



Melissa G. Liazos
Senior Counsel

August 1, 2013

VIA HAND DELIVERY AND E-FILING

Mark D. Marini, Secretary
Department of Public Utilities
One South Station, 5th Floor
Boston, MA 02110

**Re: D.P.U. 13-xx – 2012 Energy Efficiency Annual Report
Boston Gas Company and Colonial Gas Company each d/b/a National Grid**

Dear Secretary Marini:

On behalf of Boston Gas Company and Colonial Gas Company each d/b/a National Grid (the Company”), enclosed please find the Company’s 2012 Energy Efficiency Annual Report in this proceeding, along with the Affidavits of Lynn Westerland and Brian Pelletier, my Appearance of Counsel, and Certificate of Service.

Thank you for your time and attention to this matter.

Very truly yours,

A handwritten signature in blue ink that reads "Melissa G. Liazos".

Melissa G. Liazos

Enclosures

cc: Jonathan Goldberg, Hearing Officer
Matthew Saunders, Assistant Attorney General
Steven Venezia, Department of Energy Resources

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC UTILITIES

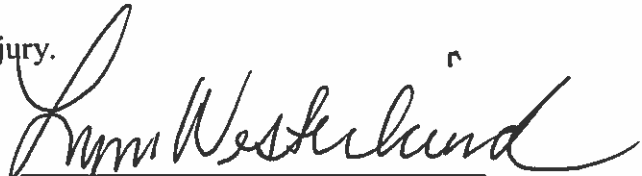
D.P.U. 13-___

Affidavit of Lynn Westerlind

I, Lynn Westerlind, do attest and swear to the following:

1. I am employed by National Grid as Manager, Policy and Evaluation Program Strategy – Massachusetts. In my current position, I am responsible for energy efficiency evaluation and for energy efficiency related regulatory efforts in support of energy efficiency for Boston Gas Company and Colonial Gas Company.
2. I am familiar with National Grid's 2012 Energy Efficiency Annual Report Filing.
3. I have reviewed the filing, and the representations made therein are true and correct to the best of my knowledge.

Signed under the pains and penalties of perjury.


Lynn Westerlind

Dated: August 1, 2013

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC UTILITIES

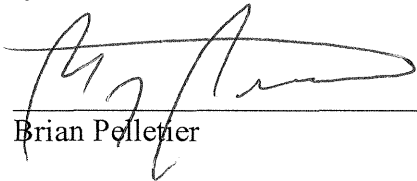
D.P.U. 13-__

Affidavit of Brian Pelletier

I, Brian Pelletier, do attest and swear to the following:

1. I am employed by National Grid as Manager, Energy Efficiency Reporting. In my current position, I am responsible for reporting of energy efficiency spending and savings in support of energy efficiency for Boston Gas Company and Colonial Gas Company.
2. I am familiar with National Grid's 2012 Energy Efficiency Annual Report Filing where it pertains to spending and savings.
3. I have reviewed the spending and savings portions of the filing, and the representations made therein are true and correct to the best of my knowledge.

Signed under the pains and penalties of perjury.



Brian Pelletier

Dated: August 1, 2013

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES

**Boston Gas Company and Colonial Gas
Company each d/b/a National Grid
2012 Energy Efficiency Annual Report**

D.P.U. 13-xx

NOTICE OF APPEARANCE

In the above-entitled proceeding, I hereby appear for and on behalf of Boston Gas Company and Colonial Gas Company each d/b/a National Grid.



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Date: August 1, 2013

THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES

**Boston Gas Company and Colonial Gas
Company each d/b/a National Grid
2012 Energy Efficiency Annual Report**

D.P.U. 13-xx

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing in the above referenced docket upon the service list compiled in this proceeding by hand delivery and E-Filing.

BOSTON GAS COMPANY and
COLONIAL GAS COMPANY
each d/b/a NATIONAL GRID



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Date: August 1, 2013

Boston Gas Company and Colonial Gas Company d/b/a National Grid

2012 Gas Energy Efficiency Annual Report

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I. INTRODUCTION

During program year 2012, the final year of implementation under the 2010-2012 three-year energy efficiency plans, the Massachusetts Energy Efficiency Program Administrators¹ (the “Program Administrators” or “PAs”) continued to build on the nationally acclaimed successes of program years 2010 and 2011. Among the many awards and accomplishments achieved during program year 2012, the American Council for an Energy-Efficient Economy (“ACEEE”) ranked Massachusetts number one in the nation for its energy efficiency efforts for the second year in a row.

