

Table of Contents

<i>I. Introduction</i>	4
A. Purpose of Energy Efficiency Annual Report	5
B. Organization of Annual Report	5
C. Summary of Program Portfolio	7
<i>II. Program Performance</i>	10
A. Residential Sector Programs	10
1. Summary	10
2. Residential Programs	17
3. Residential Pilot Programs	36
B. Low-Income Sector Programs	39
1. Summary	39
2. Low-Income Programs	43
C. Commercial & Industrial Sector Programs	53
1. Summary	53
2. C&I Programs.....	58
<i>III. Evaluation Measurement and Verification Activities</i>	69
A. Summary	69
B. Residential Studies	72
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).....	72
2. Massachusetts New Homes with ENERGY STAR Mystery Shopping (Study 2).....	72
3. The Massachusetts New Homes with ENERGY STAR Program 2011 Baseline Phase 1: Completion of Planning (Study 3).....	74
4. Massachusetts 2010 Residential Retrofit and Low-Income Evaluation - Brushless Fan Motors (Study 4)	75
5. Massachusetts 2010 Residential Retrofit and Low Income Evaluation: Mass Save (Study 5).....	76
6. 2010 Net to Gross Findings: Home Energy Assessment (Study 6)	79
7. Non-Electric Impact (NEI) Findings for the 2010 Mass Save Home Energy Services (Mass Save) program (Study 7)	81
8. Massachusetts ENERGY STAR Lighting Program: 2010 Annual Report (Study 8)	82
9. Massachusetts Appliance Turn-in Program Impact Evaluation Final (Study 9).....	83
10. Cross-Cutting Net-to-Gross Methodology Study for Residential Programs – Suggested Approaches (Final) (Study 10).....	87
11. Estimated Net-To-Gross (NTG) Factors for the Massachusetts Program Administrators (PAs) 2010 Residential New Construction Programs, Residential HEHE and Multi-Family Gas Programs, and C&I Gas Programs (Study 11)	88

12.	Massachusetts 2010 Residential Retrofit and Low Income Evaluation – Deep Energy Retrofit (Study 13)	90
13.	Massachusetts New Homes with ENERGY STAR Process Evaluation of the Four to Eight Story Multi-Family New Construction Pilot Interim Findings (Study 14)	91
14.	The Massachusetts New Homes with ENERGY STAR Program Major Renovations Pilot Evaluation: Preliminary Report on Non-Participant Interviews (Study 15)	92
15.	The Massachusetts New Homes with ENERGY STAR Program Version 3 Pilot Evaluation (Study 16)	93
C.	Low-Income Studies	95
1.	Final Report for Low Income Program – Massachusetts 2010 Residential Retrofit and Low Income Evaluation (Study 18)	95
D.	C&I Studies	98
1.	Non-Controls Lighting Evaluation for the Massachusetts Small Commercial Direct Install Program (Study 19)	98
2.	Massachusetts Non-Residential Small Business Direct Install Program: Multi-Tier Structure Assessment 2010 Process Evaluation (Study 20)	99
3.	Final Report HBL Market Effects Study Project 1A New Construction Market Characterization (Study 21)	100
4.	FINAL Commercial New Construction Customer Quantitative Profile Project 1A New Construction Market Characterization (Study 22)	104
5.	Supply Chain Profile Project 1A New Construction Market Characterization (Study 23)	105
6.	Final Report Project 1B Chain & Franchise Market Characterization (Study 24)	107
7.	Impact Evaluation of 2009 Custom HVAC Installations (Study 25)	108
8.	Final Report Project 1C Combined Heat &Power Market Characterization (Study 26)	109
9.	Project 6B Comprehensive Design Approach Process Evaluation (Study 27)	112
10.	Impact Evaluation of 2008 and 2009 Custom CDA Installations (Study 28)	118
11.	Project 7 General Process Evaluation Final Report (Study 29)	119
12.	2010 Commercial and Industrial Electric Programs Free-ridership and Spillover Study (Study 30)	121
13.	C&I Lighting Measure Life and Persistence Project (Study 31)	122
14.	C&I Lighting Loadshape (Study 32)	123
15.	C&I Unitary HVAC Loadshape Project Final Report (Study 33)	124
16.	Cross Cutting C&I Free-Ridership and Spillover Methodology Study Final Report (Study 34)	128
17.	Evaluation of WMECO’s 3 Large C&I Programs for 2007-08 Program Years	129
E.	Special and Cross Sector Studies	131
1.	Industry Practices and Policies on Energy Efficiency Program Rebate/Incentives (Study 36)	131
2.	Community Based Partnership Interim Process Evaluation (Study 37)	132
F.	Future Studies	135
IV.	Statutory Budget Requirements	137
A.	Introduction	137

B. Minimization of Administrative Costs	137
C. Competitive Procurement	139
D. Low-Income Spending	140
V. Performance Incentives	141
VI. Audits	142

VII. List of Appendices:

- A. Glossary of Defined Terms**
- B. Cost-Effectiveness Supporting Tables and Documentation**
- C. Program and Pilot Program EM&V Studies**
- D. Performance Incentives Supporting Documentation**
- E. Other Supporting Documentation**
- F. Lost Base Revenue Information**
- G. Directives from the Department's D.P.U. 10-84 Order**

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, the Western Massachusetts Electric Company (the “Company” or “WMECO”), 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 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 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, NO_x, 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 Association of Energy Professionals’ (“AESP”) Outstanding Achievement in Marketing and Communications Award based on work accomplished in 2010. Simultaneously, the Program Administrators have engaged in over 35 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 Energy Efficiency Annual Report

The Company is pleased to provide its Energy Efficiency Annual Report ("Annual Report") for 2010. 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 evaluation, measurement and verification 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 commercial and industrial (“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 energy efficiency audits conducted during the past five years.
- Section VII provides detailed supporting documentation.

C. Summary of Program Portfolio

The purpose of this section is to provide summary information on program performance at the portfolio and sector levels.

Tables¹ I.A and I.B provide summary information on program performance at the portfolio and customer sector levels, respectively.

Table I.A: Program Portfolio Summary							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	20,592,308			19,480,227		-5%
Performance Incentive	\$	1,345,833			1,451,136		8%
Savings & Benefits							
Energy							
Lifetime	MWh	545,732	549,806	1%	505,235	-8%	-7%
Annualized	MWh	44,813	46,047	3%	41,754	-9%	-7%
Demand							
Lifetime	kW	100,042	113,956	14%	120,068	5%	20%
Annualized							
Summer	kW	7,251	7,966	10%	7,984	0%	10%
Winter	kW	5,797	6,503	12%	5,545	-15%	-4%
NEB (Lifetime)	\$	24,812,932	23,181,776	-7%	26,359,472	14%	6%
Cost-Effectiveness							
TRC Benefits	\$	96,941,811			96,395,529		-1%
TRC Costs	\$	27,927,781			28,982,542		4%
Net Benefits	\$	69,014,030			67,412,987		-2%
BCR	n/a	3.47			3.33		-4%

Note: The Planned Values in Table I.A pertaining to performance incentives are as originally filed and approved in Western Massachusetts Electric Company, D.P.U. 09-118. See WMECO's updated and final D.P.U. 08-50 Tables, Exhibit WMECO-2, December 23, 2009 – Revision. All other Planned Values are as filed and approved in Western Massachusetts Electric Company, D.P.U. 10-84. See WMECO's D.P.U. 08-50 Tables, Exhibit RLO-1, July 23, 2010.

As shown in Table 1.A above, significant² variances exist at the portfolio level for:

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.

- Lifetime kW between planned and evaluated values

The Residential sector was the main contributor to the lifetime kW variance noted above, with a 75% lifetime kW increase between planned and evaluated values. The Low-Income sector had a 22% lifetime kW decrease, which counteracted the Residential increase. For a more detailed discussion of the cause of variances in each sector please reference section II.A.1 for Residential results; II.B.1 for Low-Income results; and II.C.1 for Commercial & Industrial results.

Table 1.B: Customer Sector Summary				
Sector	Units	Planned Value	Evaluated Results	
			Value	% Change from Planned
Residential				
TRC Benefits	\$	33,231,968	36,303,181	9%
TRC Costs	\$	8,641,188	9,298,996	8%
Net Benefits	\$	24,590,780	27,004,185	10%
BCR	n/a	3.85	3.90	2%
Low-Income				
TRC Benefits	\$	9,517,395	11,616,749	22%
TRC Costs	\$	2,653,531	2,547,810	-4%
Net Benefits	\$	6,863,865	9,068,939	32%
BCR	n/a	3.59	4.56	27%
C&I				
TRC Benefits	\$	54,192,448	48,475,599	-11%
TRC Costs	\$	16,633,063	17,135,735	3%
Net Benefits	\$	37,559,385	31,339,864	-17%
BCR	n/a	3.26	2.83	-13%
TOTAL				
TRC Benefits	\$	96,941,811	96,395,529	-1%
TRC Costs	\$	27,927,781	28,982,542	4%
Net Benefits	\$	69,014,030	67,412,987	-2%
BCR	n/a	3.47	3.33	-4%

As shown in Table 1.B above, significant variances exist at the sector level between planned and evaluated values for the following metrics: Low-Income TRC benefits, net benefits, and BCR.

- Within the Low Income sector, the Low-Income Residential New Construction, Low-Income 1 to 4 Family Retrofit, and Low-Income Multi-Family Retrofit programs are contributing to the variance between planned and evaluated values. Please reference section II.B.2 for a more detailed discussion of the cause of the variances by program within this sector.

WMECO-specific highlights for 2010, by sector, are briefly described below:

Residential and Low-Income – In 2010, the first year of WMECO’s Three-Year Energy Efficiency Plan, the Company, along with other PAs in the Commonwealth, built upon existing programs and significantly expanded initiatives to increase participation in all residential segments (both market rate and low income) and thus, achieved savings levels beyond all years passed. In fact, due to strong interest in the MassSAVE program, the Company filed a Mid-Year Modification in July of 2010 (D.P.U. 10-84), which presented a \$2 million dollar increase to the program. The budget increase was met, and savings far exceeded goal.

Existing programs that addressed potential energy and demand savings in both existing homes and new construction, which have a history of producing significant savings, were ramped up, and new initiatives were developed and implemented. The platform for increasing savings cost-effectively was based upon pursuing the following principles: (1) integrating gas and electric programs into a portfolio of fuel-neutral programs to the extent reasonable; (2) concentrating on seamless delivery from the customer’s perspective; (3) focusing on deeper penetration of energy efficiency with the introduction of innovative and targeted approaches and options; (4) developing an expanded, trained workforce capable of providing consistent program messaging and services, while maintaining high quality levels; (5) collaborating with community-based organizations that have long-standing relationships with homeowners, tenants and small businesses in economically marginalized communities, and developing community-based pilot initiatives that implemented a neighborhood approach to energy efficiency services.

C&I – Even with the unprecedented aggressive goals established for 2010, WMECO’s wide variety of well-established programs allowed its C&I customers to achieve permanent energy savings and the Company to reach many of the challenging goals set for its New Construction & Major Renovation, Large Retrofit and Small Retrofit programs. Part way through the implementation year, the Company identified that the participation in Small Retrofit program was closing in on goal, while both Large C&I programs were experiencing less participation than planned. In the Company’s 2010 Mid-Year Modification (D.P.U. 10-84), \$1.5 million dollars of incentives was shifted from the Large C&I programs to the Small C&I Retrofit program. In adjusting the goals as stated above, the Company was able to maximize participation in the Small C&I program, and nearly reach all savings goals set forth in the C&I sector portfolio.

Sharing some program design and administrative responsibilities with all PAs under the seamless statewide program initiative implemented in 2010 allowed WMECO staff to focus more on implementation issues and building the customer relationships necessary to meet increased program goals. Integration of gas and electric programs also played a key role in achieving 2010 goals.

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

Residential Pilots

- Deep Energy Retrofit

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.

Sections II.A.2 and II.A.3 provide detailed information on the performance of each residential program and pilot program, respectively.

Table II.A.1: Residential Sector Summary							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	6,988,573			6,836,145		-2%
Performance Incentive	\$	327,981			575,587		75%
Savings & Benefits							
Energy							
Lifetime	MWh	93,461	114,224	22%	112,084	-2%	20%
Annualized	MWh	10,373	13,158	27%	12,178	-7%	17%
Demand							
Lifetime	kW	30,374	42,786	41%	53,011	24%	75%
Annualized							
Summer	kW	1,952	2,614	34%	2,932	12%	50%
Winter	kW	1,972	2,702	37%	2,452	-9%	24%
NEB (Lifetime)	\$	19,570,767	14,483,984	-26%	17,812,952	23%	-9%
Cost-Effectiveness							
TRC Benefits	\$	33,231,968			36,303,181		9%
TRC Costs	\$	8,641,188			9,298,996		8%
Net Benefits	\$	24,590,780			27,004,185		10%
BCR	n/a	3.85			3.90		2%

As shown in Table II.A.1 above, significant³ variances exist at the Residential sector level for:

- Lifetime MWh, annual MWh, lifetime kW, summer & winter kW, and NEBs between planned and preliminary values, and
- Lifetime MWh, lifetime kW, summer and winter kW between planned and evaluated values, and
- Lifetime kW, and NEBs between preliminary and evaluated values.

Note: The Company allocated performance incentive dollars in the original 3-year plan to each sector based on its percentage of budget, then further to each program that yields benefits based on its percentage of the sector budget. In this report the Company has implemented a more current allocation method so that performance incentives are allocated to the programs most consistently with how the dollars are earned, based on their total and net benefits achievement. Therefore, nearly every sector and program performance incentive variance will appear significant – not necessarily because of an actual variance, but rather because of the differing allocation methods between the plan and the report.

In general, under the new allocation method, the performance incentive amount should trend based on a program’s benefit and net benefit achievement. Please note that this allocation method variation has no impact on the performance incentive calculation itself, as the incentive is calculated at the portfolio level. For more information on the performance incentive calculation, and allocation to programs, please reference Appendix D.

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

Each program contributed to the variances noted above as follows:

- Residential New Construction & Major Renovation: This program yielded significant variances in all savings & benefits categories in both preliminary and year-end results. Please reference section II.A.4 for a more detailed discussion of the cause of the variances in this program.
- Residential Cooling & Heating Equipment: This program yielded significant variances in all categories shown in the table above, due to high participation. Please reference section II.A.5 for a more detailed discussion of the cause of the variances in this program.
- Multi-Family Retrofit: This program yielded significant negative variances in every category in the table shown above due to the fact that it was a new program offering in 2010 and had no project completions. Please reference section II.A.6 for a more detailed discussion of the cause of the variances in this program.
- MassSAVE: This program yielded significant variances for lifetime MWh, lifetime, summer, and winter kW. Please reference section II.A.7 for a more detailed discussion of the cause of the variances in this program.
- ENERGY STAR Lighting: This program yielded significant variances in participants, annual MWh, summer & winter kW, NEBs, and TRC costs. Please reference section II.A.8 for a more detailed discussion of the cause of the variances in this program.
- ENERGY STAR Appliances: This program yielded significant variances in all categories shown in the table above, due to the participation trends resulting from the American Recovery and Reinvestment Act (“ARRA”) funded appliance rebate program. Please reference section II.A.9 for a more detailed discussion of the cause of the variances in this program.

