta kW = \max(\Delta kW_{\text{COOL}}, \Delta kW_{\text{HEAT}})
\]

\[
\Delta kW_{\text{COOL}} = Tons \times \frac{12 \text{ Btu} / \text{hr}}{\text{Tons}} \times \left( \frac{1}{\text{EER}} \right) \times 5\%
\]

\[
\Delta kW_{\text{HEAT}} = Tons \times \frac{12 \text{ Btu} / \text{hr}}{\text{Tons}} \times \left( \frac{1}{\text{HSPF}} \right) \times 5\%
\]

Where:

- **Unit** = Completed QIV
- **Tons** = Cooling capacity of HP equipment: Current default is 3 tons
- **SEER** = Seasonal cooling efficiency of HP equipment
- **EER** = Peak cooling efficiency of HP equipment
- **HSPF** = Heating efficiency of HP equipment
- **Hours\text{C}** = EFLH for cooling
- **Hours\text{H}** = EFLH for heating
- **5%** = Average demand reduction: 5%

**Baseline Efficiency**

The baseline efficiency case is a system whose installation is inconsistent with manufacturer specifications.

---


119 Massachusetts Common Assumption.
High Efficiency

The high efficiency case is a system whose installation is consistent with manufacturer specifications. The measure savings for 2010 are listed in the table below:

<table>
<thead>
<tr>
<th>Measure</th>
<th>kW Savings</th>
<th>kWh Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart HP QIV ES and NES</td>
<td>0.237</td>
<td>334</td>
</tr>
</tbody>
</table>

Hours

The equivalent full load heating hours are 1,200 hours per year and the equivalent full load cooling hours are 360 hours per year.\(^{120}\)

Measure Life

The measure life is 18 years.\(^{121}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart HP QIV ES and NES</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.59</td>
<td>0.50</td>
</tr>
<tr>
<td>CoolSmart HP QIV NES</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.59</td>
<td>0.50</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.


HVAC – Central AC Digital Check-up/Tune-up

Measure Overview

Description: Tune-up of an existing central AC system.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: HVAC
Program: Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta \text{kWh} = Tons \times \frac{12 \text{ kBtu/hr}}{Ton} \times \frac{1}{\text{SEER}} \times \text{Hours} \times 5\%
\]

\[
\Delta \text{kW} = Tons \times \frac{12 \text{ kBtu/hr}}{Ton} \times \frac{1}{\text{EER}} \times 5\%
\]

Where:
Unit = Completed tune-up
Tons = Cooling capacity of AC equipment: Current default is 3 tons\(^{122}\)
SEER = Seasonal efficiency of AC equipment, assumed to be 10 SEER.
EER = Peak efficiency of AC equipment, assumed to be 8.5 EER.
Hours = Equivalent full load hours
5% = Average demand reduction: 5%\(^{123}\)

Baseline Efficiency

The baseline efficiency case is a system that does not operate according to manufacturer specifications.

High Efficiency

The high efficiency case is a system that operates according to manufacturer specifications. The measure savings for 2010 are listed in the table below:

<table>
<thead>
<tr>
<th>Measure</th>
<th>kW Savings</th>
<th>kWh Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart AC Digital Check-up/Tune-up</td>
<td>0.212</td>
<td>65</td>
</tr>
</tbody>
</table>


\(^{123}\) Massachusetts Common Assumption.
Hours
The equivalent full load cooling hours are 360 hours per year.\textsuperscript{124}

Measure Life
The measure life is 5 years.\textsuperscript{125}

Secondary Energy Impacts
There are no secondary energy impacts for this measure.

Non-Energy Impacts
There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>$R_R$</th>
<th>$R_R$</th>
<th>$R_W$</th>
<th>CF$_SP$</th>
<th>CF$_WP$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart AC Digital Check-up/Tune-up</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors
Coincidence factors are based on Massachusetts Common Assumptions.

HVAC – Heat Pump Digital Check-up/Tune-up

Measure Overview

Description: Tune-up of an existing heat pump system.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: HVAC
Program: Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta kWh = Tons \times 12 \frac{kBtu}{hr} \times \left( \frac{1}{SEER} \times Hours_C + \frac{1}{HSPF} \times Hours_H \right) \times 5\%
\]

\[
\Delta kW = \max(\Delta kW_{COOL}, \Delta kW_{HEAT})
\]

\[
\Delta kW_{COOL} = Tons \times 12 \frac{kBtu}{hr} \times \left( \frac{1}{EER} \right) \times 5\%
\]

\[
\Delta kW_{HEAT} = Tons \times 12 \frac{kBtu}{hr} \times \left( \frac{1}{HSPF} \right) \times 5\%
\]

Where:

Unit = Completed tune-up
Tons = Cooling capacity of HP equipment: Current default is 3 tons\textsuperscript{126}
SEER = Seasonal cooling efficiency of HP equipment, assumed to be 10 SEER.
EER = Peak cooling efficiency of HP equipment, assumed to be 8.5 EER.
HSPF = Heating efficiency of HP equipment, assumed to be 7 HSPF.
Hours\textsubscript{C} = EFLH for cooling
Hours\textsubscript{H} = EFLH for heating
5% = Average demand reduction: 5%\textsuperscript{127}

Baseline Efficiency

The baseline efficiency case is a system that does not operating according to manufacturer specifications.

High Efficiency

The high efficiency case is a system that does operate according to manufacturer specifications. The measure savings for 2010 are listed in the table below:


\textsuperscript{127} Massachusetts Common Assumption.
<table>
<thead>
<tr>
<th>Measure</th>
<th>kW Savings</th>
<th>kWh Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart AC Digital Check-up/Tune-up</td>
<td>0.257</td>
<td>373</td>
</tr>
</tbody>
</table>

**Hours**

The equivalent full load hours are 1200 hours per year for heating\(^{128}\) and 360 hours per year for cooling.\(^{129}\)

**Measure Life**

The measure life is 5 years\(^{130}\)

**Secondary Energy Impacts**

There are no secondary energy impacts for this measure.

**Non-Energy Impacts**

There are no non-energy impacts for this measure.

**Impact Factors for Calculating Adjusted Gross Savings**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart HP Digital Check-up/Tune-up</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

**In-Service Rates**

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

**Savings Persistence Factor**

All PAs use 100% savings persistence factors.

**Realization Rates**

Realization rates are set to 100% based on Massachusetts Common Assumptions.

**Coincidence Factors**

Coincidence factors are based on Massachusetts Common Assumptions.

---

\(^{128}\) Massachusetts Common Assumptions.
HVAC – Duct Sealing

Measure Overview

Description: A 66% reduction in duct leakage from 15% to 5% of supplied CFM.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: HVAC
Program: Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on results of DOE2 modeling:\(^{131}\):

\[
\Delta kWh = \Delta kWh \\
\Delta kW = \Delta kW
\]

Where:
Unit = Completed job
\Delta kWh = Average annual kWh reduction based on DOE2 modeling\(^{132}\): 212 kWh
\Delta kW = Average annual kW reduction based on DOE2 modeling\(^{133}\): 0.300 kW

Baseline Efficiency

The baseline efficiency case is assumes a 15% leakage.

High Efficiency

The high efficiency case is a system with duct leakage reduced by 66% to 5% leakage.

Hours

Not applicable.

Measure Life

The measure life is 18 years.\(^{134}\)

---

\(^{131}\) The PAs are looking into abilities to track and calculate savings based on project-specific detail.

\(^{132}\) RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential HVAC Market; Page 3, Table 2.

\(^{32}\) Ibid.

\(^{133}\) Ibid.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duct Sealing</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.
HVAC – Down Size ½ Ton

Measure Overview

**Description:** Reduction in system size consistent with manual J calculations.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** One-Time Cost Reduction

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on results of DOE2 modeling:

\[ \Delta kW = \Delta kW / Ton \times \frac{1}{2} \text{Ton} \]

\[ \Delta kWh = \Delta kWh / Ton \times \frac{1}{2} \text{Ton} \]

Where:

Units = Completed job

\( \Delta kWh / Ton \) = Average annual kWh reduction based on DOE2 modeling\(^{135} \): 203 kWh

\( \Delta kW / Ton \) = Average annual kW reduction based on DOE2 modeling\(^{136} \): 0.030 kW

Baseline Efficiency

The baseline efficiency case is a system that is not sized in accordance with manual J calculation.

High Efficiency

The high efficiency case is a system that is sized in accordance with manual J calculation.

Hours

Not applicable.

Measure Life

The measure life is 18 years.\(^{137} \)

---


\(^{136}\) Ibid.

Secondary-Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Time Non-Resource</td>
<td>O&amp;M Cost savings due to smaller size unit (by ½ ton) that is purchased compared to the unit that would have been purchased.</td>
<td>$300/Unit</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down Size ½ Ton</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors
Coincidence factors are based on Massachusetts Common Assumptions.

---

138 Massachusetts Common Assumption.
HVAC – Right Sizing

Measure Overview

Description: Documentation that system size is in compliance with manual J calculations.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: O&M
Sector: Residential
Market: Lost Opportunity
End Use: HVAC
Program: Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on results of DOE2 modeling:

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kW \]

Where:
Units = completed job
\[ \Delta kWh = \text{average annual kWh reduction based on DOE2 modeling}^{139} : 123 \text{ kWh} \]
\[ \Delta kW = \text{average annual kW reduction based on DOE2 modeling}^{140} : 0.150 \text{ kW} \]

Baseline Efficiency

The baseline efficiency case is a system that is not sized in accordance with manual J calculation.

High Efficiency

The high efficiency case is a system that is sized in accordance with manual J calculation.

Hours

Not applicable.

Measure Life

The measure life is 18 years.\(^{141}\)

---


\(^{140}\) Ibid.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Time Non-Resource</td>
<td>O&amp;M Cost savings due to smaller size unit (by ½ ton) that is purchased compared to the unit that would have been purchased.</td>
<td>$30/Unit</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Sizing</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.

142 Massachusetts Common Assumptions
HVAC – Early Replacement of Central AC or Heat Pump Unit

Measure Overview

Description: Early replacement of Central Air Conditioning or Heat Pump Unit. This measure represents the additional savings achieved for the early replacement of existing inefficient AC or heat pump units over the remaining life of the existing equipment.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Retrofit
End Use: HVAC
Program: Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on engineering estimates and assumptions:

\[ \Delta kWh = \Delta kWp \]
\[ \Delta kW = \Delta kW \]

Where:
Unit = Replacement of existing inefficient system with new efficient system
\( \Delta kWh \) = Average kWh savings per unit listed in table below.
\( \Delta kW \) = Average kW savings per unit listed in table below.

The measure savings for 2010 are listed in the table below:

<table>
<thead>
<tr>
<th>Measure</th>
<th>kW Savings</th>
<th>kWh Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Replacement of AC Equipment</td>
<td>0.963</td>
<td>415</td>
</tr>
<tr>
<td>Early Replacement of HP Equipment</td>
<td>1.235</td>
<td>876</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case is assumed to be a typical 10-12 years old AC or heat pump unit.

High Efficiency

The high efficiency case is a code compliant central AC or HP unit.

Hours

The equivalent full load hours are 1,200 hours per year for heating\(^{143}\) and 360 hours per year for cooling.\(^{144}\)

\(^{143}\) Massachusetts Common Assumptions.

Measure Life
The measure life is 7 years.\textsuperscript{145}

Secondary Energy Impacts
There are no secondary energy impacts for this measure.

Non-Energy Impacts
There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Replacement of AC Equipment</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Early Replacement of HP Equipment</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.67</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors
Coincidence factors are based on Massachusetts Common Assumptions.

\textsuperscript{145} Massachusetts Common Assumption; The early replacement measure life of 7 years was determined by subtracting the estimated target age range of existing equipment between 10 and 12 years old from the 18 year measure life for new equipment.
HVAC – Quality Installation with Duct Sealing

Measure Overview

**Description:** 50% reduction in duct leakage from 20% to 10%. This measure may also include duct modifications.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on results of DOE2 modeling:

\[
\Delta kWh = \Delta Wh \\
\Delta kW = \Delta kW
\]

Where:

- **Unit** = Completed job
- **\(\Delta kWh\)** = Average annual kWh reduction based on DOE2 modeling\(^\text{146}\): 513 kWh with duct modifications, 212 kWh without duct modifications
- **\(\Delta kW\)** = Average annual kW reduction based on DOE2 modeling\(^\text{147}\): 0.850 kW with duct modifications, 0.300 kW without duct modifications

Baseline Efficiency

The baseline efficiency case is a system with an installation that is inconsistent with manufacturer specifications and may include leaky ducts.

High Efficiency

The high efficiency case is a system with an installation that is consistent with manufacturer specifications and may have reduced duct leakage.

Hours

Not applicable.

Measure Life

The measure life is 18 years.\(^\text{148}\)

---


\(^\text{147}\) Ibid.

\(^\text{148}\) Ibid.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Star QI</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Energy Star QI w/ Duct modifications</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.85</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% based on Massachusetts Common Assumptions.

Coincidence Factors
Coincidence factors are based on Massachusetts Common Assumptions.

---

HVAC – Warm Air Furnace Electronically Commutated Motor (ECM)

Measure Overview

Description: Installation of an electronically commutated variable speed air supply motor.
Primary Energy Impact: Electric
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: HVAC
Program: Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta kWh = \Delta kWh \\
\Delta kW = \Delta kW
\]

Where:
Unit = Installation of ECM
\(\Delta kWh\) = Gross annual kWh savings from the measure: 600 kWh\(^{149}\)
\(\Delta kW\) = Gross connected kW savings from the measure: 0.116 kW\(^{150}\)

Baseline Efficiency

The baseline efficiency case is the installation of a furnace with a standard efficiency steady state motor.

High Efficiency

The high efficiency case is the installation of a furnace with an electronically commutated motor.

Hours

Not applicable.

Measure Life

The measure life is 18 years.\(^{151}\)

Secondary Energy Impacts

This is the increased heating load as a result of a more efficient motor.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Energy Type</th>
<th>Savings</th>
<th>ΔMMBtu/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart Warm Air Furnace ECM</td>
<td>NG – Residential Heating</td>
<td>-1.575 MMBtu $^{152}$</td>
<td>-1.575</td>
</tr>
</tbody>
</table>

**Non-Energy Impacts**

There are no non-energy impacts for this measure.

**Impact Factors for Calculating Adjusted Gross Savings**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoolSmart Warm Air Furnace ECM</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.67</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

**In-Service Rates**

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

**Savings Persistence Factor**

All PAs use 100% savings persistence factors.

**Realization Rates**

Realization rates are set to 100% based on Massachusetts Common Assumptions.

**Coincidence Factors**

Coincidence factors are based on Massachusetts Common Assumptions.

---

$^{152}$ Ibid. An adjustment is made to the savings value of 2.3 MMBtu given in the study. The original savings value is multiplied by 420 heating hours divided by 600 total running hours (420/600 = 0.70). An AFUE adjustment of 90/92 is also multiplied to the original value to create a more realistic final value.
HVAC – Brushless Furnace Fan Motor

Measure Overview

Description: Installation of a high efficiency steady state brushless furnace fan motor.
Primary Energy Impact: Electric
Secondary Energy Impact: Gas
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: HVAC
Program: Residential Cooling & Heating Equipment

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kW \]

Where:
Unit = Installation of BFF motors
\( \Delta kWh \) = Gross annual kWh savings: 600 kWh\(^{153}\)
\( \Delta kW \) = Gross connected kW savings: 0.116 kW\(^{154}\)

Baseline Efficiency

The baseline efficiency case is the installation of a furnace with a standard efficiency steady state motor.

High Efficiency

The high efficiency case is the installation of a furnace with a brushless fan motor.

Hours

Not applicable.

Measure Life

The measure life is 18 years.\(^{155}\)

Secondary Energy Impacts

This is the increased heating load as a result of a more efficient motor.

### Non-Energy Impacts

There are no non-energy impacts for this measure.

### Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brushless Furnace Fan Motor</td>
<td>RHVAC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.67</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

### In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

### Savings Persistence Factor

All PAs use 100% savings persistence factors.

### Realization Rates

Realization rates are set to 100% based on Massachusetts Common Assumptions.

### Coincidence Factors

Coincidence factors are based on Massachusetts Common Assumptions.

---

156 Sachs, Harvey (2003). *Energy Savings from Efficient Furnace Air Handlers in Massachusetts*. An adjustment is made to the savings value of 2.3 MMBtu given in the study. The original savings value is multiplied by 420 heating hours divided by 600 total running hours (420/600 = 0.70). An AFUE adjustment of 90/92 is also multiplied to the original value to create a more realistic final value.
HVAC – Room AC (Lost Opportunity)

Measure Overview

Description: The installation of ENERGY STAR® qualified room air conditioners. ENERGY STAR® qualified air conditioners are typically 10% more efficient than models meeting federal standards.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity, Retrofit
End Use: HVAC
Program: ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are based on the following algorithms which use averaged inputs:

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kWh / Hours \]

Where:
- Unit = Rebated room AC unit
- \( \Delta kWh \) = Average annual kWh savings per unit: 49 kWh\(^{157}\)
- \( \Delta kW \) = Average demand reduction per unit: 0.24 kW
- Hours = Equivalent full load hours

Baseline Efficiency

The baseline efficiency case is a window AC unit that meets the minimum federal efficiency standard for efficiency.

High Efficiency

The high efficiency level is a room AC unit meeting or exceeding the federal efficiency standard by 10% or more. Average size and EERs is estimated from rebated units in previous year and updated annually.

Hours

Equivalent full load hours are 200 hours per year.\(^{158}\)

---


Measure Life

The measure life is 9 years.\(^{159}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_{SP}</th>
<th>RR_{WP}</th>
<th>CF_{SP}</th>
<th>CF_{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room AC (Upstream)</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.134</td>
<td>0.00</td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are set to 100% based on the assumption that all purchased units are installed.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factors

All PAs use CFs from a 2008 residential room AC coincidence factor study.\(^{160}\)

---


HVAC – Window AC Replacement (Retrofit)

Measure Overview

Description: Replacement of existing inefficient room air conditioners with more efficient models. This is only offered as a measure when an AC timer would not reduce usage during the peak period.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Annual Discounted Rate Cost Reduction, Annual Participant Benefit
Sector: Low Income
Market: Retrofit
End Use: HVAC
Program: Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta kWh = \Delta kWh \\
\Delta kW = \Delta kW
\]

Where:
Unit = Removal of existing window AC unit and installation of new efficient window AC unit
\(\Delta kWh\) = Average annual kWh savings per unit: 100 kWh\(^{161}\)
\(\Delta kW\) = Max load kW reduction: 0.214 kW\(^{162}\)

Baseline Efficiency

The baseline efficiency case is the existing air conditioning unit.

High Efficiency

The high efficiency case is the high efficiency room air conditioning unit.

Hours

Not applicable.

Measure Life

The measure life is 12 years.\(^{163}\)


Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impact

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual participant benefit including comfort, safety, and health effects</td>
<td>$104/unit</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window AC Replacement</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.02</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors

Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.\(^{166}\)


HVAC – Electric Weatherization

Measure Overview

**Description:** Installation of weatherization measures such as air sealing and insulation in electrically heated homes.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** Annual Discounted Rate Cost Reduction, One-Time Arrearage Reduction, Annual Fire, Illness and Moving Avoidance Benefits, One-Time Property Value Benefit

**Sector:** Low Income

**Market:** Retrofit

**End Use:** HVAC

**Program:** Low-Income 1-4 Family Retrofit

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on study results:

\[
\Delta \text{kWh} = \Delta \text{kWh} \\
\Delta \text{kW} = \Delta \text{kW}
\]

Where:

- **Unit** = Electrically-heated household with weatherization measures installed
- **\(\Delta \text{kWh}\)** = Average annual kWh reduction: 374 kWh\(^{167}\)
- **\(\Delta \text{kW}\)** = Average annual kW reduction: 0.047 kW\(^{168}\)

**Baseline Efficiency**

The baseline efficiency case is any existing home shell measures.

**High Efficiency**

The high efficiency case includes increased weatherization insulation levels.

**Hours**

Not applicable.

**Measure Life**

The measure life is 20 years\(^{169}\).

---


\(^{169}\) Massachusetts Common Assumption.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction$^{170}$</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>The One-Time Property Value Benefit$^{171}$</td>
<td>$20.70 \times (\text{Cost}/\text{kWh}) \times \text{kWh Saved}$</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Weatherization</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors

Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.$^{172}$

---


$^{171}$ Ibid.

HVAC – Oil Weatherization

Measure Overview

Description: Installation of weatherization measures such as air sealing and insulation in oil heated homes. Electric savings are achieved from reduced fan run time for heating and cooling systems.

Primary Energy Impact: Oil
Secondary Energy Impact: Electric
Non-Energy Impact: Annual Discounted Rate Cost Reduction, One-Time Arrearage Reduction, Annual Fire, Illness and Moving Avoidance Benefits, One-Time Property Value Benefit

Sector: Low Income
Market: Retrofit
End Use: HVAC
Program: Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kW \]

Where:
Unit = Oil heated household with weatherization measures installed
\[ \Delta kWh = \text{Average annual kWh reduction: 70 kWh}^{173} \]
\[ \Delta kW = \text{Average annual kW reduction: 0.009 kW}^{174} \]

Baseline Efficiency

The baseline efficiency case is any existing home shell measures.

High Efficiency

The high efficiency case includes increased weatherization insulation levels.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{175}\)

---


Secondary Energy Impacts

<table>
<thead>
<tr>
<th>Measure</th>
<th>Energy Type</th>
<th>Savings(^{176})</th>
<th>∆MMBtu/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Weatherization</td>
<td>Oil</td>
<td>98 gallons/home</td>
<td>13.7</td>
</tr>
</tbody>
</table>

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{177})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>The One-Time Property Value Benefit (Electric)(^{178})</td>
<td>$20.70 x ($Cost/kWh) x kWh Saved</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>The One-Time Property Value Benefit (Oil)(^{179})</td>
<td>$20.70 x ($Cost/gal Oil) x gal Oil Saved</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Weatherization</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.03</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors
Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.\(^{180}\)


\(^{178}\) Ibid.

\(^{179}\) Ibid.

HVAC – Heating System Replacement (Oil)

Measure Overview

**Description:** Replacement of existing oil heating system with a new high efficiency system. Electric savings can be attributed to reduced fan run time and reduced usage of electric space heaters.

**Primary Energy Impact:** Oil

**Secondary Energy Impact:** Electric

**Non-Energy Impact:** Annual Discounted Rate Cost Reduction, One-Time Arrearage Reduction, Annual Fire, Illness and Moving Avoidance Benefits, One-Time Property Value Benefit

**Sector:** Low Income

**Market:** Retrofit

**End Use:** HVAC

**Program:** Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta kWh = \Delta kWh \\
\Delta kW = \Delta kW
\]

Where:

- **Unit** = Installation of new high efficiency oil heating system
- **\( \Delta kWh \)** = Average annual kWh savings per unit: 194 kWh\(^{181}\)
- **\( \Delta kW \)** = Average annual kW reduction per unit: 0.024 kW\(^{182}\)

Baseline Efficiency

The baseline efficiency case is the existing inefficient heating equipment.

High Efficiency

The high efficiency case is the new efficient heating equipment.

Hours

Not applicable.

Measure Life

The measure life is 18 years.\(^{183}\)

---


Secondary Energy Impacts

<table>
<thead>
<tr>
<th>Measure</th>
<th>Energy Type</th>
<th>Savings</th>
<th>∆ MMBtu/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating System Replacement (Oil)</td>
<td>Oil</td>
<td>87 Gallons/home</td>
<td>12.2</td>
</tr>
</tbody>
</table>

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Property Value Benefit (Electric)</td>
<td>$20.70 x $Cost/kWh x kWh Saved</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Property Value Benefit (Oil)</td>
<td>$20.70 x $Cost/gal Oil x gal Oil Saved</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating System Replacement (Oil)</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors
Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.\textsuperscript{186}


HVAC/Hot Water – ENERGY STAR® Homes Heating, Cooling, and DHW Measures

Measure Overview

**Description:** To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** Natural Gas, Oil, Propane

**Non-Energy Impact:** Annual Discounted Rate Cost Reduction (Low Income only)

**Sector:** Residential, Low Income

**Market:** Lost Opportunity

**End Use:** HVAC, Hot Water

**Program:** Residential New Construction & Major Renovation, Low-Income Residential New Construction

Algorithms for Calculating Primary Energy Impact

As part of the ENERGY STAR® certification process, projected energy use is calculated for each home completed through the program and a geometrically matching baseline home (User Defined Reference Home) using Beacon, an ICF International proprietary DOE-2 based building energy simulation tool. The difference between the projected energy consumption of these two homes represents the energy savings produced by the certified home. This process is used to calculate electric demand as well as electric and fossil fuel energy savings due to heating, cooling, and water heating for all homes, both single family and multifamily. This process is documented in “Energy/Demand Savings Calculation and Reporting Methodology for the Massachusetts ENERGY STAR® Homes Program.”

Baseline Efficiency

The User Defined Reference Home was revised for 2006 as a result of the baseline study completed in 2006.

High Efficiency

The high efficiency case is represented by the specific energy characteristics of each “as-built” home completed through the program.

Hours

Not applicable.

---


Measure Life

<table>
<thead>
<tr>
<th>Measure Type</th>
<th>Measure Life (years)(^{189})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>25</td>
</tr>
<tr>
<td>Heating</td>
<td>25</td>
</tr>
<tr>
<td>Water Heating</td>
<td>15</td>
</tr>
</tbody>
</table>

Secondary Energy Impacts

Gas, Oil and Propane savings for heating and water heating measures are custom calculating using the same methodology described for the electric energy and demand savings.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{190})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One Time Arrearage Reduction(^{191})</td>
<td>$35/Participant</td>
<td>Low Income heating measures only</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES Homes – Cooling</td>
<td>RNC, LI RNC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>custom</td>
<td>custom</td>
</tr>
<tr>
<td>ES Homes – Heating</td>
<td>RNC, LI RNC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>custom</td>
<td>custom</td>
</tr>
<tr>
<td>ES Homes – Water Heating</td>
<td>RNC, LI RNC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>custom</td>
<td>custom</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are 100% because energy and demand savings are custom calculated based on project specific detail.

Coincidence Factors
Coincidence factors are custom calculated based on project-specific detail.

\(^{189}\) Massachusetts Common Assumption.
\(^{191}\) Ibid.
Hot Water – Domestic Hot Water Measures (Electric)

Measure Overview

Description: Installation of domestic hot water (DHW) measures including low flow showerheads, faucet aerators, and tank and pipe wraps in homes with electric water heating.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Residential Water, Annual Discounted Rate Cost Reduction
Sector: Low Income
Market: Retrofit
End Use: Hot Water
Program: Low-Income 1-4 Family Retrofit,

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kW \]

Where:
Unit = Household with hot water efficiency measures installed
\( \Delta kWh \) = Average annual kWh savings per unit: 134 kWh\(^{192} \)
\( \Delta kW \) = Average annual kW reduction per unit: 0.017 kW\(^{193} \)

Baseline Efficiency

The baseline efficiency case is the existing hot water equipment.

High Efficiency

The high efficiency case includes low flow showerheads and faucet aerators as well as tank and pipe wraps.

Hours

Not applicable.

Measure Life

The measure life is 7 years.\(^{194} \)

\(^{194} \) Massachusetts Common Assumption.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Water</td>
<td>Residential water savings per participant</td>
<td>8,785 Gallons/Participant</td>
<td></td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction&lt;sup&gt;195&lt;/sup&gt;</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR&lt;sub&gt;E&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;WP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;WP&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHW Measures (Electric)</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors

Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.<sup>196</sup>

---


Hot Water – Domestic Hot Water Measures (Oil and Gas)

Measure Overview

Description: Installation of domestic hot water (DHW) measures including low flow showerheads, faucet aerators, and tank and pipe wraps in homes that have oil or gas water heaters.

Primary Energy Impact: Oil or Gas
Secondary Energy Impact: None
Non-Energy Impact: Residential Water, Annual Discounted Rate Cost Reduction
Sector: Low Income
Market: Retrofit
End Use: Hot Water
Program: Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

No electric savings are claimed for this measure.

Baseline Efficiency

The baseline efficiency case is the existing hot water equipment.

High Efficiency

The high efficiency case includes low flow showerheads and faucet aerators as well as tank and pipe wraps.

Hours

Not applicable.

Measure Life

The measure life is 7 years.\(^{197}\)

Secondary Energy Impacts

<table>
<thead>
<tr>
<th>Measure</th>
<th>Energy Type</th>
<th>Savings(^{198})</th>
<th>∆MMBtu/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHW Measures (Gas)</td>
<td>NG – Residential DHW</td>
<td>9 Therms</td>
<td>0.9</td>
</tr>
<tr>
<td>DHW Measures (Oil)</td>
<td>Oil</td>
<td>6.4 Gallons</td>
<td>0.9</td>
</tr>
</tbody>
</table>

\(^{197}\) Massachusetts Common Assumption.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Water</td>
<td>Residential water savings per participant</td>
<td>8,785 Gallons/Participant</td>
<td></td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{199})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_{SP})</th>
<th>RR(_{WP})</th>
<th>CF(_{SP})</th>
<th>CF(_{WP})</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHW Measures (Gas/Other)</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>DHW Measures (Oil)</td>
<td>LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors
Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.\(^{200}\)


Hot Water – Dishwashers

Measure Overview

**Description:** Installation of ENERGY STAR® qualified dishwashers in residential homes during new construction or major renovation. ENERGY STAR® dishwashers are on average, 10% more energy-efficient than non-qualified models.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** Natural Gas, Oil, Propane

**Non-Energy Impact:** Water Savings, Low Income only: Annual Discounted Rate Cost Reduction

**Sector:** Residential

**Market:** Lost Opportunity

**End Use:** Hot Water

**Program:** Residential New Construction & Major Renovation, Low-Income Residential New Construction

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms and assumptions:

\[ \Delta kWh = kWh_{BASE} - kWh_{EE} \]

\[ \Delta kW = \Delta kW \]

Where:

- **Unit** = Installation of ENERGY® dishwasher
- **\( \Delta kWh \)** = National Grid gross average annual kWh savings per unit\(^{201}\): 28 kWh for RNC, 25 kWh for LI RNC
- **\( \Delta kW \)** = Average annual kW savings per unit\(^{202}\): 0.003 kW
- **kWh\(_{BASE}\)** = Average unit energy consumption for non-qualified product
- **kWh\(_{EE}\)** = Average unit energy consumption for ENERGY STAR® qualified product

Baseline Efficiency

The baseline efficiency case is a conventional standard sized non-ENERGY STAR® qualified model meeting Federal Standards energy performance metric criteria effective January 1, 2010 for dishwashers with maximum energy consumption of less than or equal to 355 kWh/year and maximum water consumption of 6.5 gallons of water/cycle.\(^{203}\)

High Efficiency

The high efficiency case is an ENERGY STAR® qualified standard sized dishwasher meeting the energy performance metric criteria effective July 1, 2011 for dishwashers with maximum energy consumption of greater than or equal to 307 kWh/year and maximum water consumption of 5.0 gallons/cycle.

---

\(^{201}\) Source for these values is the 9/7/09 version of the energystar.gov appliance calculator using 1/1/10 Federal Standard for baseline consumption.

\(^{202}\) Ibid.

**Hours**

Dishwashers are assumed to run 215 cycles per year.\(^{204}\)

**Measure Life**

The measure life is 10 years.\(^{205}\)

**Secondary Energy Impacts**

Gas, Oil and Propane savings occur in homes where the water is heated by that fuel.\(^{206}\)

<table>
<thead>
<tr>
<th>Program</th>
<th>Natural Gas Savings (MMBtu/unit)</th>
<th>Oil Savings (MMBtu/unit)</th>
<th>Propane Savings (MMBtu/unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNC</td>
<td>0.0714</td>
<td>0.002</td>
<td>0.0041</td>
</tr>
<tr>
<td>LI RNC</td>
<td>0.1035</td>
<td>0.0002</td>
<td>0.0096</td>
</tr>
</tbody>
</table>

**Non-Energy Impacts**

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Water</td>
<td>Reduction in annual water usage compared to conventional unit(^{207})</td>
<td>430 Gallons/Unit</td>
<td></td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{208})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

**Impact Factors for Calculating Adjusted Gross Savings**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dishwasher</td>
<td>RNC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.89</td>
<td>1.00</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>LI RNC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**In-Service Rates**

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

**Savings Persistence Factor**

All PAs use 100% savings persistence factors.

**Realization Rates**

Realization rates are based on Massachusetts Common Assumptions.

**Coincidence Factors**

Coincidence factors are based on Massachusetts Common Assumptions.

---


\(^{205}\) Ibid.

\(^{206}\) Ibid.

\(^{207}\) Ibid.


August 2011
Hot Water – Pool Pump

Measure Overview

Description: The installation of a 2-speed or variable speed drive pool pump. Operating a pool pump for a longer period of time at a lower wattage can move the same amount of water using significantly less energy.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: Hot Water
Program: ENERGY STAR Appliances

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithms which use averaged inputs:

\[ \Delta kWh = (kW_{BASE} \times Hours) \times 55\% \]
\[ \Delta kW = \Delta kW \]

Where:

- Unit = Rebated 2-speed or variable speed pool pump
- \( \Delta kWh \) = Average annual kWh reduction: 400 kWh
- \( \Delta kW \) = Average annual kW reduction: 0.071 kW\(^{209}\)
- Hours = Average annual operating hours of pump
- kW\(_{BASE} \) = connected kW of baseline pump
- 55\% = average percent energy reduction from switch to 2-speed or variable speed pump\(^{210}\)

Baseline Efficiency

The baseline efficiency case is a single speed pump.

High Efficiency

The high efficiency case is a 2-speed or variable speed pump.

Hours

Hours are considered on a case-by-case basis since they are dependent on seasonal factors, pool size, and treatment conditions.

\(^{209}\) Quantec (2001). National Grid Demand Impact Template. Interactive spreadsheet tool developed for National Grid.
Measure Life

The measure life is 10 years.\textsuperscript{211}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pool Pumps</td>
<td>ES Appliances</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.30</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

In-service rates are set to 100% based on the assumption that all purchased units are installed.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are based on Massachusetts Common Assumptions.

Coincidence Factor

Coincidence factors are based on Massachusetts Common Assumptions.

Hot Water – Waterbed Mattress Replacement

Measure Overview

Description: Replacement of waterbed mattress with a standard mattress.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Annual Discounted Rate Cost Reduction
Sector: Low Income
Market: Retrofit
End Use: Hot Water
Program: Low-Income 1-4 Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta kWh = \Delta kWh \\
\Delta kW = \Delta kW
\]

Where:
Unit = Mattress replacement
\(\Delta kWh\) = Average annual kWh reduction: 872 kWh\(^{212}\)
\(\Delta kW\) = Average annual kW reduction: 0.109 kW\(^{213}\)

Baseline Efficiency

The baseline efficiency case is an existing waterbed mattress.

High Efficiency

The high efficiency case is a new standard mattress.

Hours

Not applicable.

Measure Life

The measure life is 10 years.\(^{214}\)


\(^{214}\) See the response to the question “How do I know when I need to buy a new mattress?” at the following link for more details: http://www.serta.com/#/best-mattress-FAQs-mattresses-Serta-Number-1-Best-Selling-Mattress.html (8/19/2010).
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction&lt;sup&gt;215&lt;/sup&gt;</td>
<td>$(R_1-R_2)/kWh Low Income</td>
<td></td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR&lt;sub&gt;E&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;WP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;WP&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterbed LI 1-4 Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors
Coincidence factors are estimated using the demand allocation methodology described in the 2000 EnergyWise program impact evaluation.<sup>216</sup>

<sup>215</sup> Oppenheim, Jerry (2000). <i>Memo - Low Income DSM Program non-energy benefits.</i>

MassSAVE – Vendor Measures

Measure Overview

Description: Retrofit measures installed through the MassSAVE program including: building envelope insulation and air sealing, duct sealing and insulation, programmable thermostats, heating system replacement, windows and DHW measures.
Primary Energy Impact: Electric
Secondary Energy Impact: Gas, Oil, Propane
Non-Energy Impact: Water
Sector: Residential
Market: Retrofit
End Use: HVAC, Hot Water
Program: MassSAVE

Algorithms for Calculating Primary Energy Impact

National Grid uses vendor calculated savings for these measures in the Residential MassSAVE electric program. These savings values are calculated using vendor proprietary software where the user inputs a minimum set of technical data about the house and the software calculates building heating and cooling loads and other key parameters. The proprietary building model is based on thermal transfer, building gains, and a variable-based heating/cooling degree day/hour climate model. This provides an initial estimate of energy use that may be compared with actual billing data to adjust as needed for existing conditions. Then, specific recommendations for improvements are added and savings are calculated using measure-specific heat transfer algorithms.

Rather than using a fixed degree day approach, the building model estimates both heating degree days and cooling degree hours based on the actual characteristics and location of the house to determine the heating and cooling balance point temperatures. Savings from shell measures use standard U-value, area, and degree day algorithms. Infiltration savings use site-specific seasonal N-factors to convert measured leakage to seasonal energy impacts. HVAC savings are estimated based on changes in system and/or distribution efficiency improvements, using ASHRAE 152 as their basis. Lighting, appliance, and water heating savings are based on standard algorithms, taking into account operating conditions and pre- and post-retrofit energy consumption. Interactivity between architectural and mechanical measures is always included, to avoid overestimating savings due to incorrectly “adding” individual measure results.

Baseline Efficiency

The baseline efficiency case is the existing conditions of the participating household.

High Efficiency

The high efficiency case includes installed energy efficiency measures that reduce heating, cooling and water heating energy use.

Hours

Hours are project-specific.
Measure Life

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Measure Life (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Sealing</td>
<td>15</td>
</tr>
<tr>
<td>DHW ISMs</td>
<td>7</td>
</tr>
<tr>
<td>Duct Insulation</td>
<td>20</td>
</tr>
<tr>
<td>Duct Seal</td>
<td>20</td>
</tr>
<tr>
<td>Heating System Replacement</td>
<td>18</td>
</tr>
<tr>
<td>Indirect Water Heater</td>
<td>20</td>
</tr>
<tr>
<td>Insulation</td>
<td>25</td>
</tr>
<tr>
<td>Thermostats</td>
<td>10</td>
</tr>
<tr>
<td>Windows</td>
<td>25</td>
</tr>
</tbody>
</table>

Secondary Energy Impacts

Gas, Oil and Propane savings are project-specific.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Water</td>
<td>Residential water savings for DHW measures(^{217})</td>
<td>8785 Gallons /Participant</td>
<td>DHW ISMs only</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Sealing (Electric)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.72</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Air Sealing (Gas, Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>DHW ISMs (Electric)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.75</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>DHW ISMs (Gas, Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Duct Insulation (Electric)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.72</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Duct Insulation (Gas, Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Duct Sealing (Electric)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.72</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Duct Sealing (Gas, Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Heating System Replacement (Gas, Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Indirect Water Heater (Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Insulation (Electric)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.72</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Insulation (Gas, Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Thermostats (Electric)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Thermostats (Gas, Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Windows (Electric)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>Windows (Gas, Oil, Other FF)</td>
<td>MassSAVE</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

**In-Service Rates**
In-service rates are set to 100% based on the assumption that all purchased units are installed.

**Savings Persistence Factor**
All PAs use 100% savings persistence factors.

**Realization Rates**
Realization rates are based on Massachusetts Common Assumptions.

**Coincidence Factor**
Coincidence factors are based on Massachusetts Common Assumptions.
Multifamily – Insulation (Walls, Roof, Floor)

Measure Overview

**Description:** Insulation upgrades are applied in existing facilities.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** Low Income Only: Annual Discounted Rate Cost Reduction, Annual Fire, Illness and Moving Avoidance Benefits, One-Time Property Value Benefit

**Sector:** Residential, Low Income

**Market:** Retrofit

**End Use:** HVAC

**Program:** Multi-Family Retrofit, Low-Income MultiFamily Retrofit

Algorithms for Calculating Primary Energy Impact

\[
\Delta k\text{W} = SQFT \times kWh/SQFT \times \left( \frac{1}{R\text{-VALUE}_\text{BASE}} - \frac{1}{R\text{-VALUE}_\text{EE}} \right)
\]

\[
\Delta kW = \Delta kWh \times kW/kWh
\]

Where:

- **SQFT** = Square feet of insulation installed
- **R-VALUE\_BASE** = R-Value of the existing insulation
- **R-VALUE\_EE** = R-Value of the new installed insulation
- **kWh/SQFT** = Average annual kWh reduction per SQFT of insulation. See Table below.
- **kW/kWh** = Average annual kW reduction per kWh reduction: 0.000125 kW/kWh

<table>
<thead>
<tr>
<th>Insulation Type</th>
<th>kWh/Sqft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>10.62</td>
</tr>
<tr>
<td>Attic</td>
<td>38.803</td>
</tr>
<tr>
<td>WALL (N, S)</td>
<td>11.477</td>
</tr>
<tr>
<td>WALL (W, E)</td>
<td>10.025</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case is the R-value of the existing insulation.

High Efficiency

The high efficiency case is insulation installed with a higher R-Value.

Hours

Not applicable.

---


219 National Grid’s Multifamily Screening Tool. This was developed in the early 1990’s. Documentation of the specific variables is unavailable. Evaluation results have consistently shown realization rates close to 100%.
Measure Life

The measure life is 25 years.220

Secondary Energy Impacts

There are no secondary energy impacts for this measure

Non-Energy Benefits

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings221</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Fire, Illness and Moving Avoidance Benefits</td>
<td>$203/Participant</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>The One-Time Property Value Benefit</td>
<td>$20.70 x $Cost/kWh x kWh Saved</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_e</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation (Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.91</td>
<td>0.03</td>
<td>1.00</td>
</tr>
<tr>
<td>Insulation (Non-Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.03</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

Realization rates from the National Grid Energy Wise 2008 Program Evaluation.222

Coincidence Factors

Summer and winter coincidence factors are estimated using demand allocation methodology described National Grid 2000 EnergyWise impact evaluation.223

Multifamily – DHW (Showerheads and Aerators)

Measure Overview

**Description:** An existing showerhead or aerator with a high flow rate is replaced with a new low flow showerhead or aerator.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** Residential Water, Low Income Only: Annual Discounted Rate Cost Reduction

**Sector:** Residential, Low Income

**Market:** Retrofit

**End Use:** Hot Water

**Program:** Multi-Family Retrofit, Low-Income MultiFamily Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta \text{kWh} = \Delta \text{kWh} \]
\[ \Delta \text{kW} = \Delta \text{kWh} \times \text{kW} / \text{kWh} \]

Unit = Showerhead or aerator installation.

\[ \Delta \text{kWh} = \text{Average annual kWh reduction per unit: 80.3 kWh}^{224} \]

\[ \text{kW/kWh} = \text{Average kW reduction per kWh reduction: 0.000125 kW/kWh}^{225} \]

Baseline Efficiency

The baseline efficiency case is an existing shower head or faucet aerator with a high flow.

High Efficiency

High efficiency is a low flow showerhead or faucet aerator.

**Hours**

Not applicable.

**Measure Life**

The measure life is 7 years.\(^{226}\)

---

\(^{224}\) National Grid’s Multifamily Screening Tool. This was developed in the early 1990’s. Documentation of the specific variables is unavailable. Evaluation results have consistently shown realization rates close to 100%.


\(^{226}\) Massachusetts Common Assumption.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Benefits

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Water</td>
<td>Gallons water saved per year per unit that received DHW measures(^{227})</td>
<td>8785 Gallons/Participant</td>
<td></td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{228})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showerhead/Aerator (Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.75</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Showerhead/Aerator (Non-Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.75</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
Realization rates from the National Grid Energy Wise 2008 Program Evaluation\(^{229}\).

Coincidence Factors
Summer and winter coincidence factors are estimated using demand allocation methodology described National Grid 2000 EnergyWise impact evaluation\(^{230}\).


Multifamily – DHW (Tank and Pipe Wrap)

Measure Overview

Description: A wrap is added to the water heater tank or pipes.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Low Income Only: Annual Discounted Rate Cost Reduction
Sector: Residential, Low Income
Market: Retrofit
End Use: Hot Water
Program: Multi-Family Retrofit, Low-Income MultiFamily Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kWh \times kW / kWh \]

Where:
Unit = Each installation for tank wraps, per linear foot for pipe wrap.
kWh = Average annual kWh reduction per unit: 55 kWh\textsuperscript{231}
kW/kWh = Average annual kW reduction per kWh reduction: 0.000125 kW/kWh\textsuperscript{232}

Baseline Efficiency

The baseline efficiency case is no wrap on the tank or pipes.

High Efficiency

High efficiency is the addition of a wrap.

Hours

Not applicable.

Measure Life

The measure life is 7 years.\textsuperscript{233}

Secondary-Energy Impacts

There are no secondary energy impacts for this measure.

\textsuperscript{231} National Grid’s Multifamily Screening Tool. This was developed in the early 1990’s. Documentation of the specific variables is unavailable. Evaluation results have consistently shown realization rates close to 100%.


\textsuperscript{233} Massachusetts Common Assumption
Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank/Pipe Wrap (Electric Heat)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.75</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Tank/Pipe Wrap (Non-Electric Heat)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.75</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
Realization rates from the National Grid Energy Wise 2008 Program Evaluation.

Coincidence Factors
Summer and winter coincidence factors are estimated using demand allocation methodology described National Grid 2000 EnergyWise impact evaluation.

---

Multifamily – Thermostats

Measure Overview

**Description:** Installation of programmable thermostats  
**Primary Energy Impact:** Electric  
**Secondary Energy Impact:** None  
**Non-Energy Impact:** Low Income Only: Annual Discounted Rate Cost Reduction  
**Sector:** Residential, Low Income  
**Market:** Retrofit  
**End Use:** HVAC  
**Program:** Multi-Family Retrofit, Low-Income MultiFamily Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta kWh = \Delta kWh \]
\[ \Delta kW = \Delta kWh \times kW / kWh \]

Where:
Unit = Installation of programmable thermostat.
\( \Delta kWh \) = Average annual kWh reduction per unit: 288 kWh\(^{237} \)
kW/kWh = Average annual kW reduction per kWh reduction: 0.000125 kW/kWh\(^{238} \)

Baseline Efficiency

The baseline efficiency case is a system without a set back programmable thermostat.

High Efficiency

The high efficiency case is a system with a set-back programmable thermostats and fixed set point (common areas) thermostats.

Hours

Not applicable.

Measure Life

The measure life is 10 years.\(^{239} \)

---

\(^{237}\) National Grid’s Multifamily Screening Tool. This was developed in the early 1990’s. Documentation of the specific variables is unavailable. Evaluation results have consistently shown realization rates close to 100%.


Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction (^{240})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermostat (Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Thermostat (Non-Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
Realization rates from the National Grid Energy Wise 2008 Program Evaluation.\(^{241}\)

Coincidence Factors
Summer and winter coincidence factors are estimated using demand allocation methodology described National Grid 2000 EnergyWise impact evaluation.\(^{242}\)

---


Multifamily – Heat Pump Tune-Up

Measure Overview

Description: Heat pump tune-up for electrically-heated homes only.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Low Income Only: Annual Discounted Rate Cost Reduction
Sector: Residential, Low Income
Market: Retrofit
End Use: HVAC
Program: Multi-Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta \text{kWh} = \Delta \text{kWh} \]
\[ \Delta \text{kW} = \Delta \text{kWh} \times \text{kW} / \text{kWh} \]

Where:
Unit = Heat pump tune-up performed
\( \Delta \text{kWh} \) = Average annual kWh reduction per unit: 1162 kWh\(^{243}\)
\( \text{kW/kWh} \) = Average kW reduction per kWh reduction: 0.000125 kW/kWh\(^{244}\)

Baseline Efficiency

The baseline efficiency case is an existing heat pump that is not tuned up.

High Efficiency

The high efficiency case is an existing heat pump that is tuned up.

Hours

Not applicable.

Measure Life

The measure life is 5 years.\(^{245}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

---

\(^{243}\) National Grid’s Multifamily Screening Tool. This was developed in the early 1990’s. Documentation of the specific variables is unavailable. Evaluation results have consistently shown realization rates close to 100%.


\(^{245}\) Massachusetts Common Assumption
Non-Energy Benefits

There are no non-energy benefits for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Pump Tune-up (Electric)</td>
<td>MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
Realization rates from the National Grid Energy Wise 2008 Program Evaluation.\(^{246}\)

Coincidence Factors
Summer and winter coincidence factors are estimated using demand allocation methodology described National Grid 2000 EnergyWise impact evaluation.\(^{247}\)

---


Multifamily – Air Sealing

Measure Overview

**Description:** Thermal shell air leaks are sealed through strategic use and location of air-tight materials.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** Low Income Only: Annual Discounted Rate Cost Reduction

**Sector:** Residential, Low Income

**Market:** Retrofit

**End Use:** HVAC

**Program:** Multi-Family Retrofit, Low-Income MultiFamily Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are calculated using the following algorithms and assumptions:

\[ \Delta k\text{Wh} = \text{Stories} \times \text{SQFT} \times (\frac{\text{CFM}}{\text{SQFT}_{\text{PRE}}} - \frac{\text{CFM}}{\text{SQFT}_{\text{POST}}}) \times \Delta k\text{Wh} / \text{CFM} \]

\[ \Delta k\text{W} = \Delta k\text{Wh} \times k\text{W} / k\text{Wh} \]

Where:

- **Stories** = Total stories in the multi-family building
- **SQFT** = Total SQFT of building
- **CFM/SQFT_{PRE}** = Estimate of pre-retrofit air leakage in CFM/SQFT based on number of stories in the building and air-tightness ratings of the existing roof and floor.
- **CFM/SQFT_{POST}** = Estimate of post-retrofit air leakage in CFM/SQFT based on number of stories in the building and air-tightness ratings of the improved roof and floor.
- **\( \Delta \text{kWh/CFM} \)** = Average annual kWh reduction per CFM: 2.48633 kWh/CFM\(^{248}\)
- **kW/kWh** = Average kW reduction per kWh reduction: 0.000125 kW/kWh\(^{249}\)

**Baseline Efficiency**

The baseline efficiency case is a facility that has not received comprehensive air-sealing treatment.

**High Efficiency**

The high efficiency case is a facility with thermal shell air leaks that are sealed, leading to a reduction in air leakage.

**Hours**

Not applicable.

---

\(^{248}\) National Grid’s Multifamily Screening Tool. This was developed in the early 1990’s. Documentation of the specific variables is unavailable. Evaluation results have consistently shown realization rates close to 100%.

Measure Life

The measure life is 15 years.\(^{250}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Benefits

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{251})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Sealing (Electric Heat)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Air Sealing (Non-Electric Heat)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

Realization rates are from the National Grid Energy Wise 2008 Program Evaluation.\(^{252}\)

Coincidence Factors

Summer and winter coincidence factors are estimated using demand allocation methodology described National Grid 2000 EnergyWise impact evaluation.\(^{253}\)


Multifamily – Refrigerators and Freezers

Measure Overview

Description: Removal of old inefficient refrigerator or freezer with the installation of new efficient refrigerator or freezer.
Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: Low Income Only: Annual Discounted Rate Cost Reduction, One-Time Avoided Refrigerator Purchase
Sector: Residential, Low Income
Market: Retrofit
End Use: Refrigeration
Program: Multi-Family Retrofit, Low-Income MultiFamily Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are calculated using the following algorithms and assumptions:

\[ \Delta k\text{Wh} = k\text{Wh}_{\text{PRE}} - k\text{Wh}_{\text{POST}} \]
\[ \Delta kW = \Delta k\text{Wh} \times kW / k\text{Wh} \]

Where:
Unit = Replacement of existing refrigerator with new ENERGY STAR® refrigerator
\( k\text{Wh}_{\text{PRE}} \) = Annual kWh consumption of existing equipment. Value entered by the user.
\( k\text{Wh}_{\text{POST}} \) = Annual kWh consumption of new installed equipment. Value entered by the user.
\( kW / k\text{Wh} \) = Average kW reduction per kWh reduction: 0.00013 kW/kWh

Baseline Efficiency

The baseline efficiency case is an existing refrigerator for which the annual kWh may be looked up in a refrigerator database. If the manufacturer and model number are not found, the refrigerator is metered for 1.5 hours in order to determine the annual kWh.

High Efficiency

The high efficiency case is a new more efficiency refrigerator. The manufacture and model number is looked up in a refrigerator database to determine annual kWh.

Measure Life

The measure life is 12 years for non low income and 19 years for low income.

---

256 Massachusetts Common Assumption.
**Hours**

Not applicable.

**Secondary Energy Impacts**

There are no secondary energy impacts for this measure.

**Non-Energy Impacts**

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction(^{257})</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Avoided Refrigerator Purchase(^{258})</td>
<td>$200/Unit</td>
<td></td>
</tr>
</tbody>
</table>

**Impact Factors for Calculating Adjusted Gross Savings**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_{IP})</th>
<th>RR(_{SP})</th>
<th>RR(_{WP})</th>
<th>CF(_{SP})</th>
<th>CF(_{WP})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerators (Electric Heat)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.91</td>
<td>1.00</td>
<td>0.92</td>
</tr>
<tr>
<td>Refrigerators (Non-Electric Heat)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>1.00</td>
<td>0.92</td>
</tr>
</tbody>
</table>

**In-Service Rates**

All installations have 100% in service rate since all PA programs include verification of equipment installations.

**Savings Persistence Factor**

All PAs use 100% savings persistence factor.

**Realization Rates**

Realization rates from the National Grid Energy Wise 2008 Program Evaluation\(^{259}\).

**Coincidence Factors**

Summer and winter coincidence factors are estimated using demand allocation methodology described National Grid 2000 EnergyWise impact evaluation\(^{260}\).

---


\(^{258}\) Ibid...


MultiFamily – Fixtures and CFLs

Measure Overview

**Description:** Removal of existing inefficient fixtures/bulbs with the installation of new efficient fixtures/bulbs

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** O&M, Low Income Only: Annual Discounted Rate Cost Reduction

**Sector:** Residential, Low Income

**Market:** Retrofit

**End Use:** Lighting

**Program:** Multi-Family Retrofit, Low-Income MultiFamily Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are calculated using the following algorithms and assumptions:

\[
\Delta kWh = \left(\frac{QTY_{\text{PRE}} \times Watts_{\text{PRE}} \times Hours_{\text{PRE}}}{1000 \times 52}\right) - \left(\frac{QTY_{\text{EE}} \times Watts_{\text{EE}} \times Hours_{\text{EE}}}{1000 \times 52}\right)
\]

\[
\Delta kW = \left(\frac{QTY_{\text{PRE}} \times Watts_{\text{PRE}}}{1000}\right) - \left(\frac{QTY_{\text{EE}} \times Watts_{\text{EE}}}{1000}\right)
\]

Where:

- \(QTY_{\text{PRE}}\) = Quantity of pre-retrofit fixtures/bulbs
- \(QTY_{\text{EE}}\) = Quantity of efficient fixtures/bulbs installed
- \(Watts_{\text{PRE}}\) = Rated watts of pre-retrofit fixtures/bulbs
- \(Watts_{\text{EE}}\) = Rated watts of efficient fixtures/bulbs installed
- \(Hours_{\text{PRE}}\) = Weekly hours of operation for pre-retrofit case lighting fixtures/bulbs
- \(Hours_{\text{EE}}\) = Weekly hours of operation for efficient lighting fixtures/bulbs
- 52 = Weeks per year

**Baseline Efficiency**

The baseline efficiency case is the existing fixture and bulbs.

**High Efficiency**

The high efficiency case is the new fixture and lamps.

**Measure Life**

The measure life is 7 years for CFLs and 20 years for fixtures.

**Hours**

Operating hours are estimated by the vendor for each facility. Typical assumptions are 24 hours/day for common area lighting, 12 hours/day for exterior lighting, and 3 hours/day for in-unit lighting, but may be adjusted based on type of housing. Estimates are verified with facility maintenance staff when possible.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction</td>
<td>$(R1-R2)/kWh</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource (CFL)</td>
<td>O&amp;M Cost Reduction</td>
<td>$3.00/Bulb</td>
<td></td>
</tr>
<tr>
<td>One-Time Non-Resource (Fixture)</td>
<td>O&amp;M Cost Reduction</td>
<td>$3.50/Fixture</td>
<td></td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFLs (Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.91</td>
<td>0.35</td>
<td>1.00</td>
</tr>
<tr>
<td>CFLs (Non-Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.35</td>
<td>1.00</td>
</tr>
<tr>
<td>Fixtures (Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.91</td>
<td>0.91</td>
<td>0.91</td>
<td>0.35</td>
<td>1.00</td>
</tr>
<tr>
<td>Fixtures (Non-Electric)</td>
<td>MF Retrofit, LI MF Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.99</td>
<td>0.99</td>
<td>0.99</td>
<td>0.35</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
Realization rates from the National Grid Energy Wise 2008 Program Evaluation.²⁶⁴

Coincidence Factors
Summer and winter coincidence factors are estimated using demand allocation methodology described National Grid 2000 EnergyWise impact evaluation.²⁶⁵

²⁶³ Ibid.
Behavior – OPOWER Electric

Measure Overview

**Description:** The OPOWER program sends energy use reports to participating electric customers in order to change customers’ energy-use behavior. In 2010, the program was planned with only one measure for all participant cohorts. In 2011, the program was planned with unique measures for each participant cohort. In 2011, the program’s name was changed to Behavior/Feedback.

**Primary Energy Impact:** Electric  
**Secondary Energy Impact:** None  
**Non-Energy Impact:** None  
**Sector:** Residential  
**Market:** Products and Services  
**End Use:** Behavior  
**Program:** OPOWER Program

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta kWh = (kWh_{BASE} \times %SAVE) \\
\Delta kW = \Delta kWh / 4000
\]

Where:

- \( \text{Unit} \) = One participant household  
- \( kWh_{BASE} \) = Baseline consumption of kWh. See Table below.  
- \( %SAVE_{kWh} \) = Energy savings percent per program participant. See Table below.

**OPOWER Program - Electric Savings Factors**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>kWh_{BASE}</th>
<th>%SAVE</th>
<th>( \Delta kWh/Unit )</th>
<th>( \Delta kW/Unit )</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTSERV</td>
<td>13,017</td>
<td>1.61%</td>
<td>209.58</td>
<td>0.052</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case is a customer who does not receive OPOWER Behavior/Feedback program reports.

High Efficiency

The high efficiency case is a customer who receives an OPOWER Behavior/Feedback program report.

Hours

Not applicable.

---

Measure Life

The measure life is 1 year.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTSERV</td>
<td>OPOWER</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.25</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

In-services rates are 100% since the program tracks all participating customers.

Savings Persistence Factor

Savings persistence is 100% since the measure life for each participant is 1 year.

Realization Rates

Realization rates are 100% because deemed savings are based on assumptions from year-to-date vendor findings.

Coincidence Factors

Coincidence Factors are based on evaluation results.\(^{267}\)

\(^{267}\) Ibid.
Commercial and Industrial Electric Efficiency Measures
Lighting – Advanced Lighting Design (Performance Lighting)

Measure Overview

**Description:** Advanced lighting design refers to the implementation of various lighting design principles aimed at creating a quality and appropriate lighting experience while reducing unnecessary light usage. This is often done by a professional in a new construction situation. Advanced lighting design uses techniques like maximizing task lighting and efficient fixtures to create a system of optimal energy efficiency and functionality.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** Gas, Oil

**Non-Energy Impact:** O&M

**Sector:** Commercial and Industrial

**Market:** Lost Opportunity

**End Use:** Lighting

**Program:** C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

\[
\Delta \text{Wh} = \sum_{i=1}^{n} \left( \frac{\text{Watts}_{\text{BASE},i} - \text{Watts}_{\text{EE},i}}{1000} \right) \left( \text{Area}_i \right) \left( \text{Hours}_i \right)
\]

\[
\Delta \text{W} = \sum_{i=1}^{n} \left( \frac{\text{Watts}_{\text{BASE},i} - \text{Watts}_{\text{EE},i}}{1000} \right) \left( \text{Area}_i \right)
\]

Where:

- **N** = Total number of spaces in Space-by-Space Method or 1 for Building Area Method
- **Watts\text{BASE},i** = Allowed lighting wattage per square foot based on energy code requirements for building or space type *i*. For values, see Appendix A: Table 16 and Appendix A: Table 17.
- **Watts\text{EE},i** = Installed lighting wattage per square foot of the efficient lighting system for building or space type *i*
- **1000** = Conversion factor: 1000 watts per 1 kW
- **Area\text{,i}** = Area of building or space *i* in square feet
- **Hours\text{,i}** = Annual hours of operation of the lighting equipment for building or space type *i*

Note on HVAC system interaction: Additional Electric savings from cooling system interaction are included in the calculation of adjusted gross savings for Lighting Systems projects. The HVAC interaction adjustment factor is determined from lighting project evaluations and is included in the energy realization rates and demand coincidence factors and realization rates.

Baseline Efficiency

The Baseline Efficiency assumes compliance with lighting power density requirements as mandated by Massachusetts State Building Code. As described in Chapter 13 of the aforementioned document, energy efficiency must be met via compliance with the International Energy Conservation Code (IECC) 2009. IECC offers one compliance path, the Building Area Method. ASHRAE 90.1-2007 offers two compliance paths. For completeness, the lighting power density requirements for both the Building Area Method and
the Space-by-Space Method are presented.\footnote{IECC 2009 presents requirements consistent with ASHRAE 90.1-2007 for the Building Area Method but does not present requirements for the Space-by-Space Method.}  Table 16 and Table 17 in Appendix A: Common Lookup Tables detail the specific power requirements by compliance path.

**High Efficiency**

The high efficiency scenario assumes lighting systems that achieve lighting power densities below those required by Massachusetts State Building Code. Actual site lighting power densities should be determined on a case-by-case basis.

**Hours**

The annual hours of operation for lighting systems are site-specific and should be determined on a case-by-case basis.

**Measure Life**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Measure Life\footnote{Energy &amp; Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1.}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent Fixture</td>
<td>15 years</td>
</tr>
<tr>
<td>Hardwired CFL</td>
<td>15 years</td>
</tr>
<tr>
<td>LED Exit Signs</td>
<td>15 years</td>
</tr>
<tr>
<td>HID (interior and exterior)</td>
<td>15 years</td>
</tr>
</tbody>
</table>

**Secondary Energy Impacts**

Heating energy will be increased due to reduced lighting waste heat. This impact is estimated as an average impact in heating fossil fuel consumption per unit of energy saved.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior Lighting</td>
<td>C&amp;I Gas Heat</td>
<td>-0.0003649 MMBtu/(\Delta\text{kWh})</td>
</tr>
<tr>
<td>Interior Lighting</td>
<td>Oil</td>
<td>-0.0007129 MMBtu/(\Delta\text{kWh})</td>
</tr>
</tbody>
</table>

**Non-Energy Impacts**

Annual non-energy benefits are claimed due to the reduced operation and maintenance costs associated with the longer measure lived of lamps and ballasts as compared to the base or pre-retrofit case. See Table 20 for values.

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual O&amp;M dollars saved due to avoided incandescent bulbs and labor</td>
<td>SOM/Fixture</td>
<td>CFL Fixtures only</td>
</tr>
</tbody>
</table>
Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.07</td>
<td>0.80</td>
<td>0.73</td>
<td>custom</td>
<td>custom</td>
</tr>
</tbody>
</table>

**In-Service Rates**
All installations have 100% in service rate since programs include verification of equipment installations.

**Savings Persistence Factor**
All PAs use 100% savings persistence factor.

**Realization Rates**
Energy and demand RRs derived from impact evaluation of National Grid 2008 custom lighting installations\(^{271}\); final realization rates developed in 2008 custom program analysis study.\(^{272}\)

**Coincidence Factors**
CFs are custom calculated based on site-specific information.


Lighting – Lighting Systems

Measure Overview

**Description:** This measure promotes the installation of efficient lighting including, but not limited to, efficient fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** Gas, Oil

**Non-Energy Impact:** O&M

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity, Retrofit

**End Use:** Lighting

**Program:** C&I New Construction & Major Renovation, C&I Large Retrofit, C&I Small Retrofit

**Algorithms for Calculating Primary Energy Impact**

\[
\Delta kWh = \left[ \sum_{i=1}^{n} \left( \frac{\text{Count}_i \times \text{Watts}_i}{1000} \right)_{\text{BASE}} \right] - \left[ \sum_{j=1}^{m} \left( \frac{\text{Count}_j \times \text{Watts}_j}{1000} \right)_{\text{EE}} \right] \times \text{Hours}
\]

\[
\Delta kW = \sum_{i=1}^{n} \left( \frac{\text{Count}_i \times \text{Watts}_i}{1000} \right)_{\text{BASE}} - \sum_{j=1}^{m} \left( \frac{\text{Count}_j \times \text{Watts}_j}{1000} \right)_{\text{EE}}
\]

Where:

- \(n\) = Total number of fixture types in baseline or pre-retrofit case
- \(m\) = Total number of installed fixture types
- \(\text{Count}_i\) = Quantity of existing fixtures of type \(i\) (for lost-opportunity, \(\text{Count}_i = \text{Count}_j\)).
- \(\text{Watts}_i\) = Existing fixture or baseline wattage for fixture type \(i\)
- \(\text{Count}_j\) = Quantity of efficient fixtures of type \(j\).
- \(\text{Watts}_j\) = Efficient fixture wattage for fixture type \(j\).
- 1000 = Conversion factor: 1000 watts per kW.
- Hours = Lighting annual hours of operation.

Note on HVAC system interaction: Additional Electric savings from cooling system interaction are included in the calculation of adjusted gross savings for Lighting Systems projects. The HVAC interaction adjustment factor is determined from lighting project evaluations and is included in the energy realization rates and demand coincidence factors and realization rates.

**Baseline Efficiency**

For large retrofit installations, the baseline efficiency case is project-specific and is determined using actual fixture counts from the existing space. Existing fixture wattages are provided in the MassSAVE Retrofit Lighting Wattage Tables.\(^{273}\) For lost opportunity installations, the baseline efficiency case is determined using assumed baseline wattages for each of the installed fixtures.\(^{274}\) Small retrofit installations use the exact wattages and fixture counts from the existing space.


High Efficiency

For both large new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and the MassSave Wattage Tables. Small retrofit installations use the exact wattages and fixture counts from the existing space.

Hours

The annual hours of operation for lighting systems are site-specific and should be determined on a case-by-case basis.

Measure Life

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Measure Life</th>
<th>Retrofit</th>
<th>Lost Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulb – CFL screw base</td>
<td>5 years</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Fluorescent Fixture</td>
<td>13 years</td>
<td>15 years</td>
<td></td>
</tr>
<tr>
<td>Hardwired CFL</td>
<td>13 years</td>
<td>15 years</td>
<td></td>
</tr>
<tr>
<td>HID (interior and exterior)</td>
<td>13 years</td>
<td>15 years</td>
<td></td>
</tr>
<tr>
<td>LED Lighting Fixtures</td>
<td>13 years</td>
<td>15 years</td>
<td></td>
</tr>
<tr>
<td>LED Integral Replacement Lamps</td>
<td>13 years</td>
<td>15 years</td>
<td></td>
</tr>
<tr>
<td>LED Low Bay – Garage &amp; Canopy Fixtures</td>
<td>13 years</td>
<td>15 years</td>
<td></td>
</tr>
</tbody>
</table>

Secondary Energy Impacts

Heating energy will be increased due to reduced lighting waste heat. This impact is estimated as an average impact in heating fossil fuel consumption per unit of energy saved.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Energy Type</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior Lighting</td>
<td>C&amp;I Gas Heat</td>
<td>-0.0003649 MMBtu/kWh</td>
</tr>
<tr>
<td>Interior Lighting</td>
<td>Oil</td>
<td>-0.0007129 MMBtu/kWh</td>
</tr>
</tbody>
</table>

Non-Energy Impacts

Annual non-energy benefits are claimed due to the reduced operation and maintenance costs associated with the longer measure lived of lamps and ballasts as compared to the base or pre-retrofit case. See Table 20 for values.

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual O&amp;M dollars saved due to avoided incandescent bulbs and labor</td>
<td>SOM/Fixture</td>
<td></td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.02</td>
<td>0.97</td>
<td>0.97</td>
<td>0.98</td>
<td>0.73</td>
</tr>
<tr>
<td>All</td>
<td>Large Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.04</td>
<td>1.03</td>
<td>1.03</td>
<td>0.89</td>
<td>0.63</td>
</tr>
<tr>
<td>Screw-in CFLs</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>0.87</td>
<td>1.08</td>
<td>0.99</td>
<td>0.99</td>
<td>0.79</td>
<td>0.39</td>
</tr>
<tr>
<td>All (except screw in CFLs)</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.08</td>
<td>0.99</td>
<td>0.99</td>
<td>0.79</td>
<td>0.39</td>
</tr>
</tbody>
</table>

**In-Service Rates**
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

**Savings Persistence Factor**
All PAs use 100% savings persistence factors. with one exception: 0.874 for screw-in CFLs installed through the C&I Small Retrofit program based on 1996 savings persistence study.\(^{278}\)

**Realization Rates**

*New Construction & Major Renovation Commercial*
- Energy and demand RRs from impact evaluation of National Grid’s 2007 Design 2000plus (New Construction) Lighting installations.\(^ {278}\) Demand RR is the connected demand RR; energy RR includes connected demand RR, hours of use RR and HVAC Interactive adjustment.

*C&I Large Retrofit*
- Energy RR is from impact evaluation of National Grid’s 2007 Energy Initiative (Large Retrofit) Lighting program.\(^ {280}\) Energy RR is the ratio measured electric energy savings to gross estimates of electric energy savings, and includes electric HVAC interaction adjustment by default. Demand RR as are from impact evaluation of National Grid’s 2003 Energy Initiative Lighting program.\(^ {281}\) Demand RR is the connected demand RR.

*C&I Small Retrofit*
- Energy RRs from statewide impact evaluation of 2010 Small Business Services programs.\(^ {282}\)
- Demand RRs are connected demand RRs, from statewide impact evaluation of 2010 Small Business Services programs.\(^ {283}\)

**Coincidence Factors**

*New Construction & Major Renovation Commercial*
Coincidence Factors are based on a study of National Grid’s 2007 Design 2000plus Lighting subprogram.\(^ {284}\) Lighting coincidence factors include HVAC interactive effects.

*C&I Large Retrofit*

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\(^{283}\) Ibid.

Lighting coincidence Factors are based on a NEEP regional C&I Lighting Loadshape study. Coincidence factors include HVAC interactive effects.\textsuperscript{285}

\textbf{C&I Small Retrofit}

Summer Coincidence Factor is based on a NEEP regional C&I Lighting Loadshape study.\textsuperscript{286} Winter Coincidence Factor is based on statewide impact evaluation of the 2010 Small Business Services programs.\textsuperscript{287} Coincidence factors include HVAC interactive effects.


\textsuperscript{286} Ibid.

Lighting – Lighting Controls

Measure Overview

Description: This measure promotes the installation of lighting controls in both lost-opportunity and retrofit applications. Promoted technologies include occupancy sensors and daylight dimming controls.

Primary Energy Impact: Electric

Secondary Energy Impact: Heating energy (non-electric)

Non-Energy Impacts: O&M

Sector: Commercial & Industrial

Market: Lost Opportunity, Retrofit

End Use: Lighting

Program: C&I New Construction & Major Renovation, C&I Large Retrofit, C&I Small Retrofit

Algorithms for Calculating Primary Energy Impact

\[
\Delta kW = (\text{Controlled kW})(\text{Hours}_{\text{BASE}} - \text{Hours}_{\text{EE}})
\]

\[
\Delta kW = (\text{Controlled kW})
\]

Where:

Controlled kW = Controlled fixture wattage

\text{Hours}_{\text{BASE}} = \text{Total annual hours that the connected Watts operated in the pre-retrofit case (retrofit installations) or would have operated with code-compliance controls (new construction installations).}

\text{Hours}_{\text{EE}} = \text{Total annual hours that the connect Watts operate with the lighting controls implemented.}

Note on HVAC system interaction: Additional Electric savings from cooling system interaction are included in the calculation of adjusted gross savings for Lighting Systems projects. The HVAC interaction adjustment factor is determined from lighting project evaluations and is included in the energy realization rates and demand coincidence factors and realization rates.

Baseline Efficiency

The baseline efficiency case assumes no controls (retrofit) or code-compliant controls (new construction).