Most notably in 2012, the PAs successfully delivered on their very ambitious goals for the program year, as reviewed and approved by the Massachusetts Department of Public Utilities (the “Department”) in D.P.U. 09-116 through 09-127 and as submitted in each PA’s 2012 Mid-Term Modification dated October 28, 2011. The PAs were able to attain historic levels of energy savings while maintaining budgetary control and complying with the directive of the Green Communities Act to seek all cost-effective energy efficiency opportunities. The 2012 goals were intentionally designed to be very challenging stretch goals, and achievements in savings and benefits reached unprecedented levels in Massachusetts for residential, low-income, and commercial and industrial (“C&I”) programs. The PAs successfully implemented their programs in the field while also continuing this unprecedented ramp up of spending and savings levels for energy efficiency programs to meet goals not just for program year 2012, but for the full life of the three-year plans, and to sow the seeds for additional savings going forward.

The accomplishments of 2012 were achieved despite a slower than expected recovery in the economy, low natural gas prices, and a significant increase in savings goals. In the wake of these challenges, the PAs continued to proactively work toward developing new delivery methods to reach more customers and to encourage customers to move forward with greater commitments and investments in energy efficiency. For example, during 2012, the PAs focused on refining their marketing approach to achieve deeper savings from participating customers, and worked diligently to reach a broader range of customers to implement all cost-effective program offerings. The PAs also continued to develop new technologies and new initiatives in 2012 in order to expand programming efforts and achieve their goals.

The Program Administrators also continued to engage in very high levels of integration, coordination and cooperation – all of which are hallmarks of the 2010-2012 three-year energy efficiency plans. Examples of this statewide coordination in 2012 include the establishment of consistent guidelines and protocols for delivery of the Voluntary Accelerated Rebate Pilot, which will be implemented in 2013, and continued expansion of upstream product offerings.

In 2012, the Program Administrators created the Evaluation Management Committee (“EMC”) similar to the successful C&I and Residential Management Committees. The EMC, comprised of PA representatives and the Massachusetts Energy Efficiency Advisory Council (“EEAC” or “Council”) consultants, serves as a steering committee for statewide evaluation issues. The EMC

¹ The Massachusetts Program Administrators are: Bay State Gas Company d/b/a Columbia Gas of Massachusetts, The Berkshire Gas Company, Blackstone Gas Company, Cape Light Compact, Fitchburg Gas and Electric Light Company d/b/a Unitil, National Grid, New England Gas Company, NSTAR Electric Company, NSTAR Gas Company, and Western Massachusetts Electric Company.

plans, prioritizes and delineates the research studies to be undertaken. The PAs worked together to engage in 25 studies across a wide span of program sectors in 2012, underscoring the fact that the evaluation, measurement and verification (“EM&V”) of these program offerings remains a critical and vital tool for both Program Administrators and interested stakeholders in an ever changing marketplace.

The Program Administrators also continued to be actively engaged with the EEAC and worked collaboratively with the EEAC’s consultants to meet detailed reporting and data collection deadlines in 2012. The PAs reviewed and expanded upon many areas of policy and reporting, including continuing accurate data development, evaluation and measurement of successes and areas in need of modification, transparent codes and standards, and building the framework necessary to ensure the ability to continue to offer successful and sustainable energy efficiency programs in the Commonwealth.

In addition, the PAs were also at the forefront of creating a culture of sustainability through public education. In May 2012, the PAs hosted an Appreciative Inquiry Summit, the first of its kind for energy efficiency in Massachusetts, which provided a venue for a diverse array of nearly 300 key stakeholders, including customers, civic leaders, contractors, key trade allies, energy efficiency experts, and others to provide the PAs with insights to guide efforts designed to continue to create a culture of sustainability in the Commonwealth. The PAs also hosted an Energy Efficiency Conference and Expo in 2012, which featured a full day of programming focused primarily on business and municipal customers.