Table II.A.2: Residential Sector Summary of End Uses				
End Uses	Units (lifetime)	Preliminary Year-End Results	Evaluated Results	% Change from Preliminary to Evaluated
Lighting				
Energy	MWh	11,187	10,028	-10%
Demand	kW	1,078	955	-11%
NEB	\$	692,064	617,800	-11%
HVAC				
Energy	MWh	1,244	1,496	20%
Demand	kW	1,450	1,890	30%
NEB	\$	13,326,642	16,824,326	26%
Process				
Energy	MWh	96	96	0%
Demand	kW	14	14	0%
NEB	\$	0	0	0%
Refrigeration				
Energy	MWh	628	554	-12%
Demand	kW	71	71	0%
NEB	\$	0	0	0%
Hot Water				
Energy	MWh	4	5	21%
Demand	kW	2	2	0%
NEB	\$	465,278	370,827	-20%
Total				
Energy	MWh	13,158	12,178	-7%
Demand	kW	2,614	2,932	12%
NEB	\$	14,483,984	17,812,952	23%

Table II.A.3: Residential Program Summary				
Sector	Units	Planned Value	Evaluated Results	
			Value	% Change from Planned
Residential New Construction & Major Renovation				
TRC Benefits	\$	800,512	659,117	-18%
TRC Costs	\$	372,818	297,731	-20%
Net Benefits	\$	427,694	361,387	-16%
BCR	n/a	2.15	2.21	3%
Residential Cooling & Heating Equipment				
TRC Benefits	\$	205,641	846,514	312%
TRC Costs	\$	162,951	341,964	110%
Net Benefits	\$	42,689	504,550	1082%
BCR	n/a	1.26	2.48	96%
Multi-Family Retrofit				
TRC Benefits	\$	837,652	0	-100%
TRC Costs	\$	364,488	45,427	-88%
Net Benefits	\$	473,164	0	-100%
BCR	n/a	2.30	0.00	-100%
MassSAVE				
TRC Benefits	\$	24,780,503	26,897,009	9%
TRC Costs	\$	5,323,193	5,582,586	5%
Net Benefits	\$	19,457,310	21,314,423	10%
BCR	n/a	4.66	4.82	3%
ENERGY STAR Lighting				
TRC Benefits	\$	6,093,699	7,197,507	18%
TRC Costs	\$	1,509,884	1,911,012	27%
Net Benefits	\$	4,583,815	5,286,495	15%
BCR	n/a	4.04	3.77	-7%
ENERGY STAR Appliances				
TRC Benefits	\$	513,961	703,034	37%
TRC Costs	\$	260,018	397,305	53%
Net Benefits	\$	253,943	305,729	20%
BCR	n/a	1.98	1.77	-10%
Deep Energy Retrofit				
TRC Benefits	\$	n/a	n/a	n/a
TRC Costs	\$	125,500	121,662	-3%
Net Benefits	\$	n/a	n/a	n/a
BCR	n/a	n/a	n/a	n/a
Hard-to-Measure Initiatives				
TRC Costs	\$	522,335	601,310	15%
TOTAL				
TRC Benefits	\$	33,231,968	36,303,181	9%
TRC Costs	\$	8,641,188	9,298,996	8%
Net Benefits	\$	24,590,780	27,004,185	10%
BCR	n/a	3.85	3.90	2%

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 challenging. 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 Company supported the development of these pilots, but did not participate due to the 1% cap on pilot spending. 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.
- Residential Cooling and Heating Equipment: Consumers showed a tremendous amount of interest in the Residential Cooling and Heating Equipment program in 2010. Participation and savings increased significantly over planned values as a result of the significant uptake of incentives for mini-split heat pumps, ECM motors for warm air furnaces, and higher efficiency central air conditioning systems.
- Multi-Family Retrofit – Implementation of the Multi-family Market Integrator (“MMI”) began in July 2010 and continued as a primary focus at all PA multi-family working group meetings to address start up tasks such as data tracking and reporting, and coordination with program vendors. 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 thru the MMI increased as customers utilized the new single telephone number. In the fourth quarter, the Company’s lead vendor initiated work with several Multi-Family complexes that carried over into the contracting phase in 2011.

- ENERGY STAR Lighting – The lighting program in 2010 started off slow (due to getting new program measures up and running) but then progressed at a good pace. The program focus shifted from bare spirals to specialty lighting and a new hard-to-reach lighting market. LED products also were introduced in 2010, but due to the time it takes for LED products to be ENERGY STAR tested and qualified there were only two qualified products available in 2010. Many qualified LEDs have since come on the market and many more LED offerings are available in 2011.
- ENERGY STAR Appliances – The Company’s Appliance/Products Program overall spending was twice the planned budget. As a result of the state implemented ARRA stimulus program the number of rebates for refrigerators was ten times greater than planned. This led to significant increase in energy and demand savings.
- MassSAVE – In 2010, the Company experienced a significant uptake in participation in the MassSAVE program. Given the increased consumer interest in the program, the Company to filed a Mid-Year Modification (D.P.U. 10-84), increasing the program budget by over \$2 million dollars. The Company, along with other Massachusetts Program Administrators and external stakeholders, rolled out the new Residential Conservation Services (“RCS”) market model. During 2010 the Company completed a successful pilot within the program to incorporate Home Performance Contractors. The new model also resulted in the implementation of a 3rd party QA/QC process. Finally, the HEAT Loan program expanded its offerings to include micro loans of \$500-\$2,000.
- Deep Energy Retrofit Pilot – The Company developed a detailed process for Deep Energy Retrofit (“DER”) applicants in 2010. The DER Pilot received more applicants that it planned to fund, however several of the applicants decided not to participate due to the cost and the complexity of DER of projects. The Company reviewed the remaining applications and selected four projects to be completed in 2010, based upon the projected energy savings.

A more detailed program-level discussion can be found in the following Section, II.A.2.

2. Residential Programs

a. Residential New Construction & Major Renovation

Purpose/Goal: The purpose of the Residential New Construction & Major Renovation 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.

Targeted Customers: The target market for this program included homebuilders, contractors, architects/designers, trade allies, Home Energy Rating System (“HERS”) raters, homebuyers, realtors, developers, low income and affordable housing developers, code officials, and consumers in the market for new homes and or major renovations.

Definition of Program Participant: A participant in the Residential New Construction & Major Renovation program can be defined as an individual housing unit.

Targeted End-Uses:

- Lighting
- Heating, Ventilation, and Air Conditioning
- Hot Water
- Envelope
- Refrigeration

Delivery Mechanism: The program was administered by each Program Administrator in its service territory and coordinated regionally through the Joint Management Committee (“JMC”). The JMC’s contractor was responsible for tracking and reporting program activity. The contractor also conducted quality assurance/quality control of field activities and advised 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.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program was discussed in detail in the Company’s 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 121-130 (bates numbering 00127-00136). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.A.4⁴ provides information on the performance of the Residential New Construction & Major Renovation program.

Table II.A.4: Residential New Construction & Major Renovation							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	277,500			265,067		-4%
Performance Incentive	\$	11,663			8,013		-31%
Participants	hhlds	43			41		-5%
Program Cost / Participant	\$	6,453			6,465		0%
Savings & Benefits							
Energy							
Lifetime	MWh	975	1,698	74%	1,728	2%	77%
Annualized	MWh	76	140	85%	143	2%	88%
Average Measure Life	yrs	12.8	12.1	-6%	12.1	0%	-6%
Demand							
Lifetime	kW	817	172	-79%	172	0%	-79%
Annualized							
Summer	kW	35	12	-67%	12	0%	-67%
Winter	kW	21	27	31%	28	1%	31%
Average Measure Life	yrs	23.2	0.4		0.4		
NEB (Lifetime)	\$	607,470	463,915	-24%	463,949	0%	-24%
Cost-Effectiveness							
TRC Benefits	\$	800,512			659,117		-18%
TRC Costs	\$	372,818			297,731		-20%
Net Benefits	\$	427,694			361,387		-16%
BCR	n/a	2.15			2.21		3%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows.

- **Savings & Benefits:** Energy savings increased significantly due to the quantity of energy efficient light bulbs installed per unit. The Company planned on completing 43 units with an average of 21 bulbs per home and realized an average of 42 bulbs per home. Demand savings varied from plan due to fewer central air conditioning unit installations than planned. Lifetime NEB values were less than planned due to the fuel mix of the completed projects. The Company planned for a higher amount of oil fueled homes, however very few oil heated homes were built, resulting in a decrease from planned NEBs.
- **Cost Effectiveness:** TRC costs were lower than planned as a high percentage of the units were gas heated. Prior to 2010, the Company was providing all of the incentives and recording all the costs for gas-heated units. In 2010 the gas companies provided the incentives and recorded the costs associated with the heating, cooling and DHW measures for these homes. The Company continued to provide incentives and claim savings for energy efficient lighting and refrigerators for all homes in the program regardless of the heating fuel.

⁴ For each program and pilot program, the Company has defined “participant”, and updated the "units" column in the program or pilot program table to be consistent with that definition.

The following studies were completed for the Residential New Construction & Major Renovation program:

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, Study 2.

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, Study 3.

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, Study 1.

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.

The Residential New Construction Program is cost effective with a BCR of 2.21.

b. Residential Cooling & Heating Equipment

Purpose/Goal: The purpose of the Residential Cooling & Heating Equipment program was to raise residential consumer awareness and market share of properly installed high-efficiency cooling equipment and systems.

Targeted Customers: The program targeted residential customers in the market to purchase new or replacement HVAC equipment including 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; and improvements in operational systems in existing homes (new equipment/old systems). The program also targeted HVAC contractors and technicians; suppliers, manufacturers, and distributors of HVAC equipment; new-home builders; and remodeling contractors.

Definition of Program Participant: A participant in the Residential Cooling & Heating Equipment program can be defined as an individual residential electric account number.

Targeted End-Uses:

- Heating, Ventilation, and Air Conditioning (HVAC)
- Motors & Drives

Delivery Mechanism: The program was administered by each Program Administrator in its service territory. Delivery was through a common vendor selected through a common statewide RFP. Whenever possible, there was coordination with the related gas Program Administrator's initiatives and energy-efficiency service providers. To this end, the COOL Smart and Gas Networks' High Efficiency Heating and Hot Water programs worked to procure a single, joint circuit rider to support both programs in the field. Program initiatives were also piggybacked onto the residential new construction and MassSAVE programs:

- Participating residential new construction program builders and their HVAC contractors are referred to the COOL SMART Program for training and Quality Installation Verification ("QIV"). Whenever appropriate, these training were jointly provided with GasNetworks.
- MassSAVE participants are referred to COOL SMART for HVAC measures using COOL SMART literature, which is part of the standard MassSAVE information package.

Quality control follow-up inspections were performed by independent inspectors on up to 10 percent of installations to verify equipment installation and performance.

The program continued to use equipment distributors to process rebates, sell high-efficiency and QIV-related technology, and to provide indoor training labs for HVAC contractors.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 135-145 (bates numbering 00141-00151). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.A.5 provides information on the performance of the Residential Cooling & Heating Equipment Program.

Table II.A.5: Residential Cooling & Heating Equipment							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	151,773			291,632		92%
Performance Incentive	\$	2,076			10,661		413%
Participants	hhlds	234			815		248%
Program Cost / Participant	\$	649			358		-45%
Savings & Benefits							
Energy							
Lifetime	MWh	1,234	6,176	401%	6,176	0%	401%
Annualized	MWh	71	343	384%	343	0%	384%
Average Measure Life	yrs	17.4	18.0	4%	18.0	0%	4%
Demand							
Lifetime	kW	656	1,803	175%	1,803	0%	175%
Annualized							
Summer	kW	39	101	158%	101	0%	158%
Winter	kW	15	33	123%	33	0%	123%
Average Measure Life	yrs	16.8	3.0		3.0		
NEB (Lifetime)	\$	1,608	952	-41%	952	0%	-41%
Cost-Effectiveness							
TRC Benefits	\$	205,641			846,514		312%
TRC Costs	\$	162,951			341,964		110%
Net Benefits	\$	42,689			504,550		1082%
BCR	n/a	1.26			2.48		96%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows.

- Expenses: Dramatically increased participation for high efficiency central air conditioning units, mini-split heat pumps and ECM motors for warm air furnaces led to the significant increases in total program costs and participation. Costs per participant were somewhat lower than planned due to the high percentage of ECM motors which have much lower TRC costs than either the central air conditioning system or mini split heat pumps.
- Savings & Benefits: Lifetime and Annual Energy Savings increase approximately four fold due to combination of increased participation and the high number of ECM motors installed which provide very high kWh savings per participant. Demand Savings increased significantly due to increased participation, but not at the same rate as energy savings as the ECM motors and Mini split heat pumps measures yield relatively lower demand savings and have lower peak coincidence factors than other measures in the program. Lifetime NEBs varied significantly from plan. In planning, non energy benefits were included for downsizing of 5 central air conditioning units with a \$300 NEB value each, and right-sizing 12 central air conditioning units with a \$30 NEB value each for a total nominal value of \$1810. In 2010 no downsizing measures were completed, while 37 right-sizing measures were completed for a nominal value of \$1110.
- Cost-Effectiveness: The significant variances seen throughout all of the cost effectiveness categories correlate to the increase in spending and savings explained above. The net benefits increased at a greater rate than the total TRC benefits due to the fact that the savings far exceeded the costs.

There were no studies completed for the Residential Cooling & Heating Equipment Program.

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

At this point in time no mid-term modification is planned for this program.

The Residential Cooling and Heating Program is cost effective with a BCR of 2.48.

c. Residential Multi-Family Retrofit

Purpose/Goal: The purpose of the Residential Multi-Family Retrofit program was to address the energy efficiency retrofit opportunities in facilities with five or more residential dwelling units in the non-low income sector.

Targeted Customers: Residential facilities with five or more dwelling units were targeted by this program.

Definition of Program Participant: A participant in the Residential Multi-Family Retrofit program can be defined as an individual housing unit.

Targeted End-Uses:

- Lighting
- Heating, Ventilation, and Air Conditioning
- Motors & Drives
- Refrigeration
- Hot Water
- Envelope
- End Use Behavior
- Compressed Air

Delivery Mechanism: 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.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 181-195 (bates numbering 00187-00201). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.A.6 provides information on the performance of the Residential Multi-Family Retrofit Program.

Table II.A.6: Multi-Family Retrofit							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	313,336			45,427		-86%
Performance Incentive	\$	12,555			0		-100%
Participants	units	352			0		-100%
Program Cost / Participant	\$	890			n/a		n/a
Savings & Benefits							
Energy							
Lifetime	MWh	8,539	0	-100%	0	0%	-100%
Annualized	MWh	566	0	-100%	0	0%	-100%
Average Measure Life	yrs	15.1	n/a	n/a	n/a	n/a	n/a
Demand							
Lifetime	kW	94	0	-100%	0	0%	-100%
Annualized							
Summer	kW	12	0	-100%	0	0%	-100%
Winter	kW	31	0	-100%	0	0%	-100%
Average Measure Life	yrs	7.9	n/a		n/a		
NEB (Lifetime)	\$	5,593	0	-100%	0	0%	-100%
Cost-Effectiveness							
TRC Benefits	\$	837,652			0		-100%
TRC Costs	\$	364,488			45,427		-88%
Net Benefits	\$	473,164			0		-100%
BCR	n/a	2.30			0.00		-100%

The Company had no Multi-family Retrofit project completions in 2010, due to the fact that it was a new program offering, and the program parameters had to be developed with the lead vendor. The program costs shown in the table above reflect the Company's efforts in developing the program, which included meeting regularly with the lead vendor to discuss multi-family opportunities in the region, develop program protocols, and begin meeting with building owners. In the fourth quarter, the Company's lead vendor initiated work with several multi-family complexes that carried over into the contracting phase in 2011.

There were no studies completed for the Multi-family Retrofit program.

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

At this point in time no mid-term modification is planned for this program.

The Multi-family Retrofit Program did not have any 2010 completions and therefore does not have a BCR.

d. Residential MassSAVE

Purpose/Goal: The purpose of the MassSAVE 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.

Targeted Customers: The customers targeted by the program 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 were committed to making their homes more energy efficient.

Definition of Program Participant: A participant in the MassSAVE program can be defined as a residential electric account number.

Targeted End-Uses:

- Lighting
- Heating, Ventilation, and Air Conditioning
- Refrigeration
- Hot Water
- Envelope

Delivery Mechanism: The program was administered by each Program Administrator in its service territory and coordinated statewide through the Residential Management Committee (“RMC”). The RMC actively managed and steered the statewide MassSAVE program. The program was delivered by lead 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 a site visit, conducted by the Program Administrator’s lead vendor, to identify and prioritize all cost effective energy efficiency upgrades in order to receive incentives or a program rebate. All insulation work, whether performed by an authorized independent contractor or a lead vendor’s subcontractor, was inspected for quality control by the Program Administrator’s lead vendor when the work was completed. This ensured that, either through an authorized installer or the Program Administrator’s lead vendor, installations met Building Performance Institute 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 zero percent interest loans up to \$15,000 with terms up to seven years.

The RMC members worked together towards a “best practices” approach to provide a more coordinated statewide training as a means to ensure correct installation techniques for the Residential Conservation Services (“RCS”)/MassSAVE Program

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

RMC applied a “best practices” approach 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.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 146-157 (bates numbering 00152-00163). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118. Modified planned values were approved in D.P.U. 10-84.

Table II.A.7 provides information on the performance of the Residential MassSAVE Program.