High Efficiency

The high efficiency case involves lighting fixtures connected to controls that reduce the pre-retrofit or baseline hours of operation.
Hours

The annual hours of reduction for lighting controls are site-specific and should be determined on a case-by-case basis.

Measure Life

<table>
<thead>
<tr>
<th>Measure</th>
<th>Measure Life&lt;sup&gt;288&lt;/sup&gt;</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retrofit</td>
<td>Lost Opportunity</td>
</tr>
<tr>
<td>Occupancy Sensors</td>
<td>9 years</td>
<td>10 years</td>
</tr>
<tr>
<td>Daylight Dimming</td>
<td>9 years</td>
<td>10 years</td>
</tr>
</tbody>
</table>

Secondary Energy Impacts

Heating energy will be increased due to reduced lighting waste heat.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Energy Type</th>
<th>Savings&lt;sup&gt;289&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior Lighting</td>
<td>C&amp;I Gas Heat</td>
<td>-0.0003649 MMBtu/kWh</td>
</tr>
<tr>
<td>Interior Lighting</td>
<td>Oil</td>
<td>-0.0007129 MMBtu/kWh</td>
</tr>
</tbody>
</table>

Non-Energy Impacts

Annual non-energy benefits are claimed due to the reduced operation and maintenance costs associated with the longer measure lived of lamps and ballasts as compared to the base or pre-retrofit case. See Table 20 for values.

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
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<th>Notes</th>
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<tbody>
<tr>
<td>Annual Non-Resource</td>
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Impact Factors for Calculating Adjusted Gross Savings

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<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR&lt;sub&gt;G&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;WP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;WP&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupancy Sensors</td>
<td>NC, Large Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.76</td>
<td>0.96</td>
<td>0.96</td>
<td>0.30</td>
<td>0.19</td>
</tr>
<tr>
<td>Daylight Dimming</td>
<td>NC, Large Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.38</td>
<td>0.96</td>
<td>0.96</td>
<td>0.15</td>
<td>0</td>
</tr>
<tr>
<td>Occupancy Sensors</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.87</td>
<td>0.94</td>
<td>0.94</td>
<td>0.35</td>
<td>0.28</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

RRs from National Grid impact evaluation of C&I lighting controls installations.<sup>290</sup>

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<sup>288</sup> Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1
Coincidence Factors
CFs from National Grid impact evaluation C&I lighting controls installations.\(^{291}\)

\(^{291}\) Ibid.
Lighting – Freezer/Cooler LEDs

Measure Overview

Description: Installation of LED lighting in freezer and/or cooler cases. The LED lighting consumes less energy, and results in less waste heat which reduces the cooling/freezing load.

Primary Energy Impact: Electric

Secondary Energy Impact: None

Non-Energy Impact: None

Sector: Commercial & Industrial

Market: Retrofit

End Use: Lighting

Program: C&I Small Retrofit

Algorithms for Calculating Primary Energy Impact

\[
\Delta kWh = \Delta kWh_{LED} + \Delta kWh_{Heat}
\]

\[
\Delta kWh_{LED} = \sum_{i=1}^{N} (\text{Count}_i * \text{kW}_i * \text{Hours}_i)_{BASE} - \sum_{i=1}^{M} (\text{Count}_j * \text{kW}_j * \text{Hours}_j)_{LED}
\]

\[
\Delta kWh_{Heat} = \Delta kWh_{LED} * 0.28 * \text{Eff}_{RS}
\]

\[
\Delta kW = \Delta kWh / \text{Hours}_j
\]

Where:

\(\Delta kWh_{LED}\) = Reduction in lighting energy

\(\Delta kWh_{Heat}\) = Reduction in refrigeration energy due to reduced heat loss from the lighting fixtures

\(N\) = Total number of lighting fixture types in the pre-retrofit case

\(M\) = Total number of lighting fixture types in the post-retrofit case

\(\text{Count}_i\) = Quantity of type \(i\) fixtures in the pre-retrofit case

\(\text{kW}_i\) = Power demand of pre-retrofit lighting fixture type \(i\) (kW/fixture)

\(\text{Hours}_i\) = Pre-retrofit annual operating hours of fixture type \(i\)

\(\text{Count}_j\) = Quantity of type \(j\) fixtures in the pre-retrofit case

\(\text{kW}_j\) = Power demand of lighting fixture type \(j\) (kW/fixture)

\(\text{Hours}_j\) = Post-retrofit annual operating hours of fixture type \(j\)

0.28 = Unit conversion between kW and tons calculated as 3,413 Btuh/kW divided by 12,000 Btuh/ton

\(\text{Eff}_{RS}\) = Efficiency of typical refrigeration system: 1.3 kW/ton292

Baseline Efficiency

The baseline efficiency case is the existing lighting fixtures in the cooler or freezer cases.

High Efficiency

The high efficiency case is the installation of LED lighting fixtures on the cooler or freezer cases, replacing the existing lighting fixtures.

Hours

Annual hours of operation are determined on a case-by-case basis and are typically 8760 hours/year. Post-retrofit operating hours are assumed to be the same as pre-retrofit hours unless lighting occupancy sensors were also implemented.

Measure Life

The measure life is 13 years.293

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RRSP</th>
<th>RRWP</th>
<th>CFSP</th>
<th>CFWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freezer/Cooler LEDs</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.07</td>
<td>1.15</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

RRs for small retrofit installations based on impact evaluation of 2005 small retrofit custom measures.294

Coincidence Factors

CFs for small retrofit installations based on impact evaluation of 2005 small retrofit custom measures.295

295 Ibid.
HVAC – Single-Package and Split System Unitary Air Conditioners

Measure Overview

Description: This measure promotes the installation of high efficiency unitary air conditioning equipment in lost opportunity applications. Air conditioning (AC) systems are a major consumer of electricity and systems that exceed baseline efficiencies can save considerable amounts of energy. This measure applies to air, water, and evaporatively-cooled unitary AC systems, both single-package and split systems.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None

Sector: Commercial & Industrial
Market: Lost Opportunity
End Use: HVAC
Program: C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

For units with cooling capacities less than 65 kBtu/h:

\[
\Delta \text{kWh} = \left(\frac{1}{\text{SEER}_{\text{BASE}}} - \frac{1}{\text{SEER}_{\text{EE}}}\right) \left(\text{EFLH}_{\text{Cool}}\right)
\]

\[
\Delta \text{kW} = \left(\frac{1}{\text{SEER}_{\text{BASE}}} - \frac{1}{\text{SEER}_{\text{EE}}}\right)
\]

For units with cooling capacities equal to or greater than 65 kBtu/h:

\[
\Delta \text{kWh} = \left(\frac{1}{\text{EER}_{\text{BASE}}} - \frac{1}{\text{EER}_{\text{EE}}}\right) \left(\text{EFLH}_{\text{Cool}}\right)
\]

\[
\Delta \text{kW} = \left(\frac{1}{\text{EER}_{\text{BASE}}} - \frac{1}{\text{EER}_{\text{EE}}}\right)
\]

Where:

\(\Delta \text{kWh}\) = Gross annual kWh savings from the measure.
\(\Delta \text{kW}\) = Gross connected kW savings from the measure.
kBtu/h = Capacity of the cooling equipment in kBtu per hour (1 ton of cooling capacity equals 12 kBtu/h)
SEER_{BASE} = Seasonal Energy Efficiency Ratio of the baseline equipment. See Table 1 for values.
SEER_{EE} = Seasonal Energy Efficiency Ratio of the energy efficient equipment.
EFLH_{Cool} = Cooling equivalent full load hours. See Hours section below.
EER_{BASE} = Energy Efficiency Ratio of the baseline equipment. See Table 1 for values.

Since IECC 2009 does not provide EER requirements for air-cooled air conditioners < 65 kBtu/h, assume the following conversion from SEER to EER: EER=SEER/1.1.
EER_{EE} = Energy Efficiency Ratio of the energy efficient equipment. For air-cooled air conditioners < 65 kBtu/h, if the actual EER_{EE} is unknown, assume the following conversion from SEER to EER: EER \approx \frac{SEER}{1.1}.

**Baseline Efficiency**

Table 1 details the specific efficiency baselines by equipment type and capacity.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Size Category</th>
<th>Subcategory or Rating Condition</th>
<th>Baseline Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air conditioners, air cooled</td>
<td>&lt;65,000 Btu/h</td>
<td>Split system and single system</td>
<td>10 SEER</td>
</tr>
<tr>
<td></td>
<td>≥65,000 Btu/h</td>
<td>Split system and single package</td>
<td>8.92 EER</td>
</tr>
<tr>
<td></td>
<td>&lt;135,000 Btu/h</td>
<td>Split system and single package</td>
<td>8.6 EER</td>
</tr>
<tr>
<td>≥135,000 Btu/h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air conditioners, Water and</td>
<td>&gt;240,000 Btu/h</td>
<td>Split system and single package</td>
<td>9.5 EER</td>
</tr>
<tr>
<td>evaporatively cooled</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**High Efficiency**

The high efficiency case assumes the HVAC equipments meets or exceeds the Consortium for Energy Efficiency’s (CEE) specification. This specification results in cost-effective energy savings by specifying higher efficiency HVAC equipment while ensuring that several manufacturers produce compliant equipment. The CEE specification is reviewed and updated annually to reflect changes to the ASHRAE and IECC energy code baseline as well as improvements in the HVAC equipment technology. The minimum efficiency requirements for program participation are outlined on the Cool Choice rebate forms. Equipment efficiency is the rated efficiency of the installed equipment for each project.

**Hours**

National Grid uses 777 cooling hours for all units.296

**Measure Life**

The measure life is 15 years.297

**Secondary Energy Impacts**

There are no secondary energy impacts for this measure.

**Non-Energy Impacts**

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unitary AC</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.25</td>
<td>0.90</td>
<td>1.00</td>
<td>0.44</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**In-Service Rates**
All installations have 100% in service rate since all programs include verification of equipment installations.

**Savings Persistence Factor**
All PAs use 100% savings persistence factors.

**Realization Rates**
Energy and demand RR based on 2011 NEEP load shape study.\(^{298}\)

**Coincidence Factors**
CFs from 1998 unitary HVAC study.\(^{299}\)


HVAC – Single Package or Split System Heat Pump Systems

Measure Overview

**Description:** This measure applies to the installation of high-efficiency air cooled, water source, ground water source, and ground source heat pump systems.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

For **air cooled units with cooling capacities less than 65 kBtu/h:**

\[
\Delta kW = \left(\frac{1}{SEER_{BASE}} - \frac{1}{SEER_{EE}}\right) (EFLH_{COOL}) (HF)
\]

\[
\Delta kWh = \left(\frac{kBtu}{h} \right) \left(\frac{1}{SEER_{BASE}} - \frac{1}{SEER_{EE}}\right) (EFLH_{COOL})
\]

For **all water source, groundwater source, ground source units, and air cooled units with cooling capacities equal to, or greater than, 65 kBtu/h:**

\[
\Delta kW = \left(\frac{1}{EER_{BASE}} - \frac{1}{EER_{EE}}\right)
\]

\[
\Delta kWh = \left(\frac{kBtu}{h} \right) \left(\frac{1}{EER_{BASE}} - \frac{1}{EER_{EE}}\right)
\]

Where:

\(\Delta kWh\) = Gross annual kWh savings from the measure.

\(kBtu/h^{300}\) = Capacity of the cooling equipment in kBtu per hour (1 ton of cooling capacity equals 12 kBtu/h).

\(SEER_{BASE}\) = Seasonal Energy Efficiency Ratio of the baseline equipment. See Baseline Efficiency section for values.

\(SEER_{EE}\) = Seasonal Energy Efficiency Ratio of the energy efficient equipment.

\(EFLH_{COOL}\) = Cooling mode equivalent full load hours.

\(HF\) = Heating Factor to account for savings in heating mode for air cooled heat pumps: 2.39\(^{301}\)

---

\(^{301}\) For equipment with cooling capacities less than 65 kBtu/h, it is assumed that the heating capacity and cooling capacity are equal.
EER_{\text{BASE}} = \text{Energy Efficiency Ratio of the baseline equipment. See Baseline Efficiency section for values. Since IECC 2009 does not provide EER requirements for air-cooled heat pumps < 65 kBtu/h, assume the following conversion from SEER to EER: EER = \text{SEER}/1.1.}

EER_{\text{EE}} = \text{Energy Efficiency Ratio of the energy efficient equipment. For air-cooled air conditioners < 65 kBtu/h, if the actual EER_{\text{EE}} is unknown, assume the following conversion from SEER to EER: EER = \text{SEER}/1.1.}

**Heating Capacity Conversion Factors:**

Air Source HPs
Heating Capacity = Cooling Capacity * 13,900/12,000 (Ratio of heat produced in the heating mode divided by cooling produced in cooling mode)

Water/Ground Source HPs
Heating Capacity = Cooling Capacity * \text{COP/EER} (converts the rated cooling output to the rated heating output)

**Baseline Efficiency**

National Grid specified 10 SEER for all air cooled heat pumps and 11.5 SEER for all water source heat pumps.

**High Efficiency**

The high efficiency case assumes the HVAC equipments meets or exceeds the Consortium for Energy Efficiency’s (CEE) specification. This specification results in cost-effective energy savings by specifying higher efficiency HVAC equipment while ensuring that several manufacturers produce compliant equipment. The CEE specification is reviewed and updated annually to reflect changes to the ASHRAE and IECC energy code baseline as well as improvements in the HVAC equipment technology.

The minimum efficiency requirements for program participation are outlined on the Cool Choice rebate forms. Equipment efficiency is the rated efficiency of the installed equipment for each project.

**Hours**

National Grid uses default hours of 777 hours\textsuperscript{302} for air cooled heat pumps and 1029 hours\textsuperscript{303} for water cooled heat pumps.

**Measure Life**

The measure life is 15 years.\textsuperscript{304}

---


\textsuperscript{304} Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1.
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Pumps</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.25</td>
<td>0.90</td>
<td>1.00</td>
<td>0.44</td>
<td>0.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Energy and demand RR based on 2011 NEEP load shape study.305

Coincidence Factors

CFs from 1998 unitary HVAC study.306

---


HVAC – Dual Enthalpy Economizer Controls (DEEC)

Measure Overview

**Description:** The measure is to upgrade the outside-air dry-bulb economizer to a dual enthalpy economizer. The system will continuously monitor the enthalpy of both the outside air and return air. The system will control the system dampers adjust the outside quantity based on the two readings.

**Primary Energy Impact:** Electric
**Secondary Energy Impact:** None
**Non-Energy Impact:** None
**Sector:** Commercial & Industrial
**Market:** Lost Opportunity, Retrofit
**End Use:** HVAC
**Program:** C&I New Construction and Major Renovation

Algorithms for Calculating Primary Energy Impacts

\[
\Delta \text{kWh} = (\text{kBtu/h}) \left( \frac{1 \text{Ton}}{12 \text{kBtu/h}} \right) (\text{SAVE}_{\text{kWh}})
\]

\[
\Delta \text{kW} = (\text{kBtu/h}) \left( \frac{1 \text{Ton}}{12 \text{kBtu/h}} \right) (\text{SAVE}_{\text{kW}})
\]

Where:
- kBtu/h = Capacity of the cooling equipment in kBtu per hour (1 ton of cooling capacity equals 12 kBtu/h).
- SAVE\text{kWh} = Average annual kWh reduction per ton of cooling capacity: 289 kWh/ton\textsuperscript{307}
- SAVE\text{kW} = Average kW reduction per ton of cooling capacity: 0.289 kW/ton\textsuperscript{308}

Baseline Efficiency

The baseline efficiency case for this measure assumes the relevant HVAC equipment is operating with a fixed dry-bulb economizer.

High Efficiency

The high efficiency case is the installation of an outside air economizer utilizing two enthalpy sensors, one for outdoor air and one for return air.

**Hours**

Not applicable.

\textsuperscript{308} Ibid.
Measure Life

The measure life is 10 years for lost-opportunity applications.\(^{309}\) The measure life is 7 years for retrofit installations.\(^{310}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEEC</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.40</td>
<td>0.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

RRs are 1.0 since there have been no impact evaluations of the prescriptive savings calculations.

Coincidence Factors

CFs from 1998 unitary HVAC study.\(^{311}\)

\(^{309}\) Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1


HVAC – Demand Control Ventilation (DCV)

Measure Overview

**Description:** The measure, offered through the CoolChoice program, is to control quantity of outside air to an air handling system based on detected space CO₂ levels. The installed systems monitor the CO₂ in the spaces or return air and reduce the outside air use when possible to save energy while meeting indoor air quality standards.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** Gas, Oil

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** C&I New Construction and Major Renovation

**Algorithms for Calculating Primary Energy Impacts**

\[
\Delta kWh = (kBtu / h) \left( \frac{1}{12} \frac{Ton}{kBtu / h} \right) (SAVE_{kWh})
\]

\[
\Delta kW = (kBtu / h) \left( \frac{1}{12} \frac{Ton}{kBtu / h} \right) (SAVE_{kW})
\]

Where:

- \( kBtu/h \) = Capacity of the cooling equipment in kBtu per hour
- \( SAVE_{kWh} \) = Average annual kWh reduction per ton of cooling capacity: 170 kWh/ton\(^{312} \)
- \( SAVE_{kW} \) = Average kW reduction per ton of cooling capacity: 0.15 kW/ton\(^{313} \)

**Baseline Efficiency**

The baseline efficiency case for this measure assumes the relevant HVAC equipment has no ventilation control.

**High Efficiency**

The high efficiency case is the installation of an outside air intake control based on CO₂ sensors.

**Hours**

The operating hours are site-specific for custom savings calculations.

**Measure Life**

The measure life is 10 years.\(^{314} \)

---


\(^{313}\) Ibid.

\(^{314}\)
Secondary Energy Impacts

Gas and oil heat impacts are counted for DCV measures for reduction in space heating. If these impacts are not custom calculated, they can be approximated using the interaction factors described below:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Energy Type</th>
<th>Savings$^{315}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCV</td>
<td>C&amp;I Gas Heat</td>
<td>0.001277 MMBtu/kWh</td>
</tr>
<tr>
<td>DCV</td>
<td>Oil</td>
<td>0.002496 MMBtu/kWh</td>
</tr>
</tbody>
</table>

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR$_E$</th>
<th>RR$_{SP}$</th>
<th>RR$_{WP}$</th>
<th>CF$_{SP}$</th>
<th>CF$_{WP}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCV</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
RRs based on engineering estimates.

Coincidence Factors
CFs based on engineering estimates.

---

$^{314}$ Energy & Resource Solutions (2005). *Measure Life Study*. Prepared for The Massachusetts Joint Utilities; Table 1-1. Measure life is assumed to be the same as Enthalpy Economizer.

HVAC – ECM Fan Motors

Measure Overview

Description: This measure is offered through the Cool Choice program and promotes the installation of electronically commutated motors (ECMs) on fan powered terminal boxes, fan coils, and HVAC supply fans on small unitary equipment.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Commercial & Industrial
Market: Lost Opportunity
End Use: HVAC
Program: C&I New Construction & Major Renovation

Algorithms for Calculating Electric Energy Impact

\[ \Delta kWh = (Design \ CFM)(Box \ Size \ Factor)(%Flow_{ANNUAL})(Hours) \]
\[ \Delta kW_{SP} = (Design \ CFM)(Box \ Size \ Factor)(%Flow_{SP}) \]
\[ \Delta kW_{WP} = (Design \ CFM)(Box \ Size \ Factor)(%Flow_{WP}) \]

Where:
- Design CFM = Capacity of the VAV box in cubic feet per minute
- Box Size Factor = Savings factor in Watts/CFM. See Table 2 for values.
- %Flow_{ANNUAL} = Average % of design flow over all operating hours. See Table 2 for values.
- %Flow_{SP} = Average % of design flow during summer peak period. See Table 2 for values.
- %Flow_{WP} = Average % of design flow during summer peak period. See Table 2 for values.
- Hours = Annual operating hours for VAV box fans

Table 2: ECM Fan Motor Savings Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Box Size</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box Size Factor</td>
<td>&lt; 1000 CFM</td>
<td>0.32</td>
<td>Watts/CFM</td>
</tr>
<tr>
<td>Box Size Factor</td>
<td>≥ 1000 CFM</td>
<td>0.21</td>
<td>Watts/CFM</td>
</tr>
<tr>
<td>%Flow_{ANNUAL}</td>
<td>All</td>
<td>0.52</td>
<td>-</td>
</tr>
<tr>
<td>%Flow_{SP}</td>
<td>All</td>
<td>0.63</td>
<td>-</td>
</tr>
<tr>
<td>%Flow_{WP}</td>
<td>All</td>
<td>0.33</td>
<td>-</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case for this measure assumes the VAV box fans are powered by a single speed fractional horsepower permanent split capacitor (PSC) induction motor.

---

316 Factors based on engineering analysis developed at National Grid.
High Efficiency

The high efficiency case must have a motor installed on new, qualifying HVAC equipment.

Hours

The annual operating hours for ECMs on VAV box fans are site-specific and should be determined on a case-by-case basis.

Measure Life

The measure life is 20 years for lost-opportunity applications.\textsuperscript{317}

Algorithms for Calculating Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECM Fan Motors</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

RRs based on engineering estimates

Coincidence Factors

CFs based on engineering estimates.

\textsuperscript{317} Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1.
HVAC – Energy Management System

Measure Overview

Description: The measure is the installation of a new building energy management system (EMS) or the expansion of an existing energy management system for control of non-lighting electric and gas end-uses in an existing building on existing equipment.

Primary Energy Impact: Electric
Secondary Energy Impact: Gas, Oil
Non-Energy Impact: None
Sector: Commercial & Industrial
Market: Retrofit
End Use: HVAC
Program: C&I New Construction & Major Renovation, C&I Large Retrofit

Algorithms for Calculating Primary Energy Impacts

Gross energy and demand savings for energy management systems (EMS) are custom calculated using National Grid’s EMS savings calculation tools. The tool is used to calculate energy and demand savings based on project-specific details including hours of operation, HVAC system equipment and efficiency and points controlled.\[318\]

Baseline Efficiency

The baseline for this measure assumes the relevant HVAC equipment has no control.

High Efficiency

The high efficiency case is the installation of a new EMS or the expansion of an existing EMS to control additional non-lighting electric or gas equipment. The EMS must be installed in an existing building on existing equipment.

Hours

Not applicable.

Measure Life

For lost-opportunity applications, the measure life is 15 years.\[319\] For retrofit applications, the measure life is 10 years.\[320\]

---

\[318\] Detailed descriptions of the EMS Savings Calculation Tools are included in the TRM Library under the “C&I Spreadsheet Tools” folder.


\[320\] Ibid.
Secondary Energy Impacts

Heating Impacts: Gas and oil heat impacts are counted for EMS measures for reduction in space heating. If the heating system impacts are not calculated in the EMS savings calculation tool, they can be approximated using the interaction factors described below:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Energy Type</th>
<th>Savings $^{321}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS</td>
<td>C&amp;I Gas Heat</td>
<td>0.001277 MMBtu/ΔkWh</td>
</tr>
<tr>
<td>EMS</td>
<td>Oil</td>
<td>0.002496 MMBtu/ΔkWh</td>
</tr>
</tbody>
</table>

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR$_E$</th>
<th>RR$_SP$</th>
<th>RR$_WP$</th>
<th>CF$_SP$</th>
<th>CF$_WP$</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS</td>
<td>Large Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.04</td>
<td>1.03</td>
<td>1.03</td>
<td>custom</td>
<td>custom</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

RRs derived from a 1994 study of HVAC and process cooling equipment.$^{322}$

Coincidence Factor

CFs are custom calculated.

---


HVAC – High Efficiency Chiller

Measure Overview

Description: This measure promotes the installation of efficient water-cooled and air-cooled water chilling packages for comfort cooling applications. Eligible chillers include air-cooled, water cooled rotary screw and scroll, and water cooled centrifugal chillers for single chiller systems or for the lead chiller only in multi-chiller systems.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Commercial & Industrial
Market: Lost Opportunity
End Use: HVAC
Program: C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impacts

Air-Cooled Chillers:

\[
\Delta kWh = (Tons) \left( \frac{12}{EER_{BASE}} - \frac{12}{EER_{EE}} \right) (Hours)
\]

\[
\Delta kW = (Tons) \left( \frac{12}{EER_{BASE}} - \frac{12}{EER_{EE}} \right) (LF)
\]

Water-Cooled Chillers:

\[
\Delta kWh = (Tons) \left( kW/ton_{BASE} - kW/ton_{EE} \right) (Hours)
\]

\[
\Delta kW = (Tons) \left( kW/ton_{BASE} - kW/ton_{EE} \right) (LF)
\]

Where:

- **Tons** = Rated capacity of the cooling equipment
- **EER\_BASE** = Energy Efficiency Ratio of the baseline equipment. See Table 3 for values.
- **EER\_EE** = Energy Efficiency Ratio of the efficient equipment. Site-specific.
- **kW/ton\_BASE** = Energy efficiency rating of the baseline equipment. See Table 3 for values.
- **kW/ton\_EE** = Energy efficiency rating of the efficient equipment. Site-specific.
- **Hours** = Equivalent full load hours for chiller operation
- **LF** = Load Factor

Baseline Efficiency

The baseline efficiencies used in 2010 are a 10% reduction of the minimum efficiency requirements. Table 3 details the specific efficiency requirements and baseline efficiencies by equipment type and capacity.
Table 3: Water Chilling Packages - Minimum Efficiency Requirements

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Size Category (Tons)</th>
<th>Units</th>
<th>Full Load</th>
<th>IPLV</th>
<th>Full Load</th>
<th>IPLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air-cooled chillers</td>
<td>&lt; 150</td>
<td>EER</td>
<td>11.5</td>
<td>10.5</td>
<td>10.45</td>
<td>9.55</td>
</tr>
<tr>
<td>Water cooled, electrically operated, positive displacement (rotary screw and scroll)</td>
<td>≥ 75 and &lt; 150</td>
<td>kW/ton</td>
<td>0.609</td>
<td>0.711</td>
<td>0.677</td>
<td>0.790</td>
</tr>
<tr>
<td></td>
<td>≥ 150 and &lt; 300</td>
<td>kW/ton</td>
<td>0.565</td>
<td>0.646</td>
<td>0.628</td>
<td>0.718</td>
</tr>
<tr>
<td></td>
<td>≥ 300</td>
<td>kW/ton</td>
<td>0.515</td>
<td>0.575</td>
<td>0.572</td>
<td>0.639</td>
</tr>
<tr>
<td>Water cooled, electrically operated, centrifugal</td>
<td>≥ 150 and &lt; 300</td>
<td>kW/ton</td>
<td>0.536</td>
<td>0.57</td>
<td>0.596</td>
<td>0.633</td>
</tr>
<tr>
<td></td>
<td>≥ 300 and &lt; 600</td>
<td>kW/ton</td>
<td>0.494</td>
<td>0.519</td>
<td>0.549</td>
<td>0.577</td>
</tr>
</tbody>
</table>

High Efficiency

The high efficiency scenario assumes water chilling packages that exceed the efficiency levels required by Massachusetts State Building Code and meet the minimum efficiency requirements as stated in the New Construction HVAC energy efficiency rebate forms. Energy and demand savings calculations are based on actual equipment efficiencies should be determined on a case-by-case basis.

Hours

Hours are specified by equipment type as shown in the table below.

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Size Category (Tons)</th>
<th>EFLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air-cooled chillers</td>
<td>&lt; 150</td>
<td>698  698</td>
</tr>
<tr>
<td>Water cooled, electrically operated, positive displacement (rotary screw and scroll)</td>
<td>≥ 75 and &lt; 150</td>
<td>1086 1038</td>
</tr>
<tr>
<td></td>
<td>≥ 150 and &lt; 300</td>
<td>1086 1038</td>
</tr>
<tr>
<td></td>
<td>≥ 300</td>
<td>1620 2066</td>
</tr>
<tr>
<td>Water cooled, electrically operated, centrifugal</td>
<td>≥ 150 and &lt; 300</td>
<td>1086 1038</td>
</tr>
<tr>
<td></td>
<td>≥ 300 and &lt; 600</td>
<td>1620 2066</td>
</tr>
</tbody>
</table>

Measure Life

The measure life is 20 years.

Secondary Energy Impacts

There are no secondary energy impacts counted for this measure.

---

323 DOE (2009). 2009 IECC Based Building Codes; Table 503.2.3(7): Water Chilling Packages, Efficiency Requirements - as of 1/1/2020 minimum efficiency values.
324 Staff estimates from 1994.
**Non-Energy Impacts**

There are no non-energy impacts for this measure.

**Impact Factors for Calculating Adjusted Gross Savings**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RRF</th>
<th>RRSP</th>
<th>RRWP</th>
<th>CFSP</th>
<th>CFWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chillers</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.04</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**In-Service Rates**
All installations have 100% in service rate since all PAs programs include verification of equipment installations.

**Savings Persistence Factor**
All PAs use 100% savings persistence factors.

**Realization Rates**
Energy RR based on a 1994 study of HVAC and process cooling equipment.

**Coincidence Factors**
CFs estimated based on 1993-1994 evaluation research and engineering estimates.

---

HVAC – Hotel Occupancy Sensors

Measure Overview

**Description:** The measure is to the installation of hotel occupancy sensors (HOS) to control packaged terminal AC units (PTACs) with electric heat, heat pump units and/or fan coil units in hotels that operate all 12 months of the year.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Retrofit

**End Use:** HVAC

**Program:** C&I Large Retrofit

Algorithms for Calculating Primary Energy Impacts

Unit savings are deemed based on evaluation results:

\[ \Delta kWh = SAVE_{kWh} \]
\[ \Delta kW = SAVE_{kW} \]

Where:

- Unit = Installed hotel room occupancy sensor
- \( \text{SAVE}_{kWh} \) = Average annual kWh reduction per unit: 1801 kWh\(^{327}\)
- \( \text{SAVE}_{kW} \) = Average annual kW reduction per unit: 0.35 kW\(^{328}\)

Baseline Efficiency

The baseline efficiency case assumes the equipment has no occupancy based controls.

High Efficiency

The high efficiency case is the installation of controls that include (a) occupancy sensors, (b) window/door switches for rooms that have operable window or patio doors, and (c) set back to 65 F in the heating mode and set forward to 78 F in the cooling mode when occupancy detector is in the unoccupied mode. Sensors controlled by a front desk system are not eligible.

Hours

Not applicable.

Measure Life

For retrofit applications, the measure life is 10 years.\(^{329}\)


\(^{328}\) Ibid.

\(^{329}\) Ibid.
Secondary Energy Impacts

There are no secondary energy impacts.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOS</td>
<td>Large Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.30</td>
<td>0.70</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

RRs based on engineering estimates.

Coincidence Factors

CFs based on engineering estimates.

---

329 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1; Measure life is assumed to be the same as for EMS retrofit measure.
HVAC – Programmable Thermostats

Measure Overview

**Description:** This measure involves the installation of a programmable thermostat for cooling and/or heating systems in spaces with either no or erratic existing control.
**Primary Energy Impact:** Electric
**Secondary Energy Impact:** None
**Non-Energy Impact:** None
**Sector:** Commercial & Industrial
**Market:** Retrofit
**End Use:** HVAC
**Program:** C&I Small Retrofit

Algorithms for Calculating Primary Energy Impacts

\[ \Delta kWh = (SQFT)(SAVE_{kWh}) \]
\[ \Delta kW = (SQFT)(SAVE_{kW}) \]

Where:
- \( SQFT \) = Square feet of controlled space
- \( SAVE_{kWh} \) = Average kW reduction per SQFT of controlled space. See Table 4.
- \( SAVE_{kW} \) = Average annual kWh reduction per SQFT of controlled. See Table 4.

**Table 4: Savings Factors (Save)\(^{330}\)**

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>( SAVE_{kWh} ) (kWh/SQFT)</th>
<th>( SAVE_{kW} ) (kW/SQFT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool Only No Existing Control</td>
<td>0.539</td>
<td>0.00</td>
</tr>
<tr>
<td>Cool Only Erratic Existing Control</td>
<td>0.154</td>
<td>0.00</td>
</tr>
<tr>
<td>Heat Only No Existing Control</td>
<td>0.418</td>
<td>0.00</td>
</tr>
<tr>
<td>Heat Only Erratic Existing Control</td>
<td>0.119</td>
<td>0.00</td>
</tr>
<tr>
<td>Cool and Heat No Existing Control</td>
<td>0.957</td>
<td>0.00</td>
</tr>
<tr>
<td>Cool and Heat Erratic Existing Control</td>
<td>0.273</td>
<td>0.00</td>
</tr>
<tr>
<td>Heat Pump No Existing Control</td>
<td>0.848</td>
<td>0.00</td>
</tr>
<tr>
<td>Heat Pump Erratic Existing Control</td>
<td>0.242</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Baseline Efficiency**

The baseline efficiency case includes spaces with either no or erratic heating and/or cooling control as indicated in the equipment type selection.

**High Efficiency**

The high efficiency case includes control of the space cooling and/or heating system as indicated in the equipment type selection.

---

\(^{330}\) Factors form National Grid tracking system.
Hours

Not applicable.

Measure Life

For retrofit applications, the measure life is 8 years.\textsuperscript{331}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>( R_{RE} )</th>
<th>( R_{RS} )</th>
<th>( R_{RP} )</th>
<th>( CF_{SP} )</th>
<th>( CF_{WP} )</th>
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</thead>
<tbody>
<tr>
<td>Thermostats</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

RRs set to 100% based on no evaluations.

Coincidence Factors

CFs set to zero since no savings are expected during peak periods.

\textsuperscript{331} Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1.
Refrigeration – Door Heater Controls

Measure Overview

**Description:** Installation of controls to reduce the run time of door and frame heaters for freezers and walk-in or reach-in coolers. The reduced heating results in a reduced cooling load.\(^{332}\)

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Retrofit

**End Use:** Refrigeration

**Program:** C&I Small Retrofit

Algorithms for Calculating Primary Energy Impact

\[
\Delta kWh = kW_{DH} \times \%OFF \times 8760
\]

\[
\Delta kW = kW_{DH} \times \%OFF
\]

Where:

- \( kW_{DH} \) = Total demand of the door heater, calculated as Volts \times Amps / 1000
- 8760 = Door heater annual run hours before controls
- %OFF = Door heater Off time\(^{333}\): 46% for freezer door heaters or 74% for cooler door heaters

Baseline Efficiency

The baseline efficiency case is a cooler or freezer door heater that operates 8,760 hours per year without any controls.

High Efficiency

The high efficiency case is a cooler or freezer door heater connected to a heater control system, which controls the door heaters by measuring the ambient humidity and temperature of the store, calculating the dewpoint, and using pulse width modulation (PWM) to control the anti-sweat heater based on specific algorithms for freezer and cooler doors. Door temperature is typically maintained about 5°F above the store air dewpoint temperature with the heaters operating at 80% (adjustable).\(^{334}\)

Hours

Pre-retrofit hours are 8,760 hours per year. After controls are installed, the door heaters in freezers are on for an average 4,730.4 hours/year (46% off time) and the door heaters for coolers are on for an average 2,277.6 hours/year (74% off time).

---

\(^{332}\) The assumptions and algorithms used in this section are specific to NRM products.

\(^{333}\) The value is an estimate by NRM based on hundreds of downloads of hours of use data from Door Heater controllers. These values are also supported by Select Energy (2004). *Cooler Control Measure Impact Spreadsheet User’s Manual*. Prepared for NSTAR.

Measure Life

The measure life for cooler and freezer door heater controls is 10 years.\(^{335}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_{SP})</th>
<th>RR(_{WP})</th>
<th>CF(_{SP})</th>
<th>CF(_{WP})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door Heater Control</td>
<td>Small Retrofit</td>
<td>1.00</td>
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<td>1.13</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.46</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs’ programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

Energy RR based on staff estimates.

Coincidence Factors

CFs from the 1995 HEC study of walk-in cooler anti-sweat door heater controls.\(^{336}\)

---


Refrigeration – Novelty Cooler Shutoff

Measure Overview

**Description:** Installation of controls to shut off a facility’s novelty coolers for non-perishable goods based on pre-programmed store hours. Energy savings occur as coolers cycle off during facility unoccupied hours.\(^\text{337}\)

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Retrofit

**End Use:** Refrigeration

**Program:** C&I Small Retrofit

Algorithms for Calculating Primary Energy Impact

\[ \Delta kW = (kW_{NC})(DC_{AVG})(HoursOFF) \]

\[ \Delta kW = 0 \]

Where:

- \(\Delta kW\) = 0 since savings are assumed to occur during evening hours and are therefore not coincident with either summer or winter peak periods.
- \(kW_{NC}\) = Power demand of novelty cooler calculated from equipment nameplate data and estimated 0.85 power factor\(^\text{338}\)
- HoursOFF = Potential hours off per night, estimated as one less than the number of hours the store is closed per day
- DC\(_{AVG}\) = Weighted average annual duty cycle\(^\text{339}\)

Baseline Efficiency

The baseline efficiency case is the novelty coolers operating 8,760 hours per year.

High Efficiency

The high efficiency case is the novelty coolers operating fewer than 8,760 hours per year since they are controlled to cycle each night based on pre-programmed facility unoccupied hours.

Hours

Energy and demand savings are based on the reduced operation hours of the cooler equipment. Hours reduced per day are estimated on a case-by-case basis, and are typically calculated as one less than the number of hours per day that the facility is closed each day.

\(^{337}\) The assumptions and algorithms used in this section are specific to NRM products.

\(^{338}\) Conservative value based on 15 years of NRM field observations and experience.

\(^{339}\) Ibid: the estimated duty cycles for Novelty Coolers are supported by Select Energy (2004). *Cooler Control Measure Impact Spreadsheet Users' Manual.* Prepared for NSTAR. The study gives a less conservative value than used by NRM.
Measure Life

The measure life is 10 years.\textsuperscript{340}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty Cooler Shutoff</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.13</td>
<td>1.00</td>
<td>0.73</td>
<td>1.46</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs’ programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

Energy RR based on staff estimates.

Coincidence Factors

CFs from the 1995 HEC study of walk-in cooler anti-sweat door heater controls.\textsuperscript{341}


\textsuperscript{341} HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at Ten Sites in Massachusetts. Prepared for NEPSCO; Table 9.
Refrigeration – ECM Evaporator Fan Motors for Walk–in Coolers and Freezers

Measure Overview

Description: Installation of various sizes of electronically commutated motors (ECMs) in walk-in coolers and freezers to replace existing evaporator fan motors.  

Primary Energy Impact: Electric  
Secondary Energy Impact: None  
Non-Energy Impact: None  
Sector: Commercial & Industrial  
Market: Retrofit  
End Use: Refrigeration  
Program: C&I Small Retrofit

Algorithms for Calculating Primary Energy Impact

\[ \Delta kWh = \Delta kWh_{Fan} + \Delta kWh_{Heat} \]
\[ \Delta kWh_{Fan} = kW_{Fan} \times LRF \times \text{Hours} \]
\[ \Delta kWh_{Heat} = \Delta kWh_{Fan} \times 0.28 \times \text{Eff}_{RS} \]
\[ \Delta kW = \Delta kWh / \text{Hours} \]

Where:
\[ \Delta kWh_{Fan} = \text{Energy savings due to increased efficiency of evaporator fan motor} \]
\[ \Delta kWh_{Heat} = \text{Energy savings due to reduced heat from the evaporator fans} \]
\[ kW_{Fan} = \text{Power demand of evaporator fan calculated from equipment nameplate data and estimated 0.55 power factor/adjustment} \]
\[ LRF = \text{Load reduction factor for motor replacement (65%)} \]
\[ \text{Hours} = \text{Annual fan operating hours.} \]
\[ 0.28 = \text{Conversion factor between kW and tons: 3,413 Btuh/kW divided by 12,000 Btuh/ton} \]
\[ \text{Eff}_{RS} = \text{Efficiency of typical refrigeration system: 1.6 kW/ton} \]

Baseline Efficiency

The baseline efficiency case is an existing evaporator fan motor.

High Efficiency

The high efficiency case is the replacement of existing evaporator fan motors with ECMs.

---

342 The assumptions and algorithms used in this section are specific to NRM products.  
343 Conservative value based on 15 years of NRM field observations and experience.  
344 Load factor is an estimate by NRM based on several pre- and post-meter readings of installations; the value is supported by RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation, Prepared for National Grid.  
345 Assumed average refrigeration efficiency for typical installations. Conservative value based on 15 years of NRM field observations and experience.
**Hours**

The annual operating hours are assumed to be $8,760 \ast (1-%OFF)$, where $%OFF = 0$ if the facility does not have evaporator fan controls or $%OFF = 35\%$ if the facility has evaporator fan controls. See section: Refrigeration – Evaporator Fan Controls for $%OFF$ value.

**Measure Life**

The measure life is 15 years.\(^{347}\)

**Secondary Energy Impacts**

There are no secondary energy impacts for this measure.

**Non-Energy Impacts**

There are no non-energy impacts for this measure.

**Impact Factors for Calculating Adjusted Gross Savings**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_SP)</th>
<th>RR(_WP)</th>
<th>CF(_SP)</th>
<th>CF(_WP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evap Fan ECMs</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.61</td>
<td>1.00</td>
<td>1.00</td>
<td>1.50</td>
<td>0.70</td>
</tr>
</tbody>
</table>

**In-Service Rates**

All installations have 100% in service rate since PA programs include verification of equipment installations.

**Savings Persistence Factor**

All PAs use 100% savings persistence factor.

**Realization Rates**

RR based on 2005 custom small retrofit study.\(^{348}\)

**Coincidence Factors**

CFs based on 2005 custom small retrofit study.\(^{349}\)

---

\(^{346}\) The value is an estimate by NRM based on hundreds of downloads of hours of use data. These values are also supported by Select Energy (2004), *Cooler Control Measure Impact Spreadsheet User’s Manual*. Prepared for NSTAR.  
\(^{349}\) Ibid.
Refrigeration – Case Motor Replacement

Measure Overview

**Description:** Installation of electronically commutated motors (ECMs) in multi-deck and freestanding coolers and freezers, typically on the retail floor of convenience stores, liquor stores, and grocery stores.\(^{350}\)

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Retrofit

**End Use:** Refrigeration

**Program:** C&I Small Retrofit

Algorithms for Calculating Primary Energy Impacts

\[
\Delta k\text{Wh} = \Delta k\text{Wh}_{\text{Motor}} + \Delta k\text{Wh}_{\text{Heat}}
\]

\[
\Delta k\text{Wh}_{\text{Motor}} = kW_{\text{Motor}} \times \text{LRF} \times \text{Hours}
\]

\[
\Delta k\text{Wh}_{\text{Heat}} = \Delta k\text{Wh}_{\text{Motor}} \times 0.28 \times \text{Eff}_{RS}
\]

\[
\Delta kW = \Delta k\text{Wh} / \text{Hours}
\]

Where:

\(\Delta k\text{Wh}_{\text{Motor}}\) = Energy savings due to increased efficiency of case motor

\(\Delta k\text{Wh}_{\text{Heat}}\) = Energy savings due to reduced heat from evaporator fans

\(kW_{\text{motor}}\) = Metered load of case motor

\(\text{LRF}\) = Load reduction factor: 53% when shaded pole motors are replaced, 29% when PSC motors are replaced\(^{351}\)

\(\text{Hours}\) = Average runtime of case motors (8,500 hours)\(^ {352}\)

0.28 = Conversion of kW to tons: 3,413 Btuh/kW divided by 12,000 Btuh/ton.

\(\text{Eff}_{RS}\) = Efficiency of typical refrigeration system (1.6 kW/ton)\(^ {353}\)

Baseline Efficiency

The baseline efficiency case is the existing case motor.

High Efficiency

The high efficiency case is the replacement of the existing case motor with an ECM.

Hours

Hours are the annual operating hours of the case motors.

\(^{350}\) The assumptions and algorithms used in this section are specific to NRM products.

\(^{351}\) Load factor is an estimate by NRM based on several pre- and post-meter readings of installations

\(^{352}\) Conservative value based on 15 years of NRM field observations and experience.

\(^{353}\) Assumed average refrigeration efficiency for typical installations. Conservative value based on 15 years of NRM field observations and experience.
Measure Life

The measure life is 15 years.\textsuperscript{354}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case ECMs</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.61</td>
<td>1.00</td>
<td>1.00</td>
<td>1.50</td>
<td>0.70</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs’ programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

RR based on 2005 custom small retrofit study.\textsuperscript{355}

Coincidence Factors

CFs based on 2005 custom small retrofit study.\textsuperscript{356}


\textsuperscript{356} Ibid.
Refrigeration – Evaporator Fan Controls

Measure Overview

**Description:** Installation of controls to modulate the evaporator fans based on temperature control. Energy savings include: fan energy savings from reduced fan operating hours, refrigeration energy savings from reduced waste heat, and compressor energy savings resulting from the electronic temperature control. Electronic controls allow less fluctuation in temperature, thereby creating savings.357

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Retrofit

**End Use:** Refrigeration

**Program:** C&I Small Retrofit

### Algorithms for Calculating Primary Energy Impact

\[ \Delta \text{kWh} = \Delta \text{kWh}_{\text{Fan}} + \Delta \text{kWh}_{\text{Heat}} + \Delta \text{kWh}_{\text{Control}} \]

\[ \Delta \text{kWh}_{\text{Fan}} = \text{kW}_{\text{Fan}} \times 8760 \times \% \text{OFF} \]

\[ \Delta \text{kWh}_{\text{Heat}} = \Delta \text{kWh}_{\text{Fan}} \times 0.28 \times \text{Eff}_{\text{RS}} \]

\[ \Delta \text{kWh}_{\text{Control}} = [\text{kW}_{\text{CP}} \times \text{Hours}_{\text{CP}} + \text{kW}_{\text{Fan}} \times 8760 \times (1 - \% \text{Off})] \times 5\% \]

\[ \Delta \text{kW} = \Delta \text{kWh} / 8760 \]

**Where:**

- \( \Delta \text{kWh}_{\text{Fan}} \) = Energy savings due to evaporator being shut off
- \( \Delta \text{kWh}_{\text{Heat}} \) = Energy savings due to reduced heat from the evaporator fans
- \( \Delta \text{kWh}_{\text{Control}} \) = Energy savings due to the electronic controls on compressor and evaporator
- \( \text{kW}_{\text{Fan}} \) = Power demand of evaporator fan calculated from equipment nameplate data and estimated 0.55 power factor/adjustment358
- \( \% \text{OFF} \) = Percent of annual hours that the evaporator is turned off: 35%359
- 0.28 = Conversion of kW to tons: 3,413 Btuh/kW divided by 12,000 Btuh/ton.
- \( \text{Eff}_{\text{RS}} \) = Efficiency of typical refrigeration system: 1.6 kW/ton360
- \( \text{kW}_{\text{CP}} \) = Total power demand of compressor motor and condenser fan calculated from equipment nameplate data and estimated 0.85 power factor360
- \( \text{Hours}_{\text{CP}} \) = Equivalent annual full load hours of compressor operation362

5% = Reduced run-time of compressor and evaporator due to electronic controls363

---

357 The assumptions and algorithms used in this section are specific to NRM products.

358 Conservative value based on 15 years of NRM field observations and experience.

359 The value is an estimate by NRM based on hundreds of downloads of hours of use data. These values are also supported by Select Energy (2004). *Cooler Control Measure Impact Spreadsheet User’s Manual*. Prepared for NSTAR.

360 Estimated average refrigeration efficiency for small business customers.

361 This value is an estimate by NRM based on hundreds of downloads of hours of use data form the electronic controller.

362 Conservative value based on 15 years of NRM field observations and experience.

363 Conservative estimate supported by less conservative values given by several utility-sponsored 3rd Party studies including: Select Energy (2004). *Analysis of Cooler Control Energy Conservation Measures*. Prepared for NSTAR.
Baseline Efficiency

The baseline efficiency case assumes evaporator fans that run 8760 annual hours with no temperature control.

High Efficiency

The high efficiency case is the use of an energy management system to control evaporator fan operation based on temperature.

Hours

The operation of the fans is estimated to be reduced by 35% from the 8,760 hours in the base case scenario.

Measure Life

The measure life is 10 years.\textsuperscript{364}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evap Fan Control</td>
<td>Small Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>0.58</td>
<td>1.00</td>
<td>1.00</td>
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</table>

In-Service Rates

All installations have 100% in service rate since all PAs’ programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

Small retrofit RRs from 1996 savings analysis\textsuperscript{365}

Coincidence Factors

CFs from 1996 savings analysis\textsuperscript{366}

\textsuperscript{364} Energy & Resource Solutions (2005), Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1.
\textsuperscript{365} HEC, Inc. (1996), Analysis of Savings from Walk-In Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSCO.
\textsuperscript{366} Ibid.
Refrigeration – Vending Misers

Measure Overview

**Description:** Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified vending machines, as they already have built-in controls.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Retrofit

**End Use:** Refrigeration

**Program:** C&I Large Retrofit, C&I Small Retrofit

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on the following algorithms and assumptions:

\[
\Delta kWh = (kW_{\text{rated}})(\text{Hours})(SAVE)
\]

\[
\Delta kW = \Delta kWh / \text{Hours}
\]

Where:

- \( kW_{\text{rated}} \) = Rated kW of connected equipment. See Table 5 for default rated kW by connected equipment type.
- \( \text{Hours} \) = Operating hours of the connected equipment: default of 8,760 hours
- \( SAVE \) = Percent savings factor for the connected equipment. See Table 5 for values.

**Table 5: Vending Machine and Cooler Controls Savings Factors**

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>( \Delta kW )</th>
<th>( \Delta kWh )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerated Beverage Vending Machines</td>
<td>0.1</td>
<td>800</td>
</tr>
<tr>
<td>Non-Refrigerated Snack Vending Machines</td>
<td>0</td>
<td>234</td>
</tr>
<tr>
<td>Glass Front Refrigerated Coolers</td>
<td>0.1</td>
<td>800</td>
</tr>
</tbody>
</table>

**Baseline Efficiency**

The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

---

367 Deemed savings based on Staff estimates.
High Efficiency

The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.

Hours

It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.

Measure Life

The measure life is 5 years.\textsuperscript{368}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vending Misers</td>
<td>Large Retrofit</td>
<td>1</td>
<td>1</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Vending Misers</td>
<td>Small Retrofit</td>
<td>1</td>
<td>1</td>
<td>1.035</td>
<td>1.004</td>
<td>1.12</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PAs’ programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

RRs calculated based on the number and type of vending miser installations and results from 2006 RLW impact study.\textsuperscript{369}

Coincidence Factors

CFs based on staff estimates.

\textsuperscript{368} Energy & Resource Solutions (2005). \textit{Measure Life Study}. Prepared for The Massachusetts Joint Utilities; Table 1-1. 

Compressed Air – High Efficiency Air Compressors

Measure Overview

Description: Covers the installation of oil flooded, rotary screw compressors with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with properly sized air receiver. Efficient air compressors use various control schemes to improve compression efficiencies at partial loads. When an air compressor fitted with Load/No Load, Variable Speed Drive, or Variable Displacement capacity controls is used in conjunction with a properly-sized air receiver, considerable amounts of energy can be saved.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Commercial & Industrial
Market: Lost Opportunity, Retrofit
End Use: Compressed Air
Program: C&I New Construction, C&I Large Retrofit

Algorithms for Calculating Primary Energy Impacts

\[
\Delta kWh = \left(HP_{\text{COMPRESSOR}}\right) (\text{SAVE}) (\text{Hours})
\]
\[
\Delta kW = \left(HP_{\text{COMPRESSOR}}\right) (\text{SAVE})
\]

Where:
HP_{COMPRESSOR} = Nominal rated horsepower of high efficiency air compressor.
Save = Air compressor kW reduction per HP. See Table 6 for values.
Hours = Annual operating hours of the air compressor.

Table 6: Air Compressor kW Reduction per Horsepower

<table>
<thead>
<tr>
<th>Control Type</th>
<th>Nominal Horsepower (HP)</th>
<th>kW Reduction per Horsepower (Save) (^{370})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lost Opportunity</td>
</tr>
<tr>
<td>Load/No Load</td>
<td>(\geq 15 \text{ and } &lt; 25)</td>
<td>0.076</td>
</tr>
<tr>
<td>Load/No Load</td>
<td>(\geq 25 \text{ and } \leq 75)</td>
<td>0.114</td>
</tr>
<tr>
<td>VSD</td>
<td>(\geq 15 \text{ and } &lt; 25)</td>
<td>0.159</td>
</tr>
<tr>
<td>VSD</td>
<td>(\geq 25 \text{ and } \leq 75)</td>
<td>0.228</td>
</tr>
<tr>
<td>Variable Displacement</td>
<td>(\geq 50 \text{ and } \leq 75)</td>
<td>0.110</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case is a typical modulating compressor with blow down valve.

\(^{370}\) From NSTAR analysis based on metering data. The location of original data and analysis is unknown; however, these values are supported by multiple 3rd party impact evaluations.
High Efficiency

The high efficient case is an oil-flooded, rotary screw compressor with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with a properly sized air receiver. Air receivers are designed to provide a supply buffer to meet short-term demand spikes which can exceed the compressor capacity. Installing a larger receiver tank to meet occasional peak demands can allow for the use of a smaller compressor.

Hours

The annual hours of operation for air compressors are site-specific and should be determined on a case-by-case basis.

Measure Life

For lost-opportunity installations, the lifetime for this measure is 15 years. For retrofit projects, the lifetime is 13 years.371

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Compressor</td>
<td>NC, Large Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.80</td>
<td>0.54</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

RRs based on impact evaluation of PY 2004 compressed air installations.372

Coincidence Factors

CFs based on impact evaluation of PY 2004 compressed air installations.373

372 Ibid.
Compressed Air – Refrigerated Air Dryers

Measure Overview

**Description:** The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers. Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air dryers used in a single-compressor system are eligible.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** Compressed Air

**Program:** C&I New Construction and Major Renovation

### Algorithms for Calculating Primary Energy Impact

\[ \Delta kW_h = (CFM_{DRYER})^{(SAVE)}(Hours) \]

\[ \Delta kW = (CFM_{DRYER})^{(SAVE)} \]

Where:

- \( CFM_{DRYER} \) = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM). Obtain from equipment’s Compressed Air Gas Institute Datasheet.
- \( Save \) = Refrigerated air dryer kW reduction per dryer full flow rated CFM. See Table 7.
- \( Hours \) = Annual operating hours of the refrigerated air dryer.

### Table 7: Default kW Reduction per CFM by Dryer Capacity (SAVE)

<table>
<thead>
<tr>
<th>Dryer Capacity (CFM_{DRYER})</th>
<th>kW Reduction per CFM (Save)</th>
<th>( ^{374} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100</td>
<td>0.00474</td>
<td></td>
</tr>
<tr>
<td>( \geq 100 ) and &lt;200</td>
<td>0.00359</td>
<td></td>
</tr>
<tr>
<td>( \geq 200 ) and &lt;300</td>
<td>0.00316</td>
<td></td>
</tr>
<tr>
<td>( \geq 300 ) and &lt;400</td>
<td>0.00290</td>
<td></td>
</tr>
<tr>
<td>( \geq 400 )</td>
<td>0.00272</td>
<td></td>
</tr>
</tbody>
</table>

**Baseline Efficiency**

The baseline efficiency case is a non-cycling refrigerated air dryer.

**High Efficiency**

The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.

---

\( ^{374} \) From NSTAR analysis based on metering data. The location of original data and analysis is unknown; however, these values are supported by multiple 3rd party impact evaluations.
Hours

The annual hours of operation for compressed air dryers are site-specific.

Measure Life

The measure life is 15 years.\(^{375}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR(_E)</th>
<th>RR(_{SP})</th>
<th>RR(_{WP})</th>
<th>CF(_{SP})</th>
<th>CF(_{WP})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerated Air Dryers</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.80</td>
<td>0.54</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

RRs based on impact evaluation of PY 2004 compressed air installations.\(^{376}\)

Coincidence Factors

CFs based on impact evaluation of PY 2004 compressed air installations.\(^{377}\)

---


\(^{377}\) Ibid.
Motors/Drives – Premium Efficiency Motors

Measure Overview

Description: This measure promotes the purchase and installation of NEMA Premium Efficiency motors for new construction or time-of-replacement applications. Motors covered by this program must be new, three phase, induction motors, NEMA Design A & B, 1-200 HP, Open Drip-Proof (ODP) or Totally Enclosed Fan Cooled (TEFC), 1200, 1800, 3600 RPM and operate a minimum of 2,000 hours per year.

Primary Energy Impact: Electric

Secondary Energy Impact: None

Non-Energy Impact: None

Sector: Commercial & Industrial

Market: Lost Opportunity

End Use: Motors/Drives

Program: C&I New Construction & Major Renovation

Algorithms for Calculating Energy and Demand Savings

\[
\Delta kWh = (HP)(0.746)(LF)\left(\frac{1}{\eta_{base}} - \frac{1}{\eta_{ee}}\right)(HOURS)
\]

\[
\Delta kW = (HP)(0.746)(LF)\left(\frac{1}{\eta_{base}} - \frac{1}{\eta_{ee}}\right)
\]

Where:

HP = Motor rated nameplate horsepower.

0.746 = kW per HP.

LF = Motor load factor: 0.62\(^{378}\)

\(\eta_{base}\) = Baseline motor efficiency. See Table 18.

\(\eta_{ee}\) = Installed motor efficiency. See Table 19.

HOURS = Motor annual run hours.

Baseline Efficiency

For both lost opportunity and retrofit applications, it is assumed that the baseline efficiency meets the minimum federal manufacturing requirements as legislated by the Energy Policy Act of 1992 (EPACT 1992). The Baseline Efficiency levels are presented in Appendix A: Table 18.

High Efficiency

The high efficiency scenario assumes compliance with NEMA Premium Efficiency Motors requirements by motor type and size. These requirements are reproduced in Appendix A: Table 19.

Hours

The annual hours of operation for motors are site-specific and should be determined on a case-by-case basis.

Measure Life

The measure life is 20 years.\textsuperscript{379}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motors</td>
<td>NC</td>
<td>1.00</td>
<td>1.00</td>
<td>0.97</td>
<td>1.00</td>
<td>0.76</td>
<td>0.60</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Energy RR is the hours of use realization rate\textsuperscript{380}; demand RR is set to 100% since the motor load factor is based on evaluated results.

Coincidence Factors

CFs from motor run-time and persistence study\textsuperscript{381}

\textsuperscript{379} Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities; Table 1-1.


\textsuperscript{381} Ibid.
Motors/Drives – Variable Frequency Drives

Measure Overview

Description: This measure covers the installation of variable speed drives according to the terms and conditions stated on the statewide worksheet. The measure covers multiple end use types. The installation of this measure saves energy since the power required to rotate a pump or fan at lower speeds requires less power than when rotated at full speed.

Primary Energy Impact: Electric
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Commercial & Industrial
Market: Lost Opportunity, Retrofit
End Use: Motors/Drives
Program: C&I New Construction & Major Renovation, C&I Large Retrofit

Algorithms for Calculating Primary Energy Impacts

\[ \Delta k\text{Wh} = (HP)(k\text{Wh} / HP) \]

\[ \Delta kW = (HP)(kW / HP) \]

Where:

- kWh/HP = Annual electric energy reduction based on program and equipment type. See Table 8.
- kW/HP = Electric demand reduction based on program and equipment type. See Table 8.
Table 8: VFD Savings Factors (kWh/HP and kW/HP)\textsuperscript{382}

<table>
<thead>
<tr>
<th>Measure</th>
<th>NEW CONSTRUCTION</th>
<th>RETROFIT (Drive Only)</th>
<th>RETROFIT (Motor &amp; Drive)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Energy Savings Factors (kWh/HP)</td>
<td>Demand Savings Factors (kWh/HP)</td>
<td>Energy Savings Factors (kW/HP)</td>
</tr>
<tr>
<td>Building Exhaust Fan</td>
<td>987.26</td>
<td>0.26</td>
<td>987.26</td>
</tr>
<tr>
<td>Boiler Feed Water Pump</td>
<td>890.76</td>
<td>0.20</td>
<td>902.48</td>
</tr>
<tr>
<td>Boiler Draft Fan</td>
<td>1412.60</td>
<td>0.32</td>
<td>1438.39</td>
</tr>
<tr>
<td>Chilled Water Pump</td>
<td>551.55</td>
<td>0.05</td>
<td>551.55</td>
</tr>
<tr>
<td>Cooling Tower Fan</td>
<td>295.80</td>
<td>0.06</td>
<td>843.25</td>
</tr>
<tr>
<td>Heating Hot Water Pump</td>
<td>969.13</td>
<td>0.25</td>
<td>969.13</td>
</tr>
<tr>
<td>Return Fan</td>
<td>987.26</td>
<td>0.26</td>
<td>987.26</td>
</tr>
<tr>
<td>Supply Fan</td>
<td>1443.02</td>
<td>0.31</td>
<td>1443.02</td>
</tr>
<tr>
<td>Make-Up Air Fan</td>
<td>125.60</td>
<td>0.03</td>
<td>1160.65</td>
</tr>
<tr>
<td>Process Cooling Water Pump</td>
<td>505.22</td>
<td>0.10</td>
<td>519.42</td>
</tr>
<tr>
<td>WS Heat Pump Circulating Loop</td>
<td>876.99</td>
<td>0.20</td>
<td>968.60</td>
</tr>
<tr>
<td>Waste Water Treatment Pump</td>
<td>N/A</td>
<td>N/A</td>
<td>340.97</td>
</tr>
</tbody>
</table>

**Baseline Efficiency**

All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.

**High Efficiency**

In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.

**Hours**

Hours vary by end use.

**Measure Life**

For lost-opportunity installations, the lifetime for this measure is 15 years. For retrofit projects, the lifetime is 13 years.\textsuperscript{383}

**Secondary Energy Impacts**

There are no secondary energy impacts.

\textsuperscript{382} The estimates of gross savings were developed through spreadsheet models and historical participation information.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>PA Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>VFD NC</td>
<td>National Grid</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>Error! Reference source not found.</td>
<td>Error! Reference source not found.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VFD Large Retrofit</td>
<td>National Grid</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>Error! Reference source not found.</td>
<td>Error! Reference source not found.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all installations include verification of equipment installation.

Savings Persistence Factor

National Grid uses 100% savings persistence factors.

Realization Rates

RRs for all installations are set to 1.0.

Coincidence Factors

CFs vary by equipment type and program as given in Table 9.

Table 9: Coincidence Factors for VSD Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>NEW CONSTRUCTION</th>
<th>RETROFIT Drive Only</th>
<th>RETROFIT Motor &amp; Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Exhaust Fan</td>
<td>0.11 1.00</td>
<td>0.11 1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Boiler Feed Water Pump</td>
<td>0.00 1.00</td>
<td>0.00 1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Boiler Draft Fan</td>
<td>0.00 1.00</td>
<td>0.00 1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Chilled Water Pump</td>
<td>1.00 0.00</td>
<td>1.00 0.00</td>
<td>1.00 0.00</td>
</tr>
<tr>
<td>Cooling Tower Fan</td>
<td>1.00 1.00</td>
<td>1.00 0.00</td>
<td>1.00 0.00</td>
</tr>
<tr>
<td>Heating Hot Water Pump</td>
<td>0.00 1.00</td>
<td>0.00 1.00</td>
<td>0.00 1.00</td>
</tr>
<tr>
<td>Return Fan</td>
<td>0.11 1.00</td>
<td>0.11 1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Supply Fan</td>
<td>0.36 1.00</td>
<td>0.36 1.00</td>
<td>0.17 1.00</td>
</tr>
<tr>
<td>Make-Up Air Fan</td>
<td>1.00 1.00</td>
<td>1.00 1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Process Cooling Water Pump</td>
<td>1.00 1.00</td>
<td>1.00 1.00</td>
<td>0.41 1.00</td>
</tr>
<tr>
<td>WS Heat Pump Circulating Loop</td>
<td>0.10 1.00</td>
<td>0.11 1.00</td>
<td>0.33 1.00</td>
</tr>
<tr>
<td>Waste Water Treatment Pump</td>
<td>N/A N/A</td>
<td>1.00 1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Custom Measures

Measure Overview

**Description:** The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

**Primary Energy Impact:** Electric

**Secondary Energy Impact:** Project Specific

**Non-Energy Impact:** Project Specific

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity, Retrofit

**End Use:** All

**Program:** C&I New Construction & Major Renovation, C&I Large Retrofit, C&I Small Retrofit

Algorithms for Calculating Primary Energy Impact

Gross energy and demand savings estimates for custom projects are calculated using engineering analysis with project-specific details. Custom analyses typically include a weather dependent load bin analysis, whole building energy model simulation, end-use metering or other engineering analysis and include estimates of savings, costs, and an evaluation of the projects’ cost-effectiveness.

Baseline Efficiency

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Massachusetts State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the facility.

High Efficiency

The high efficiency scenario is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

Hours

All hours for custom savings analyses should be determined on a case-by-case basis.

Measure Life

For both lost-opportunity and retrofit custom applications, the measure life is determined based on specific project using the common custom measure life recommendations.\(^\text{384}\)

---

Secondary Energy Impacts

All secondary energy impacts should be determined on a case-by-case basis.

Non-Energy Impacts

All non-energy impacts should be determined on a case-by-case basis.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
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<td>Comprehensive</td>
<td>NC, Large Retrofit,</td>
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<td>Other</td>
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</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

C&I NC and C&I Large Retrofit

- Realization Rates for the Lighting and Process categories are from “Sample Design and Impact Evaluation Analysis of the 2009 Custom Program.”
- Realization Rates for the Comprehensive and HVAC categories were updated based on the results of “Impact Evaluation of 2008-2009 Custom Comprehensive Installations” and “Impact Evaluation of 2009 Custom HVAC Installations”.

Realization Rates for CHP projects are assumed to be 100% because projects undergo thorough technical review.

C&I Small Retrofit:

Realization Rates are derived from the results of an impact evaluation of National Grid’s 2005 SBS program and updated each year based on the distribution of 2010 installations.

Coincidence Factors

---

387 Ibid.
Gross summer and winter peak coincidence factors are custom-calculated for each custom project based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Residential Natural Gas Efficiency Measures
HVAC – Boiler (Forced Hot Water)

Measure Overview

**Description:** Installation of a new space heating gas-fired boiler.
**Primary Energy Impact:** Natural Gas
**Secondary Energy Impact:** None
**Non-Energy Impact:** None
**Sector:** Residential
**Market:** Lost Opportunity
**End Use:** HVAC
**Program:** Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta MMBtu = \Delta MMBtu
\]

Where:
- **Units** = Installation of high efficiency boiler
- \(\Delta MMBtu\) = Annual MMBtu savings high efficiency boiler. See Table for values.

<table>
<thead>
<tr>
<th>Measure</th>
<th>(\Delta MMBtu/Unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler (AFUE &gt;= 85%)</td>
<td>7.2 (^{389})</td>
</tr>
<tr>
<td>Boiler (AFUE &gt;= 90%)</td>
<td>13.7 (^{390})</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case is an 80% AFUE boiler.

High Efficiency

The high efficiency case is a boiler with an AFUE of 85% or greater.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{391}\)

---


\(^{390}\) Ibid.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
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<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler (AFUE &gt;=85%)</td>
<td>Residential Heating and Water Heating</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Boiler (AFUE &gt;=90%)</td>
<td>Residential Heating and Water Heating</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
HVAC – Boiler Reset Controls (Retrofit only)

Measure Overview

**Description:** Boiler Reset Controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program.
**Primary Energy Impact:** Natural Gas
**Secondary Energy Impact:** None
**Non-Energy Impact:** None
**Sector:** Residential
**Market:** Retrofit
**End Use:** HVAC
**Program:** Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:
\[ \Delta MMBtu = \text{Annual MMBtu savings per boiler reset control installed: 7.9 MMBtu}^{392} \]
\[ \text{Units} = \text{Number of installed Boiler Reset Controls} \]

Baseline Efficiency

The baseline efficiency case is a boiler without reset controls.

High Efficiency

The high efficiency case is a boiler with reset controls.

Hours

Not applicable.

Measure Life

The measure life is 15 years.\(^{393}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

---


\(^{393}\) Ibid.
Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
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</thead>
<tbody>
<tr>
<td>Boiler Reset Controls</td>
<td>Residential Heating and Water Heating</td>
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<td>n/a</td>
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</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
HVAC – Early Replacement Boiler

Measure Overview

**Description:** Early retirement of inefficient gas-fired boiler and installation of new high efficiency gas-fired boiler.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Retrofit

**End Use:** HVAC

**Program:** Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results and include two parts: (1) energy savings over the remaining lifetime of the existing boiler and (2) energy savings over the full life of the new high efficiency boiler:

\[ \Delta MMbtu = \Delta MMbtu_{RETIRE} + \Delta MMbtu_{EE} \]

Where:

- **Unit** = Removal of existing inefficient boiler and installation of new high efficiency boiler
- **\( \Delta MMbtu_{RETIRE} \)** = Annual MMBtu savings of new code-compliant boiler compared to existing boiler: 9.0 MMBtu\(^{394}\)
- **\( \Delta MMbtu_{EE} \)** = Annual MMBtu savings of high efficiency boiler compared to new code-compliant boiler: 15.0 MMBtu\(^{395}\)

**Baseline Efficiency**

For the retirement savings over the remaining life of existing boiler, the baseline is the existing inefficient boiler. For the high efficiency unit savings over lifetime of the new boiler, the baseline is a code-compliant boiler (AFUE = 80%).

**High Efficiency**

For the retirement savings over the remaining life of existing boiler, the efficient case is a code-compliant boiler (AFUE = 80%). For the high efficiency savings over lifetime of the new boiler, the efficient case is a new high efficiency (AFUE >= 85%).

**Hours**

Not applicable.

---


\(^{395}\) Ibid.
Measure Life

The remaining life of an existing unit is 14 years. The measure life of new equipment is 20 years.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
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<th>RR_WP</th>
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<th>CF_WP</th>
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</thead>
<tbody>
<tr>
<td>Early Replacement Boiler</td>
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<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.

---

Massachusetts Common Assumption: The remaining life of 14 years was determined by subtracting the average age of existing equipment (estimated by program vendor at 26 years) from the full lifetime of standard efficiency boilers (estimated by program vendor at 40 years).

HVAC – Programmable Thermostats

Measure Overview

**Description:** Installation of ENERGY STAR® labeled or 7-day programmable thermostats, which give the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Retrofit

**End Use:** HVAC

**Program:** Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta \text{MMBtu} = \Delta \text{MMBtu} \]

Where:

- Units = Number of Programmable T-stats installed
- \( \Delta \text{MMBtu} \) = Annual MMBtu savings per programmable thermostat installed: 7.7 MMBtu\(^{398}\)

Baseline Efficiency

The baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.

High Efficiency

The high efficiency case is an HVAC system that has an ENERGY STAR® or 7-day programmable thermostat installed.

Hours

Not applicable.

Measure Life

The measure life is 15 years.\(^{399}\)

\(^{398}\) RLW Analytics (2007). *Validating the Impacts of Programmable Thermostats.* Prepared for GasNetworks; Page 2, conversion factor CCF to Therms is 1.024.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
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<th>CF_SP</th>
<th>CF_WP</th>
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</thead>
<tbody>
<tr>
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<td>n/a</td>
<td>n/a</td>
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</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.
HVAC – Furnace (Forced Hot Air) with ECM

Measure Overview

Description: Installation of a new high efficiency space heating gas-fired furnace with an electronically commutated motor (ECM) for the fan.
Primary Energy Impact: Natural Gas
Secondary Energy Impact: Electric
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: HVAC
Program: Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

$$\Delta \text{MMBtu} = \Delta \text{MMbtu}$$

Where:
Units = Installation of furnace with ECM
$\Delta \text{MMBtu}$ = Annual MMBtu savings for a furnace with ECM. See Table for values.

<table>
<thead>
<tr>
<th>Measure</th>
<th>$\Delta \text{MMBtu}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnace (AFUE = 92%)</td>
<td>11.8 $^{401}$</td>
</tr>
<tr>
<td>Furnace w/ECM (AFUE = 92%)</td>
<td>19.6 $^{401}$</td>
</tr>
<tr>
<td>Furnace w/ECM (AFUE = 94%)</td>
<td>23.6 $^{402}$</td>
</tr>
</tbody>
</table>

Baseline Efficiency

The baseline efficiency case is a 78% AFUE furnace.

High Efficiency

The high efficiency case is a new furnace with AFUE >= 92%.