Throughout 2012, the PAs continued their efforts to integrate gas and electric energy efficiency services and expand statewide marketing efforts, which, through the use of the Mass Save[®] brand, continued to be an integral part of promoting energy efficiency programs in Massachusetts. The 2012 marketing campaign introduced a renewed, simplified Mass Save message.

Simultaneously with the activities and achievements noted above, the Program Administrators also devoted considerable time and effort in 2012 to developing their 2013-2015 energy efficiency plans. During the 2013-2015 planning process, each PA focused on increasing savings goals and reducing costs, streamlining the participation process in all sectors and realigning outreach and delivery efforts to be more customer-focused, all of which built on the achievements and lessons learned from 2010-2012.

Given the unprecedented nature of these efforts, and the ambitious goals established in the 2010-2012 Plans, program year 2012 performance has been an outright success for energy efficiency in Massachusetts. Over the three years of the 2010-2012 energy efficiency plans, the Program Administrators have achieved unprecedented levels of savings and benefits within budget, and look forward to continuing these efforts and achieving additional successes going forward.

A. Purpose of Annual Report

Boston Gas Company and Colonial Gas Company d/b/a National Grid (the “Company”) is pleased to provide its Energy Efficiency Annual Report (“Annual Report”) for 2012. 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 significant² variances between the Company’s planned and evaluated costs, savings, and benefits for the program year, and discuss reasons for such variances.
- Discuss how program performance during the program year informs the Company’s proposed modifications to program implementation, if any, during upcoming years.
- Describe the EM&V activities undertaken by the Company 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 2012 Annual Report is organized as follows:

- Section I.C provides summary information on program performance at the portfolio and sector levels.
- Section II provides detailed information on program performance at the sector and program levels for the residential, low-income, and C&I sectors.
- Section III provides detailed information on the EM&V studies included in the Annual Report for each sector.
- Section IV addresses statutory budget requirements.
- Section V addresses the performance incentives the Company proposes to collect.
- Section VI addresses energy efficiency audits conducted during the past five years, where applicable.
- Section VII consists of Appendices A through F which provide further detailed supporting documentation for this report.

C. Summary of Program Portfolio

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

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

Tables³ 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	\$	78,456,459			85,776,174		9%
Performance Incentive	\$	2,807,455			3,044,221		8%
Savings & Benefits							
Gas							
Lifetime	therms	165,327,907	187,122,245	13%	183,276,212	-2%	11%
Annualized	therms	14,120,214	14,899,249	6%	14,520,567	-3%	3%
Electric							
Annualized Energy	kWh	803,928	969,555	21%	1,108,405	14%	38%
Annualized Demand							
Summer	kW	323	113	-65%	521	363%	61%
Winter	kW	80	141	76%	260	84%	225%
Non-Gas Non-Electric							
Benefits (Lifetime)	\$	61,910,304	83,239,695	34%	69,527,636	-16%	12%
Cost-Effectiveness							
TRC Benefits	\$	203,311,808			225,213,429		11%
TRC Costs	\$	120,496,470			123,844,455		3%
Net Benefits	\$	82,815,338			101,368,975		22%
BCR	n/a	1.69			1.82		8%

Note: The Planned Values in Table I.A and all subsequent tables that contain Planned Values in this Annual Report (except as otherwise noted) were originally submitted to the Department on October 28, 2011 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 11-109.

As shown in Table I.A above, at the portfolio level there were significant variances between planned and preliminary savings and benefits. Specifically, Annual kWh, Winter kW and Non-Gas Non-Electric Benefits were 21%, 76% and 34% higher than planned values, while Summer kW was 65% lower than planned. There were also significant variances between preliminary and evaluated savings. Summer and Winter kW evaluated values were 363% and 84% higher than preliminary year-end results. It should be noted that the electric savings presented here are unique to any electric savings presented in the 2012 Electric Energy Efficiency Annual Report. Net benefits were 22% higher than planned overall, leading to a higher BCR than initially planned. For a more detailed discussion of the cause of variances in each sector please reference section II.A.1 for residential results, section II.B.1 for low-income results; and section II.C.1 for C&I results.

³ The Company is also providing 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.