Table II.A.7: MassSAVE							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	4,273,794			4,056,193		-5%
Performance Incentive	\$	187,518			449,323		140%
Participants	hhlds	3,587			4,284		19%
Program Cost / Participant	\$	1,191			947		-21%
Savings & Benefits							
Energy							
Lifetime	MWh	32,268	38,306	19%	44,616	16%	38%
Annualized	MWh	3,280	3,691	13%	3,910	6%	19%
Average Measure Life	yrs	9.8	10.4	6%	11.4	10%	16%
Demand							
Lifetime	kW	23,305	33,385	43%	44,454	33%	91%
Annualized							
Summer	kW	1,176	1,529	30%	1,967	29%	67%
Winter	kW	571	726	27%	722	-1%	26%
Average Measure Life	yrs	19.8	2.1		2.7		
NEB (Lifetime)	\$	18,590,422	13,478,547	-27%	16,880,295	25%	-9%
Cost-Effectiveness							
TRC Benefits	\$	24,780,503			26,897,009		9%
TRC Costs	\$	5,323,193			5,582,586		5%
Net Benefits	\$	19,457,310			21,314,423		10%
BCR	n/a	4.66			4.82		3%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows.

- **Expenses:** Participation in the MassSAVE program increased from planned values due to aggressive outreach, and inclusion of home performance contractors in the second half of 2010.
- **Savings & Benefits:** Preliminary demand savings increased due to higher than planned air conditioning savings related to air sealing, duct sealing and insulation measures that were installed. Evaluated energy and demand savings increased in part due to the spillover values that were found in the EM&V studies noted below. Preliminary NEB values decreased from planned values due to lower than planned fossil fuel savings related to insulation and heating system replacements.

The following studies were completed for the MassSAVE program:

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 Light bulbs (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, Study 6.

Non-Electric Impact (NEI) Findings

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. WMECO 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, Study 7.

Massachusetts 2010 Residential Retrofit and Low Income Evaluation: Mass Save

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, Study 5.

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.

The results of the impact evaluations described above will be used to adjust the planning estimates for the program in 2012.

The MassSAVE Program is cost effective with a BCR of 4.82.

e. Residential ENERGY STAR Lighting

Purpose/Goal: The purpose of the ENERGY STAR Lighting program was to increase consumer awareness of the importance and benefits of purchasing ENERGY STAR-qualified lighting products and expand the availability, consumer acceptance, and use of high-quality energy-efficient lighting technologies and controls.

Targeted Customers: All residential customers were targeted by this program.

Definition of Program Participant: The total number of participants is defined as the estimated number of households served under the program. Since the number of bulbs sold cannot be related to electric account numbers for some products in this program, the number of households served is estimated by measure by dividing the total bulbs (or fixtures) installed per measure by the assumed number of bulbs (or fixtures) installed per household for each measure. These assumptions are shown in the table below. The estimated number of households served by measure is then summed to get to the number of households served at the program level.

ENERGY STAR Lighting Measures	Assumed Measures Installed per Household
Screw-in Bulbs	8
Screw-in Bulbs (Specialty bulbs)	8
LED Bulbs	1
LED Fixtures	1
Indoor Fixture	2
Outdoor Fixture	2
Screw-in Bulbs – School Fundraiser	4
Screw-in Bulbs – Hard to reach	4

Targeted End-Uses: Lighting

Delivery Mechanism: A manufacturer/retailer outreach contractor recruited and trained retailers to participate in the program; placed point-of-purchase materials and rebate coupons in participating retail stores; oversaw the Negotiated Cooperative Promotions (“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 rebate coupons and

NCPs, and provided 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 processed catalog and website purchases.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 164-172 (bates numbering 00170-00178). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.A.8 provides information on the performance of the Residential ENERGY STAR Lighting Program.

Table II.A.8: ENERGY STAR Lighting							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	1,155,535			1,116,386		-3%
Performance Incentive	\$	106,963			99,774		-7%
Participants	est. hhlds	32,526			43,728		34%
Program Cost / Participant	\$	36			26		-28%
Savings & Benefits							
Energy							
Lifetime	MWh	46,393	61,782	33%	53,865	-13%	16%
Annualized	MWh	5,888	8,339	42%	7,208	-14%	22%
Average Measure Life	yrs	7.9	7.4	-6%	7.5	1%	-5%
Demand							
Lifetime	kW	4,975	6,637	33%	5,793	-13%	16%
Annualized							
Summer	kW	627	892	42%	771	-14%	23%
Winter	kW	1,277	1,816	42%	1,570	-14%	23%
Average Measure Life	yrs	7.9	0.5		0.5		
NEB (Lifetime)	\$	365,674	540,570	48%	467,756	-13%	28%
Cost-Effectiveness							
TRC Benefits	\$	6,093,699			7,197,507		18%
TRC Costs	\$	1,509,884			1,911,012		27%
Net Benefits	\$	4,583,815			5,286,495		15%
BCR	n/a	4.04			3.77		-7%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows.

- Expenses: The ENERGY STAR Lighting program saw a dramatic increase in actual versus planned participation due to the statewide marketing efforts of the program. Variances to program costs per participant are a result of higher than anticipated participants. Greater participation also affected the cost per participant by spreading fixed costs out over a larger base.
- Savings & Benefits: Lifetime kW and annual kW were also affected by the higher participation numbers. Results from the ongoing evaluation of the program changed NTG ratios, accounting for the variances in preliminary and evaluated results. Increases in overall savings, benefits and TRC costs are attributable to the higher number of participants.
- Cost-Effectiveness: Total TRC costs increased due to higher participation in the program.

The following studies were completed for the ENERGY STAR Lighting program:

Massachusetts ENERGY STAR Lighting Program: 2010 Annual Report

This study estimated net-to-gross ratios (“NTGR”) for all markdown CFLs; including separate estimates for spiral, specialty, and targeting hard-to-reach (“HTR”) customers.

The new NTGRs resulting from this study have been applied to the Company’s evaluated results.

This study is discussed in more detail in Section III, Study 8.

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.

The results of the impact evaluations described above will be used to adjust the planning estimates for this program in 2012.

The Residential ENERGY STAR[®] Lighting Program is cost effective with a BCR of 3.77.

f. Residential ENERGY STAR Appliances

Purpose/Goal: The purpose of the program was to raise consumer awareness of the benefits of energy-efficient ENERGY STAR-qualified consumer products, encourage consumers to purchase qualified appliances and consumer electronics, promote higher efficiency standards for products, and to help customers reduce energy bills by replacing or recycling inefficient products.

Targeted Customers: All residential customers were targeted by this program.

Definition of Program Participant: A participant in the Residential ENERGY STAR Appliances program can be defined as a residential electric account number.

Targeted End-Uses:

- Refrigeration
- Air Conditioning
- Home Electronics

Delivery Mechanism: A manufacturer/retailer outreach contractor recruited and trained retailers to participate in the program; placed point-of-purchase materials and rebate forms in participating retail stores; oversaw the Negotiated Cooperative Program process for televisions; and acted as a liaison for Program Administrators, manufacturers, and retailers.

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

For advanced power strips, 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 processed catalog and website purchases

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1,

pages 173-178 (bates numbering 00179-00184). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.A.9 provides information on the performance of the Residential ENERGY STAR Appliances Program.

Table II.A.9: ENERGY STAR Appliances							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	168,800			338,468		101%
Performance Incentive	\$	7,205			7,817		8%
Participants	hhlds	1,569			4,094		161%
Program Cost / Participant	\$	108			83		-23%
Savings & Benefits							
Energy							
Lifetime	MWh	4,052	6,262	55%	5,698	-9%	41%
Annualized	MWh	492	644	31%	574	-11%	17%
Average Measure Life	yrs	8.2	9.7	18%	9.9	2%	21%
Demand							
Lifetime	kW	528	789	49%	789	0%	49%
Annualized							
Summer	kW	63	82	30%	82	0%	30%
Winter	kW	57	99	74%	99	0%	74%
Average Measure Life	yrs	8.4	0.8		0.8		
NEB (Lifetime)	\$	0	0	0%	0	0%	0%
Cost-Effectiveness							
TRC Benefits	\$	513,961			703,034		37%
TRC Costs	\$	260,018			397,305		53%
Net Benefits	\$	253,943			305,729		20%
BCR	n/a	1.98			1.77		-10%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows.

- **Expenses:** The higher than anticipated participation and total program costs were related to a ten fold increase in the number of refrigerator rebates above the planned value. This increase can be attributed in part to the ARRA-funded appliance rebate program. The higher than anticipated number of participants affected this number by spreading out the fixed costs.
- **Savings & Benefits:** Lifetime savings were also impacted by the high number of participants. This percentage increase is disproportionate due to the product mix. New refrigerators accounted for a much higher percentage of total measures than was originally budgeted. An evaluation of the refrigerator recycling component of the program impacted the net-to-gross ratios applied to program savings, which explains the variance between preliminary and evaluated results. Demand was also impacted by the high number of participants; the percentage of increase is disproportionate due to the product mix. New refrigerators accounted for a much higher percentage of total

measures than was originally budgeted but they deliver lower demand savings per unit than other measures in the program.

- Cost-Effectiveness: The program's TRC benefits and costs were also impacted by the higher than planned program participation. The product mix of actual measures versus planned measures also affected these values disproportionately.

The following study was completed for the ENERGY STAR Appliance program:

Massachusetts Appliance Turn-in Program Impact Evaluation Final

This study evaluated the gross and net impact estimates for the Massachusetts Appliance Turn-In program which collects and recycles working refrigerators and stand-alone freezers that are being used as second units from residential customers. The impact and process evaluation resulted in new net savings estimates for refrigerators and freezers which have been applied to the Company's evaluated results.

This study is discussed in more detail in Section III, Study 9.

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

The results of the impact evaluations described above will be used to adjust the planning estimates for this program in 2012.

The Residential ENERGY STAR Appliance Program is cost effective with a BCR of 1.77.

g. Residential Education

Purpose/Goal: The purpose of the Residential Education program was to educate residential customers on the multitude of energy efficiency programs available to them as well as highlight the benefits - both monetary and environmental - of each of these programs.

Targeted Customers: Residential consumers

Definition of Program Participant: A participant in the Company's Residential Education program can be defined as a residential customer within a specific geographic region.

Targeted End-Uses

- End Use Behavior

Delivery Mechanism: The Residential Education Program evolved into a Behavioral/Feedback Pilot called "Western Mass Saves." The pilot was developed in coordination with Smartpower and Efficiency 2.0 and has been shifted into the proper pilot category in subsequent mid-term modifications. In 2010, marketing efforts and a substantial amount of IT work was completed in order to get the pilot up and running for 2011.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118. The program budget was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-18.

3. Residential Pilot Programs

a. Deep Energy Retrofit

Description of Pilot/Specific Activities Intended to Study: The Deep Energy Retrofit pilot was implemented to investigate the potential for energy savings of at least 50 percent of total on-site energy use through deep retrofits of existing residential buildings and to identify incremental savings and how to reduce the costs and challenges associated with deep retrofits.

Why Implemented on Pilot Basis rather than as a Full Program: This initiative was offered as a pilot to determine if the initiative is cost-effective. Once an evaluation of the pilot is completed, the pilot may be offered as a program in the future.

Targeted Customers: The pilot targeted home owners, property owners, and property managers considering renovations and willing to invest in extensive carbon reductions. In addition, the pilot targeted advanced building remodelers, architects, designers, trade allies, and others involved in renovation or restoration of residential buildings.

Definition of Pilot Program Participant: A participant in the Deep Energy Retrofit pilot can be defined as a residential electric account number.

Targeted End-Uses:

- Lighting
- Heating, Ventilation, and Air Conditioning
- Hot Water
- Envelope
- End Use Behavior

Delivery Mechanism: Project design details and assistance to the Deep Energy Retrofit contractors performing the work the work was handled through technical specialist contractor, program manager and organizations under contract and/or utilizing DOE Building America funds.

Significant Differences in Actual Program Design from Approved Program Design: None.

How Achievement of the Pilot's Stated Goal was Measured: An evaluation of the pilot is currently in process.

Docket/Exhibit where the Program is Discussed and Approved: The pilot is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 158-163 (bates numbering 00164-00169). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.A.10 provides information on the performance of Deep Energy Retrofit pilot. Because of the nature of pilot programs, the table for this pilot program is incomplete with regard to savings and benefits. The Company has provided all information that is available.

Table II.A.10: Deep Energy Retrofit							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	125,500			121,662		-3%
Participants	hhlds	n/a			4		n/a
Program Cost / Participant	\$	n/a			30,415		n/a
Savings & Benefits							
Energy							
Lifetime	MWh	n/a	n/a	n/a	n/a	n/a	n/a
Annualized	MWh	n/a	n/a	n/a	n/a	n/a	n/a
Average Measure Life	yrs	n/a	n/a	n/a	n/a	n/a	n/a
Demand							
Lifetime	kW	n/a	n/a	n/a	n/a	n/a	n/a
Annualized							
Summer	kW	n/a	n/a	n/a	n/a	n/a	n/a
Winter	kW	n/a	n/a	n/a	n/a	n/a	n/a
Average Measure Life	yrs	n/a	n/a	n/a	n/a	n/a	n/a
NEB (Lifetime)	\$	n/a	n/a	n/a	n/a	n/a	n/a
Cost-Effectiveness							
TRC Benefits	\$	n/a			n/a		n/a
TRC Costs	\$	125,500			121,662		-3%
Net Benefits	\$	n/a			n/a		n/a
BCR	n/a	n/a			n/a		n/a

In 2010 the Company completed four Deep Energy Retrofit projects. Based on preliminary calculations, these projects represent tremendous energy savings. The projects overall were challenging as they took longer to complete and cost more than the homeowners and builders initially anticipated. The largest energy savings were found in older homes that had not already implemented many efficiency improvements. Homes that had already made incremental improvements towards energy efficiency were not able to implement deep energy saving measures as cost effectively.

Three projects are slated to be completed in 2011. By implementing the pilot program for another year, the Company will be able to see if different housing types and project scopes affect the cost effectiveness of deep energy improvements. Continuing the pilot also allows for more opportunities to refine how the measurement tools are utilized and the incentive structure used in the pilot.

An evaluation of the pilot is currently underway.

B. Low-Income Sector Programs

1. Summary

During 2010 the Company implemented the following low-income programs⁵:

- Low-Income Residential New Construction
- Low-Income 1-4 Family Retrofit
- Low-Income Multi-Family Retrofit

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.

Table II.B.1: Low-Income Sector Summary							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	2,466,968			2,317,313		-6%
Performance Incentive	\$	186,563			230,498		24%
Savings & Benefits							
Energy							
Lifetime	MWh	20,113	14,880	-26%	14,880	0%	-26%
Annualized	MWh	2,073	1,618	-22%	1,618	0%	-22%
Demand							
Lifetime	kW	2,018	1,574	-22%	1,574	0%	-22%
Annualized							
Summer	kW	210	169	-20%	169	0%	-20%
Winter	kW	453	354	-22%	354	0%	-22%
NEB (Lifetime)	\$	7,123,735	9,814,630	38%	9,814,630	0%	38%
Cost-Effectiveness							
TRC Benefits	\$	9,517,395			11,616,749		22%
TRC Costs	\$	2,653,531			2,547,810		-4%
Net Benefits	\$	6,863,865			9,068,939		32%
BCR	n/a	3.59			4.56		27%

⁵ The Company did not offer any pilot programs in the low-income sector during 2010.

As shown in Table II.B.1 above, significant⁶ variances exist at the Low-Income sector level for:

- Lifetime MWh, annual MWh, lifetime kW, summer & winter kW, and NEBs between planned and preliminary values, and
- Lifetime MWh, annual MWh, lifetime kW, summer and winter kW, TRC benefits, net benefits, and BCR between planned and evaluated values.

Each program contributed to these variances as follows:

- Low-Income Residential New Construction: This program yielded significant variances in nearly all expenses, savings & benefits, and cost effectiveness categories in both preliminary and year-end results. Please reference section II.B.4 for a more detailed discussion of the cause of the variances in this program.
- Low-Income 1 to 4 Family Retrofit: This program yielded significant variances in nearly all expenses, savings & benefits, and cost effectiveness categories in both preliminary and year-end results. Please reference section II.B.5 for a more detailed discussion of the cause of the variances in this program.
- Low-Income Multi-Family Retrofit: This program yielded significant variances in all expenses, savings & benefits, and cost effectiveness categories in both preliminary and year-end results. Please reference section II.B.6 for a more detailed discussion of the cause of the variances in this program.