Hours

Not applicable.

Measure Life

The measure life is 18 years.$^{403}$

---


$^{401}$ Ibid.

$^{402}$ Ibid.

$^{403}$ Ibid.
Secondary Energy Impacts

High efficiency furnaces equipped with ECM fan motors also save electricity from reduced fan energy requirements. The reduction of electric use is 478 kWh.404

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
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<th>CF_SP</th>
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<tbody>
<tr>
<td>Furnace (AFUE = 92%)</td>
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<tr>
<td>Furnace w/ECM (AFUE = 92%)</td>
<td>Residential Heating and Water Heating</td>
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<td>1.00</td>
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<tr>
<td>Furnace w/ECM (AFUE = 94%)</td>
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<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
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</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.

404 The heating penalty of 21.1 – 19.6 MMBTU is equivalent to 478 kWh for the 92% efficient furnace (1,500,000BTU/ (0.92*3413 BTU/kWh).
HVAC – Heat Recovery Ventilator

Measure Overview

*Description:* Heat Recovery Ventilators (HRV) can help make mechanical ventilation more cost effective by reclaiming energy from exhaust airflows.

*Primary Energy Impact:* Natural Gas

*Secondary Energy Impact:* None

*Non-Energy Impact:* None

*Sector:* Residential

*Market:* Lost Opportunity

*End Use:* HVAC

*Program:* Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta MMBtu = \Delta MMbtu
\]

Where:

\[
\Delta MMBtu = \text{Annual MMBtu savings per heat recovery ventilation installed: 7.7 MMBtu}^{405}
\]

Units = Number of heat recovery ventilation systems installed

Baseline Efficiency

The baseline efficiency case is an ASHRAE 62.2-compliant exhaust fan system with no heat recovery.

High Efficiency

The high efficiency case is an exhaust fan system with heat recovery.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{406}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

---


\(^{406}\) Ibid.
Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR&lt;sub&gt;E&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;WP&lt;/sub&gt;</th>
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<tbody>
<tr>
<td>Heat Recovery Ventilator</td>
<td>Residential Heating and Water Heating</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.
HVAC – Stand Alone Storage Water Heater

Measure Overview

Description: High efficiency water heaters that are not combined with space heating devices.
Primary Energy Impact: Natural Gas
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: Hot Water
Program: Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

$$\Delta \text{MMbtu} = \Delta \text{MMbtu}$$

Where:
Units = Number of stand alone storage water heaters installed
$$\Delta \text{MMBtu} = \text{Annual MMBtu savings per stand alone storage water heater EF } \geq 0.62: 1.9^{407}$$

Baseline Efficiency

The baseline efficiency case is a stand alone tank water heater with an energy factor of 0.575.

High Efficiency

The high efficiency case is a stand alone tank water heater with an energy factor of 0.62 or higher.

Hours

Not applicable.

Measure Life

The measure life is 13 years.\textsuperscript{408}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

\textsuperscript{408} Ibid.
Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
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<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand Alone Storage Water Heater</td>
<td>Residential Heating and Water Heating</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**In-Service Rates**
All installations have 100% in service rate since programs include verification of equipment installations.

**Savings Persistence Factor**
All PAs use 100% savings persistence factor.

**Realization Rates**
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

**Coincidence Factors**
Not applicable for this measure since no electric savings are claimed.
HVAC – Gas Heating System Replacement (Low Income)

Measure Overview

Description: Replacement of an existing gas heating system with a new high efficiency system. Electric savings are achieved from reduced fan run time.

Primary Energy Impact: Gas

Secondary Energy Impact: Electric

Non-Energy Impact: Annual Discounted Rate Cost Reduction, One-Time Arrearage Reduction, Annual Fire, Illness and Moving Avoidance Benefits, One-Time Property Value Benefit

Sector: Low Income

Market: Retrofit

End Use: HVAC

Program: Low-Income Single Family Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

Unit = Installation of new high efficiency gas heating system.

\[ \Delta MMBtu = \] Average annual MMBtu savings per unit: 12.2 MMBtu

Baseline Efficiency

The baseline efficiency case is the existing inefficient heating equipment.

High Efficiency

The high efficiency case is the new efficient heating equipment.

Hours

Not applicable.

Measure Life

The measure life is 20 years.

Secondary Energy Impacts

Unit electric savings are deemed based on study results.

---


### Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction (Gas)</td>
<td>$(R3-R4)/Therm</td>
<td>Low Income</td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Fire, Illness and Moving Avoidance Benefit</td>
<td>$203/Participant</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Arrearage Benefit</td>
<td>$32/Participant</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Property Value Benefit (Electric)</td>
<td>$20.70 x ($Cost/kWh) x kWh saved</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Property Value Benefit (Natural Gas)</td>
<td>$20.70 x ($Cost/therm) x therms saved</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

### Impact Factors for Calculating Adjusted Gross Savings

<table>
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<tr>
<th>Measure Name</th>
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<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Heating System Replacement</td>
<td>Low-Income Single Family Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.03</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

### In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

### Savings Persistence Factor

All PAs use 100% savings persistence factor.

### Realization Rates

Realization rates are set to 100% because savings estimates are based on evaluation and analysis results.

### Coincidence Factors

CFs are developed based on Quantec demand allocation methodology.

---


414 Ibid.


417 Ibid.

HVAC – Gas Weatherization (Low Income)

Measure Overview

**Description:** Installation of weatherization measures such as air sealing and insulation in gas heated homes. Electric savings are achieved from reduced fan run time.

**Primary Energy Impact:** Gas

**Secondary Energy Impact:** Electric

**Non-Energy Impact:** Annual Discounted Rate Cost Reduction, One-Time Arrearage Reduction, Annual Fire, Illness and Moving Avoidance Benefits, One-Time Property Value Benefit

**Sector:** Low Income

**Market:** Retrofit

**End Use:** HVAC

**Program:** Low-Income Single Family Retrofit

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

- **Unit** = Household with weatherization measures installed
- **\( \Delta MMBtu \)** = Average annual MMBtu savings per unit: 13.7 MMBtu\(^{419}\)

**Baseline Efficiency**

The baseline efficiency case is the existing home shell.

**High Efficiency**

The high efficiency case can be a combination of increased insulation, air sealing, duct sealing, and other improvements to the home shell.

**Hours**

Not applicable.

**Measure Life**

The measure lives for weatherization projects may differ depending on the measures implemented. The final measure life of each application is weighted based on the mix of weatherization measures installed. The measure life for each type of weatherization measure is based on statewide measure lives for residential energy efficiency measures.\(^{420}\)

---


Secondary Energy Impact

Unit savings are deemed based on study results.

<table>
<thead>
<tr>
<th>PA</th>
<th>ΔkWh/Unit</th>
<th>ΔkW/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Grid</td>
<td>70</td>
<td>0.009</td>
</tr>
</tbody>
</table>

Non-Energy Benefits

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Discounted Rate Cost Reduction (Gas)</td>
<td>$(R3-R4)/Therm</td>
<td>Low Income</td>
</tr>
<tr>
<td>Annual Non-Resource</td>
<td>Annual Fire, Illness and Moving Avoidance Benefit</td>
<td>$203/Participant</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Arrearage Benefit</td>
<td>$32/Participant</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Property Value Benefit (Electric)</td>
<td>$20.70 x ($Cost/kWh) x kWh saved</td>
<td>Low Income</td>
</tr>
<tr>
<td>One-Time Non-Resource</td>
<td>One-Time Property Value Benefit (Natural Gas)</td>
<td>$20.70 x ($Cost/therm) x therms saved</td>
<td>Low Income</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_e</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Weatherization</td>
<td>Low-Income Single Family Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.003</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
Realization rates are set to 100% because savings estimates are based on evaluation and analysis results.

Coincidence Factors
CFs are developed based on Quantec demand allocation methodology.

---

423 Ibid.
426 Ibid.
427 Ibid.
HVAC – Gas Insulation

Measure Overview

Description: Shell insulation upgrades are applied in existing homes including improved insulation in attics, basements and sidewalls.
Primary Energy Impact: Natural Gas
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Retrofit
End Use: HVAC
Program: Residential Gas Weatherization Program

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:
\( \Delta MMBtu \) = Annual MMBtu savings for insulation in a gas heated home: 12.3 MMBtu\(^{429}\)

Baseline Efficiency

The baseline efficiency case is any existing home shell measures.

High Efficiency

The high efficiency case includes increased weatherization insulation levels.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{430}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

\(^{429}\) Residential Gas Weatherization Program Impact Evaluation: 2008 Program Year by Summit Blue Consulting July 2009
Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>Gas Weatherization</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factors.

Realization Rates

Realization rates are set to 100% since deemed savings are based on evaluation results.

Coincidence Factors

There are no electric savings for this measure.
HVAC – Gas Air Sealing

Measure Overview

Description: Thermal shell air leaks are sealed through strategic use and location of air-tight materials.
Primary Energy Impact: Natural Gas
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Retrofit
End Use: HVAC
Program: Residential Gas Weatherization Program

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed:

\[ \Delta \text{MMBtu} = \Delta \text{MMBtu} \]

Where:

\[ \Delta \text{MMBtu} = \text{Annual MMBtu savings for air sealing in a gas heated home: 6.5 MMBtu}^{431} \]

Baseline Efficiency

The baseline efficiency case is the existing building before the air sealing measure is implemented.

High Efficiency

The baseline efficiency case is the existing building after the air sealing measure is implemented.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{432}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

---

\(^{431}\) Estimated based on previous years’ savings per home reported by CSG for the RCS program.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Sealing</td>
<td>Gas Weatherization</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since all PA programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factors.

Realization Rates
Realization rates are set to 100%.

Coincidence Factors
There are no electric savings for this measure.
HVAC/Hot Water – Integrated Water Heater/Condensing Boiler

Measure Overview

Description: This measure promotes the installation of a combined high-efficiency boiler and water heating unit. Combined boiler and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.

Primary Energy Impact: Natural Gas

Secondary Energy Impact: None

Non-Energy Impact: None

Sector: Residential

Market: Lost Opportunity

End Use: HVAC

Program: Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta \text{MMbtu} = \Delta \text{MMbtu} \]

Where:

\[ \text{Units} = \text{Installation of integrated water heater/condensing boiler} \]

\[ \Delta \text{MMBtu} = \text{Annual MMBtu savings per integrated water heater/condensing boiler installed: 21.1 MMBtu}^{433} \]

Baseline Efficiency

The baseline efficiency case is an 80% AFUE boiler with a 0.594 EF water heater.

High Efficiency

The high efficiency case is an integrated water heater/condensing boiler with a 90% AFUE boiler and a 0.9 EF water heater.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{434}\)

---


Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated water heater/condensing boiler</td>
<td>Residential Heating and Water Heating</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
 HVAC/Hot Water – Integrated Water Heater/Non-Condensing Boiler

Measure Overview

Description: This measure promotes the installation of a combined high-efficiency boiler and water heating unit. Combined boiler and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.

Primary Energy Impact: Natural Gas

Secondary Energy Impact: None

Non-Energy Impact: None

Sector: Residential

Market: Lost Opportunity

End Use: HVAC

Program: Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta \text{MMbtu} = \Delta \text{MMbtu} \]

Where:

Units = Number of per integrated water heater/condensing boilers installed

\[ \Delta \text{MMBtu} = \text{Annual MMBtu savings per integrated water heater/condensing boiler installed:} \]

\[ 13.5 \text{ MMBtu}^{435} \]

Baseline Efficiency

The baseline efficiency case is an 80% AFUE boiler with a 0.594 EF water heater.

High Efficiency

The high efficiency case is an integrated water heater/condensing boiler with an 85% AFUE boiler and a 0.86 EF water heater.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{436}\)


Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated water heater/non-condensing boiler</td>
<td>Residential Heating and Water Heating</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
Hot Water – Condensing Water Heater

Measure Overview

**Description**: Condensing water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy.

**Primary Energy Impact**: Natural Gas

**Secondary Energy Impact**: None

**Non-Energy Impact**: None

**Sector**: Residential

**Market**: Lost Opportunity

**End Use**: Hot Water

**Program**: Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

- \( \Delta MMBtu \) = Annual MMBtu savings per condensing stand alone water heater installed: 7.4 MMBtu\(^{37} \)
- Units = Number of Condensing Water Heaters installed

**Baseline Efficiency**

The baseline efficiency case is a stand alone tank water heater with an energy factor of 0.575.

**High Efficiency**

The high efficiency case is a condensing water heater with an energy factor of 0.8.

**Hours**

Not applicable.

**Measure Life**

The measure life is 15 years.\(^{38} \)

**Secondary Energy Impacts**

There are no secondary energy impacts for this measure.

---


\(^{38}\) Ibid.
Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
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</thead>
<tbody>
<tr>
<td>Condensing water heaters</td>
<td>Residential Heating and Water Heating</td>
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<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
Hot Water – Indirect Water Heater

Measure Overview

Description: The installation of a high-efficiency indirect water heater. Indirect water heaters use a storage tank that is heated by the main boiler. The energy stored by the water tank allows the boiler to turn off and on less often, saving considerable energy.

Primary Energy Impact: Natural Gas
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Residential
Market: Lost Opportunity
End Use: Hot Water
Program: Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:
\[ \Delta MMBtu = \text{Annual MMBtu savings indirect water heater unit installed: 8.0 MMBtu} \]
\[ \text{Units} = \text{Number of savings indirect water heaters installed} \]

Baseline Efficiency

The baseline efficiency case is a stand alone tank water heater with an energy factor of 0.575.

High Efficiency

The high efficiency case is an indirect water heater attached to an ENERGY STAR® rated forced hot water gas boiler.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{440}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

---


Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR&lt;sub&gt;E&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;WP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;WP&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Water Heaters</td>
<td>Residential Heating and Water Heating</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
Hot Water – Tankless Water Heaters

Measure Overview

**Description:** The installation of a high-efficiency tankless water heater with electronic ignition and an Energy Factor (EF) of at least 0.82. Tankless water heaters circulate water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.

**Primary Energy Impact:** Natural Gas  
**Secondary Energy Impact:** None  
**Non-Energy Impact:** None  
**Sector:** Residential  
**Market:** Lost Opportunity  
**End Use:** Hot Water  
**Program:** Residential Heating and Water Heating

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta \text{MMBtu} = \Delta \text{MMBtu}
\]

Where:

\[
\Delta \text{MMBtu} = \text{Annual MMBtu savings per tankless water heater (EF >= 0.82) installed: 9.7 MMBtu}^{441}
\]

Units = Number of tankless water heaters installed.

Baseline Efficiency

The baseline efficiency case is a stand alone tank water heater with an energy factor of 0.575.

High Efficiency

The high efficiency case is a tankless water heater with an energy factor of 0.82 or greater.

Hours

Not applicable.

Measure Life

The measure life is 20 years.\(^{442}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

---


Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tankless Water Heaters (EF&gt;=0.82)</td>
<td>Residential Heating and Water Heating</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
Behavior – OPOWER Gas

Measure Overview

**Description:** The OPOWER programs send energy use reports to participating gas customers in order to change customers’ energy-use behavior. In 2010, the program was planned with only one measure for all cohorts. In 2011, the program was planned with unique measures for each cohort. In 2011, the program’s name was changed to Behavior/Feedback.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Residential

**Market:** Products and Services

**End Use:** Behavior

**Program:** OPOWER Program

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = (MMBtu_{\text{BASE}})(%SAVE) \]

Where:

- Unit = One participant household
- \( \Delta MMBtu \) = Average annual gas heating MMBtu savings per unit: 1.006 MMBtu\(^{443}\)
- MMBtu\(_{\text{BASE}}\) = Average baseline consumption MMBtu per unit: 130.7 MMBtu\(^{444}\)
- %SAVE = Annual percent of MMBtu savings per unit: 0.77%\(^{445}\)

OPOWER Program - Gas Savings Factors

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>MMBtu(_{\text{BASE}})</th>
<th>%SAVE</th>
<th>( \Delta MMBtu )</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTSERV</td>
<td>130.7</td>
<td>0.77%</td>
<td>1.006</td>
</tr>
</tbody>
</table>

**Baseline Efficiency**

The baseline efficiency case is a customer who does not receive OPOWER program reports.

**High Efficiency**

The high efficiency case is a customer who does receive OPOWER program reports.

**Hours**

Not applicable.


\(^{444}\)Ibid.

\(^{445}\)Ibid.
Measure Life

The measure life is 1 year.

Secondary Energy Impacts

There are no secondary energy impacts for this measure

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTSERV</td>
<td>OPOWER</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

RRs are 100% because deemed savings are based on assumptions from year-to-date vendor findings. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.
Commercial and Industrial Natural Gas Efficiency Measures
HVAC – Programmable Thermostat

Measure Overview

**Description:** Installation of ENERGY STAR® labeled or 7-day programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Retrofit

**End Use:** HVAC

**Program:** C&I Retrofit, C&I Direct Install

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on study results:

\[ \Delta \text{MMBtu} = \Delta \text{MMBtu} \]

Where:

- Unit = Installed programmable thermostat
- \( \Delta \text{MMBtu} \) = Average annual MMBtu reduction per unit: 7.5 MMBtu\(^{446}\)

**Baseline Efficiency**

The baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.

**High Efficiency**

The high efficiency case is an HVAC system using natural gas to provide space heating with an ENERGY STAR® labeled or 7-day programmable thermostat installed.

**Hours**

Not applicable.

**Measure Life**

The measure life is 15 years.\(^{447}\)

---

\(^{446}\) RLW Analytics (2007). *Validating the Impacts of Programmable Thermostats*; Page 2, conversion factor CCF to Therms is 1.024.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_e</th>
<th>RR_sp</th>
<th>RR_wp</th>
<th>CF_sp</th>
<th>CF_wp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable Thermostat</td>
<td>C&amp;I Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Programmable Thermostat</td>
<td>C&amp;I Direct Install</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
HVAC – Boiler Reset Controls (Retrofit only)

Measure Overview

**Description:** Boiler Reset Controls are devices that automatically control boiler water temperature based on outdoor or return water temperature using a software program.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Retrofit

**End Use:** HVAC

**Program:** C&I Retrofit, C&I Direct Install

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

- Unit = Installed boiler reset control
- \( \Delta MMBtu \) = Average annual MMBtu savings per unit: 35.5 MMBtu\(^{448}\)

**Baseline Efficiency**

The baseline efficiency case is a boiler without reset controls.

**High Efficiency**

The high efficiency case is a boiler with reset controls.

**Hours**

Not applicable.

**Measure Life**

The measure life is 20 years.\(^{449}\)

**Secondary Energy Impacts**

There are no secondary energy impacts for this measure.

\(^{448}\) GDS Associates, Inc. (2009). *Natural Gas Energy Efficiency Potential in Massachusetts.* Prepared for GasNetworks; the GDS Study assumes 710.46 MMBTU base use with 5% savings factor.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_R</th>
<th>RR_SP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler Reset Controls</td>
<td>C&amp;I Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Boiler Reset Controls</td>
<td>C&amp;I Direct Install</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
HVAC – Condensing Unit Heater

Measure Overview

**Description:** Installation of a Condensing Gas Fired Unit Heater for space heating with capacity of 151 – 400 MBH and minimum combustion efficiency of 90%

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

- Unit = Installed condensing unit heater
- \( \Delta MMBtu \) = Average annual MMBtu savings per unit: 40.9 MMBtu\(^{450} \)

**Baseline Efficiency**

The baseline efficiency case is a standard efficiency gas fired unit heater with minimum combustion efficiency of 80%, interrupted or intermittent ignition device (IID), and either power venting or an automatic flue damper.\(^{451} \)

**High Efficiency**

The high efficiency case is a condensing gas unit heater with 90% AFUE or greater.

**Hours**

Not applicable.

**Measure Life**

The measure life is 18 years.\(^{452} \)

---

\(^{450}\) NYSERDA Deemed Savings Database (Rev 11); Measure Name: A.UNIT-HEATER-COND.<300000,CI.\_\_\_,N. The database provides savings of 204.6 MMBtu per million BTU/hr of heater input capacity. Assume average unit size of 200,000 BTU capacity.

\(^{451}\) ASHRAE Standard 90.1-2007; Table 6.8.1E.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condensing Unit Heater</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.
HVAC – Gas-Fired Low Intensity Infrared Heating

Measure Overview

Description: The installation of a gas-fired low intensity infrared heating system in place of unit heater, furnace, or other standard efficiency equipment. Infrared heating uses radiant heat as opposed to warm air to heat buildings. In commercial environments with high air exchange rates, heat loss is minimal because the space’s heat comes from surfaces rather than air.

Primary Energy Impact: Natural Gas
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Commercial & Industrial
Market: Lost Opportunity
End Use: HVAC
Program: C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

$$\Delta MMBtu = \Delta MMBtu$$

Where:

Unit = Installed infrared heating unit
$$\Delta MMBtu =$$ Average annual MMBtu savings per unit: 74.4 MMBtu$^{453}$

Baseline Efficiency

The baseline efficiency case is a standard efficiency gas-fired unit heater with combustion efficiency of 80%.

High Efficiency

The high efficiency case is a gas-fired low-intensity infrared heating unit.

Hours

Not applicable.

Measure Life

The measure life is 17 years.$^{454}$

---

$^{453}$ The savings are based on modeled data form 62 low-intensity infrared heaters installed through the Columbia Gas of MA custom commercial and industrial energy efficiency program. See “Infrared Samples - Bay State Gas.xls” for additional project data.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>( R_{E} )</th>
<th>( R_{SP} )</th>
<th>( R_{WP} )</th>
<th>( CF_{SP} )</th>
<th>( CF_{WP} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Intensity Infrared Heating Unit</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.
HVAC – High Efficiency Natural Gas Boiler

Measure Overview

**Description:** The installation of a high efficiency natural gas fired steam boiler or hot water boiler. High-efficiency boilers can take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. This measure incorporates steam boilers, condensing boilers and hydronic boilers of all capacities.

**Primary Energy Impact:** Natural Gas
**Secondary Energy Impact:** None
**Non-Energy Impact:** None
**Sector:** Commercial & Industrial
**Market:** Lost Opportunity
**End Use:** HVAC
**Program:** C&I New Construction & Major Renovation

Notes

This measure uses deemed savings values, but is a strong candidate for developing a deemed calculation with inputs provided by the customer. In particular, the C&I evaluation project planned to start in 2010 should provide useful results to inform a deemed calculation and factor values.

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on study results:

\[ \Delta \text{MMBtu} = \Delta \text{MMBtu} \]

Where:

- Unit = Installed high efficiency boiler
- \( \Delta \text{MMBtu} \) = Average annual MMBtu savings per unit. See Table 10 for values.

**Table 10: MMBtu Savings by Boiler Type**

<table>
<thead>
<tr>
<th>Boiler Type/Size</th>
<th>( \Delta \text{MMBTU/Unit} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam Boiler 82% AFUE or greater</td>
<td>36.5</td>
</tr>
<tr>
<td>Condensing Boiler &lt;=300 MBH - 90% AFUE or greater</td>
<td>22.1</td>
</tr>
<tr>
<td>Condensing Boiler 301-499 MBH - 90% thermal efficiency or greater</td>
<td>42.3</td>
</tr>
<tr>
<td>Condensing Boiler 500-999 MBH - 90% thermal efficiency or greater</td>
<td>77.1</td>
</tr>
<tr>
<td>Condensing Boiler 1000-1700 MBH - 90% thermal efficiency or greater</td>
<td>142.6</td>
</tr>
<tr>
<td>Condensing Boiler 1701+ MBH - 90% thermal efficiency or greater</td>
<td>249.0</td>
</tr>
<tr>
<td>Hydronic Boiler &lt;= 300 MBH – 85% AFUE or greater</td>
<td>16.8</td>
</tr>
<tr>
<td>Hydronic Boiler 301-499 MBH – 85% thermal efficiency or greater</td>
<td>35.3</td>
</tr>
<tr>
<td>Hydronic Boiler 500-999 MBH – 85% thermal efficiency or greater</td>
<td>66.2</td>
</tr>
<tr>
<td>Hydronic Boiler 1000-1700 MBH – 85% thermal efficiency or greater</td>
<td>119.1</td>
</tr>
<tr>
<td>Hydronic Boiler 1701+ MBH – 85% thermal efficiency or greater</td>
<td>150.0</td>
</tr>
</tbody>
</table>

Baselines Efficiency

The baseline efficiency assumes compliance with the efficiency requirements as mandated by Massachusetts State Building Code. The deemed savings methodology for this measure does not require specific baseline data, but the baseline information is provided here for use in the future when this is converted to a deemed calculated measure.

As described in Chapter 13 of the Massachusetts State Building Code, energy efficiency must be met via compliance with the International Energy Conservation Code (IECC) 2009 with the 2007 Supplement or ASHRAE 90.1-2007. The requirements for gas-fired boilers differ slightly between the two, so the less stringent requirements as presented in IECC 2006 are referenced below. Table 11 details the specific efficiency requirements by equipment type and capacity.

Table 11: Boilers, Gas-Fired, Minimum Efficiency Requirements

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Size Category (Input)</th>
<th>Subcategory or Rating Condition</th>
<th>Minimum Efficiency&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiler, Gas-Fired</td>
<td>&lt;300,000 Btu/h</td>
<td>Hot Water</td>
<td>80% AFUE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steam</td>
<td>75% AFUE</td>
</tr>
<tr>
<td>&gt;=300,000 Btu/h and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;=2,500,000 Btu/h</td>
<td>Minimum Capacity&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td>75% E&lt;sub&gt;c&lt;/sub&gt; and 80% E&lt;sub&gt;c&lt;/sub&gt;</td>
</tr>
<tr>
<td>&gt;2,500,000 Btu/h</td>
<td>Hot Water</td>
<td></td>
<td>80% E&lt;sub&gt;c&lt;/sub&gt;</td>
</tr>
<tr>
<td></td>
<td>Steam</td>
<td></td>
<td>80% E&lt;sub&gt;c&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Minimum ratings as provided for and allowed by the unit's controls

High Efficiency

The high efficiency scenario assumes a gas-fired boiler that exceeds the efficiency levels required by Massachusetts State Building Code. Actual site efficiencies should be determined on a case-by-case basis.

Hours

Not applicable.

Measure Life

The measure life is 25 years.<sup>457</sup>

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

<sup>456</sup> Adapted from 2007 Supplement to the 2006 International Energy Conservation Code; Page 15, Table 503.2.3(5).
<sup>457</sup> ASHRAE Applications Handbook (2003); Page 36.3.
Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RRₜ</th>
<th>RRₛₜ</th>
<th>RRₛₚ</th>
<th>CFₛₜ</th>
<th>CFₛₚ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condensing Boiler</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Hydronic Boiler</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Steam Boiler</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**In-Service Rates**
All installations have 100% in service rate since programs include verification of equipment installations.

**Savings Persistence Factor**
All PAs use 100% savings persistence factor.

**Realization Rates**
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

**Coincidence Factors**
Not applicable for this measure since no electric savings are claimed.
HVAC – High Efficiency Natural Gas Warm Air Furnace

Measure Overview

**Description:** The installation of a high efficiency natural gas warm air furnace with or without an electronically commutated motor (ECM) for the fan. High efficiency furnaces are better at converting fuel into direct heat and better insulated to reduce heat loss. ECM fan motors significantly reduce fan motor electric consumption as compared to both shaped-pole and permanent split capacitor motors.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** Electric

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** HVAC

**Program:** C&I New Construction & Major Renovation

**Notes**

This measure has significant savings and is thus a good candidate for a deemed calculation rather than a deemed savings value.

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

- Unit = Installed high efficiency warm air furnace
- \( \Delta MMBtu \) = Average annual MMBtu savings per unit. See Table 12 for values.

<table>
<thead>
<tr>
<th>Boiler Type/Size</th>
<th>( \Delta MMBtu )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnace AFUE =&gt; 92%</td>
<td>21.1</td>
</tr>
<tr>
<td>Furnace AFUE =&gt; 92% w/ ECM</td>
<td>19.6(^{459})</td>
</tr>
<tr>
<td>Furnace AFUE =&gt; 94% w/ ECM</td>
<td>23.6</td>
</tr>
</tbody>
</table>

**Baseline Efficiency**

The baseline efficiency assumes compliance with the efficiency requirements as mandated by Massachusetts State Building Code. The deemed savings methodology for this measure does not require specific baseline data, but the baseline information is provided here for use in the future when this is converted to a deemed calculated measure.

As described in Chapter 13 of the Massachusetts State Building Code, energy efficiency must be met via compliance with the International Energy Conservation Code (IECC) 2006 with the 2007 Supplement or


\[^{459}\] NYSERDA Deemed Savings Database.
ASHRAE 90.1-2007. The two documents present nearly identical requirements for gas-fired furnaces, so only the requirements as presented in IECC 2006 are referenced below. Table 13 details the specific efficiency requirements by equipment type and capacity.

Table 13: Warm Air Furnaces and Combination Warm Air Furnace/Air-Conditioning Units, Warm Air Duct Furnaces, Minimum Efficiency Requirements

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Size Category (Input)</th>
<th>Subcategory or Rating Condition</th>
<th>Minimum Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm air furnaces, gas fired</td>
<td>&lt; 225,000 Btu/h</td>
<td>-</td>
<td>78% AFUE or 80% Et</td>
</tr>
<tr>
<td></td>
<td>&gt;= 225,000 Btu/h</td>
<td>Maximum capacity</td>
<td>80% Et</td>
</tr>
<tr>
<td>Warm air duct furnaces, gas fired</td>
<td>All capacities</td>
<td>Maximum capacity</td>
<td>80% Et</td>
</tr>
</tbody>
</table>

a. Minimum and maximum ratings as provided for and allowed by the unit’s controls.
b. Combination units not covered by the National Appliance Energy Conservation Act of 1987 (NAECA) (3-phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]) shall comply with either rating.
c. Units must also include an Intermittent Ignition Device (IID), have jackets not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

**High Efficiency**

The high efficiency scenario assumes a gas-fired furnace that exceeds the efficiency levels required by Massachusetts State Building Code. Actual site efficiencies should be determined on a case-by-case basis.

**Hours**

Not applicable.

**Measure Life**

The measure life is 18 years.

**Secondary Energy Impacts**

High efficiency furnaces equipped with ECM fan motors also save electricity from reduced fan energy requirements. The reduction of electric use is 478 kWh.

**Non-Energy Impacts**

There are no non-energy impacts for this measure.

**Impact Factors for Calculating Adjusted Gross Savings**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR E</th>
<th>RR SP</th>
<th>RR WP</th>
<th>CF SP</th>
<th>CF WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE Natural Gas Furnace</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>HE Natural Gas Furnace w/ ECM</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

---

460 Adapted form 2006 International Energy Conservation Code; Page 36, Table 503.2.3(4).
461 ASHRAE Applications Handbook (2003); Page 36.3.
462 The heating penalty of 21.1 – 19.6 MMBTU is equivalent to 478 kWh for the 92% efficient furnace (1,500,000BTU/ (0.92*3413 BTU/kWh).
**In-Service Rates**
All installations have 100% in service rate since programs include verification of equipment installations.

**Savings Persistence Factor**
All PAs use 100% savings persistence factor.

**Realization Rates**
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

**Coincidence Factors**
Not applicable for this measure since no electric savings are claimed.
HVAC/Hot Water – Combined High Efficiency Boiler and Water Heater

Measure Overview

**Description:** This measure promotes the installation of a combined high-efficiency boiler and water heating unit. Combined boiler and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** HVAC, Hot Water

**Program:** New Construction & Major Renovation Commercial

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

- **Unit** = Installed high efficiency boiler/water heater combo units
- **\( \Delta MMBtu \)** = Average annual MMBtu savings per unit. See Table 14 for values.

### Table 14: MMBtu Savings by Boiler/Water Heater Combo Type

<table>
<thead>
<tr>
<th>Boiler/Water Heater Combo Type</th>
<th>( \Delta MMBTU )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated water heater/condensing boiler (0.86 EF, 0.85 AFUE)</td>
<td>20.0</td>
</tr>
<tr>
<td>Integrated water heater/condensing boiler (0.86 EF, 0.90 AFUE)</td>
<td>24.6</td>
</tr>
</tbody>
</table>

**Baseline Efficiency**

The baseline efficiency case is a standard efficiency gas-fired storage tank hot water heater with a separate standard efficiency boiler for space heating purposes.

**High Efficiency**

The high efficiency case is a condensing, integrated water heater/boiler with an AFUE of \( \geq 90\% \) or \( \geq 85\% \).

**Hours**

Not applicable.

---

463 Based on an analysis conducted by Summit Blue, Inc. See “SB Gas Networks Calculations for Combined HVAC and DHW.xlsx” for source calculations.
Measure Life

The measure life is 25 years.\textsuperscript{464}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{R}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Water Heater/Condensing Boiler</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.

\textsuperscript{464} ASHRAE Applications Handbook (2003); Page 36.3, assumes combined boiler and water heating systems have a measure life similar to a typical boiler.
Hot Water – Condensing Stand-Alone Water Heater

Measure Overview

Description: Installation of a condensing stand alone water heater with a capacity between 75-300 MBH and thermal efficiency of 95% or greater.
Primary Energy Impact: Natural Gas
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Commercial & Industrial
Market: Lost Opportunity
End Use: Hot water
Program: C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

$$\Delta MMBtu = \Delta MMBtu$$

Where:
Unit = Installed condensing stand-alone water heater
$$\Delta MMBtu$$ = Average annual MMBtu savings per unit (75,000 – 300,000 BTU) installed: 25.0 MMBtu

Baseline Efficiency

The baseline efficiency case is a stand alone tank water heater with a thermal efficiency of 80%.

High Efficiency

The high efficiency case is a condensing stand alone commercial water heater with a thermal efficiency of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu.

Hours

Not applicable.

Measure Life

The measure life is 15 years.

---


466 ASHRAE Standard 90.1-2007; Table 7.8

Secondary Energy Impacts
There are no secondary energy impacts for this measure.

Non-Energy Impacts
There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condensing Stand-Alone Water Heater</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
Hot Water – Pre-Rinse Spray Valve

Measure Overview

Description: Retrofitting existing standard spray nozzles in locations where service water is supplied by natural gas fired hot water heater with new low flow pre-rinse spray nozzles with an average flow rate of 1.6 gpm.

Primary Energy Impact: Natural Gas

Secondary Energy Impact: None

Non-Energy Impact: C&I Water, C&I Sewer

Sector: Commercial, Industrial

Market: Retrofit

End Use: Hot Water

Program: C&I Retrofit, C&I Direct Install

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta \text{MMBtu} = \Delta \text{MMBtu} \]

Where:

Unit = Installed pre-rinse spray valve

\[ \Delta \text{MMBtu} = \text{Average annual MMBtu savings per unit: } 33.6 \text{ MMBtu}^{468} \]

Baseline Efficiency

The baseline efficiency case is a standard efficiency spray valve.

High Efficiency

The high efficiency case is a low flow pre-rinse spray valve with an average flow rate of 1.6 gpm.

Hours

Not applicable.

Measure Life

The measure life is 5 years.\textsuperscript{469}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

\textsuperscript{468} SBW Consulting (2004). EM&V Report for the CUWCC Pre-Rinse Spray Head Distribution Program. Prepared for the California Urban Water Conservation Council; Page 20, savings of 0.92 therms per day * 365 days per year = 335.8 therms.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;I Water</td>
<td>C&amp;I water savings</td>
<td>62,305 Gallons/Unit</td>
</tr>
<tr>
<td>C&amp;I Sewer</td>
<td>C&amp;I sewer water savings</td>
<td>62,305 Gallons/Unit</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Rinse Spray Valve</td>
<td>C&amp;I Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Pre-Rinse Spray Valve</td>
<td>C&amp;I Direct Install</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.

SBW Consulting (2004). *EM&V Report for the CUWCC Pre-Rinse Spray Head Distribution Program*. Prepared for the California Urban Water Conservation Council; Page 18, savings based on assumptions of 2.24 gallons per minute flow rate, 1.27 hours per day, 365 days per year.

Ibid.
Hot Water – Repair/Replace Malfunctioning Steam Trap

Measure Overview

Description: Repair or replace malfunctioning steam traps.
Primary Energy Impact: Natural Gas
Secondary Energy Impact: None
Non-Energy Impact: None
Sector: Commercial & Industrial
Market: Retrofit
End Use: HVAC, Process
Program: C&I Retrofit

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:
Unit = Repaired/replaced steam trap
\( \Delta MMBtu \) = Average annual MMBtu savings per unit: 25.3 MMBtu

Baseline Efficiency

The baseline efficiency case is a failed steam trap.

High Efficiency

The high efficiency case is a repaired or replaced steam trap.

Hours

Not applicable.

Measure Life

The measure life is 1 year.

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

---

472 Assumption based on historical steam trap surveys.
473 Massachusetts Common Assumption.
Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_{E}</th>
<th>RR_{SP}</th>
<th>RR_{WP}</th>
<th>CF_{SP}</th>
<th>CF_{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam Traps</td>
<td>C&amp;I Retrofit</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**In-Service Rates**
All installations have 100% in service rate since programs include verification of equipment installations.

**Savings Persistence Factor**
All PAs use 100% savings persistence factor.

**Realization Rates**
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

**Coincidence Factors**
Not applicable for this measure since no electric savings are claimed.
Hot Water – Low Flow Shower Heads

Measure Overview

Description: Installation of a low flow showerhead with a flow rate of 1.5 gpm or less in a commercial setting with service water heated by natural gas.

Primary Energy Impact: Natural Gas

Secondary Energy Impact: None

Non-Energy Impact: C&I Water, C&I Sewer

Sector: Commercial

Market: Retrofit

End Use: Hot water

Program: C&I Direct Install

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[
\Delta\text{MMBtu} = \Delta\text{MMBtu}
\]

Where:

Unit = Installed low flow shower head

\[\Delta\text{MMBtu} = \text{Average annual MMBtu savings per unit}: 5.2 \text{ MMBtu}\]

Baseline Efficiency

The baseline efficiency case is a 2.5 gpm showerhead.

High Efficiency

The high efficiency case is a 1.5 gpm showerhead.

Hours

The savings estimates for this measure are determined empirically in terms of units installed and so the equivalent heating full load hours are not directly used, however, the calculator used to determine the deemed savings uses a default operation of 20 minutes a day, 365 days a year.

Measure Life

The measure life is 10 years.


August 2011  242
Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;I Water</td>
<td>C&amp;I water savings</td>
<td>7,300 Gallons/Unit</td>
</tr>
<tr>
<td>C&amp;I Sewer</td>
<td>C&amp;I sewer water savings</td>
<td>7,300 Gallons/Unit</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR&lt;sub&gt;S&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;WP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;WP&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Flow Shower Heads</td>
<td>C&amp;I Direct Install</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.
Hot Water – Faucet Aerator

Measure Overview

**Description:** Installation of a faucet aerator with a flow rate of 1.5 gpm or less on an existing faucet with high flow in a commercial setting with service water heated by natural gas.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** C&I Water, C&I Sewer

**Sector:** Commercial

**Market:** Retrofit

**End Use:** Hot water

**Program:** C&I Direct Install

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

Unit = Installed faucet aerator

\[ \Delta MMBtu = \text{Average annual MMBtu savings per unit: 1.7 MMBtu}^{476} \]

**Baseline Efficiency**

The baseline efficiency case is a 2.2 gpm faucet.

**High Efficiency**

The high efficiency case is a faucet with 1.5 gpm or less aerator installed.

**Hours**

The savings estimates for this measure are determined empirically in terms of units installed and so the equivalent heating full load hours are not directly used, however, the calculator used to determine the deemed savings uses a default operation of 30 minutes a day, 260 days a year.

**Measure Life**

The measure life is 10 years.\(^{477}\)

---


Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;I Water</td>
<td>C&amp;I water savings</td>
<td>5,460 Gallons/Unit</td>
</tr>
<tr>
<td>C&amp;I Sewer</td>
<td>C&amp;I sewer water savings</td>
<td>5,460 Gallons/Unit</td>
</tr>
</tbody>
</table>

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR&lt;sub&gt;E&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>RR&lt;sub&gt;WP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;SP&lt;/sub&gt;</th>
<th>CF&lt;sub&gt;WP&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faucet Aerator</td>
<td>C&amp;I Direct Install</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
Hot Water – High Efficiency Indirect Water Heater

Measure Overview

**Description:** The installation of a high-efficiency indirect water heater. Indirect water heaters use a storage tank that is heated by the main boiler. The energy stored by the water tank allows the boiler to turn off and on less often, saving considerable energy.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** Hot Water

**Program:** C&I New Construction & Major Renovation

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on study results:

\[ \Delta \text{MMBtu} = \Delta \text{MMBtu} \]

Where:

- **Unit** = Installed high efficiency indirect water heater
- **\( \Delta \text{MMBtu} \)** = Average annual MMBtu savings per unit: 30.4 MMBtu\(^{478} \)

**Baseline Efficiency**

The baseline efficiency case is a code compliant gas-fired storage water heater with an assumed energy factor of 0.59. The baseline efficiency case assumes compliance with the efficiency requirements as mandated by Massachusetts State Building Code. As described in Chapter 13 of the State Building Code, energy efficiency must be met via compliance with the International Energy Conservation Code (IECC) 2009 with the 2007 Supplement or ASHRAE 90.1-2007. The two documents present nearly identical requirements for gas-fired storage water heaters. The assumed efficiency slightly exceeds the minimum required by code to reflect the typical baseline unit available in the marketplace.

**High Efficiency**

The high efficiency scenario is an indirect water heater with a Combined Appliance Efficiency (CAE) of 85% or greater.

**Hours**

Not applicable.

---

Measure Life

The measure life is 15 years. 479

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE Indirect Water Heater</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.

479 Ibid.
Hot Water – High Efficiency Tankless Water Heater

Measure Overview

**Description:** The installation of a high-efficiency tankless water heater with electronic ignition and an Energy Factor of at least 0.82. Tankless water heaters circulate water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** Hot Water

**Program:** C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

- **Unit** = Installed high efficiency tankless water heater
- **ΔMMBtu** = Average annual MMBtu savings per unit: 7.1 MMBtu\(^{480}\)

Baseline Efficiency

The baseline efficiency case is a code compliant gas-fired storage water heater with an assumed Energy Factor of 0.59. The baseline efficiency assumes compliance with the efficiency requirements as mandated by Massachusetts State Building Code. As described in Chapter 13 of the aforementioned document, energy efficiency must be met via compliance with the International Energy Conservation Code (IECC) 2006 with the 2007 Supplement or ASHRAE 90.1-2007. The two documents present nearly identical requirements for gas-fired storage water heaters. The assumed efficiency slightly exceeds the minimum required by code to reflect the typical baseline unit available in the marketplace.

High Efficiency

The high efficiency equipment is a gas-fired instantaneous hot water heater with an Energy Factor of at least 0.82.

Hours

Not applicable.

---

Measure Life

The measure life is 20 years.\textsuperscript{481}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR\textsubscript{E}</th>
<th>RR\textsubscript{SP}</th>
<th>RR\textsubscript{WP}</th>
<th>CF\textsubscript{SP}</th>
<th>CF\textsubscript{WP}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tankless Water Heater</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.

Hot Water – High Efficiency Free Standing Water Heater

Measure Overview

**Description:** The installation of a high efficiency ENERGY STAR® freestanding water heater with an Energy Factor of at least 0.62, a nominal input of 75,000 BTU/hour, or less and a rated storage volume from 20 to 100 gallons.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** Hot Water

**Program:** C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:

- **Unit** = Installed high efficiency free-standing water heater
- **\(\Delta MMBtu\)** = Average annual MMBtu savings per unit: 0.76 MMBtu\(^{482}\)

Baseline Efficiency

The baseline efficiency case is a code compliant gas-fired free standing water heater with an assumed Energy Factor of 0.594. The baseline efficiency assumes compliance with the efficiency requirements as mandated by Massachusetts State Building Code. As described in Chapter 13 of the aforementioned document, energy efficiency must be met via compliance with the International Energy Conservation Code (IECC) 2006 with the 2007 Supplement or ASHRAE 90.1-2007. The two documents present nearly identical requirements for gas-fired storage water heaters. The assumed efficiency slightly exceeds the minimum required by code to reflect the typical baseline unit available in the marketplace.

High Efficiency

The high efficiency case is an ENERGY STAR® gas-fired freestanding hot water heater with an Energy Factor of at least 0.62 and a nominal input of 75,000 BTU/hour.

**Hours**

Not applicable.

Measure Life

The measure life is 10 years.\(^{483}\)

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE Free Standing Water Heater</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.

**Food Service – Commercial Gas-Fired Oven**

**Measure Overview**

- **Description:** Installation of High Efficiency Gas Ovens
- **Primary Energy Impact:** Natural Gas
- **Secondary Energy Impact:** None
- **Non-Energy Impact:** None
- **Sector:** Commercial & Industrial
- **Market:** Lost Opportunity
- **End Use:** Process
- **Program:** C&I New Construction & Major Renovation

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:
- **Unit** = Installed high efficiency gas oven
- **\( \Delta MMBtu \)** = Average annual MMBtu savings per unit. See Table 15 for values.

**Table 15: Baseline and High Efficiency Ratings and MMBtu Savings by Oven Type**

<table>
<thead>
<tr>
<th>Oven Type</th>
<th>Baseline Efficiency</th>
<th>High Efficiency</th>
<th>( \Delta MMBTU )</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Efficiency Gas Convection Oven</td>
<td>30%</td>
<td>( \geq 40% )</td>
<td>24.8<strong>484</strong></td>
</tr>
<tr>
<td>High Efficiency Gas Combination Oven</td>
<td>35% Heavy Load</td>
<td>( \geq 40% )</td>
<td>40.3</td>
</tr>
<tr>
<td>High Efficiency Gas Conveyer Oven</td>
<td>20% Heavy Load</td>
<td>( \geq 40% )</td>
<td>84.5</td>
</tr>
<tr>
<td>High Efficiency Gas Rack Oven</td>
<td>30%</td>
<td>( \geq 50% )</td>
<td>211.3</td>
</tr>
</tbody>
</table>

**Baseline Efficiency**

The baseline efficiency case is a standard efficiency oven. See Table 15 for values by oven type.

**High Efficiency**

High efficiency case is an oven that meets or exceeds the high efficiency ratings per oven type shown in Table 15.

**Hours**

Not applicable.

**Measure Life**

The measure life is 12 years for both convection and combination ovens. 486

---

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>HE Gas Convection Oven (&gt;=40%)</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>HE Gas Combination Oven (&gt;=40%)</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>HE Gas Conveyer Oven (&gt;=40%)</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>HE Gas Rack Oven (&gt;=50%)</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.

Food Service – Commercial Gas-Fired Griddle

Measure Overview

- **Description:** Installation of a gas griddle with an efficiency of 38%.
- **Primary Energy Impact:** Natural Gas
- **Secondary Energy Impact:** None
- **Non-Energy Impact:** None
- **Sector:** Commercial & Industrial
- **Market:** Lost Opportunity
- **End Use:** Process
- **Program:** C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on study results:

\[ \Delta MMBtu = \Delta MMBtu \]

Where:
- **Unit** = Installed high efficiency gas griddle.
- **\( \Delta MMBtu \)** = Average annual MMBtu savings per unit: 18.5 MMBtu\(^{487}\)

Baseline Efficiency

The baseline efficiency case is a standard efficiency (30% efficient) gas griddle.

High Efficiency

The high efficiency case is a gas griddle with an efficiency of 38%.

Hours

Not applicable.

Measure Life

The measure life is 12 years\(^{488}\).

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

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\(^{487}\) Food Service Technology Center (2010). *Gas Griddle Life-Cycle Cost Calculator.*

\(^{488}\) Ibid.
Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_Sp</th>
<th>RR_WP</th>
<th>CF_Sp</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas-Fired Griddle</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates
All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor
All PAs use 100% savings persistence factor.

Realization Rates
All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors
Not applicable for this measure since no electric savings are claimed.
Food Service – Commercial Fryer

Measure Overview

**Description:** The installation of a natural-gas fired fryer that is either ENERGY STAR® rated or has a heavy-load cooking efficiency of at least 50%. Qualified fryers use advanced burner and heat exchanger designs to use fuel more efficiently, as well as increased insulation to reduce standby heat loss.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** None

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** Process

**Program:** C&I New Construction & Major Renovation

**Algorithms for Calculating Primary Energy Impact**

Unit savings are deemed based on the following algorithm and assumptions:

\[
\Delta MMBtu = \left( \frac{A_{BASE}}{\eta_{BASE}} + (B_{BASE} \times IDLE_{BASE}) + C_{BASE} \right) - \left( \frac{A_{EE}}{\eta_{EE}} + B_{EE} (IDLE_{EE}) + C_{EE} \right) \left( \frac{365}{1,000,000} \right)
\]

Where:

- **Unit** = Installed high efficiency gas commercial fryer
- **ΔMMBtu** = gross annual average MMBtu savings per unit: 58.6 \(^{489}\)
- **A_{BASE}** = Baseline equipment daily cooking energy (Btu/day). Default = 85,500 Btu.
- **\(\eta_{BASE}\)** = Baseline equipment heavy-load cooking efficiency. Default = 35%.
- **B_{BASE}** = Baseline equipment daily fryer idle time (hours). Default = 13.25 hrs.
- **IDLE_{BASE}** = Baseline equipment idle energy rate (Btu/h). Default = 14,000 Btu/h.
- **C_{BASE}** = Baseline equipment total daily preheat energy (Btu). Default = 16,000 Btu.
- **A_{EE}** = Efficient equipment daily cooking energy (Btu/day). Default = 85,500 Btu.
- **\(\eta_{EE}\)** = Efficient equipment heavy-load cooking efficiency.
- **B_{EE}** = Efficiency equipment daily fryer idle time (hours). Default 13.44 hrs.
- **IDLE_{EE}** = Efficient equipment idle energy rate (Btu/h).
- **C_{EE}** = Efficient equipment daily total preheat energy (Btu). Default = 15,500 Btu.
- **365** = Days per year.
- **1,000,000** = Btu per MMBtu.

**Baseline Efficiency**

The baseline efficiency case is a typical low-efficiency gas-fired fryer with 35% cooking efficiency, 16,000 Btu preheat energy, 14,000 Btu/h Idle Energy Rate, 60 lbs/h production capacity.\(^{490}\)


High Efficiency

The high efficiency case cooking efficiency and Idle Energy Rate are site specific and can be determined on a case-by-case basis. To simplify the savings algorithm, typical values for food load (150 lbs/day) and preheat energy (15,500 Btu) are assumed.

Hours

Not applicable.

Measure Life

The measure life is 12 years.\textsuperscript{491}

Secondary Energy Impacts

There are no secondary energy impacts for this measure.

Non-Energy Impacts

There are no non-energy impacts for this measure.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RRF</th>
<th>RRSP</th>
<th>RRWP</th>
<th>CFSP</th>
<th>CFWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Fryer</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.

\textsuperscript{491} Ibid.
Food Service – Commercial Gas-Fired Steamer

Measure Overview

**Description:** The installation of an ENERGY STAR® rated natural-gas fired steamer, either connectionless or steam-generator design, with heavy-load cooking efficiency of at least 38%. Qualified steamers reduce heat loss due to better insulation, improved heat exchange, and more efficient steam delivery systems.

**Primary Energy Impact:** Natural Gas

**Secondary Energy Impact:** None

**Non-Energy Impact:** Water

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity

**End Use:** Process

**Program:** C&I New Construction & Major Renovation

Algorithms for Calculating Primary Energy Impact

Unit savings are deemed based on the following algorithm and assumptions:

\[
\Delta MMBtu = (PANS)(SAVE)
\]

Where:
- Unit = Installed high efficiency gas-fired steamer
- \(\Delta MMBtu\) = Average annual MMBTU savings for default condition of three pans: 153.6 MMBtu
- PANS = Efficient equipment number of pans. Default is 3 pans.
- SAVE = Average savings per pan: default of 51.2 MMBtu

Baseline Efficiency

The baseline efficiency case is a typical boiler-based steamer with the following operating parameters:

- Preheat Energy = 18,000 Btu, Idle Energy Rate = 3,667 Btu/h/pan, Heavy Load Efficiency = 15.0%,
- Production Capacity = 21.7 lbs/h/pan, Average Water Consumption Rate = 40 gal/h, and Percentage of Time in Constant Steam Mode = 90%.

High Efficiency

The high efficiency case is an ENERGY STAR® qualified gas-fired steamer with the following operating parameters: Preheat Energy = 7,000 Btu, Idle Energy Rate = 2,083 Btu/h/pan, Heavy Load Efficiency = 492

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492 Food Service Technology Center (2010). *Gas Steamer Life-Cycle Cost Calculator.* http://www.fishnick.com/saveenergy/tools/calculators/gsteamercalc.php. Accessed on 10/20/2010; the estimated annual MMBtu savings per pan is derived using the referenced cost calculator and the operating parameters described in the Baseline Efficiency, High Efficiency, and Hours sections. The savings per pan is found by averaging the per pan savings estimates for 3-, 4-, 5-, and 6-pan steamers.

38.0%, Production Capacity = 18.3 lbs/h/pan, Average Water Consumption Rate = 3.0 gal/h, and Percentage of Time in Constant Steam Mode = 0%.  

**Hours**

The deemed savings assumes 4,380 annual operating hours (12 hours a day * 365 days/year).  

**Measure Life**

The measure life is 10 years.  

**Secondary Energy Impacts**

There are no secondary energy impacts for this measure.  

**Non-Energy Impacts**

<table>
<thead>
<tr>
<th>Benefit Type</th>
<th>Description</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;I Water</td>
<td>C&amp;I Water Savings</td>
<td>162,060 Gallons/Unit</td>
</tr>
<tr>
<td>C&amp;I Wastewater</td>
<td>C&amp;I Wastewater Savings</td>
<td>162,060 Gallons/Unit</td>
</tr>
</tbody>
</table>

**Impact Factors for Calculating Adjusted Gross Savings**

<table>
<thead>
<tr>
<th>Measure Name</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RR_WP</th>
<th>CF_SP</th>
<th>CF_WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas-Fired Steamer</td>
<td>C&amp;I NC</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

**In-Service Rates**

All installations have 100% in service rate since programs include verification of equipment installations.  

**Savings Persistence Factor**

All PAs use 100% savings persistence factor.  

**Realization Rates**

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.  

**Coincidence Factors**

Not applicable for this measure since no electric savings are claimed.  

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494 Ibid.
496 Ibid.
http://www.fishnick.com/saveenergy/tools/calculators/gsteamercalc.php. Accessed on 10/20/2010; the estimated water savings is derived using the referenced cost calculator and the operating parameters described in the Baseline Efficiency, High Efficiency, and Hours sections. The savings per pan is found by averaging the per pan savings estimates for 3-, 4-, 5-, and 6-pan steamers.
Custom Measures

Measure Overview

**Description:** The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.

**Primary Energy Impact:** Natural Gas (Heating, Water Heating, or All)

**Secondary Energy Impact:** Project Specific

**Non-Energy Impact:** Project Specific

**Sector:** Commercial & Industrial

**Market:** Lost Opportunity, Retrofit

**End Use:** All

**Program:** All

**Algorithms for Calculating Primary Energy Impact**

Gross energy and demand savings estimates for custom projects are calculated using engineering analysis and project-specific details. Custom analyses typically include a weather dependent load bin analysis, whole building energy model simulation, or other engineering analysis and include estimates of savings, costs, and an evaluation of the project’s cost-effectiveness.

**Baseline Efficiency**

For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Massachusetts State Building Code or industry accepted standard practice.

For retrofit projects, the baseline efficiency case is the same as the existing, or pre-retrofit, case for the facility.

**High Efficiency**

The high efficiency scenario is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.

**Hours**

All hours for custom savings analyses should be determined on a case-by-case basis.

**Measure Life**

For both lost-opportunity and retrofit custom applications, the measure life is determined on a case-by-case basis.
Secondary Energy Impacts

All secondary energy impacts should be determined on a case-by-case basis.

Non-Energy Impacts

All non-energy impacts should be determined on a case-by-case basis.

Impact Factors for Calculating Adjusted Gross Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>Program</th>
<th>ISR</th>
<th>SPF</th>
<th>RR_E</th>
<th>RR_SP</th>
<th>RRWP</th>
<th>CFSP</th>
<th>CFWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom</td>
<td>All</td>
<td>1.00</td>
<td>1.00</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

In-Service Rates

All installations have 100% in service rate since programs include verification of equipment installations.

Savings Persistence Factor

All PAs use 100% savings persistence factor.

Realization Rates

All PAs use 100% energy realization rate. The summer and winter peak realization rates are not applicable for this measure since there are no electric savings claimed.

Coincidence Factors

Not applicable for this measure since no electric savings are claimed.
Appendix A: Common Lookup Tables

Table 16: Lighting Power Densities Using the Building Area Method (WATTs\textsubscript{b,a})\textsuperscript{498}

<table>
<thead>
<tr>
<th>Building Area Type</th>
<th>Lighting Power Density (W/ft\textsuperscript{2})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive Facility</td>
<td>0.9</td>
</tr>
<tr>
<td>Convention Center</td>
<td>1.2</td>
</tr>
<tr>
<td>Court House</td>
<td>1.2</td>
</tr>
<tr>
<td>Dining: Bar Lounge/Leisure</td>
<td>1.3</td>
</tr>
<tr>
<td>Dining: Cafeteria/Fast Food</td>
<td>1.4</td>
</tr>
<tr>
<td>Dining: Family</td>
<td>1.6</td>
</tr>
<tr>
<td>Dormitory</td>
<td>1.0</td>
</tr>
<tr>
<td>Exercise Center</td>
<td>1.0</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>1.1</td>
</tr>
<tr>
<td>Healthcare-Clinic</td>
<td>1.0</td>
</tr>
<tr>
<td>Hospital</td>
<td>1.2</td>
</tr>
<tr>
<td>Hotel</td>
<td>1.0</td>
</tr>
<tr>
<td>Library</td>
<td>1.3</td>
</tr>
<tr>
<td>Manufacturing Facility</td>
<td>1.3</td>
</tr>
<tr>
<td>Motel</td>
<td>1.0</td>
</tr>
<tr>
<td>Motion Picture Theatre</td>
<td>1.2</td>
</tr>
<tr>
<td>Multi-Family</td>
<td>0.7</td>
</tr>
<tr>
<td>Museum</td>
<td>1.1</td>
</tr>
<tr>
<td>Office</td>
<td>1.0</td>
</tr>
<tr>
<td>Parking Garage</td>
<td>0.3</td>
</tr>
<tr>
<td>Penitentiary</td>
<td>1.0</td>
</tr>
<tr>
<td>Performing Arts Theatre</td>
<td>1.6</td>
</tr>
<tr>
<td>Police/Fire Station</td>
<td>1.0</td>
</tr>
<tr>
<td>Post Office</td>
<td>1.1</td>
</tr>
<tr>
<td>Religious Building</td>
<td>1.3</td>
</tr>
<tr>
<td>Retail</td>
<td>1.5</td>
</tr>
<tr>
<td>School/University</td>
<td>1.2</td>
</tr>
<tr>
<td>Sports Arena</td>
<td>1.1</td>
</tr>
<tr>
<td>Town Hall</td>
<td>1.1</td>
</tr>
<tr>
<td>Transportation</td>
<td>1.0</td>
</tr>
<tr>
<td>Warehouse</td>
<td>0.8</td>
</tr>
<tr>
<td>Workshop</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 17: Lighting Power Densities Using the Space-by-Space Method (WATTs\textsubscript{b,sp})\textsuperscript{499}

<table>
<thead>
<tr>
<th>Common Space Types</th>
<th>Lighting Power Density (W/ft\textsuperscript{2})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office – Enclosed</td>
<td>1.1</td>
</tr>
<tr>
<td>Office - Open Plan</td>
<td>1.1</td>
</tr>
<tr>
<td>Conference/Meeting/Multipurpose</td>
<td>1.3</td>
</tr>
</tbody>
</table>

\textsuperscript{498} IECC 2009 Lighting Provisions, Section 505 Electrical Power and Lighting Systems, Table 505.5.2 Interior Lighting Power Allowances, Lighting provisions pgs.5-6.

\textsuperscript{499} ASHRAE 90.1-2007 Energy Standard for Building Except Low-Rise Residential Buildings, Table 9.6.1, pp.63-64.
<table>
<thead>
<tr>
<th>Common Space Types</th>
<th>Lighting Power Density (W/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom/Lecture/Training</td>
<td>1.4</td>
</tr>
<tr>
<td>For Penitentiary</td>
<td>1.3</td>
</tr>
<tr>
<td>Lobby</td>
<td>1.3</td>
</tr>
<tr>
<td>For Hotel</td>
<td>1.1</td>
</tr>
<tr>
<td>For Performing Arts Theater</td>
<td>3.3</td>
</tr>
<tr>
<td>For Motion Picture Theater</td>
<td>1.1</td>
</tr>
<tr>
<td>Audience/Seating Area</td>
<td>0.9</td>
</tr>
<tr>
<td>For Gymnasium</td>
<td>0.4</td>
</tr>
<tr>
<td>For Exercise Center</td>
<td>0.3</td>
</tr>
<tr>
<td>For Convention Center</td>
<td>0.7</td>
</tr>
<tr>
<td>For Penitentiary</td>
<td>0.7</td>
</tr>
<tr>
<td>For Religious Buildings</td>
<td>1.7</td>
</tr>
<tr>
<td>For Sports Arena</td>
<td>0.4</td>
</tr>
<tr>
<td>For Performing Arts Theater</td>
<td>2.6</td>
</tr>
<tr>
<td>For Motion Picture Theater</td>
<td>1.2</td>
</tr>
<tr>
<td>For Transportation</td>
<td>0.5</td>
</tr>
<tr>
<td>Atrium - First Three Floors</td>
<td>0.6</td>
</tr>
<tr>
<td>Atrium - Each Additional Floor</td>
<td>0.2</td>
</tr>
<tr>
<td>Lounge/Recreation</td>
<td>1.2</td>
</tr>
<tr>
<td>For Hospital</td>
<td>0.8</td>
</tr>
<tr>
<td>Dining Area</td>
<td>0.9</td>
</tr>
<tr>
<td>For Penitentiary</td>
<td>1.3</td>
</tr>
<tr>
<td>For Hotel</td>
<td>1.3</td>
</tr>
<tr>
<td>For Motel</td>
<td>1.2</td>
</tr>
<tr>
<td>For Bar Lounge/Leisure Dining</td>
<td>1.4</td>
</tr>
<tr>
<td>For Family Dining</td>
<td>2.1</td>
</tr>
<tr>
<td>Food Preparation</td>
<td>1.2</td>
</tr>
<tr>
<td>Laboratory</td>
<td>1.4</td>
</tr>
<tr>
<td>Restrooms</td>
<td>0.9</td>
</tr>
<tr>
<td>Dressing/Locker/Fitting Room</td>
<td>0.6</td>
</tr>
<tr>
<td>Corridor/Transition</td>
<td>0.5</td>
</tr>
<tr>
<td>For Hospitals</td>
<td>1.0</td>
</tr>
<tr>
<td>For Manufacturing Facilities</td>
<td>0.5</td>
</tr>
<tr>
<td>Stairs – Active</td>
<td>0.6</td>
</tr>
<tr>
<td>Active Storage</td>
<td>0.8</td>
</tr>
<tr>
<td>For Hospital</td>
<td>0.9</td>
</tr>
<tr>
<td>Inactive Storage</td>
<td>0.3</td>
</tr>
<tr>
<td>For Museum</td>
<td>0.8</td>
</tr>
<tr>
<td>Electrical/Mechanical</td>
<td>1.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Building Specific Space Types</th>
<th>Lighting Power Density (W/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gymnasium/Exercise Center</td>
<td></td>
</tr>
<tr>
<td>Exercise Area</td>
<td>0.9</td>
</tr>
<tr>
<td>Playing Area</td>
<td>1.4</td>
</tr>
<tr>
<td>Court House/Police Station/Penitentiary</td>
<td></td>
</tr>
<tr>
<td>Courtroom</td>
<td>1.9</td>
</tr>
</tbody>
</table>
### Common Space Types

<table>
<thead>
<tr>
<th></th>
<th>Lighting Power Density (W/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Space Types</strong></td>
<td></td>
</tr>
<tr>
<td>Confinement Cells</td>
<td>0.9</td>
</tr>
<tr>
<td>Judges Chambers</td>
<td>1.3</td>
</tr>
<tr>
<td>Fire Stations</td>
<td></td>
</tr>
<tr>
<td>Engine Room</td>
<td>0.8</td>
</tr>
<tr>
<td>Sleeping Quarters</td>
<td>0.3</td>
</tr>
<tr>
<td>Post Office – Sorting Area</td>
<td>1.2</td>
</tr>
<tr>
<td>Convention Center - Exhibit Space</td>
<td>1.3</td>
</tr>
<tr>
<td>Library</td>
<td></td>
</tr>
<tr>
<td>Card File and Cataloging</td>
<td>1.1</td>
</tr>
<tr>
<td>Stacks</td>
<td>1.7</td>
</tr>
<tr>
<td>Reading Area</td>
<td>1.2</td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
</tr>
<tr>
<td>Emergency</td>
<td>2.7</td>
</tr>
<tr>
<td>Recovery</td>
<td>0.8</td>
</tr>
<tr>
<td>Nurses’ Station</td>
<td>1.0</td>
</tr>
<tr>
<td>Exam/Treatment</td>
<td>1.5</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>1.2</td>
</tr>
<tr>
<td>Patient Room</td>
<td>0.7</td>
</tr>
<tr>
<td>Operating Room</td>
<td>2.2</td>
</tr>
<tr>
<td>Nursery</td>
<td>0.6</td>
</tr>
<tr>
<td>Medical Supply</td>
<td>1.4</td>
</tr>
<tr>
<td>Physical Therapy</td>
<td>0.9</td>
</tr>
<tr>
<td>Radiology</td>
<td>0.4</td>
</tr>
<tr>
<td>Laundry-Washing</td>
<td>0.6</td>
</tr>
<tr>
<td>Automobile - Service/Repair</td>
<td>0.7</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
</tr>
<tr>
<td>Low Bay (&lt; 25 ft. Floor to Ceiling Height)</td>
<td>1.2</td>
</tr>
<tr>
<td>High Bay (≥ 25 ft. Floor to Ceiling Height)</td>
<td>1.7</td>
</tr>
<tr>
<td>Detailed Manufacturing</td>
<td>2.1</td>
</tr>
<tr>
<td>Equipment Room</td>
<td>1.2</td>
</tr>
<tr>
<td>Control Room</td>
<td>0.5</td>
</tr>
<tr>
<td>Hotel/Motel Guest Rooms</td>
<td>1.1</td>
</tr>
<tr>
<td>Dormitory - Living Quarters</td>
<td>1.1</td>
</tr>
<tr>
<td>Museum</td>
<td></td>
</tr>
<tr>
<td>General Exhibition</td>
<td>1.0</td>
</tr>
<tr>
<td>Restoration</td>
<td>1.7</td>
</tr>
<tr>
<td>Bank/Office - Banking Activity Areas</td>
<td>1.5</td>
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### Table 18: EPACT 1992 Baseline Motor Efficiencies

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### Table 19: Minimum Premium Efficiency Motors Compliance Efficiencies

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501 NEMA Premium MG1-2006 Table 12-12
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Table 20: Non-Energy Impacts for Commercial Lighting Measures

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502 Ibid.
### Appendix B: Net to Gross Impact Factors

#### Residential Electric Efficiency Measures

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<td>Insulation, Other FF</td>
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<td>Screw-in Bulbs (piggyback)</td>
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<td>DHW Measures (FF)</td>
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<td>DHW Measures (Electric)</td>
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<td>0%</td>
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<tr>
<td>DHW Showerheads/Aerators (Electric)</td>
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<td>3%</td>
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<tr>
<td>DHW Showerheads/Aerators (Non-Electric)</td>
<td>National Grid</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>97%</td>
</tr>
<tr>
<td>DHW Tank/pipe Wrap (Electric)</td>
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<td>3%</td>
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<td>0%</td>
<td>97%</td>
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<tr>
<td>DHW Tank/pipe Wrap (Non-Electric)</td>
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<tr>
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<tr>
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<tr>
<td>Heat Pump Tune-Up (Electric)</td>
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<tr>
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<tr>
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<td>Programmable Thermostats (Electric)</td>
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<td>Refrigerator (Retirement Value)</td>
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<td>97%</td>
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<tr>
<td>Refrigerators/Freezers (Electric Heat)</td>
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<tr>
<td>Refrigerators/Freezers (Non-Electric Heat)</td>
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<td>0%</td>
<td>97%</td>
</tr>
<tr>
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<td>0%</td>
<td>65%</td>
</tr>
<tr>
<td>Room AC</td>
<td>National Grid</td>
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<td>0%</td>
<td>65%</td>
</tr>
<tr>
<td>Screw-in Bulbs</td>
<td>National Grid</td>
<td>3%</td>
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<td>0%</td>
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</tr>
<tr>
<td>Smart Strips</td>
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<td>SPACE Air Sealing (Electric)</td>
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**OPOWER Program**

| CUSTSERV          | National Grid | 0%  | 0%  | 0%  | 100% |

**ENERGY STAR Lighting**

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<td>Item</td>
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<tr>
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**ENERGY STAR Appliances**

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<tr>
<td>Room AC (Upstream)</td>
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<tr>
<td>Smart Strips</td>
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**Low-Income Residential New Construction**

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**Low-Income 1-4 Family Retrofit**

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<td>Low Income – DHW Measures (Electric)</td>
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## Low Income – Torchieres
National Grid 0% 0% 0% 100%

## Low Income – Waterbed Mattress Replacement
National Grid 0% 0% 0% 100%

## Low Income – Window AC Replacement
National Grid 0% 0% 0% 100%

### Low-Income MultiFamily Retrofit

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<th>Utility</th>
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<th>Gt</th>
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<td><strong>Low Income – ENERGY STAR® CFL Bulbs</strong></td>
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<td><strong>Low Income – ENERGY STAR® CFL Fixtures</strong></td>
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<td><strong>Multifamily – Refrigerators and Freezers</strong></td>
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* The Net-to-Gross factors for Residential Lighting CFL measures are accounted for in the In Service Rate factor.

### EVALUATIONS


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### Commercial Electric Efficiency Measures

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<th>Measure</th>
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<th>SONP</th>
<th>NTG</th>
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<td>C&amp;I Large Retrofit</td>
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### EVALUATIONS
- All factors are from the Massachusetts C&I Electric Net-to-Gross Study.\(^{505}\)


### Residential Natural Gas Measures

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<td><strong>Residential Heating and Water Heating</strong></td>
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<td>Integrated water heater/non-condensing boiler</td>
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### EVALUATIONS

All NTG factors are set to 100% based on no completed evaluations, unless noted otherwise below.