Table I.B: Customer Sector Summary				
Sector	Units	Planned Value	Evaluated Results	
			Value	% Change from Planned
Residential				
TRC Benefits	\$	114,413,613	106,725,486	-7%
TRC Costs	\$	64,486,631	73,423,069	14%
Net Benefits	\$	49,926,981	33,302,417	-33%
BCR	n/a	1.77	1.45	-18%
Low-Income				
TRC Benefits	\$	24,644,149	52,271,719	112%
TRC Costs	\$	18,383,255	24,060,663	31%
Net Benefits	\$	6,260,895	28,211,057	351%
BCR	n/a	1.34	2.17	62%
C&I				
TRC Benefits	\$	64,254,046	66,216,224	3%
TRC Costs	\$	37,626,584	26,360,723	-30%
Net Benefits	\$	26,627,462	39,855,501	50%
BCR	n/a	1.71	2.51	47%
TOTAL				
TRC Benefits	\$	203,311,808	225,213,429	11%
TRC Costs	\$	120,496,470	123,844,455	3%
Net Benefits	\$	82,815,338	101,368,975	22%
BCR	n/a	1.69	1.82	8%

As shown in the Table I.B above, there were significant variances between planned and actual values for the Residential, Low-income, and C&I sector levels. Overall, evaluated Net Benefits were 22% above planned estimates. These variances are due to individual program performance and evaluation results. Sections II.A, II.B and II.C provide more detail on the performance of each individual program.

II. PROGRAM PERFORMANCE

A. Residential Sector Programs

1. Summary

During 2012, the Company implemented the following residential programs and residential pilots:

Residential Programs

- Residential New Construction and Major Renovation
- Residential Heating and Water Heating
- Residential Mass Save/Weatherization
- Residential Multi-Family Retrofit
- Behavior/Feedback

Residential Pilots

- Deep Energy Retrofit
- Community Based Pilot
- Residential Building Practices and Demonstration

Tables II.A.1 and II.A.3 provide summary information on the performance of the residential programs at the sector and program levels, respectively. Please note the gas Program Administrators do not track data by end-use, and, therefore, are not required to provide the information in Table II.A.2.

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	\$	41,225,367			47,872,896		16%
Performance Incentive	\$	1,527,244			1,325,844		-13%
Savings & Benefits							
Gas							
Lifetime	therms	89,006,968	102,508,224	15%	87,909,997	-14%	-1%
Annualized	therms	8,389,838	8,993,094	7%	7,984,661	-11%	-5%
Electric							
Annualized Energy	kWh	564,382	763,541	35%	526,529	-31%	-7%
Annualized Demand							
Summer	kW	322	112	-65%	82	-26%	-74%
Winter	kW	80	115	44%	74	-36%	-7%
Non-Gas Non-Electric Benefits (Lifetime)	\$	37,907,071	52,797,353	39%	32,298,241	-39%	-15%
Cost-Effectiveness							
TRC Benefits	\$	114,413,613			106,725,486		-7%
TRC Costs	\$	64,486,631			73,423,069		14%
Net Benefits	\$	49,926,981			33,302,417		-33%
BCR	n/a	1.77			1.45		-18%

In the Residential sector, there were significant variances between planned and preliminary values. Annual kWh, Winter kW and Lifetime Non-Gas Non-Electric Benefits were 35%, 44% and 39% higher than planned, while Summer kW was 65% lower than planned. Moreover, evaluated Annual kWh, Summer kW, Winter kW and Non-Gas Non-Electric Benefits were significantly lower than preliminary results. These variances are due to individual program performance and evaluation results. Sections II.A.2 and II.A.3 provide more detailed information on the performance of each residential program and pilot, respectively.