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

Table II.B.2: Low-Income Sector Summary of End Uses				
End Uses	Units (lifetime)	Preliminary Year-End Results	Evaluated Results	% Change from Preliminary to Evaluated
Lighting				
Energy	MWh	920	920	0%
Demand	kW	84	84	0%
NEB	\$	289,735	289,735	0%
HVAC				
Energy	MWh	31	31	0%
Demand	kW	2	2	0%
NEB	\$	7,593,827	7,593,827	0%
End Use Behavior				
Energy	MWh	145	145	0%
Demand	kW	14	14	0%
NEB	\$	1,134,498	1,134,498	0%
Refrigeration				
Energy	MWh	486	486	0%
Demand	kW	67	67	0%
NEB	\$	244,171	244,171	0%
Hot Water				
Energy	MWh	36	36	0%
Demand	kW	3	3	0%
NEB	\$	552,399	552,399	0%
Total				
Energy	MWh	1,618	1,618	0%
Demand	kW	169	169	0%
NEB	\$	9,814,630	9,814,630	0%

Table II.B.3: Low-Income Program Summary				
Sector	Units	Planned Value	Evaluated Results	
			Value	% Change from Planned
Low-Income Residential New Construction				
TRC Benefits	\$	155,454	55,213	-64%
TRC Costs	\$	67,647	73,440	9%
Net Benefits	\$	87,807	-18,227	-121%
BCR	n/a	2.30	0.75	-67%
Low-Income 1 to 4 Family Retrofit				
TRC Benefits	\$	8,565,010	11,448,612	34%
TRC Costs	\$	2,317,054	2,336,354	1%
Net Benefits	\$	6,247,955	9,112,258	46%
BCR	n/a	3.70	4.90	33%
Low-Income MultiFamily Retrofit				
TRC Benefits	\$	796,931	112,924	-86%
TRC Costs	\$	210,880	84,203	-60%
Net Benefits	\$	586,051	28,720	-95%
BCR	n/a	3.78	1.34	-65%
Hard-to-Measure Initiatives				
TRC Costs	\$	57,949	53,812	-7%
TOTAL				
TRC Benefits	\$	9,517,395	11,616,749	22%
TRC Costs	\$	2,653,531	2,547,810	-4%
Net Benefits	\$	6,863,865	9,068,939	32%
BCR	n/a	3.59	4.56	27%

During 2010, the Company built upon existing low-income programs and significantly expanded initiatives to increase participation in all low-income programs. Selected highlights are presented below:

- Low-Income Residential New Construction & Major Renovation – In 2010, this program successfully completed the targeted number of new housing units.
- Low-Income 1 to 4 Family Retrofit – The Company worked with the local community action agencies to complete a number of projects which yielded deeper fossil fuel savings than in years past.
- Multi-Family Retrofit – In 2010, The Company worked with LEAN and the local community action agencies to identify participants for this program. Two small projects were completed at the end of the year and a pipeline of new projects was developed for implementation in 2011.

A more detailed program-level discussion can be found in Section II.B.2.

2. Low-Income Programs

a. Low-Income New Construction

Purpose/Goal: The purpose of the Low-Income New Construction program was to encourage the construction of energy-efficient homes, and drive the market to one in which new homes are moving towards net-zero energy.

Targeted Customers: The target market for this program included homebuilders, contractors, architects/designers, trade allies, HERS raters, homebuyers, realtors, developers, low income and affordable housing developers, code officials, and consumers in the market for new homes and or major renovations.

Definition of Program Participant: A participant in the Low-Income Residential New Construction & Major Renovation program can be defined as an individual housing unit.

Targeted End-Uses:

- Lighting
- Heating, Ventilation, and Air Conditioning
- Refrigeration
- Hot water
- Envelope

Delivery Mechanism: The program is administered each Program Administrator in its service territory and coordinated regionally through the JMC.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 202-208 (bates numbering 00208-00214). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.B.4 provides information on the performance of the Low-Income New Construction Program.

Table II.B.4: Low-Income Residential New Construction							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	65,028			73,241		13%
Performance Incentive	\$	2,619			199		-92%
Participants	hhlds	22			23		5%
Program Cost / Participant	\$	2,956			3,184		8%
Savings & Benefits							
Energy							
Lifetime	MWh	177	137	-22%	137	0%	-22%
Annualized	MWh	16	15	-5%	15	0%	-5%
Average Measure Life	yrs	11.1	9.0	-18%	9.0	0%	-18%
Demand							
Lifetime	kW	135	60	-56%	60	0%	-56%
Annualized							
Summer	kW	6	3	-48%	3	0%	-48%
Winter	kW	4	6	49%	6	0%	49%
Average Measure Life	yrs	22.5	0.5		0.5		
NEB (Lifetime)	\$	120,879	33,158	-73%	33,158	0%	-73%
Cost-Effectiveness							
TRC Benefits	\$	155,454			55,213		-64%
TRC Costs	\$	67,647			73,440		9%
Net Benefits	\$	87,807			-18,227		-121%
BCR	n/a	2.30			0.75		-67%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows.

- **Savings & Benefits:** Energy and demand savings decreased from planned to evaluated results for several reasons. First, 16 of the 23 completed units were smaller multi-family units which produce much lower savings per unit than were planned for. Secondly, of the 23 units, only two had central air conditioning. Such a small percentage of air conditioning versus the planned values dramatically reduced the summer and lifetime demand savings. NEBs were less than planned due to a smaller number of oil and propane heated units, and a higher percentage of multi-family units. An anomaly in the way the savings are calculated for certain multi-family homes in the HERS was identified. This anomaly resulted in certain projects achieving an ENERGY STAR rating and incentive payments but not producing savings based on the Massachusetts Use Defined Reference Home (“UDRH”). The utilities have instituted new program requirements that participants must achieve a minimum percentage increase over the Massachusetts UDRH baseline in order to receive incentives.
- **Cost-Effectiveness:** Due to the difference in the measure mix from planned to actual completions, in addition to the anomaly described above, the program realized lower TRC benefits, net benefits, and a BCR below 1.0. The Company expects that the new program enhancements implemented in late 2010 will address the anomaly described above, and will result in a BCR greater than 1.0. Therefore the Company does not intend to discontinue the program at this time.

The following studies were completed for the Low-Income Residential New Construction program:

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, Study 2.

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, Study 3.

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, Study 1.

As noted above, the anomaly in the HERS scoring criteria that had led to negative savings associated with certain participants was addressed by the Joint Management Committee. Going forward in 2011 and beyond the program structure has been adjusted to ensure that the participation criteria reflects net savings for each participating home. See further description below.

At this point in time no mid-term modification is planned for this program.

The Low-Income Residential New Construction Program did not screen as cost-effective with a BCR of 0.75. As described above, the utilities identified an anomaly in the way savings were being calculated in Massachusetts versus the way the national ENERGY STAR Homes program indexed new homes. The utilities instructed ICF, the lead vendor, to provide analyses of the

situation. Based upon the result of the analyses, it was determined that using a system of percent savings as compared with the Massachusetts UDRH would result in a much more accurate correlation of increased savings with higher tier and incentive levels. Using this method it was determined that a minimum HERS Index of 85 (to conform with ENERGY STAR performance path requirements) and 60% energy savings over the UDRH was an appropriate target for the stretch goal to be used in 2010. The sponsors decided that the four 2010 program tier levels would be structured as follows: Code +, HERS 85 (ENERGY STAR), HERS 65, and HERS 85 + 60% improvement over the UDRH.

The Company does not intend to discontinue this program at this time, based on the limited number of participants in 2010, which tend to skew the BCR. Projects that were implemented in 2010, that led to the BCR below 1 were initiated in 2009 prior to the revised program criteria being put into place. Using a system which correlates percent savings to the incentive is expected to allow the program to be cost effective in 2011.

b. Low-Income 1-4 Family Retrofit

Purpose/Goal: The purpose of the Low-Income 1-4 Family Retrofit program was to increase energy efficiency and reduce the energy cost burden for income-eligible customers through education and the installation of electric and gas energy efficiency measures to achieve deeper and broader energy savings.

Targeted Customers: This program targeted residential electric customers using natural gas heating living in one- to four-unit dwellings who are at sixty percent (60%) of the state median income level.

Definition of Program Participant: A participant in the Low-Income 1-4 Family Retrofit program can be defined as an individual residential account number.

Targeted End-Uses:

- Lighting
- Heating, Ventilation, and Air Conditioning
- Refrigeration
- Hot water
- Envelope
- End Use Behavior

Delivery Mechanism: This Program was administered by the three Community Action Agencies (“CAPs”) within the Company service territory. The Program Administrators worked closely with the CAP agencies on all aspects of the program design and implementation.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company’s 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 209-216 (bates numbering 00215-00222). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.B.5 provides information on the performance of the Low-Income 1 to 4 Family Retrofit Program.

Table II.B.5: Low-Income 1 to 4 Family Retrofit							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	2,148,842			2,130,485		-1%
Performance Incentive	\$	168,212			205,870		22%
Participants	hhlds	1,820			1,481		-19%
Program Cost / Participant	\$	1,181			1,439		22%
Savings & Benefits							
Energy							
Lifetime	MWh	17,407	13,864	-20%	13,864	0%	-20%
Annualized	MWh	1,878	1,510	-20%	1,510	0%	-20%
Average Measure Life	yrs	9.3	9.2	-1%	9.2	0%	-1%
Demand							
Lifetime	kW	1,774	1,465	-17%	1,465	0%	-17%
Annualized							
Summer	kW	194	161	-17%	161	0%	-17%
Winter	kW	416	336	-19%	336	0%	-19%
Average Measure Life	yrs	9.1	0.5		0.5		
NEB (Lifetime)	\$	6,470,639	9,769,351	51%	9,769,351	0%	51%
Cost-Effectiveness							
TRC Benefits	\$	8,565,010			11,448,612		34%
TRC Costs	\$	2,317,054			2,336,354		1%
Net Benefits	\$	6,247,955			9,112,258		46%
BCR	n/a	3.70			4.90		33%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows.

- **Expenses:** Program costs per participant increased from plan as deeper levels of weatherization were achieved. For more information reference the NEB discussion below.
- **Savings & Benefits:** Annual and lifetime energy savings were reduced due to fewer homes being served than had been planned for. This reduction was due in part to the community action agencies' focus on ARRA funded projects for which they have a limited time period to complete. Energy and demand savings are derived primarily for CFL bulbs installations, along with refrigerator and freezer replacements. The amount of electric measures installed ties closely to the number of homes served so the 19% reduction in homes served resulted in the 20% reduction in energy savings. Lifetime NEBs increased significantly as projects realized deeper weatherization savings. Deeper weatherization savings were achieved for each home served correlating to the 22% increase in cost per participating home.
- **Cost Effectiveness:** The dramatic increase in NEBs as explained above drove total TRC benefits up, while costs maintained, therefore increasing net benefits as well. Overall the cost-effectiveness of the program increased significantly due to the fact that deeper weatherization was achieved at the homes that were retrofitted.

A process evaluation was conducted for this program. The study results do not affect program savings. For more information on this evaluation please reference Section III, Study 18

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

At this point in time no mid-term modification is planned for this program.

The Low-Income 1-4 Family Retrofit Program is cost effective with a BCR of 4.90.

c. Low-Income Multi-Family Retrofit

Purpose/Goal: 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.

Targeted Customers: 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.

Definition of Program Participant: A participant in the Low-Income Multi-Family Retrofit program can be defined as an individual housing unit.

Targeted End-Uses:

- Lighting
- Heating, Ventilation, and Air Conditioning
- Refrigeration
- Hot water
- Envelope

Delivery Mechanism: The program was administered cooperatively by the gas and electric Program Administrators in conjunction with interested stakeholders.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 217-230 (bates numbering 00223-00236). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118.

Table II.B.6 provides information on the performance of the Low-Income Multi-Family Retrofit Program.

Table II.B.6: Low-Income MultiFamily Retrofit							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	195,149			59,774		-69%
Performance Incentive	\$	15,731			24,429		55%
Participants	units	216			149		-31%
Program Cost / Participant	\$	903			401		-56%
Savings & Benefits							
Energy							
Lifetime	MWh	2,529	879	-65%	879	0%	-65%
Annualized	MWh	179	92	-49%	92	0%	-49%
Average Measure Life	yrs	14.1	9.5	-32%	9.5	0%	-32%
Demand							
Lifetime	kW	109	50	-55%	50	0%	-55%
Annualized							
Summer	kW	10	5	-47%	5	0%	-47%
Winter	kW	33	12	-64%	12	0%	-64%
Average Measure Life	yrs	10.9	0.4		0.4		
NEB (Lifetime)	\$	532,217	12,121	-98%	12,121	0%	-98%
Cost-Effectiveness							
TRC Benefits	\$	796,931			112,924		-86%
TRC Costs	\$	210,880			84,203		-60%
Net Benefits	\$	586,051			28,720		-95%
BCR	n/a	3.78			1.34		-65%

An explanation of significant variances between planned, preliminary year-end, and evaluated values follows

- **Expenses:** Spending and participation in the Low-Income Multifamily program in 2010 were below target due to the focus of the community action agencies on implementing ARRA related projects. Planning for this program assumed a significant amount of weatherization work for electrically heated units. However, no electrically heated units were retrofitted in 2010. This reduction in weatherization work led to the significant decline in program costs per participant.
- **Savings & Benefits:** The decrease in energy and demand savings from plan is due to the fact that this program was planned to serve a mix of electrically heated multi-family units along with piggy back retrofits (light bulbs and refrigerator replacements) for gas heated multi-family units. However, in 2010 no electrically heated units were retrofitted. Electric weatherization work is planned to include both one time and annual non resources benefits for each unit that is completed. Since there was no electric weatherization work completed in 2010 the non-resource benefits did not materialize, and therefore caused a significant variance in actual NEBs versus the plan.

- Cost-Effectiveness: The significant reduction in projects completed led to lower TRC benefits than were planned for. This further caused significant reductions in the net benefits and the BCR ratio for this program.

There were no studies completed for this program.

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

At this point in time no mid-term modification is planned for this program.

The Low-Income Multi-Family Program is cost effective with a BCR of 1.34.

C. Commercial & Industrial Sector Programs

1. Summary

During 2010 the Company implemented the following Commercial & 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

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.

Sections II.C.2 and II.C.3 provide detailed information on the performance of each C&I program and pilot program, respectively.

Table II.C.1: C&I Sector Summary							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	11,136,767			10,326,770		-7%
Performance Incentive	\$	831,289			645,051		-22%
Savings & Benefits							
Energy							
Lifetime	MWh	432,158	420,701	-3%	378,271	-10%	-12%
Annualized	MWh	32,367	31,271	-3%	27,958	-11%	-14%
Demand							
Lifetime	kW	67,650	69,595	3%	65,482	-6%	-3%
Annualized							
Summer	kW	5,089	5,182	2%	4,883	-6%	-4%
Winter	kW	3,372	3,447	2%	2,739	-21%	-19%
NEB (Lifetime)	\$	(1,881,571)	-1,116,838	-41%	-1,268,111	14%	-33%
Cost-Effectiveness							
TRC Benefits	\$	54,192,448			48,475,599		-11%
TRC Costs	\$	16,633,063			17,135,735		3%
Net Benefits	\$	37,559,385			31,339,864		-17%
BCR	n/a	3.26			2.83		-13%

As shown in Table II.A.1 above, significant⁷ variances exist at the C&I sector level for:

- Lifetime NEBs between planned and preliminary values, and
- Lifetime NEBs between planned and evaluated values, and
- Winter kW between preliminary and evaluated values.

Each program contributed to these variances as follows:

- C&I New Construction and Major Renovation: This program yielded significant variances in participation, cost per participant, lifetime and summer kW, NEBs, TRC costs, and BCR in both preliminary and year-end results. Please reference section II.C.4 for a more detailed discussion of the cause of the variances in this program.
- C&I Large Retrofit: This program yielded significant variances in total program costs, cost per participant, and NEBs. Please reference section II.C.5 for a more detailed discussion of the cause of the variances in this program.
- C&I Small Retrofit: This program yielded significant variances in most savings & benefits categories from planned to evaluated results, due to EM&V study results. No significant variances were reflected in the preliminary results. Please reference section II.C.6 for a more detailed discussion of the cause of the variances in this program.