- **Residential Heating and Water Heating**: Free-ridership rates are based on the results of the 2011 impact evaluation for measures that were included in that study.\(^{506}\) The hard-to-reach (HTR) version of each of these measures has assumed free-ridership rates set to 1/3 the value of the non-HTR measure.\(^{507}\)


\(^{507}\) Massachusetts Common Assumption.
### Commercial Natural Gas Efficiency Measures

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<tr>
<td>Furnace (AFUE &gt;= 92%) w/ECM</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>Furnace (AFUE &gt;= 94%) w/ECM</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>Integrated Water Heater/Condensing Boiler (0.86 EF, 0.85 AFUE)</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>Integrated Water Heater/Condensing Boiler (0.86 EF, 0.90 AFUE)</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>Free Standing Water Heater</td>
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<td>0%</td>
<td>0%</td>
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</tr>
<tr>
<td>C&amp;I Retrofit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Rinse Spray Valve</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>Steam Traps</td>
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<td>0%</td>
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</tr>
<tr>
<td>Boiler Reset Controls</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>ES Programmable Thermostats</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>C&amp;I Direct Install</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faucet Aerators</td>
<td>National Grid</td>
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<td>0%</td>
<td>0%</td>
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</tr>
<tr>
<td>Low Flow Shower Heads</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
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</tr>
<tr>
<td>Pre-Rinse Spray Valve</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>Boiler Reset Controls</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
<tr>
<td>ES Programmable Thermostats</td>
<td>National Grid</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>83%</td>
</tr>
</tbody>
</table>

**EVALUATIONS**

All factors are from the Massachusetts C&I Gas Net-to-Gross Study.\(^{508}\)

### Appendix C: Acronyms

<table>
<thead>
<tr>
<th>ACRONYM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Air Conditioning</td>
</tr>
<tr>
<td>AFUE</td>
<td>Annual Fuel Utilization Efficiency (see the Glossary)</td>
</tr>
<tr>
<td>AHU</td>
<td>Air Handling Unit</td>
</tr>
<tr>
<td>Btu</td>
<td>British Thermal Unit (see the Glossary)</td>
</tr>
<tr>
<td>CF</td>
<td>Coincidence Factor (see the Glossary)</td>
</tr>
<tr>
<td>CFL</td>
<td>Compact Fluorescent Lamp</td>
</tr>
<tr>
<td>CHP</td>
<td>Combined Heat and Power</td>
</tr>
<tr>
<td>COP</td>
<td>Coefficient of Performance (see the Glossary)</td>
</tr>
<tr>
<td>DCV</td>
<td>Demand Controlled Ventilation</td>
</tr>
<tr>
<td>DHW</td>
<td>Domestic Hot Water</td>
</tr>
<tr>
<td>DOER</td>
<td>Department of Energy Resources</td>
</tr>
<tr>
<td>DSM</td>
<td>Demand Side Management (see the Glossary)</td>
</tr>
<tr>
<td>ECM</td>
<td>Electrically Commutated Motor</td>
</tr>
<tr>
<td>EER</td>
<td>Energy Efficiency Ratio (see the Glossary)</td>
</tr>
<tr>
<td>EF</td>
<td>Efficiency Factor</td>
</tr>
<tr>
<td>EFLH</td>
<td>Equivalent Full Load Hours (see the Glossary)</td>
</tr>
<tr>
<td>ES</td>
<td>ENERGY STAR® (see the Glossary)</td>
</tr>
<tr>
<td>FCM</td>
<td>Forward Capacity Market</td>
</tr>
<tr>
<td>FR</td>
<td>Free-Ridership (see the Glossary)</td>
</tr>
<tr>
<td>HE</td>
<td>High-Efficiency</td>
</tr>
<tr>
<td>HID</td>
<td>High-Intensity Discharge (a lighting technology)</td>
</tr>
<tr>
<td>HP</td>
<td>Horse Power (see the Glossary)</td>
</tr>
<tr>
<td>HSPF</td>
<td>Heating Seasonal Performance Factor (see the Glossary)</td>
</tr>
<tr>
<td>HVAC</td>
<td>Heating, Ventilating, and Air Conditioning</td>
</tr>
<tr>
<td>ISO</td>
<td>Independent System Operator</td>
</tr>
<tr>
<td>ISR</td>
<td>In-Service Rate (see the Glossary)</td>
</tr>
<tr>
<td>kW</td>
<td>Kilo-Watt, a unit of electric demand equal to 1,000 watts</td>
</tr>
<tr>
<td>kWh</td>
<td>Kilowatt-Hour, a unit of energy (1 kilowatt of power supplied for one hour)</td>
</tr>
<tr>
<td>LED</td>
<td>Light-Emitting Diode (one type of solid-state lighting)</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display (a technology used for computer monitors and similar displays)</td>
</tr>
<tr>
<td>MMBtu</td>
<td>One million British Thermal Units (see “Btu” in the Glossary)</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt – a measure of electric demand equal to 1,000 kilowatts</td>
</tr>
<tr>
<td>MWh</td>
<td>Megawatt-hour – a measure of energy equal to 1,000 kilowatt-hours</td>
</tr>
<tr>
<td>NEB</td>
<td>Non-Electric Benefit (see the Glossary)</td>
</tr>
<tr>
<td>NEI</td>
<td>Non-Energy Impact</td>
</tr>
<tr>
<td>NE-ISO</td>
<td>New England Independent System Operator</td>
</tr>
<tr>
<td>NTG</td>
<td>Net-to-Gross (see the Glossary)</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operations and Maintenance</td>
</tr>
<tr>
<td>PA</td>
<td>Program Administrator (see the Glossary)</td>
</tr>
<tr>
<td>PARIS</td>
<td>Planning And Reporting Information System (a DOER database - see the Glossary)</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>RR</td>
<td>Realization Rate (see the Glossary)</td>
</tr>
<tr>
<td>SEER</td>
<td>Seasonal Energy Efficiency Ratio (see the Glossary)</td>
</tr>
<tr>
<td>SO</td>
<td>Spillover (see the Glossary)</td>
</tr>
<tr>
<td>SPF</td>
<td>Savings Persistence Factor (see the Glossary)</td>
</tr>
<tr>
<td>SSL</td>
<td>Solid-State Lighting (e.g., LED lighting)</td>
</tr>
<tr>
<td>VSD</td>
<td>Variable-Speed Drive</td>
</tr>
</tbody>
</table>
Appendix D: Glossary

This glossary provides definitions as they are applied in this TRM for Massachusetts’ energy efficiency programs. Alternate definitions may be used for some terms in other contexts.

<table>
<thead>
<tr>
<th>TERM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusted Gross Savings</td>
<td>Gross savings (as calculated by the measure savings algorithms) that have been subsequently adjusted by the application of all impact factors except the net-to-gross factors (free-ridership and spillover). For more detail, see the section on Impact Factors for Calculating Adjusted Gross and Net Savings.</td>
</tr>
<tr>
<td>AFUE</td>
<td>Annual Fuel Utilization Efficiency. The measure of seasonal or annual efficiency of a furnace or boiler. AFUE takes into account the cyclic on/off operation and associated energy losses of the heating unit as it responds to changes in the load, which in turn is affected by changes in weather and occupant controls.</td>
</tr>
<tr>
<td>Baseline Efficiency</td>
<td>The level of efficiency of the equipment that would have been installed without any influence from the program or, for retrofit cases where site-specific information is available, the actual efficiency of the existing equipment.</td>
</tr>
<tr>
<td>Btu</td>
<td>British thermal unit. A Btu is approximately the amount of energy needed to heat one pound of water by one degree Fahrenheit.</td>
</tr>
<tr>
<td>Coefficient of Performance (COP)</td>
<td>Coefficient of Performance is a measure of the efficiency of a heat pump, air conditioner, or refrigeration system. A COP value is given as the Btu output of a device divided by the Btu input of the device. The input and output are determined at AHRI testing standards conditions designed to reflect peak load operation.</td>
</tr>
<tr>
<td>Coincidence Factor (CF)</td>
<td>Coincidence Factors represent the fraction of connected load expected to occur concurrent to a particular system peak period; separate CF are found for summer and winter peaks. The CF given in the TRM includes both coincidence and diversity factors multiplied into one number. Coincidence factors are provided for peak periods defined by the NE-ISO for FCM purposes and calculated consistent with the FCM methodology.</td>
</tr>
<tr>
<td>Connected Load kW Savings</td>
<td>The connected load kW savings is the power saved by the equipment while in use. In some cases the savings reflect the maximum power draw of equipment at full load. In other cases the connected load may be variable, which must be accounted for in the savings algorithm.</td>
</tr>
<tr>
<td>Deemed Savings</td>
<td>Savings values (electric, fossil fuel and/or non-energy benefits) determined from savings algorithms with assumed values for all algorithm parameters. Alternatively, deemed savings values may be determined from evaluation studies. A measure with deemed savings will have the same savings per unit since all measure assumptions are the same. Deemed savings are used by program administrators to report savings for measures with well-defined performance characteristics relative to baseline efficiency cases. Deemed savings can simplify program planning and design, but may lead to over- or under-estimation of savings depending on product performance.</td>
</tr>
<tr>
<td>Deemed Calculated Savings</td>
<td>Savings values (electric, fossil fuel and/or non-energy benefits) that depend on a standard savings algorithm and for which at least one of the algorithm parameters (e.g., hours of operation) is project specific.</td>
</tr>
<tr>
<td>Demand Savings</td>
<td>The reduction in demand due to installation of an energy efficiency measure, usually expressed as kW and measured at the customer's meter (see Connected Load kW Savings).</td>
</tr>
<tr>
<td>Demand Side Management (DSM)</td>
<td>Strategies used to manage energy demand including energy efficiency, load management, fuel substitution, and load building.</td>
</tr>
<tr>
<td>Diversity</td>
<td>A characteristic of a variety of electric loads whereby individual maximum demands occur at different times. For example, 50 efficient light fixtures may be installed, but they are not necessarily all on at the same time. See Coincidence Factor.</td>
</tr>
<tr>
<td>TERM</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>Diversity Factor</td>
<td>This TRM uses coincidence factors that incorporate diversity (See Coincidence Factor), thus this TRM has no separate diversity factors. A diversity factor is typically calculated as: 1) the percent of maximum demand savings from energy efficiency measures available at the time of the company’s peak demand, or 2) the ratio of the sum of the demands of a group of users to their coincident maximum demand.</td>
</tr>
</tbody>
</table>
| End Use | Refers to the category of end use or service provided by a measure or technology (e.g., lighting, cooling, etc.). For the purpose of this manual, end uses with their PARIS codes include:  
- ALght: Lighting  
- HVAC: HVAC  
- CMoDr: Motors & Drives  
- DRefr: Refrigeration  
- EHoWa: Hot Water  
- FComA: Compressed Air  
- FProc: Process*  
*For residential measures, “process” is used for products that have low savings, such as consumer electronics, or do not conform to existing end use categories. For commercial and industrial measures, “process” is used for systematic improvements to manufacturing or pump systems, or efficient models of specialty equipment not covered in other end uses. |
| Energy Efficiency Ratio (EER) | The Energy Efficiency Ratio is a measure of the efficiency of a cooling system at a specified peak, design temperature, or outdoor temperature. In technical terms, EER is the steady-state rate of heat energy removal (i.e. cooling capacity) of a product measured in Btuh output divided by watts input. |
| ENERGY STAR® (ES) | Brand name for the voluntary energy efficiency labeling initiative sponsored by the U.S. Environmental Protection Agency. |
| Energy Costing Period | A period of relatively high or low system energy cost, by season. The energy periods defined by ISO-NE are:  
- **Summer Peak**: 6am–10pm, Monday–Friday (except ISO holidays), June–September  
- **Summer Off-Peak**: Summer hours not included in the summer peak hours: 10pm–6am, Monday–Friday, all day on Saturday and Sunday, and ISO holidays, June–September  
- **Winter Peak**: 6am–10pm, Monday–Friday (except ISO holidays), January–May and October–December  
- **Winter Off-Peak**: Winter hours not included in the sinter peak hours: 10pm–6am, Monday–Friday, all day on Saturday and Sunday, and ISO holidays, January–May and October–December. |
<p>| Equivalent Full Load Hours (EFLH) | The equivalent hours that equipment would need to operate at its peak capacity in order to consume its estimated annual kWh consumption (annual kWh/connected kW). |
| Free Rider | A customer who participates in an energy efficiency program, but would have installed some or all of the same measure(s) on their own, with no change in timing of the installation, if the program had not been available. |
| Free-Ridership Rate | The percentage of savings attributable to participants who would have installed the measures in the absence of program intervention. |
| Gross kW | Expected demand reduction based on a comparison of standard or replaced equipment and equipment installed through an energy efficiency program. |
| Gross kWh | Expected kWh reduction based on a comparison of standard or replaced equipment and equipment installed through an energy efficiency program. |</p>
<table>
<thead>
<tr>
<th>TERM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Savings</td>
<td>A saving estimate calculated from objective technical factors. In this TRM, “gross savings” are calculated with the measure algorithms and do not include any application of impact factors. Once impact factors are applied, the savings are called “Adjusted Gross Savings”. For more detail, see the section on Impact Factors for Calculating Adjusted Gross and Net Savings.</td>
</tr>
<tr>
<td>High Efficiency (HE)</td>
<td>Refers to the efficiency measures that are installed and promoted by the energy efficiency programs.</td>
</tr>
<tr>
<td>Horsepower (HP)</td>
<td>A unit for measuring the rate of doing work. One horsepower equals about three-fourths of a kilowatt (745.7 watts).</td>
</tr>
<tr>
<td>Heating Seasonal Performance Factor (HSPF)</td>
<td>A measure of the seasonal heating mode efficiencies of heat pumps expressed as the ratio of the total heating output to the total seasonal input energy.</td>
</tr>
<tr>
<td>Impact Factor</td>
<td>Generic term for a value used to adjust the gross savings estimated by the savings algorithms in order to reflect the actual savings attributable to the efficiency program. In this TRM, impact factors include realization rates, in-service rates, savings persistence, peak demand coincidence factors, free-ridership, spillover and net-to-gross factors. See the section on Impact Factors for more detail.</td>
</tr>
<tr>
<td>In-Service Rate</td>
<td>The percentage of units that are actually installed. For example, efficient lamps may have an in-service rate less than 100% since some lamps are purchased as replacement units and are not immediately installed. The in-service rate for most measures is 100%.</td>
</tr>
<tr>
<td>Measure Life</td>
<td>The number of years that an efficiency measure is expected to garner savings. These are generally based on engineering lives, but sometimes adjusted based on observations of market conditions.</td>
</tr>
<tr>
<td>Lost Opportunity</td>
<td>Refers to a measure being installed at the time of planned investment in new equipment or systems. Often this reflects either new construction, renovation, remodeling, planned expansion or replacement, or replacement of failure.</td>
</tr>
<tr>
<td>Measure</td>
<td>A product (a piece of equipment), combination of products, or process designed to provide energy and/or demand savings. Measure can also refer to a service or a practice that provides savings. Measure can also refer to a specific combination of technology and market/customer/practice/strategy (e.g., direct install low income CFL).</td>
</tr>
<tr>
<td>Net Savings</td>
<td>The final value of savings that is attributable to a program or measure. Net savings differs from gross savings (or adjusted gross savings) because it includes adjustments due to free-ridership and/or spillover. Net savings is sometimes referred to as “verified” or “final” savings. For more detail see the section on Impact Factors for Calculating Adjusted Gross and Net Savings.</td>
</tr>
<tr>
<td>Net-to-Gross Ratio</td>
<td>The ratio of net savings to the adjusted gross savings (for a measure or program). The adjusted gross savings include any adjustment by the impact factors other than free-ridership or spillover. Net-to-gross is usually expressed as a percent.</td>
</tr>
<tr>
<td>Non-Electric Benefits (NEBs)</td>
<td>Quantifiable benefits (beyond electric savings) that are the result of the installation of a measure. Fossil fuel, water, and maintenance are examples of non-electric benefits. Non-electric benefits can be negative (i.e. increased maintenance or increased fossil fuel usage which results from a measure) and therefore are sometimes referred to as “non-electric impacts”.</td>
</tr>
<tr>
<td>Non-Participant</td>
<td>A customer who is eligible to participate in a program, but does not. A non-participant may install a measure because of a program, but the installation of the measure is not through regular program channels; as a result, their actions are normally only detected through evaluations.</td>
</tr>
<tr>
<td>On-Peak kW</td>
<td>See Summer/Winter On-peak kW</td>
</tr>
<tr>
<td>Operating Hours</td>
<td>Hours that a piece of equipment is expected to be in operation, not necessarily at full load (typically expressed per year).</td>
</tr>
<tr>
<td>TERM</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PARIS</td>
<td>Planning And Reporting Information System, a statewide database maintained by the Department of Energy Resources (DOER) that emulates the program administrators’ screening model. As a repository for quantitative data from plans, preliminary reports, and reports, PARIS generates information that includes funding sources, customer profiles, program participation, costs, savings, cost-effectiveness and program impact factors from evaluation studies. DOER developed PARIS in 2003 as a collaborative effort with the Department of Public Utilities and the electric program administrators. Beginning with the 2010 plans, PARIS holds data from gas program administrators.</td>
</tr>
<tr>
<td>Participant</td>
<td>A customer who installs a measure through regular program channels and receives any benefit (i.e. incentive) that is available through the program because of their participation. Free-riders are a subset of this group.</td>
</tr>
<tr>
<td>Prescriptive Measure</td>
<td>A prescriptive measure is generally offered by use of a prescriptive form with a prescribed incentive based on the parameters of the efficient equipment or practice.</td>
</tr>
<tr>
<td>Program Administrator (PA)</td>
<td>Those entities that oversee public benefit funds in the implementation of energy efficiency programs. This generally includes regulated utilities, other organizations chosen to implement such programs, and state energy offices. The Massachusetts electric PAs include Cape Light Compact, National Grid, NSTAR, Western Massachusetts Electric Company (WMECO), and Unitil. The Massachusetts natural gas PAs include Berkshire Gas, Blackstone Gas Company, Columbia Gas of Massachusetts, National Grid, New England Gas Company, NSTAR, and Unitil.</td>
</tr>
<tr>
<td>Realization Rate (RR)</td>
<td>The ratio of measure savings developed from impact evaluations to the estimated measure savings derived from the TRM savings algorithms. This factor is used to adjust the estimated savings when significant justification for such adjustment exists. The components of the realization rate are described in detail in the section on Impact Factors.</td>
</tr>
<tr>
<td>Retrofit</td>
<td>The replacement of a piece of equipment or device before the end of its useful or planned life for the purpose of achieving energy savings. &quot;Retrofit&quot; measures are sometimes referred to as &quot;early retirement&quot; when the removal of the old equipment is aggressively pursued.</td>
</tr>
<tr>
<td>Savings Persistence Factor (SPF)</td>
<td>Percentage of first-year energy or demand savings expected to persist over the life of the installed energy efficiency equipment. The SPF is developed by conducting surveys of installed equipment several years after installation to determine the operational capability of the equipment. In contrast, measure persistence takes into account business turnover, early retirement of installed equipment, and other reasons the installed equipment might be removed or discontinued. Measure persistence is generally incorporated as part of the measure life, and therefore is not included as a separate impact factor.</td>
</tr>
<tr>
<td>Seasonal Energy Efficiency Ratio (SEER)</td>
<td>A measurement of the efficiency of a central air conditioner over an entire season. In technical terms, SEER is a measure of equipment the total cooling of a central air conditioner or heat pump (in Btu) during the normal cooling season as compared to the total electric energy input (in watt-hours) consumed during the same period.</td>
</tr>
<tr>
<td>Seasonal Peak kW</td>
<td>See Summer/Winter Seasonal Peak kW, and Summer/Winter On-Peak Peak kW.</td>
</tr>
<tr>
<td>Sector</td>
<td>A system for grouping customers with similar characteristics. For the purpose of this manual, the sectors are Commercial and Industrial (C&amp;I), Small Business, Residential, and Low Income.</td>
</tr>
<tr>
<td>Spillover Rate</td>
<td>The percentage of savings attributable to the program, but additional to the gross (tracked) savings of a program. Spillover includes the effects of (a) participants in the program who install additional energy efficient measures outside of the program as a result of hearing about the program and (b) non-participants who install or influence the installation of energy efficient measures as a result of being aware of the program.</td>
</tr>
<tr>
<td>Summer/Winter On-Peak kW</td>
<td>The average demand reduction during the summer/winter on-peak period. The summer on-peak period is 1pm-5pm on non-holiday weekdays in June, July and August; the winter on-peak period is 5pm-7pm on non-holiday weekdays in December and January.</td>
</tr>
<tr>
<td>TERM</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Summer/Winter Seasonal Peak kW</td>
<td>The demand reduction occurring when the actual, real-time hourly load for Monday through Friday on non-holidays, during the months of June, July, August, December, and January, as determined by the ISO, is equal to or greater than 90% of the most recent 50/50 system peak load forecast, as determined by the ISO, for the applicable summer or winter season.</td>
</tr>
<tr>
<td>Ton</td>
<td>Unit of measure for determining cooling capacity. One ton equals 12,000 Btu.</td>
</tr>
<tr>
<td>Watt</td>
<td>A unit of electrical power. Equal to 1/1000 of a kilowatt.</td>
</tr>
</tbody>
</table>
APPENDIX D
Performance Incentive Supporting Documentation
Shareholder Incentive Calculation
Summary
## National Grid Electric 2010 Performance

### Total Program Cost + Participant Cost

<table>
<thead>
<tr>
<th>Metric</th>
<th>Total</th>
<th>Participant Cost</th>
<th>% Net Benefits</th>
<th>Adjusted Net Benefits</th>
<th>Savings Value</th>
<th>Performance Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Residential</td>
<td>98,276</td>
<td>149,801,552</td>
<td>51,379,520</td>
<td>98,422,032</td>
<td>1,072,247</td>
<td>793,260</td>
</tr>
<tr>
<td>B - Low Income</td>
<td>6,563</td>
<td>32,826,734</td>
<td>10,678,639</td>
<td>22,148,095</td>
<td>234,967</td>
<td>178,509</td>
</tr>
<tr>
<td>C - Commercial &amp; Industrial</td>
<td>190,072</td>
<td>279,036,690</td>
<td>72,486,146</td>
<td>206,550,543</td>
<td>1,997,284</td>
<td>1,664,753</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>294,910</strong></td>
<td><strong>461,664,975</strong></td>
<td><strong>134,544,305</strong></td>
<td><strong>327,120,670</strong></td>
<td><strong>3,304,497</strong></td>
<td><strong>2,636,523</strong></td>
</tr>
</tbody>
</table>

2010 Savings as percent of 2010 goal: 101.77%

2010 Net Benefits as percent of 2010 goal: 98.37% Must be at least 75%

### Savings Value Payout Rate

<table>
<thead>
<tr>
<th>Rate</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0081</td>
<td>3,304,497</td>
<td>Savings Value Payout Rate: 0.0081 As Approved in Plan</td>
</tr>
</tbody>
</table>

### Performance Metrics

- 2010 Savings as percent of 2010 goal: 101.77%
- 2010 Net Benefits as percent of 2010 goal: 98.37% Must be at least 75%

### Notes

- The savings and value factors of the performance incentive were calculated based on evaluated electric savings and allocated to programs based on evaluated net benefits.
- The performance incentive factor was allocated to programs based on 2011 E330 assumptions.
## National Grid Gas 2010 Performance

### SHAREHOLDER INCENTIVE CALCULATION

**Adjusted Net Benefits Savings Value Performance Measure**

<table>
<thead>
<tr>
<th>Program</th>
<th>Preliminary Total Benefits</th>
<th>Payout Rate</th>
<th>Net Benefits</th>
<th>Savings</th>
<th>Value</th>
<th>Payout Rate</th>
<th>Pre-incentive Saviors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preliminary Annual</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Residential New Construction &amp; Major Renovations</td>
<td>109,723</td>
<td>3,334,530 $</td>
<td>1,761,081 $</td>
<td>3.7%</td>
<td>1,461,116 $</td>
<td>24,650 $</td>
<td>15,051 $</td>
</tr>
<tr>
<td>2. Multifamily Retrofit</td>
<td>447,677</td>
<td>10,634,840 $</td>
<td>9,273,069 $</td>
<td>3.2%</td>
<td>1,264,550 $</td>
<td>78,618 $</td>
<td>13,026 $</td>
</tr>
<tr>
<td>3. O Power</td>
<td>416,355</td>
<td>2,132,082 $</td>
<td>1,203,964 $</td>
<td>2.2%</td>
<td>861,857 $</td>
<td>15,761 $</td>
<td>8,878 $</td>
</tr>
<tr>
<td>4. Deep Energy Retrofit</td>
<td>730,000</td>
<td>692,456 $</td>
<td>656,012 $</td>
<td>0.1%</td>
<td>33,842 $</td>
<td>5,119 $</td>
<td>349 $</td>
</tr>
<tr>
<td>5. Residential Building Practices and Demonstration Program</td>
<td>-</td>
<td>- $</td>
<td>485,682 $</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>6. Energy Analysis: Internet Audit Program</td>
<td>-</td>
<td>- $</td>
<td>85,815 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>7. Workforce Development</td>
<td>-</td>
<td>- $</td>
<td>151,963 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>8. EEAC Consultants</td>
<td>-</td>
<td>- $</td>
<td>286,276 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>9. DOER Assessment</td>
<td>-</td>
<td>- $</td>
<td>135,153 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>10. Low Income Energy Affordability Network Funding</td>
<td>-</td>
<td>- $</td>
<td>27,408 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>11. Statewide Marketing &amp; Education</td>
<td>-</td>
<td>- $</td>
<td>95,519 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>12. Deep Energy Retrofit</td>
<td>-</td>
<td>- $</td>
<td>247,474 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>13. EEAC Consultants</td>
<td>-</td>
<td>- $</td>
<td>130,979 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td>14. DOER Assessment</td>
<td>-</td>
<td>- $</td>
<td>89,196 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td><strong>Total Benefits</strong></td>
<td>3,235,246</td>
<td>58,397,109 $</td>
<td>27,298,616 $</td>
<td>71.4%</td>
<td>22,205,421 $</td>
<td>235,017 $</td>
<td>228,739 $</td>
</tr>
<tr>
<td><strong>Savings</strong></td>
<td>219,547</td>
<td>14,192,140 $</td>
<td>6,682,057 $</td>
<td>75.1%</td>
<td>6,496,724 $</td>
<td>90,735 $</td>
<td>66,923 $</td>
</tr>
<tr>
<td><strong>Low-Income Single Family Retrofit</strong></td>
<td>158,615</td>
<td>12,273,913 $</td>
<td>5,598,019 $</td>
<td>86.5%</td>
<td>6,496,724 $</td>
<td>90,735 $</td>
<td>66,923 $</td>
</tr>
<tr>
<td><strong>Low-Income MultiFamily Retrofit</strong></td>
<td>60,932</td>
<td>1,918,226 $</td>
<td>876,921 $</td>
<td>13.5%</td>
<td>1,013,359 $</td>
<td>14,180 $</td>
<td>10,439 $</td>
</tr>
<tr>
<td><strong>C&amp;I New Construction &amp; Major Renovation</strong></td>
<td>1,597,318</td>
<td>31,791,384 $</td>
<td>9,279,488 $</td>
<td>71.4%</td>
<td>22,205,421 $</td>
<td>235,017 $</td>
<td>228,739 $</td>
</tr>
<tr>
<td><strong>C&amp;I Retrofit</strong></td>
<td>1,537,432</td>
<td>25,944,844 $</td>
<td>17,470,273 $</td>
<td>26.9%</td>
<td>8,359,199 $</td>
<td>141,796 $</td>
<td>86,108 $</td>
</tr>
<tr>
<td><strong>Energy Analysis: Internet Audit Program</strong></td>
<td>-</td>
<td>- $</td>
<td>36,065 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td><strong>Workforce Development</strong></td>
<td>-</td>
<td>- $</td>
<td>157,798 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td><strong>Statewide Marketing &amp; Education</strong></td>
<td>-</td>
<td>- $</td>
<td>157,586 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td><strong>Low Income Energy Affordability Network Funding</strong></td>
<td>-</td>
<td>- $</td>
<td>90,513 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td><strong>DOER Assessment</strong></td>
<td>-</td>
<td>- $</td>
<td>89,196 $</td>
<td>-</td>
<td>- $</td>
<td>- $</td>
<td>- $</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,326,067</td>
<td>136,434,255 $</td>
<td>58,341,684 $</td>
<td>78.1%</td>
<td>78,092,571 $</td>
<td>1,008,586 $</td>
<td>804,435 $</td>
</tr>
</tbody>
</table>

**2010 Savings as percent of 2010 goal** 101.16%

**2010 Benefits as percent of 2010 goal** 98.40% Must be at least 75%

**2010 Net Benefits as percent of 2010 goal** 118.5% Must be at least 75%

**Savings** 10,000 $ Savings Payout Rate 0.0074 $

**Value** 10,000 $ Value Payout Rate 0.0103 $

### Notes:
The savings and value portions of the performance incentive were calculated based on preliminary gas savings and projected program benefits as stated in the approved 3 year plan. Future years should use evaluated results.
### National Grid 2010 Performance Metrics Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>National Grid Electric Final 2010 Production</th>
<th>National Grid Gas Final 2010 Production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESIDENTIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RES #1 MassSAVE/Weatherization: Deeper Savings</td>
<td>Increase in # of Customers: <strong>Design</strong></td>
<td>Increase in # of Customers: <strong>None -did not meet.</strong></td>
</tr>
<tr>
<td>RES #2 MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>RES #3 CoolSmart</td>
<td>Threshold</td>
<td>N/A</td>
</tr>
<tr>
<td>RES #4 Community Initiatives</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>RES #5 MassSAVE: Facilitate Inclusion of Independent Energy Auditors</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td><strong>LOW INCOME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Income #1. Hard to Reach Landlords</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>Low Income #2. New Measures</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>Low Income #3. Multi-family Building Inventory</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td><strong>COMMERCIAL AND INDUSTRIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I #1 Small Business Electric and Gas Integration</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
<tr>
<td>C&amp;I #2 Targeted Customer Segments</td>
<td>Exemplary</td>
<td>Threshold</td>
</tr>
<tr>
<td>C&amp;I #3 Combined Heat &amp; Power (CHP)</td>
<td>Exemplary</td>
<td>None -did not meet.</td>
</tr>
<tr>
<td>C&amp;I #4 Retrofit Depth of Savings</td>
<td>Exemplary</td>
<td>Threshold</td>
</tr>
<tr>
<td>C&amp;I #5 N/C Comprehensiveness and Depth of Savings</td>
<td>Exemplary</td>
<td>Design</td>
</tr>
<tr>
<td><strong>OTHER FUNDING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Program Funding</td>
<td>None -did not meet.</td>
<td>None -did not meet.</td>
</tr>
<tr>
<td>Other Financing Capital</td>
<td>Exemplary</td>
<td>None -did not meet.</td>
</tr>
</tbody>
</table>
### National Grid Electric MA Performance Metrics and Incentives for 2010

<table>
<thead>
<tr>
<th>RESIDENTIAL METRICS</th>
<th>Target Levels</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Threshold</td>
<td>Design</td>
</tr>
<tr>
<td></td>
<td>Units/Task</td>
<td>Dollars</td>
</tr>
<tr>
<td>Residential #1: MassSAVE/Weatherization: Deeper Savings (Electric &amp; Gas)</td>
<td>2.5% $61,090</td>
<td>5% $81,454</td>
</tr>
<tr>
<td>Threshold (1): Achieve an increase in number of customers installing major measures* in 2010 of 2.5%<strong>, as compared with 2009, and/or achieve an increase in average MMBTU savings per customer installing one or more major measures in 2010 of 2.5%</strong>*, as compared with customers who installed major measures in 2009. Each PA to submit documentation showing performance relative to targets.</td>
<td>2.5% $61,090</td>
<td>5% $81,454</td>
</tr>
<tr>
<td>Design (2): Achieve an increase in number of customers installing major measures in 2010 of 5%, as compared with 2009, and/or achieve an increase in average MMBTU savings per customer installing one or more major measures in 2010 of 7.5%, as compared with customers who installed major measures in 2009. Each PA to submit documentation showing performance relative to targets.</td>
<td>5% $81,454</td>
<td>7.5% $101,817</td>
</tr>
<tr>
<td>Exemplary (3): Achieve an increase in number of customers installing major measures in 2010 of 7.5%, as compared with 2009, and/or achieve an increase in average MMBTU savings per customer installing one or more major measures in 2010 of 7.5%, as compared with customers who installed major measures in 2009. Each PA to submit documentation showing performance relative to targets.</td>
<td>7.5% $101,817</td>
<td></td>
</tr>
<tr>
<td>MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration (Electric &amp; Gas) increase of customer results:</td>
<td>Non</td>
<td>30</td>
</tr>
<tr>
<td>MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration (Electric &amp; Gas) increase of savings results:</td>
<td>7.5% Exemplary $101,817</td>
<td></td>
</tr>
<tr>
<td>Residential #2: MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration (Electric &amp; Gas) results:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold (1): Coordinate among all of the residential direct-installation lighting efforts and the Products program on the availability of specialty bulbs for direct installations. Produce a memo from all PA’s proposing a strategy to use the current direct-installation bulb procurement process, or an alternative, to ensure the availability of consistent quality specialty bulbs across all PA programs promoting efficient residential lighting. Memo focusing on specialty bulbs to EEAC consultants by 4/30/10. EEAC consultant comments by 5/15/10. Final memo by 5/30/10.</td>
<td>1 $122,180</td>
<td></td>
</tr>
<tr>
<td>Design (2): Achieve an overall average increase in number of DI bulbs installed per customer served in Q3-Q4 2010 of 25% or an average total of 11 bulbs, which is greater. Base year will be 2009.</td>
<td>2 $162,907</td>
<td></td>
</tr>
<tr>
<td>Exemplary (3): Achieve an overall average increase in number of DI bulbs installed per customer served in Q3-Q4 2010 of 40% or an average total of 12 bulbs, which is greater. Base year will be 2009.</td>
<td>3 $203,634</td>
<td></td>
</tr>
<tr>
<td>MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration (Electric &amp; Gas) results:</td>
<td>3 Exemplary $203,634</td>
<td></td>
</tr>
<tr>
<td>Residential #3: Coolsmart: Increase % of correct installations (Electric)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold (1): 16% of homes participating in the CoolSmart program that receive an efficient equipment rebate for ducted systems will have equipment installations that include both QI (charge &amp; airflow) and proper sizing (based on completed Manual J) services.</td>
<td>16% $54,302</td>
<td></td>
</tr>
<tr>
<td>Design (2): 18% of homes participating in the CoolSmart program that receive an efficient equipment rebate for ducted systems will have equipment installations that include both QI (charge &amp; airflow) and proper sizing (based on completed Manual J) services.</td>
<td>18% $72,403</td>
<td></td>
</tr>
<tr>
<td>Exemplary (3): 20% (Tier 1) of homes participating in the CoolSmart program that receive an efficient equipment rebate for ducted systems will have equipment installations that include both QI (charge &amp; airflow) and proper sizing (based on completed Manual J) services.</td>
<td>20%, w/ 10% $90,504</td>
<td></td>
</tr>
<tr>
<td>Coolsmart: Increase % of correct installations (Electric) results:</td>
<td>16% Threshold $54,302</td>
<td></td>
</tr>
<tr>
<td>Residential #4: Community Initiatives (Electric &amp; Gas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold (1): Each PA will develop and implement at least one (1) community-based initiative, in collaboration with community-based personnel, to deliver energy efficient services to at least six (6) communities (e.g. Cities, towns, neighborhoods) in the Commonwealth. Gas and electric PAs will cooperate, as appropriate, on initiatives in shared towns. A shared initiative will be counted as one (1) initiative for each PA.</td>
<td>1 $122,180</td>
<td></td>
</tr>
<tr>
<td>Design (2): Establish a PA Community Initiatives working group to coordinate with any pertinent EEAC working groups, and to coordinate on-going community initiative efforts.</td>
<td>2 $162,907</td>
<td></td>
</tr>
<tr>
<td>Exemplary (3): Produce a final report documenting the results of the initiatives, includes lessons learned, by January 31, 2011. Each PA to submit a memo to EEAC consultants and DOER by January 31, 2011 detailing their distinct and clear role in accomplishing this activity.</td>
<td>3 $203,634</td>
<td></td>
</tr>
<tr>
<td>Community Initiatives (Electric &amp; Gas) results:</td>
<td>3 Exemplary $203,634</td>
<td></td>
</tr>
</tbody>
</table>
National Grid Electric MA Performance Metrics and Incentives for 2010

<table>
<thead>
<tr>
<th>Threshold Design Exemplary</th>
<th>Units/Task Dollars</th>
<th>Units/Task Dollars</th>
<th>Units/Task Dollars</th>
<th>Actual Units/Task Achieved To Date</th>
<th>Level Achieved To Date</th>
<th>Pre Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential #5:</strong> MassSAVE Facilitate Inclusion of Independent Energy Auditors (Electric &amp; Gas)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Threshold (1):</strong> To address the need to engage independent energy auditors in the auditing services of the RCS-auditing service of the MassSAVE program, the PA’s will: 1) Document the standards for vendor services (e.g. accreditation/certifications, cost-effectiveness, administration, reporting to DOER and PA’s, training requirements, pricing) and provide a detailed specification on each component of the new program audit process. 2) Prepare and send an RFQ to independent energy auditors to determine the approximate pool of qualified individuals and companies. Each PA to submit a memo to IEAC consultants and DOER by May 1, 2010 detailing their distinct and clear role in accomplishing this activity.</td>
<td>1 $122,180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Design (2):</strong> Each PA will work to expand the pool of independent auditors, identified through the RFQ process, qualified to deliver auditing services in the Commonwealth. Each PA will coordinate with their primary vendor to integrate customers brought to the program by pre-qualified independent energy auditors. Each PA to submit a memo to IEAC consultants and DOER by July 1, 2010 detailing their distinct and clear role in accomplishing this activity.</td>
<td>2 $162,907</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exemplary (3):</strong> Prepare a statewide multi-PA report documenting the initiative to be delivered to IEAC consultants and DOER by January 31, 2011. Include in the report lessons learned and recommendations for continuing efforts to expand the program services delivery base. Each PA to submit a memo to IEAC consultants and DOER by January 31, 2011, detailing their distinct and clear role in preparing the report.</td>
<td>3 $203,634</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MassSAVE Facilitate Inclusion of Independent Energy Auditors (Electric &amp; Gas) results:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal for Residential Metrics:</strong></td>
<td>$543,024</td>
<td>$724,033</td>
<td>$905,041</td>
<td>$767,022</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LOW INCOME METRICS**

**Law Income #1: Hard to Reach Landlords (Electric & Gas)**

| Threshold (1): Establish a subcommittee consisting of members of the Best Practices Working Group with representatives from all gas and electric program administrators to design and develop a cost-effective statewide landlord early retirement high efficiency heating incentive initiative. Incentive plan should target single family (1-4 units) and should be completed by August 1, 2010. | | | | | | |
| **Design (2):** Each program administrator to develop a database consisting of landlords in their respective service territories of low-income tenants that pay their own heating bills by September 30, 2010. | 2 $181,008 | | | | | |
| **Exemplary (3):** Working group to develop and initiate a statewide marketing plan prior to 2010-2011 heating season. Each program administrator to use their individual database to target market and submit a final report of participation and any lessons learned to the Best Practices Working Group by January 30, 2011. | 3 $226,260 | | | | | |
| **Hard to Reach Landlords (Electric & Gas) results:** | | | | | | |
| **Law Income #2: New Measures** | | | | | | |
| **Threshold (1):** In coordination with LEAN, implement best practices to achieve deeper energy savings. Best Practices meet monthly, with each PA participating, to discuss and pursue new technologies and deeper measure penetration, and to review new measures for review. PA’s will provide written updates on meetings, technical analyses performed, and additional best practices implemented. Each PA will accept an assignment with respect to written products. | 1 $135,756 | | | | | |
| **Design (2):** Study possible new program measures that are above and beyond the DOE measure list, specifically, but not limited to: 1) mixed-use building and power (with emphasis on three-deckers, six-flats and single family homes), 2) indirect water heating, 3) demand control measurements (if feasible and available), 4) LED lighting, and 5) outdoor areas for new building designs. Cost-effectiveness analysis will be conducted by the PA’s common assumptions group, or the equivalent, which shall include LEAN for this purpose within eight weeks of referral by Best Practices, with final reports of analysis no later than June 15, 2010. | 2 $181,008 | | | | | |
| **Exemplary (3):** For each measure that passes the common assumptions group cost-effectiveness screening, implement field testing of new program measures in 2010. Document results and findings in a memo to IEAC consultants by April 1, 2011, including: measurement of savings per home due to each measure. Where field testing indicates if it is appropriate to do so, there will be re-assessing of Common Assumptions and/or a second field test. Each PA will conduct field testing with respect to each such measure and provide a memo documenting results. PA field tests will include a sufficient number of installations for each measure, reasonable in proportion to the size of each utility budget to yield reliable field test results, as set out in table, and will begin no later than two months after the relevant Common Assumption report. | 3 $226,260 | | | | | |

**New Measures results:** | | | | | | |
| **Law Income #3: Multi-family Building Inventory** | | | | | | |
| | | | | | |
### National Grid Electric MA Performance Metrics and Incentives for 2010

<table>
<thead>
<tr>
<th>Threshold/Design Exemplary</th>
<th>Units/Task Dollars</th>
<th>Actual Units/Task Achieved To Date</th>
<th>Level Achieved To Date</th>
<th>Pre Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COMMERCIAL &amp; INDUSTRIAL METRICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;I #1: Small Business Electric and Gas Integration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold NGrid Electric</td>
<td>94,887</td>
<td>$181,454</td>
<td>105,429</td>
<td>$108,605</td>
</tr>
<tr>
<td>Design: NGrid Electric</td>
<td>94,887</td>
<td>$181,454</td>
<td>105,429</td>
<td>$108,605</td>
</tr>
<tr>
<td>Exemplary: NGrid Electric</td>
<td>115,972</td>
<td>$135,756</td>
<td>155,756</td>
<td>$135,756</td>
</tr>
</tbody>
</table>

Small Business Electric Integration results:
- **Threshold (30% increase):** NGrid Electric $81,454
- **Design (30% increase):** NGrid Electric $108,605
- **Exemplary (40% increase):** NGrid Electric $135,756

Targeted Customer Segments (Electric) results:
- **Threshold:** NGrid Electric $40,727
- **Design (30% increase):** NGrid Electric $54,302
- **Exemplary (40% increase):** NGrid Electric $67,878

<table>
<thead>
<tr>
<th><strong>C&amp;I #2: Targeted Customer Segments</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>During 2010, develop projects not initiated prior to 1/1/10 and obtain commitments to follow through with implementation from X data centers, high performance labs/clean rooms or industrial facilities. To qualify:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold (20% increase): NGrid Electric</td>
<td>$81,454</td>
<td>$108,605</td>
</tr>
<tr>
<td>Design (30% increase): NGrid Electric</td>
<td>$108,605</td>
<td>$135,756</td>
</tr>
<tr>
<td>Exemplary (40% increase): NGrid Electric</td>
<td>$135,756</td>
<td>$135,756</td>
</tr>
</tbody>
</table>

Targeted Customer Segments (Electric) results:
- **Threshold:** NGrid Electric $81,454
- **Design (30% increase):** NGrid Electric $108,605
- **Exemplary (40% increase):** NGrid Electric $135,756

<table>
<thead>
<tr>
<th><strong>C&amp;I #3: Combined Heat &amp; Power</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Each PA will complete X Combined Heat &amp; Power commitments in 2010. A commitment either a signed application or MOC between the PA and customer. Targets are not additive. Electric and Gas PA targets reflect the same</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold NGrid Electric X</td>
<td>$81,454</td>
<td>$108,605</td>
</tr>
<tr>
<td>Design: NGrid Electric X</td>
<td>$105,429</td>
<td>$135,756</td>
</tr>
<tr>
<td>Exemplary: NGrid Electric X</td>
<td>$135,756</td>
<td>$135,756</td>
</tr>
</tbody>
</table>

Combined Heat & Power (Electric) results:
- **Threshold:** NGrid Electric X $81,454
- **Design (30% increase):** NGrid Electric X $108,605
- **Exemplary (40% increase):** NGrid Electric X $135,756

**C&I #4: Retrofits – Depth of Savings:** Begin implementation of efforts at capturing whole-building (defined as the whole space under mgmt & control of the customer, which can include tenant space in a larger bldg), deep savings of both electric and gas.

<table>
<thead>
<tr>
<th><strong>Threshold</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold NGrid Electric X</td>
<td>$101,817</td>
<td></td>
</tr>
<tr>
<td>Design: NGrid Electric X</td>
<td>$135,756</td>
<td></td>
</tr>
<tr>
<td>Exemplary: NGrid Electric X</td>
<td>$135,756</td>
<td></td>
</tr>
</tbody>
</table>

**Retrofit – Depth of Savings Electric “X” results:**
- **Threshold:** NGrid Electric X $101,817
- **Design (20% increase):** NGrid Electric X $135,756
- **Exemplary (25% increase):** NGrid Electric X $135,756

**Retrofit – Depth of Savings Electric “Y” results:**
- **Threshold:** NGrid Electric Y $20% $101,817 $135,756 $135,756
- **Design (20% increase):** NGrid Electric Y $20% $135,756 $135,756
- **Exemplary (25% increase):** NGrid Electric Y $20% $135,756 $135,756

---

**Notes:**
- All thresholds are based on a three-year project, beginning in 2010 and ending in 2012.
- Incentives are calculated based on percentage of threshold achievement, with a maximum cap per project.
- Incentives are subject to audit and approval by the utility.

---

**Exemplary:**
- By January 1, 2011, each PA will submit a status report of the implementation of the inventory, together with recommendations going forward. The status report will include a summary of what has been learned to-date relating to energy consumption in non-profit, low-income, multi-family buildings (e.g., average BTU/square foot, reasonable target consumption, reasonable threshold consumption for treatment).

---

**Subtotal for Low Income Metrics:**
- Threshold: $407,268
- Design: $543,024
- Exemplary: $678,781

**Total Subtotal:** $678,781
### National Grid Electric MA Performance Metrics and Incentives for 2010

<table>
<thead>
<tr>
<th>Units/Task</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Actual Units/Task Achieved To Date</th>
<th>Level Achieved To Date</th>
<th>Pre Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>C&amp;I #5: New Construction - Comprehensiveness and depth of savings: Each PA must achieve in a minimum of X% of new construction or substantial/major renovation projects at least an estimated Y% whole building (defined as the whole space under the management's control).</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Units/Task</td>
<td>Threshold</td>
<td>Design</td>
<td>Exemplary</td>
<td>Actual Units/Task Achieved To Date</td>
<td>Level Achieved To Date</td>
<td>Pre Tax Incentive Achieved To Date</td>
</tr>
<tr>
<td>50%</td>
<td>$100,817</td>
<td></td>
<td></td>
<td>$135,756</td>
<td>$169,695</td>
<td>$169,695</td>
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<tr>
<td>20%</td>
<td></td>
<td>$100,817</td>
<td></td>
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</tr>
<tr>
<td>Exemplary</td>
<td>$100,817</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Construction - Comprehensiveness and depth of savings Electric &quot;X&quot; results: 20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Construction - Comprehensiveness and depth of savings Electric &quot;Y&quot; results: 25%</td>
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<tr>
<td>Subtotal for Commercial &amp; Industrial Metrics:</td>
<td>$407,268</td>
<td>$543,024</td>
<td>$509,085</td>
<td>$678,781</td>
<td></td>
<td></td>
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<tr>
<td>FINANCING &amp; FUNDING METRICS</td>
<td></td>
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</tr>
<tr>
<td>Other Financing Metric: Actively participate with DOER, EEAC and/or other stakeholders to aggressively pursue potential sources of other program funding for 2010 by applying for federal, state, municipal or private grants independently or in conjunction with the DOER to acquire other program funding. Submit documentation detailing actions undertaken specifically by the PA to obtain other program funding. Each PA must successfully attain $X in other funding to offset each PA's energy efficiency program costs in 2010.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Threshold:</td>
<td>$75,420</td>
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<tr>
<td>Design:</td>
<td>$100,560</td>
<td></td>
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<tr>
<td>Exemplary:</td>
<td>$125,700</td>
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</tr>
<tr>
<td>Other Financing Metric - Other Funding &quot;X&quot; Results:</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Other Financing Metric - Other Funding &quot;Y&quot; Results:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Subtotal for Financing and Funding Metric:</td>
<td>$150,840</td>
<td>$201,120</td>
<td>$251,400</td>
<td>$125,700</td>
<td>$125,700</td>
<td>$125,700</td>
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<tr>
<td>Total for all Performance Metrics:</td>
<td>$1,508,401</td>
<td>$2,011,202</td>
<td>$2,344,307</td>
<td>$2,250,283</td>
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</table>
### National Grid Gas MA Performance Metrics and Incentives for 2010

<table>
<thead>
<tr>
<th>Residential METRICS</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Actual Units/Task Achieved</th>
<th>Level Achieved</th>
<th>Pre Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Units/ Task Dollars</td>
<td>Dollars</td>
<td>Units/ Task Dollars</td>
</tr>
<tr>
<td><strong>RESIDENTIAL METRICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Residential #1: MassSAVE/Weatherization: Deeper Savings (Electric &amp; Gas)</strong></td>
<td></td>
<td></td>
<td></td>
<td>2.5% $14,471</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold (1): Achieve an increase in number of customers installing major measures* in 2010 of 2.5%<strong>, as compared with 2009, and/or achieve an increase in average MMBTU savings per customer installing one or more major measures in 2010 of 2.5%</strong>, as compared with customers who installed major measures in 2009.** Each PA to submit documentation showing performance relative to targets.</td>
<td>2.5%</td>
<td>$14,471</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design (2): Achieve an increase in number of customers installing major measures in 2010 of 5%, as compared with 2009, and/or achieve an increase in average MMBTU savings per customer installing one or more major measures in 2010 of 5%, as compared with customers who installed major measures in 2009. Each PA to submit documentation showing performance relative to targets.</td>
<td>5%</td>
<td>$18,295</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exemplary (3): Achieve an increase in number of customers installing major measures in 2010 of 7.5%, as compared with 2009, and/or achieve an increase in average MMBTU savings per customer installing one or more major measures in 2010 of 7.5%, as compared with customers who installed major measures in 2009. Each PA to submit documentation showing performance relative to targets.</td>
<td>7.5%</td>
<td>$24,119</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MassSAVE/Weatherization: Deeper Savings (Electric &amp; Gas) increase of customer results:</td>
<td>0%</td>
<td>None</td>
<td>$0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MassSAVE/Weatherization: Deeper Savings (Electric &amp; Gas) increase of savings results:</td>
<td>7.5%</td>
<td>Exemplary</td>
<td>$24,119</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Residential #2: MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration (Electric &amp; Gas)</strong></td>
<td></td>
<td></td>
<td></td>
<td>1 $28,943</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold (1): Coordinate among all of the residential direct-installation lighting efforts and the Products program on the availability of specialty bulbs for direct installation. Produce a memo from all PA's proposing a strategy to use the current direct-installation bulb procurement process, or an alternative, to ensure the availability of consistent quality specialty bulbs across all PA programs promoting efficient residential lighting. Memos focusing on specialty bulbs to EEAC consultants by 4/30/10. EEAC consultant comments by 5/15/10. Final memo by 5/30/10.</td>
<td>1</td>
<td>$28,943</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design (2): Achieve an overall average increase in number of DI bulbs installed per customer served in Q3-Q4 2010 of 25% or an average total of 11 bulbs, which is greater. Base year will be 2009.</td>
<td>2</td>
<td>$38,590</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exemplary (3): Achieve an overall average increase in number of DI bulbs installed per customer served in Q3-Q4 2010 of 40% or an average total of 12 bulbs, which is greater. Base year will be 2009.</td>
<td>3</td>
<td>$48,238</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration (Electric &amp; Gas) results:</td>
<td>5</td>
<td>Exemplary</td>
<td>$48,238</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Residential #4: Community Initiatives (Electric &amp; Gas)</strong></td>
<td></td>
<td></td>
<td></td>
<td>1 $28,943</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold (1): Each PA will develop and implement at least one (1) community-based initiative, in collaboration with community-based personnel, to deliver energy efficient services in at least six (6) communities (e.g. Cities, towns, neighborhoods) in the Commonwealth. Gas and electric PAs will cooperate, as appropriate, on initiatives in shared towns. A shared initiative will be counted as one (1) initiative for each PA.</td>
<td>1</td>
<td>$28,943</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design (2): Establish a PA Community Initiatives working Group to coordinate with any pertinent EEAC working groups, and to coordinate on-going community initiative efforts.</td>
<td>2</td>
<td>$38,590</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exemplary (3): Produce a final report documenting the results of the initiatives, includes lessons learned, by January 31, 2011. Each PA to submit a memo to EEAC consultants and DOER by January 31, 2011 detailing their distinct and clear role in accomplishing this activity.</td>
<td>3</td>
<td>$48,238</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Community Initiatives (Electric &amp; Gas) results:</strong></td>
<td>5</td>
<td>Exemplary</td>
<td>$48,238</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Residential #5: MassSAVE Facilitate Inclusion of Independent Energy Auditors (Electric &amp; Gas)</strong></td>
<td></td>
<td></td>
<td></td>
<td>1 $28,943</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold (1): To address the need to engage independent energy auditors in the auditing services of the RCS auditing service of the MassSAVE program, the PA’s will: 1) Document the standards for vendor services (e.g. accreditation/certifications, cost-effectiveness, administration, reporting to DOER and PA’s, training requirements pricing) and provide a detailed specification on each component of the new program audit process. 2) Prepare and send an RFQ to independent energy auditors to determine the approximate pool of qualified individuals and companies. Each PA to submit a memo to EEAC consultants and DOER by May 1, 2010 detailing their distinct and clear role in accomplishing this activity.</td>
<td>1</td>
<td>$28,943</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design (2): Each PA will work to expand the pool of independent auditors, identified through the RFQ process, qualified to deliver auditing services in the Commonwealth. Each PA will coordinate with their primary vendor to integrate customers brought to the program by pre-qualified independent energy auditors. Each PA to submit a memo to EEAC consultants and DOER by July 1, 2010 detailing their distinct and clear role in accomplishing this activity.</td>
<td>2</td>
<td>$38,590</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## National Grid Gas MA Performance Metrics and Incentives for 2010

<table>
<thead>
<tr>
<th>Metric</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Actual Units/Task Achieved</th>
<th>Level Achieved</th>
<th>Pre Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Actual</strong></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>$48,238</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$115,771</td>
<td>$124,361</td>
<td>$192,952</td>
<td>$168,833</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LOW INCOME METRICS

#### Low Income #1: Hard to Reach Landlords (Electric & Gas)

<table>
<thead>
<tr>
<th>Task</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Actual Units/Task Achieved</th>
<th>Level Achieved</th>
<th>Pre Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Threshold</strong></td>
<td>$38,590</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>$38,590</td>
<td>$51,454</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exemplary</strong></td>
<td>$64,317</td>
<td></td>
<td>$64,317</td>
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<td></td>
</tr>
</tbody>
</table>

Hard to Reach Landlords (Electric & Gas) results:

#### Low Income #2: New Measures

<table>
<thead>
<tr>
<th>Task</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Actual Units/Task Achieved</th>
<th>Level Achieved</th>
<th>Pre Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Threshold</strong></td>
<td>$38,590</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>$38,590</td>
<td>$51,454</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exemplary</strong></td>
<td>$64,317</td>
<td></td>
<td>$64,317</td>
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</table>

New Measures results:

#### Low Income #3: Multi-family Building Inventory

<table>
<thead>
<tr>
<th>Task</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Actual Units/Task Achieved</th>
<th>Level Achieved</th>
<th>Pre Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Threshold</strong></td>
<td>$38,590</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>$38,590</td>
<td>$51,454</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exemplary</strong></td>
<td>$64,317</td>
<td></td>
<td>$64,317</td>
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</table>
### National Grid Gas MA Performance Metrics and Incentives for 2010

#### Target Levels

<table>
<thead>
<tr>
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<th>Exemplary</th>
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<tbody>
<tr>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
<td>Units/ Task Dollars</td>
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</table>

### Multi-family Building Inventory results:

- **Actual Achieved**
  - Pre Tax Incentive Achieved To Date: $64,317

### Subtotal for Low Income Metrics:

- $115,771
- $154,361
- $192,952
- $192,952

### COMMERCIAL & INDUSTRIAL METRICS

#### C&I #1: Small Business Electric and Gas Integration

- In 2010, completed Direct Install (DI) projects will achieve a total of X THERM gas savings for each PA. For Electric PA's, X THERM gas savings among projects within its electric territory regardless of the gas PA territory they occur in. For Gas PA's, X THERM gas savings in its gas territory. (Gas measures were not included in the 2009 DI Program so baseline data is 0.)

<table>
<thead>
<tr>
<th>Threshold: NGrid Gas</th>
<th>Design: NGrid Gas</th>
<th>Exemplary: NGrid Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>119,861</td>
<td>$41,163</td>
<td>$51,454</td>
</tr>
</tbody>
</table>

#### C&I #2: Targeted Customer Segments

- During 2010, develop projects not initiated prior to 1/1/10 and obtain commitments to follow through with implementation from X data centers, high performance labs/clean rooms or industrial facilities. To qualify, assessments and commitments must include both electric and gas non-prescriptive measures where applicable (e.g., customers with gas process usage). Measures for industrial facilities must be related to process. Data center and lab spaces can apply even if a subset of a larger building. Data center and lab measures must be related to those “processes” (i.e., related to HVAC or servers/ lab equipment). A “commitment” is a completed custom application. For each PA, “X” is defined as a percent increase (Threshold=20%, Design=30%, Exemplary=40%) in commitments from the commitments that originated from application projects in 2009.

<table>
<thead>
<tr>
<th>Threshold (20% increase): NGrid Gas</th>
<th>Design (30% increase): NGrid Gas</th>
<th>Exemplary (40% increase): NGrid Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 $20,582</td>
<td>$25,727</td>
<td></td>
</tr>
</tbody>
</table>

#### C&I #3: Combined Heat & Power

- Each PA will complete X Combined Heat & Power commitments in 2010. A commitment is either a signed application or MOU between the PA and customer. Targets are not additive. Electric and Gas PA targets reflect the same CHP units. Each CHP project is counted twice – once by the electric PA and once by the gas PA. Note that the baseline data also reflects this double counting. Note: NGrid Electric 2009 units = 4 and NGrid Gas 2009 units = 12.

<table>
<thead>
<tr>
<th>Threshold: NGrid Gas X</th>
<th>Design: NGrid Gas X</th>
<th>Exemplary: NGrid Gas X</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 $40,727</td>
<td>$41,163</td>
<td>$67,878</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Threshold: NGrid Gas Y</th>
<th>Design: NGrid Gas Y</th>
<th>Exemplary: NGrid Gas Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 $64,317</td>
<td>$67,878</td>
<td></td>
</tr>
</tbody>
</table>

#### C&I #4: Retrofit – Depth of Savings

- Begin implementation of efforts at capturing whole-building (defined as the whole space under mgmt control of the customer, which can include tenant space in a larger building) deep savings of both electric and gas. Perform assessments and obtain X customer commitments to follow-through with savings of at least 5% building energy savings (gas or electric). To be eligible, buildings must have fossil fuel (e.g., natural gas, oil) and electric measures and a minimum of 5% of savings from fossil fuel and electric. In order to reach exemplar, you must achieve design. A “commitment” is a signed application or MOU.

<table>
<thead>
<tr>
<th>Threshold: NGrid Gas X</th>
<th>Design: NGrid Gas X</th>
<th>Exemplary: NGrid Gas X</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 $38,590</td>
<td>20%</td>
<td>25%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Threshold: NGrid Gas Y</th>
<th>Design: NGrid Gas Y</th>
<th>Exemplary: NGrid Gas Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 $51,454</td>
<td>20%</td>
<td>25%</td>
</tr>
</tbody>
</table>

**Combined Heat & Power (Gas) results:**

- 7 None

**Retrofit – Depth of Savings Gas"X" results:**

- 15 Threshold $38,590
### National Grid Gas MA Performance Metrics and Incentives for 2010

#### Key Metrics and Incentives

<table>
<thead>
<tr>
<th>Metric Description</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Pre-Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Retrofit - Depth of Savings Gas &quot;Y&quot; results:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each PA must achieve in a minimum of X% of new construction or substantial/major renovation projects at least an estimated Y% whole building savings (gas &amp; electric) compared to code. Projects completed in 2010 or signed commitments in 2010 with projects under construction can count. Core Performance projects will qualify at the threshold level and count at the design level if they do at least one Enhanced Strategy and Exemplary if they do at least two Enhanced Strategies. In order to reach exemplary, you must achieve design. If total number of new construction or substantial/major renovation projects for a specific PA is less than 4, the PA may meet the design or exemplary level with 1 project, or be exempt from this metric and allocate funds to other metrics proportionally. Note: NGrid Electric 2009 units - X = 8.5%, Y = 20% and NGrid Gas 2009 units - X = 10%, Y = 20%.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold: NGrid Gas X</td>
<td>18%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold: NGrid Gas Y</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design: NGrid Gas X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design: NGrid Gas Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exemplary: NGrid Gas X</td>
<td>18%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exemplary: NGrid Gas Y</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>New Construction - Comprehensiveness and depth of savings Gas &quot;X&quot; results:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Construction - Comprehensiveness and depth of savings Gas &quot;X&quot; results:</td>
<td>34%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>New Construction - Comprehensiveness and depth of savings Gas &quot;Y&quot; results:</strong></td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal for Commercial &amp; Industrial Metrics:</strong></td>
<td>$164,216</td>
<td>$205,815</td>
<td>$273,693</td>
<td>$156,934</td>
</tr>
</tbody>
</table>

#### FINANCING & FUNDING METRICS

<table>
<thead>
<tr>
<th>Metric Description</th>
<th>Threshold</th>
<th>Design</th>
<th>Exemplary</th>
<th>Pre-Tax Incentive Achieved To Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Funding Metric: Actively participate with DOER, SEAC, and/or other stakeholders to aggressively pursue potential sources of other program funding for 2010 by applying for federal, state, municipal or private grants independently or in conjunction with the DOER to acquire other program funding. Submit documentation detailing actions undertaken specifically by the PA to obtain other program funding. Each PA must successfully attain X in other funding to offset such PA's energy efficiency program costs in 2010.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold: NGrid Electric X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design: NGrid Electric X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exemplary: NGrid Electric X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other Funding Metric - Other Funding &quot;X&quot; Results:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Financing Metric: Other Financing &quot;X&quot; Results:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threshold: NGrid Electric Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design: NGrid Electric Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exemplary: NGrid Electric Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal for Financing and Funding Metric:</strong></td>
<td>$55,129</td>
<td>$73,505</td>
<td>$91,852</td>
<td>$518,719</td>
</tr>
</tbody>
</table>

### Total for all Performance Metrics:

$450,887  $588,044  $751,479  $518,719
2010
Residential
Performance Metrics
RES #1
MassSAVE/Weatherization:
Deeper Savings {Electric and Gas} - Statewide
### National Grid Achievements

<table>
<thead>
<tr>
<th>Metric Number</th>
<th>Metric Language</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RES #1: MassSAVE/Weatherization: Deeper Savings (Electric and Gas) - Statewide</strong></td>
<td>Achieve an increase in number of customers installing major measures* in 2010 of 2.5%, 5%, and 7.5%** (Threshold, Design, Exemplary) as compared with 2009, and/or achieve an increase in average MMBTU savings per customer installing one or more major measures in 2010 of 2.5%, 5%, and 7.5%*** (Threshold, Design, Exemplary), as compared with customers who installed major measures in 2009. ***</td>
</tr>
</tbody>
</table>

| **Electric** |  
| Increase in number of customers | 5% Design |
| Increase in average MMBTU savings | 90% Exemplary |
| **Gas** |  
| Increase in number of customers | -43% Did not meet Threshold |
| Increase in average MMBTU savings | 142% Exemplary |

### National Grid Electric Residential Metric#1: MassSAVE/Weatherization: Deeper Savings Metric Report

<table>
<thead>
<tr>
<th>2010</th>
<th>Participants</th>
<th>ThermSavings/per customer</th>
<th>Total Therm Savings</th>
<th>MMBTuSavings</th>
<th>Average Savings/per Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heating System Replacement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating System Replacement, Oil</td>
<td>1,946</td>
<td>83</td>
<td>161,128.8</td>
<td>16,112.9</td>
<td></td>
</tr>
<tr>
<td>Heating System Replacement, Other FF</td>
<td>50</td>
<td>83</td>
<td>4,140.0</td>
<td>414.0</td>
<td></td>
</tr>
<tr>
<td><strong>Insulation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation, Electric</td>
<td>124</td>
<td>88</td>
<td>10,901.9</td>
<td>1,090.2</td>
<td></td>
</tr>
<tr>
<td>Insulation, Gas</td>
<td>768</td>
<td>298</td>
<td>228,864.0</td>
<td>22,886.4</td>
<td></td>
</tr>
<tr>
<td>Insulation, Oil</td>
<td>2,351</td>
<td>287</td>
<td>674,266.8</td>
<td>67,426.7</td>
<td></td>
</tr>
<tr>
<td>Insulation, Other FF</td>
<td>111</td>
<td>134</td>
<td>14,907.3</td>
<td>1,490.7</td>
<td></td>
</tr>
<tr>
<td><strong>Air Sealing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Sealing, Electric</td>
<td>133</td>
<td>36</td>
<td>4,788.0</td>
<td>478.8</td>
<td></td>
</tr>
<tr>
<td>Air Sealing, Gas</td>
<td>583</td>
<td>60</td>
<td>34,980.0</td>
<td>3,498.0</td>
<td></td>
</tr>
<tr>
<td>Air Sealing, Oil</td>
<td>2,083</td>
<td>60</td>
<td>124,980.0</td>
<td>12,498.0</td>
<td></td>
</tr>
<tr>
<td>Air Sealing, Other FF</td>
<td>140</td>
<td>60</td>
<td>8,400.0</td>
<td>840.0</td>
<td></td>
</tr>
<tr>
<td><strong>Indirect &amp; Indirect Water Heater</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Water Heater, Oil</td>
<td>1,040</td>
<td>80</td>
<td>83,200.0</td>
<td>8,320.0</td>
<td></td>
</tr>
<tr>
<td>Indirect Water Heater, Other FF</td>
<td>36</td>
<td>80</td>
<td>2,880.0</td>
<td>288.0</td>
<td></td>
</tr>
<tr>
<td><strong>Unique count Customers who install Major measures in MassSave</strong></td>
<td>3,534</td>
<td>1,353,436.8</td>
<td>135,343.7</td>
<td>382.98</td>
<td></td>
</tr>
<tr>
<td><strong>2009 Baseline</strong></td>
<td>3,375</td>
<td>680,870.0</td>
<td>68.070.0</td>
<td>201.7</td>
<td></td>
</tr>
<tr>
<td><strong>Progress to GOAL - 2009 Baseline</strong></td>
<td>5%</td>
<td>99%</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16 of 271
<table>
<thead>
<tr>
<th>Gas Weatherization Participants 2010</th>
<th>Participants</th>
<th>ThermSavings/per customer</th>
<th>Total ThermSavings</th>
<th>MMBTuSavings</th>
<th>Average Savings/per Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOILER</td>
<td>34</td>
<td>141</td>
<td>4,794.0</td>
<td>479.4</td>
<td></td>
</tr>
<tr>
<td>BOILERS_90*</td>
<td>185</td>
<td>150</td>
<td>27,750.0</td>
<td>2,775.0</td>
<td></td>
</tr>
<tr>
<td>ECM_FURNACE</td>
<td>6</td>
<td>185</td>
<td>1,110.0</td>
<td>110.0</td>
<td></td>
</tr>
<tr>
<td>ECM_FURNACE_92****</td>
<td>96</td>
<td>196</td>
<td>18,816.0</td>
<td>1,881.6</td>
<td></td>
</tr>
<tr>
<td>ECM_FURNACE_94**</td>
<td>0</td>
<td>236</td>
<td>0.0</td>
<td>0.0</td>
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</tr>
<tr>
<td>FURNACE</td>
<td>44</td>
<td>185</td>
<td>8,140.0</td>
<td>814.0</td>
<td></td>
</tr>
<tr>
<td>FURNACE_92***</td>
<td>0</td>
<td>211</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>INDIRECT_DHW</td>
<td>158</td>
<td>79</td>
<td>12,482.0</td>
<td>1,248.2</td>
<td></td>
</tr>
<tr>
<td>ON_DEM_TANKLESS_DHW</td>
<td>75</td>
<td>79</td>
<td>5,925.0</td>
<td>592.5</td>
<td></td>
</tr>
<tr>
<td>STEAM_BOILER</td>
<td>20</td>
<td>141</td>
<td>2,820.0</td>
<td>282.0</td>
<td></td>
</tr>
<tr>
<td>STORAGE_WATER_HEATER****</td>
<td>0</td>
<td>19</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Unique count Customers who participant Gas Weatherization/Gas Network</td>
<td>3,534</td>
<td>1,048,491.0</td>
<td>104,849.1</td>
<td>296.7</td>
<td></td>
</tr>
<tr>
<td>2009 Baseline</td>
<td>6,162</td>
<td>756,750.0</td>
<td>122.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progress to GOAL - 2009 Baseline</td>
<td>-43%</td>
<td>39%</td>
<td>142%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** * * * ** * **** new measures that the program offered in 2010
MassSave excluded air sealing only but included the air sealing was done in combination with other major measures
RES #2

MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration {Electric & Gas} – Statewide
National Grid 2010 CFL Metric Tracking

### National Grid Electric

<table>
<thead>
<tr>
<th>Metric</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Jul - Dec Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening Visits</td>
<td>571</td>
<td>677</td>
<td>941</td>
<td>1111</td>
<td>1029</td>
<td>1170</td>
<td>5499</td>
</tr>
<tr>
<td>Comprehensive Visits</td>
<td>36</td>
<td>33</td>
<td>76</td>
<td>114</td>
<td>103</td>
<td>90</td>
<td>452</td>
</tr>
<tr>
<td>Total Customers Served</td>
<td>607</td>
<td>710</td>
<td>1017</td>
<td>1225</td>
<td>1132</td>
<td>1260</td>
<td>5951</td>
</tr>
<tr>
<td>CFL's Installed *</td>
<td>10801</td>
<td>13531</td>
<td>19834</td>
<td>23265</td>
<td>20885</td>
<td>21815</td>
<td>110131</td>
</tr>
<tr>
<td>Average CFLs per Customer</td>
<td>17.794</td>
<td>19.058</td>
<td>19.502</td>
<td>18.992</td>
<td>18.450</td>
<td>17.313</td>
<td>18.506</td>
</tr>
</tbody>
</table>

### National Grid Gas

<table>
<thead>
<tr>
<th>Metric</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Jul - Dec Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening Visits</td>
<td>260</td>
<td>315</td>
<td>483</td>
<td>388</td>
<td>248</td>
<td>280</td>
<td>1974</td>
</tr>
<tr>
<td>Comprehensive Visits</td>
<td>94</td>
<td>83</td>
<td>134</td>
<td>133</td>
<td>37</td>
<td>17</td>
<td>498</td>
</tr>
<tr>
<td>Customers Served</td>
<td>354</td>
<td>398</td>
<td>617</td>
<td>521</td>
<td>285</td>
<td>297</td>
<td>2472</td>
</tr>
<tr>
<td>CFL's Installed **</td>
<td>5379</td>
<td>7309</td>
<td>9614</td>
<td>7965</td>
<td>3789</td>
<td>3580</td>
<td>37636</td>
</tr>
<tr>
<td>Average CFLs per Customer</td>
<td>15.195</td>
<td>18.364</td>
<td>15.582</td>
<td>15.288</td>
<td>13.295</td>
<td>12.054</td>
<td>15.225</td>
</tr>
</tbody>
</table>

### National Grid 2010 CFL Metric

- RES #2 MassSAVE/Weatherization: Increase Direct Installation (DI) bulb penetration (Electric & Gas) – Statewide
  - Exemplary: 18.51%
  - Exemplary: 15.26%

- Coordinate among all of the residential direct-installation lighting efforts and the Products program on the availability of specialty bulbs for direct installation. Produce a memo from all PAs proposing a strategy to use the current direct-installation bulb procurement process, or an alternative, to ensure the availability of consistent quality specialty bulbs across all PA programs promoting efficient residential lighting. Memo focusing on specialty bulbs to EEAC consultants by April 30, 2010. EEAC consultant comments by May 15, 2010. Final memo by May 30, 2010. Each PA to submit documentation of performance relative to task.

- Achieve an overall average increase in number of DI bulbs installed per customer served in Q3-Q4 2010 of 25% or an average total of 11 bulbs, whichever is greater. Base year will be 2009. Each PA to submit documentation of performance relative to target.
<table>
<thead>
<tr>
<th>2010 Metric</th>
<th>2009 Baseline</th>
<th>Design (+25%)</th>
<th>Exemplary (+40%)</th>
<th>2010 Metric Results</th>
<th>Metric Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Grid (Electric)</td>
<td>12.00</td>
<td>15.00</td>
<td>16.80</td>
<td>18.51</td>
<td>Exemplary</td>
</tr>
<tr>
<td>National Grid (Gas)</td>
<td>9.70</td>
<td>12.13</td>
<td>13.58</td>
<td>15.26</td>
<td>Exemplary</td>
</tr>
</tbody>
</table>
RES #3

CoolSmart: Increase correct installations
{Electric} – Statewide
<table>
<thead>
<tr>
<th>Metric</th>
<th>Metric Language</th>
<th>National Grid Electric Targets</th>
<th>National Grid Electric Final 2010 Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>RES #3 CoolSmart: Increase % of correct installations (Electric) - Statewide</td>
<td>16% of homes participating in the CoolSmart program that receive an efficient equipment rebate for ducted systems will have equipment installations that include both QI (charge and airflow) and proper sizing (based on completed Manual J) services. Each PA to submit documentation of performance relative to target.</td>
<td>Threshold: 16% of Homes</td>
<td>Threshold: 16%</td>
</tr>
<tr>
<td></td>
<td>18% of homes participating in the CoolSmart program that receive an efficient equipment rebate for ducted systems will have equipment installations that include both QI (charge and airflow) and proper sizing (based on completed Manual J) services. Each PA to submit documentation of performance relative to target.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20% (Tier 1) of homes participating in the CoolSmart program that receive an efficient equipment rebate for ducted systems will have equipment installations that include both QI (charge and airflow) and proper sizing (based on completed Manual J) services. Of these 20% of homes receiving equipment rebates and combined QI and sizing/Manual J services, 10% (Tier 2) must also participate in the program’s duct sealing or ESQI component. Each PA to submit documentation of performance relative to target.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Metric #3  CoolSmart: Increase % of correct installations (Electric)

National Grid has achieved the THRESHOLD Level for Metric # 3 increasing, by 16%, the number of homes participating in the Cool Smart program that received an efficient equipment rebate for ducted systems and had equipment installations that have included both QI (charge and airflow) and proper sizing (completed Manual J) services.