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

Table II.C.2: C&I Sector Summary of End Uses				
End Uses	Units (lifetime)	Preliminary Year-End Results	Evaluated Results	% Change from Preliminary to Evaluated
Lighting				
Energy	MWh	19,408	16,235	-16%
Demand	kW	3,856	3,060	-21%
NEB	\$	-1,116,838	-1,268,111	14%
HVAC				
Energy	MWh	3,436	2,941	-14%
Demand	kW	559	463	-17%
NEB	\$	0	0	0%
Motors				
Energy	MWh	775	1,333	72%
Demand	kW	102	117	14%
NEB	\$	0	0	0%
Refrigeration				
Energy	MWh	1,393	1,230	-12%
Demand	kW	58	88	52%
NEB	\$	0	0	0%
Compressed Air				
Energy	MWh	1,936	1,956	1%
Demand	kW	257	497	93%
NEB	\$	0	0	0%
Process				
Energy	MWh	4,323	4,264	-1%
Demand	kW	349	659	89%
NEB	\$	0	0	0%
Total				
Energy	MWh	31,271	27,958	-11%
Demand	kW	5,182	4,883	-6%
NEB	\$	-1,116,838	-1,268,111	14%

Table II.C.3: C&I Program Summary				
Sector	Units	Planned Value	Evaluated Results	
			Value	% Change from Planned
C&I New Construction and Major Renovation				
TRC Benefits	\$	16,103,087	18,535,701	15%
TRC Costs	\$	3,143,551	4,497,650	43%
Net Benefits	\$	12,959,536	14,038,051	8%
BCR	n/a	5.12	4.12	-20%
C&I Large Retrofit				
TRC Benefits	\$	18,461,168	16,411,746	-11%
TRC Costs	\$	6,637,736	5,572,224	-16%
Net Benefits	\$	11,823,432	10,839,523	-8%
BCR	n/a	2.78	2.95	6%
C&I Small Retrofit				
TRC Benefits	\$	19,628,193	13,528,152	-31%
TRC Costs	\$	6,602,468	6,924,121	5%
Net Benefits	\$	13,025,725	6,604,031	-49%
BCR	n/a	2.97	1.95	-34%
Hard-to-Measure Initiatives				
TRC Costs	\$	249,308	141,740	-43%
TOTAL				
TRC Benefits	\$	54,192,448	48,475,599	-11%
TRC Costs	\$	16,633,063	17,135,735	3%
Net Benefits	\$	37,559,385	31,339,864	-17%
BCR	n/a	3.26	2.83	-13%

During 2010, the Company built upon existing C&I Industrial programs and significantly expanded initiatives to increase participation in all C&I programs. Selected highlights are presented below:

- C&I New Construction and Major Renovation:** In 2010 the Company saw the completion of the first two Advanced Building projects under the C&I New Construction and Major Renovation Program. Another major highlight of this program in 2010 involved the steps taken to offer consistent program offerings statewide. The Company, in collaboration with the other PAs, developed new marketing materials and program participation forms which included the new Mass Save brand logo. The Company also revised all prescriptive programs to the new statewide Mass Save format where each PA offers consistent incentives and eligibility criteria to all participants.

- C&I Large Retrofit: In 2010 the Company successfully implemented several dual-fuel projects that included both electric and gas savings in conjunction with two Gas PAs within its service territory. The statewide C&I working group also launched implementation of the new statewide dual fuel project screening tool, which enables all PAs, whether gas or electric, the ability to screen projects for all cost-effective energy efficiency measures at once.
- C&I Small Retrofit: 2010 marked the first year of some changes for the C&I Small Retrofit Program. In an effort to make the program consistent throughout the state, the Company increased the maximum peak demand for participants in the program from 200 kW to 300 kW; the incentive level was also increased to 70%. The Company saw increased program participation with the new program parameters, and therefore allocated an additional \$1.5 millions dollars of incentive from the large C&I programs in its mid-year modification in docket D.P.U. 10-84. Finally, the Company began implementation of six directly installed gas measures including pre-rinse spray valves, duct insulation, pipe insulation, boiler reset controls, programmable thermostats, low flow aerators and showerheads.

A more detailed program-level discussion can be found in the following section.

2. C&I Programs

a. C&I New Construction & Major Renovation

Purpose/Goal: The C&I New Construction & Major Renovation program was designed to optimize the efficiency of equipment, building design and systems in new construction and renovation of commercial, industrial, institutional and government facilities. Focusing on offering a comprehensive set of electric and gas efficiency options specific to the needs unique to each customer, the program also targeted the brief window of opportunity to install premium grade replacements when equipment fails or is near the end of its useful life. In doing so, the Program Administrators worked to ensure that the best practices propagated by the program are ultimately built into the evolution of better building requirements.

Targeted Customers: The target market for this program was all time-dependent gas and electric energy efficiency opportunities in the C&I sector – commercial, industrial, institutional, and government customers.

Definition of Program Participant: A program participant is defined as an individual project undertaken by a customer who has received a financial incentive for the completed implementation of one or more time dependent electric energy efficiency measures. One customer may undertake multiple projects at different locations during the program year. Each project is, therefore, counted as an individual participant.

Targeted End-Uses: End uses targeted by the program included: lighting equipment and controls, lighting design, motors, variable speed drives, high performance HVAC equipment, chilled water systems/refrigeration systems, building envelope measures, compressed air, high efficiency heating and water heating, and industry-specific gas and electric industrial processes. Site-specific custom measures were also considered.

Delivery Mechanism: The Program Administrators worked together to market and implement the program as a unitary statewide effort to maximize the acquisition of potential energy savings (gas and electric) in the ongoing market for new facilities and replacement equipment in the Commonwealth.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where the Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1,

pages 243-254 (bates numbering 00249-00260). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118. Planned values were approved in D.P.U. 10-84.

Table II.C.4 provides information on the performance of the C&I New Construction and Major Renovation Program.

Table II.C.4: C&I New Construction and Major Renovation							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	2,977,746			2,949,099		-1%
Performance Incentive	\$	335,827			254,755		-24%
Participants	sites	85			63		-26%
Program Cost / Participant	\$	35,032			46,811		34%
Savings & Benefits							
Energy							
Lifetime	MWh	127,806	143,242	12%	142,457	-1%	11%
Annualized	MWh	9,404	9,349	-1%	9,331	0%	-1%
Average Measure Life	yrs	13.6	15.3	13%	15.3	0%	12%
Demand							
Lifetime	kW	17,357	21,074	21%	26,270	25%	51%
Annualized							
Summer	kW	1,198	1,346	12%	1,773	32%	48%
Winter	kW	863	906	5%	1,025	13%	19%
Average Measure Life	yrs	14.5	1.5		1.7		
NEB (Lifetime)	\$	-99,146	-62,482	-37%	-65,685	5%	-34%
Cost-Effectiveness							
TRC Benefits	\$	16,103,087			18,535,701		15%
TRC Costs	\$	3,143,551			4,497,650		43%
Net Benefits	\$	12,959,536			14,038,051		8%
BCR	n/a	5.12			4.12		-20%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows

- **Expenses:** The Company realized a decrease in the number of participants from plan due to the fact that participants are difficult to predict; historical participant counts are used a proxy but it ultimately depends on the measure/project mix. The increase in program cost per participant from planned is reflective of larger sized projects than had been planned for.
- **Savings & Benefits:** The preliminary demand savings increase reflects a change in measure mix (HVAC vs. lighting or process equipment) to measures that offer relatively higher summer demand savings. Evaluated demand savings were further increased due to new realization rates for summer demand which resulted from EM&V studies. Efficient lighting results in a negative non-electric benefits (NEB) due to the slight amount of additional gas or oil heating fuel required to offset the heat produced as compared to if less efficient lighting fixtures had been installed. The amount of actual

negative NEBs was less than planned as less new construction lighting was implemented in 2010 than had been assumed in planning

- Cost-effectiveness: Customer costs were higher than planned due to the nature of the projects that were installed under this program in 2010. The increased customer costs led to the 20% reduction in the BCR.

The following studies were completed for the Large C&I New Construction and Major Renovation program:

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, Study 25.

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, and Industrial Process.

The results of this study vary for each end-use category within the program.

Please refer to Section III, Study 30.

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, Study 21.

Impact Evaluation of 2007-08 Installations for All Three of WMECO's Large C&I Programs:

This study evaluated the realization rates for annual kWh, summer on-peak kW and winter on-peak kW reductions, in total and for each of six end uses: lighting, cooling, industrial process, refrigeration, other motors, and other. It also produced 8,760 hour load shapes by end use.

The net effect of this study is to decrease energy savings and increase demand savings for these programs.

Please refer to Section III, Study 38.

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

The results of the evaluations described above will be used to adjust the planning estimates for this program in 2012.

The C&I New Construction and Major Renovation Program is cost effective with a BCR of 4.12.

b. C&I Large Retrofit

Purpose/Goal: The C&I Large Retrofit program focused on comprehensive gas and electric energy efficiency opportunities associated with mechanical, electrical, and thermal systems in existing commercial, industrial, governmental and institutional buildings. Through this program, technical assistance and incentives were provided to encourage retrofitting of equipment that continued to function, but was outdated and inefficient, and could be replaced with a premium efficient product. In addition, this program helped participants identify specific peak load management opportunities and assisted occupants in improving their ongoing operation and maintenance practices.

Targeted Customers: The target market for this program was all non-residential customers - commercial, industrial, governmental, and institutional.

Definition of Program Participant: A program participant is defined as an individual project undertaken by a customer who has received a financial incentive for the completed implementation of one or more electric energy efficiency measures. One customer may undertake multiple projects at different locations during the program year. Each project is, therefore, counted as an individual participant.

Targeted End-Uses: Targeted end uses included, but were not limited to, lighting and lighting controls, variable speed motor controls, HVAC equipment, energy management systems, compressed air and unique industrial processes. Targeted gas end uses included: building envelope and glazing, commercially sized heating and water heating equipment, system and building controls. Consideration was provided for any commercially available energy efficiency technology. Site specific custom measures including CHP, distributed generation, were also considered.

Delivery Mechanism: Program Administrator staff, trade allies and project administrators performed most sales, marketing, program administration, and implementation functions while outside contractors were retained for technical review of applications, on-site energy analysis, technical and design assistance for comprehensive projects, project verification services, and the actual measure installations.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western

Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 231-242 (bates numbering 00237-00248). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118. Planned values were approved in D.P.U. 10-84.

Table II.C.5 provides information on the performance of the C&I Large Retrofit Program.

Table II.C.5: C&I Large Retrofit							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	3,382,786			2,509,597		-26%
Performance Incentive	\$	333,094			231,043		-31%
Participants	sites	185			175		-5%
Program Cost / Participant	\$	18,285			14,341		-22%
Savings & Benefits							
Energy							
Lifetime	MWh	158,439	145,219	-8%	130,075	-10%	-18%
Annualized	MWh	11,389	11,197	-2%	10,031	-10%	-12%
Average Measure Life	yrs	13.9	13.0	-7%	13.0	0%	-7%
Demand							
Lifetime	kW	18,149	19,244	6%	20,788	8%	15%
Annualized							
Summer	kW	1,351	1,482	10%	1,600	8%	18%
Winter	kW	1,031	1,001	-3%	937	-6%	-9%
Average Measure Life	yrs	13.4	1.5		1.7		
NEB (Lifetime)	\$	-1,163,054	-537,860	-54%	-634,812	18%	-45%
Cost-Effectiveness							
TRC Benefits	\$	18,461,168			16,411,746		-11%
TRC Costs	\$	6,637,736			5,572,224		-16%
Net Benefits	\$	11,823,432			10,839,523		-8%
BCR	n/a	2.78			2.95		6%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows

- **Expenses:** Overall program costs were lower than planned due to economic conditions in western Massachusetts, which led to lower customer participation. In addition, the program cost per participant was lower than planned as customers implemented smaller sized projects than were included in planning assumptions.
- **Savings & Benefits:** NEBs from Combined Heat and Power (CHP) projects, due to increased natural gas usage, were included in the planning assumptions for this program. However no CHP installations were achieved in 2010, therefore fewer negative NEBs were reported, which resulted in this variance.

The following studies were completed for the C&I Large Retrofit Program:

Impact Evaluation of 2007-08 Installations for All Three of WMECO's Large C&I Programs:

This study evaluated the realization rates for annual kWh, summer on-peak kW and winter on-peak kW reductions, in total and for each of six end uses: lighting, cooling, industrial process, refrigeration, other motors, and other. It also produced 8,760 hour load shapes by end use.

The net effect of this study is to decrease energy savings and increase demand savings for these programs.

Please refer to Section III, Study 38.

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 Section III, Study 25.

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 effect of these results is to increase/decrease program savings.

Please refer to Section III, Study 30.

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, Study 21.

The results of the evaluations described above will be used to adjust the planning estimates for this program in 2012.

At this point in time no mid-term modification is planned for this program.

The C&I Large Retrofit Program is cost effective with a BCR of 2.95.

c. C&I Small Retrofit

Purpose/Goal: The primary objective of the C&I Small Retrofit Program was to provide cost-effective, comprehensive electric and gas retrofit services to business customers on a turnkey basis using the same delivery model throughout the Commonwealth.

Targeted Customers: While 2010 stood as a transition year, all PAs moved toward targeting direct install retrofit business customers below 300kW.

Definition of Program Participant: A Program Participant is defined as a customer below 300kW in usage who has received turnkey retrofit services and incentive dollars through the C&I Small Retrofit Program. One customer may undertake multiple projects at different locations during the program year. Each project is, therefore, counted as an individual participant.

Targeted End-Uses: Targeted end uses included a variety of electric and gas measures including but not limited to: lighting and lighting controls, HVAC equipment, water heating, variable speed motor controls, and refrigeration. Direct install gas measures including pre-rinse spray valves, duct insulation, pipe insulation, boiler reset controls, programmable thermostats, low flow aerators and showerheads.

Delivery Mechanism: Vendors were selected through a competitive bidding process to implement the program. These vendors marketed the program, performed facility audits, and offered recommendations to customers while completing audit forms and questionnaires. In addition the same vendors purchased materials, installed measures, inputted data into a database, and prepared progress reports for the Program Administrators on a regular basis.

Significant Differences in Actual Program Design from Approved Program Design: None.

Docket/Exhibit where Program is Discussed and Approved: The program is discussed in detail in the Company's 2010-2012 Three-year Electric Energy Efficiency Plan, filed October 30, 2009. See Western Massachusetts Electric Company, D.P.U. 09-118, Exhibit WMECO-1, pages 255-259 (bates numbering 00261-00265). The program was approved by the Department on January 28, 2010 in WMECO, D.P.U. 09-118. Planned values were approved in D.P.U. 10-84.

Table II.C.6 provides information on the performance of the C&I Small Retrofit Program.

Table II.C.6: C&I Small Retrofit							
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results		
			Value	% Change from Planned	Value	% Change from Preliminary	% Change from Planned
Expenses							
Total Program Costs	\$	4,526,927			4,726,333		4%
Performance Incentive	\$	162,368			159,252		-2%
Participants	sites	390			403		3%
Program Cost / Participant	\$	11,608			11,728		1%
Savings & Benefits							
Energy							
Lifetime	MWh	145,913	132,239	-9%	105,738	-20%	-28%
Annualized	MWh	11,574	10,725	-7%	8,597	-20%	-26%
Average Measure Life	yrs	12.6	12.3	-2%	12.3	0%	-2%
Demand							
Lifetime	kW	32,144	29,278	-9%	18,425	-37%	-43%
Annualized							
Summer	kW	2,540	2,354	-7%	1,510	-36%	-41%
Winter	kW	1,478	1,540	4%	776	-50%	-47%
Average Measure Life	yrs	12.7	1.5		1.9		
NEB (Lifetime)	\$	-619,371	-516,496	-17%	-567,614	10%	-8%
Cost-Effectiveness							
TRC Benefits	\$	19,628,193			13,528,152		-31%
TRC Costs	\$	6,602,468			6,924,121		5%
Net Benefits	\$	13,025,725			6,604,031		-49%
BCR	n/a	2.97			1.95		-34%

An explanation of significant variances between planned, preliminary year-end and evaluated values follows

- **Savings & Benefits:** The evaluated energy and demand savings reduction from the preliminary results reflect the inclusion of the results from the EM&V studies noted below. A comparison of planned and evaluated realization rates is presented in the following table.