Below the production numbers confirming the 16% increase:

<table>
<thead>
<tr>
<th>2010 EE Metric - Residential</th>
<th>National Grid COOL Smart Program - Increase % of correct installations</th>
<th>January - December 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Equipment Rebates*</td>
<td>1562</td>
<td>2010</td>
</tr>
<tr>
<td>Equipment Rebates with QI and Manual J (proper sizing)</td>
<td>256</td>
<td>2010</td>
</tr>
<tr>
<td>% of Equipment Rebates with QI and Manual J</td>
<td>16%</td>
<td>2010</td>
</tr>
<tr>
<td>Equipment Rebates with QI and Manual J + Duct Sealing or ESQI</td>
<td>3</td>
<td>2010</td>
</tr>
<tr>
<td>% of Equipment Rebates with QI and Manual J + Duct Sealing or ESQI</td>
<td>1.2%</td>
<td>2010</td>
</tr>
</tbody>
</table>

*Excludes Ductless Minisplits

In addition, the following is a list of activities performed by National Grid to achieve the 16% increase resulting in meeting the THRESHOLD Level for this metric:

**Activities performed to achieve Sponsor Metric for Packaged Incentives**

- Provided 20 Intro to Cool Smart classes to 16 new companies
- Provided refresher classes in QIV to 349 technicians
- Provided 31 new training classes to 68 companies, 47 of which were new to Cool Smart in 2010. Total of 172 new technicians were trained.
- Email blast to all participating contractors about packages
- Follow-up phone calls to all contractors
- Outreach to distributors to enlist their help with reaching their contractors
- Creation and mailing of a certified letter to all contractors advising them of deadline for paperwork submission
- Field staff assisted with the following:
  - Manual review of Contractor Incentive Packages, with real time status updates provided to Contractor
  - Technical Assistance and training with Manual J Surveys
  - Field Training Technicians on site with QIV to further contractor confidence with process
RES #4
Community Initiatives
{Electric & Gas} – Statewide
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RES #4 Community Initiatives (Electric &amp; Gas) – Statewide</td>
<td>Each PA will develop and implement at least one (1) community-based initiative, in collaboration with community-based personnel, to deliver energy efficiency services in at least six (6) communities (e.g. cities, towns, neighborhoods) in the Commonwealth. Gas and Electric PAs will cooperate, as appropriate, on initiatives in shared towns. A shared initiative will be counted as one (1) initiative for each PA. Each PA to submit documentation of performance relative to task.</td>
<td>Threshold</td>
<td>Threshold</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Establish a PA Community Initiatives Working Group to coordinate with any pertinent EEAC working groups, and to coordinate on-going community initiative efforts. Each PA to submit documentation of performance relative to task.</td>
<td>Design</td>
<td>Design</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Produce a final report documenting the results of the initiatives, including lessons learned, by January 31, 2011. Each PA to submit a memo to EEAC consultants and DOER by January 31, 2011 detailing their distinct and clear role in accomplishing this activity.</td>
<td>Exemplary</td>
<td>Exemplary</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
</tbody>
</table>
Community Initiatives (Electric and Gas) - Statewide

I. THRESHOLD

The Program Administrators (PAs) have been developing initiatives in conjunction with community partners to advance the aggressive savings goals of the Green Communities Act. The following list summarizes the various community initiatives as led by the PAs who met the Threshold Community Initiative Metric by having developed and implemented at least one community-based initiative to deliver energy-efficiency services with community personnel in at least six communities (e.g., cities, towns, neighborhoods) in the Commonwealth.

List of Community Initiatives and Organizations

<table>
<thead>
<tr>
<th>Community Initiative</th>
<th>Organization Name</th>
<th>Organization Role Within the Program</th>
<th>Role Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR</td>
<td>Electric PA</td>
<td>Program Administrator</td>
<td></td>
</tr>
<tr>
<td>NSTAR</td>
<td>Gas PA</td>
<td>Program Administrator</td>
<td></td>
</tr>
<tr>
<td>Green Jobs Green Economy / Marion Institute</td>
<td>Residential and small business outreach</td>
<td>Market programs to New Bedford businesses and residents</td>
<td></td>
</tr>
<tr>
<td>City of New Bedford</td>
<td>Local Govt. Coordinator</td>
<td>Coordinate and facilitate program delivery with municipal offices</td>
<td></td>
</tr>
<tr>
<td>YouthBuild New Bedford/ PACE, Inc.</td>
<td>Sub-contractors (installers)</td>
<td>Workforce training, weatherization</td>
<td></td>
</tr>
<tr>
<td>Environment Northeast</td>
<td>EEAC representative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Grid</td>
<td>Gas PA</td>
<td>Program Administrator</td>
<td></td>
</tr>
<tr>
<td>NSTAR</td>
<td>Electric PA</td>
<td>Program Administrator</td>
<td></td>
</tr>
<tr>
<td>Green Justice Coalition/Community Labor United</td>
<td>Project Coordination</td>
<td>Coordinates program delivery, identifies geographic areas and local contractors</td>
<td></td>
</tr>
<tr>
<td>Chelsea Collaborative</td>
<td>Residential outreach organization</td>
<td>Conducts outreach</td>
<td></td>
</tr>
<tr>
<td>Conservation Services Group (CSG)</td>
<td>Lead Vendor</td>
<td>Audit scheduling, performing the audits, writing the contracts and work orders, providing quality control services, data tracking</td>
<td></td>
</tr>
<tr>
<td>InsulPro</td>
<td>Implementation subcontractor</td>
<td>Weatherization installer</td>
<td></td>
</tr>
<tr>
<td>Town of Chelsea</td>
<td>City Contact</td>
<td>Assist in permitting; provide voter database information to outreach group</td>
<td></td>
</tr>
<tr>
<td>New England Regional Council of Carpenters</td>
<td>Workforce Development</td>
<td>Establish recruitment goals, recruit Chelsea residents into NERCC Apprentice Training</td>
<td></td>
</tr>
<tr>
<td>Environment Northeast</td>
<td>EEAC representative</td>
<td>EEAC representative</td>
<td></td>
</tr>
<tr>
<td><strong>Boston Chinatown</strong></td>
<td><strong>Western Mass Saves Challenge: Four Towns Amherst Easthampton Ludlow Sunderland</strong></td>
<td><strong>Springfield</strong></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>NSTAR</td>
<td>Electric PA</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>National Grid</td>
<td>Gas PA</td>
<td>Electric PA</td>
<td></td>
</tr>
<tr>
<td>Chinese Progressive Assn.</td>
<td>Residential outreach organization</td>
<td>Program Administrator</td>
<td></td>
</tr>
<tr>
<td>Green Justice Coalition/Community Labor United</td>
<td>Project Coordination</td>
<td>Program Administrator</td>
<td></td>
</tr>
<tr>
<td>Conservation Services Group (CSG)</td>
<td>MultiFamily vendor</td>
<td>Program Administrator</td>
<td></td>
</tr>
<tr>
<td>Next Step Living</td>
<td>1-4 Family vendor</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Mass Energy</td>
<td>Renew Boston Partner</td>
<td>Electric PA</td>
<td></td>
</tr>
<tr>
<td>International Union of Painters and Allied Trades DC 35</td>
<td>Workforce Development</td>
<td>Program Administrator</td>
<td></td>
</tr>
<tr>
<td>Aulson Company</td>
<td>Implementation subcontractor</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td><strong>WMECO</strong></td>
<td>Electric PA</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>SmartPower</td>
<td>Project Coordination and outreach to contractors and community groups</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Amherst Conservation Task Force</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Easthampton Conservation Commission</td>
<td>Local Govt. Coordinators</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Ludlow Conservation Commission</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Sunderland Conservation Commission</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Amherst Chamber of Commerce</td>
<td>Business community outreach</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Easthampton Chamber of Commerce</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Amherst School Department</td>
<td>Community outreach through students</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Ludlow School Department</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>University of Massachusetts</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Clean Water Action</td>
<td>Grass roots organizations performing outreach to members</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Hitchcock Center for the Environment</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Massachusetts Interfaith Power &amp; Light</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Sunderland Women’s Club/Men’s Club</td>
<td></td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td><strong>WMECO</strong></td>
<td>Electric PA</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Columbia Gas of Massachusetts</td>
<td>Gas PA</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>Alliance to Develop Power</td>
<td>Residential Outreach</td>
<td>WMEO</td>
<td></td>
</tr>
<tr>
<td>United for Hire</td>
<td>Implementation Subcontractor</td>
<td>WMEO</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Conducts outreach
- Coordinates program delivery, identifies geographic areas and local contractors
- Performs MultiFamily Audits
- Performs 1-4 Family Audits
- Income Verification
- Runs "Green Collar Pathways" workforce development program
- Weatherization installer
- Work with SmartPower to promoting this program across their community.
- Work with SmartPower to promote community outreach through local business participation in Rewards program.
- Working with SmartPower to promote program through student engagement
- Various organizations that are working with program to utilize this program to help them promote environmental stewardship
- Weatherization Installer
<table>
<thead>
<tr>
<th></th>
<th>WMECO</th>
<th>Electric PA</th>
<th>Program Administrator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Springfield</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Columbia Gas of Massachusetts</td>
<td>Gas PA</td>
<td>Program Administrator</td>
</tr>
<tr>
<td></td>
<td>City of Springfield – Green Committee</td>
<td>Local Government coordinator</td>
<td>Conducts outreach</td>
</tr>
<tr>
<td></td>
<td>National Grid</td>
<td>Electric PA</td>
<td>Program Administrator</td>
</tr>
<tr>
<td><strong>Athol</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Town of Athol Energy Committee</td>
<td>Residential, Small Business outreach and Municipal coordination</td>
<td>Market Programs to residents and small businesses. Coordinate municipal projects.</td>
</tr>
<tr>
<td></td>
<td>North Quabbin Chamber of Commerce</td>
<td>Small Business Outreach</td>
<td>Conducts outreach to small businesses in Athol and surrounding towns.</td>
</tr>
<tr>
<td></td>
<td>Conservation Services Group (CSG)</td>
<td>Lead Vendor</td>
<td>Schedules and performs audits, writes the contracts and work orders, provides quality control services, data tracking</td>
</tr>
</tbody>
</table>

## II. DESIGN

The PAs established a Community Initiatives Working Group to provide a venue for discussion of community initiatives being planned and implemented throughout the state. The working group also consisted of several members of the EEAC Council that were recommended by Consultant John Livermore. PAs share information on program design, goals and implementation strategies to try and identify best practices, minimize barriers and maximize program impact. The first CIWG meeting was convened on 9/30/2010 at NSTAR headquarters with PAs attending in-person and by phone. A second meeting occurred via teleconference on 11/30/2010. The group intends to meet at a minimum on a quarterly basis. The CIWG includes the following individuals:

**NSTAR**
Bill Stack  
Jan Gudell  
Tina Haggerty  
Suzanne Farrington

**National Grid**
Monica Ibrahim  
Ellen Pfefifer  
Robert O’Brien  
Wendy Todd

**Berkshire**
Robert Gyurjan
Columbia
Kara Gray

New England Gas
Jim Carey

Unitil
Derek Kimball

Cape Light Compact
Margaret Song

WMECO
Aprille Soderman

Danah Tench    ENE
John Livermore  Livermore Energy Associates
Danielle Rathbun  Attorney General's Office
Lyn Huckabee  DOER
Paul Horowitz  EEAC Consultant
Mike Guerard  Opt Energy

Columbia Gas of Massachusetts and Berkshire Gas have achieved the DESIGN status for this metric.

III. EXEMPLARY

In consideration for the “Exemplary” rating, NSTAR Electric & Gas, WMECO and National Grid, the contributing PAs, submit the following overviews which documents the results of the initiatives and lessons learned. Individual, utility specific, detailed reports will be independently submitted from each PA to document its clear and distinct role in the respective community initiatives.

NSTAR Community Initiatives Overview
NSTAR participated in three community pilot initiatives in 2010: New Bedford, Chinatown and Chelsea. The New Bedford community pilot was the first to launch with NSTAR as the sole PA as NSTAR provides both electric and gas service to the City of New Bedford. The New Bedford pilot is the most mature of all the community pilots in which NSTAR has participated and thus has produced the most extensive body of data, highest participation levels and provided the deepest opportunities for lessons learned. The Chinatown and Chelsea pilots launched later (Fall 2010) and are jointly overseen by
NSTAR as the Electric Program Administrator and National Grid as the Gas Program Administrator. Each pilot is a unique collaboration with local community organizations and weatherization contractors. The community organizations perform outreach to local residents to increase participation levels in the Mass Save 1-4 family and multi-family programs. In addition to helping residents save money and energy, the New Bedford, Chinatown and Chelsea initiatives seek to provide employment opportunities and career pathways for community residents who are trained and qualified to perform residential weatherization work. Attached is a memo describing the New Bedford community initiative in detail, including program partner descriptions, goals, outreach efforts, training, results and lessons learned. The Chelsea and Chinatown pilots started in late 2010 and do not yet have significant results report on at this point.

NSTAR believes it has achieved exemplary status as it has participated in three community initiatives and assumed a leadership role in: creating the Community Initiatives Working Group, scheduling and hosting meetings conference calls, developing the basic procedures and criteria for the New Bedford, Chelsea and Chinatown pilots, developing this report and presenting a unique community grant funding distribution tool created by NSTAR.

Pilot Goals
The goals of each community initiative include:

- Installing weatherization measures in 50 1-4 family dwellings
- Installing weatherization and/or lighting fixtures in 4 multi-family buildings with 5-20 units each
- Provide lighting upgrades to 25 small businesses (New Bedford initiative only)

WMECO Community Initiatives Overview
WMECO participated in community mobilization pilot initiatives in six (6) communities in 2010: Amherst, Easthampton, Sunderland, Ludlow, Pittsfield and Springfield. The largest of the pilot initiatives was “Western Mass Saves Challenge” which combines on-the-ground marketing and outreach, direct mail, a website that engages and interacts with customers (www.westernmasssaves.com), and resources that address many of the barriers that traditionally impeded energy efficiency actions. As a pilot, “Western Mass Saves Challenge” will provide WMECO customers with targeted, personalized recommendations for reducing their home electricity usage, will encourage them to commit to personal savings plans, and will track their progress by analyzing their WMECO bills through a web portal service. When customers save energy relative to a personal baseline determined by their (seasonally-adjusted) energy usage over the course of the previous 12 months, the program will provide them with reward points for each kilowatt-hour they save. Reward points can be used for discounts and merchandise from retailers in Western Massachusetts as administered by RecycleBank. Customers who sign up will receive rewards points...
during the pilot program. The pilot rolled out in November 2010 and will continue to grow and broaden throughout 2011. By end of December 2010, more than 1,000 customers had already signed up to engage, review and improve their energy savings through this web-based service. As of the time of this memo, the program continues to grow at a significant rate with close to 2,000 customers engaged by end of January 2011.

While all WMECO customers can utilize the “Western Mass Saves” program, 25,000 customers in nine towns have receive personalized recommendations via direct mail as a starting baseline. These towns include:

Challenge towns
• Amherst
• Easthampton
• Ludlow
• Sunderland

Control towns
• Agawam
• Montgomery
• West Springfield
• Springfield
• Huntington

The four challenge towns noted above will be participating in the “Western Mass Saves Challenge” as a whole community, an effort which offers an incentive in the form of a free 1kw solar PV system to each town that succeeds in achieving its residential energy reduction goals. Outreach has been ongoing to various municipal and local community groups in these towns to enhance local participation. The other towns will be a “control group” by which the pilot will be evaluating the results of the Challenge. Customers will be able to opt out of receiving further mailers using a toll-free number.

Western Mass Saves – (4) Town Challenge Timeline Synopsis:
• Week ending 11/5/10: Mailers sent to 25,000 customers in listed towns
• Week ending 11/12/10: Hard “roll-out” with press releases and other media
• December cycle billing: Bill insert to ALL WMECo customers describing “Western Mass Saves” program
• TBA: Other media and PR events to promote program continue in 2011

In addition to the Western Mass Saves Challenge, WMECO also developed a broad-based pilot for Pittsfield, MA in collaboration with Berkshire Gas, CET and local community organizations. This pilot was designed to educate and motivate residents of Pittsfield and surrounding communities to increase awareness and adoption of energy efficiency and renewable energy programs. In particular, efforts were made to reach underserved, hard-to-reach households. On behalf of WMECO and Berkshire Gas, CET employed multiple strategies to engage with such local stakeholder groups as the
Pittsfield Green Commission, Chamber of Commerce, Pittsfield Community TV, Berkshire County HR Directors, West Side Neighborhood Steering Committee, Pittsfield Rental Association and the Superintendent of Pittsfield Public Schools. The community organizations perform outreach to local residents to increase participation levels in the Mass Save 1-4 family and multi-family programs. In addition to helping residents save money and energy, this pilot also seeks to enhance awareness, education and career development for community residents who are trained and qualified to perform residential weatherization work. Neighborhood informational meetings, large employer presentations and outreach, and civic events will continue to be a focus throughout 2011, as this pilot continues to its community mission.

In the southern portion of its service territory, WMECO and Columbia Gas also began development in 2010 of a Springfield area pilot designed to engage collaboratively with community-based Alliance to Develop Power (ADP) as a weatherization subcontractor working with Environmental Compliance Services, of Agawam, MA as a newly registered Home Performance contractor for WMECO. Seventy-five (75) homes will be served with audit and weatherization services in the first phase of this pilot. It is expected that upon successful completion of these homes, ADP and ECS will revisit with WMECO, the future expansion of other neighborhood initiatives in greater Springfield, MA and surrounding communities.

**National Grid Community Initiatives**
In addition to the Chelsea and Chinatown community pilots jointly administered with NSTAR, National Grid participated in another community initiative in the western Massachusetts semi-rural town of Athol. Goals of this community initiative were to create a scalable model for a community driven, no-to-low cost community initiative using only pre-existing program design and delivery elements. This initiative also tested the viability of community outreach to increase residential and business energy efficiency participation in this underserved town. Further details on National Grid’s involvement and lessons learned from the Chelsea Community Mobilization Initiative and Athol community initiative can be found in the National Grid specific memo.
The purpose of this memo is to satisfy the Exemplary Level of the Mass Save Metric: Community Initiatives for National Grid.

### 4. Community Initiatives [Electric & Gas] - Statewide

| Exemplary | Produce a final report documenting the results of the initiatives, including lessons learned, by January 31, 2011. Each PA to submit a memo to EEAC consultants and DOER by January 31, 2011 detailing their distinct and clear role in accomplishing this activity. |

**Overview**

In consideration for the “Exemplary” rating, National Grid submits the following report which documents in detail the results and lessons learned from the Company’s community initiatives involvement in 2010 and their distinct and clear role in accomplishing this activity. The joint Program Administrator (PA) memo to achieve exemplary status was submitted to EEAC consultants and the DOER on January 31, 2011.

In 2010, National Grid convened an internal working group in order to develop a standard process for organizing responses to community customer requests for National Grid support of energy efficiency and green activities. The goals of the working group are to drive energy efficiency program participation and savings achievement, drive energy efficiency program awareness and increase customer satisfaction. Through these efforts, the Company performed an extensive inventory of existing community projects, investigated peer utility models and best practices across the country and Canada, and is currently finalizing a comprehensive community response program to serve the needs of National Grid’s 1.2 million customers within the state of Massachusetts. Also in 2010, the Company started and headed an AESP communities working group with utilities across the country in order to learn from best practices and share successes and challenges in managing community based programs. Both working groups continue into 2011.

In additional, National Grid believes it has achieved exemplary status as it has participated as an active member in two Community Mobilization Initiatives (CMI’s) in 2010, serving as the Program Administrator (PA) lead in Chelsea and partnering with NStar in Chinatown. For the purposes of this metric, the Company will focus on their efforts in the town of Athol, a non-CMI, standard community outreach effort, and the Chelsea CMI. The report below describes the results of these two initiatives.

**I. Athol**
One initiative that arose in 2010 is in Athol, a community in which National Grid provides electric service. In 2010, Athol was designated a Green Community, and in that capacity, was eager to increase energy efficiency among its residents and businesses. In July 2010, National Grid began initial talks with the town of Athol and has been working in close partnership with the community to improve building energy performance and to advance the Green Community Action Plan for a sustainable energy future in the North Quabbin area.

A. Pilot Goals

The goals of the Athol Community Initiative are:

- Create a scalable model for a community driven, no-to-low cost community initiative using only pre-existing program design and delivery elements.

- Test viability of community outreach to increase residential and business energy efficiency participation in underserved semi-rural areas of Massachusetts.

B. Partners – Qualifications and Responsibilities

1. National Grid
   Qualifications
   National Grid is the Mass Save Program Administrator for Athol.

   Responsibilities
   National Grid is responsible for all aspects of program administration. Primary responsibilities include managing the process/program design effort and collecting and analyzing program data, especially as it pertains to customer behavior.

2. Town of Athol Energy Committee
   Qualifications
   The Town of Athol Energy Committee is extremely active and has the full support of the town manager. The committee demonstrated it’s competence in gaining regional support and applying for Green Community status.

   Responsibilities
   Following initial meetings with National Grid, the committee developed a detailed action plan for educating citizens on energy efficiency and increasing energy efficiency program participation. Responsibilities outlined included residential and small business outreach effort including training, personnel management, data tracking, media outreach and event planning, as well as coordination of municipal projects.

3. North Quabbin Chamber of Commerce
   Qualifications
   The Chamber of Commerce fully supports Athol’s goals as a green community. It has an active membership from nine towns in the region, including Athol.

   Responsibilities
   The Chamber of Commerce is responsible for outreach to small business customers.

C. Training
1. National Grid
   National Grid staff trained Athol town manager, energy committee members, and North Quabbin Chamber of Commerce on National Grid efficiency programs and incentives, as well as best practices in low cost/no cost energy efficiency community outreach from across the country.

D. Outreach

1. Go Green Event / North Quabbin Buy Local Fair
   National Grid partnered with Athol to host a Go Green Event for families in conjunction with the annual North Quabbin Buy Local Vendor Fair on December 11, 2010. National Grid staff trained Athol Volunteers to work at several tables highlighting family oriented energy efficiency education and arts and crafts as well as Residential and Small Business energy assessment sign ups.

   a. As part of the Whole Building Assessment (WBA) Program noted below, National Grid donated 500 CFLs and cookies with the Athol town seal. People who bought an Athol cookie for $1, also received a free gift of a CFL. Proceeds of the fundraiser go to Athol to execute an Energy efficiency related project of their choice.

   b. Children learned about leaky windows and doors by making their own draft block critters. They also created magnets with friendly reminders to their families to turn off lights, only start the dishwasher when it is full, etc.

   c. National Grid Staff and Athol Volunteers used kilowatts to teach all ages about the energy consumption of various household appliances. A kilowatt is an electricity usage monitor that connects to appliances and shows how efficient they are.

   d. National Grid lighting specialists were on hand to educate residents and small businesses about choices in efficient lighting as well as smart strips technology.

   e. Interested customers signed up to participate for free home energy assessments and National Grid’s lead vendor, Conservation Services Group, followed up with all interested participants.

2. North Quabbin Chamber of Commerce Small Business Meeting
   The Chamber hosted a breakfast meeting where small businesses could learn about National Grid’s direct install program and sign up to participate.

3. Main Streets Program
   In coordination with the town of Athol and the North Quabbin Chamber of Commerce, National Grid sponsored a main streets promotion for Athol. National Grid small business vendor, PRISM, sent a mailing to all small businesses in Athol, alerting them of a special sign-up opportunity for their town only, the week of December 12th. Athol volunteers did personal outreach to let businesses know of the opportunity and encourage them to sign up. The week of December 12th, Prism auditors canvassed the town and audited all those businesses which had signed up. In addition, they stopped in any additional businesses that did not sign up to give them a personal invitation to get an audit.

4. WJDF Radio Partnership
   After attending the Go Green Event and being impressed with National Grid’s presence, local radio station WJDF offered a corporate sponsorship of their non-stop Christmas music
program on December 24th and 25th. National Grid was mentioned each half hour as the sponsor of the initiative.

5. Whole Building Assessment

Athol Energy committee and the town manager have committed to move forward with a Whole Building Assessment of their town buildings. The Town Hall and the high school will be audited in Q1 of 2011. Each WBA also highlights education for building occupants, bridging the gap between C&I and Residential. The Athol Energy Committee will be responsible for locating and training energy efficiency champions in each of the buildings to assist in the education of building occupants. The education will include National Grid’s award-winning Power to Save educational campaign for students and their families.

E. Results for 2010

2010 has been primarily a start up year for the Athol community initiative, beginning in mid summer. The Buy Local Vendor Fair attracted over 200 visitors. For the Direct Install program, Athol had a baseline of 16 audits out of 386 businesses in 2009. In 2010, there were no audits scheduled until the kick-off of small business outreach in November. At the Chamber of Commerce event, there were 48 participants, a very high turnout for these types of meetings. There have been historically low small business participation numbers in the Athol community, with a maximum of 16 small business audits in 2009. Since the direct-install pilot launched in November 2010, average monthly participation rates have increased by 300%. As a result of the community efforts made in Athol in 2010, the town also committed to a Whole Building Assessment of its town hall and high school in Q1 of 2011.

In the residential sector, the town of Athol increased its 1-4 family audit count from 49 audits completed between July to December 2009 to 64 audits completed within the same months of the pilot running in 2011, a 23% increase in completed audits in the same timeframe. With a dedicated insulation contractor operating in the community, weatherization rates have continued to remain stable as residents of this semi rural region have participated in the program. As the pilot progresses, residential outreach will be tracked and monitored further in 2011. National Grid looks forward to furthering their community partnership with Athol in 2011.

F. Lessons Learned: Athol

• Personal attention and assistance to the community group is essential for a successful initiative.

• Efforts to partner with communities through in-kind services can substantially increase customer awareness, participation and satisfaction.

• Even through a non-standard Community Mobilization Initiative (CMI), setting clear and quantifiable participation goals will help the community evaluate their own success and mobilize accordingly.

• Towns designated as MA Green Communities are good candidates for further efficiency outreach, education and partnership.

• Additional strategies such as increased consulting, displaying public artwork, small business main streets pilots, public relations, contests, duel-branded collateral, and community events are effective in garnering increased interest and participation in National Grid’s efficiency programs.
II. Chelsea

The Chelsea pilot is jointly overseen by National Grid as the Gas Program Administrator and NStar as the Electric Program Administrator. Initial discussions began in Spring 2010 with the Chelsea Collaborative as the local residential outreach organization, Community Labor United as the Green Justice Coalition representative, and National Grid and NStar. Once finalizing the contract and receiving a final proposal from the Chelsea Collaborative in the fall, a training session with outreach staff took place in November 2010. Conservation Services Group (CSG) participated in the training along with the utilities, in educating the Chelsea Collaborative about all facets of the outreach and tracking the Collaborative would be performing. The pilot officially kicked off in December 2010 with 28 customer audits scheduled within the month.

A. Pilot Goals

The goals of the Chelsea Community Initiative, as in the other CMI’s include:

- Installing weatherization measures in 50 1-4 family dwellings
- Installing weatherization and/or lighting fixtures in 4 multi-family buildings with 5-20 units each

B. Partners – Qualifications and Responsibilities

1. National Grid

   Qualifications
   National Grid is the Mass Save Program Administrator for gas customers in Chelsea.

   Responsibilities
   As the lead for the Chelsea CMI, primary responsibilities for National Grid include managing the process/program design effort and collecting and analyzing program data, especially as it pertains to customer behavior.

2. NSTAR Electric & Gas

   Qualifications
   NStar is the Mass Save Program Administrator for electric customers in Chelsea.

   Responsibilities
   NStar is working with National Grid in delivering this pilot in Chelsea.

3. The Chelsea Collaborative

   Qualifications
   The Chelsea Collaborative, working for twenty-three years within the Chelsea community, has a mission to enhance the social, environmental and economic health of the community and its people. The mission is carried out by various programs at the Collaborative. In a given year, the Collaborative mobilizes more than 3,000 people for its various campaigns and projects. The CMI is led by the Chelsea Collaborative’s Green Space and Recreation Committee (Green Space), a Committee working on improving Chelsea’s urban environment for the past 16 years. The Chelsea Collaborative has the reputation and experience to knock on doors, engage the community and ensure their experience will be a positive one with any and all projects being sponsored or co-sponsored by the Collaborative. Their office is well known, recognized and publically accessible in the heart of the city with staff as residents of Chelsea.
Responsibilities
The Chelsea Collaborative’s responsibilities include hiring and managing Chelsea residents to conduct outreach as part of the CMI. The Collaborative oversees all aspects of the outreach effort including training, personnel management, data tracking, media outreach and event planning.

4. **Green Justice Coalition and Community Labor United**

*Qualifications*
Through a program of coalition building, research and policy development, public education and grassroots mobilization, the Green Justice Coalition and Community Labor United move forward policies that promote quality jobs, secure healthcare and affordable housing for all of the Boston area’s working people.

*Responsibilities*
The Green Justice Coalition and Community Labor United coordinate program delivery, make sure the goals are met, identify geographic areas and identify local contractors.

5. **New England Regional Council of Carpenters (NERCC)**

*Qualifications*

*Responsibilities*
The New England Regional Council of Carpenters (NERCC) is a union partner in training and workforce development objectives for the CMI.

6. **Chelsea Bank**

*Qualifications*
Chelsea Bank is a mutual, community bank serving the financial needs of Chelsea and surrounding communities. The Bank strives to provide customer oriented products and service while maintaining financial stability and soundness. The Bank's Board, management and staff will maintain a working partnership with its community, keeping in mind the good corporate citizen philosophy. The bank was incorporated in 1885. All deposits are fully insured by FDIC (Federal Deposit Insurance Corp.) and SIF (Share Insurance Fund), and they are an equal opportunity lender.

*Responsibilities*
The Chelsea Bank is a partner in providing gap financing from the David Rockefeller Foundation, New World Foundation and the Surdna Foundation. The bank has made $100,000 available for micro-loans to Chelsea residents. The bank provided information to the Chelsea Collaborative on mortgage-owners that meet the requirement of 60% -120% of area median income for a Chelsea Collaborative mailing to community residents.

6. **City of Chelsea**

*Qualifications*
The City of Chelsea is a strong supporter of the Chelsea Collaborative and the weatherization goals associated with the Chelsea CMI pilot.

*Responsibilities*
The role of the City Manager in the pilot is to coordinate city services that support the pilot, through receiving weatherization specs from the participating contractor to determine what permits are required.

7. **Conservation Services Group (CSG)**

*Qualifications*
Conservation Services Group (CSG) has several decades of experience in the field of energy efficiency services. CSG is currently serving as the Lead Vendor for the Mass Save program services offered in the National Grid service territory.

*Responsibilities*
CSG continued with their role as Lead Vendor, just as they do for the traditional Mass Save program. This requires audit scheduling, performing the audits, writing the contracts and work orders and providing quality control services. In Chelsea’s case, each week CSG opens up extra capacity for the outreach group to schedule audits as part of their outreach in the community. CSG is also responsible for data tracking.

8. **Insul Pro Inc.**

*Qualifications*
Insul Pro has been working in the field of residential weatherization for several years and is a qualified subcontractor under lead vendor CSG.

*Responsibilities*
Insul-Pro is the contractor for measure installation in Chelsea. Insul-Pro supplies insulation to homeowners and numerous insulation & building contractors. More than 50% of Insul-Pro, Inc.’s business is from insulation and supplying light density fiberglass batt insulation. In an effort to keep up with the newest and latest trends in insulation, Insul-Pro, Inc. began spraying Icynene and Wall Spray Cellulose. Icynene spray-in-place foam and Wall Spray Cellulose make up a considerable portion of Insul-Pro, Inc’s business and looks to grow in the future. Insul-Pro, Inc. also installs: gutters & downspouts, roofing and vinyl siding.

**E. Training**

1. **Outreach**

*Technical Training – National Grid/NStar/CSG*
National Grid, NStar and CSG collaborated to develop training. In November 2010, National Grid and NStar provided information on the Mass Save program and the process to be used for the pilot. CSG presented product samples used in the program and gave an overview of the audit and weatherization process.

2. **Audit and Weatherization Shadowing**

*Audit and Weatherization participation*
Members of the Chelsea Collaborative Green Space and Recreation Committee attend CSG audits on a weekly basis to get a better understanding of the process and recommendations made to Chelsea residents.

**F. Outreach**

1. **Cable TV Show**
In early December 2010, a taped cable TV session began airing, informing Chelsea residents of the Chelsea CMI pilot and weatherization opportunities, while providing contact information for viewers.
2. Chelsea Collaborative Open House
   A welcome event for Chelsea residents took place in December 2010, and many attendees signed up for audits; a strong start for the Chelsea Collaborative outreach efforts.

3. Neighborhood group event
   100 families attended this event where Chelsea CMI fliers were distributed.

4. Chelsea Collaborative Holiday Gala
   This fundraising event was held as an opportunity for the Chelsea Collaborative to recognize the many volunteers and projects taking place that sustain the community throughout the year. National Grid participated as an attendee and financial sponsor of the event.

5. Three Kings Day Event
   This holiday celebration was held in January 2011 as an opportunity to spread news of Chelsea pilot and get further audit signups.

6. Chelsea Collaborative Membership Retreat
   This retreat, held in late January 2011 served as an additional opportunity to spread news of Chelsea pilot.

7. Hiring of Additional Staff
   The Chelsea Collaborative has brought on additional staff to perform data entry and income verification so that the outreach staff can spend additional time on their outreach work.

G. Air Sealing and Insulation Work
   As the program was only running for one month by years end, there were no air sealing or insulation work orders in the pipeline. With continued outreach in 2011, the Company anticipates further air sealing and insulation jobs scheduled in 2011.

H. Program Oversight and Decision Making
   Led by National Grid, the steering committee was comprised of CSG Business Development, Chelsea Collaborative Green Space members, NStar program manager, and a Community Labor United representative. The purpose of the Steering Committee was to monitor progress and resolve issues. Weekly agendas and meeting notes were distributed by National Grid.

I. Results for 2010
   28 1-4 family audits were scheduled and completed by December 31, 2010. There were no completed multi-family audits by years end. Because the pilot began in late 2010, full metrics on success are not fully comprehensive, but the following information exists to date.

   **Summary of Chelsea Collaborative Outreach and Program Participation in Chelsea Mobilization Initiative to date, as of January 26, 2011**

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Income Households Reached</td>
<td>12 households</td>
</tr>
<tr>
<td>60% - 120% Income Households Reached</td>
<td>30 households – (participating in program)</td>
</tr>
<tr>
<td>120% Income Households Reached</td>
<td>None</td>
</tr>
<tr>
<td>In- Process/Awaiting Documentation</td>
<td>15 households</td>
</tr>
<tr>
<td>Rejected Weatherization Program</td>
<td>1 household</td>
</tr>
<tr>
<td>Received Initial Screening Audit (1-4 family)</td>
<td>28 households (as of 12/31/10)</td>
</tr>
</tbody>
</table>
Received Initial Screening Audit  
(MultiFamily)  
0 households (as of 12/31/10)

<table>
<thead>
<tr>
<th>Outreach/Events</th>
<th>Estimated/Reached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial meetings with different Chelsea Collaborative committees</td>
<td>60 persons</td>
</tr>
<tr>
<td>FUEL meeting – 2 meetings</td>
<td>150 persons</td>
</tr>
<tr>
<td>Thanksgiving Day Dinner with CUDE: Chelsea United in Defense of Education</td>
<td>58 persons</td>
</tr>
<tr>
<td>Thanksgiving Day Lunch (Centro)</td>
<td>150 persons</td>
</tr>
<tr>
<td>Initial mailing bilingual flyer to Chelsea Collaborative list</td>
<td>406 households</td>
</tr>
<tr>
<td>Chelsea Collaborative Open House</td>
<td>45 persons</td>
</tr>
<tr>
<td>Flyers distributed at Chelsea Bank</td>
<td>100 persons</td>
</tr>
<tr>
<td>City of Chelsea: All Chelsea Awards Night</td>
<td>100 persons</td>
</tr>
<tr>
<td>Outreach to MultiFamily Property Owners (5-20 Units)</td>
<td>5 property owners</td>
</tr>
<tr>
<td>Second mailing: Bilingual flyer (to a specific Chelsea neighborhood)</td>
<td>330 households</td>
</tr>
<tr>
<td>Three Kings Day Event</td>
<td>75 persons</td>
</tr>
<tr>
<td>Chelsea Collaborative Membership Retreat</td>
<td>90 persons</td>
</tr>
<tr>
<td>Third mailing Bilingual Flyer</td>
<td>426 households</td>
</tr>
<tr>
<td>Town manager email to Chelsea residents</td>
<td>500 persons/households</td>
</tr>
<tr>
<td>Chelsea CMI flier in town water and sewer bills</td>
<td>5000 persons/households</td>
</tr>
<tr>
<td>Chelsea Cable TV Interview</td>
<td>Unable to be tracked</td>
</tr>
<tr>
<td>Bilingual Press Release: 2 times in Chelsea Ledger Twice, 1 time in Siglo21 Hispanic Newspaper in New England</td>
<td>Unable to be tracked</td>
</tr>
</tbody>
</table>

J. Lessons Learned: Chelsea

- While various stakeholders want to be involved in a community-based effort, not everyone has the training and resources necessary to participate.

- Subcontractors must be equipped with the training and qualifications necessary to participate as part of the MassSave program before committing to a community based pilot program.

- Establishing a timeline prior to pilot launch is essential, and flexibility must exist by all stakeholders. A clear understanding of everyone’s scope of work is key and scheduling must be adhered to in order to move forward. Maintaining the right balance in frequency of communication and meetings with all stakeholders is important.

- It is key to get full buy-in and support from the city government or local community group. Their resources, participation and trust within the community are essential for a successful initiative.

- Documenting Best Practices of outreach and audit scheduling and documenting questions faced is useful in maintaining clear scopes of work and priorities.
• Marketing must be mutually developed. In the case of distinct communities local input should be encouraged. Co-branding is essential to mitigate any chance of brand confusion.

• It is essential to work out logistics around scheduling of audits and maintain an open communication with utility sponsor and lead vendor performing the audits.

• Outreach staff must be equipped with the knowledge and resources necessary to address pre-weatherization barriers with interested participants.

• With older housing stock and landlord identification challenges, it is difficult to reach certain segments in a community. Outreach staff must be very vigilant in following up with owners of multi-family properties in order to ensure follow through.

• Outreach groups have a strong influence in the community. When their mission is not just a green mission but community growth and civil service, they have greater success and buy-in from the community they serve.

• Buy-in and support of lead vendor is essential in pilot success. CSG providing the Outreach staff with blocks of time for scheduling audits is the most effective strategy.

**Conclusion**

National Grid will continue the Athol community initiative into 2011 and will investigate further opportunities for community partnership through the Company’s internal community working group, while continuing to be a key player in the joint PA communities working group and the AESP working group, sharing best practices and strategies with fellow PA’s. The Chinatown and Chelsea pilots will continue into 2011 until project goals are reached or the project deadlines are reached, whichever comes first. In 2011, National Grid anticipates heading a National Grid only CMI in the town of Lynn, serving as the gas and electric Program Administrator. In conclusion, National Grid feels that with their community efforts in the town of Athol, as well as their active involvement in the Chinatown CMI and leadership in the Chelsea CMI in 2011, the Company is deserving of exemplary status on this metric.
RES #5

MassSAVE: Facilitate Inclusion of Independent Energy Auditors
{Electric & Gas} – Statewide
<table>
<thead>
<tr>
<th>Metric Number</th>
<th>Metric Language</th>
<th>National Grid Electric Final 2010 Production</th>
<th>National Grid Gas Final 2010 Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>RES #5</td>
<td><strong>MassSAVE: Facilitate Inclusion of Independent Energy Auditors (Electric &amp; Gas) - Statewide</strong></td>
<td>Threshold</td>
<td>Threshold</td>
</tr>
<tr>
<td></td>
<td>To address the need to engage independent energy auditors in the auditing services of the RCS auditing service of the MassSAVE program, the PAs will: Document the standards for vendor services (e.g. accreditation/certifications, cost-effectiveness, administration, reporting to DOER and PAs, training requirements, pricing) and provide a detailed specification on each component of the new program audit process. Prepare and send an RFQ to independent energy auditors to determine the approximate pool of qualified individuals and companies. Each PA to submit a memo to EEAC consultants and DOER by May 1, 2010 detailing their distinct and clear role in accomplishing these activities. Each PA will expand the pool of independent auditors identified through the RFQ process, qualified to deliver auditing services in the Commonwealth. Each PA will coordinate with their primary vendor to integrate customers brought to the program by pre-qualified independent energy auditors. Each PA to submit a memo to EEAC consultants and DOER by July 1, 2010 detailing their distinct and clear role in accomplishing this activity. Prepare a statewide multi-PA report documenting the initiative to be delivered to EEAC consultants and DOER by January 15, 2011. Include in the report lessons learned and recommendations for continuing efforts to expand the program services delivery base.</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
</tbody>
</table>
Metric 5. MassSave: Facilitate Inclusion of Independent Energy Auditors (Electric & Gas) – Statewide

Threshold: To address the need to engage independent auditors in the auditing services of the RCS auditing service of the MassSave program, the PA’s will:

Document the standards for vendor services (e.g. accreditation/certification, cost-effectiveness, administration, reporting to DOER and PA’s, training requirements, pricing) and provide a detailed specification on each component of the new program and audit process.

Prepare and send an RFQ to independent energy auditors to determine the approximate pool of qualified individuals and companies.

Each PA to submit a memo to EEAC consultants and DOER by May 1, 2010 detailing their distinct and clear role in accomplishing these activities.

National Grid Response:

National Grid worked with its lead vendor Conservation Services Group to create a pilot process whereby independent auditors could work in the MassSave program. To that end:

3/10/10 - RFQ sent out answered by 19 respondents.
3/25/10 - RFP # 10-002 was issued to 9 respondents.
4/30/10 – RFP process completed by 8 of the respondents.
5/12/10, and 5/14/10 Interviews set up for final 8 candidates.

June, 2010 Finalists should start auditing.
National Grid in accordance to the following Metric is reporting on its completion of reaching the Design level.

Design: Each PA will work to expand the pool of independent auditors, identified through the RFQ process, qualified to deliver auditing services in the Commonwealth. Each PA will coordinate with their primary Vendor to integrate customers brought to the program by pre-qualified independent energy auditors. Each PA to submit a memo to EEAC consultants and DOER by July 1, 2010 detailing their distinct and clear role in accomplishing this activity.

Results: National Grid's lead vendor, in the April of 2010, initiated an RFQ to approximately 50 companies. 19 companies showed interest in continuing the process. The next step to follow was an RFP to the 19 interested companies. This resulted in 8 companies successfully completing the RFP process and moving on to be interviewed. National Grid's lead vendor conducted interviews with the 8 companies and chose 3 to participate in the audit program.

The independent audit companies were trained by National Grid's lead vendor in June 2010 and will start in the field July 6, 2010.

I believe the actions taken by National Grid and its lead vendor achieve the intent of the design level of this metric.

Yours truly,

Jerry Hanna
National Grid
Principal Analyst
MassSave Program manager.
TO: EEAC CONSULTANTS AND DOER
FROM: PARTICIPATING MASSACHUSETTS PROGRAM ADMINISTRATORS
SUBJECT: MASS SAVE METRIC: FACILITATE INCLUSION OF INDEPENDENT ENERGY AUDITORS – EXEMPLARY LEVEL MEMO
DATE: 1/14/2011

The purpose of this memo is to satisfy the Exemplary Level of the Mass Save Metric: Facilitate Inclusion of Independent Audit Providers (IAPs).

<table>
<thead>
<tr>
<th>5. MassSAVE: Facilitate Inclusion of Independent Energy Auditors (Electric &amp; Gas) – Statewide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exemplary</td>
</tr>
</tbody>
</table>

OVERVIEW

The Massachusetts Electric and Gas Program Administrators (PAs) are committed to providing pathways for the inclusion of qualified energy professionals in utility sponsored programs. The PAs began planning for the inclusion of Independent Audit Providers (IAPs) in the Residential Conservation Services (RCS) program in early 2010.

Through a competitive procurement process, each PA maintains a contract with a Lead RCS Implementation Vendor.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Lead Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric &amp; Gas</td>
<td>Conservation Services Group (CSG)</td>
</tr>
<tr>
<td>National Grid Electric &amp; Gas</td>
<td>Conservation Services Group</td>
</tr>
<tr>
<td>Western Massachusetts Electric Company</td>
<td>Center for Ecological Technology (CET)</td>
</tr>
<tr>
<td>Berkshire Gas Company</td>
<td>Center for Ecological Technology</td>
</tr>
<tr>
<td>Columbia Gas of Massachusetts</td>
<td>Honeywell</td>
</tr>
<tr>
<td>New England Gas Company</td>
<td>Honeywell</td>
</tr>
<tr>
<td>Unitil</td>
<td>Energy Efficient Investments (EEI)</td>
</tr>
</tbody>
</table>

Included in the PAs’ contracts with their respective Lead Vendors is the delivery of residential home energy assessments. In order to maximize participation of eligible IAPs in the RCS program, participating PAs engaged their Lead Vendor to partner in developing a Request for Qualifications
(RFQ) and some of the PAs issued a subsequent Request for Proposals (RFP) to potential Independent Audit Providers.

The RFP solicited IAPs to perform all levels of home energy assessments offered via the RCS program as a subcontractor to the PA Lead Vendors for the period of July, 2010 through December, 2010. PAs requested that their Lead Vendors provide programmatic training, software, hardware, collateral, as well as, technical and data transfer support to all selected bidders.

Throughout this initiative, the PAs remained highly engaged in this process, working collaboratively with their Lead Vendors to maximize the effectiveness of IAP inclusion. The PAs have collaborated with their Lead Vendors to understand the challenges and lessons learned via this pilot. The lessons learned were used to develop recommendations for the future RCS program re-design model.

INTRODUCTION

To begin the IAP integration process, bids were solicited on behalf of the PAs for the role of Independent Audit Providers only. However, feedback from interested organizations suggested that the bidders were not interested in solely providing energy audits, but to also provide implementation of weatherization measures. The PAs considered the bidders’ request and concluded that it was reasonable to incorporate these organizations as audit and weatherization subcontractors. As a result of this change, the organizations were integrated into the program in a Home Performance Contractor (HPC) role, rather than solely as audit providers.

In order to facilitate the capability of the HPCs to implement weatherization measures, HPCs were subcontracted as audit providers in the pilot, as well as weatherization installers to the PAs’ Lead Vendor. All weatherization measures implemented by HPCs were installed at PA specific program prices. Although the work was offered and implemented by the HPCs, under the contract of the Lead Vendor, PAs Lead Vendors were ultimately responsible to ensure the work was completed to program standards.

Below is a summary of each participating PA’s information related to this initiative.

<table>
<thead>
<tr>
<th>Participating Program Administrator Organization</th>
<th>Number of IAPs</th>
<th>Dates IAPs Provided Services</th>
<th>Number of Jobs IAPs Performed (as of Y/E 2010)</th>
<th># of Audits</th>
<th># of Wx Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric &amp; Gas</td>
<td>3</td>
<td>July 2010 – Present</td>
<td>897</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>National Grid Electric &amp; Gas</td>
<td>3</td>
<td>July 2010 – Present</td>
<td>522</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Western Massachusetts Electric Company</td>
<td>5</td>
<td>October 2010 - Present</td>
<td>173</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Berkshire Gas Company</td>
<td>4</td>
<td>October 2010 - Present</td>
<td>12</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Please Note: Additional information regarding HPC production can be found in Attachment A**
LESSONS LEARNED AND RECOMMENDATIONS

The following are eight identified areas where PAs believe enhancements can be made to the HPC integration process for the future RCS program model. Each area includes summaries of lessons learned throughout this initiative with supporting recommendations for improvement.

I. Training

Lessons Learned

Based upon the qualifications presented by the HPCs through the RFP process, the HPCs selected possessed adequate knowledge and proficiency in completing whole house, fuel blind assessments. Therefore, the PAs directed their Lead Vendors to focus training on programmatic and procedural elements. Training was provided by the Lead Vendor to HPC in-field energy auditors, as well as, administrative/back office staff. The HPC staff received classroom training on software, program offerings, (including incentives and the HEAT Loan) expectations for data transfers, reporting, creating contracts, accurately filling out paperwork, and dealing with health and safety concerns. Throughout this initiative, Lead Vendors provided ongoing training and support for technical, software, reporting, and programmatic related questions.

Recommendations

Although HPCs underwent five days of classroom training during the start up phase of the pilot, the Lead Vendor continued to provide training and support throughout the engagement. The HPCs possessed qualifications such as BPI Building Analyst or Envelope Professional certifications and/or company accreditation. While these credentials are important from a building science perspective related to the development of work scopes for energy efficiency improvements; certifications alone do not guarantee an individual is skilled in all aspects of whole house auditing, sales, or customer service. In addition to training the HPCs prior to the program start; it is important that Lead Vendors provide a direct line of communication for ongoing training, mentoring and all other aspects of program delivery.

II. Consistency

Lessons Learned

With multiple market actors involved in implementing the program, it is important to maintain consistency in the services provided to support the integrity of the Mass Save program. It was the expectation of the PAs that HPCs were to offer the program to customers in a manner consistent with the current RCS program design and offerings. This includes conveying a consistent message, distributing consistent materials and offering customers consistent services. (Dependent on customer need and cost-effectiveness of offerings)

Recommendations

Providing appropriate training and maintaining adequate oversight of HPCs will be necessary going forward to ensure all market actors are conveying a consistent message to customers. It is important that HPCs represent themselves appropriately as participating Mass Save contractors to avoid any customer confusion. As the RCS program evolves in 2011 to expand the number of HPCs working within the program, it is recommended that information regarding HPCs association with the PAs programs and oversight of the HPCs operation be available to customers via the Mass Save website.
and other program collateral. It is critical that it is made clear to the marketplace that HPCs are contractors working under the direction of the PAs through their Lead Vendors providing approved RCS program services in an integrated manner and not independent service providers in competition with the RCS program. HPCs must be appropriately monitored to assure that consistent and accurate information is being provided to customers. A high level of oversight will minimize the inevitable market confusion that should be anticipated as the RCS program transitions to an open market model.

III. Customer Confusion

Lessons Learned

Customer service in all facets is of the highest priority to the PAs. PAs strive to avoid any confusion related to the various steps and the multiple parties involved. HPCs are expected to guide customers throughout the entire process including customer follow up as necessary and timely submission of all customer related data. HPCs are expected to be respectful and courteous to the customer in all situations including all customer interactions. Implementation of the program should be as seamless as possible for all customers.

Recommendations

A clear distinction should be made to customers that all contractors and subcontractors represent Mass Save Home Energy Services and although there are various parties involved, program offerings need to be represented to consumers as being provided by their local utility and not the independent contractors.

It is the intention of the PAs to develop clear guidelines related to HPC logo use, HPCs articulation of their engagement with the program, approval of marketing materials, control over services offered, and terms of service to minimize confusion in the marketplace and to maintain the Mass Save brand.

Detailed guidelines should be put in place outlining PAs’ expectations regarding HPC customer service. Additionally, HPCs will be expected to meet the audit volume submitted to the PAs and Lead Vendors, which will be one of several metrics that will be necessary to monitor HPC performance.

IV. Customer Service

Lessons Learned

Customer service should be well defined; maintaining an excellent level of customer service is expected of all representatives and contractors. HPCs may have competing interests in balancing deployment of staff and resources for their engagement with the RCS program versus other aspects of their businesses. Therefore, it must be clearly articulated to the HPCs that commitments made to the RCS program must be met. For example, last minute cancellations of customer appointments for audits or installations due to competing priorities are unacceptable and should be monitored through customer surveys and follow-up.
Recommendations

Clear guidelines for expectations of customer service should be defined, and performance monitored. In addition to in-process and post inspections of work done by the Lead Vendor, follow-up surveys should be conducted to gather important feedback regarding the customer experience. This follow-up is important to ensure customers are being offered consistent program services and that a high level of customer satisfaction is being achieved. Furthermore, HPCs are expected to make customers aware of the one point of contact for all related questions or concerns.

V. Integration of Existing Systems

Lessons Learned

HPCs were provided with the Lead Vendors’ audit software and trained on its use. The audit and workflow systems the Lead Vendors currently have in place were not designed for the integration of external service providers. The current contracts under which the Lead Vendors were operating in 2010 were for turnkey services. The PAs requested that their Lead Vendors work with HPCs on a pilot basis to gain a better understanding related to the process of seamlessly incorporating qualified HPCs on a larger scale in the future. The lessons learned will assist HPC integration into the new market model being discussed and designed through the multi-year planning process with the EEAC and DOER.

The PAs recognized that it was not plausible for their Lead Vendors to make significant investment in information technology systems in 2010. The decision of PAs to eliminate any requirement of Lead Vendors to implement costly technology upgrades was based on the planned pilot representing a relatively low number of projected HPC audits. The term of existing Lead Vendor contracts and the fact that the new market model was still under development also guided the PA decisions.

Recommendations

As the market of external service providers expands, systems and/or procedures should be put in place to accommodate and optimize data sharing, as well as, create an efficient integration process. Workflow management should be incorporated in order for PAs and the Lead Vendors to view what stage of the process customers are engaged in. The PAs have articulated the new market model and requirements for integration of qualified HPCs in their current RFPs for Lead Vendors.

* HPCs in the Berkshire Gas pilot program were not trained on audit software use due to the small size of the pilot program. Software training time would have exceeded the time spent performing audits. The Lead Vendor entered the data from audits based on the HPC paperwork.

VI. Broad Knowledge of Residential Program Offerings

Lessons Learned

The local utilities offer a multitude of programs to our customers. This requires that auditors maintain a broad knowledge of all residential programs and details to ensure they are advising the customers on the most cost-effective energy efficiency improvements available. Understanding the volume of program offerings requires auditors to expand their professional knowledge beyond their particular specialty to incorporate appropriate recommendations made available by all residential programs.
Recommendations

Auditors should be well versed on the array of residential program offerings and understand when those recommendations are appropriate for customers. Lead Vendors must be tasked with providing ongoing communication and training to the HPCs related to all residential program offerings as the conduit between the PAs and the HPCs. The PAs are continually working to improve and enhance all of their programs. Therefore, information on current offerings must be consistently provided to the customer.

VII. Quality Control (QC)

Lessons Learned

To maintain a high quality program, robust QC is necessary when many market actors are working within a program. QC of data, audits, and implementation should be done in order to ensure our customers are receiving consistent, safe, and cost-effective energy efficiency recommendations. Throughout this initiative a high level of QC was required despite the credentials of the IAPs.

Recommendations

QC of installed measure and billing data within the HPC organization is necessary prior to data submittal to the Lead Vendor in order to avoid arduous administrative burden. Additionally, in-process and post inspections should be completed by the Lead Vendor for work done by HPCs in order to ensure consistent and high quality service. In the future, extensive QC will be completed by the Lead Vendor and an independent third party QC vendor. In order to maintain this robust level of QC, HPCs must maintain transparency and communication with the Lead Vendor to ensure a seamless and efficient process.

VIII. Metrics

Lessons Learned

Setting clear metrics is another important lesson learned throughout this initiative. HPCs must be required to meet certain metrics to ensure the broader goals of the program are achieved rather than the goals of each individual participating HPC. Guidelines should be developed that outline tracking, incentives, and any corrective action that could result if program goals are not achieved.

Recommendations

HPCs must be provided with clear expectations as to the performance metrics of which they will be evaluated. HPC metrics should be similar to the metrics of Lead Vendors. The metrics attributed to HPCs should reflect the ability of HPCs to selectively recruit and properly serve designated customer segments. To achieve the PAs aggressive goals for participation and energy savings in 2011; all service providers must be provided with clear expectations related to performance metrics. Performance against defined metrics should be tied to the number of customers HPCs can serve to allow the PAs to effectively manage their budgets and assure that the RCS program meets cost effectiveness expectations.
CONCLUSION

The Massachusetts Electric and Gas Program Administrators look forward to implementing the future design of the Residential Conservation Services program to incorporate the inclusion of additional HPCs. The PAs found this engagement to be extremely valuable in identifying potential barriers and allowing time for appropriate recommendations to be incorporated for future engagements. It is the expectation of the PAs that these lessons learned will be used to maximize the effectiveness of the inclusion of HPCs. This initiative, continuous communication between PAs, Lead Vendors and HPCs will provide insight to improve HPC integration in the future. The lessons learned and recommendations listed above will be considered by the PAs to integrate HPCs more seamlessly as the 2011 RCS market model is deployed.
## Home Performance Contractor Production Analysis

### NSTAR

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Number of Audits*</th>
<th>Number of Completed Weatherization Jobs**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Guild</td>
<td>190</td>
<td>17</td>
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<tr>
<td>Next Step Living</td>
<td>634</td>
<td>42</td>
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<tr>
<td>Wellhome</td>
<td>73</td>
<td>14</td>
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<tr>
<td>Total</td>
<td>897</td>
<td>73</td>
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### National Grid

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Number of Audits*</th>
<th>Number of Completed Weatherization Jobs**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Guild</td>
<td>250</td>
<td>14</td>
</tr>
<tr>
<td>Next Step Living</td>
<td>182</td>
<td>12</td>
</tr>
<tr>
<td>Wellhome</td>
<td>90</td>
<td>5</td>
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<tr>
<td>Total</td>
<td>522</td>
<td>31</td>
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### Berkshire Gas

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Number of Audits*</th>
<th>Number of Completed Weatherization Jobs**</th>
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<tbody>
<tr>
<td>Co-op Power</td>
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<tr>
<td>Cozy Home Performance</td>
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<tr>
<td>Environmental Compliance Services (ECS)</td>
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<tr>
<td>Energia</td>
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<td>0</td>
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<tr>
<td>Total</td>
<td>12</td>
<td>0</td>
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</tbody>
</table>

### Western Massachusetts Electric Company

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Number of Audits*</th>
<th>Number of Completed Weatherization Jobs**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-op Power</td>
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<td>1</td>
</tr>
<tr>
<td>Cozy Home Performance</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Environmental Compliance Services</td>
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<td>1</td>
</tr>
<tr>
<td>Energia</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Next Step Living</td>
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<td>14</td>
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<tr>
<td>Total</td>
<td>157</td>
<td>16</td>
</tr>
</tbody>
</table>

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*The number of audits includes all site visits and does not indicate the number of distinct customers served.

**Please Note: The weatherization jobs noted have been completed as of this report and additional completed weatherization jobs are expected to occur beyond this date. Additionally, 11 NSTAR weatherization jobs and 6 National Grid weatherization jobs are in various stages of verification related to invoicing discrepancies and/or QC related issues.
2010
Low Income Performance Metrics
Low Income #1

Hard to Reach Landlords
<table>
<thead>
<tr>
<th>Metric Number</th>
<th>Metric Language</th>
<th>National Grid Electric Final 2010 Production</th>
<th>National Grid Gas Final 2010 Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Income #1. Hard to Reach Landlords (Electric &amp; Gas) – Statewide</td>
<td>Establish a subcommittee consisting of members of the Best Practices Working Group with representatives from all gas and electric program administrators to design and develop a cost-effective statewide landlord early retirement high efficiency heating incentive initiative. Incentive Plan should target single family (1-4 units) and should be completed by August 1st, 2010.</td>
<td>Design</td>
<td>Threshold</td>
</tr>
<tr>
<td></td>
<td>Each program administrator to develop a database consisting of landlords in their respective service territories of low-income tenants that pay their own heating bills by September 30th 2010.</td>
<td>Exemplary</td>
<td>Design</td>
</tr>
<tr>
<td></td>
<td>Working group to develop and initiate a statewide marketing plan prior to 2010-2011 heating season. Each program administrator to use their individual database to target market and submit a final report of participation and any lessons learned to the Best Practices Working Group by January, 30th 2011.</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
</tbody>
</table>
2010 Low Income Metric One

NSTAR Electric & Gas, National Grid, Western Massachusetts Electric Company, Fitchburg Gas & Electric Company, Columbia Gas of Massachusetts, Berkshire Gas Company and New England Gas Company are submitting this report to update the Low Income Energy Affordability Network (LEAN) on the status of the 2010 low income metric number one.

<table>
<thead>
<tr>
<th>1. Hard to Reach Landlords {Electric &amp; Gas} – Statewide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Threshold</strong></td>
</tr>
<tr>
<td><strong>Design</strong></td>
</tr>
<tr>
<td><strong>Exemplary</strong></td>
</tr>
</tbody>
</table>

We believe that by completion and documentation of these tasks, NSTAR Electric & Gas, National Grid, Western Massachusetts Electric Company, Fitchburg Gas & Electric Company, Columbia Gas of Massachusetts, Berkshire Gas Company and New England Gas Company have completed the 2010 low income metric number one as described at the exemplary level.

Respectfully submitted by:

Diane M. Lopes  
Residential Program Manager  
NSTAR Electric & Gas

Diana Duffy  
Senior Program Manager  
National Grid

Deborah E. Sas  
Senior Project Administrator  
Western Massachusetts Electric Company

Derek T. Kimball  
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Unutil Service Corporation

Kara A. Gray  
Program Manager  
Columbia Gas of Massachusetts

Robert Gyurjan  
Lead Analyst – Energy Services  
The Berkshire Gas Company

Jeanne B. Cherry  
Lead Energy Efficiency Programs Administrator  
New England Gas Company
Marketing Plan for Landlord Heating Incentive Initiative for 1-4 units

The development of a Statewide Marketing Plan began when PAs determined how best to reach this historically elusive and specific customer segment in time for the 2010 heating season, starting in September. With the support of LEAN, the PAs agreed to launch its marketing campaign using direct mail to connect with potential landlords. The PA’s sought a direct connection to potential metric candidates using data on these customers that each PA could generate.

Targeted Direct Mailing – Developmental Process

Specific Target Audience:

- Landlords with low-income tenants, where tenants pay for heat

Specific Method:

- Query landlords of low-income tenants from internal PA databases
- Establish data queries to generate information to yield at least 5% of landlords identified by database

Determine Outreach Frequency:

Varies by PA based on number of landlords in database, as well as the availability of local agency staff, who are best equipped to verify quality of leads

Medium – finalized in September

- Direct mail issued from each PA, designed specifically for their territory, and quality of leads from each database. (See attached for PA specific letters/flyers)
- PAs mailed PA specific letter to landlords in their service territory

Content:

Letter/flyer released by each PA

Enhanced Marketing Effort:

When possible, attend landlord association-type meetings
- Sept. 29 – Greenfield Landlord Association
- Oct. 9 – Springfield Residential Landlord Association
- Nov. 18 – Westfield Landlord Business Association
Metric 1: Hard to Reach Landlords

Subcommittee of the members of the Best Practices Working Group, which included representatives from all gas and electric utilities, develop, market and execute a statewide landlord early retirement high efficiency heating incentive initiative for single family (1-4 units)

Metric Achievements

THRESHOLD

- Established a Best Practices subcommittee which included representatives from all gas and electric Program Administrators
- Initial meeting held on April 13, 2010
  - initiated a sub-committee of PAs and lead agency vendors to work collaboratively on this effort
  - Reviewed NSTAR pilot
  - Discussed ways to obtain data for this initiative
- Other meetings/conference calls held:
  - May 4, 2010
  - May 24, 2010
  - June 2, 2010
  - June 8, 2010
  - July 16, 2010
  - September 16, 2010
  - September 21, 2010
  - September 27, 2010
  - October 7, 2010
  - October 13, 2010
  - October 15, 2010
  - November 9, 2010

- Developed a statewide plan in collaboration and approved by LEAN (See The Low-Income 1-4 Family Building Heating System Early Retirement Initiative Description attached)
  - Achieved Threshold status on June 8, 2010

DESIGN

Each utility worked with their internal departments to identify where sources of data existed.
- Each PA had similar data mining methods
  - PAs worked with their IT departments to identify the best methods to extract appropriate data
  - Berkshire Gas – worked with IT to extract names and addresses for landlords with tenant accounts on the low-income rate for marketing outreach
Columbia Gas – worked with IT to extract names and addresses for landlords with tenant accounts on the low-income rate for marketing outreach

- National Grid - worked closely with its Lead agency to come up with a targeted list of landlord properties with gas heat that received low income weatherization services during 2010

- New England Gas – Collaborated with local landlord representatives to compile a community list of landlords

- NSTAR- worked with IT to extract any residential discount electric/gas customer account from our CIS system with owner information on the account, scrubbed the data removing incomplete, unusable or duplicate information and created a database for marketing outreach

- Unitil– used the local yellow pages and worked with IT to extract names and addresses for landlords with tenant accounts on the low-income rate for marketing outreach

- WMECO - worked with IT to extract any residential discount electric customer account from our CS2 system with landlord information on the account along with data mining from the CLMTRS internal database

- Design level achieved varies per utility
  - Berkshire Gas-August
  - Columbia Gas -July
  - National Grid - September
  - New England Gas - August
  - NSTAR - August
  - Unitil - August
  - WMECO-August

EXEMPLARY

Outreach activities
- PAs developed a generic letter to target landlord (See attached for PA specific letters/flyers)
- Attended landlord association meeting
  - Sept. 29 – in Springfield – Greenfield Landlord Association
  - Oct. 9 – in Springfield – Springfield Residential Landlord Association
  - Nov. 18 – in Westfield – Westfield Landlord Business Association
- Approximately six MMI referrals were redirected to the local Community Action Agencies (CAA)
- Finalized marketing plan in late September
  - PAs mailed PA specific letter to LL in their service territory. Some starting in October
    - Berkshire Gas-November 19
    - Columbia Gas – October 18
    - National Grid – November 29
    - New England Gas – December 20
    - NSTAR – October 15
    - Unitil – December 20
    - WMECO-October 15
<table>
<thead>
<tr>
<th>Utility</th>
<th>Number of Landlords Identified</th>
<th>Number of letters sent</th>
<th>Tenant Heating systems replaced*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berkshire</td>
<td>1500</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Columbia Gas</td>
<td>197</td>
<td>197</td>
<td>0</td>
</tr>
<tr>
<td>National Grid</td>
<td>89</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>New England Gas</td>
<td>25</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>NSTAR</td>
<td>7000</td>
<td>600</td>
<td>58</td>
</tr>
<tr>
<td>Unitil</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Wmeco</td>
<td>3000</td>
<td>600</td>
<td>0</td>
</tr>
</tbody>
</table>

*As of this writing, tenant systems have been replaced but cannot be traced definitive to program because 1) qualifying leads and the subsequent installation can take several weeks/months and 2) There is no existing tracking system in place to report this to the utilities.

Some utilities opted to limit the number of letters sent to landlords in order to better manage demand. There was some concern that an uptick in this initiative might divert too many resources away from the overall goals and objectives of the Low-Income Program.

**Barriers/Lessons Learned**

In the Fall and Winter of 2010, the utilities and their Community Action Agency (CAA) partners have been actively marketing the Heating System Early Retirement Initiative to landlords through direct mailings and presentations at local landlord association events. One newspaper, the Berkshire Eagle, ran an article about the initiative in a November 2010 issue.

The Electric and Gas utilities have compiled the following observations and recommendations regarding the 2010 Metric. These categories highlight the experience the utilities have collectively had since the initiative’s inception.

**Utility & Landlord Data Reliability:**
- Seeking qualifying customer information through fuel assistance and utility databases is more difficult due to current privacy laws.
Due to confidentiality requirements, tenant LIHEAP information cannot be shared with landlords without consent from tenants or with utilities for marketing purposes.

Landlord data may be incorrect. Utility databases may not capture most current landlord/owner name and address. In addition, the data is not typically updated. Landlord information is not available unless landlord requests to be put on the account in case of a unit vacancy.

The process for requesting and receiving customer data from some utility companies is tedious. IT department’s priorities have been established per IT management. Incoming data requests of this nature may not be a high priority thus information can take a considerable amount of time. Specialty queries may have to be written to identify landlord information and the results may not be complete.

Heating system installations being installed through Metric # 1 are not tracked directly to specific marketing efforts.

Utilities do not have one standard method to track and report this Metric result.

Utility & Landlord Budgets & Costs:

UTILITY:

- Lack of specific budget – this metric was contemplated after budgets were approved and not included in the Statewide 3-year Energy Efficiency Plan for low income programs.
- General concern that the utility weatherization programs will become heating system replacement programs. The dollars spent for this Metric alone will diminish the total dollars available for all other weatherization services and heating system replacements for low income customers.
- Smaller utilities can provide fewer systems to fewer landlords. There is a question of the prioritization and equity to qualified landlords and tenants. Should 1 house receive 4 new heating systems at a total cost of $18,000 or should 4 landlords receive one system each? How many per building/address can be installed if qualified? How many per landlord with multiple sites?

LANDLORD:

- Landlord Return on Investment - Some landlords want to upgrade the current heating system but cannot afford the upfront dollars for the co-pay or the pre-installation work that may be required. For example asbestos removal and chimney liners are additional costs that would need to be covered by the landlord. These expensive add-ons may be beyond what a landlord would spend if they replaced the current system with a less efficient model.

Resources:

- Each CAA that administers their utility weatherization programs has different levels of expertise and staffing capabilities (time, resources, etc) for handling the landlord initiative. More detailed information is required to review and
approve/disapprove a candidate with multiple heating systems and/or properties.
- Current utility mailings are creating the CAA’s to chase bad leads which is diverting resources from the core goals and objectives of the program and the initiative.
- Prioritization of CAA limited staffing resources that may take away resources from current utility weatherization programs.

**Exposure/Liability:**
- Any mass marketing efforts have and could generate high demand. This could potentially put PAs at risk to exceed budgets.
- Misinformation could be disseminated about the program that leads to distrust and frustration with utility conservation programs not being able to meet the needs of landlords and tenants.

**Other Issues:**
- The 2 year rent freeze is a barrier to sign up and cannot be enforced by the utilities.
- The installation of a new heating system requires the heating contractor to pull a permit. This opens the door to code officials inspecting the building(s). Some landlords don’t want exposure if additional code violations are identified and they incur additional costs as a result of the heating system upgrade.
- Some landlords have expressed interest in switching from oil to gas. This is not allowed under the HEARTWAP or initiative guidelines.
- Landlords that have made inquiries have included owners of 4 units to 400 unit buildings. Landlords with more than 4 units are now looking for the same incentive through other weatherization programs.
- Several interested landlords have empty apartments in their buildings. This initiative was not designed to address these units which are not occupied by low-income tenants.
- Installing heating systems in an un-insulated 1-4 family building may not accomplish the desired energy savings without a whole building approach. Through better, more qualified leads the initiative can address this issue.
- In some locations, multiple agencies administer heating system replacement programs. This causes confusion to landlords seeking these services.