Performance Category	Planned Value	Evaluated Value
Lighting kWh Realization Rate	105%	83%
kW Realization	105%	87%
Summer Coincidence Factor	100%	61%
Winter Coincidence Factor	57%	29%

- **Cost-effectiveness:** The reduction in TRC benefits, net benefits, and BCR correlates to the application of the C&I Small Retrofit EM&V study as explained above.

The following studies were completed for the C&I Small Retrofit 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, Study 30.

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 effect 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, Study 19.

Impact Evaluation of WMECO 2008 Small Business Energy Advantage Program Installations

This study evaluated the realization rates for annual kWh, summer on-peak kW and winter on-peak kW reductions for all SBEA projects. It provided separate realization rates for lighting equipment (not used here), lighting controls, refrigeration, and other. The net effect of this study was to decrease both energy and demand savings for this program.

This Study was previously submitted with the WMECO 2009 Annual Report Appendix 7, study # 11 in docket D.P.U.10-90.

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

The results of the evaluations described above will be used to adjust the planning estimates for this program in 2012.

The C&I Small Retrofit Program is cost effective with a BCR of 1.95.

III. EVALUATION MEASUREMENT AND VERIFICATION ACTIVITIES

A. Summary

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

Table III.A: Evaluation Studies in Annual Report			
Studies	Location of Complete Study in Annual Report	Docket & Exhibit Approving Planned Evaluation Studies	Implemented as Approved? (yes/no)
Residential Program Studies			
Massachusetts New Homes with ENERGY STAR Estimated Maximum Potential Savings from Enhanced Code Compliance with the IECC 2009 Residential Building Code in Massachusetts	App. C, Study 1	D.P.U. 09-118	Yes
Massachusetts New Homes with ENERGY STAR Mystery Shopping	App. C, Study 2	D.P.U. 09-118	Yes
The Massachusetts New Homes with ENERGY STAR Program 2011 Baseline Phase 1: Completion of Planning	App. C, Study 3	D.P.U. 09-118	Yes
Massachusetts 2010 Residential Retrofit and Low-Income Evaluation - Brushless Fan Motors	App. C, Study 4	D.P.U. 09-118	Yes
Massachusetts 2010 Residential Retrofit and Low Income Evaluation: Mass Save	App. C, Study 5	D.P.U. 09-118	Yes
2010 Net to Gross Findings: Home Energy Assessment	App. C, Study 6	D.P.U. 09-118	Yes
Non-Electric Impact (NEI) Findings for the 2010 Mass Save Home Energy Services (Mass Save) program	App. C, Study 7	D.P.U. 09-118	Yes
Massachusetts ENERGY STAR Lighting Program: 2010 Annual Report	App. C, Study 8	D.P.U. 09-118	Yes
Massachusetts Appliance Turn-in Program Evaluation Integrated Report Findings	App. C, Study 9	D.P.U. 09-118	Yes
Cross-Cutting Net-to-Gross Methodology Study for Residential Programs – Suggested Approaches (Final)	App. C, Study 10	D.P.U. 09-118	Yes
Estimated Net-To-Gross (NTG) Factors for the Massachusetts Program Administrators (PAs) 2010 Residential New Construction Programs, Residential HEHE and Multi-Family Gas Programs, and Commercial and Industrial Gas Programs	App. C, Study 11	D.P.U. 09-118	Yes
Residential Pilot Studies			
Massachusetts 2010 Residential Retrofit and Low Income Evaluation – Deep Energy Retrofit	App. C, Study 13	D.P.U. 09-118	Yes

Massachusetts New Homes with ENERGY STAR Process Evaluation of the Four to Eight Story Multi-Family New Construction Pilot Interim Findings	App. C, Study 14	D.P.U. 09-118	Yes
The Massachusetts New Homes with ENERGY STAR Program Major Renovations Pilot Evaluation: Preliminary Report on Non-Participant Interviews	App. C, Study 15	D.P.U. 09-118	Yes
The Massachusetts New Homes with ENERGY STAR Program Version 3 Pilot Evaluation	App. C, Study 16	D.P.U. 09-118	Yes
Low-Income Program Studies			
Massachusetts 2010 Residential Retrofit and Low Income Evaluation: Low Income	App. C, Study 18	D.P.U. 09-118	Yes
Commercial & Industrial Program Studies			
Non-Controls Lighting Evaluation for the Massachusetts Small Commercial Direct Install Program	App. C, Study 19	D.P.U. 09-118	Yes
Massachusetts Non-Residential Small Business Direct Install Program: Multi-Tier Structure Assessment 2010 Process Evaluation	App. C, Study 20	D.P.U. 09-118	Yes
Final Report HBL Market Effects Study Project 1A New Construction Market Characterization	App. C, Study 21	D.P.U. 09-118	Yes
FINAL Commercial New Construction Customer Quantitative Profile Project 1A New Construction Market Characterization	App. C, Study 22	D.P.U. 09-118	Yes
Supply Chain Profile Project 1A New Construction Market Characterization	App. C, Study 23	D.P.U. 09-118	Yes
Final Report Project 1B Chain & Franchise Market Characterization	App. C, Study 24	D.P.U. 09-118	Yes
Impact Evaluation of 2009 Custom HVAC Installations	App. C, Study 25	D.P.U. 09-118	Yes
Final Report Project 1C Combined Heat &Power Market Characterization	App. C, Study 26	D.P.U. 09-118	Yes
Project 6B Comprehensive Design Approach Process Evaluation	App. C, Study 27	D.P.U. 09-118	Yes
Impact Evaluation of 2008 and 2009 Custom CDA Installations	App. C, Study 28	D.P.U. 09-118	Yes
Project 7 General Process Evaluation Final Report	App. C, Study 29	D.P.U. 09-118	Yes
2010 Commercial and Industrial Electric Programs Free-ridership and Spillover Final Report	App. C, Study 30	D.P.U. 09-118	Yes
C&I Lighting Measure Life and Persistence Project	App. C, Study 31	D.P.U. 09-118	Yes
C&I Lighting Loadshape	App. C, Study 32	D.P.U. 09-118	Yes
C&I Unitary HVAC Loadshape Project Final Report	App. C, Study 33	D.P.U. 09-118	Yes
Cross Cutting C&I Free Ridership and Spillover Methodology Study Final Report	App. C, Study 34	D.P.U. 09-118	Yes
WMECO-Specific Large C&I Study	App. C, Study 38	D.P.U. 09-118	Yes

Special & Cross Sector Studies			
Industry Practices and Policies on Energy Efficient Program Rebate/Incentives	App. C, Study 36	D.P.U. 09-118	Yes
Community Based Partnership Interim Process Evaluation	App. C, Study 37	D.P.U. 09-118	Yes

B. Residential 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 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.

2. Massachusetts New Homes with ENERGY STAR Mystery Shopping (Study 2)

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 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:

1	Continue <i>Be a Star with ENERGY STAR</i> trainings. 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.
2	Expand trainings to include builders. 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.
3	Focus a portion of trainings on the HERS index and HERS ratings. All ENERGY STAR homes are not created equal, and agents should take advantage of the increased marketability of homes with low HERS ratings.
4	Encourage agents to attend all of the inspection stages of an ENERGY STAR home. 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.
5	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.

6	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:

1	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).
---	--

2	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.
---	---

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 Cadmus 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:

1	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.
2	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.

A copy of the complete study can be found in Appendix C, Study 4.

5. Massachusetts 2010 Residential Retrofit and Low Income Evaluation: Mass Save (Study 5)

Type of Study: Process

Objective of the Study: For the 2010 process evaluation, the Cadmus 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 Cadmus 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:

1	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.
2	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.
3	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 Cadmus team suggests expanding the existing financing options to cover these critical pre-participation issues.
4	<ul style="list-style-type: none"> • 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 (see Appendix H). • 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 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 evaluability and add transparency to the measure-tracking process. The Cadmus 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.
5	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.
6	Consider offering incentives to auditors based on implementation percentages or another participation goal designed to increase follow-through participation.

How the Study Came to the Recommended Conclusions: The RCS 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 Cadmus 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:

1	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.
2	The PAs have developed consistent statewide material and installation standards, as well as, Energy Assessment standards.
3	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.
4	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.
5	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.
6	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 Mass Save 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:

2010 Home Energy Services NTG Findings					
Measure Category	Measure	Participant Free-ridership	Participant Spillover	Non-participant Spillover	NTG
CFL Direct Installs	CFL	22%	19%	0%	97%
Direct Installs	Air Leak Sealing	7%	0%	0%	93%
	Programmable Thermostat	11%	0%	0%	89%
Incented Measures	Heating System	28%	0%	0%	72%
	Insulation	20%	8%	50%	138%
	Refrigerator	5%	0%	0%	95%
	Water Heater	25%	0%	0%	75%
Overall		18%	7%	23%	112%

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

1. **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 in Table 1, this analysis considered all program measures. A survey of 1,200 electric and 400 gas participants informed the analysis.
2. **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.
3. **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 Cadmus teams’ experience, professional judgment, and understanding of the programs.

How the Results of the Study Impact each Identified Program’s Savings: The results of this study will be used to derive net energy savings by multiplying the gross reported savings by the NTG factors.

Formulas Necessary to Understand the Impact of the Study on the PA’s Programs:

$$\text{NTG} = 1 - [\text{participant freeridership}] + [\text{participant spillover}] + [\text{nonparticipant spillover}]$$

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 Mass Save Home Energy Services (Mass Save) program (Study 7)

Type of Study: Impact

Objective of the Study: The study summarized Cadmus' review of the non-electric impacts ("NEIs") claimed for the 2011 Mass Save Home Energy Services ("Mass Save") program by the PAs. 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.

Cadmus' 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.

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.

Formulas Necessary to Understand the Impact of the Study on the PA's Programs: Not Applicable.

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 7.

8. Massachusetts ENERGY STAR Lighting Program: 2010 Annual Report (Study 8)

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. 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 panelist. The final NTGR estimates from the Delphi panel serve as the evaluation-recommended NTGR. 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.8.

Formulas Necessary to Understand the Impact of the Study on the PA's Programs:

Net savings = gross savings * in service rate * NTGR.

The planning NTGR value will be updated with the evaluated NTGR results. Markdown spirals will go from .30 to .43, specialty markdown bulbs change from 0.8 to 0.6, and HTR markdown bulbs change from 0.7 to 0.6.

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.

9. Massachusetts Appliance Turn-in Program Impact Evaluation Final (Study 9)

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)

Results of the 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 NMR 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.

Process related conclusions are based on the participant survey, in-depth interviews with Sponsors and the implementation contractor, and exploration of the secondary market and disposal market for appliances outside of the program.

Recommendations Derived from the Study:

1	<i>Use updated gross and net impact estimates for the program</i> —Overall, the net savings estimate for refrigerators is 522 kWh/year and for freezers is 391 kWh/year. The <i>ex ante</i> estimates used by the Sponsors are 724 kWh.
2	<i>Weigh the value of removing primary refrigerators</i> —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.
3	<i>Consider partnering with major retailers to market and implement the program.</i> 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.
4	<i>Target missed appointments</i> —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 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.
5	<i>Adjust goals to reflect demographics of the residential customer base for each Sponsor</i> —Service areas in NSTAR and Western Massachusetts Electric have a large number of apartments and multifamily homes and

	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.
6	<i>Educate participants about the program goals</i> —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.
7	<i>Continue messaging about the ease of removal through the program</i> —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.
8	<i>Continue promoting the program through existing channels</i> —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.
9	<i>Reinforce the idea of saving energy by not using appliances that are not essential and buying products with the ENERGY STAR label</i> —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.
10	<i>Sponsors should consider reaching out to Craigslist sellers.</i> 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.
11	<i>Let participants know about the environmental benefits they generated</i> —It 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 Results of the Study Impact each Identified Program’s Savings:

Please see Table II.A.9.

Formulas Necessary to Understand the Impact of the Study on the PA’s Programs: Not Applicable.

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

1	The PAs have adopted the net savings estimates.
2	The PAs will look into the best approach for handling primary refrigerators in the future.
3	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.
4	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.
5	Currently, each PA adjusts goals annually after assessing the previous year’s results.
6	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.
7	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.
8	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 & NGRID are also purchasing radio advertising).
9	All of the PAs’ advertising currently highlights energy savings more than once by having a specific call-out on ads with the savings message in a prominent 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.

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

10. Cross-Cutting Net-to-Gross Methodology Study for Residential Programs – Suggested Approaches (Final) (Study 10)

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 and Gas)
- Residential Cooling & Heating Equipment (Electric)
- Multi-Family Retrofit (Electric and Gas)
- MassSave (Electric and Gas)
- Behavior/Feedback Program (Electric and 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 NMR 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: In general, the Company adopts results from an evaluation study which are supported by the data generated 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 residential programs.

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

11. Estimated Net-To-Gross (NTG) Factors for the Massachusetts Program Administrators (PAs) 2010 Residential New Construction Programs, Residential HEHE⁸ and Multi-Family Gas Programs, and C&I Gas Programs (Study 11)

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:

⁸ HEHE is an acronym for the Residential High Efficiency Heating and Water Heating Equipment Program

- Residential New Construction and Major Renovation (Electric & Gas)
- Residential 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:

Program Type	Recommended NTGR
Residential New Construction	1.00
C&I Gas	
Custom	0.96
Prescriptive	0.83
Residential HEHE and Multi-family	
Boiler controls—HEHE	NTGR 1.0 (Residential)
Boilers—HEHE	Spillover: 0.14 (Residential)
Furnace/ECM furnace—HEHE	Spillover: 0.19 (Residential)
Insulation	NTGR 0.8 (Multifamily)
Programmable thermostats	NTGR 0.88 (Multifamily) 0.42 (Residential)
Misc water heating equipment	NTGR 0.63 (Residential)
Water saving devices	NTGR 0.77 (Multifamily)
Windows	NTGR 0.8 (Combined MF & Res)

The evaluation contractors (Tetra Tech, NMR, and KEMA) 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.

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.

Formulas Necessary to Understand the Impact of the Study on the PA’s Programs: Not Applicable

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. Massachusetts 2010 Residential Retrofit and Low Income Evaluation – Deep Energy Retrofit (Study 13)

Type of Study: Process

Objective of the Study: The overarching goal of the 2010 Deep Energy Retrofit 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:

1	<p>Restructure and refocus the pilot. The pilot is primarily focused on completing projects. Though pilot performance will clearly fall short of the cost-effective energy saving goals, it is still valuable. The Cadmus 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 overall cost-effectiveness should be a near term focus of the research effort.</p>
2	<p>Seek to fill program gaps. 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:</p> <p>Partial deep retrofits. 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.</p> <p>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</p>

relatively low-cost programs and the very high savings achieved at a high cost in the 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 Cadmus 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: It is both evident in this report and in practice that deep energy retrofits are extremely complex projects and require additional research and cost-effectiveness study for it to be a viable initiative as a stand alone program or for its 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 study 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.

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.

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

13. Massachusetts New Homes with ENERGY STAR Process Evaluation of the Four to Eight Story Multi-Family New Construction Pilot Interim Findings (Study 14)

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 completed in 2010. The objective of the interviews was to address several

process evaluation issues such as 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.

14. The Massachusetts New Homes with ENERGY STAR Program Major Renovations Pilot Evaluation: Preliminary Report on Non-Participant Interviews (Study 15)

Type of Study: Process

Objective of the Study: The purpose of the Major Renovations Pilot 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.

15. The Massachusetts New Homes with ENERGY STAR Program Version 3 Pilot Evaluation (Study 16)

Type of Study: Process

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 (“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:

1	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.
---	--

2	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.
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.

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 Cadmus 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 Cadmus 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:

1	To address any concerns related to funding and resource management, PAs and lead Community Action Program (“CAP”) agency could increase communication during the goal-setting processes, and track spending throughout implementation.
2	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.
3	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.
4	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.
5	The PAs should ensure the collection and availability of a minimum set of critical data fields for current and future evaluation work.
6	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.
7	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.
8	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.

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 evaluability, and add transparency to the measure tracking process. The Cadmus 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 Cadmus 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: In general, the PAs adopt results from an evaluation study which are supported by the data generated from the study.

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.

The PAs will use the Best Practice Meetings to clearly define standardization and integration objectives for the program and a timeline.

There is already a new QA/QC process being initiated that would minimize the number of visits to customer homes.