**Observations and Recommendations based on Lesson Learned:**
- The landlord heating system campaign has received more responses that anticipated. Some utilities and CAA’s have attended local landlord association events. They have been well received and all flyers describing the program were taken. There is a need a definite need and interest from landlords.
- Landlords that are advocates for energy efficiency have been an asset to getting the word out about all programs through word of mouth.
- This is initiative has very stringent requirements which is hard to address in a mass marketing appeal.
- The Community Action Agencies are a trusted local resource in their communities.
- Based upon the barriers and lessons learned, the utilities believe the local CAA’s are better equipped to manage a tenant/landlord relationship, determine heating system eligibility, marketing the program to qualified landlords and tenants versus utility database lists and mailings, and manage this program and their workloads throughout the year. The most appropriate candidates will be identified and the process will be smoother and easier to manage budgets and resources. This will allow PAs to control cost, quantity, exposure and relieve resources of following poor leads.
The Low Income 1 to 4 Family Building Heating System
Early Retirement Initiative Description

Background:
In many instances landlords of low income one to four family rental housing may not invest in heating system replacements for their income producing properties until the existing heating equipment becomes degraded to the point that it is totally inoperable and no longer repairable. If they do replace the heating system, typically an energy efficient unit is not installed. In both situations, this directly impacts the tenant’s energy use. Tenants have no choice other than to pay high heating bills during the coldest winter months and beyond as a direct result of old, inefficient heating equipment and choose between basic essentials and keeping their families warm. Across all Massachusetts communities, a large number of low income tenants live in aging housing stock with old and inefficient heating systems.

Currently, all weatherization funding sources only allow replacement of owner occupied heating systems. Therefore, the Massachusetts utility Program Administrators (PA’s) believe one of the best ways to reduce these tenants’ high heating bills is to introduce a plan encouraging landlords in this housing sector to replace or retire inefficient heating systems with new, reliable, high efficiency models.

Plan Overview & Design:
The PA’s plan to implement a heating system early retirement program to encourage landlords to replace inefficient heating equipment with high efficiency heating equipment (e.g., ENERGY STAR rated or equivalent). The Massachusetts utility programs propose to adopt and operate using the standards and protocols currently used by the Department of Housing and Community Development (DHCD) HEARTWAP Heating System Program, which is implemented statewide by the Low Income Energy Affordability Network (LEAN). The financial incentive per heating system will be 100% of the total installed cost up to $4500.00. Landlords will be required to agree to a 2 year rent freeze on all units benefitting from the new heating system installation and subsequent lower utility bills.
The PA’s plan to offer the financial incentive through an approved delivery mechanism negotiated and supported by LEAN and its low income vendors. Processing and administration of the incentives and installed equipment inspections will be the responsibility of the low income vendors.

**Cost Effectiveness:**
All Massachusetts utilities Low Income Weatherization Programs were tested for cost effectiveness using the Total Resource Cost Test as specified by the Department in Energy Efficiency Guidelines, D.P.U. 08-50-B, specifically page 48, section 3.4.3 and were found to be cost effective.

**Proposed Implementation Date:**
The PA’s plan to begin the Heating System Early Retirement Program in the fall of 2010.

**Proposed Budget:**
Funding for the incentives will not be specifically earmarked for this program and the proposed budget will be incorporated into the existing utility low income budgets and measure offering portfolio.
Date

RE: Tenant Heating System Replacement Program

Dear Owner:

NSTAR is offering a program which will pay up to $4,500 to install a new, energy efficient heating system for income eligible tenants you may be interested in taking advantage of.

We’ve developed this incentive program to encourage the replacement of old, inefficient heating systems to significantly reduce energy consumption and high bills for our neediest rental customers. The program will be administered by local community action agencies and will install high efficiency heating equipment using protocols and standards established through the Department of Housing and Community Development HEARTWAP Program.

To be eligible for an oil or gas heating system replacement, projects must meet the following criteria:

1 – The oil or gas heating system to be replaced must:
   - be operational
   - be grossly inefficient
   - be installed in a 1-4 family home
   - serve only one unit versus multiple units

2 – Tenant must:
   - Pay their own oil or gas bill
   - Be an NSTAR customer
   - Qualify for fuel assistance

Note: if the cost of heating is included in the rent, these systems do not qualify.

3 – Landlord must:
   - Agree to freeze rents for two years at their current level for units that receive a new heating system
   - Pay for costs not covered by NSTAR. (Depending on the local agency, there may be other sources of funds available.)

4 – Replacement equipment must be certified by ENERGY STAR and the replacement project must be done in accordance with Massachusetts standards (contractor must have insurance and a license; three bids are required before hiring a contractor, etc.) Your Community Action Program will manage the securing of contractors and provide a quality verification of the installation after the project is complete.

If you have a tenant(s) that qualifies for Fuel Assistance and are interested in this great opportunity, please contact the community action agency for your tenant’s town by calling 866-537-7267 and entering the 5 digit zip code for that property.

Sincerely,

NSTAR Electric and Gas
Your qualified rental property - We'll connect you to the CAP that can serve you
Call 781-907-1573
Email Diana.Duffy@us.g.removeEventListener

Want to Learn More

* Insurance, through etc. (e.g. energy star or equivalent equipment, appropriate contractor license and
  inspections.
  - Inspections completed in accordance with state codes and standards.
  
* Projected to be completed by March 2023.
  
* Agree to have the heating system replacement installed.
  
* Heating System.
  
* Fees above $4500 that National Grid would provide for the installed.
  
* Pay for all costs not covered by National Grid. This would include any
  
* The Landlord must:
  
* Customer of record at the address where these services were delivered.
  
* Have received weatherization measures through National Grid's Income.
  
* Payment.
  
* Pay their own gas heating bills. (Heating cannot be included in rental.

The Tenants must:

* Systems that serve more than one unit will not qualify.
  
* The heating system can only serve one apartment/unit: Heating
  
* Below 70% AFUE.
  
* The existing heating system for your tenants must be operating at

The Details:

* A complete heating system replacement.

Massachusetts community action agencies can offer qualified landlords
For a very limited time, National Grid and its

Efficient heating systems for your tenants!
You may qualify for up to $4500.00 towards a new.

ATTENTION LANDLORDS

N E R D
RE: NEW Landlord/Tenant Oil or Propane Heating System Replacement Program

Dear Owner:

Western Massachusetts Electric Company has a NEW program which will pay up to $4,500 to install a new energy efficient oil or propane heating system for income eligible tenants. This program is specifically for income eligible tenants and is administered by local community action agencies. The purpose of the program is to help tenants who live in housing that has old and inefficient oil or propane heating systems to significantly lower their energy costs.

To be eligible for an oil or propane heating system replacement, projects must meet the following criteria:

1 – The oil or propane heating system to be replaced must:
   : be grossly inefficient.
   : be operational.
   : be installed in a 1-4 family home.
   : serve only one unit versus multiple units.

2 – Tenant must:
   : pay their own oil/propane heating bill and be a WMECO customer.
   : be qualified for fuel assistance and/or WMECO’s Discount Electric Rate.

Note: if the cost of heating is included in the rent, these systems do not qualify.

3 – Landlord must:
   : agree to freeze all rents for two years at their current level for the units that receive a new heating system.
   : pay for all costs in excess of $4,500 not covered by WMECO.

Note: Depending on the local community action agency, there may be other sources of funding available to supplement the cost of the heating system replacement. Contact your local community action agency for further information.
4 – Replacements must be done in accordance with state and local standards (e.g., Energy Star equipment, appropriate contractor insurance and license, 3 bids). Your local community action agencies will manage the securing of the contractors, oversee the installation and will provide a post quality verification installation.

If you are interested in this great opportunity, please contact the appropriate community action agency for your town by calling 866-537-7267 and entering the 5 digit zip code for your property. You may also visit the www.masssave.com website under the “home” tab and click on Income Eligible Programs and the “Get Started” tab.

Find out about this great opportunity today!

Sincerely,

Western Massachusetts Electric Company
October, 2010

LL name
LL address
LL town, state zip

RE: Tenant Heating System Replacement Program

Dear Landlord Name:

Columbia Gas of Massachusetts – the new name Bay State Gas – is offering a limited time program which will pay up to $4,500 to install a new, energy efficient heating system for income eligible tenants.

We’ve developed this incentive program to encourage the replacement of old, inefficient heating systems to significantly reduce energy consumption and high bills for our neediest rental customers. The program will be administered by local community action agencies and will install high efficiency heating equipment using protocols and standards established through the Department of Housing and Community Development HEARTWAP Program.

To be eligible for natural gas heating system replacement, projects must meet the following criteria:

1) The natural gas heating system to be replaced must:
   • Be operating and functional
   • Be grossly inefficient

2) Tenant must:
   • Pay their own natural gas bill
   • Be a Columbia Gas customer
   • Certified for fuel assistance

3) Landlord must:
   • Agree to freeze rent increases for two years
   • Pay for costs not covered by Columbia Gas (Depending on the local agency, there may be other sources of funds available.)

4) Replacements must be done in accordance with state standards (e.g., Energy Star equipment, appropriate contractor insurance and license, 3 bids). Local community action agencies will manage the securing of the contractors and provide a post quality verification installation.

If you have a tenant that qualifies for Fuel Assistance and are interested in this great opportunity, please contact the community action agency for your tenant’s town by calling 866-537-7267 and entering the 5 digit zip code for your property. This is a limited time offer and all requests should be made no later than December 31, 2010.

Sincerely,

[Signature]

Kara Gray
Program Manager
Columbia Gas of Massachusetts
November, 2010

LL name
LL address
LL town, state zip

RE: Tenant Heating System Replacement Program

Dear Landlord Name:

Berkshire Gas Company is offering a limited time program which will pay up to $4,500 towards the installation of a new, energy efficient heating system for income eligible tenants.

We’ve developed this incentive program to encourage the replacement of old, inefficient heating systems to significantly reduce energy consumption and heating bills for our low income customers. The program will be administered by local Community Action Agencies (Berkshire Community Action Council or Community Action of the Franklin, Hampshire and North Quabbin Regions. The agencies will coordinate the installation of high efficiency heating equipment using protocols and standards established through the Department of Housing and Community Development HEARTWAP Program.

To be eligible for natural gas heating system replacement, projects must meet the following criteria:

1) The natural gas heating system to be replaced must:
   • Be operating and functional
   • Be grossly inefficient

2) Tenant must:
   • Pay their own natural gas bill
   • Be a Berkshire Gas heating customer
   • Be certified for fuel assistance

3) Landlord must:
   • Agree to freeze rent increases for two years
   • Pay for costs not covered by Berkshire Gas (Depending on the local agency, there may be additional sources of funding available.)

4) Replacements must be done in accordance with state standards (e.g., Energy Star equipment, appropriate contractor insurance and license, 3 bids). Local community action agencies will manage the securing of the contractors and provide a post quality verification installation.

If you have a tenant that qualifies for Fuel Assistance and are interested in this unique opportunity, please contact the Community Action Agency covering your tenant’s town by calling 866-537-7267 and entering the 5 digit zip code for your property. This is a limited time offer and all requests should be made to the local agency no later than December 31, 2010.

Sincerely,

Robert Gyurjan
The Berkshire Gas Company
December 21, 2010

New England Gas Company

FILE COPY

RE: Tenant Heating System Replacement Program

Dear [Name]:

New England Gas Company is offering a limited time program which will pay up to $4,500 towards the installation of a new, energy efficient heating system for income eligible tenants.

We’ve developed this incentive program to encourage the replacement of old, inefficient heating systems to significantly reduce energy consumption and heating bills for our low income customers. The program will be administered by local our Community Action Agency (Citizens for Citizens - CFC). CFC will coordinate the installation of high efficiency heating equipment using protocols and standards established through the Department of Housing and Community Development HEARTWAP Program.

To be eligible for natural gas heating system replacement, projects must meet the following criteria:

1) The natural gas heating system to be replaced must:
   • Be operating and functional
   • Be grossly inefficient

2) Tenant must:
   • Pay their own natural gas bill
   • Be a New England Gas heating customer
   • Be certified for fuel assistance

3) Landlord must:
   • Agree to freeze rent increases for two years
   • Pay for costs not covered by New England Gas (Depending on the local agency, there may be additional sources of funding available.)

4) Replacements must be done in accordance with state standards (e.g., Energy Star equipment, appropriate contractor insurance and license, 3 bids). Local community action agencies will manage the securing of the contractors and provide a post quality verification installation.

If you have a tenant that qualifies for Fuel Assistance and are interested in this unique opportunity, please contact the Community Action Agency covering your tenant’s town by calling 866-537-7267 and entering the 5 digit zip code for your property. This is a limited time offer and all requests should be made to the local agency no later than December 31, 2010.

Sincerely,

[Signature]

James J. Carey
Marketing Manager

Cc: Trish Walker – New England Gas, Joe Silvia - CFC
Special Offer for Landlords

Tenant heating system replacement program

NSTAR will pay up to **$4,500** to install an efficient new heating system for income eligible tenants.

Attached is information about the oil and gas heating system replacement program for low income tenants recently introduced by NSTAR and administered by local energy assistance agencies. The purpose of the program is to help tenants who have inefficient heating systems to significantly lower their energy costs and thereby free-up money for other basic needs.

To be eligible for an oil or gas heating system replacement, projects must meet the following criteria:

1. The oil or gas heating system to be replaced must be grossly inefficient.

2. Tenant must:
   - pay their own oil or gas bill and be a NSTAR electric or gas customer;
   - be qualified for fuel assistance.

3. Landlord must:
   - agree to limit rent increases for 2 years;
   - pay for costs not covered by NSTAR. Depending on the local agency, there may be other sources of funds available.

4. Replacements must be done in accordance with state standards (e.g., Energy Star equipment, appropriate contractor insurance and license, 3 bids). Low income energy assistance agencies will manage the securing of the contractors, and will provide a post installation energy efficiency inspection.

If any of your members are interested please contact the appropriate person for your town listed on the information sheet which will be emailed to all board members and is available on [www.massrha.com](http://www.massrha.com) members only area.

If you need further information, please contact:
Bruce Ledgerwood (617) 780-6759

This is an excellent opportunity for MRHA members that are NSTAR customers. You may forward this offer to other interested landlords.

Sincerely,
Massachusetts Rental Housing Association
Landlords  Tenants  Home Buyers  Home Owners

Come Talk to the Experts!
Rental Housing Association of Berkshire County (RHABC) is inviting you to an event with service professionals to help answer your questions and network your needs.

The RHABC has brought together the following Community Resources:

Berkshire County Regional Housing Authority
Berkshire Housing Development Corp.
Berkshire Gas
Berkshire Pest Control
Carr Hardware
Center for Ecological Technology
Childhood Lead Poisoning Prevention Program
Coakley, Pierpan & Dolan Insurance **
Colt Insurance **
Greylock Federal Credit Union
Habitat for Humanity
Hashim & Spinola Attorney
Mass Fair Housing
National Vinyl Products
New England Fence Company
Pittsfield Community Development Office
V&L Cleaning Service
Western Mass Electric Company
WJ Blueprints & Digital Graphics

Zucchinis Restaurant
Refreshments will be served.
November 16, 2010
6:00-8:00pm
Who to bring: Everyone!
This event is open to the public

** Bring a copy of your homeowner's insurance policy. The policy will be reviewed for you at no charge.

www.RHABC.com  Landlords Helping Landlords Through Education and Communication
ATTENTION LANDLORDS!
Western Massachusetts Electric Company
Columbia Gas of Massachusetts (Formerly Bay State Gas)
Berkshire Gas Company and National Grid
Are offering
A New Oil or Gas Heating System Replacement Program

You May Qualify for up to $4500.00 towards a new heating system!

The Details:

The Existing Heating System must be operating and grossly inefficient. The heating system can only serve one apartment/unit. (Heating systems that serve more than one unit will not qualify for this program).

The Tenants must:
- Pay for their heat (gas or oil). (Heating cannot be included in rental payment).
- Be a WMECO, Columbia Gas, Berkshire Gas or National Grid customer of record.
- Live in a 1-4 family home. (5 or more attached units do not qualify for this program).
- Qualify for their utility Discount Rate and/or be determined eligible/certified for fuel assistance for the 2011 heating season.

The Landlord must:
- Agree to freeze rent at its existing level for 2 years from the date of the installation.
- Pay for all costs not covered by WMECO, Columbia Gas, Berkshire Gas or National Grid. (Note: Speak to your local community action agency to see if you qualify for additional funding sources).
- Contact the local community action agency to confirm eligibility and participate.

Local community action agencies (Springfield Partners for Community Action, Berkshire Community Action Council and Community Action!) will manage the project, secure contractors and provide post installation quality verification inspections. All replacements must be done in accordance with Mass codes and standards (e.g., Energy Star or equivalent equipment, appropriate contractor license and insurance, 3 bids, etc.)

Call Peter Wingate @ FCAC
At: 413-376-1119
Don’t Hesitate. Call Today!
Low Income #2

New Measures
In coordination with LEAN, implement best practices to achieve deeper energy savings. Best Practices meets monthly, with each PA participating, to discuss and pursue new technologies and deeper measure penetration, and to select new measures for review. PAs will provide written updates on meetings, technical analyses performed, and additional best practices implemented. Each PA will accept an assignment with respect to written products. Each PA to submit documentation showing performance relative to these tasks.

Study possible new program measures that are above and beyond the DOE measure list, specifically including, but not limited to: (1) micro-combined-heat-and-power (with emphasis on three-deckers, six-flats, and single family furnaces), (2) indirect water heating, (3) demand control measures (if feasible and available), (4) LED lighting, and (5) outdoor resets for new heating systems. Cost-effectiveness analysis will be conducted by the PA common assumptions group, or the equivalent, which shall include LEAN for this purpose, within eight weeks of referral by Best Practices, with first reports of analysis no later than June 15, 2010. Each PA to submit documentation showing performance relative to these tasks.

For each measure that passes the common assumptions group cost-effectiveness screening, implement field testing of new program measures in 2010. Document results and findings in a memo to EEAC consultants by April 1, 2011, including measurement of savings per home due to each measure. Where field testing indicates it is appropriate to do so, there will be re-screening by Common Assumptions and/or a second field test. Each PA will conduct field testing with respect to each such measure and provide a memo documenting results. PA field tests will include a sufficient number of installations for each measure, reasonable in proportion to the size of each utility budget, to yield reliable field test results, as set out in the table below, and will begin no later than two months after the relevant Common Assumptions report.

<table>
<thead>
<tr>
<th>Metric Number</th>
<th>Metric Language</th>
<th>National Grid Electric Final 2010 Production</th>
<th>National Grid Gas Final 2010 Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Income 92. New Measures</td>
<td>In coordination with LEAN, implement best practices to achieve deeper energy savings. Best Practices meets monthly, with each PA participating, to discuss and pursue new technologies and deeper measure penetration, and to select new measures for review. PAs will provide written updates on meetings, technical analyses performed, and additional best practices implemented. Each PA will accept an assignment with respect to written products. Each PA to submit documentation showing performance relative to these tasks. Study possible new program measures that are above and beyond the DOE measure list, specifically including, but not limited to: (1) micro-combined-heat-and-power (with emphasis on three-deckers, six-flats, and single family furnaces), (2) indirect water heating, (3) demand control measures (if feasible and available), (4) LED lighting, and (5) outdoor resets for new heating systems. Cost-effectiveness analysis will be conducted by the PA common assumptions group, or the equivalent, which shall include LEAN for this purpose, within eight weeks of referral by Best Practices, with first reports of analysis no later than June 15, 2010. Each PA to submit documentation showing performance relative to these tasks. For each measure that passes the common assumptions group cost-effectiveness screening, implement field testing of new program measures in 2010. Document results and findings in a memo to EEAC consultants by April 1, 2011, including measurement of savings per home due to each measure. Where field testing indicates it is appropriate to do so, there will be re-screening by Common Assumptions and/or a second field test. Each PA will conduct field testing with respect to each such measure and provide a memo documenting results. PA field tests will include a sufficient number of installations for each measure, reasonable in proportion to the size of each utility budget, to yield reliable field test results, as set out in the table below, and will begin no later than two months after the relevant Common Assumptions report.</td>
<td>Threshold</td>
<td>Threshold</td>
</tr>
<tr>
<td>Exemplary</td>
<td>Exemplary</td>
<td>Exemplary</td>
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</tr>
</tbody>
</table>
2010 Low Income Metric Two

Included in this report are the following:

Page 1 & 2 – Overview of the metric and level each utility reached

Pages 3 – 8 – Explanation of each status and how it was accomplished including PA’s assigned role in documenting each of the measures/technologies

Page 9 – 95 – Includes written updates/agendas on the Best Practices meetings, technical and cost-effectiveness analysis conducted by the Common Assumptions group.
2010 Low Income Metric Two

NSTAR Electric & Gas, National Grid, Western Massachusetts Electric Company, Fitchburg Gas & Electric Company, Columbia Gas of Massachusetts, Berkshire Gas Company and New England Gas Company are submitting this report to update the Low Income Energy Affordability Network (LEAN) on the status of the 2010 low income metric number two.

2. New Measures

<table>
<thead>
<tr>
<th>Threshold</th>
<th>In coordination with LEAN, implement best practices to achieve deeper energy savings. Best Practices meets monthly, with each PA participating, to discuss and pursue new technologies and deeper measure penetration, and to select new measures for review. PAs will provide written updates on meetings, technical analyses performed, and additional best practices implemented. Each PA will accept an assignment with respect to written products. Each PA to submit documentation showing performance relative to these tasks.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Study possible new program measures that are above and beyond the DOE measure list, specifically including, but not limited to: (1), micro-combined-heat-and-power (with emphasis on three-deckers, six-flats, and single family furnaces), (2) indirect hot water heating, (3) demand control measures (if available), (4) LED lighting, and (5) outdoor resets for new heating systems. Cost-effectiveness analysis will be conducted by the PA common assumptions group, or the equivalent, which shall include LEAN for this purpose, within six weeks of referral by Best Practices, with first reports of analysis no later than June 15, 2010. Each PA to submit documentation showing performance relative to these tasks.</td>
</tr>
<tr>
<td>Exemplary</td>
<td>For each measure that passes the common assumptions group cost-effectiveness screening, implement field testing of new program measures in 2010. Document results and findings in a memo to EEAC consultants by April 1, 2011, including measurement of increased savings per home due to each measure. Where field testing indicates it is appropriate to do so, there will be re-screening by Common Assumptions and/or a second field test. Each PA will conduct field testing with respect to each such measure and provide a memo documenting results. PA field tests will include a sufficient number of installations for each measure, reasonable in proportion to the size of each utility budget, to yield reliable field test results, as set out in the table below, and will begin no later than two months after the relevant Common Assumptions report:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measures/PA</th>
<th>MicroCHP*</th>
<th>Indirect DHW</th>
<th>Demand Control**</th>
<th>LED Lighting</th>
<th>Outdoor Resets</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric</td>
<td>1</td>
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<td>Standard</td>
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<td>Standard</td>
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<tr>
<td>NGRID Electric</td>
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<td>Standard</td>
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<td>measure</td>
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<tr>
<td>Unitil Electric</td>
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<tr>
<td>NSTAR Gas</td>
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</tr>
<tr>
<td>NGRID Gas</td>
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<td>-</td>
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<tr>
<td>Columbia Gas of Massachusetts</td>
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<td>-</td>
<td>measure</td>
</tr>
<tr>
<td>Berkshire Gas</td>
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<td>measure</td>
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<td>measure</td>
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<tr>
<td>New England Gas</td>
<td>-</td>
<td>measure</td>
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<td>measure</td>
</tr>
<tr>
<td>Unitil Gas</td>
<td>-</td>
<td>measure</td>
<td>-</td>
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<td>measure</td>
</tr>
</tbody>
</table>

We believe that by completion and documentation of these tasks each utility has reached the level of the metric listed below.

NSTAR Electric & Gas – exemplary
National Grid – design 🚦
Western Massachusetts Electric Company – design
Unitil Service Company – design
Berkshire Gas – design
New England Gas – design
Columbia Gas of Massachusetts - design

Respectfully submitted by:
Diane M. Lopes                                   Robert P. O’Brien
Residential Program Manager                      Manager
NSTAR Electric & Gas                             National Grid

Deborah E. Sas                                    Derek T. Kimball
Senior Project Administrator                     Residential Programs Coordinator
Western Massachusetts Electric Company            Unitil Service Corporation

Kara A. Gray                                      Robert Gyurjan
Program Manager                                   Lead Analyst – Energy Services
Columbia Gas of Massachusetts                      The Berkshire Gas Company

Jeanne B. Cherry                                  The Berkshire Gas Company
Lead Energy Efficiency Programs Administrator
New England Gas Company
Explanation of Threshold, Design and Exemplary Status of Metric Two
Metric 2: New Measures

Threshold
In coordination with LEAN, PAs to implement best practices in achieving deeper energy savings by pursuing new technologies, deeper measure penetration and selecting new measures for review.

- New measures and technical analysis performed was discussed at Best Practices meetings
- PAs worked collectively to ensure that these measures were reviewed in a thorough and timely manner by the Common Assumptions Group at each Best Practices meeting
- Each PA, in participation in the Best Practices working group, selected and agreed to have the Common Assumptions working group screen the following measures.

Design
The initial request for measure screening was submitted to the Common Assumptions group on May 24, 2010 during a PA Metrics Meeting scheduled that day. Questions were answered for the Common Assumptions group, and measures were provided to screening.

Working in conjunction with LEAN, GDS, and the MA Common Assumptions group, PAs met the June 15th, 2010 deadline for the report analysis. Each PA was assigned a lead role in documenting each of the measures/technologies below.

- **LEDs lights (WMECO)** – A light-emitting-diode lamp is a solid-state lamp that uses light-emitting diodes (LEDs) as the source of light. The light output of individual light-emitting diodes is small compared to incandescent and compact fluorescent lamps so multiple diodes are often used together. LED lamps offer long service life and high energy efficiency. This measure is deemed cost effective by the common assumptions group for LED down/task lighting fixtures when replacing a 75w fixture with a 6.0 LED down light (69w diff).

- **Indirect Water Heaters (CMA)** – Indirect water heaters offer a more efficient choice for most homes, even though they require a storage tank. An indirect water heater uses the main boiler to heat a fluid that's circulated through a heat exchanger in the storage tank. The energy stored by the water tank allows the boiler to turn off and on less often, which saves energy. Therefore, an indirect water heater is used with a high-efficiency boiler and well-insulated tank can be the least expensive means of providing hot water. This measure was deemed cost effective by the common assumptions group when it is installed in conjunction with an oil or gas boiler.

- **MCHP (NSTAR)** – combines two technologies, a natural gas fired engine generator with an energy-efficient warm air furnace or a boiler. The unit generates significant levels of electricity for the home and also recycles most of the heat generated to produce domestic heat and/or hot water.
MCHP systems lower energy consumption, reduce electricity demand and reduce costs for residential customers. The benefits of the installed measure are greater than the cost concluding this measure is cost effective.

- **Demand Control Measures (Unitil)** – This measure is a Behavior/Feedback technology that integrates behavioral change principles with web, mobile and mail applications. It consists of a (branded) web site enabling customers to log in using a unique username and password. Through a website customers can set energy saving goals, compare their monthly energy usage to similar households, get energy saving recommendations and earn points redeemable for rewards. Method for follow-ups and an innovative approach to creating the behavioral changes required to achieve greater levels of persistent, sustained savings. Grounded Power’s technology and program – analyzed for cost effectiveness – is designed to provide a new follow-up service and a means for engaging low income populations over time to develop more effective energy savings habits. The system provides an energy saving planning process that is integrated with education, social gaming and monthly feedback, based on bill data, on energy consumption and energy savings. The tool delivers a “turn-key” program and technology to address the issue of behavior change as a follow-up service to existing energy audits. The program also functions as a follow-up service to the existing energy efficiency audit and retrofit services. The goal of the approach is to deliver a higher level of savings through engagement, education and persistent behavior change and provides a multi channel outreach and feedback process. Regardless of whether internet or mobile access is available, the client would still be able to participate in a chosen follow-up program. The proposal assumed a target number of 1500 households. It is assumed that 20% of those households will not have internet or mobile phone. This population will have access to the monthly paper-based report and phone support. Grounded Power proposal was found not to be cost effective using common assumptions including Non-energy benefits. Assuming a one-year program, however, this measure will be re-analyzed in 2011 as a possible pilot for a program with a longer life.

- **Outdoor Reset for new heating systems (Berkshire/New England Gas)** – Outdoor reset is a weather-responsive control rather than a weather controller. Based on changes in outdoor temperature, it automatically adjusts boiler water temperature. If the temperature is colder outside, it takes more heat to overcome its effect inside the building than if the weather is warmer. Outdoor reset is the same as turning down the boiler water aquastat in the spring and fall — automatically. The Common Assumption group found that the measure was not cost effective.

- **Window Quilts/Shades (National Grid)** - The Common Assumptions group screened both cellular shades and window quilts for possible energy savings installations in 2010. Their screenings found that window shades can be cost effective when installed in electrically heated homes. Certain cellular shades can reduce heat loss from a home's interior, and restrict the
flow of cold air from the exterior. Customers can raise and lower the
shades, like other window blinds, to help maximize passive solar heating
or keep warm air inside the home.

- **Smartstrips (WMECO)** – Many home electronic devices continue to use
electricity to power peripherals such as remote controls or clock display
even when turned off creating “phantom” or “vampire load”.
Using an advance power strip to turn off electronics or office equipment
when not in use saves energy and money for the customer. Typical home
products include computers, ink jet printers, fax machines, digital cable
and satellite boxes as well as DVRs. Power strips have 3 types of outlets; a
main control outlet (primary or control units) automatically switched
outlets (secondary) and outlets that are always on. The power strip works
by cutting power to connected to the secondary outlets (such as a DVD
play, satellite box, etc) when the TV is switched off or goes into standby
or sleep mode. The Common Assumption group found that the measure
was cost effective and recommended for the Low Income Program.

**Exemplary**
These measures have passed the cost effectiveness screening and have become standard
measures in the program when specific parameters are met. It should be noted that
adopting these measures is a significant accomplishment and further distinguishes the
Massachusetts Low-Income program as a leader in the industry. These measures put the
program on the forefront of achieving deeper savings in customers’ homes.

- **MCHP**- In 2010, four MCHP units were installed in the NSTAR/National
Grid territory as customer heating system replacements. These systems
were installed in individual and 3-unit dwellings. Participating customers
indicated their satisfaction with the installation of the measure, as well as
the work of the contractors.

Projected energy savings is approximately 3,000 kWh on the electric side
per month, as well as an average of 150 therms per month on the gas side.
The utilities will monitor these systems to determine actual savings.

Initial billing data shows the customers experienced a savings of one third
on their actual energy consumption, and their actual energy bills were
reduced by half. As a result, customers were satisfied with the MCHP
installations and the associated energy savings, and would recommend the
measure to future program participants.

- **Indirect Water Heating** - Ninety-five indirect water heaters were
installed across the state by NSTAR, National Grid, Columbia Gas of
Massachusetts and WMECO. Indirect water heaters are not a stand alone
measure; an indirect water heater is only installed in conjunction with an
oil or gas boiler when warranted. Field results shows that customers are
extremely satisfied and appreciative of the utility program. They are not
only pleased with the efficiency (energy savings) of the system, but also the amount of hot water and the quietness of the systems. In addition, the local CAP agencies report having very positive experiences with the installation contractor in terms of their acceptance and installation of the technology. Auditors state that some of these customers were in desperate situations and would not have had hot water without the assistance of the utilities.

**LED lighting** – WMECO conducted LED in-field testing in partnership with NGrid, NSTAR and Unitil. WMECO installed four CREE CR6 LED recessed downlights in a customer’s home in Pittsfield, MA. The LED’s were installed into existing kitchen soffit downlights, replacing four 100-watt flood type bulbs used for general and task lighting. The lighting was being used for 8 or more hours a day. The CR6 was chosen as it was designed for use in residential settings and fits into most standard 6” recessed housings.

The CREE CR6 bulbs may be installed in two ways; by removing the existing bulb from the existing downlight fixture housing and installing the new LED bulb/unit into the existing housing or removing the existing bulb/unit and housing trim ring and inserting the new LED bulb into the existing housing. The CREE CR6 includes the LED bulb, the housing and trim ring as one unit. The components are one piece and cannot be separated. If the LED unit is installed into an existing downlight fixture, it is operable. If it is installed in this manner, a double trim ring will be visible which may or may not be suitable for all customers and applications. The preferred installation method, as recommend by the manufacturer, would be to remove the existing fixture trim ring and install the LED unit into the existing recessed housing.

In the field test, the customer’s soffit is painted sheetrock with no texture. The existing down light trim rings and the ceiling were both painted at the same time. This is typically done. An auditor/contractor installing the replacement CREE CR6 will need to break the paint seal very carefully so as to not tear the sheetrock and the paint. If this is accomplished successfully, the Owner will have to be advised that once the new CREE unit is installed, the paint may no longer match the paint under the old trim ring and touch up may be needed.

An additional consideration for installation is the CREE unit trim ring is smaller than the older 6” downlight trim rings. The auditor/contractor will have to determine if the ceiling material was installed close enough to the existing fixture. If it is not, there may be an unfinished ceiling edge or gap in the ceiling material that will show. This would most likely not be
acceptable to a customer and therefore not an appropriate installation for the LED unit.

The customer reported that they did like the CREE LED units. Their appearance was attractive and the quality of the light was excellent. The light spread was wide which illuminated the kitchen room quite nicely. They said the color of the light at night, a warm yellow, was warm and comfortable.

The customer highly recommended the CREE CR6 units. They also recommended that prior to installation the Owners’s be advised about the possible paint and trim ring issues.

This technology was adopted by the Massachusetts electric utilities in 2010.

- **Smart strips** – Although the utilities have adopted this measure into the low income weatherization programs, several concerns have been raised. Firstly, if the main power experienced a power surge or was suddenly turned off due to a power outage, and the electronic devices plugged into the strip were damaged, would the customer have recourse to recover the cost of the items? Research showed that the manufacturers of the strips do warrantee damaged products under these conditions but the concern is the customers would expect the utilities to replace the damaged items. Secondly, the weatherization programs install all of the measures in customer’s homes. Auditors expressed concern that in order to install advances power strips, they would have to unplug and then reprogram electronic devices such as TV’s cable boxes, computers, etc. This could expose them to potential liability for customer’s equipment beyond what the typical and customary weatherization products installations would be. The auditor’s concern was not able to be addressed fully by the Best Practices Group in 2010, therefore no advanced power strips were installed.

- **Window cellular shades (electric only)** - 2010 field research revealed reservations from some PAs and CAP agencies for this measure. Concerns have been raised given that window shades do not have guaranteed energy savings. The success of the measure depends on the continuous participation of the customer to use the blinds as intended. As a result, this measure has not been tested beyond the auditor and local agency teams. Discussion of window shades will continue to be discussed in 2011 with the possibility of leaving the option to install this measure at the CAPs discretion for the appropriate customer.
These measures did not pass cost effectiveness screening and will not be offered in the Low-Income single-family program:

- Window quilts
- Window cellular shades—gas only
- Outdoor reset control
Back-up to support meetings, technical analysis and Best Practices implemented
From: Lopes, Diane  
Sent: Monday, January 18, 2010 8:55 AM  
To: 'Peter Wingate'  
Subject: FW: Best Practices meetings and agenda - Jan. 20 at 10 at NSTAR

Needed to change your email......

From: Lopes, Diane  
Sent: Monday, January 18, 2010 8:41 AM  
To: 'Jerrold Oppenheim'; 'Briana Kane'; 'AMickeye@GLCAC.Org'; 'artwillcox@yahoo.com'; 'bruceledgerwood@comcast.net'; 'craig@actioninc.org'; 'Danielle Rathbun'; 'DBuchler@nisource.com'; 'sasde@nu.com'; 'Duffy, Diana'; 'Elj@actioninc.org'; 'Jeanne Cherry'; 'John Livermore'; 'jhowat@ncdc.org'; 'walshj@nu.com'; 'Ken.Rauseo@ocd.state.ma.us'; 'kgray@nisource.com'; 'kimball@until.com'; 'Rossaccl, Michael F.>'; 'msommer@berkshiregas.com'; 'NDAVISON@haconcapecod.org'; 'pjackson@smoc.org'; 'pwingate@mocinc.org'; 'rbechtold@haconcapecod.org'; 'oswalrl@nu.com'; 'ritac@actioninc.org'; 'Kate Agin'; 'Tackey Chan'; 'tobin@bostonabcd.org'; 'John Wells'  
Subject: RE: Best Practices meetings and agenda - Jan. 20 at 10 at NSTAR

Just a reminder.....please use the West entrance....we will be in W2A. Security will call me upon your arrival. Thanks Diane

Good Morning....the call in number for those whom need it will be 781-441-3101, access code 3875#. The conference room will be West 2 A. Come into the West side of the building and sign in with the security guard. I will have a list with them of whom may be coming. See you then....thanks Diane

We will have a full meeting on Wednesday, January 20, starting at 10 am.

Many thanks to Diane Lopes at NSTAR for agreeing to host.

Cheers,

Jerry

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1/18/2011
Here are the assignments for our next two meetings:

Art – SDHW cost-effectiveness (with Briana); Smart Strip protocol; update of measure universality list
Bruce – Clean Energy Centre re mobile home training; landlord heating system replacements (promotion for 2010?)
Debi – circulate WMECo evaluation of repair pilot
Diane and Diana – top- and front-load clothes washers
Kate – use of unemployment benefit system to inform potential clients of program
Ken and/or Craig – procurement RFP status
Ruth – cellulose window shade sample

Here is a proposed agenda for the two meetings, which we will only get partially through in December:

GAS & ELECTRIC

1. Rotating Notetaker, next meeting, amendments

2. Procurement (Craig, Ken)
   a. timing of RFP
   b. lead
   c. other issues

3. Enhancing visibility of Best Practices at PAs

4. Contractor training and recruitment (Bruce)
   a. Status
   b. New contractor requirements
   c. Mobile homes walls and bellies
   d. Repairs (avoiding undue expense -- see 5b below)
   e. 2010 Metric 2:
      In coordination with LEAN and, if feasible, the Massachusetts Department of Housing and Community Development (DHCD), contribute sufficient funding and logistical support of LEAN's efforts and those of the DHCD to continue and expand efforts to recruit and train weatherization and heating contractors to support network activities sufficient for the ramp up of the program, and to assure all needed training is funded. Specifically, working closely with LEAN and the Massachusetts Department of Housing and Community Development (DHCD), strongly support their recruitment of weatherization and heating contractors in numbers appropriate to meet the requirements of Energy Efficiency funding and who demonstrate the ability to meet US DOE standards.

5. Auditor training (Ken)
   a. Status
   b. 2009 Metric 2: funding and logistical support; training materials re plug loads, air conditioning (Art, Dave), ducts (Art, Dave)
   c. 2010 Metric 2: Contribute funding and logistical support of LEAN's efforts and, if feasible, those of the Massachusetts Department of Housing and Community Development (DHCD) for auditor training and explore common protocols in areas identified through the Best Practices Working Group.

1/18/2011
This will include developing and distributing new auditor training materials.

d. Kate circulated Fire Marshall’s handout re space heater safety (Feb. 2 e-mail). Bruce and Kate will circulate PC Power Management piece to auditors. Add recycling update to topics.

4. DHCD (Ken)
   a. Recovery Act
   b. Davis Bacon update
   c. Other

5. Repairs
   a. Status (Until?)
   b. Training to avoid undue expense
   c. extend to protect EE installation if within, say, one year?

6. Compare measure lists across administrators -- Art’s draft survey results showed a few measures not shared universally -- Art updating
   a. 2010-2012 update.
   b. Multi-family update update

7. New measures

   a. SDHW -- Electric utilities previously agreed to cost-share solar hot water with MTC (assuming an MTC grant) where cost-effective (i.e., larger water users). Nothing to report yet from MTC. This consideration is a 2009 and 2010 performance metric.
   b. Window quilts? Cellulose window shades (cheaper)? (Ruth, Art) -- approved for DOE; Art computing cost-effectiveness
   c. Bruce re recruiting landlords for heating system replacement. We have agreed that Bruce will continue marketing efforts for landlord heating system pilots at NGrid Electric and NSTAR G&E. At last report, eliminating the co-pay did not generate response, perhaps because of the fact that it was still winter. This consideration is a 2009 and 2010 performance metric.
   d. MicroCHPs (Bruce and Art)-- Gas pilots are underway and preliminary evaluation results have been circulated showing furnaces to be cost-effective. This consideration is a 2009 and 2010 performance metric.
   e. Clothes washers and drying racks (Diane and Diana) -- 2010 metric.
   f. TLC kit -- 2010 metric. Reviewed in 2009; any need for additional review?
   g. Indirect water heating -- 2010 metric. Review approval; all aboard?
   h. LEDs -- 2010 metric.
   i. Smart strips -- we agreed to include where appropriate, Art to determine what is appropriate (e.g., VCR, DVD, games) and draft protocol, some education needed re: what to plug in each socket.
   j. Demand control -- 2009 and 2010 metric.

Grounded Power proposal: Pilot feedback approach whereby auditors develop target reductions with clients by use, clients receive monthly report via internet comparing their usage from utility billing system with their target and with community results (to be defined) -- could also include gas (Action, Cape Light, others have expressed interest in participating in pilot). Awaits definitive Grounded Power proposal. (Jerry)

k. Outdoor resets -- 2010 metric. Rejected in 2009; any need to revisit?
   n. 2009 Metric 1: assess and possibly adopt: micro CHP, landlord heating systems where tenant pays for heat, SDHW, single family horizontal axis clothes washers, measures to be included in TLC kit, indirect DHW, demand control measures.
   o. 2010 Metric 1: Explore and consider adoption of new cost-effective program measures, specifically including, but not limited to: solar domestic hot water heating, single family energy efficient clothes washers, clothes drying racks, micro-combined-heat-and-power, landlord heating systems where tenants pay for heat, measures to be included in TLC Kit, indirect hot water heating, demand control measures, LED lighting, outdoor resets for new heating systems, super-insulation of walls and attics, foundation wall and slab insulation.

   Implement a limited pilot to test at least two (2) of these new program measures in 2010. Document results and findings in a memo to EEAC consultants by January 30, 2011.

p. 2010 Metric 3: Note: A Deep Energy Retrofit is a project that involves super-insulating the building shell, and which achieves over 50% energy savings.

Convene a planning forum with key members of LEAN, the Best Practices working group and the Deep Energy Retrofit (DER) Pilot working group to discuss collaborating on a deep retrofit project in 2010. Explore potential synergies in marketing, training, incentives, QA/QC, etc. Document the proposed coordination in a memo. Draft memo to EEAC consultants by April 1, 2010. Consultant comments by April 8, 2010. Final memo by April 15, 2010.

Collaborate with LEAN agencies and Deep Energy Retrofit (DER) working group to identify properties with opportunities for Deep Energy Retrofit treatment.

Contract with at least one (1) landlord to implement a Deep Energy Retrofit project in 2011.


FOR REFERENCE: 2010 METRICS:

<table>
<thead>
<tr>
<th>1. Low-income Best Practices Working Group {Electric &amp; Gas}</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Threshold</strong></td>
</tr>
<tr>
<td><strong>Design</strong></td>
</tr>
</tbody>
</table>
Implement a limited pilot to test at least two (2) of these new program measures in 2010. Document results and findings in a memo to EEAC consultants by January 30, 2011.

| 2. Low-income Auditor Training & Contractor Recruitment/Support {Elec. &Gas} |
|-----------------------------|-----------------|
| **Threshold**               | **N/A**         |
| Design                      | Contribute funding and logistical support of LEAN's efforts and, if feasible, those of the Massachusetts Department of Housing and Community Development (DHCD) for auditor training and explore common protocols in areas identified through the Best Practices Working Group. This will include developing and distributing new auditor training materials. |
| Exemplary                   | In coordination with LEAN and, if feasible, the Massachusetts Department of Housing and Community Development (DHCD), contribute sufficient funding and logistical support of LEAN's efforts and those of the DHCD to continue and expand efforts to recruit and train weatherization and heating contractors to support network activities sufficient for the ramp up of the program, and to assure all needed training is funded. Specifically, working closely with LEAN and the Massachusetts Department of Housing and Community Development (DHCD), strongly support their recruitment of weatherization and heating contractors in numbers appropriate to meet the requirements of Energy Efficiency funding and who demonstrate the ability to meet US DOE standards. |

| 3. Low-income 1-4 Retrofit: Deep Energy Retrofit {Electric & Gas} |
|-----------------------------|-----------------|
| **Threshold**               | Convene a planning forum with key members of LEAN, the Best Practices working group and the Deep Energy Retrofit (DER) Pilot working group to discuss collaborating on a deep retrofit project in 2010. Explore potential synergies in marketing, training, incentives, QA/QC, etc. Document the proposed coordination in a memo. Draft memo to EEAC consultants by April 1, 2010. Consultant comments by April 8, 2010. Final memo by April 15, 2010. |
| Design                      | Collaborate with LEAN agencies and Deep Energy Retrofit (DER) working group to identify properties with opportunities for Deep Energy Retrofit treatment. |
| Exemplary                   | Contract with at least one (1) landlord to implement a Deep Energy Retrofit project in 2011. |

Note: A Deep Energy Retrofit is a project that involves super-insulating the building shell, and which achieves over 50% energy savings.

**Metric Weighting – Electric & Gas (proposed)**
1. Low-income Best Practices Working Group (33.33%)
2. Low-income Auditor Training & Contractor Recruitment/Support (33.33%)
3. Low-income 1-4 Retrofit: Deep Energy Retrofit (33.34%)
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LIBP Meeting at NSTAR January 20, 2010 (FINALIZED 02/10/10)

NEXT MEETING 02/23/10 from 10-2 at BSG

Attendees: Mike Rossacci (NGRID), Diana Duffy (NGRID), Diane Lopes (NSTAR), Art Willcox (LEAN), Briana Kane (CLC), Al Mickee (GLCAC), Kim Crossman (NGRID), Craig Brown (ACTION), Rita Carvalho (ACTION), Elliott Jacobson (LEAN), Ruth Bechtold (HAC), Deb Sass (WMECO), Jeanne Cherry (NE Gas), Kara Gray (BSG), John Livermore (consultant), Derek Kimball (UNITIL), Jerry Oppenheim (LEAN). On the phone John Walsh (WMECO)

Distribution list—

Briana and Diane to work on new distribution list. (Due February 03, 2010 Finalized February 10, 2010) (DONE 02/10/10) Add DER dist list, MF dist list, update Peter Wingate

LIMF —

This group (LIBP) needs to be the group to make the decisions on the program not the advisory committee. The advisory helps to make the selection but not design the program

LEAN to provide MF contact for MF advisory committee (from Dec meeting)

All PA’s need to send LIMF requests to John Wells

Jerry to describe the three committees (MF advisory—operations, MF working group, LIBP—policy) (Due as an attachment to the next agenda emailed prior to the meeting on February 23, 2010)

MF Market Integrator (MMI) – RFP to go out mid-February

MF auditors and contractors to work with projects specific needs

PA’s need to try to leverage funds

Heating systems out to bid

Insulation / fridges etc., contracted network pricing use what is already in place

LEAN—

Elliot to reach out to Ken so we can get regular DHCD representation at the meetings. Worst case scenario an email an update before the meeting. We haven’t had DHCD representation in the last 8-12 months.
Invoicing detail is going to be required for LEAN invoices going forward for all utilities. PAs will need a summary of hours and activities to back up all costs.

DER—

Deep Energy Retrofit (DER)—metric #3

Next DER meeting to be held at NGRID on 02/10/10 9:30 – 12:30

Working Group List— BK to get info to John Livermore (DONE 01/20) John to send out finalized list?

Trainings—

Auditors / training – all set

Contractors / training – ongoing, every contractor has to have new training by April 22, 2010

Craig to reach out to DHCD for list of 2010 trainings and provide a list to Diane (due By February 01, 2010) (DONE 02/08/10) then as trainings come up, each PA or agency will be responsible to send Diane Lopes an email of those trainings for metric tracking

CORI—

CORI affidavits’ kept on file at some agencies; each contractor CORI’s their employees, not the agency

Procurement—

Network in process of procuring, most agencies have a deadline of this Friday for contractors to return RFP’s with pricing. Then the agencies will meet and submit pricing to DHCD. Hopeful to have pricing by mid-February and will be good through March of 2012

Repairs (major)—

John Walsh to provide evaluation report on WMECO’s major repair pilot and hopes to have it out by the end of the month
Measure list review—

Art will follow up with agencies not here to see if they are ok with the omission list to Jerry by February 15, 2010

SDHW—

For homeowners with electric hot water with a family of 4 or more, equipment must be SRCC certified, roof must be in good condition; initial site review to qualify the site, 3 bids needed, replacement/repair to be handled like a heating system, customer needs to be educated. OK FOR ELECTRIC PA's SF and MF

Art will do an analysis of the maintenance issues and MF and oil /gas to Jerry by February 15, 2010

Window treatments—

Art Willcox will look into window blinds to see if there are any independent studies to Jerry by February 15, 2010

Smart Strips—

Deb Sass to explore possible fire issues report to Jerry by February 15, 2010
Here is my proposed agenda for tomorrow’s meeting.

GAS & ELECTRIC
SINGLE FAMILY & MULTI-FAMILY

1. Rotating Notetaker, next meeting, amendments to agenda, corrections to notes of last meeting

2. Procurement update (Craig, Ken)

3. Metrics update -- meeting directly after this (JO)

4. Contractor training and recruitment update (Bruce; Craig reporting re individual contractor training)

5. Auditor training and DHCD updates (Ken)

6. Compare measure lists across administrators -- Art’s final survey of agencies

7. Repairs -- WMEECo evaluation (John Walsh)

8. New measures

   NOTE -- Brad Steele will join us at 12.30 to discuss LEDs and other measures.

   a. SDHW -- Electric utilities previously agreed to cost-share solar hot water with MTC (assuming an MTC grant) where cost-effective (i.e., larger water users). Art to report re repairs.

   b. Window quilts? Cellulose window shades (cheaper)? (Ruth, Art) -- Art reporting re cost-effectiveness

   c. Bruce re recruiting landlords for heating system replacement.

   d. MicroCHPs (Bruce and Art)

   e. Clothes washers and drying racks (Diane and Diana) -- 2010 metric.

   f. TLC kit -- 2010 metric. Reviewed in 2009; any need for additional review?
g. Indirect water heating -- 2010 metric. Review approval; all aboard?

h. LEDs -- 2010 metric. Brad Steele presentation.

i. Smart strips -- Deb Sas to report re possible fire danger.

j. Demand control -- 2009 and 2010 metric.

Grounded Power proposal: Pilot feedback approach whereby auditors develop target reductions with clients by use, clients receive monthly report via internet comparing their usage from utility billing system with their target and with community results (to be defined) -- could also include gas (Action, Cape Light, others have expressed interest in participating in pilot). Awaits definitive Grounded Power proposal. (Jerry)

k. Outdoor resets -- 2010 metric. Rejected in 2009; any need to revisit?

l. Deep retrofit (super-insulation, foundation insulation) -- 2010 metric.

m. Pilots -- 2010 metric. (Metric to be revised)

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From: Briana Kane <bkane@capelightcompact.org>
To: tobin@bostonabcd.org; wells@bostonabcd.org; macellan@bostonabcd.org; craig@actioninc.org; ritac@actioninc.org; Elj@actioninc.org; DBychler@nisource.com; kgray@nisource.com; msommer@berkshiregas.com; Briana Kane <bkane@capelightcompact.org>; Ken.Rauseo@ocd.state.ma.us; AMicke@GLCAC.Org; rbrechtold@haconapecedoc.org; NDAVISON@haconapecedoc.org; bruceledgerwood@comcast.net; JerroldOpp@DemocracyAndRegulation.com; artwillcox@yahoo.com; PWingate@communityaction.us; jhowat@ncdc.org; James.Carey@sug.com; Dianal.Duffy@us.ngrid.com; Lynn.Ross@us.ngrid.com; michael.rossacci@us.ngrid.com; DAVE.LEGG@us.ngrid.com; Beth.Lonergan@us.ngrid.com; gall.azulay@nstar.com; diane.lopes@nstar.com; pjackson@smoc.org; kimball@unitil.com; aginkt@nu.com; oswahl@nu.com; sasde@nu.com; walshj@nu.com; tachey.chan@state.ma.us; danielle.rathbun@state.ma.us; jeanne.cherry@sug.com; James.Carey@sug.com; jgilvermore@yahoo.com
Sent: Wed, February 10, 2010 2:16:21 PM
Subject: Low Income Best Practices updates
LIBP Meeting at NSTAR February 23, 2010

NEXT MEETING April 06, 2010 from 10-2 at BSG (Kara to confirm room availability)

Attendees: Beth Lonergan (NGRID), Mike Rossacci (NGRID), Diana Duffy (NGRID), Art Willcox (LEAN), Ken Rauseo (DHCD), Briana Kane (CLC), Al Mickee (GLCAC), Craig Brown (ACTION), Rita Carvalho (ACTION), David MacLellan (ABCD), Elliott Jacobson (LEAN), Peter Wingate (Community Action), Ruth Bechtold (HAC), Deb Sass (WMECO), Jeanne Cherry (NE Gas), Kara Gray (BSG), Robert Gyurjan (Berkshire), Paul Jackson (SMOC), Jerry Oppenheim (LEAN), Bruce Ledgerwood (LEAN). On the phone John Livermore (Consultant), Derek Kimbal (Unitil)

Distribution list—

Briana circulated list for final updates and will send out revised list with today’s meeting notes.

Working Group List— BK to get info to John Livermore (DONE 01/20) Updated/Circulated on 02/23/2010

Procurement—

Pricing has been sent to PA’s if there are questions, contact your Lead Agency. If all approve, new pricing could start mid-March.

Metric update—

PA’s will have a meeting today at 1:30, followed by a meeting with Jerry at 2:00 need to be completed by March 04, 2010. Up for discussion:

Building Inventory

LIMF

How to deal with ARRA (?)

Trainings—

Recruitment-- will have a booth at the NESEA conference

Each PA or agency will be responsible to send Diane Lopes an email of those trainings for metric tracking

Mattapan BootCamp— first class starting next week
MassGreen—DHCD looking to provide 1 million in ARRA funding

**CORI Checks—**

NGRID has as a procurement requirement

BSG has required checks since 2004 and the Lead Agency gets a letter from contractor(s) to certify checks were done

Each company/agency runs their own checks

**Repairs (major)—**

John Walsh to provide evaluation report on WMECO’s major repair pilot and hopes to have it out prior to the next meeting on 04/06/10

Utilil has agreed to offer major repairs

Measure list—roofs, knob and tube / wiring issues, heating distribution (limited basis), structural and moisture mitigation (each PA to decide what they want to offer)

**New measures—**

Blown Cellulose—Borate vs. Ammonium Sulfate and Borate mix (contractor makes decision) Briana circulated email to Jerry and Deb with links on borate vs. ammonium sulfate and borate mix. (Emailed out on 02/23/10). Deb to look into Maine’s concerns for 04/06/10 mtg to circulate info by 04/01/10

Fiberglass—talked about blown fiberglass...looking for specs etc., looking for independent third party evaluation (contractor makes decision)

**SDHW—**

For homeowners with electric hot water with a family of 4 or more, equipment must be SRCC certified, roof must be in good condition; initial site review to qualify the site, 3 bids needed, replacement/repair to be handled like a heating system, customer needs to be educated. OK FOR ELECTRIC PA’s SF and MF Warranty coverage to be at least 5 years.
Window treatments—

Art Wilcox will look into window blinds to see if there are any independent studies to Jerry by February 15, 2010 (completed)...NEXT STEP: Art and Ruth to propose protocol and lifetime analysis by 04/01/10 circulated to group

Smart Strips—

Deb Sass to explore possible fire issues report to Jerry by February 15, 2010 (completed)...update no direct correlation between power strips and house fires. However, LI housing stock at greater risk for fire. Art to look into overload protection by 04/01/10...Brad Steele confirmed that the BiTS model has overload protection.

Residential Lighting update (Brad Steele)

Items for next meeting:

Savings calculations for heating systems
Lopes, Diane

From: Jerrold Oppenheim [jerroidopp@democracyandregulation.com]
Sent: Tuesday, April 06, 2010 3:24 PM
To: tobin@bostonabcd.org; wells@bostonabcd.org; maclellan@bostonabcd.org; craig@actioninc.org; ritac@actioninc.org; El@actioninc.org; DBuchler@nisource.com; kgray@nisource.com; msommer@berkshiregas.com; rgyurjan@berkshiregas.com; bkane@capelightcompact.org; Ken.Rauseo@state.ma.us; AMickee@GLCAC.Org; rbechtold@haconcapecod.org; NDAVISON@haconcapecod.org; bruceledgerwood@comcast.net; JerroldOpp@DemocracyAndRegulation.com; artwillcox@yahoo.com; PWingate@communityaction.us; jhowat@ncfc.org; Diana.Duffy@us.ngrid.com; Lynn.Ross@us.ngrid.com; dave.legg@us.ngrid.com; michael.rossacci@us.ngrid.com; Beth.Lonergan@us.ngrid.com; Azulay, Gail; Lopes, Diane; pjohnson@smoc.org; kimball@unitil.com; aginkt@nu.com; oswalrl@nu.com; sasde@nu.com; walshj@nu.com; tacock.chan@state.ma.us; danielle.rathbun@state.ma.us; jeanne.cherry@sug.com; James.Carey@sug.com; trish.walker@sug.com; jglivemore@yahoo.com; pahorowitz@earthlink.com; Mary Gianetti

Subject: Re: Low Income Best Practices agenda (with assignments and agreements from April 6)-- Wednesday, July 7 at 10 AM at Bay State Gas, Westborough

LOW INCOME BEST PRACTICES DRAFT AGENDA FOR July 7, 2010
Assignments in bold
APRIL 6 DECISIONS IN BOLD CAPS

1. Notetaker, next meeting (September on Cape?), amendments to agenda, corrections to notes of last meeting, corrections to e-list

2. List of Working Groups (John L circulated res. 2/23) -- other WGs?

3. Procurement update (Craig)
CAPE LIGHT, BERKSHIRE OK. GRID WILL OK VIA DIANA. NSTAR AND WMECO OK AFTER FINAL CHECK. BSG?
PAs to respond, preferably by this Friday, April 9. PAs to notify LEAN of cost-effectiveness issues.

4. Metrics updates
   a. 2010
   b. 2009 - Diana will send JO revised cover memo

5. Contractor training and recruitment (Craig)

6. Auditor training (Craig)

7. DHCD (Ken)

8. Repairs
   a. WMECO evaluation (Debi, John Walsh)
9. New measures
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10. MF Building Inventory -- NB: Metric

2010 METRICS (pending at DPU)

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Note: Where technically appropriate, indirect domestic water heating, LED lighting, and Outdoor resets will become standard measures if they pass cost-effectiveness screening. In the case of LED lighting, it is possible that only specialty lights or applications will pass screening.

* Each Micro CHP installation in a shared Gas and Electric PA territory counts as one (1) installation for each of the two PAs for the purposes of this metric.

** If this measure is feasible and available, Best Practices will develop a statistically reliable number of participants statewide, but no fewer than 500, to be allocated among the electric PAs in proportion to the number of low-income customers in each service territory.
Each PA to submit documentation showing performance relative to targets.

3. Multi-family Building Inventory

| Threshold | Develop and support a low-income non-profit multi-family building inventory in order to facilitate benchmarking for project identification of energy retrofit potential and screening of potential projects. It is anticipated that the three-year cost will be $360,000 and that it will provide building square footage and at least a year of energy consumption data with respect to buildings identified by LEAN that are majority-occupied by low-income tenants. This information is currently available only on a limited basis, with respect to public housing authority buildings, and virtually non-existent for other non-profit-owned buildings. This coordinated and comprehensive project will make it possible to better identify maximum achievable efficiency savings, as well as to refine rollout of the Low Income MultiFamily Retrofit program. It will also support development of an energy efficiency standard (e.g., BTUs of energy per square foot of heated space) for low-income multi-family buildings. LEAN estimates that there are approximately 8,300 buildings of low-income multi-family housing in the Commonwealth. Each utility will support the inventory on an allocated basis.

This will be a three-year project, beginning approximately July 1, 2010, with milestones each year consisting of the addition of 250 buildings per month (allocated by utility) to the database. Allocations are established on a monthly basis (each year ending November 30) since it is not known precisely when the project will begin and will be allocated among utilities in proportion to their customer count of non-profit low-income multifamily buildings in the following format:

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The current metric for this three-year project only covers 2010, but it is anticipated that there will be customized metrics consistent with the current metric with respect to this project for 2011 and 2012 based on the status of the project at the end of years 2010 and 2012, respectively.

In coordination with LEAN, each PA will develop the scope, design, and contracting for the low-income multi-family building inventory in its service territory and commit to its implementation. This will include consensus agreement on the allocation of non-profit low-income multifamily buildings among the utility service territories. It is anticipated that there will be one statewide procurement.

| Design | In coordination with LEAN, each PA will implement the Inventory in its service territory, reaching the designated milestone number of buildings. |
| Exemplary | By January 1, 2011, in coordination with LEAN, each PA will submit a status report of the implementation of the Inventory, together with recommendations going forward. The status report will include a summary of what has been learned to-date relating to energy consumption in non-profit low-income multifamily buildings (e.g., average BTUs/square foot, reasonable target consumption, reasonable threshold consumption for treatment). |

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*************************************************************************
LOW INCOME BEST PRACTICES DRAFT AGENDA FOR July 7, 2010

Assignments in bold

UPDATES OF APRIL 6 DECISIONS IN BOLD CAPS

1. Notetaker, next meeting (September on Cape ?), amendments to agenda, corrections to notes of last meeting, corrections to e-list

NOTE RE TODAY’S SCHEDULE -- TWO PRESENTATIONS

~11.30 - Paul Nahass, Austin Aerogels (new insulation product suitable for masonry sidewalls) [Art]

~12.30 - Ed Connelly, New Ecology re WEGOWISE (used in MF program; proposed for use re: MF building inventory)

2. List of Working Groups (John L circulated res. 2/23) -- other WGs?

3. Procurement update (Craig)
EVERYONE HAS NOW OK'D/

4. Metrics updates
   a. 2010
   b. 2009 - **DONE**

5. Contractor training and recruitment (Craig)

6. Auditor training (Craig)

7. DHCD (Ken)

8. Repairs
   a. WMECO evaluation (Debi, John Walsh; Art)
      b. Review of menu of approved measures (local option; must make Wx or EE possible): roof, K&T and other electrical, heating-related including occasional distribution. moisture control, structural

9. Program issues
   a. MF - building inventory (metric), process flow at WMECo (defer to MF screening comm.?)
      b. 60-80% update
      c. Building Permits required
10. New measures - minimum Metric 2 met

   a. Hybrid electric water heaters (Art will circulate material from utilities group and
      update re: manufacturer response)

   b. SDHW - PAs agreed last two meetings on cost-effectiveness parameters; discussion of
      agreed cost-sharing with RET, assuming funding

   c. Cellulose - safety of ammonium sulfate (Debi will ask Maine program for written DOE
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   d. Blown Fibreglass - ANY MATERIAL THAT MEETS SPECS (INCLUDING
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   e. Window quilts (Art will propose protocol)

COST-EFFECTIVE IF INSTALLED IN SELECTED PLACES. BEST
OPPORTUNITIES ARE MF, SLIDERS, AND DRAFTY WINDOWS. MUST INCLUDE
TRACKS AND EDUCATION/SCREENING.

COMMON ASSUMPTIONS, ASSUMING 5 YEAR LIFE, REJECTED QUILTS AND
APPROVED CELLULOSE ONLY RE: ELECTRIC HEAT.

   f. Landlord heating systems -- N.B.: Metric

Committee led by Diane will develop proposal for July meeting. Other members: Craig,
David, Diana, Kara, Peter, Debi, Robert, Al, Jeanne

In the meantime, PAs will develop SF Landlord databases where tenants pay for heat --
assemble data via agencies?

Later, plan marketing for next winter
g. MicroCHPs (**Bruce, Art**) -- NB: Metric

**AGREED.**

Art will send report (with narrative) to JO.

Diane will identify Common Assumptions lead to JO.

JO will submit report to Common Assumptions lead as referral from BP, for analysis no later than 8 weeks/June 15, 2010.

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h. Indirect water heaters, previously approved -- all aboard? **YES** NB: Metric

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**COMMON ASSUMPTIONS APPROVED, ONLY FOR OIL.**

i. Smart strips - EFI model includes overload protection against fire

Agreed on cost-effectiveness two meetings ago where there are 3+ switchable units. Ready to approve? **YES, PROVIDED OVERLOAD PROTECTION**

j. LEDs - Brad Steele of EFI advised us that LEDs were not as efficient or cost-effective as CFLs, though there may be some cost-effective specialty applications such as downlights. NB: Metric

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COMMON ASSUMPTIONS DID NOT ACT -- SO RE-SUBMIT.

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m. Super-insulation -- NB: no metric -- further discussion of potential more economic and equitable measures, e.g., 2" instead of 4" (David), super-insulate roof being replaced anyway (Kara), new roofing materials (Debi)

Debi will research new roofing materials

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Debi will gather information re purchasing.

p. Electric heat alternatives - DHCD Ductless Air Source Hedal Pump Demonsgtration
Project (Debra Hall), see attachment

from Debra:

Ductless Air Source Heat Pump Demonstration Project in an all-electric elderly development at Winthrop Housing Authority, which is served by NGRID.

Background
DHCD and housing authorities have been challenged in finding ways to save energy in the substantial portfolio of electrically-heated public housing. This portfolio includes approximately 15,000 one-bedroom, elderly apartments statewide. Each apartment is usually less than 450 square feet. The average annual electrical consumption to heat the apartment is 8,500 kWh. At a statewide average cost of $0.18 per kWh, the annual cost to heat the apartments is $1,530 -- a $20 million operating expense statewide! Most of these apartments have electric baseboard resistance heat, but some have original radiant wall or ceiling heat panels (that usually have been painted over many times) or electric radiators with bricks that retain heat. Weatherization of building envelopes can help make these units somewhat more efficient, as can setback thermostats, if they are easy for elders to use. However, we are also interested in exploring other all-electric technologies.

Current DHCD policy does not require housing authorities to provide cooling in apartments, but most housing authorities air condition community rooms to provide a cool refuge for elders during hot weather. Nonetheless, many tenants install inefficient window AC in their apartments, and the housing authority pays for the cooling on the common electric bill. Air Source Heat Pumps may be an option for providing heating and cooling at a lower total electricity cost than the authority currently pays year-round.

Winthrop Housing Authority Demonstration Project
Winthrop Housing Authority is very interested in hosting a demonstration project that would involve metering 4 buildings that include 32 housing units in their 176-unit Golden Drive Elderly development 667-2. Two of the buildings (16 units), would have ductless ASHP installed. The performance of the 2 buildings with electric resistance heat and window air conditioners and would be compared with the 2 buildings that have ASHP installed.

The buildings at 2, 4, 6, and 8 Golden Drive are identical in size, shape and geographical orientation. There are 8 apartments per building and a front and rear foyer. All apartments have one bedroom and are less than 450 square feet. The foyers are equivalent in square feet to an apartment. Buildings 2 and 4 Golden Drive are served by one three phase electrical service; Buildings 6 and 8 Golden Drive are served by one three phase electrical service. This would make it easy to study these buildings separate from the larger development.

DHCD is hiring Norian Siani Engineering, Inc. to assist with design.

We also have this project on the ARRA WAP public housing project list. We would like to propose participation from LEAN / NGRID as follows:

-- Air seal and weather strip 32 units to achieve building envelope performance improvement in both the electric resistance heat and ASHP units (approx $1000 per unit or $32,000) [Note: this would be through the MF program, if approved; ARRA funds would pay for the heat pumps]

-- Real time interval metering of the each of the four buildings which would allow much more detailed electric use information to this research effort. (approx $20,000?)

Air Source Heat Pumps Can Work in New England
Air Source Heat Pumps (ASHP) are estimated to save 50% or more on heating kWh, and the utility companies have promoted them primarily as a source of cooling through their COOL SMART incentive program for homeowners. The Single Phase ASHP with inverter technology is currently rated to operate down to 17 F. Three Phase ASHP with
both inverter and variable refrigeration flow technology operate as low as 0 F. The three phase ASHP also have the capability of heating and cooling at the same time. Air source heat pumps have been of interest to MA Dept. of Energy Resources (DOER) for some time now, as a potential alternative or supplement to electric resistance heat.

The Northwest Energy Efficiency Alliance launched the Northwest Ductless Heat Pump Project to demonstrate the use of single phase invert driven ductless heat pumps to displace electric resistance heat in single family homes across the Northwest, Washington, Oregon, Idaho and Montana in 2009. [www.nwductless.com](http://www.nwductless.com) The project current has 4586 approved installations. Their consumer webpage [www.GoingDuctless.com](http://www.GoingDuctless.com) has a Frequently Asked Questions page that provides good background information on single phase ductless heat pumps. Due to the fact that single family homes are seldom served by three phase power, this project focuses on single phase equipment.

I have attached the detailed work order that DHCD Engineer John Donoghue prepared for this project.

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<td>Standard measure</td>
<td>-</td>
<td>Standard measure</td>
<td></td>
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<tr>
<td>New England Gas</td>
<td>-</td>
<td>Standard measure</td>
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<td>Standard measure</td>
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<tr>
<td>Unil Gas</td>
<td>-</td>
<td>Standard measure</td>
<td>-</td>
<td>Standard measure</td>
<td></td>
</tr>
</tbody>
</table>

Note: Where technically appropriate, indirect domestic water heating, LED lighting, and Outdoor resets will become standard measures if they pass cost-effectiveness screening. In the case of LED lighting, it is possible that only specialty lights or applications will pass screening.

* Each Micro CHP installation in a shared Gas and Electric PA territory counts as one (1) installation for each of the two PAs for the purposes of this metric.

** If this measure is feasible and available, Best Practices will develop a statistically reliable number of participants statewide, but no fewer than 500, to be allocated among the electric PAs in proportion to the number of low-income customers in each service territory.

Each PA to submit documentation showing performance relative to targets.

3. Multi-family Building Inventory

| Threshold | Develop and support a low-income non-profit multi-family building inventory in order to facilitate benchmarking for project identification of energy retrofit potential and screening of potential projects. It is anticipated that the three-year cost will be $360,000 and that it will provide building square footage and at least a year of energy consumption data with respect to buildings identified by LEAN that are majority-occupied by low-income tenants. This information is |

1/18/2011
Currently available only on a limited basis, with respect to public housing authority buildings, and virtually non-existent for other non-profit-owned buildings. This coordinated and comprehensive project will make it possible to better identify maximum achievable efficiency savings, as well as to refine rollout of the Low Income MultiFamily Retrofit program. It will also support development of an energy efficiency standard (e.g., BTUs of energy per square foot of heated space) for low-income multi-family buildings. LEAN estimates that there are approximately 8,300 buildings of low-income multi-family housing in the Commonwealth. Each utility will support the inventory on an allocated basis.

This will be a three-year project, beginning approximately July 1, 2010, with milestones each year consisting of the addition of 250 buildings per month (allocated by utility) to the database. Allocations are established on a monthly basis (each year ending November 30) since it is not known precisely when the project will begin and will be allocated among utilities in proportion to their customer count of non-profit low-income multifamily buildings in the following format:

<table>
<thead>
<tr>
<th>PA</th>
<th>% Allocation</th>
<th># of Buildings/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NGRID Electric</td>
<td></td>
<td></td>
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<tr>
<td>WMECO</td>
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<tr>
<td>Unitil Electric</td>
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</tr>
<tr>
<td>NSTAR Gas</td>
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<tr>
<td>NGRID Gas</td>
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<tr>
<td>Bay State Gas</td>
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<td>Berkshire Gas</td>
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<td>New England Gas</td>
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<td></td>
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<tr>
<td>Unitil Gas</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The current metric for this three-year project only covers 2010, but it is anticipated that there will be customized metrics consistent with the current metric with respect to this project for 2011 and 2012 based on the status of the project at the end of years 2010 and 2012, respectively.

In coordination with LEAN, each PA will develop the scope, design, and contracting for the low-income multi-family building inventory in its service territory and commit to its implementation. This will include consensus agreement on the allocation of non-profit low-income multifamily buildings among the utility service territories. It is anticipated that there will be one statewide procurement.
<table>
<thead>
<tr>
<th>Design</th>
<th>In coordination with LEAN, each PA will implement the Inventory in its service territory, reaching the designated milestone number of buildings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exemplary</td>
<td>By January 1, 2011, in coordination with LEAN, each PA will submit a status report of the implementation of the Inventory, together with recommendations going forward. The status report will include a summary of what has been learned to-date relating to energy consumption in non-profit low-income multifamily buildings (e.g., average BTUs/square foot, reasonable target consumption, reasonable threshold consumption for treatment).</td>
</tr>
</tbody>
</table>

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******************************************************************************
LOW INCOME BEST PRACTICES MEETING NOTES FOR July 7, 2010

Attendees: Jerry Oppenheim, Bruce Ledgerwood, Mike Rossacci, Debra Hall, Craig Brown, Peter Wingate, Dave Fuller, Ken Rauseo, Deb Sas, Kate Agin, Derek Kimball, Robert Gyurjan, Dave MacLellan, Paul Jackson, Kara Gray, Jeanne Cherry, Art Willcox, John Donahue, Ruth Bechtold, Diana Duffy, Diane Lopes

By phone: Biana Kane and Margaret Song

Next meeting date. October 13 at 10am at HAC – actual location to be determined.