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.

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.

A copy of the complete study can be found in Appendix C, Study 18.

D. C&I 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. The data were also used to adjust estimates of energy and demand savings to determine realization rates at the statewide level, by program administrator and for two demand ranges. Information collected on site was compared to that in electronic tracking system files to make documentation, technology and quantity adjustments, as well as incorporating 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 results of this study are used to update uncontrolled lighting realization rates for energy (RR_E), summer on-peak demand (RR_{SP}) and winter on-peak demand (RR_{WP}) savings, and the coincidence factor for winter on-peak demand (CF_{WP}). Both the Energy Realization Rate and the Coincidence factors incorporate HVAC interactive effects.

The formulas necessary to understand the impacts are described in the TRM.

If the Results of the Study are Not Adopted, Fully Explain Why: This study collected operating hour data during winter months. 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.

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

2. Massachusetts Non-Residential Small Business Direct Install Program: Multi-Tier Structure Assessment 2010 Process Evaluation (Study 20)

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 C&I 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.

Future evaluation work during 2011 and 2012 should allow examination of the effectiveness of this approach in motivating direct install program participants to undertake additional energy efficiency projects by channeling them to other C&I programs. This may be accomplished through a combination of additional process interviews and mining of data from PA program tracking database systems.

A copy of the complete study can be found in Appendix C, Study 20.

3. Final Report HBL Market Effects Study Project 1A New Construction Market Characterization (Study 21)

Type of Study: Market Assessment

Objective of the Study: The principal research objectives of the High Bay Lighting 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 New Construction and Major Renovation - Government (Electric)
- C&I Large Retrofit (Electric)
- Large C&I Retrofit – Government (Electric)
- Small C&I Retrofit (Electric)

Recommendations Derived from the Study: The High Bay Lighting (“HBL”) Market Effects Study recommendations are provided in the following table. For a more detailed discussion please refer to the full report.

1	<p>Based on the modeled approach and the preponderance of evidence presented in the market effects study, KEMA recommends the electric PAs claim untracked spillover energy savings associated with Massachusetts HBL measures. KEMA 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.</p> <p>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.</p>
---	--

How the Study Came to the Recommended Conclusions: The Large C&I Electric Consultant (“LCIEC”) 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 includes:

- Surveys with:
 - End Users
 - Lighting Contractors
- In-depth Interviews with:
 - Program staff
 - Lighting Distributors
 - 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 described above.

Formulas Necessary to Understand the Impact of the Study on the PA's Savings: Following the recommendations of the study, the PAs have applied the 39 percent spillover factor resulting from this study to all measures associated with high bay lighting, instead of applying any spillover from any other net-to-gross study.

Each PA uses the results of the *2010 Commercial and Industrial Electric Programs Free-ridership and Spillover Study (TetraTech, Study 30)* for the spillover value for all non-high bay lighting savings in 2010. In order to determine the factor for all lighting measures, the following equation is used:

$$SO_{ALL} = \frac{SO_{HBL} \times kWh_{HBL} + SO_{OTH} \times kWh_{OTH}}{kWh_{ALL}}$$

Where:

- SO_{ALL} is the final spillover rate for all lighting measures.
- SO_{HBL} is the spillover rate of 39 percent resulting from this study for High Bay Lighting measures only.
- kWh_{HBL} is the gross annual kWh savings resulting from High Bay Lighting measure installations.
- SO_{OTH} is the spillover rate for all other Non-High Bay Lighting Measures and is specific to each program administrator.

- kWh_{OTH} is the gross annual kWh savings resulting from all other Non-High Bay Lighting measure installations.
- kWh_{ALL} is the total gross annual kWh savings for all Lighting measures.

This calculation is done for both the *C&I New Construction and Major Renovation* and the *C&I Large Retrofit* programs by each Program Administrator, except Unutil, as the spillover rates used for the Non-High Bay Lighting measures are specific to each PA. The calculation is also done for *C&I Small Business* program for WMECO and CLC, as their programs included high bay lighting installations and these savings were analyzed as part of this study. None of Unutil's projects in 2010 included High Bay Lighting installations. This calculation is therefore unnecessary for Unutil.

The following table shows this calculation for each PA's programs:

PA	NSTAR		National Grid		WMECO			CLC		
Program	NC	Retrofit	NC	Retrofit	NC	Retrofit	Small Business	NC	Retrofit	Small Business
kWh _{HBL}	765,663	4,933,376	3,645,109	19,438,428	534,105	55,859	1,654,904	0	59,015	76,616
kWh _{OTH}	13,451,544	52,632,615	2,723,676	45,575,106	7,423,917	776,427	6,822,148	154,161	386,354	3,398,029
kWh _{ALL}	14,217,207	57,565,991	6,368,785	65,013,534	7,958,022	832,286	8,477,052	154,161	445,369	3,474,645
SO _{HBL}	39%	39%	39%	39%	39%	39%	39%	39%	39%	39%
SO _{OTH}	2.40%	16.50%	16.00%	2.50%	4.70%	0.00%	3.70%	0.00%	0.00%	6.40%
SO _{ALL} (Result)	4.37%	18.43%	29.16%	13.41%	7.00%	2.62%	10.59%	0.00%	5.17%	7.12%

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

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 overarching objective of all LCIEC Market Characterization studies is: “To define the attributes of a specific market area in enough detail that the program planners and administrators can use the information for improving program implementation.” 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 projects 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 New Construction and Major Renovation - Government (Electric)
- C&I Large Retrofit (Electric and Gas)
- Large C&I Retrofit – Government (Electric)

Recommendations Derived from the Study: None.

How the Study Came to the Recommended Conclusions: The LCIEC 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 overarching objective of all LCIEC Market Characterization studies is: “To define the attributes of a specific market area in enough detail that the program planners and administrators can use the information for improving program implementation.” The principal research objectives of the New Construction Supply Chain Profile are provided in the following.

Principal Research Objectives

- 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 PA’s.

Programs to which the Results of the Study Apply:

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

Recommendations Derived From The Study:

The New Construction Supply Chain Profile recommendations are summarized below. For a more detailed discussion please refer to the full report.

Recommendation Summaries

1. 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.
2. 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.
3. Assist architects and engineers in understanding appropriate high performance building envelope design strategies for the Massachusetts climate. The study suggests 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.
4. Continue to build upon educational seminars, similar to Advanced Building seminars, to provide education and programmatic support on integrated design and whole building performance.
5. Streamline the application process by reducing the amount of paperwork that is required for participation.
6. Establish contacts within the top 25 architects, design engineers and construction management firms.

How the Study Came to the Recommended Conclusions

The New Construction Supply Chain Profile included the follow research activities:

- Examination of the F. W. Dodge Players Database for non-residential construction projects in Massachusetts.
- In-depth Interviews with:
 - 31 architects,
 - 11 design engineers, and
 - 9 construction engineers.

Explain Whether Or Why the PA Decided to Adopt Recommendations from the Study and Why: The Program Administrators accept the results of the study and are considering all recommendations at this time. The recommendations resulting from this study are based solely on interviews with market actors in the commercial new construction market and therefore do not necessarily provide an objective view of the programs.

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 overarching objective of all LCIEC Market Characterization studies is: “To define the attributes of a specific market area in enough detail that the program planners and administrators can use the information for improving program implementation.” 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 New Construction and Major Renovation - Government (Electric)

- C&I Large Retrofit (Electric and Gas)
- Large C&I Retrofit – Government (Electric)

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
 - C&F 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 New Construction and Major Renovation - Government (Electric)
- C&I Large Retrofit (Electric)
- Large C&I Retrofit – Government (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 (“RRs”) are calculated individually for National Grid and NSTAR, and at the statewide level. Site level RRs 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.

Formulas Necessary to Understand the Impact of the Study on the PA’s Programs: The results of this study are used to update the realization rates for energy (RRE), summer on-peak demand (RRSP), and winter on-peak demand (RRWP) savings for the “HVAC” end-use within Custom Measures.

The formulas necessary to understand the impacts are described in the TRM.

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 25.

8. Final Report Project 1C Combined Heat & Power Market Characterization (Study 26)

Type of Study: Market Assessment

Objective of the Study: The overarching objective of all LCIEC Market Characterization studies is: “To define the attributes of a specific market area in enough detail that the program planners and administrators can use the

information for improving program implementation.” 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 New Construction and Major Renovation - Government (Electric)
- C&I Large Retrofit (Electric)
- Large C&I Retrofit – Government (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.

1	Determine realistically achievable targets. 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.
2	Outreach to large sites. The PAs should identify and reach out to high-

	value large sites using the Account Executive (“AE”) teams from the different utilities.
3	Focused outreach for under 300 kW. For sites 60 – 300 kW, the PAs should work with partners to promote the incentive program. The PAs’ role with these 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.
4	Training Using Webinars. 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.
5	Program Stability-Coordination. 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.
6	Partners to collaborate. 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.

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 have accepted the results of the study and are considering all recommendations for adoption.

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”) tracks that are being delivered by National Grid, Western Massachusetts Electric Company (“WMECO”) 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.

CDA is a track within the custom C&I New Construction and Major Renovation programs offered by these PAs. It is an integrated approach that is ideally initiated at the beginning of the building design stage in order to ensure that cost-effective energy efficiency opportunities are incorporated such that energy use reduction of twenty percent or more is achieved relative to the requirements of state building code. The CDA track also offers financial incentives that are usually larger than those offered by prescriptive or the traditional custom new construction programs.

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. The AB track is similar to CDA but it targets smaller buildings within the commercial new construction market and aims to simplify and expedite the participation process by using standardized incentive and savings assumptions. In order for customers to receive monetary incentives through the AB track, they must incorporate a series of thirteen Core Performance requirements into their building designs.

Programs to which the Results of the Study Apply:

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

Recommendations Derived from the Study: The following are two different sets of recommendations, one for the CDA track and one for the AB track.

Recommendation Summaries for CDA Track	
1	Reduce the costs associated with the energy modeling study required for the CDA or alter the payment arrangement so that it is less burdensome on the customer upfront. Although technical study costs are split between the PA and the customer, it is still an upfront cost that is

	<p>incurred by the customer that would not necessarily be faced if a non-comprehensive program track were used. A possible solution would be for the PA to initially absorb the cost of the study, and then deduct the amount from the final incentive offer. This would relieve the customer of the burden of facing an upfront cost to participating in CDA.</p>
2	<p>Use a variety of marketing methods to inform customers of the CDA track, including printed materials and communication via AEs. In the process, make sure to inform customers of the relative benefits of CDA over competing approaches that may be simpler to use, but result in smaller long term energy savings and offer lower incentives. These marketing methods are needed to address key barriers to using the CDA track include a lack of customer awareness about the CDA track and competition with alternative energy efficiency programs that may be simpler or faster to use.</p>
3	<p>Since AEs are usually the first to hear about new construction projects, the Sponsors 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.</p>
4	<p>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.</p>
5	<p>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.</p>
6	<p>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.</p>
7	<p>Create a database, or annual report, of past program participants to</p>

	<p>document all information about their CDA project. 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.</p>
8	<p>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>
9	<p>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.</p>
10	<p>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.</p>
11	<p>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.</p>
12	<p>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.</p>
13	<p>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.</p>
14	<p>Improve CDA tracking systems: The process evaluation had a number of</p>

	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.
--	--

Recommendation Summaries for AB Track	
1	Foster personal relationships with design teams and customers: 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.
2	Take advantage of green marketing opportunities: 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.
3	Emphasize importance of long-term savings: 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.
4	Maintain interest with follow-up communications: 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.
5	Improve lead tracking: 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 & 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

	<p>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>
6	<p>Minimize customer burden: 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.</p>
7	<p>Take advantage of American Institute of Architects (“AIA”) continuing education requirements: 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.</p>
8	<p>Anticipate advancements in code and standard practice: 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.</p>
9	<p>Present the AB track as a learning opportunity for design firms: 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.</p>
10	<p>Discuss ideas with design team before presenting them to the customer: 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.</p>
11	<p>Maintain “soft cap” on building size: 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</p>

	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.
12	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.
13	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.

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 AEs;
- 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: All recommendations are being considered for adoption at this time. The PAs have not formally adopted or rejected any recommendations that require changes program design and operations.

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)
- C&I New Construction and Major Renovation - Government (Electric)
- C&I Large Retrofit (Electric)
- Large C&I Retrofit – Government (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 “Impact Evaluation of 2008 and 2009 Custom CDA Installations” report.

Site level RRs are determined through site inspection, data collection and engineering analysis. Analysis methods included 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

Formulas Necessary to Understand the Impact of the Study on the PA’s Programs: The results of this study are used to update the realization rates for energy (RRE), summer on-peak demand (RRSP), and winter on-peak demand (RRWP) savings for the “Comprehensive” end-use within Custom Measures.

The formulas necessary to understand the impacts are described in the TRM.

If the Results of the Study are Not Adopted, Fully Explain Why: WMECO did not utilize this study to evaluate 2010 results as there were no comprehensive design projects completed in 2010. WMECO will apply the statewide comprehensive realization rates going forward, for any comprehensive projects it has.

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

11. Project 7 General Process Evaluation Final Report (Study 29)

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

Recommendations Derived from the Study:

1	Increase AE and technical advisor staffing levels: 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.
2	Increase program incentive levels and limits: 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&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.
3	Offer turnkey financing: 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&I customers overcome the important lack-of-capital barrier. In 2011 the PAs are preparing to launch several prescriptive loan products for C&I customers that would buy down the interest rate to 0%.
4	Improve the design of marketing materials: The AEs recommended that program marketing materials be easier to understand and make greater use of case studies and testimonials.
5	Organize AEs by industry sector: 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.
6	Tie AE performance to program energy savings: 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.
7	Systematize the process for making requests for technical assistance: 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.
8	Help large C&I customers establish long-term commitments to energy efficiency: At least one PA is developing multi-year non-binding commitments with the corporate management of their large C&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.

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 customers' 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 commercial and industrial 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.

Formulas Necessary to Understand the Impact of the Study on the PA's Programs:

The results of this study are used to calculate the net savings associated with programs listed above. The formulas necessary to understand the impacts are described in the TRM.

If the Results of the Study are Not Adopted, Fully Explain Why: Not Applicable.

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 199 to 2009 using statistical analysis techniques.

Programs to which the Results of the Study Apply:

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

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.

Formulas Necessary to Understand the Impact of the Study on the PA's Programs: The results of this study were compared with existing values used by program administrators. Existing values come from a 2005 Massachusetts study, updated in 2007 for the State Program Working Group, a group of New England electric energy efficiency program administrators and state regulators. Measure lives developed from these two studies were based on secondary research of manufacturer literature and surveys of energy efficiency programs in other states.

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.

14. C&I Lighting Loadshape (Study 32)

Type of Study: Impact

Objective of the Study: A regional study conducted by the Northeast Energy Efficiency Partnership's EM&V Forum building upon a 2007 study done for the New England State Program Working Group to develop Commercial and Industrial lighting loadshapes and coincidence factors.

- C&I New Construction (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 Commercial and Industrial 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.

Formulas Necessary to Understand the Impact of the Study on the PA's Programs:

The results of this study are used to update the coincidence factors for summer on-peak demand (CF_{SP}), and winter on-peak demand (CF_{WP}) savings for non-controlled lighting measures for the Large C&I New Construction and Retrofit programs, and the summer on-peak demand (CF_{SP}) for the Small C&I Retrofit programs. The Coincidence factors incorporate HVAC interactive effects.

The results of this study were presented for three weather zones; NE-Mass Weather (representing NEMA and SEMA Load zones), NE-North Weather (representing New Hampshire and Maine), and NE-South Coastal (representing Rhode Island and Connecticut). The Massachusetts PAs used the results from the NE-Mass Weather zone and NE-North Weather zone (this zone was used as the best representation of western Massachusetts weather). The results across these two weather zones were exactly the same to two significant digits.

The formulas necessary to understand the impacts are described in the TRM.

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 determined winter on-peak (CF_{WP}) 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.

15. C&I Unitary HVAC Loadshape Project Final Report (Study 33)

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 representative 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)
- C&I New Construction and Major Renovation - Government (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 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.

Formulas Necessary to Understand the Impact of the Study on the Program Administrator's Programs: The formulas necessary to understand the impacts are described in the TRM. Gross energy and demand savings use the following four formulas.