LIHEAP funding issues. Diana Duffy referenced a National Article on the need for greater prevention controls for LIHEAP funding. There was an article that stated 7 states are identified and using LIHEAP funds improperly. No issues found in MA to date.

Procurement. Complete

2009 Metrics. Document complete

Training and Recruitment – This is an ongoing process. Bruce Torrey and Jules Junker are doing lots of training that is paid for with ARRA/WAP funds at this point in time but may be addressed to the PAs once ARRA money in gone.

There are 113 contractors in the networks - not including additional crews. Currently there are about 250 crews. The networks is adding 1-2 contractors a week.

To date, no one has spent out ARRA and if they do then more ARRA money may be available. So far, 800 jobs are being paid for with ARRA money (not all new) this includes contractors and all supporting staff. There are currently 80 auditors in the program which has grown from 40 originally.

ARRA update and discussion - 122 million was received by MA. It was a 3 year program scheduled to end Mar 31, 2012 but may be extended due to the late start caused by the Davis Bacon wage issue. 86 million was directed to the traditional network, 25 million to state public housing for 4000 units, and 6 million to affordable housing for 963 units. There was
also a Governmental service agreement with STCC to train auditors and contractors.

The State weatherization program is ahead of their production goal thru June putting them at 105% of goal. In the fall they will look at reallocation of funds.

PAs mentioned how this is impacting utility/energy efficiency provider program. DHCD states we will need to get more contractors and auditors into the program. Many independent contractors don’t want to work on the LI program due to LI pricing and stringent requirements. Can we mandate independents to work on residential and LI program in order to work for utility/EE provider programs?

In some PA territories, customers are calling to be served thru the residential program due to long waiting times. Priority becomes an issue. Agencies are able to serve these customers under PA program funds only to avoid prioritization.

Can PA claim DOE savings? Some PAs use deemed savings and others use site specific. Can PAs claim DOE savings if they leverage the job? Can we set a leverage requirement to help spend PA money? Jerry what is the next step if we want to pursue this?

DHCD states many problems would go away if WX programs were to be an exact mirror of each other but that is not likely possible due to cost effectiveness and savings requirements put on the PAs.

Shifting of funds. Do we reallocate from SF to MF? PAs to discuss with local caps/LV to see if SF is in jeopardy of not spending out. PAs are awaiting resolution on a request as to whether they will be able to shift funds within a program sector.

Windows are a hot topic. DOE is questioning windows on one hand and promoting them on the other. They are out of the MA program as of right now. And steps are being taken to work them back in. In order to continue agencies will need to use the DOE audit tool and the SIR must be at least 1.0. Window pricing is putting this under the 1.0 SIR requirement. DHCD may try a window buydown approach to put windows over the 1.0 SIR. Can PAs pay for the air sealing and insulation required around the window but not the actual window? LEAN to propose an approach to address windows.
At this point Mass Save is not impacting the LI program as far as contractors are concerned.

**Repairs** - Menu of approved repair measures (local option; must make Wx or EE possible): roof, K&T and other electrical, heating-related including occasional distribution. $10,000 is the maximum per wx job but agencies are required to maintain an average of $5500. For repairs, the max is $2500 with an average of no more than $500. Wmeco repairs evaluation is complete. Repairs were found to be cost effective. Deb Sas to share with group.

**Multifamily.** Process flow for MF for Western MA and BSG is not clear. First step is to have one entity qualify projects. How the work gets done is a separate issue. The intent is to work through existing channels. ABCD role will be funded by LEAN and allocated appropriately to the correct entities.

**Building inventory metric.** WEGO WISE to present software later in meeting.

**60-80%**. Serving the 60-80% population has been proposed to the council for consideration. It would work the same way as it does for the current program. Not 100% sure how customers would be qualified but it would likely go through the FA agency. The proposal is looking to provide a grant to those in the 60-80 range. Funding would come out of the residential sector funds. LEAN stated that work in 2011 would lead up to the transition of ARRA funding going away, so agencies will be in a better position to utilize the PA dollars. CLC is currently running 80% program. CLC uses a simple income form that the customer fills out and the customer receive 100% up to $2000 thru the residential program. Do agencies have the capacity to handle this jump to 80%?

**Building permits** - Building permit requirements are slowing things down for contractors. Some cities and towns are more stringent than others, there is no consistency. (Permits appear to be a money maker for municipals.)

**New measures** - Hybrid electric water heaters had a series of issues including: reliability, noise, and condensation. Some products have addressed some of the issues. Cost effectiveness in our climate is not ideal for this technology. No need for Best Practices Working Group (BP) to pursue any further at this time. Some electric PAs are pursuing a pilot in the
non-LI arena. BP will wait on results that are expected to be available next year (2011).

SDHW. Defer to next meeting. Waiting for information on CEC grant (renewable energy trust)

Ammonium Sulfate. 50/50 mix of contractors using this material in MA. DHCD has no position at this point. Price differential is not significant but may be enough for contractors to go with the cheaper product. Product does meet federal standards. Consensus is to continue status quo. This is also consistent with the RCS group decision.

Outdoor resets. Needs to be resubmitted to common assumptions group. Art to provide any necessary info to Common assumptions group.

Window quilts. Rejected quilts and approved cellulose for electric heat only. Art to challenge some of the assumptions used by PA common assumptions group. Art will work with the Common Assumptions group.

Indirect water heaters. Approved for oil but not for gas. Art to provide any necessary info to the Common assumptions group. INWH will only be replaced with the boiler which is causing it not to pass - assuming end of useful life replacement – on the gas side.

Smart strips, LED, MCHP. Approved.

Indoor resets. Not a lot of products out there that are reliable and the cost is high. Not viable at this time.

Find a light. Samples provided by Deb Sas for people to use and see if it is worth putting in the TLC kit.

Super Insulation – Art to do some modeling in regards to 2 inch vs. 4 inch wall insulation and super insulated roof vs. new roof with attic insulation. Deb Sas spoke about some new technologies where manufacturers are experimenting with coatings for roof shingles. One is made from recycled cooking oils that are designed for our specific climate. There are also a photovoltaic film made for shingles that collect solar energy. Deb to update group on the costs of these technologies.

Demand Control. Art did some preliminary research on Grounded Power - a behavior modification program. If PAs were to accept the entire package
(all options) it would cost approximately $125,000 and would serve approximately 1,500 customers with savings of 174 kwh. Using a 5 year life, Art calculated the BCR to be 1 with no Non energy benefits (NEBS) and 1.5 with NEBs. LEAN will circulate the Grounded power proposal and forward information to the Common Assumptions group for screening.

**LI metrics** – on target.

LL design level is with Jerry O for comment. **Due August 1.**

**Presentation by Aerogel** – Paul Nahass

Art to get information to the Common Assumptions group re: this new measure.

**Presentation by New Ecology** re: WEGOWISE (used in MF program; proposed for use re: MF building inventory)

**Presentation by DHCD** – re: Ductless Air source Heat Pump by Debra Hall and John Donahue

ANY ACTION ITEMS HERE?
From: Jerrold Oppenheim [jerroldopp@democracyandregulation.com]

Sent: Thursday, July 08, 2010 9:33 AM

To: tobin@bostonabcd.org; wells@bostonabcd.org; maclellan@bostonabcd.org; craig@actioninc.org; ritac@actioninc.org; Elj@actioninc.org; DBuchler@nisource.com; kgray@nisource.com; msommer@berkshiregas.com; rgyurjan@berkshiregas.com; Briana Kane; Ken.Rauseo@state.ma.us; AMicke@GLCAC.Org; rbchotld@haconcapecod.org; NDAVISON@haconcapecod.org; bruceledgerwood@comcast.net; artwillcox@yahoo.com; PWingate@communityaction.us; jhowat@ncic.org; Diana.Duffy@us.ngrid.com; Lynn.Ross@us.ngrid.com; dave.legg@us.ngrid.com; michael.rossacol@us.ngrid.com; Beth.Lonergan@us.ngrid.com; Azulay, Gail; Lopes, Diane; pjackson@smoc.org; kimball@unitl.com; aginkt@nu.com; oswaltl@nu.com; sasde@nu.com; walshj@nu.com; danielle.rathbun@state.ma.us; jeanne.cherry@sug.com; James.Carey@sug.com; trish.walker@sug.com; jglivermore@yahoo.com; pahorowitz@earthlink.com; Mary Gianetti; Margaret M. Song; Debra Hall

Subject: Low Income Best Practices agenda (with assignments and agreements from July 7) -- October 13 at 10 AM at HAC, Hyannis

LOW INCOME BEST PRACTICES DRAFT AGENDA FOR October 13, 2010
At Housing Assistance Corp., Hyannis
Assignments in bold

JULY 7 DECISIONS IN BOLD CAPS

ATTACHED: Grounded Power proposal (2 files).
NOTE: FYI, National Energy Assistance Directors’ Association (NEADA) press release at the very bottom of this e-mail re: GAO LIHEAP report. Call with any questions.

1. Notetaker, next meeting, amendments to agenda, corrections to notes of last meeting, corrections to e-list

2. List of Working Groups (John L circulated res. 2/23) -- other WGs?

3. Contractor training and recruitment (Craig)

4. Auditor training (Craig)

5. DHCD (Ken)

6. Repairs
   a. Final WMEOCO evaluation (Debi, John Walsh)
   b. Review of menu of approved measures (local option; must make Wx or EE possible): roof, K&T and other electrical, heating-related including occasional distribution. moisture control, structural

9. Program issues
   a. MF - building inventory (metric) – WEGOWISE?

1/18/2011
10. New measures - minimum Metric 2 almost met, except outdoor resets
   a. Hybrid electric water heaters (Art: marginal cost-effectiveness, manufacturers have
      not addressed issues raised by utilities) (CLC, NS, and NG conducting a 14-site pilot
      under DOE Building America – results in 2011 (Margaret))
   
   b. SDHW - PAs agreed on cost-effectiveness parameters; discussion of agreed cost-sharing
      with RET, assuming funding
   
   c. Cellulose - safety of ammonium sulfate **ALTHOUGH PREFERENCE IS TO BAN
      AMMONIUM SULFATE, WE WILL FOLLOW DHCD LEAD AND RELY ON STATE
      CODE (current product is about 50-50)**
   
   d. Window quilts **(ART WILL PROPOSE PROTOCOL)**
      WE DECIDED COST-EFFECTIVE IF INSTALLED IN SELECTED PLACES. BEST
      OPPORTUNITIES ARE MF, SLIDERS, AND DRAFTY WINDOWS. MUST INCLUDE
      TRACKS AND EDUCATION/SCREENING.
      BUT COMMON ASSUMPTIONS, ASSUMING 5 YEAR LIFE AND 80%-EFFICIENT
      HEATING, REJECTED QUILTS AND APPROVED CELLOLUSE ONLY RE:
      ELECTRIC HEAT. ART WILL RESPOND TO COMMON ASSUMPTIONS.
   
   e. Landlord heating systems -- N.B.: Metric
      COMMITTEE LED BY DIANE DEVELOPED PROPOSAL, WHICH DIANE WILL
      CIRCULATE. OTHER MEMBERS: CRAIG, DAVID, DIANA, KARA, PETER, DEBI,
      ROBERT, AL, JEANNE
      IN THE MEANTIME, PAS WILL DEVELOP SF LANDLORD DATABASES WHERE
      TENANTS PAY FOR HEAT BY SETEMBER 30.-- ASSEMBLE DATA VIA
      AGENCIES?
      AT NEXT MEETING, COMMITTEE WILL PRESENT MARKETING PLAN FOR
      NEXT WINTER.
   
   f. MicroCPHs (Bruce, Art) -- NB: Metric
      COMMON ASSUMPTIONS APPROVED.
   
   g. Indirect water heaters, previously approved -- all aboard? YES NB: Metric
      COMMON ASSUMPTIONS APPROVED, ONLY FOR OIL. ART WILL FOLLOW-UP
      RE: GAS. NOTE THAT NGRID GAS HAS APPROVED. THERE MAY BE AN ISSUE
      RE: ASSUMING END-OF-LIFE REPLACEMENT. NOTE THAT COULD ARGUE
      AVOIDED CHIMNEY LINER AS BENEFIT.
   
   h. LEDs - Brad Steele of EFI advised us that LEDs were not as efficient or cost-effective as
      CFLs, though there may be some cost-effective specialty applications such as downlights. NB: Metric
      AGREED - SPECIAL APPLICATIONS ARE DOWNLIGHTS AND TASK LIGHTING

1/18/2011
COMMON ASSUMPTIONS APPROVED.

i. Outdoor re-sets -- rejected in 2009, any need to revisit? NO (NB: Metric)
COMMON ASSUMPTIONS DID NOT ACT -- SO RE-SUBMIT. ART WILL CONTACT.

j. Indoor re-sets (Art) — NO RELIABLE, ECONOMIC PRODUCTS.

k. Super-insulation -- NB: no metric -- further discussion of potential more economic and equitable measures, e.g., 2" instead of 4" (David), super-insulate roof being replaced anyway (Kara), new roofing materials (Debi)
ART WILL MODEL 2" V 4" AND r-60 V R-38
ROBERT WILL PROVIDE COSTS AND BENEFITS OF WHITE ROOFS
DEBI WILL RESEARCH COMMERCIAL ROOF COATINGS BENEFITS AND COSTS

l. Demand control -- NB: Metric. Grounded Power has made a proposal, which Art is analyzing. ART WILL PROVIDE ANALYSIS TO COMMON ASSUMPTIONS. JERRY WILL CIRCULATE GROUNDED POWER PROPOSAL [ATTACHED]. FURTHER DISCUSSION OF PILOT AT NEXT MEETING.

m. Glow in the dark panels (Find A Light) instead of night lights for TLC Kit. -- Will they stay on through the night?
DEBI DISTRIBUTED FOR TESTING; COST IS $1.30/3

n. Ductless Air Source Heat Pump Demonstration Project (DHCD proposing ARRA-NGrid project in an all-electric elderly development at Winthrop Housing Authority, with some real-time metering to measure efficiency v temperature) — WATCH PROGRESS FOR COST-EFFECTIVENESS

o. Paul Nahass and Steve (last name?), Austin Aerogels, presented Spaceloft, a new insulation product suitable for masonry sidewalls). STEVE AND PAUL SENDING PRESENTATION, HANDOUT, THIRD-PARTY REVIEW, OTHER MATERIAL. ART SENDING THAT MATERIAL AND HIS BCR ANALYSIS TO COMMON ASSUMPTIONS. FURTHER DISCUSSION AT NEXT MEETING ABOUT WHICH LIMITED APPLICATIONS MAY BE SUITABLE FOR.

================================================================================
Jerrold Oppenheim, Esq.
Democracy And Regulation
LOW INCOME BEST PRACTICES DRAFT AGENDA FOR July 7, 2010

Assignments in bold

UPDATES OF APRIL 6 DECISIONS IN BOLD CAPS

1. Notetaker, next meeting (September on Cape ?), amendments to agenda, corrections to notes of last meeting, corrections to e-list
NOTE RE TODAY'S SCHEDULE -- TWO PRESENTATIONS

~11.30 - Paul Nahass, Austin Aerogels (new insulation product suitable for masonry sidewalls) [Art]

~12.30 - Ed Connelly, New Ecology re WEGOWISE (used in MF program; proposed for use re: MF building inventory)

2. List of Working Groups (John L circulated res. 2/23) -- other WGs?

3. Procurement update (Craig)

EVERYONE HAS NOW OK'D/

4. Metrics updates
   a. 2010
   b. 2009 - DONE

5. Contractor training and recruitment (Craig)

6. Auditor training (Craig)

7. DHCD (Ken)

8. Repairs
   a. WMECO evaluation (Debi, John Walsh; Art)
b. Review of menu of approved measures (local option; must make Wx or EE possible): roof, K&T and other electrical, heating-related including occasional distribution. moisture control, structural

9. Program issues

a. MF - building inventory (metric), process flow at WMEO (defer to MF screening comm.?)

b. 60-80% update

c. Building Permits required

10. New measures - minimum Metric 2 met

a. Hybrid electric water heaters (Art will circulate material from utilities group and update re: manufacturer response)

b. SDHW - PAs agreed last two meetings on cost-effectiveness parameters; discussion of agreed cost-sharing with RET, assuming funding

c. Cellulose - safety of ammonium sulfate (Debi will ask Maine program for written DOE blessing, see 3/25 e-mail) (Paul Jackson will circulate data re: borate cheaper per R-value because it packs more densely) PREFERENCE IS TO BAN AMMONIUM SULFATE

d. Blown Fiberglass - ANY MATERIAL THAT MEETS SPECS (INCLUDING DENSITY) IS OK

e. Window quilts (Art will propose protocol)

COST-EFFECTIVE IF INSTALLED IN SELECTED PLACES. BEST OPPORTUNITIES ARE MF, SLIDERS, AND DRAFTY WINDOWS. MUST INCLUDE TRACKS AND EDUCATION/SCREENING.
COMMON ASSUMPTIONS, ASSUMING 5 YEAR LIFE, REJECTED QUILTS AND APPROVED CELLULOSE ONLY RE: ELECTRIC HEAT.

f. Landlord heating systems -- N.B.: Metric

Committee led by Diane will develop proposal for July meeting. Other members: Craig, David, Diana, Kara, Peter, Debi, Robert, Al, Jeanne

In the meantime, PAs will develop SF Landlord databases where tenants pay for heat -- assemble data via agencies?

Later, plan marketing for next winter

g. MicroCHPs (Bruce, Art) -- NB: Metric

AGREED.

Art will send report (with narrative) to JO.

Diane will identify Common Assumptions lead to JO.

JO will submit report to Common Assumptions lead as referral from BP, for analysis no later than 8 weeks/June 15, 2010.

COMMON ASSUMPTIONS APPROVED.

h. Indirect water heaters, previously approved -- all aboard? YES NB: Metric

Art will send report (with narrative) to JO.

Diane will identify Common Assumptions lead to JO.

JO will submit report to Common Assumptions lead as referral from BP, for analysis no later than 8 weeks/June 15, 2010.

COMMON ASSUMPTIONS APPROVED, ONLY FOR OIL.

i. Smart strips - EFI model includes overload protection against fire
Agreed on cost-effectiveness two meetings ago where there are 3+ switchable units. Ready to approve? YES, PROVIDED OVERLOAD PROTECTION

j. LEDs - Brad Steele of EFI advised us that LEDs were not as efficient or cost-effective as CFLs, though there may be some cost-effective specialty applications such as downlights. NB: Metric

AGREED - SPECIAL APPLICATIONS ARE DOWNLIGHTS AND TASK LIGHTING

Art will gather data, evidence re: niche applications, and information about quality, then draft report to send to JO for Common Assumptions.

JO will submit to Common Assumptions as referral from BP, for analysis within 8 weeks.

After Common Assumptions reports and approves, special applications become standard measure.

COMMON ASSUMPTIONS APPROVED.

k. Outdoor re-sets -- rejected in 2009, any need to revisit? NO (NB: Metric)

Art will draft report to send to JO for Common Assumptions.

JO will submit to Common Assumptions as referral from BP, for analysis within 8 weeks / June 15, 2010.

After Common Assumptions reports and agrees, consideration is complete.

COMMON ASSUMPTIONS DID NOT ACT -- SO RE-SUBMIT.

l. Indoor re-sets (Art)

m. Super-insulation -- NB: no metric -- further discussion of potential more economic and equitable measures, e.g., 2" instead of 4" (David), super-insulate roof being replaced anyway (Kara), new roofing materials (Debi)

Debi will research new roofing materials
n. Demand control -- NB: Metric. Grounded Power has made a proposal, which Art is analyzing. (Art)

o. Glow in the dark panels (Find A Light) instead of night lights for TLC Kit. -- Will they stay on through the night?

**Debi will gather information re purchasing.**

p. Electric heat alternatives - DHCD Ductless Air Source Hedal Pump Demonstrsgtration Project (Debra Hall), see attachment

from Debra:

Ductless Air Source Heat Pump Demonstration Project in an all-electric elderly development at Winthrop Housing Authority, which is served by NGRID.

**Background**

DHCD and housing authorities have been challenged in finding ways to save energy in the substantial portfolio of electrically-heated public housing. This portfolio includes approximately 15,000 one-bedroom, elderly apartments statewide. Each apartment is usually less than 450 square feet. The average annual electrical consumption to heat the apartment is 8,500 kWh. At a state wide average cost of $0.18 per kWh, the annual cost to heat the apartments is $1,530 -- a $20 million operating expense statewide! Most of these apartments have electric baseboard resistance heat, but some have original radiant wall or ceiling heat panels (that usually have been painted over many times) or electric radiators with bricks that retain heat. Weatherization of building envelopes can help make these units somewhat more efficient, as can setback thermostats, if they are easy for elders to use. However, we are also interested in exploring other all-electric technologies.

Current DHCD policy does not require housing authorities to provide cooling in apartments, but most housing authorities air condition community rooms to provide a cool refuge for elders during hot weather. Nonetheless, many tenants install inefficient window AC in their apartments, and the housing authority pays for the cooling on the common electric bill. Air Source Heat Pumps may be an option for providing heating and cooling at a lower total electricity cost than the authority currently pays year-round.

**Winthrop Housing Authority Demonstration Project**

Winthrop Housing Authority is very interested in hosting a demonstration project that would involve metering 4 buildings that include 32 housing units in their 176-unit Golden Drive Elderly development 667-2. Two of the buildings (16 units), would have ductless ASHP installed. The performance of the 2 buildings with electric resistance heat and window air conditioners and would be compared with the 2 buildings that have ASHP installed.

The buildings at 2, 4, 6, and 8 Golden Drive are identical in size, shape and geographical orientation. There are 8 apartments per building and a front and rear foyer. All apartments have one bedroom and are less than 450 square feet. The foyers are equivalent in square feet to an apartment. Buildings 2 and 4 Golden Drive are served by one three phase electrical service; Buildings 6 and 8 Golden Drive are served by one three phase electrical service. This would make it easy to study these buildings separate from the larger development.
DHCD is hiring Norian Siani Engineering, Inc. to assist with design.

We also have this project on the ARRA WAP public housing project list. We would like to propose participation from LEAN / NGRID as follows:

- Air seal and weather strip 32 units to achieve building envelope performance improvement in both the electric resistance heat and ASHP units (approx $1000 per unit or $32,000) [Note: this would be through the MF program, if approved; ARRA funds would pay for the heat pumps]
- Real time interval metering of the each of the four buildings which would allow much more detailed electric use information to this research effort. (approx $20,000?)

Air Source Heat Pumps Can Work in New England

Air Source Heat Pumps (ASHP) are estimated to save 50% or more on heating kWh, and the utility companies have promoted them primarily as a source of cooling through their COOL SMART incentive program for homeowners. The Single Phase ASHP with inverter technology is currently rated to operate down to 17 F. Three Phase ASHP with both inverter and variable refrigeration flow technology operate as low as 0 F. The three phase ASHP also have the capability of heating and cooling at the same time. Air source heat pumps have been of interest to MA Dept. of Energy Resources (DOER) for some time now, as a potential alternative or supplement to electric resistance heat.

The Northwest Energy Efficiency Alliance launched the Northwest Ductless Heat Pump Project to demonstrate the use of single phase inverter driven ductless heat pumps to displace electric resistance heat in single family homes across the Northwest, Washington, Oregon, Idaho and Montana in 2009. www.nwductless.com The project current has 4866 approved installations. Their consumer webpage www.GoingDuctless.com has a Frequently Asked Questions page that provides good background information on single phase ductless heat pumps. Due to the fact that single family homes are seldom served by three phase power, this project focuses on single phase equipment.

I have attached the detailed work order that DHCD Engineer John Donoghue prepared for this project.

2010 METRICS (pending at DPU)

<table>
<thead>
<tr>
<th>1. Hard to Reach Landlords {Electric &amp; Gas} – Statewide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Threshold</strong> Establish a subcommittee consisting of members of the Best Practices Working Group with representatives from all gas and electric program administrators to design and develop a (cost-effective) statewide landlord early retirement high efficiency heating incentive initiative. Incentive Plan should target single family (1-4 units) and should be completed by August 1st, 2010.</td>
</tr>
<tr>
<td><strong>Design</strong> Each program administrator to develop a database</td>
</tr>
</tbody>
</table>

1/18/2011
consisting of landlords in their respective service territories of low-income tenants that pay their own heating bills by September 30th 2010.

| Exemplary | Working group to develop and initiate a statewide marketing plan prior to 2010 heating season. Each program administrator to use their individual database to target market and submit a final report of participation and any lessons learned to the Best Practices Working Group by January, 30th 2011. |

2. New Measures

| Threshold | In coordination with LEAN, implement best practices to achieve deeper energy savings. Best Practices meets monthly, with each PA participating, to discuss and pursue new technologies and deeper measure penetration, and to select new measures for review. PAs will provide written updates on meetings, technical analyses performed, and additional best practices implemented. Each PA will accept an assignment with respect to written products. Each PA to submit documentation showing performance relative to these tasks. |

| Design | Study possible new program measures that are above and beyond the DOE measure list, specifically including, but not limited to: (1), micro-combined-heat-and-power (with emphasis on three-deckers, six-flats, and single family furnaces), (2) indirect water heating, (3) demand control measures (if feasible and available), (4) LED lighting, and (5) outdoor resets for new heating systems. Cost-effectiveness analysis will be conducted by the PA common assumptions group, or the equivalent, which shall include LEAN for this purpose, within eight weeks of referral by Best Practices, with first reports of analysis no later than June 15, 2010. Each PA to submit documentation showing performance relative to these tasks. |

| Exemplary | For each measure that passes the common assumptions group cost-effectiveness screening, implement field testing of new program measures in 2010. Document results and findings in a memo to EEAC consultants by April 1, 2011, including measurement of savings per home due to each measure. Where field testing indicates it is appropriate to do so, there will be re-screening by Common Assumptions and/or a second field test. Each PA will conduct field |
testing with respect to each such measure and provide a memo documenting results. PA field tests will include a sufficient number of installations for each measure, reasonable in proportion to the size of each utility budget, to yield reliable field test results, as set out in the table below, and will begin no later than two months after the relevant Common Assumptions report:

<table>
<thead>
<tr>
<th>Measures/PA</th>
<th>MicroCHP*</th>
<th>Indirect DHW</th>
<th>Demand Control**</th>
<th>LED Lighting</th>
<th>Outdoor Resets</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric</td>
<td>1</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td></td>
</tr>
<tr>
<td>NGRID Electric</td>
<td>1</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td></td>
</tr>
<tr>
<td>WMECO</td>
<td>-</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td></td>
</tr>
<tr>
<td>Unitil Electric</td>
<td>-</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td></td>
</tr>
<tr>
<td>NSTAR Gas</td>
<td>1</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>NGRID Gas</td>
<td>1</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>Bay State Gas</td>
<td>1</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>Berkshire Gas</td>
<td>-</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>New England Gas</td>
<td>-</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>Unitil Gas</td>
<td>-</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
</tbody>
</table>

Note: Where technically appropriate, indirect domestic water heating, LED lighting, and Outdoor resets will become standard measures if they pass cost-effectiveness screening. In the case of LED lighting, it is possible that only specialty lights or applications will pass screening.

* Each Micro CHP installation in a shared Gas and Electric PA territory counts as one (1) installation for each of the two PAs for the purposes of this metric.

** If this measure is feasible and available, Best Practices will develop a statistically reliable number of participants statewide, but no fewer than 500, to be allocated among the electric PAs in proportion to the number of low-income customers in each service territory.
Each PA to submit documentation showing performance relative to targets.

3. Multi-family Building Inventory

| Threshold | Develop and support a low-income non-profit multi-family building inventory in order to facilitate benchmarking for project identification of energy retrofit potential and screening of potential projects. It is anticipated that the three-year cost will be $360,000 and that it will provide building square footage and at least a year of energy consumption data with respect to buildings identified by LEAN that are majority-occupied by low-income tenants. This information is currently available only on a limited basis, with respect to public housing authority buildings, and virtually non-existent for other non-profit-owned buildings. This coordinated and comprehensive project will make it possible to better identify maximum achievable efficiency savings, as well as to refine rollout of the Low Income MultiFamily Retrofit program. It will also support development of an energy efficiency standard (e.g., BTUs of energy per square foot of heated space) for low-income multi-family buildings. LEAN estimates that there are approximately 8,300 buildings of low-income multi-family housing in the Commonwealth. Each utility will support the inventory on an allocated basis.

This will be a three-year project, beginning approximately July 1, 2010, with milestones each year consisting of the addition of 250 buildings per month (allocated by utility) to the database. Allocations are established on a monthly basis (each year ending November 30) since it is not known precisely when the project will begin and will be allocated among utilities in proportion to their customer count of non-profit low-income multifamily buildings in the following format:

<table>
<thead>
<tr>
<th>PA</th>
<th>% Allocation</th>
<th># of Buildings/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NGRID Electric</td>
<td></td>
<td></td>
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<tr>
<td>WMECO</td>
<td></td>
<td></td>
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<tr>
<td>Unitil Electric</td>
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<td></td>
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<tr>
<td>NSTAR Gas</td>
<td></td>
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<tr>
<td>NGRID Gas</td>
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<td>Bay State Gas</td>
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<tr>
<td>Berkshire Gas</td>
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<tr>
<td>New England Gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unitil Gas</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The current metric for this three-year project only covers 2010, but it is anticipated that there will be customized metrics consistent with the current metric with respect to this project for 2011 and 2012 based on the status of the project at the end of years 2010 and 2012, respectively.

In coordination with LEAN, each PA will develop the scope, design, and contracting for the low-income multi-family building inventory in its service territory and commit to its implementation. This will include consensus agreement on the allocation of non-profit low-income multifamily buildings among the utility service territories. It is anticipated that there will be one statewide procurement.

<table>
<thead>
<tr>
<th>Design</th>
<th>In coordination with LEAN, each PA will implement the Inventory in its service territory, reaching the designated milestone number of buildings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exemplary</td>
<td>By January 1, 2011, in coordination with LEAN, each PA will submit a status report of the implementation of the Inventory, together with recommendations going forward. The status report will include a summary of what has been learned to-date relating to energy consumption in non-profit low-income multifamily buildings (e.g., average BTUs/square foot, reasonable target consumption, reasonable threshold consumption for treatment).</td>
</tr>
</tbody>
</table>

====================================================================================================

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transmission to us at the address above by U.S. mail. Thank you.

States Develop Task Force with HHS to Address Fraud Prevention in the Low Income Home Energy Assistance Program

State energy officials today announced the formation of a joint task force to address issues concerning waste, fraud and abuse in the Low Income Home Energy Assistance Program (LIHEAP). Established by National Energy Assistance Directors’ Association (NEADA) in conjunction with the US Department of Health and Human Services (HHS), the task force is a response to a recent report by the US General Accounting Office (GAO) revealing the risk of fraud and abuse in the program due to a lack of systematic checking of applications and payments to utility vendors.

“There is no question that all of the state LIHEAP directors strongly support the accurate and appropriate awarding of grants funds,” says Jo-Ann Choate, chair of NEADA. “Any dollar wasted is a dollar that cannot be used to help a needy family have access to energy assistance.”

To that end, the states are requesting full access from GAO to the files in question in order to assess the accuracy of the review, develop appropriate measures to prevent waste, and eliminate weaknesses in the in-take system.

The task force will work with HHS to strengthen internal controls to ensure these funds are used properly.

While the purpose of the Task Force is to prevent waste, fraud and abuse in LIHEAP, it can only do so by addressing serious questions about the rate of error identified in the GAO report.

- Because the states have not had an opportunity to review the files GAO identified as suspicious, it is possible many of these cases are issues of paperwork, not fraud. For example, a recently widowed elderly woman who qualifies for LIHEAP might include her
husband’s name on the application so that it is consistent with the billing information her utility company has. Though the paperwork is inaccurate and must be updated, she is still eligible.

- The GAO study reported that LIHEAP programs give low-income residents checks made out to "Your Heating Supplier." In fact, vendor payments are generally marked with specific instructions to the bank that they are only to be deposited by the supplier. Some states pay LIHEAP benefits through the gas, electric and heating companies. A qualifying client’s account is credited with the benefit they are eligible for. No payment is issued directly to the client. In rare instances - generally during a home-energy emergency - a two-party check may be issued to the vendor and the client jointly. However, in all cases, the payment is provided only for the purpose intended.

- In a letter to GAO commenting on their review of its program, the State of Ohio pointed out that draft report could be interpreted as finding widespread fraud in Ohio. However, the GAO identified only four questionable cases, with payments totaling $1,400.

- New York State also submitted a letter commenting on the GAO report that raised an important issue: federally mandated deadlines for the delivery of emergency assistance. As stated in the GAO report, federal LIHEAP funds are provided to assist households “in meeting their immediate home energy needs.” States have to move fast to meet household energy crises—within 18 to 48 hours, according to federal statutory requirements. The timeframe can make immediate fraud detection difficult. The state recommended, “Additional fraud and abuse prevention measures must take into account the need for states to be responsive to the immediate needs of eligible applicants.”

- Lastly, one of the key issues raised by the GAO report is the lack of Social Security numbers required on LIHEAP applications. Because of privacy concerns, until recently HHS would not allow states to require Social Security numbers on applications. HHS has since clarified that states can now do so. Officials believe this will be a significant help in identifying ineligible applicants. New York’s letter also recommended this measure.
For the states, the bottom line is that all funds should be spent accurately and in accordance with program regulations, according to Mark Wolfe, executive director of NEADA. "We will be working closely with the HHS to identify all potential strategies to support this outcome," Wolfe said.

The National Energy Assistance Directors’ Association (NEADA) represents the state LIHEAP directors. www.neada.org.
Lopes, Diane

From: Jerrold Oppenheim [jerroldopp@democracyandregulation.com]
Sent: Tuesday, October 12, 2010 12:18 PM
To: tobinc@bostonabcd.org; wells@bostonabcd.org; maclellan@bostonabcd.org; craig@actioninc.org; ritac@actioninc.org; Elj@actioninc.org; DBuchler@nisource.com; kgray@nisource.com; msommer@berkshiregas.com; rgyurjan@berkshiregas.com; Briana Kane; Ken.Rauseo@state.ma.us; AMicke@GLCAC.Org; rbechtold@haconcapecod.org; NDAVISON@haconcapecod.org; bruceledgerwood@comcast.net; artwillcox@yahoo.com; PWingate@communityaction.us; jhowat@nclc.org; Diana.Duffy@us.ngrid.com; Lynn.Ross@us.ngrid.com; dave.legg@us.ngrid.com; michael.rossacci@us.ngrid.com; Azulay, Gail; Lopes, Diane; pjackson@smoc.org; kimball@unutil.com; aginkt@nu.com; oswalr@nu.com; saade@nu.com; walshj@nu.com; danielle.rathbun@state.ma.us; jeanne.cherry@sug.com; James.Carey@sug.com; trish.walker@sug.com; jglivermore@yahoo.com; pahorowitz@earthlink.com; Mary Gianetti; Margaret M. Song; Debra Hall

Subject: Low Income Best Practices agenda (with assignments and agreements from July 7)-- TOMORROW, October 13 at 10 AM at HAC, Hyannis

Assignments and notes from last meeting follow this updated agenda.

Updated proposed agenda:

LOW INCOME BEST PRACTICES DRAFT AGENDA FOR October 13, 2010
At Housing Assistance Corp., Hyannis

Directions: http://www.haconcapecod.org/directions.htm

Call-in: 712-432-0220 + 102 1979

Lunch: selections: contact Margaret Song if you have not done so already -- MSong@CapeLightCompact.org

1. Preliminaries: note taker, next meeting, amendments to agenda, corrections to notes of last meeting, corrections to e-list

2. List of Working Groups: John L. circulated res. WGs 2/23; others?

3. Contractor training and recruitment, Auditor training, DHCD Report -- Craig and Ken
   a. NEW MEASURE: air sealing of windows

4. Health and cost issues regarding borate and aluminum sulfate in insulation products -- presentation by Chris White, National Insulation Products, and discussion of relative costs, what DOE does and does not require, i.e., State Code (15 minutes)

5. Repairs -- DEFER discussion of WMECo evaluation

6. Program issues
   a. Aluminum sulfate (above)
      b. Cost of building permits
c. SDHW - coordinate with CEC?

d. MF status report

e. Other?

7. New measures, including consideration for 2011 Metric
   a. Hybrid electric water heaters, ductless air source heat pump -- Art
   b. Window cellular shades for oil and gas homes, discussion of evaluation assumptions and installation protocols -- Art and Craig
   c. Indirect water heaters for gas -- Art, NSTAR
   d. Outdoor re-sets (need Common Assumptions to confirm rejection)
   e. Roofing materials, super insulation (when roof replaced anyway) -- Kara, Debi
   f. Grounded Power demand control pilot -- Art, Jerry
   g. Find A Light for TLC kits? -- Debi
   h. Options for 2" foam on foundation -- Peter
   i. Air sealing around windows (above)
   j. Other measures to review in 2011?

8. 2010 Metrics -- see metrics at the very end of this e-mail
   a. #1 (Landlords) -- update (statewide program design, PA databases, statewide marketing plan and PA initiatives)

   b. #2 (New Measures) -- approved and adopted as standard measure: smart strips (prior to metric), indirect water heating (oil), window cellular shades (electric), LED down light (electric);
      rejected: window quilts, outdoor re-sets (needs Common Assumptions confirmation), indoor resets
      status re micro CHP installations (approved)
      pending at Commn Assumptions: indirect water heating (gas), window cellular shades (gas, oil), outdoor resets (reject), Grounded power demand control pilot

   c. #3 (MF Building Inventory) -- status

9. 2011 metrics
   a. #1 (Landlords)

   b. #2 (New Measures)

   c. #3 (MF Building Inventory)
LOW INCOME BEST PRACTICES DRAFT AGENDA FOR October 13, 2010
At Housing Assistance Corp., Hyannis

Assignments in bold

JULY 7 DECISIONS IN BOLD CAPS

ATTACHED: Grounded Power proposal (2 files).
NOTE: FYI, National Energy Assistance Directors’ Association (NEADA) press release at the
very bottom of this e-mail re: GAO LIHEAP report. Call with any questions.

1. Notetaker, next meeting, amendments to agenda, corrections to notes of last meeting,
corrections to e-list

1/18/2011
2. List of Working Groups (John L circulated res. 2/23) -- other WGs?

3. Contractor training and recruitment (Craig)

4. Auditor training (Craig)

5. DHCD (Ken)

6. Repairs
   a. Final WMECO evaluation (Debi, John Walsh)
   b. Review of menu of approved measures (local option; must make Wx or EE possible): roof, K&T and other electrical, heating-related including occasional distribution. moisture control, structural

9. Program issues
   a. MF - building inventory (metric) – WEGOWISE?

10. New measures - minimum Metric 2 almost met, except outdoor resets
    a. Hybrid electric water heaters (Art: marginal cost-effectiveness, manufacturers have not addressed issues raised by utilities) (CLC, NS, and NG conducting a 14-site pilot under DOE Building America – results in 2011 (Margaret))

    b. SDHW - PAs agreed on cost-effectiveness parameters; discussion of agreed cost-sharing with RET, assuming funding

    c. Cellulose - safety of ammonium sulfate ALTHOUGH PREFERENCE IS TO BAN AMMONIUM SULFATE, WE WILL FOLLOW DHCD LEAD AND RELY ON STATE CODE (current product is about 50-50)

    d. Window quilts (ART WILL PROPOSE PROTOCOL)
    WE DECIDED COST-EFFECTIVE IF INSTALLED IN SELECTED PLACES. BEST OPPORTUNITIES ARE MF, SLIDERS, AND DRAFTY WINDOWS. MUST INCLUDE TRACKS AND EDUCATION/SCREENING.
    BUT COMMON ASSUMPTIONS, ASSUMING 5 YEAR LIFE AND 80%-EFFICIENT HEATING, REJECTED QUILTS AND APPROVED CELULOSE ONLY RE: ELECTRIC HEAT. ART WILL RESPOND TO COMMON ASSUMPTIONS.

    e. Landlord heating systems -- N.B.: Metric
    COMMITTEE LED BY DIANE DEVELOPED PROPOSAL, WHICH DIANE WILL CIRCULATE. OTHER MEMBERS: CRAIG, DAVID, DIANA, KARA, PETER, DEBI, ROBERT, AL, JEANNE
    IN THE MEANTIME, PAS WILL DEVELOP SF LANDLORD DATABASES WHERE TENANTS PAY FOR HEAT BY SETEMBER 30.-- ASSEMBLE DATA VIA

1/18/2011
AGENCIES?
AT NEXT MEETING, COMMITTEE WILL PRESENT MARKETING PLAN FOR NEXT WINTER.

f. MicroCHPs (Bruce, Art) -- NB: Metric
COMMON ASSUMPTIONS APPROVED.

g. Indirect water heaters, previously approved -- all aboard? YES NB: Metric
COMMON ASSUMPTIONS APPROVED, ONLY FOR OIL. ART WILL FOLLOW-UP RE: GAS. NOTE THAT NGRID GAS HAS APPROVED. THERE MAY BE AN ISSUE RE: ASSUMING END-OF-LIFE REPLACEMENT. NOTE THAT COULD ARGUE AVOIDED CHIMNEY LINER AS BENEFIT.

h. LEDs - Brad Steele of EFI advised us that LEDs were not as efficient or cost-effective as CFLs, though there may be some cost-effective specialty applications such as downlights. NB: Metric
AGREED - SPECIAL APPLICATIONS ARE DOWNLIGHTS AND TASK LIGHTING
COMMON ASSUMPTIONS APPROVED.

i. Outdoor re-sets -- rejected in 2009, any need to revisit? NO (NB: Metric)
COMMON ASSUMPTIONS DID NOT ACT -- SO RE-SUBMIT. ART WILL CONTACT.

j. Indoor re-sets (Art)—NO RELIABLE, ECONOMIC PRODUCTS.

k. Super-insulation -- NB: no metric -- further discussion of potential more economic and equitable measures, e.g., 2" instead of 4" (David), super-insulate roof being replaced anyway (Kara), new roofing materials (Debi)
ART WILL MODEL 2" V 4" AND r-60 V R-38
ROBERT WILL PROVIDE COSTS AND BENEFITS OF WHITE ROOFS
DEBI WILL RESEARCH COMMERCIAL ROOF COATINGS BENEFITS AND COSTS

l. Demand control -- NB: Metric. Grounded Power has made a proposal, which Art is analyzing. ART WILL PROVIDE ANALYSIS TO COMMON ASSUMPTIONS. JERRY WILL CIRCULATE GROUNDED POWER PROPOSAL [ATTACHED]. FURTHER DISCUSSION OF PILOT AT NEXT MEETING.

m. Glow in the dark panels (Find A Light) instead of night lights for TLC Kit. -- Will they stay on through the night?
DEBI DISTRIBUTED FOR TESTING; COST IS $1.30/3

n. Ductless Air Source Heat Pump Demonstration Project (DHCD proposing ARRA-NGrid project Project in an all-electric elderly development at Winthrop Housing Authority, with some

1/18/2011
real-time metering to measure efficiency vs temperature) – WATCH PROGRESS FOR COST-EFFECTIVENESS

- Paul Nahass and Steve (last name?), Austin Aerogels, presented Spaceloft, a new insulation product suitable for masonry sidewalls. STEVE AND PAUL SENDING PRESENTATION, HANDOUT, THIRD-PARTY REVIEW, OTHER MATERIAL. ART SENDING THAT MATERIAL AND HIS BCR ANALYSIS TO COMM ASSUMPTIONS. FURTHER DISCUSSION AT NEXT MEETING ABOUT WHICH LIMITED APPLICATIONS MAY BE SUITABLE FOR.

=================================================================
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From: Jerrold Oppenheim <jerroldopp@democracyandregulation.com>
To: tobin@bostonabcd.org; wells@bostonabcd.org; macellan@bostonabcd.org; craig@actioninc.org; ritac@actioninc.org; Ej@actioninc.org; DBuchler@nisource.com; kgray@nisource.com; msommer@berkshiregas.com; rgyurjan@berkshiregas.com; Briana Kane <bkane@capelightcompact.org>; Ken.Rauseo@state.ma.us; AMickee@GLCAC.Org; rbechtold@haconcapecod.org; NDAVISON@haconcapecod.org; bruceledgerwood@comcast.net; JerroldOpp@DemocracyAndRegulation.com; artwillcox@yahoo.com; PWingate@communityaction.us; jhowat@nccl.org; Diana.Duffy@us.ngrid.com; Lynn.Ross@us.ngrid.com; dave.legg@us.ngrid.com; michael.rossacci@us.ngrid.com; Beth.Lonergan@us.ngrid.com; gall.azulay@nstar.com; diane.lopes@nstar.com; pjackson@smoc.org; kimball@unitil.com; aginkt@nu.com; oswallr@nu.com; sasde@nu.com; walshj@nu.com; tackey.chan@state.ma.us; danielle.rathbun@state.ma.us; jeanne.cherry@sug.com; James.Carey@sug.com; trish.walker@sug.com;

1/18/2011
LOW INCOME BEST PRACTICES DRAFT AGENDA FOR July 7, 2010

Assignments in bold

UPDATES OF APRIL 6 DECISIONS IN BOLD CAPS

1. Notetaker, next meeting (September on Cape ?), amendments to agenda, corrections to notes of last meeting, corrections to e-list

NOTE RE TODAY'S SCHEDULE -- TWO PRESENTATIONS

~11.30 - Paul Nahass, Austin Aerogels (new insulation product suitable for masonry sidewalls) [Art]

~12.30 - Ed Connelly, New Ecology re WEGOWISE (used in MF program; proposed for use re: MF building inventory)

2. List of Working Groups (John L circulated res. 2/23) -- other WGs?

3. Procurement update (Craig)

EVERYONE HAS NOW OK'D/

4. Metrics updates
   a. 2010
   b. 2009 - DONE
5. Contractor training and recruitment (Craig)

6. Auditor training (Craig)

7. DHCD (Ken)

8. Repairs
   a. WMECO evaluation (Debi, John Walsh; Art)
      b. Review of menu of approved measures (local option; must make Wx or EE possible): roof, K&T and other electrical, heating-related including occasional distribution. moisture control, structural

9. Program issues
   a. MF - building inventory (metric), process flow at WMECo (defer to MF screening comm.?)
      b. 60-80% update
   c. Building Permits required

10. New measures - minimum Metric 2 met
    a. Hybrid electric water heaters (Art will circulate material from utilities group and update re: manufacturer response)
    b. SDHW - PAs agreed last two meetings on cost-effectiveness parameters; discussion of agreed cost-sharing with RET, assuming funding
c. Cellulose - safety of ammonium sulfate (Debi will ask Maine program for written DOE blessing, see 3/25 e-mail) (Paul Jackson will circulate data re: borate cheaper per R-value because it packs more densely) PREFERENCE IS TO BAN AMMONIUM SULFATE

d. Blown Fibreglass - ANY MATERIAL THAT MEETS SPECS (INCLUDING DENSITY) IS OK

e. Window quilts (Art will propose protocol)

COST-EFFECTIVE IF INSTALLED IN SELECTED PLACES. BEST OPPORTUNITIES ARE MF, SLIDERS, AND DRAFTY WINDOWS. MUST INCLUDE TRACKS AND EDUCATION/SCREENING.

COMMON ASSUMPTIONS, ASSUMING 5 YEAR LIFE, REJECTED QUILTS AND APPROVED CELLULOSE ONLY RE: ELECTRIC HEAT.

f. Landlord heating systems -- N.B.: Metric

Committee led by Diane will develop proposal for July meeting. Other members: Craig, David, Diana, Kara, Peter, Debi, Robert, Al, Jeanne

In the meantime, PAs will develop SF Landlord databases where tenants pay for heat -- assemble data via agencies?

Later, plan marketing for next winter

g. MicroCHPs (Bruce, Art) -- NB: Metric

AGREED.

Art will send report (with narrative) to JO.

Diane will identify Common Assumptions lead to JO.

JO will submit report to Common Assumptions lead as referral from BP, for analysis no later than 8 weeks/June 15, 2010.
COMMON ASSUMPTIONS APPROVED.

h. Indirect water heaters, previously approved -- all aboard? YES NB: Metric

Art will send report (with narrative) to JO.

Diane will identify Common Assumptions lead to JO.

JO will submit report to Common Assumptions lead as referral from BP, for analysis no later than 8 weeks/June 15, 2010.

COMMON ASSUMPTIONS APPROVED, ONLY FOR OIL.

i. Smart strips - EFI model includes overload protection against fire

  Agreed on cost-effectiveness two meetings ago where there are 3+ switchable units. Ready to approve? YES, PROVIDED OVERLOAD PROTECTION

j. LEDS - Brad Steele of EFI advised us that LEDs were not as efficient or cost-effective as CFLs, though there may be some cost-effective specialty applications such as downlights. NB: Metric

AGREED - SPECIAL APPLICATIONS ARE DOWNLIGHTS AND TASK LIGHTING

Art will gather data, evidence re: niche applications, and information about quality, then draft report to send to JO for Common Assumptions.

JO will submit to Common Assumptions as referral from BP, for analysis within 8 weeks.

After Common Assumptions reports and approves, special applications become standard measure.

COMMON ASSUMPTIONS APPROVED.

k. Outdoor re-sets -- rejected in 2009, any need to revisit? NO (NB: Metric)

Art will draft report to send to JO for Common Assumptions.
JO will submit to Common Assumptions as referral from BP, for analysis within 8 weeks/June 15, 2010.

After Common Assumptions reports and agrees, consideration is complete.

COMMON ASSUMPTIONS DID NOT ACT – SO RE-SUBMIT.

1. Indoor re-sets (Art)

m. Super-insulation -- NB: no metric -- further discussion of potential more economic and equitable measures, e.g., 2" instead of 4" (David), super-insulate roof being replaced anyway (Kara), new roofing materials (Debi)

Debi will research new roofing materials

n. Demand control -- NB: Metric. Grounded Power has made a proposal, which Art is analyzing. (Art)

o. Glow in the dark panels (Find A Light) instead of night lights for TLC Kit. -- Will they stay on through the night?

Debi will gather information re purchasing.

p. Electric heat alternatives - DHCD Ductless Air Source Heat Pump Demonstration Project (Debra Hall), see attachment

from Debra:

Ductless Air Source Heat Pump Demonstration Project in an all-electric elderly development at Winthrop Housing Authority, which is served by NGRID.

Background
DHCD and housing authorities have been challenged in finding ways to save energy in the substantial portfolio of electrically-heated public housing. This portfolio includes approximately 15,000 one-bedroom, elderly apartments statewide. Each apartment is usually less than 450 square feet. The average annual electrical consumption to heat the apartment is 8,500 kWh. At a state wide average cost of $0.18 per kWh, the annual cost to heat the apartments is $1,530 -- a $20 million operating expense statewide! Most of these apartments have electric baseboard resistance heat, but
some have original radiant wall or ceiling heat panels (that usually have been painted over many times) or electric radiators with bricks that retain heat. Weatherization of building envelopes can help make these units somewhat more efficient, as can setback thermostats, if they are easy for elders to use. However, we are also interested in exploring other all-electric technologies.

Current DHCD policy does not require housing authorities to provide cooling in apartments, but most housing authorities air condition community rooms to provide a cool refuge for elders during hot weather. Nonetheless, many tenants install inefficient window AC in their apartments, and the housing authority pays for the cooling on the common electric bill. Air Source Heat Pumps may be an option for providing heating and cooling at a lower total electricity cost than the authority currently pays year-round.

Winthrop Housing Authority Demonstration Project

Winthrop Housing Authority is very interested in hosting a demonstration project that would involve metering 4 buildings that include 32 housing units in their 176-unit Golden Drive Elderly development 667-2. Two of the buildings (16 units), would have ductless ASHP installed. The performance of the 2 buildings with electric resistance heat and window air conditioners and would be compared with the 2 buildings that have ASHP installed.

The buildings at 2, 4, 6, and 8 Golden Drive are identical in size, shape and geographical orientation. There are 8 apartments per building and a front and rear foyer. All apartments have one bedroom and are less than 450 square feet. The foyers are equivalent in square feet to an apartment. Buildings 2 and 4 Golden Drive are served by one three phase electrical service; Buildings 6 and 8 Golden Drive are served by one three phase electrical service. This would make it easy to study these buildings separate from the larger development.

DHCD is hiring Norian Siani Engineering, Inc. to assist with design.

We also have this project on the ARRA WAP public housing project list. We would like to propose participation from LEAN / NGRID as follows:

-- Air seal and weather strip 32 units to achieve building envelope performance improvement in both the electric resistance heat and ASHP units (approx $1000 per unit or $32,000) [Note: this would be through the MF program, if approved; ARRA funds would pay for the heat pumps]

-- Real time interval metering of the each of the four buildings which would allow much more detailed electric use information to this research effort. (approx $20,000?)

Air Source Heat Pumps Can Work in New England

Air Source Heat Pumps (ASHP) are estimated to save 50% or more on heating kWh, and the utility companies have promoted them primarily as a source of cooling through their COOL SMART incentive program for homeowners.

The Single Phase ASHP with inverter technology is currently rated to operate down to 17 F. Three Phase ASHP with both inverter and variable refrigeration flow technology operate as low as 0 F. The three phase ASHP also have the capability of heating and cooling at the same time. Air source heat pumps have been of interest to MA Dept. of Energy Resources (DOER) for some time now, as a potential alternative or supplement to electric resistance heat.

The Northwest Energy Efficiency Alliance launched the Northwest Ductless Heat Pump Project to demonstrate the use of single phase inverter driven ductless heat pumps to displace electric resistance heat in single family homes across the Northwest, Washington, Oregon, Idaho and Montana in 2009. www.nwductless.com The project currently has 4586 approved installations. Their consumer webpage www.GoingDuctless.com has a Frequently Asked Questions page that provides good background information on single phase ductless heat pumps. Due to the fact that single family homes are seldom served by three phase power, this project focuses on single phase equipment.

I have attached the detailed work order that DHCD Engineer John Donoghue prepared for this project.
### 2010 METRICS (pending at DPU)

#### 1. Hard to Reach Landlords {Electric & Gas} – Statewide

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Threshold</strong></td>
<td>Establish a subcommittee consisting of members of the Best Practices Working Group with representatives from all gas and electric program administrators to design and develop a (cost-effective) statewide landlord early retirement high efficiency heating incentive initiative. Incentive Plan should target single family (1-4 units) and should be completed by August 1(^{st}), 2010.</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>Each program administrator to develop a database consisting of landlords in their respective service territories of low-income tenants that pay their own heating bills by September 30(^{th}) 2010.</td>
</tr>
<tr>
<td><strong>Exemplary</strong></td>
<td>Working group to develop and initiate a statewide marketing plan prior to 2010 heating season. Each program administrator to use their individual database to target market and submit a final report of participation and any lessons learned to the Best Practices Working Group by January, 30(^{th}) 2011.</td>
</tr>
</tbody>
</table>

#### 2. New Measures

<table>
<thead>
<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Threshold</strong></td>
<td>In coordination with LEAN, implement best practices to achieve deeper energy savings. Best Practices meets monthly, with each PA participating, to discuss and pursue new technologies and deeper measure penetration, and to select new measures for review. PAs will provide written updates on meetings, technical analyses performed, and additional best practices implemented. Each PA will accept an</td>
</tr>
</tbody>
</table>
Each PA to submit documentation showing performance relative to these tasks.

**Design**

Study possible new program measures that are above and beyond the DOE measure list, specifically including, but not limited to: (1), micro-combined-heat-and-power (with emphasis on three-deckers, six-flats,and single family furnaces), (2) indirect water heating, (3) demand control measures (if feasible and available), (4) LED lighting, and (5) outdoor resets for new heating systems. Cost-effectiveness analysis will be conducted by the PA common assumptions group, or the equivalent, which shall include LEAN for this purpose, within eight weeks of referral by Best Practices, with first reports of analysis no later than June 15, 2010. Each PA to submit documentation showing performance relative to these tasks.

**Exemplary**

For each measure that passes the common assumptions group cost-effectiveness screening, implement field testing of new program measures in 2010. Document results and findings in a memo to EEAC consultants by April 1, 2011, including measurement of savings per home due to each measure. Where field testing indicates it is appropriate to do so, there will be re-screening by Common Assumptions and/or a second field test. Each PA will conduct field testing with respect to each such measure and provide a memo documenting results. PA field tests will include a sufficient number of installations for each measure, reasonable in proportion to the size of each utility budget, to yield reliable field test results, as set out in the table below, and will begin no later than two months after the relevant Common Assumptions report:

<table>
<thead>
<tr>
<th>Measures/PA</th>
<th>MicroCHP*</th>
<th>Indirect DHW</th>
<th>Demand Control**</th>
<th>LED Lighting</th>
<th>Outdoor Resets</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric</td>
<td>1</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
</tr>
<tr>
<td>NGRID Electric</td>
<td>1</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
</tr>
<tr>
<td>WMECO</td>
<td>-</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
</tr>
<tr>
<td>Unitil Electric</td>
<td>-</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
<td>Standard measure</td>
</tr>
<tr>
<td>NSTAR Gas</td>
<td>1</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>NGRID Gas</td>
<td>1</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>Bay State Gas</td>
<td>1</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>Berkshire Gas</td>
<td>-</td>
<td>Standard measure</td>
<td>-</td>
<td>-</td>
<td>Standard measure</td>
</tr>
<tr>
<td>New</td>
<td>-</td>
<td>Standard</td>
<td>-</td>
<td>-</td>
<td>Standard</td>
</tr>
<tr>
<td>England Gas</td>
<td>measure</td>
<td>measure</td>
<td>measure</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Uniutil Gas</td>
<td>-</td>
<td>Standard measure</td>
<td>-</td>
<td>Standard measure</td>
<td></td>
</tr>
</tbody>
</table>

Note: Where technically appropriate, indirect domestic water heating, LED lighting, and Outdoor resets will become standard measures if they pass cost-effectiveness screening. In the case of LED lighting, it is possible that only specialty lights or applications will pass screening.

* Each Micro CHP installation in a shared Gas and Electric PA territory counts as one (1) installation for each of the two PAs for the purposes of this metric.

** If this measure is feasible and available, Best Practices will develop a statistically reliable number of participants statewide, but no fewer than 500, to be allocated among the electric PAs in proportion to the number of low-income customers in each service territory.

Each PA to submit documentation showing performance relative to targets.

3. Multi-family Building Inventory

| Threshold | Develop and support a low-income non-profit multi-family building inventory in order to facilitate benchmarking for project identification of energy retrofit potential and screening of potential projects. It is anticipated that the three-year cost will be $360,000 and that it will provide building square footage and at least a year of energy consumption data with respect to buildings identified by LEAN that are majority-occupied by low-income tenants. This information is currently available only on a limited basis, with respect to public housing authority buildings, and virtually non-existent for other non-profit-owned buildings. This coordinated and comprehensive project will make it possible to better identify maximum achievable efficiency savings, as well as to refine rollout of the Low Income MultiFamily Retrofit program. It will also support development of an energy efficiency standard (e.g., BTUs of energy per square foot of heated space) for low-income multi-family buildings. LEAN estimates that there are approximately 8,300 buildings of low-income multi-family housing in the Commonwealth. Each utility will support the inventory on an allocated basis. |

This will be a three-year project, beginning approximately July 1,
2010, with milestones each year consisting of the addition of 250 buildings per month (allocated by utility) to the database. Allocations are established on a monthly basis (each year ending November 30) since it is not known precisely when the project will begin and will be allocated among utilities in proportion to their customer count of non-profit low-income multifamily buildings in the following format:

<table>
<thead>
<tr>
<th>PA</th>
<th>% Allocation</th>
<th># of Buildings/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NGRID Electric</td>
<td></td>
<td></td>
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<tr>
<td>WMÉCO</td>
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</tr>
<tr>
<td>Unitil Electric</td>
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</tr>
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<td>NSTAR Gas</td>
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</tr>
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</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Unitil Gas</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The current metric for this three-year project only covers 2010, but it is anticipated that there will be customized metrics consistent with the current metric with respect to this project for 2011 and 2012 based on the status of the project at the end of years 2010 and 2012, respectively.

In coordination with LEAN, each PA will develop the scope, design, and contracting for the low-income multi-family building inventory in its service territory and commit to its implementation. This will include consensus agreement on the allocation of non-profit low-income multifamily buildings among the utility service territories. It is anticipated that there will be one statewide procurement.

**Design**

In coordination with LEAN, each PA will implement the Inventory in its service territory, reaching the designated milestone number of buildings.

**Exemplary**

By January 1, 2011, in coordination with LEAN, each PA will submit a status report of the implementation of the Inventory, together with recommendations going forward. The status report will include a summary of what has been learned to-date relating to energy consumption in non-profit low-income multifamily buildings (e.g., average BTUs/square foot, reasonable target consumption, reasonable threshold consumption for treatment).
States Develop Task Force with HHS to Address Fraud Prevention in the Low Income Home Energy Assistance Program

State energy officials today announced the formation of a joint task force to address issues concerning waste, fraud and abuse in the Low Income Home Energy Assistance Program (LIHEAP). Established by National Energy Assistance Directors’ Association (NEADA) in conjunction with the US Department of Health and Human Services (HHS), the task force is a response to a recent report by the US General Accounting Office (GAO) revealing the risk of fraud and abuse in the program due to a lack of systematic checking of applications and payments to utility vendors.

“There is no question that all of the state LIHEAP directors strongly support
the accurate and appropriate awarding of grants funds,” says Jo-Ann Choate, chair of NEADA. “Any dollar wasted is a dollar that cannot be used to help a needy family have access to energy assistance.”

To that end, the states are requesting full access from GAO to the files in question in order to assess the accuracy of the review, develop appropriate measures to prevent waste, and eliminate weaknesses in the in-take system.

The task force will work with HHS to strengthen internal controls to ensure these funds are used properly.

While the purpose of the Task Force is to prevent waste, fraud and abuse in LIHEAP, it can only do so by addressing serious questions about the rate of error identified in the GAO report.

- Because the states have not had an opportunity to review the files GAO identified as suspicious, it is possible many of these cases are issues of paperwork, not fraud. For example, a recently widowed elderly woman who qualifies for LIHEAP might include her husband’s name on the application so that it is consistent with the billing information her utility company has. Though the paperwork is inaccurate and must be updated, she is still eligible.

- The GAO study reported that LIHEAP programs give low-income residents checks made out to "Your Heating Supplier." In fact, vendor payments are generally marked with specific instructions to the bank that they are only to be deposited by the supplier. Some states pay LIHEAP benefits through the gas, electric and heating companies. A qualifying client’s account is credited with the benefit they are eligible for. No payment is issued directly to the client. In rare instances - generally during a home-energy emergency - a two-party check may be issued to the vendor and the client jointly. However, in all cases, the payment is provided only for the purpose intended.

- In a letter to GAO commenting on their review of its program, the State of Ohio pointed out that draft report could be interpreted as finding widespread fraud in Ohio. However, the GAO identified only four questionable cases, with payments totaling $1,400.
• New York State also submitted a letter commenting on the GAO report that raised an important issue: federally mandated deadlines for the delivery of emergency assistance. As stated in the GAO report, federal LIHEAP funds are provided to assist households "in meeting their immediate home energy needs." States have to move fast to meet household energy crises—within 18 to 48 hours, according to federal statutory requirements. The timeframe can make immediate fraud detection difficult. The state recommended, "Additional fraud and abuse prevention measures must take into account the need for states to be responsive to the immediate needs of eligible applicants."

• Lastly, one of the key issues raised by the GAO report is the lack of Social Security numbers required on LIHEAP applications. Because of privacy concerns, until recently HHS would not allow states to require Social Security numbers on applications. HHS has since clarified that states can now do so. Officials believe this will be a significant help in identifying ineligible applicants. New York’s letter also recommended this measure.

For the states, the bottom line is that all funds should be spent accurately and in accordance with program regulations, according to Mark Wolfe, executive director of NEADA. "We will be working closely with the HHS to identify all potential strategies to support this outcome," Wolfe said.

The National Energy Assistance Directors’ Association (NEADA) represents the state LIHEAP directors. www.neada.org.
Margaret Song
Deb Sas
Diane Lopes
Riley Hastings
Chris White, National Fiber
Paul Jackson
Craig Brown
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Peter Wingate
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Mike Rossacci
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Ruth Bechtold
Nancy Davison
Jeanne Cherry
Derek Kimball
Debra Hall
Art Wilcox
Bruce Ledgerwood

Preliminaries – remove Beth Lonergan and Briana Kane; Add Riley Hastings
(christine.hastings@nstar.com)
— Meeting – January 10th, WMECO, Springfield

Chris White – National Fiber – Presentation in electronic form attached –
  — Wet applications can be an issue with hybrid
  — Cellulose with borate is better quality
  — All borate jobs would be about $30 more.

Ammonium Sulfate Insulation – Leads will ask their contractors what they currently use and ask them
to change to borate product for next meeting. Craig to speak with Ken.

Trainings – Jules Junker and Bruce Torrey – going pretty well.
  — BPI certification – Analyst training through DHCD at North Shore Community College.
  — BootCamp – Mattapan – still running folks through this – City of Boston owns it.
  — Some distributors of insulation products have been giving scholarships for BPI Analyst and
    Envelope
  — DHCD – Other half of ARRA funds went through.

Windows are coming in close to $390 – not pass NEAT with that cost – may need to be bid out in case-by-
case basis. Riley Hastings to review the screening for windows and installation for next meeting.
LEAN (Paul and Art) to spec a loose window for next meeting.

Repairs – are cost-effective – per WMECO
Program Issues
  - Cost of building permits – universal – Did anyone not pay?
  - SDHW – coordinate with CEC – may be cost-effective
  - MF – You don’t to hear about it.
  - Aerogel – tried a product (david and art) – .04 BCR with benefits BCR as .7 – might only work on gut rehab and new construction – wait for grant results

Hybrid electric water heaters – how to deal with noise, condensation, and temperature recovery – DOE Building America – NGRID, NSTAR, and CLC – EPRI is getting data from us. – Wait until data next year.

Window Quilt/Shades – DOE funds to pay for this – remove agenda item

Cellular shades – lifetime is the issue and hours of use. – remove agenda item

Indirect water heaters for gas – Riley to check for next meeting

Outdoor resets – Riley to check for next meeting.

Super insulation – roofing materials when replacement – remove this.

Brushless Fan Motors – for future years?

Grounded Power pilot? – Need to file for MTMs? Why not amortize over 5 years? Issue is behavior program usually has 1 year. – Art to send to Riley, Wendy Todd, Gail, and Jerry.

TLC Kits – Find a Lights - glow in the dark wall sockets – not good – remove this.

2” foam – Thermax – Class A fire rated – $3-4 per sq ft. (labor included) versus the R-7 number for perimeter $1.82 sq ft. – may help with homes that have moisture issues. – price needs clarification for fire code – Art to do this for next meeting.

Landlord – Tenant Heating Systems – If need report by January 30th, then needs to be installed by the end of the year. Each PA has different information from systems. Some presentations to landlord associations.

LED Downlights – more on list. Perhaps look at Cree CR6 (rather than LR6)

MicroCHP – at least one in Cambridge and maybe others – Bruce Ledgerwood to check on this.

2011 Metric – May include: Aerogel – HPWH – incremental roof – foundation foam – LED CR6 – roof materials – ductless mini-splits – brushless fan motors – Will some of this be in grants?

Building Inventory – All except for NGRID Electric
L1 Best Practices – October 13, 2010 – Draft Meeting Notes

Margaret Song
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Chris White, National Fiber
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LED Downlights – more on list. Perhaps look at Cree CR6 (rather than LR6) in 2011

MicroCHP – at least one in Cambridge and maybe others – Bruce Ledgerwood to check on this.
2011 Metrics approved
#1 - Hart-to-Reach Landlords (continue) – need to supplement databases, possible collaboration with RCS, marketing to tenants

#3 - Building Inventory (continue) – may need to adjust total for NGRID Electric
Lopes, Diane

From: Azulay, Gail
Sent: Tuesday, June 15, 2010 3:39 PM
To: 'Jerrold Oppenheim'; artwillcox@yahoo.com; pahorowitz@earthlink.net; 'SchlegelJ@aol.com'
Cc: 'Duffy, Diana'; 'kgray@nisource.com'; 'Rossacci, Michael F.;'; 'Briana Kane'; 'sasde@nu.com'; 'Kimball, Derek'; 'artwillcox@yahoo.com'; 'Crossman, Kimberly'; 'Jenn Kallay'; 'walshj@nu.com'; 'beaurce@nu.com'; 'glover@until.com'; 'sasde@nu.com'; Lopes, Diane; Olsson, Charles; Shea, Lisa; 'DBuchler@NiSource.com'; oswalrl@nu.com

Subject: Metric 2 - New Measures

In accordance with the Design portion of the New Measures Metric the attached memo documents the completed measure screening and the attachments describe the measures and assumptions used. Working in conjunction with LEAN and GDS the MA common Assumptions working group has met the June 15 deadline for a first report analysis.

If you have any questions, let us know.

Gail

Gail Azulay
Sr. Research Analyst
NSTAR Electric & Gas
Ph #781-441-8024
To: Jerry Oppenheim
   Art Wilcox

From: MA Common Assumptions Working Group
   GDS

Date: June 15, 2010

Subject: Low Income Metric 2 – New Measures

Each year, as part of the Massachusetts Utilities Energy Efficiency Plan we are assigned Metrics; either individual company or statewide which are tied to company goals and incentives. One of the Statewide Metrics the PA’s has is to achieve deeper energy savings. This memo is documentation to meet the first report of analysis by June 15, 2010 in the design portion of Metric 2.

**New Measures Metric**

| Design | Study possible new program measures that are above and beyond the DOE measure list, specifically including, but not limited to: (1) micro-combined heat and power (with emphasis on three-deckers, six-flats, and single family furnaces), (2) indirect water heating, (3) demand control measures (if feasible and available), (4) LED lighting, and (5) outdoor resets for new heating systems. Cost – effectiveness analysis will be conducted by the PA common assumptions group, or the equivalent, which shall include LEAN for this purpose, within eight weeks of referral by Best Practices, with first reports of analysis no later than June 15, 2010. Each PA to submit documentation showing performance related to these tasks. |

On May 24, 2010 the MA Common Assumptions Working Group participated on a call with LEAN and the Best Practices Working Group to discuss measure screening. On this call it was decided that we would not screen demand control measures and outdoor resets at the current time but may be asked to do so at a later date. In addition to the above list we were asked to screen Window Quilts. Subsequent e-mail correspondence and follow up calls were held with LEAN. The statewide working group in conjunction with LEAN analysed the measures to be screened and documented assumptions used in the attached reports. From these reports each of the PA’s screened the measures in the individual Benefit Cost Screening models for electric. In addition, National Grid and
Until performed screening in their gas models while GDS screened for the remainder of the Gas PA's.

All PA's are in agreement that the measures screened as follows:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Electric Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro CHP</td>
<td>Measure is cost effective based on current information and average pilot program savings.</td>
</tr>
<tr>
<td>Indirect Water Heating</td>
<td>The measure is cost effective when installing in conjunction with an oil boiler. This measure is not cost effective in the GDS screening model.</td>
</tr>
<tr>
<td>Window Quilts</td>
<td>NOT cost effective as benefits are not greater than costs. Window Cellular shades are cost effective when installed in an electrically heated home only.</td>
</tr>
<tr>
<td>LED lighting (down light)</td>
<td>The benefits are greater than the costs so this measure is cost effective. Electric Only.</td>
</tr>
</tbody>
</table>

As mentioned above, documentation associated with this screening is attached. If the PA's and Lean determine they would like to offer these measures a determination will need to be made where the savings should be claimed electric or gas.
Review of MCHP systems
Kimberly Crossman, National Grid
Gail Azuley, NSTAR

Introduction:

Micro combined heat and power (MCHP) systems are designed to replace an existing warm air furnace. The system uses natural gas to provide heat and electricity to a home.