For units with cooling capacities less than 65 kBtu/h (for National Grid):

$$\Delta kWh = (kBtu / h) \left(\frac{1}{SEER_{BASE}} - \frac{1}{SEER_{EE}} \right) (EFLH_{Cool})$$

$$\Delta kW = (kBtu / h) \left(\frac{1}{SEER_{BASE}} - \frac{1}{SEER_{EE}} \right)$$

For units with cooling capacities equal to or greater than 65 kBtu/h (all PAs):

$$\Delta kWh = (kBtu / h) \left(\frac{1}{EER_{BASE}} - \frac{1}{EER_{EE}} \right) (EFLH_{Cool})$$

$$\Delta kW = (kBtu / h) \left(\frac{1}{EER_{BASE}} - \frac{1}{EER_{EE}} \right)$$

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.

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

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

$$\Delta kWh = (kBtu/h)(\Delta kW)(777)(150.08\%)$$

$$\Delta kW_{Summer} = (kBtu/h)(\Delta kW)(0.820)(54.63\%)$$

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.

Load Zone	National Grid Load Zone Weight	NEEP Result EFLH	NEEP Result ISO-NE On-Peak Summer Coincidence Factor (1-5PM, WDNH, Jun-Aug)
SEMA	0.3234	1,172	0.448
NEMA	0.2378	1,172	0.448
WCMA	0.4388	719	0.332
National Grid Results		973	0.397
Gross Estimate		777	0.441
Realization Rate		125.23%	89.94%

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

$$\Delta kWh = (kBtu / h)(\Delta kW)(777)(125.23\%)$$

$$\Delta kW Summer = (kBtu / h)(\Delta kW)(0.441)(89.9\%)$$

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 all unitary HVAC measures in the company’s tracking system.

Load Zone	NSTAR Load Zone Weight	NEEP Result EFLH	NEEP Result ISO-NE On-Peak Summer Coincidence Factor (1-5PM, WDNH, Jun-Aug)
SEMA	1	1,172	0.448
NEMA	1	1,172	0.448
WCMA	0	719	0.332
NSTAR Results		1172	0.448
Gross Estimate		xxxx	0.82
Realization Rate		yy%	54.6%

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

$$\Delta kWh = (kBtu / h)(\Delta kW)(xxxx)(yyyy\%)$$

$$\Delta kW Summer = (kBtu / h)(\Delta kW)(0.82)(54.6\%)$$

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

WMECO will use these coincidence factors and default equivalent full load hours (EFLH) by building type going forward, once they are incorporated into the TRM. However, in most cases, WMECO will continue to use site-specific estimates of EFLHs. For coincidence factors, unlike other MA PAs, WMECO will use the ISO-NE FCM Seasonal Peak values, corresponding to how WMECO bids into ISO-NE’s Forward Capacity Market.

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

16. Cross Cutting C&I Free-Ridership and Spillover Methodology Study Final Report (Study 34)

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 New Construction and Major Renovation—Government (Electric)
- C&I Large Retrofit (Electric)
- C&I Large Retrofit—Government (Electric)
- C&I Small Retrofit (Electric)
- C&I Small Retrofit—Government (Electric)
- C&I Retrofit (Gas)
- C&I Direct Install (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: In general, the Company adopts results from an evaluation study which are supported by the data generated 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 Commercial & Industrial programs.

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

17. Evaluation of WMECO's 3 Large C&I Programs for 2007-08 Program Years

Type of Study: Impact

Objective of the Study: Provide independent estimates of annual energy savings and peak demand impacts for all six types of end uses for all of WMECO's Large C&I programs. Also provide typical load shapes for each end use, across all the hours of the year.

This study was initiated by WMECO in late summer 2009. Metering took place mostly in winter 2009-10 and in summer 2010. The report was finalized in spring 2011. This study was not part of the MA-wide 2010-12 evaluation framework.

Programs to Which the Results of the Study Apply:

- WMECO Large C&I New Construction Program (new and old)
- WMECO Large C&I Retrofit Program (new)
- WMECO Large C&I Custom Services Program (old)
- WMECO Large C&I RFP Program (old)

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

The study produced gross energy and demand (summer and winter, seasonal peak definition) gross savings realization rates, with accompanying precision, jointly for WMECO's large C&I programs. The savings estimates were for lighting, HVAC (cooling), industrial process, refrigeration, other motors, and other. It also produced load shapes for each of these 6 end uses, for 24 hours a day, for each of 12 months, weekend or weekday.

The study sampled equipment at 54 WMECO participants, chosen by stratified sampling. It used instantaneous power readings, hour and current loggers, equipment nameplate data, and manufacturer specifications to calculate site-specific savings. These often spanned multiple end use categories at particular sites. Metered data from several weeks was extrapolated to the full year, using building simulation models and equipment simulations (both calibrated to customer monthly bill data), fan and pump curves, chiller logs, EMS readouts, and building equipment operating schedules.

Study Impact Results Effect on Each Identified Program's Savings:

The realization rates were	kWh	S kW	W kW
Lighting	104.5%	122.9%	105.3%
Cooling	91.1%	119.5%	122.0%
Process	89.6%	171.0%	122.0%
Refrigeration	90.7%	208.1%	87.2%
Other Motors	131.4%	84.6%	60.1%
Other	57.4%	77.5%	81.0%

Overall realization rates were 92.4% for kWh, 130.2% for S kW, and 104.7% for W kW. Overall precision (at 80% confidence) was 4.0%, 9.1%, and 12.3% respectively.

These rates are applied to WMECO's tracking estimates of savings, until they are superseded by later studies. The realization rates from the MA-wide Custom HVAC study, using 2009 data, mostly supersedes the cooling realization rates, since custom cooling measures outnumbered prescriptive ones.

Formulas Necessary to Understand the Impact of the Study on the Program Administrator's Programs:

The results of this study are used to update all realization rates for energy (RR_E), summer on-peak demand (RR_{SP}) and winter on-peak demand (RR_{WP}) savings, for all WMECO Large C&I end uses. They realization rates incorporate HVAC interactive effects. The formulas necessary to understand the impacts are described in the TRM.

The results are fully adopted, to the extent not superseded by later studies, as noted above.

A copy of the complete study can be found in Appendix C, Study 38.

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:

Tetra Tech and the Energy Center of Wisconsin (ECW) ("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 Large Retrofit—Government (Electric)
- C&I Small Retrofit (Electric)
- C&I Small Retrofit—Government (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:

Not Applicable

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 and Gas)
- Western Mass Saves Challenge (Electric)
- New Bedford Community Mobilization Initiative (Electric and Gas)

Recommendations Derived from the Study:

Overarching Findings
<p>Articulate program design to reflect the target market – 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.</p>
<p>Draw on the strengths of local and existing resources and ensure that the community group efforts align with partnership goals – 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.</p>
<p>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.</p>
<p>Tracking information to help improve efforts and demonstrate success –</p>

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 summarizes the studies expected to be included in next year's Annual Report.⁹

Table III.B: Evaluation Studies in Next Annual Report		
Studies	Docket & Exhibit Approving Planned Evaluation Studies	Expected to be Implemented as Approved? (yes/no)
Residential Studies		
Market Study for Hard-to-Reach Lighting market	N/A	N/A
Impact Study for Specialty Lighting	N/A	N/A
Impact study on CFL measure life	N/A	N/A
Evaluation of Smart Powerstrips	N/A	N/A
Market study on changes in consumer electronics	N/A	N/A
Market assessment to identify additional areas for residential energy efficiency savings	N/A	N/A
Process study to streamline appliance rebate programs	N/A	N/A
Follow-up Evaluation of Appliance Recycling program	N/A	N/A
Net-to-Gross study for selected appliance rebates	N/A	N/A
Baseline Study/Impact Study of Mass Save program	N/A	N/A
Process and Impact evaluation of Multifamily Program	N/A	N/A
Phase II: Baseline Study/Code Compliance Assessment	N/A	N/A
Phase II: Analysis of Code Upgrade Program Impacts	N/A	N/A
Phase II: Analysis of Code Compliance Enhancement Impacts	N/A	N/A
Major Renovation Pilot	N/A	N/A
Homebuyer Survey	N/A	N/A
Assessment of New Technologies	N/A	N/A
Builder Focus Groups	N/A	N/A

⁹ See D.P.U. 09-116 through D.P.U. 09-120, at 132; D.P.U. 09-121 through D.P.U. 09-128, at 122.

Residential Potential Study work	N/A	N/A
Low-Income Studies		
Baseline Study/Impact Study of Low Income program	N/A	N/A
Commercial & Industrial Studies		
Integrated Program Process Evaluation	N/A	N/A
Lighting Billing Analysis Evaluation	N/A	N/A
Market Assessment	N/A	N/A
Net-to-Gross Study	N/A	N/A
Phase II: Non-Residential New Construction Market Assessment Study	N/A	N/A
Custom Electric Measures Impact Evaluations (Lighting, Process, Compressed Air)	N/A	N/A
Prescriptive Gas Measures Impact Evaluation	N/A	N/A
Custom Gas Measures Impact Evaluation	N/A	N/A
Prescriptive Measure Impact Evaluation (Lighting, VSDs)	N/A	N/A
CHP Impact Evaluation	N/A	N/A
Phase II: Behavioral Pilots	N/A	N/A
Phase II: Community Based Pilots	N/A	N/A
Phase II: Umbrella Marketing	N/A	N/A
C&I Net-to-Gross Study	N/A	N/A
Non-Energy Impacts 2011 - C&I: non-Custom	N/A	N/A

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 IV.A through IV.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, the benefits of collaborative planning, the adoption of consistent programs and processes and the coordination of program design, EM&V studies, and regulatory proceedings 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 sharing 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.

Table IV.A: Program Planning and Administration Costs						
Customer Sector / Program	Planned		Actual		Change from Planned to Actual	
	Value (\$)	% of Total Program Costs	Value (\$)	% of Total Program Costs	Value	% of Total Program Costs
Residential						
Residential New Construction & Major Renovation	65,000	23%	52,981	20%	-12,019	-3%
Residential Cooling & Heating Equipment	5,000	3%	35,291	12%	30,291	9%
Multi-Family Retrofit	60,000	19%	14,655	32%	-45,345	13%
MassSAVE	91,192	2%	303,895	7%	212,703	5%
ENERGY STAR Lighting	68,023	6%	101,209	9%	33,186	3%
ENERGY STAR Appliances	30,000	18%	55,088	16%	25,088	-1%
Residential Education Program	5,000	8%	27,794	27%	22,794	19%
Workforce Development	10,000	40%	9,437	36%	-563	-4%
Heat Loan Program	0	0%	18,267	4%	18,267	4%
Deep Energy Retrofit	10,000	8%	7,348	6%	-2,652	-2%
EEAC Consultants	47,858	100%	0	0%	-47,858	-100%
DOER Assessment	44,477	100%	44,477	100%	0	0%
Residential Total	436,550	6%	670,443	10%	-233,893	4%
Low-Income						
Low-Income Residential New Construction	8,261	13%	8,217	11%	-44	-1%
Low-Income 1 to 4 Family Retrofit	195,984	9%	366,502	17%	170,518	8%
Low-Income MultiFamily Retrofit	20,000	10%	6,379	11%	-13,621	0%
Low-Income Energy Affordability Network Funding	34,000	100%	29,863	100%	-4,137	0%
DOER Assessment	23,949	100%	23,949	100%	0	0%
Low-Income Total	282,194	11%	434,911	19%	152,717	7%
Commercial & Industrial						
C&I New Construction and Major Renovation	466,032	16%	357,777	12%	-108,255	-4%
C&I Large Retrofit	556,552	16%	298,303	12%	-258,249	-5%
C&I Small Retrofit	318,360	7%	268,588	6%	-49,772	-1%
EEAC Consultants	111,668	100%	0	0%	-111,668	-100%
DOER Assessment	102,640	100%	102,640	100%	0	0%
Sponsorships & Subscriptions	0	0%	0	0%	0	0%
C&I Total	1,555,252	14%	1,027,309	10%	-527,943	-4%
GRAND TOTAL	2,273,996	11%	2,132,663	11%	-141,334	0%

The Company did not experience any variances greater than ten percent between planned and actual PP&A spending at the sector level.

C. Competitive Procurement

Table IV.B: Outsourced & Competitively Procured Services									
Customer Sector	In-House Activities		Outsourced Activities						TOTAL Activities
			Competitively Procured		Non-Competitively Procured		Total Outsourced Activities		
	\$	% of Total Activities	\$	% of Total Outsourced	\$	% of Total Outsourced	\$	% of Total Activities	\$
Residential									
Planned	\$344,215	16%	\$1,753,140	95%	\$92,335	5%	\$1,845,475	84%	\$2,189,690
Actual	\$657,412	27%	\$1,769,351	98%	\$44,477	2%	\$1,813,829	73%	\$2,471,241
% Difference from Planned to Actual		11%		3%		-3%		-11%	
Low-Income									
Planned	\$227,995	26%	\$97,959	15%	\$542,999	85%	\$640,958	74%	\$868,953
Actual	\$397,673	43%	\$84,057	16%	\$442,478	84%	\$526,536	57%	\$924,209
% Difference from Planned to Actual		17%		1%		-1%		-17%	
Commercial & Industrial									
Planned	\$1,400,094	48%	\$1,265,596	82%	\$272,058	18%	\$1,537,654	52%	\$2,937,748
Actual	\$1,020,445	57%	\$628,571	82%	\$141,740	18%	\$770,311	43%	\$1,790,756
% Difference from Planned to Actual		9%		-1%		1%		-9%	
TOTAL									
Planned	\$1,972,304	33%	\$3,116,695	77%	\$907,392	23%	\$4,024,087	67%	\$5,996,391
Actual	\$2,075,530	40%	\$2,481,980	80%	\$628,696	20%	\$3,110,676	60%	\$5,186,206
% Difference from Planned to Actual		7%		2%		-2%		-7%	

The Company did not experience any significant variances between planned and reported outsourced activities and competitively procured activities.

D. Low-Income Spending

Table IV.C: Customer Sector Budget Allocation						
Customer Sector	Planned		Actual		Change from Planned to Actual	
	Total Program Costs	% of Total Program Costs	Total Program Costs	% of Total Program Costs	Value	% Change
Residential	\$6,988,573	34%	\$6,836,145	35%	-\$152,429	1%
Low-Income	\$2,466,968	12%	\$2,317,313	12%	-\$149,655	0%
Commercial & Industrial	\$11,136,767	54%	\$10,326,770	53%	-\$809,997	-1%
TOTAL	\$20,592,308	100%	\$19,480,227	100%	-\$1,112,081	0%

As shown in Table IV.C, the Company met the minimum statutory requirement by spending 12% of energy efficiency funds in the low-income customer sector.

V. PERFORMANCE INCENTIVES

Table V¹⁰ below summarizes the performance incentives.

Table V: Performance Incentives Summary				
Incentive Components	Threshold	Design	Exemplary	Actual Incentive
Savings Mechanism	\$471,667	\$628,889	\$786,111	\$689,980
Value Mechanism	\$383,672	\$511,563	\$639,454	\$555,031
Performance Metrics	\$154,035	\$205,381	\$256,726	\$206,125
Total Incentive (before-tax)	\$1,009,375	\$1,345,833	\$1,682,291	\$1,451,136
Total Incentive (after-tax)	\$613,602	\$818,135	\$1,022,669	\$882,149

For each performance incentive component, the Company is providing information to support its determination of actual performance incentives for which it seeks recovery in Section VII, Appendix D.

The Company did not apply the 25 percent EM&V impact bandwidth to the savings and/or value mechanisms, as evaluated sector savings levels did not decrease at that level.

WMECO fully describes its role in each performance metric, especially for those designed on a statewide basis, and explains why the Company should earn the incentive associated with such metric. Full supporting documentation for each performance metric is provided as Appendix D.¹¹

¹⁰ Applied Corporate tax rate of .39225

¹¹ See D.P.U. 09-116-B through D.P.U. 09-118-B and D.P.U. 09-120-B through D.P.U. 09-127-B at 12-14.

VI. AUDITS

The following audits (internal and external) that relate to the Company's energy efficiency activities have been conducted during the last five years (2006-2010):

Audit 1: WMECO Energy Efficiency Programs (EEPs) Audit

This was an audit of WMECO's Energy Efficiency Programs conducted by the Northeast Utilities Internal Audit Department in 2009. A full copy of the audit report including scope, findings, recommendations, and implementation of such recommendations has been provided in Appendix E.