The systems screened here are the Climate Energy Freewatt systems. Savings and cost information was provided by Art Wilcox based on his analysis of 25 homes that participated in the pilot.

Based on Art’s analysis of the pilot data the average savings per home is 3,854 kWh and 158 therms.1 These systems were looked at from a retrofit perspective rather than time of replacement.

Approval for Use:

The benefits of the installed measure are greater than the cost using the following assumptions:

- Benefits are assigned dollar value based on current avoided costs.2
- Measure lifetime is 15 years.
- Cost of the MCHP system (furnace and MCHP unit) is no more than $12,000 (total cost including installation, extended warranty and lifetime maintenance is $14,113)
- An annual avoided discount on reduced sales (Low Income NEB) of $0.24/therm3 and 2.728 cents/kWh were used when screening.
- A one time property value benefit is used based on the theory that energy efficiency investments improve the property value of low-income participants homes.4

Unit Costs:

The average full cost of installing a system was $14,113:
- $5,000 for the furnace
- $7,000 for the generator
- $1,600 for modifications to accommodate installations
- $270 for the extended warranty
- $243 for the lifetime maintenance cost for generator

Conclusions and Recommendations:

Measure is cost effective based on current information and average pilot program savings and costs.

---

1 Spreadsheet provide by Art Wilcox called Mchp_CE_5_26_10F3.xls
3 When a participant’s usage is reduced, the discount provided to the participant is also reduced. The benefit to the utility is the value of the participant’s kWh or therms savings multiplied by the per kWh or per therm discount. The difference between the R3 and R4 rate is $0.24/therm and the difference between the R2 and R1 rate is 2.728cents/kWh based on National Grid rates.
4 Value is calculated as annual savings per unit times avg. cost per kWh or therm times $20.70 increase in property value per $ of annual savings. The $20.70 property value increase per $ of annual energy savings is a report result supplied by J. Oppenheim. Avg cost of kWh is $0.1415/kWh and avg cost per therm is $1.27
Review of Indirect Water Heaters
Kimberly Crossman, National Grid
Gail Azuley, NSTAR

Introduction:
Indirect water heaters use a home’s heating system to heat water. They’re part of what’s called integrated or combination water and space heating systems.

Indirect water heaters offer a more efficient choice for most homes, even though they require a storage tank. An indirect water heater uses the main boiler to heat a fluid that’s circulated through a heat exchanger in the storage tank. The energy stored by the water tank allows the boiler to turn off and on less often, which saves energy. Therefore, an indirect water heater is used with a high-efficiency boiler and well-insulated tank can be the least expensive means of providing hot water.¹

Approval for Use:
The benefits of the installed measure are greater than the cost using the following assumptions for oil water heat:

- Benefits are assigned dollar value based on current avoided costs.²
- Measure lifetime is 20 years.³
- Annual energy savings of 5.44 MMBtu per year.⁴

The measure is not cost effective for gas water heating.

Unit Costs:
The installed cost of a unit is approximately $1,350.⁵

Conclusions and Recommendations:
Measure is cost effective when installing in conjunction with an oil boiler.

¹ http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13020
³ Natural Gas Energy Efficiency Potential in Massachusetts: April 22, 2009 GDS Associates
Review of Window Quilts and Cellular Shades
Kimberly Crossman, National Grid
Gail Azulay, NSTAR

Introduction:

Window Quilts® and Cellular Shades are insulating window shades. They block air infiltration and temperature penetration.

Approval for Use:

The Window Quilt is NOT approved for use as the benefits are not greater than the costs. The Window Cellular Shade is approved for use only in electrically heated homes.

Unit Costs:

The cost for the Window Quilt Panel Quilt is $14 per sq ft. We assume an average window is 15 sq ft so the cost is $210 per window.\(^1\)

The cost for the Window Cellular Shade is $121. [NEED SOURCE FROM ART]

Conclusions and Recommendations:

These measures are not cost effective.

- Based on the brochure from Window Quilts a single pane window has an R-value of 0.87 and a Window Quilt would increase the R-value to 5.88. A cellular shade would increase the R-value to 4.1 [NEED SOURCE FROM ART]. To calculate therm savings the following formula was used:
  - Area (sq ft) * (1/Initial R value - 1/Final R value) *12 *HDD/100,000 BTU/therm/AFUE
  - The quilt is assumed to be down 12 hours per day
  - AFUE is assumed to be 78%, federal standard for a furnace
  - HDD is assumed to be 6,000
  - A lifetime of 5 years was assumed
- Using the formula and assumptions above a quilt would save 13.5 therms and a cellular shade would save 12.5 therms. This is equivalent to 9.6 and 8.9 gallons of oil or 396 and 366 kWh, respectively.
- An annual avoided discount on reduced sales (Low Income NEB) of $0.24/therm\(^2\) was used when screening for gas heated homes.
- An annual avoided discount on reduced sales (Low Income NEB) of 2.728 cents/kWh\(^3\) was used when screening for electric heated homes.

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\(^1\) [https://www.windowquilt.com/wqstore/index.php?main_page=product_info&cPath=2&products_id=2]

\(^2\) When a participant's usage is reduced, the discount provided to the participant is also reduced. The benefit to the utility is the value of the participant's therms savings multiplied by the per therm discount. The difference between the R3 and R4 rate is $0.24/therm based on National Grid rates

\(^3\) When a participant's usage is reduced, the discount provided to the participant is also reduced. The benefit to the utility is the value of the participant's kWh savings multiplied by the per kWh discount. The difference between the R2 and R1 rate is 2.728cents/kWh based on National Grid rates.
Review of LED Down Light Fixtures
Gail Azulay, NSTAR
Kimberly Crossman, National Grid

Introduction:

The fixture is for one specific single bulb down/task lighting fixture. Product ranges from $35 - $120.

Approval for Use:
The LED down light fixture is approved for use as the benefits are greater than the costs.

Unit Costs:
The cost for the LED down light fixture is $40 material plus $120 labor.
[NEED LABOR SOURCE FROM ART]

Conclusions and Recommendations:
This measure is cost effective.

- Replacing a 75w fixture with a 6.0 LED down light (69w diff). To calculate savings the following formula was used:
  - The fixture is assumed to operate 4 hours per day; 365 days per year.
  - 69w/1000 *1,460 hours of use = 101 kWh savings.
  - A lifetime of 25 years was assumed

- Using the formula and assumptions above an LED down light would save 101 kWh and .069 kW.
- An annual non resource avoided discount on reduced sales (Low Income NEB) of $3.90 was used.
- A one time non resource avoided discount on reduced sales (Low Income NEB) of $4.00 was used.
Review of Boiler Reset Controls (Low Income Gas)
Riley Hastings, NSTAR
Gail Azulay, NSTAR
Wendy Todd, National Grid

Introduction:

This technology works by monitoring the outdoor temperature and adjusting the frequency with which the boiler responds to the demand. For example, on a relatively mild winter day, the thermostat won’t call for heat as often, so the boiler will not need to work as hard. The reset control adjusts the water supply temperature allowing it to drop to lower temperatures before firing.

Approval for Use:

Outdoor boiler reset controls are NOT approved for use as the costs of the installed gas measure are greater than the benefits using the following assumptions:

- Benefits are assigned dollar value based on current avoided costs.¹
- Measure lifetime is 5 years.²
- Annual MMBTus savings of 7.9.³

Unit Costs:

- The installed cost of a unit is approximately $600.⁴

Non-Energy Benefits:

- Annual Low Income Monetary Savings difference between R4 and R3 rates of $0.25/therm or $19.75/participant. When a participant’s usage is reduced, the discount provided to the participant is also reduced resulting in a benefit to the utility of the value of the participant’s annual therm savings.

Conclusions and Recommendations:

Boiler reset controls are not cost effective...

- The TRC benefit-cost ratio is 0.97 slightly below 1.
- Using a 5 year measure life instead of a 15-year measure life from the CEEE Report because of the remaining life of the boilers in the low income housing on which these controls are being installed.
- Using a $600 installed unit cost instead of $500 from the CEEE Report because there are often additional costs to install this measure on older heating systems in low income housing stock.

² Based on Art Wilcox’s discussions with the Best Practices committee a measure life of 5 years was determined to be more appropriate than the measure life of 15 years from the “CEE Emerging Technologies Report: Advanced Boiler Controls-2006” Report because of the remaining life of the boilers in the low income housing on which these controls are being installed.
⁴ Based on Art Wilcox’s discussions with the Best Practices committee an installed cost of $600 was determined to be more appropriate than the $500 cost from the “CEE Emerging Technologies Report: Advanced Boiler Controls-2006” Report because there are often additional costs to install this measure on older heating systems in low income housing stock.
This is to confirm LEAN's acknowledgement that metric achievements are accurately stated in the attached documents, with the exception that National Grid achieved exemplary in Metric Two.

Please let me know if there are any questions.

Please forward this to whomever needs it in your organization.

Thank you.
Low Income #3

Multi-family Building Inventory
<table>
<thead>
<tr>
<th>Metric Number</th>
<th>Metric Language</th>
<th>National Grid Electric Targets</th>
<th>National Grid Electric Final 2010 Production</th>
<th>National Grid Gas Final 2010 Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Income Multi-Family Building Inventory</td>
<td>Develop and support a low-income non-profit multi-family building inventory in order to facilitate benchmarking for project identification of energy retrofit potential and screening of potential projects. It is anticipated that the three-year effort will provide building square footage and at least a year of energy consumption data with respect to buildings identified by LEAN that are majority-occupied by low-income tenants. This information is currently available only on a limited basis, with respect to public housing authority buildings, and virtually non-existent for other non-profit-owned buildings. This coordinated and comprehensive project will make it possible to better identify maximum achievable efficiency savings, as well as to refine rollout of the Low Income Multi-Family Retrofit program. It will also support development of an energy efficiency standard (e.g., BTUs per square foot of heated space) for low-income multi-family buildings. LEAN estimates that there are approximately 8,300 buildings of low-income multi-family housing in the Commonwealth. Each utility will support the inventory on an allocated basis. This will be a three-year project, beginning approximately July 1, 2010, with milestone number of buildings.</td>
<td>Threshold</td>
<td>Threshold</td>
<td>Threshold</td>
</tr>
<tr>
<td>In coordination with LEAN, each PA will implement the inventory in its service territory, reaching the designated milestone number of buildings.</td>
<td>Design</td>
<td>Design</td>
<td>Design</td>
<td></td>
</tr>
<tr>
<td>By January 1, 2011, in coordination with LEAN, each PA will submit a status report of the implementation of the inventory, together with recommendations going forward. The status report will include a summary of what has been learned to-date relating to energy consumption in non-profit low-income multi-family buildings (e.g., average BTUs/square foot, reasonable target consumption, reasonable threshold consumption for treatment).</td>
<td>Exemplary</td>
<td>Exemplary</td>
<td>Exemplary</td>
<td>Exemplary</td>
</tr>
</tbody>
</table>
2010 Low Income Metric Three

NSTAR Electric & Gas, National Grid, Western Massachusetts Electric Company, Fitchburg Gas & Electric Company, Columbia Gas Company, Berkshire Gas Company and New England Gas Company are submitting this report to update the Low Income Energy Affordability Network (LEAN) on the status of the 2010 low income metric number three.

3. Multi-family Building Inventory

| Threshold     | Develop and support a low-income non-profit multi-family building inventory in order to facilitate benchmarking for project identification of energy retrofit potential and screening of potential projects. It is anticipated that the three-year effort will provide building square footage and at least a year of energy consumption data with respect to low-income buildings identified by LEAN. This information is now available only on a limited basis with respect to public housing authority buildings and barely at all for other non-profit-owned buildings. This will make it possible to pinpoint maximum achievable efficiency savings, as well as to refine rollout of the Low Income Multifamily Retrofit program. It will also support development of an energy efficiency standard (e.g., BTUs of energy per square foot of heated space) for low-income multi-family buildings. LEAN estimates that there are approximately 8300 buildings of low-income multi-family housing in the Commonwealth. Each utility will support the inventory on an allocated basis. This will be a three-year project, beginning approximately July 1, 2010, with milestones each year consisting of the addition of 350 buildings per month (allocated by utility) to the database. Allocations are established on a monthly basis (each year ending November 30) since it is not known precisely when the project will begin and will be allocated among utilities in proportion to their customer count of non-profit low-income multifamily buildings in the following format:

<table>
<thead>
<tr>
<th>PA</th>
<th>% Allocation</th>
<th># of Buildings/Mth</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSTAR Electric</td>
<td>17%</td>
<td>43</td>
</tr>
<tr>
<td>NGRID Electric</td>
<td>23%</td>
<td>59</td>
</tr>
<tr>
<td>WMECO</td>
<td>6%</td>
<td>15</td>
</tr>
<tr>
<td>Unitil Electric</td>
<td>1%</td>
<td>1</td>
</tr>
<tr>
<td>NSTAR Gas</td>
<td>9%</td>
<td>23</td>
</tr>
<tr>
<td>NGRID Gas</td>
<td>25%</td>
<td>63</td>
</tr>
<tr>
<td>Bay State Gas</td>
<td>13%</td>
<td>32</td>
</tr>
<tr>
<td>Berkshire Gas</td>
<td>2%</td>
<td>5</td>
</tr>
<tr>
<td>New England Gas</td>
<td>2%</td>
<td>4</td>
</tr>
<tr>
<td>Unitil Gas</td>
<td>1%</td>
<td>2</td>
</tr>
<tr>
<td>Design</td>
<td>In coordination with LEAN, each PA will implement the Inventory in its service territory, reaching the designated milestone number of buildings.</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Exemplary</td>
<td>By December 31, 2010, in coordination with LEAN, each PA will submit a status report of the implementation of the Inventory, together with recommendations going forward. The status report will include a summary of what has been learned to date about energy consumption in non-profit low-income multifamily buildings (e.g., average BTUs/square foot, reasonable target consumption, reasonable threshold consumption for treatment).</td>
<td></td>
</tr>
</tbody>
</table>

We believe that by completion and documentation of these tasks each utility has reached the level of the metric listed below.

NSTAR Electric & Gas – exemplary
National Grid – exemplary
Western Massachusetts Electric Company – exemplary
Unitil Service Company – did not participate in this metric
Berkshire Gas – did not participate in this metric
New England Gas – did not participate in this metric
Columbia Gas - Threshold

Respectfully submitted by:

Diane M. Lopes  
Residential Program Manager  
NSTAR Electric & Gas  

Diana Duffy  
Senior Program Manager  
National Grid  

Deborah E. Sas  
Senior Project Administrator  
Western Massachusetts Electric Company  

Derek T. Kimball  
Residential Programs Coordinator  
Unitil Service Corporation  

Kara A. Gray  
Program Manager  
Columbia Gas of Massachusetts  

Robert Gyurjan  
Lead Analyst – Energy Services  
The Berkshire Gas Company  

Jeanne B. Cherry  
Lead Energy Efficiency Programs Administrator  
New England Gas Company
Metric 3: Multi-Family Building Inventory

In coordination with LEAN, the PAs will develop and support a low-income non-profit multi-family building inventory in order to facilitate benchmarking for project identification of energy retrofit potential and screening of potential projects.

Metric Achievements

THRESHOLD
- Contracted with, through LEAN, New Ecology to develop this building inventory metric
- New Ecology selected by LEAN based on memo by Tohn Environmental Strategies
- Developed the scope, design and contracting for the inventory
- Approved the WEGOWise application used in the multi-family program
- Began project in September 2010

DESIGN
In coordination with LEAN, each PA implemented the Inventory in its service territory.

EXEMPLARY

Received status report (attached) of the implementation of the Inventory, together with recommendations going forward from New Ecology by due date of December 31, 2010.

<table>
<thead>
<tr>
<th>Number of Buildings per Month by PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Target</td>
</tr>
<tr>
<td>Berkshire Gas</td>
</tr>
<tr>
<td>Columbia Gas of Massachusetts</td>
</tr>
<tr>
<td>National Grid Electric</td>
</tr>
<tr>
<td>National Grid Gas</td>
</tr>
<tr>
<td>New England Gas</td>
</tr>
<tr>
<td>NSTAR Electric</td>
</tr>
<tr>
<td>NSTAR Gas</td>
</tr>
<tr>
<td>Unitil Electric</td>
</tr>
<tr>
<td>Unitil Gas</td>
</tr>
<tr>
<td>WMECo</td>
</tr>
<tr>
<td>Column 1</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Data 1</td>
</tr>
<tr>
<td>Data 5</td>
</tr>
</tbody>
</table>

Note: The table data is not clearly visible due to the image quality.
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<thead>
<tr>
<th>Section</th>
<th>Type</th>
<th>Start</th>
<th>End</th>
<th>Length (mi)</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Natural Gas</td>
<td>1400</td>
<td>1600</td>
<td>200</td>
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<td>3</td>
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<td>4</td>
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<tr>
<td>7</td>
<td>Natural Gas</td>
<td>3600</td>
<td>4000</td>
<td>400</td>
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</tr>
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</table>

(continued on next page)
<table>
<thead>
<tr>
<th>Street Name</th>
<th>City</th>
<th>Zip Code</th>
<th>National Grid</th>
<th>Longitude</th>
<th>Latitude</th>
<th>Epoch</th>
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<th>Notes</th>
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</thead>
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<tr>
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<td>Beverly</td>
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<td>10605</td>
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<td>N/A</td>
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<tr>
<td>8</td>
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<tr>
<td>11</td>
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<td>10605</td>
<td>10605</td>
<td>10605</td>
<td>9.37</td>
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<tr>
<td>12</td>
<td>Seabrook Rd</td>
<td>Beverly</td>
<td>100</td>
<td>10605</td>
<td>10605</td>
<td>10605</td>
<td>11.83</td>
<td>N/A</td>
</tr>
<tr>
<td>13</td>
<td>Seabrook Rd</td>
<td>Beverly</td>
<td>87</td>
<td>10605</td>
<td>10605</td>
<td>10605</td>
<td>9.37</td>
<td>N/A</td>
</tr>
<tr>
<td>14</td>
<td>Seabrook Rd</td>
<td>Beverly</td>
<td>100</td>
<td>10605</td>
<td>10605</td>
<td>10605</td>
<td>11.83</td>
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<tr>
<td>15</td>
<td>Seabrook Rd</td>
<td>Beverly</td>
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<td>10605</td>
<td>10605</td>
<td>10605</td>
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<tr>
<td>16</td>
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<tr>
<td>11</td>
<td></td>
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<td>Andover</td>
<td>18</td>
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<td>100 Morton St -2</td>
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<tr>
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<td>Ann I. Ward House</td>
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<td>Brockton</td>
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<td>Description</td>
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<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total sqft</td>
<td>Includes all conditioned and unconditioned common areas, tenant units and basement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditioned sqft</td>
<td>Includes all conditioned common areas, tenant units and basements only if basement is finished AND heated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common area sqft</td>
<td>Includes all conditioned and unconditioned common areas and basement and excludes only tenant unit square footage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Btu/Conditioned sqft</td>
<td>Total annual Btus divided by conditioned square footage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Therms</td>
<td>Total annual therms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Therms/sqft</td>
<td>Total annual therms divided by conditioned square footage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kwh/common area sqft</td>
<td>Total annual kwh divided by common area if building electric meter covers only common areas. Total annual kwh divided by common area if building electric meter covers only common areas. If a building's common area electric meters include significant outdoor lighting this number can be artificially high.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kwh/bldg sqft</td>
<td>Total annual kwh divided by total building square footage if electricity is master metered and covers whole building or if all tenant meters are being tracked as well as common areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lopes, Diane

From: Daniel Teague [dteague@wegowise.com]
Sent: Thursday, December 23, 2010 1:13 PM
To: Diana Duffy; Lopes, Diane; Jerrold Oppenheim; sasde@nu.com; kgray@nisource.com; wells@bostonabcd.org
Subject: 2010 Benchmarking Report

All,

Attached is the status report for the benchmarking work we did this fall. Let us know if you have any questions or edits.

Dan and Shiva
--
Daniel Teague
Business Development
WegoWise, Inc
www.wegowise.com
15 Court Square, Suite 420
Boston, MA 02108
617-367-WEGO (9346)
This report was prepared by Dan Teague and Shiva Prakash of WegoWise, Inc. It is based on analysis of the first phase of data collection for the LEAN multi-family benchmarking program through December 2010. The data, analysis and recommendations are subject to change as the implementation of this program progresses. This report should therefore be understood to be an analysis of a partial sample.

Please contact WegoWise with any questions or comments:

617-367-WEGO

dteague@wegowise.com or sprakash@wegowise.com
PROJECT DESCRIPTION

The goal of this project is to create a comprehensive inventory of low-income multi-family buildings in the state of Massachusetts with the ultimate objective of establishing energy benchmarks based on aggregated usage data of these buildings over three years. This project supports the development of an energy efficiency standard and in turn an understanding of the extent of achievable energy savings in low-income multi-family buildings.

One full year of usage data was gathered for each building as well as key building characteristics including whole building square footage and common area square footage. An individual metric for each building was calculated using these numbers and added to the database. This document serves as a status report summarizing the data gathered through December 2010 and outlines general recommendations based on the analysis of this data.

SUMMARY OF RELEVANT FINDINGS

Based on a quartile analysis of the data gathered from September 2010 through December 2010, the following energy benchmarks were calculated.

<table>
<thead>
<tr>
<th>Gas Usage (therms/conditioned ft²)</th>
<th>Energy Efficiency Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;.54</td>
<td>Energy Efficient</td>
</tr>
<tr>
<td>.54-.75</td>
<td>Better Than Average</td>
</tr>
<tr>
<td>.75-.94</td>
<td>Worse Than Average</td>
</tr>
<tr>
<td>&gt;.94</td>
<td>Poor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Whole Building Electricity Usage (kWh/1000ft²)</th>
<th>Energy Efficiency Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6.28</td>
<td>Energy Efficient</td>
</tr>
<tr>
<td>6.28-8.77</td>
<td>Better Than Average</td>
</tr>
<tr>
<td>8.77-14.66</td>
<td>Worse Than Average</td>
</tr>
<tr>
<td>&gt;14.66</td>
<td>Poor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Common Area Electricity Usage (kWh/Common Area ft²)</th>
<th>Energy Efficiency Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.99</td>
<td>Energy Efficient</td>
</tr>
<tr>
<td>1.99-3.83</td>
<td>Better Than Average</td>
</tr>
<tr>
<td>3.83-11.83</td>
<td>Worse Than Average</td>
</tr>
<tr>
<td>&gt;11.83</td>
<td>Poor</td>
</tr>
</tbody>
</table>

"Energy Efficient" is defined as buildings in the top quartile of performance; "Better Than Average" represents the second quartile, "Worse Than Average" the third, and "Poor" the fourth. These calculated benchmarks can be used to approximately assess a building’s performance relative to other buildings in Massachusetts based on where its energy use falls in this classification scheme. Buildings that fall into the "Worse Than Average" and "Poor" categories likely have high payback energy conservation opportunities.
CHALLENGES

- Limited venues for outreach and awareness of the Multi-family Building Inventory lead to a lack of clarity on the part of housing organizations about our goals and the benefits of their participation. Therefore we found we had to make many unsuccessful cold calls to non-profit housing organizations and public housing authorities.

- Housing organizations often lacked the staff time or technical capability to collect the required information for the inventory. In addition, the specific information required to set up online utility accounts isn’t readily available and proved to be particularly difficult for housing organizations to deliver.

RECOMMENDATIONS

- We received excellent support from the Department of Housing and Community Development, and found that their ability to directly interface with Housing Authorities greatly reinforced our efforts. We believe that the continued support from DHCD, the Low-income Energy Affordability Network will be crucial to the success of the inventory in the next year.

- Continue to develop persuasive marketing materials and strategies to improve program uptake.

- If feasible, more streamlined access to participants’ utility data would greatly improve the efficiency and success of developing the inventory as it would reduce the burden on housing organizations.
ANALYSIS BYUTILITY TYPE

GAS USAGE DATA AND ANALYSIS

<table>
<thead>
<tr>
<th>Aggregated Gas Benchmark 2010 Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Median</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
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<tr>
<td>Count</td>
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Aggregated Gas Benchmark 2010 Histogram

Aggregated Gas Benchmark 2010

Building Number (reference Appendix 1)
ELECTRICITY USAGE DATA AND ANALYSIS

Common Area Usage

<table>
<thead>
<tr>
<th>Aggregated Electric Common Area Benchmark 2010 Statistics</th>
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<tbody>
<tr>
<td>Mean</td>
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<tr>
<td>Median</td>
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<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Minimum</td>
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<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Count</td>
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Aggregated Electric Benchmark 2010 Common Area Histogram

Aggregated Electric Benchmark 2010 Common Area

Building Number (reference Appendix 1)

5
Whole Building Usage

Aggregated Electric Whole Building Benchmark 2010 Statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
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Aggregated Electric Benchmark 2010 Whole Building Histogram

Aggregated Electric Benchmark 2010 Whole Building
NATIONAL GRID GAS

NGRID Gas Benchmark 2010

<table>
<thead>
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<td>Standard Deviation</td>
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NGRID Gas Benchmark 2010 Histogram

NGRID Gas Benchmark 2010

[Graph showing distribution of therms per conditioned ft²]
NSTAR GAS

### NSTAR Gas Benchmark 2010

**Statistics**

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<td>Minimum</td>
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<td>Maximum</td>
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### NSTAR Gas Benchmark 2010 Histogram

![Histogram showing distribution of Therm/Conditioned ft²](image)

### NSTAR Gas Benchmark 2010

![Chart showing Therm/Conditioned ft² for various locations](image)
<table>
<thead>
<tr>
<th>Bay State Gas Benchmark 2010 Statistics</th>
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<tbody>
<tr>
<td>Mean</td>
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<td>Median</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Count</td>
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![Bay State Gas Benchmark 2010 Histogram](image)

![Bay State Gas Benchmark 2010](image)
NATIONAL GRID ELECTRIC

Common Area Usage

<table>
<thead>
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<th>NGRID Electric Common Area Benchmark 2010 Statistics</th>
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</thead>
<tbody>
<tr>
<td>Mean</td>
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<tr>
<td>Median</td>
</tr>
<tr>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Count</td>
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NGRID Electric Benchmark 2010
Common Area Histogram

NGRID Electric Benchmark 2010
Common Area
Whole Building Usage

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NGRID Electric Benchmark 2010
Whole Building Histogram

NGRID Electric Benchmark 2010
Whole Building
NSTAR ELECTRIC

Common Area Usage

<table>
<thead>
<tr>
<th>NSTAR Electric Common Area Benchmark 2010 Statistics</th>
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</thead>
<tbody>
<tr>
<td>Mean</td>
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<td>Median</td>
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<tr>
<td>Standard Deviation</td>
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<td>Minimum</td>
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<tr>
<td>Maximum</td>
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<tr>
<td>Count</td>
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NSTAR Electric Benchmark 2010

Common Area Histogram

NSTAR Electric Benchmark 2010

Common Area

12
**NSTAR Electric Whole Building Benchmark 2010 Statistics**

<table>
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**NSTAR Electric Benchmark 2010 Whole Building Histogram**

**NSTAR Electric Benchmark 2010 Whole Building**

---

13
WMECO

Common Area Usage

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<tr>
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<td>Median</td>
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<tr>
<td>Minimum</td>
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</tr>
<tr>
<td>Maximum</td>
<td>3.53</td>
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<tr>
<td>Count</td>
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</tbody>
</table>

WMECO Electric Benchmark 2010

Common Area Histogram

Number of Buildings

kWh/Common Area ft²

[Bar chart showing distribution of kWh usage]
Whole Building Usage

WMECO Electric Whole Building Benchmark 2010 Statistics

<table>
<thead>
<tr>
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<th>Value</th>
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<td>Minimum</td>
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<td>Maximum</td>
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<tr>
<td>Count</td>
<td>46</td>
</tr>
</tbody>
</table>
2010
Commercial and Industrial
Performance Metrics
C&I #1
Small Business Electric and Gas Integration
In 2010 completed DI projects will achieve a total of X THERM gas savings for each PA. For Electric PAs, X = THERM gas savings among projects within its electric territory, regardless of the gas PA territory they occur in. For Gas PAs, X = THERM gas savings in its gas territory. Gas measures were not included in the 2009 DI Program so baseline data is 0.

### 2010 DIRECT INSTALL PROGRAM RESULTS

<table>
<thead>
<tr>
<th>Metric Language</th>
<th>Provided by RISE-CLC</th>
<th>Provided by NSTAR-ELECTRIC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGRID ELECTRIC INDEMAND through 12-28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bay State Gas</td>
<td>34,506</td>
<td>-644</td>
<td>33,862</td>
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<tr>
<td>Berkshire Gas</td>
<td>5,840</td>
<td>5,840</td>
<td>2,278</td>
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<tr>
<td>NGRID GAS</td>
<td>58,881</td>
<td>58,881</td>
<td>14,833</td>
</tr>
<tr>
<td>New England Gas</td>
<td>10,451</td>
<td>10,451</td>
<td>2,601</td>
</tr>
<tr>
<td>NSTAR Gas and Electric</td>
<td>24,440</td>
<td>24,440</td>
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<tr>
<td>Unitil/FG&amp;E</td>
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<td>1,085</td>
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<tr>
<td>Grand Total</td>
<td>135,203</td>
<td>134,559</td>
<td>7,558</td>
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</table>

<table>
<thead>
<tr>
<th>Metric Language</th>
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<th>Design</th>
<th>Exemplary</th>
<th>Therm Savings</th>
<th>Results</th>
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<tr>
<td>Bay State Gas</td>
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<td>45,042</td>
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<td>Berkshire Gas</td>
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<td>Fitchburg G&amp;E - Gas</td>
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<td>New England Gas</td>
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<td>5,617</td>
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<tr>
<td>NGRID Gas</td>
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<td>119,861</td>
<td>131,847</td>
<td>136,518</td>
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<td>NSTAR Gas</td>
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<td>36,978</td>
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</table>

<table>
<thead>
<tr>
<th>Metric Language</th>
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<th>Design</th>
<th>Exemplary</th>
<th>Therm Savings</th>
<th>Results</th>
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</thead>
<tbody>
<tr>
<td>NGRID Electric</td>
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<td>NSTAR Electric</td>
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<td>Electric Company</td>
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<td>City</td>
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<tr>
<td>------------------</td>
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<td>BARNSTABLE</td>
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<td>NSTAR</td>
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<td>YARMOUTH</td>
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<tr>
<td>NSTAR</td>
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C&I #2
Targeted Customer Segments
### Metric Language

During 2010, develop projects not initiated prior to 1/1/2010 and obtain commitments to follow through with implementation from X data centers, high performance laboratories/clean rooms, or industrial facilities. To qualify, assessments and commitments must include both electric and gas non-prescriptive measures where applicable (e.g., customers with gas process usage). Measures for industrial facilities must be related to process. Data center and lab spaces can apply even if a subset of a larger building. Data center and lab measures must be related to those “processes” (i.e., related to HVAC or servers/lab equipment). A "commitment" is a completed custom application.

For each PA, "X" is defined as a percent increase (Threshold=20%, Design=30%, Exemplary=40%) in commitments from the commitments that originated from applicable projects in 2009. * indicates targets are scaled from other PA targets where baseline data is missing or inappropriate (e.g., NSTAR Gas is scaled as a share of load from Grid Gas because NSTAR did not serve industrial projects in 2009).

Note: It is the PA’s and EEAC’s intent to have 2011 performance metricdollars tied to the 2010 commitments becoming installed with savings in 2011.

* NSTAR Gas did not serve industrial gas customers in 2009 because they were not contributing to gas efficiency programs. Therefore, this baseline is not relevant.

### Report for C&I #2 Targeted Customer Segments

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<td>623881</td>
<td>Andover</td>
<td>EI-VSDO) installation of four variable speed drives to control the drive motor output speed</td>
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<td>580617</td>
<td>Andover</td>
<td>(D2-INRG) Screw compressors with VFD control. Evaporative-cooled condenser with VFD capacity control. Other 2010 Appl. #597243 (D2 CUSTA-INRG) uncommitted. #572452 (EI LIGHT-Code 41), #577831 - #577834 (EI CUSTA LIGHT), #577839 (EI LIGHT)</td>
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<td>594932</td>
<td>Andover</td>
<td>(D2-CCHL) 2 x 750 ton Centrifugal Chillers with VFDs Other 2010 Appl. #587393 (EI CUSTA LIGHT-Exterior), #599649 (EI VSD)</td>
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<td>568174</td>
<td>East Longmeadow</td>
<td>(D2-PROC) 4 - 280 ton and 2 - 350 ton Sumitomo machines</td>
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<td>568815</td>
<td>Franklin</td>
<td>(EI-REFG) Thermosyphon oil cooling on (4) 500HP RWBII 222 and (1) 600HP VFD RWBII 270 Compressors, head pressure minimum 114psig, 10DegreesF approach over wb</td>
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<td>(EI-CM) Decrease set points on process pumps (25 Psig)</td>
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<td>619830</td>
<td>Lawrence</td>
<td>(D2-INRG) Two-cell blast freezer, 12,000 lb/hr, +40°F vestibules R717 central two-stage refrigeration plant, remanufactured reciprocating compressors, rebuilt evaporative condenser, hot gas defrost</td>
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<td>577718</td>
<td>Princeton</td>
<td>(EI-PROC) Install 24 new HKD SV10 tower guns of varying heights, 10-foot Focus, 20-foot SV10, and 30-foot SV10.</td>
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<td>638524</td>
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<td>(EI-VSDO) 3 well-water pumps, 2 @ 125 hp, 1 @ 150 hp, with VSIs installed in a PID loop to control flow.</td>
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<td>(EI-AGRI) Warm milk is pre-cooled by cold well water in a heat exchanger before entering the refrigeration system.</td>
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<td>(EI-AGRI) Vacuum sensing input to vfd to control motor speed and generate required vacuum for washing, milking and standby.</td>
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<td>(EI-AGRI) Milk is pre-cooled by well water in a plate and frame heat exchanger before entering the refrigeration system.</td>
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<td>(D2-AGRI) Vacuum is regulated by vfd on vacuum pump motor with input from various vacuum sensors.</td>
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<td>581968</td>
<td>Sturbridge</td>
<td>(D2-PROC) Upgrade to hybrid electric IMM Arbarg model 570 E</td>
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<td>594939</td>
<td>Plainville</td>
<td>(D2-HVAC) BPE XE-MIR 2000 Air to Air Polymer fixed plate heat &amp; humidity transfer heat exchanger 120 volt single phase. 495 input watts @1868 cfm</td>
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<td>(EI-HVAC) Install intelligent floor panels to eliminate sev condition. VFDs and economizer with ductwork in electric room. (ECM3 Ltg #560972)</td>
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<td>(EI-HVAC) Eliminate short cycling of cold air (modify racks) and install intelligent floor panels</td>
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<td>(EI-VSDO) Install VFDs on 6 molding machines and 1 air compressor.</td>
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<td>(EI-VSDO) add VFDs to each Other 2010 Appl #649135 (D2 CUSTA-AGRI), #566514 (EI CUSTA-HVAC), #568256 (EI CUSTA-VFD)</td>
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<td>(D2-INRG) Oversized Condenser</td>
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<td>(EI-LGHT) Upgrade to volumetric lighting with dimming and occ controlled lighting</td>
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<td>(EI-LGHT) Qty 55 : 130 Watt LED's w' Occ sensors in minus 20 F freezer warehouse</td>
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<td>Haverhill</td>
<td>(D2-PROC) Piping changes and new controls and sequences.</td>
<td>03/10/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>581085</td>
<td>Leominster</td>
<td>(EI-VSDO) Retrofit ICSC controller, Integrate with machine controls to alter hydraulic pump speed to meet hydraulic requirements.</td>
<td>03/23/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>606033</td>
<td>Leominster</td>
<td>(EI-VSDO) Install VSD on 60 hp hydraulic pump motor.</td>
<td>06/02/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>606038</td>
<td>Leominster</td>
<td>(EI-VSDO) Install VSD to control hydraulic pump.</td>
<td>06/02/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>602429</td>
<td>Lowell</td>
<td>(EI-PROC) Dry Claw Vacuum Pumps</td>
<td>05/25/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>592691</td>
<td>Lynn</td>
<td>(EI-REFG) variable speed chilled glycol pumping 30psig suction pressure for all compressors new 25-hp compressor for OJ room</td>
<td>04/28/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>608067</td>
<td>Melrose</td>
<td>(EI-AGRI) Install hydraulic variable frequency servo controllers</td>
<td>06/07/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>580959</td>
<td>West Brookfield</td>
<td>(EI-ECMR) 5 EC motors on 2 evaporators in apple cooler.</td>
<td>03/23/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>608059</td>
<td>Medford</td>
<td>(EI-AGRI) VFD controllers added to the 4 motors</td>
<td>06/07/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>GRID</td>
</tr>
<tr>
<td>600216</td>
<td>Marlborough</td>
<td>(EI-HVAC) Five UH stand alone units same data center.</td>
<td>05/23/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>NSTAR</td>
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<tr>
<td>605949</td>
<td>Marlborough</td>
<td>(EI-HVAC) Install new US humidifiers</td>
<td>06/02/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>NSTAR</td>
</tr>
<tr>
<td>619440</td>
<td>Quincy</td>
<td>(D2-PROC) Fybroc Pumps with impellers sized for desired flow, throttling assumed to not be required, 1200 RPM premium efficient ODP motors</td>
<td>06/25/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>NSTAR</td>
</tr>
<tr>
<td>620250</td>
<td>Quincy</td>
<td>(EI-REFG) Install Astro Rink Low E Ceiling Mtg by Energie Innovations Inc</td>
<td>07/06/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>NSTAR</td>
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<tr>
<td>572658</td>
<td>Westborough</td>
<td>(EI-HVAC) ECMs 1A Filter Mod, 2A &amp; B Pressure Drop Mods, 3A Damper Controls, 4 AHU &amp; MAU Optimization and 6 CHW &amp; HW Pump Diff Pressure Control</td>
<td>02/22/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>NSTAR</td>
</tr>
<tr>
<td>590709</td>
<td>Westborough</td>
<td>(EI-REFG) Install two (2) Fastrax FR Series High-Performance Rolling Doors</td>
<td>04/13/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>NSTAR</td>
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<tr>
<td>568893</td>
<td>Worcester</td>
<td>(D2-OTH) Install new 650 ton high efficiency York chiller with VFD and float condenser water temperature</td>
<td>02/04/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>NSTAR</td>
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<tr>
<td>593295</td>
<td>Worcester</td>
<td>(EI-PROC) optimize process to only use 2 robots</td>
<td>05/04/2010</td>
<td>2010</td>
<td>NATIONAL</td>
<td>NSTAR</td>
</tr>
<tr>
<td>Appln # or Ref #</td>
<td>City</td>
<td>Basic Project or EEM Description</td>
<td>Signed Commitment Date</td>
<td>Expected Completion Year</td>
<td>Electric PA</td>
<td>Gas PA</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>------------------------</td>
<td>--------------------------</td>
<td>-------------</td>
<td>--------</td>
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<tr>
<td>573471</td>
<td>Grafton</td>
<td>(EI-UHUM) Upgrade to UH</td>
<td>02/23/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>NSTAR</td>
</tr>
<tr>
<td>618666</td>
<td>Gardner</td>
<td>(EI-PROC) Rex TCS Premium Insulated Barrel Heaters</td>
<td>06/16/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>Unitil</td>
</tr>
<tr>
<td>621057</td>
<td>Gardner</td>
<td>(EI-VSDO) Install VSDs with DP control on 6 existing vacuum fan motors.</td>
<td>07/08/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>Unitil</td>
</tr>
<tr>
<td>646244</td>
<td>East Longmeadow</td>
<td>(D2-PROC) 1-220 ton, 1-280 ton, 1-450 ton Sumitomo electric servo IMMs</td>
<td>09/08/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>CMA</td>
</tr>
<tr>
<td>648100</td>
<td>East Longmeadow</td>
<td>(EI-HVAC) Sychro belting</td>
<td>09/17/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>CMA</td>
</tr>
<tr>
<td>649135</td>
<td>Dudley</td>
<td>(D2-PROC) 2-300 ton electric servo IMMs</td>
<td>09/21/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>660085</td>
<td>Sutton</td>
<td>(EI-PROC) 240 Quartz heaters with 80 zones in thermoforming oven.</td>
<td>10/08/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>NSTAR</td>
</tr>
<tr>
<td>646890</td>
<td>Gardner</td>
<td>(D2-PROC) New 450 ton all-electric injection molding machine #9.</td>
<td>09/13/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>Unitil</td>
</tr>
<tr>
<td>692700</td>
<td>Chelmsford</td>
<td>(D2-CUST AGRI) Rotary claw vac pump w/T</td>
<td>11/08/2010</td>
<td>2011</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>698352</td>
<td>Marlborough</td>
<td>(D2-CUST HVAC) Install new 400 ton plate-and-frame heat exchanger and re-pipe existing heat ex.</td>
<td>11/17/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>NSTAR</td>
</tr>
<tr>
<td>698298</td>
<td>Medford</td>
<td>(D2-HVAC) 30 ton air cooled chiller for series of lab spaces; (D2-VFD) Roof exhaust fans (Laboratory) - No TA Studies (prescr)</td>
<td>11/16/2010</td>
<td>2010</td>
<td>NATIONAL GRID</td>
<td>NSTAR</td>
</tr>
</tbody>
</table>
During 2010, develop projects not initiated prior to 1/1/2010 and obtain commitments to follow through with implementation from X data centers, high performance laboratories/clean rooms, or industrial facilities. To qualify, assessments and commitments must include both electric and gas non-prescriptive measures where applicable (e.g., customers with gas process usage). Measures for industrial facilities must be related to process. Data center and lab spaces can apply even if a subset of a larger building. Data center and lab measures must be related to those "processes" (i.e., related to HVAC or server/lab equipment). A "commitment" is a completed custom application.

For each PA, "X" is defined as a percent increase (Threshold=20%, Design=30%, Exemplary=40%) in commitments from the commitments that originated from applicable projects in 2009. * indicates targets are scaled from other PA targets where baseline data is missing or inappropriate (e.g., NSTAR Gas is scaled as a share of load from Grid Gas because NSTAR did not serve industrial projects in 2009).

Note: It is the PA's and EEAC's intent to have 2011 performance metric dollars tied to the 2010 commitments becoming installed with savings in 2011.

* NSTAR Gas did not serve industrial gas customers in 2009 because they were not contributing to gas efficiency programs. Therefore, this baseline is not relevant.

### Report for C&I #2 Targeted Customer Segments

<table>
<thead>
<tr>
<th>Application #</th>
<th>City</th>
<th>Basic Project or EEM Description</th>
<th>Signed Commitment Date</th>
<th>Expected Completion Date</th>
<th>Electric PA</th>
<th>Gas PA</th>
</tr>
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<tbody>
<tr>
<td>694734</td>
<td>BILLERICA</td>
<td>VENTILATION HEAT RECOVERY</td>
<td>04/30/2010</td>
<td>04/30/2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>694744</td>
<td>CHARLESTON</td>
<td>BOILER COMBUSTION CONTROLS</td>
<td>04/30/2010</td>
<td>04/30/2010</td>
<td>NSTAR NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>694892</td>
<td>BEDFORD</td>
<td>HEATING PERFORMANCE OPTIMIZE</td>
<td>07/12/2010</td>
<td>07/28/2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>694703</td>
<td>SOUTHBRIDGE</td>
<td>BOILER COMBUSTION CONTROLS</td>
<td>07/28/2010</td>
<td>07/28/2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>694538</td>
<td>HAVERHILL</td>
<td>PROCESS PERFORMANCE OPTIMIZE</td>
<td>04/30/2010</td>
<td>04/30/2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>694695</td>
<td>CARVER</td>
<td>STEAM TRAP REPAIRS</td>
<td>04/30/2010</td>
<td>04/30/2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>643822</td>
<td>BILLERICA</td>
<td>HOOD CONTROLS</td>
<td>08/31/2010</td>
<td>08/31/2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>632107</td>
<td>AYER</td>
<td>BOILER COMBUSTION CONTROLS</td>
<td>06/30/2010</td>
<td>06/30/2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>643837</td>
<td>MIDDLETON</td>
<td>STEAM TRAP SURVEY</td>
<td>04/09/2010</td>
<td>08/31/2010</td>
<td>MUNI NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>692716</td>
<td>DORCHESTER</td>
<td>STEAM TRAP SURVEY</td>
<td>05/05/2010</td>
<td>06/09/2010</td>
<td>NSTAR NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>748100</td>
<td>CLINTON</td>
<td>PIPE INSULATION</td>
<td>04/22/2010</td>
<td>09/10/2010</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>692696</td>
<td>WALTHAM</td>
<td>VENTILATION HEAT RECOVERY</td>
<td>04/07/2010</td>
<td>05/28/2010</td>
<td>NSTAR NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>698767</td>
<td>CHATHAM</td>
<td>PROCESS OTHER</td>
<td>09/28/2010</td>
<td>01/27/2011</td>
<td>CLC NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>650091</td>
<td>CARVER</td>
<td>PROCESS HEAT RECOVERY</td>
<td>10/01/2010</td>
<td>01/21/2011</td>
<td>NSTAR NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>709411</td>
<td>ROCKLAND</td>
<td>PROCESS HEAT RECOVERY</td>
<td>12/10/2010</td>
<td>07/30/2011</td>
<td>NATIONAL GRID</td>
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<tr>
<td>783639</td>
<td>BOSTON</td>
<td>LAB VENTILATION CONTROLS</td>
<td>12/10/2010</td>
<td>03/04/2011</td>
<td>NSTAR NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>783601</td>
<td>AYER</td>
<td>BOILER COMBUSTION CONTROLS</td>
<td>10/24/2010</td>
<td>03/04/2011</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>654779</td>
<td>MIDDLETON</td>
<td>HEAT RECOVERY FROM THERMAL C</td>
<td>12/06/2010</td>
<td>08/01/2011</td>
<td>MUNI NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>73170</td>
<td>BOSTON</td>
<td>EMB INSTALL Lab Ventilation</td>
<td>12/14/2010</td>
<td>02/11/2011</td>
<td>NSTAR NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>803875</td>
<td>WALTHAM</td>
<td>STEAM TRAP SURVEY</td>
<td>03/11/2010</td>
<td>03/11/2010</td>
<td>NSTAR NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
</tbody>
</table>

20
C&I #3
Combined Heat & Power (CHP)

***National Grid did not attain Threshold Level for Gas C&I Metric #3
### Metric Language

Each PA will complete X Combined Heat & Power commitments in 2010. A commitment is either a signed application or a signed Memorandum of Understanding between the PA and customer.

This metric applies to all gas and electric PAs except Berkshire Gas, FG&E Electric and FG&E Gas, however, it is not a requirement that gas PAs contribute any funds to TA studies or CHP rebates.

Note: it is the PA's and EEAC's intent to have 2011 performance metric dollars tied to the 2010 commitments becoming installed with savings in 2011, as appropriate based on expected completion dates of the commitments.

Targets are not additive. Electric and Gas PA targets reflect the same CHP units. Each CHP project is counted twice -- once by the electric PA and once by the gas PA. Note that baseline data also reflects this double counting.

Baseline data: in the past most electric PAs did not promote CHP, and NSTAR Gas did not provide services to industrial customers. Also, past gas CHP efforts relied on a cost-effectiveness screening method that no longer applies and had other less stringent requirements to qualify projects. Therefore, baseline data may not adequately reflect what can be achieved with the new CHP program design. * Electric PA 2009 baseline data reflects projects done by the applicable gas PA in the applicable electric PA’s service territory (e.g., NSTAR Electric baseline reflects projects done by NSTAR Gas in NSTAR Electric’s service territory).

### Final Report for MA C&I Metric #3 - NGRID 2010 CHP Projects

<table>
<thead>
<tr>
<th>Application #</th>
<th>City</th>
<th>Basic Project Description</th>
<th>Signed Commitment Date</th>
<th>No of App't Letter for CHP Goal</th>
<th>Elec PA</th>
<th>Gas PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>664567</td>
<td>Beverly</td>
<td>75 kW Gas-fired engine driven CHP</td>
<td>11/29/2010</td>
<td>1</td>
<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
</tr>
<tr>
<td>568009</td>
<td>Marlborough</td>
<td>555 kW Gas-fired engine driven CHP with Absorber</td>
<td>03/19/2010</td>
<td>1</td>
<td>NATIONAL GRID</td>
<td>NSTAR</td>
</tr>
<tr>
<td>592227</td>
<td>Oxford</td>
<td>250 kW Gas Fired engine CHP</td>
<td>05/07/2010</td>
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<td>NATIONAL GRID</td>
<td>NATIONAL GRID</td>
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<tr>
<td>617129</td>
<td>Marlborough</td>
<td>2 (75 kW Gas-fired engines)</td>
<td>07/22/2010</td>
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<td>NATIONAL GRID</td>
<td>NSTAR</td>
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<tr>
<td>622837</td>
<td>Worcester</td>
<td>60 kW Gas-fired Engine CHP</td>
<td>10/06/2010</td>
<td>1</td>
<td>NATIONAL GRID</td>
<td>NSTAR</td>
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<tr>
<td>831019</td>
<td>Brockton</td>
<td>60 kW Gas Fired Engine CHP</td>
<td>11/19/2010</td>
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<td>CMA</td>
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<tr>
<td>592314</td>
<td>Worcester</td>
<td>(4) 75 kW units Gas fired engine CHP</td>
<td>09/06/2010</td>
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<td>NSTAR</td>
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<td>569650</td>
<td>Worcester</td>
<td>75 kW Gas Fired engine CHP</td>
<td>08/31/2010</td>
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<td>NSTAR</td>
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<td>569848</td>
<td>Worcester</td>
<td>75 kW Gas Fired engine CHP</td>
<td>08/31/2010</td>
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<td>569849</td>
<td>Worcester</td>
<td>75 kW Gas Fired engine CHP</td>
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<td>646603</td>
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<td>NSTAR</td>
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<tr>
<td>710024</td>
<td>Northampton</td>
<td>275 kW (HPT) Back Pressure Turbine</td>
<td>12/19/2010</td>
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<td>CMA</td>
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</table>

**Threshold:** 8  
**Design:** 10  
**Exemplary:** 15
C&I #4
Retrofit Depth of Savings
### Metric Number

<table>
<thead>
<tr>
<th>Metric Language</th>
<th>National Grid Gas Targets</th>
<th>National Grid Gas Final 2010 Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin implementation of efforts at capturing whole-building*, deep savings of both electric and gas. Perform assessments and obtain X customer commitments to follow-through with savings of at least Y% building energy savings (gas or electric). To be eligible, buildings must have fossil fuel (e.g. natural gas, oil) and electric measures and a minimum of 5% of savings from fossil fuel and electric. (*Defined as the whole space under management and control of the customer, which can include tenant space in a larger building.) In order to reach exemplary, you must achieve design. A &quot;commitment&quot; is a signed application or Memorandum of Understanding. Note: It is the PA’s and EEAC’s intent to have 2011 performance metric dollars tied to the 2010 commitments becoming installed with savings in 2011. Baseline data is provided in the 2009 columns. Targets based on proportional scaling of gas and electric PAs.</td>
<td>Threshold: X=15, Y=25% Design: X=18, Y=20% Exemplary: X=15, Y=25%</td>
<td>Threshold: X=15, Y=20%</td>
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</tbody>
</table>

### C&I #4 Retrofit Depth of Savings

<table>
<thead>
<tr>
<th>Project No.</th>
<th>City</th>
<th>Project Description</th>
<th>12-month kWh usage</th>
<th>2010 EE kWh</th>
<th>12-month therm usage</th>
<th>2010 EE therms</th>
<th>% of Account Usage kWh</th>
<th>% of Account Usage therms</th>
<th>Gas Threshold X=15, Y=20%</th>
<th>Gas Design X=18, Y=20%</th>
<th>Gas Exemplary X=15, Y=25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5168/13750</td>
<td>Brookline</td>
<td>EMS Install</td>
<td>5,000,000</td>
<td>300,000</td>
<td>167,029</td>
<td>63,047</td>
<td>6%</td>
<td>38%</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>50618/10930</td>
<td>Weston</td>
<td>EMS Install</td>
<td>1,404,854</td>
<td>281,405</td>
<td>191,948</td>
<td>39,277</td>
<td>25%</td>
<td>30%</td>
<td>1</td>
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<tr>
<td>50868/31810</td>
<td>Newton</td>
<td>Kitchen Hood Controls</td>
<td>1,002,400</td>
<td>145,083</td>
<td>53,000</td>
<td>10,581</td>
<td>14%</td>
<td>20%</td>
<td>1</td>
<td>1</td>
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<tr>
<td>49916/25900</td>
<td>Belmont</td>
<td>EMS Install</td>
<td>207,850</td>
<td>21,428</td>
<td>5,646</td>
<td>3,252</td>
<td>6%</td>
<td>56%</td>
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<td>51328/14361</td>
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<td>Lab Ventilation Controls - Simches</td>
<td>20,266,723</td>
<td>2,630,883</td>
<td>777,720</td>
<td>240,000</td>
<td>13%</td>
<td>31%</td>
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<tr>
<td>49726/36460</td>
<td>Lexington</td>
<td>EMS Install</td>
<td>161,248</td>
<td>42,916</td>
<td>36,685</td>
<td>5,309</td>
<td>27%</td>
<td>14%</td>
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<tr>
<td>44916/22420</td>
<td>Burlington</td>
<td>EMS Install</td>
<td>1,914,570</td>
<td>568,716</td>
<td>31,367</td>
<td>11,567</td>
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<td>37%</td>
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<tr>
<td>43622/15010</td>
<td>Revere</td>
<td>EMS, insulation</td>
<td>2,968,837</td>
<td>750,125</td>
<td>62,946</td>
<td>25,989</td>
<td>25%</td>
<td>41%</td>
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<tr>
<td>43622/11740</td>
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<td>EMS</td>
<td>1,059,000</td>
<td>262,589</td>
<td>61,201</td>
<td>15,986</td>
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<td>26%</td>
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<tr>
<td>43694/13870</td>
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<td>2,007,000</td>
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<td>7%</td>
<td>35%</td>
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<td>43638/19270</td>
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<td>178,720</td>
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<td>35,713</td>
<td>19,384</td>
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<tr>
<td>43670/16322</td>
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<td>EMS</td>
<td>1,812,000</td>
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<td>53,163</td>
<td>11,800</td>
<td>5%</td>
<td>22%</td>
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<td>DCV/ RCX</td>
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<td>42638/23320</td>
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<td>EMS</td>
<td>350,000</td>
<td>100,000</td>
<td>54,932</td>
<td>12,630</td>
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<td>23%</td>
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<td>45546/12762</td>
<td>Billerica</td>
<td>HVAC controls</td>
<td>385,850</td>
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<td>25%</td>
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### Metric Language

Begin implementation of efforts at capturing whole-building*, deep savings of both electric and gas. Perform assessments and obtain customer commitments to follow-through with savings of at least 1% building energy savings (gas or electric). To be eligible, buildings must have fiscal fuel (e.g., natural gas, oil) and electric measures and a minimum of 5% of savings from fiscal fuel and electric. *(Defined as the whole space under management and control of the customer, which can include tenant space in a larger building.)* In order to reach exemplary, you must achieve design.

A “commitment” is a signed application or Memorandum of Understanding.

**Note:** It is the PA’s and EEAC’s intent to have 2011 performance metric dollars tied to the 2010 commitments becoming installed with savings in 2011.

Baseline data is provided in the 2009 column. Targets are based on proportional scaling of gas and electric PAs.

### Metric Number

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<th>National Grid Electric Targets</th>
<th>National Grid Electric Final 2010 Production</th>
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<td>Electric Targets</td>
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<td>National Grid Electric Final</td>
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### Project No. Language

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<th>12-month kWh usage 2010</th>
<th>2010 EE kWh</th>
<th>12-month therms usage 2010</th>
<th>2010 EE therms</th>
<th>% of Account Usage kWh</th>
<th>% of Account Usage therms</th>
<th>Electric PA</th>
<th>Natural Gas PA</th>
<th>Electric Threshold x 10, %0</th>
<th>Electric Design x 10, %0</th>
<th>Electric Exemplary x 10, %0</th>
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<td>F117112</td>
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<td>Upgrade HVAC</td>
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<td>Retrocommissioning of gas domestic water heater, from WBA study.</td>
<td>1,147,800</td>
<td>303,932</td>
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<td>1,009</td>
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<td>17%</td>
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<td>Review</td>
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<td>2,966,537</td>
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<td>62,946</td>
<td>25,989</td>
<td>25%</td>
<td>41%</td>
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<td>EMS</td>
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<td>Review</td>
<td>Hydronic Boiler</td>
<td>2,007,030</td>
<td>143,130</td>
<td>12,734</td>
<td>4,900</td>
<td>7%</td>
<td>35%</td>
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<td>NATIONAL GRID</td>
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<tr>
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<td>Review</td>
<td>EMS, insulation, TRV, skumu trap</td>
<td>178,720</td>
<td>57,032</td>
<td>35,713</td>
<td>19,384</td>
<td>32%</td>
<td>54%</td>
<td>NATIONAL GRID</td>
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<tr>
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<td>EMS</td>
<td>1,612,020</td>
<td>75,098</td>
<td>53,163</td>
<td>11,800</td>
<td>5%</td>
<td>22%</td>
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<td>24,000</td>
<td>4,819.7</td>
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<td>2,461,070</td>
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<td>850086</td>
<td>Falmouth</td>
<td>1-250 ton hi eff air cooled chiller, VFDs for fans and pumps, premium motors, high eff dehum and hi eff lighting</td>
<td>2,781,503</td>
<td>1,066,641</td>
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<td>38%</td>
<td>17%</td>
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<td>Upgrade HVAC, EMS, and custom dry cooler</td>
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<td>&gt;5%</td>
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<td>Worcester</td>
<td>Upgrade lighting, HVAC controls to include pump, VFD, occupancy based space reset</td>
<td>2,299,375</td>
<td>466,946</td>
<td>36,837</td>
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<td>Lighting, Motors, HVAC, Custom</td>
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<tr>
<td>549021</td>
<td>Brockton</td>
<td>12 new wash baths with electric heat use approximately 5.6 kwh/cycle. Total heat rejection is 450 kwh and chiller is 24,700 BTU/cycle.</td>
<td>98,0320</td>
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<td>31%</td>
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<tr>
<td>Project No.</td>
<td>City</td>
<td>Project Description</td>
<td>12-month kWh usage</td>
<td>2010 EE kWh</td>
<td>12-month therm usage</td>
<td>2010 EE therms</td>
<td>% of Account Usage kWh</td>
<td>% of Account Usage therms</td>
<td>Electric PA</td>
<td>Natural Gas PA</td>
<td>Electric Threshold</td>
<td>Electric Design Exemplary</td>
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<tr>
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<td>VFDs, Aeration, Insulation, Eff.</td>
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<td>Columbia Gas</td>
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<td>Boilers, EMS, Lighting</td>
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C&I #5
Comprehensiveness and Depth of Savings
### GAS & #5: Gas Comprehensiveness and Depth of Savings

Each PA must achieve in a minimum of X% of new construction or substantial/major renovation projects at least an estimated Y% whole building savings (gas and electric) compared to code. Projects completed in 2010 or signed commitments in 2010 with projects under construction can count. Core Performance projects will qualify at the threshold level and can count at the Design Level if they do at least one Enhanced Strategy and Exemplary if they do at least two Enhanced Strategies. *(Defined as the whole space under management and control of the customer, which can include tenant space in a larger building.) In order to reach exemplary, you must achieve design.

If total number of new construction or substantial/major renovation projects for a specific PA is less than 4, the PA may meet the design or exemplary level with 1 project, or be exempt from this metric and allocate funds to other metrics proportionally.

Note: It is the PA’s and EEAC’s intent to have 2011 performance metric dollars tied to the 2010 commitments becoming installed with savings in 2011.

Baseline data is provided in the 2009 column.

<table>
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<th>Project #</th>
<th>City</th>
<th>Project Description</th>
<th>Core Performance</th>
<th>No. of Enhanced Strategies / Y% Electric PA</th>
<th>Natural Gas PA</th>
<th>Gas PA Threshold X=18%, Y=20%</th>
<th>Gas PA Design X=20%, Y=20%</th>
<th>Gas PA Exemplary X=18%, Y=25%</th>
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<td></td>
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<td>594858</td>
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<td>619392</td>
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<tr>
<td>541152</td>
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<td>52% (20% elec)</td>
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<td>YES</td>
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<td>619778</td>
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<tr>
<td>Project #</td>
<td>City</td>
<td>Project Description</td>
<td>Core Performance</td>
<td>No. of Enhanced Strategies / Y%</td>
<td>Electric PA</td>
<td>Natural Gas PA</td>
<td>Elec PA Threshold</td>
<td>Elec PA Design</td>
<td>Elec PA Exemplary</td>
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<tr>
<td>51555</td>
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<td>X=18%, Y=20%</td>
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<td>523804</td>
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<td>X=20%, Y=20%</td>
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<td>604226</td>
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<td>581686</td>
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<tr>
<td>719761</td>
<td>Worcester</td>
<td>Cust-Leads</td>
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<td>NGRID</td>
<td>NSTAR</td>
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</tr>
</tbody>
</table>

| Count-Tally | 50 | 6 | 13 | 13 | 10 |

<table>
<thead>
<tr>
<th>Project Base</th>
<th>Whole Bldg Savings min. Y %</th>
<th>Eligible Projects (Numerator)</th>
<th>NGRID ELEC X %</th>
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<tbody>
<tr>
<td>Denominator</td>
<td>50</td>
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<tr>
<td>Threshold</td>
<td>20.0%</td>
<td>13</td>
<td>26.0%</td>
</tr>
<tr>
<td>Design</td>
<td>20.0%</td>
<td>13</td>
<td>26.0%</td>
</tr>
<tr>
<td>Exemplary</td>
<td>25.0%</td>
<td>10</td>
<td>20.0%</td>
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</table>

| D2/CDA Design | min Y=20% | 7 | for Exemplary | min Y=25% | 6 | AB for Design | AB + 1ES | 2 | for Exemplary | AB + 2ES | 4 |

263 of 271
Other Funding Performance Metrics
<table>
<thead>
<tr>
<th></th>
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<td>Other Funding</td>
<td>See 04/01/2010 PI filing for metric language.</td>
<td>None -did not meet.</td>
<td>See 04/01/2010 PI filing for metric language.</td>
<td>None -did not meet.</td>
<td>None -did not meet.</td>
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<td>Exemplary</td>
<td>See 04/01/2010 PI filing for metric language.</td>
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<tr>
<td>Other Financing Capital</td>
<td>See 04/01/2010 PI filing for metric language.</td>
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<td></td>
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</table>
Other program funding

***National Grid did not achieve Threshold level for this metric.
Other financing capital
**Other Financing Metric**

In 2010, National Grid was successful in providing financing opportunities to our customers through historically successful financing options, while also working diligently to identify and develop new financing opportunities. Information addressing how National Grid achieved success consistent with the Other Financing Metric is provided below:

1. **The clear and distinct role the PAs had in attaining the other financing capital, demonstrating the specific role the PAs played in attaining the financing, and in particular how the PAs used the bulk purchasing power of the energy efficiency programs and the negotiating clout of the Program Administrators to attain the financing capital.** Payday loans, consumer credit cards, and C&I project financing not involving a clear and distinct PA role as historically implemented (e.g., ESCO arranged financing) would not qualify for this metric.

In 2010 the Company employed the very successful Residential Heat Loan programs and company-funded SBS loans. For the residential HEAT Loan Program the Company has worked closely with the other PAs in the development and deployment of the program since its inception and initial roll out in 2006. The HEAT Loan Program has been and continues to be a collaborative effort of all of the electric PAs in Massachusetts working with the fulfillment administrator. The bulk purchasing power of the PAs is evident in the low interest rate of 5 percent that they were able to obtain in 2010 with the financing institutions that provide the HEAT Loans to our customers. For 2010, the Company continued to work closely with the fulfillment administrator, River Energy Associates, through the Residential Conservation Services (“RCS”) working group. Based on $9,911,956 of Residential HEAT loans issued in 2010 (which excludes any loans issued by Enerbank) and $2,843,490 in SBS funds, National Grid was able to achieve the exemplary level for this metric.

In addition, as noted in our 2009 Annual Report and 2011 Mid-Term Modification filings, National Grid also focused on identifying financing options that minimized the overall cost of financing to energy efficiency participants, including: (1) upfront/setup costs; (2) ongoing administrative costs; (3) opportunity costs of capital; and (4) cost of money, and mitigating risk to ratepayers. After several months in 2010 exploring these options, the Program Administrators announced new financing products to promote energy efficiency, in conjunction with the Massachusetts Bankers Association.

The agreed-upon proposal includes financial products for specific customer segments (owner-occupied residential, residential multi-family, landlords/investment property, small business and municipal) that have been developed based on the successful, and nationally recognized HEAT Loan program. The proposal offers rapid expansion of new financial products and streamlines the process for customers to access funds. Ultimately, the proposal will bring benefits not only to Massachusetts customers, but also, importantly, to the Massachusetts business community through participating MBA lenders.
For the first phase, residential loans would be available from a minimum of $500 for periods of up to 24 months (for all applicable customer segments) to a maximum of $15,000 for periods of up to 84 months. For the first time investment property would be included with loan sizes of $5,000 to $25,000. Also for small business customers, and in an expansion of the program, loans from $5000 to $100,000 would available. The financial products would be offered by member banks, with the PAs providing funds through their respective energy efficiency budgets to “buy-down” the applicable interest rate to zero percent. These loans have no up-front costs, no new administrative costs, and do not tie-up capital (opportunity cost). The loan terms and interest rates would differ depending on the customer segment being served. This approach minimizes the overall cost while being responsive to the unique needs of each segment.

2. The interest rates and financing costs the PAs were able to attain, compared to the range of interest rates and financing costs available in the market and those required in the metric language above.

The interest rates and financing costs of the HEAT Loan Program compare very favorably to options available to customers in other states, as noted below:

<table>
<thead>
<tr>
<th>State/Territory</th>
<th>Cost of Capital</th>
<th>Provider</th>
<th>Loan Loss Reserve Requirement</th>
<th>State/Utility Guarantee Requirement</th>
<th>Over-collateralization Requirement</th>
<th>Lending Pool Ceiling</th>
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<tr>
<td>Massachusetts</td>
<td>5.00% - 6.25%</td>
<td>Multiple Lenders</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Oregon</td>
<td>5.99% - 6.00%</td>
<td>Shorebank &amp; City of Portland Grant</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Connecticut (Pilot)</td>
<td>8.00% up to 7%</td>
<td>Deutsche Bank</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Michigan</td>
<td>5.00% - 7%</td>
<td>Multiple Lenders</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Pennsylvania</td>
<td>14.99%</td>
<td>AFC First</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Connecticut</td>
<td>14.99%</td>
<td>AFC First</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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</table>

3. How the other financing capital attained by the PAs, at the interest rates and financing costs attained by the PAs, was effective at increasing customer participation in the energy efficiency programs. Satisfactory documentation may include narrative descriptions of how the qualifying other capital was effective at increasing customer participation, including, but not limited to, descriptions of how the financing supported with the other financing capital (a) was effective in assisting customers to participate in the programs, (b) reduced a specific market barrier to program participation, or (c) was targeted to certain customer groups or market

---

1 Loan Loss Reserve is utilized to pay lenders for fund losses.
2 State/Utility Guarantee provides a full guarantee against defaults paid by either the State or Utility.
3 Over-collateralization is utilized to create a second layer of loan loss reserve.
4 Lending Pool Ceiling is an artificial maximum loan issuance ceiling based on lender limitations and/or loan loss reserve fund constraints.
segments that were considered to have lower participation historically in order to increase their participation in the programs.

The PAs were successful in increasing financing capital through the HEAT Loan Program and the use of SBS funds in 2010 over 2009. In addition, participation in energy efficiency programs increased as well. Although the correlation between increased financing and participation is more qualitative than quantitative, the PAs regard outside capital as an important tool in reducing or removing financial barriers that may prevent or delay customers’ investments in energy efficiency measures. Such financing mechanisms can help potentially address barriers associated with the substantial (in some cases) up-front costs of installing energy efficiency measures and the difficulties customers may encounter in securing financing independently. Customers—from residential to large C&I—may refrain from installing cost-effective energy efficiency measures due to concerns regarding initial capital, budgeting constraints or other financial impediments. In confronting these barriers, outside capital can: (1) assist customers in identifying a financing source by engaging lenders already versed in the elements and benefits of the programs; (2) facilitate and expedite the lending process; and (3) potentially better align customers’ cash flow and the benefits they derive from the investment in Energy Efficiency.
<table>
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<tr>
<th>Month</th>
<th># of Loans</th>
<th>Closed Loan Amount</th>
<th>Interest Buydown Amount</th>
<th>Avg Loan Amount</th>
<th>Avg Interest Buydown</th>
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<td>Jan</td>
<td>145</td>
<td>$1,181,437.68</td>
<td>$173,554.89</td>
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<td>Feb</td>
<td>73</td>
<td>$569,019.40</td>
<td>$84,032.80</td>
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<td>March</td>
<td>71</td>
<td>$553,211.63</td>
<td>$88,804.84</td>
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<tr>
<td>Enerbank</td>
<td>172</td>
<td>$1,226,570.43</td>
<td>$462,952.05</td>
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<td><strong>Total 1st Qtr</strong></td>
<td><strong>461</strong></td>
<td><strong>$3,530,239.14</strong></td>
<td><strong>$809,344.56</strong></td>
<td><strong>$7,657.79</strong></td>
<td><strong>$1,755.63</strong></td>
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<td>April</td>
<td>68</td>
<td>$478,042.13</td>
<td>$71,167.74</td>
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<td>May</td>
<td>69</td>
<td>$576,765.69</td>
<td>$90,541.29</td>
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<td>June</td>
<td>85</td>
<td>$706,408.29</td>
<td>$107,661.21</td>
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<td>$631,107.15</td>
<td>$238,490.45</td>
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<td><strong>Total 2nd Qtr</strong></td>
<td><strong>315</strong></td>
<td><strong>$2,392,323.26</strong></td>
<td><strong>$507,860.69</strong></td>
<td><strong>$7,594.68</strong></td>
<td><strong>$1,612.26</strong></td>
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<tr>
<td><strong>Total after 2 quarters</strong></td>
<td><strong>776</strong></td>
<td><strong>$5,922,562.40</strong></td>
<td><strong>$1,317,205.27</strong></td>
<td><strong>$7,632.17</strong></td>
<td><strong>$1,697.43</strong></td>
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<td>$545,369.31</td>
<td>$81,045.87</td>
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<td>Aug.</td>
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<td>$593,307.48</td>
<td>$90,839.97</td>
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<td>Sept.</td>
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<td>$711,713.74</td>
<td>$105,440.00</td>
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<td>$649,616.82</td>
<td>$238,490.45</td>
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<td><strong>Total 3rd Qtr</strong></td>
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<td><strong>$2,500,067.35</strong></td>
<td><strong>$515,816.29</strong></td>
<td><strong>$8,038.61</strong></td>
<td><strong>$1,658.57</strong></td>
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<td>Oct.</td>
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<td>$755,000.11</td>
<td>$107,028.73</td>
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<td>Nov.</td>
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<td>$1,066,152.49</td>
<td>$164,162.49</td>
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<td>$318,511.32</td>
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<td>$462,952.05</td>
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<td><strong>Total 4th Qtr</strong></td>
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<td><strong>$1,052,654.59</strong></td>
<td><strong>$7,929.76</strong></td>
<td><strong>$1,602.21</strong></td>
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<tr>
<td><strong>Yearly Total</strong></td>
<td><strong>1744</strong></td>
<td><strong>$13,632,418.98</strong></td>
<td><strong>$2,885,676.15</strong></td>
<td><strong>$31,220.83</strong></td>
<td><strong>$1,654.63</strong></td>
</tr>
<tr>
<td><strong>Yearly Total Without Enerbank</strong></td>
<td><strong>1218</strong></td>
<td><strong>$9,911,956.98</strong></td>
<td><strong>$1,482,791.15</strong></td>
<td><strong>$8,137.90</strong></td>
<td><strong>$1,217.40</strong></td>
</tr>
</tbody>
</table>

Percent of interest buydown to total: 14.96%