Table II.A.3: Residential Program Summary				
Program / Performance Category	Units	Planned Value	Evaluated Results	
			Value	% Change from Planned
Residential New Construction & Major Renovations				
TRC Benefits	\$	10,824,591	12,128,924	12%
TRC Costs	\$	4,264,867	7,129,833	67%
Net Benefits	\$	6,559,724	4,999,091	-24%
BCR	n/a	2.54	1.70	-33%
Residential Heating and Water Heating				
TRC Benefits	\$	60,530,517	45,390,744	-25%
TRC Costs	\$	33,320,636	33,281,677	0%
Net Benefits	\$	27,209,882	12,109,067	-55%
BCR	n/a	1.82	1.36	-25%
MassSAVE				
TRC Benefits	\$	-	-	0%
TRC Costs	\$	3,134,665	4,569,672	46%
Net Benefits	\$	(3,134,665)	(4,569,672)	46%
BCR	n/a	-	-	0%
Weatherization Program				
TRC Benefits	\$	32,259,487	39,092,202	21%
TRC Costs	\$	15,710,905	21,456,939	37%
Net Benefits	\$	16,548,582	17,635,263	7%
BCR	n/a	2.05	1.82	-11%
Multifamily Retrofit				
TRC Benefits	\$	7,513,194	7,345,490	-2%
TRC Costs	\$	3,178,239	2,880,558	-9%
Net Benefits	\$	4,334,955	4,464,932	3%
BCR	n/a	2.36	2.55	8%
Behavior/Feedback Program				
TRC Benefits	\$	3,285,823	2,768,126	-16%
TRC Costs	\$	2,709,772	2,760,504	2%
Net Benefits	\$	576,050	7,621	-99%
BCR	n/a	1.21	1.00	-17%
Deep Energy Retrofit				
TRC Benefits	\$	n/a	n/a	n/a
TRC Costs	\$	613,889	624,224	2%
Net Benefits	\$	n/a	n/a	n/a
BCR	n/a	n/a	n/a	n/a
Residential Building Practices and Demonstration Program				
TRC Benefits	\$	n/a	n/a	n/a
TRC Costs	\$	357,779	87,213	-76%
Net Benefits	\$	n/a	n/a	n/a
BCR	n/a	n/a	n/a	n/a
Community Based Pilot				
TRC Benefits	\$	n/a	n/a	n/a
TRC Costs	\$	208,373	96,011	-54%
Net Benefits	\$	n/a	n/a	n/a
BCR	n/a	n/a	n/a	n/a
TOTAL				
TRC Benefits	\$	114,413,613	106,725,486	-7%
TRC Costs	\$	64,486,631	73,423,069	14%
Net Benefits	\$	49,926,981	33,302,417	-33%
BCR	n/a	1.77	1.45	-18%

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

Residential Sector Performance Highlights

During 2012, the Program Administrators 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 Renovation⁴ – In 2012, with 121 communities adopting the Stretch Energy Code, this program faced a market in which energy codes continued to change. Single-family development picked up from previous years, but opportunities to capture future energy savings became increasingly difficult due to evolving code requirements. To address these barriers, the Program Administrators offered technical assistance as well as incentives to exceed the baseline. The PAs also increased market penetration while providing energy savings for residents. During 2012, the Program Administrators provided multiple trainings and participated in several recruitment events targeted at builders and trade allies new to performance-based construction. It is expected that builders will continue to look to the Program Administrators to provide training, technical assistance and incentives to meet the new energy codes. As of the end of 2012, over 40 Home Energy Rating System (“HERS”) companies participated in the program. Finally, the Program Administrators in western Massachusetts continued to participate in the *Western Massachusetts Storm Recovery Program*. This storm recovery program contacted all of the communities affected by the 2011 tornado and distributed thousands of flyers to builders, building code offices, homeowners, tornado relief centers, town meetings/events and churches.
- Residential Heating and Water Heating - In 2012, the PAs collectively achieved over 100 percent of their annual savings goals within budget due to attractive customer incentives. Through the program, the Program Administrators reached out to 300 supply houses and over 1,000 contractors throughout Massachusetts and New England. The PAs continued to successfully utilize extensive contractor outreach via supply houses and big box retailers, which contributed to increased participation levels in this program. On September 20, 2012, the PAs sponsored their 12th Annual GasNetworks[®]/Mass Save Fall Conference and Trade Show in Randolph, MA. Attendees included over 400 HVAC contractors, trainers, and inspectors from across the Commonwealth, as well as 32 exhibitors. The Program Administrators coordinated a full-day agenda of training sessions and seminars on the latest high efficiency natural gas HVAC technologies and installation and maintenance practices. Participants also learned about opportunities to save energy and participate in PA programs. The Program Administrators also continued their integration efforts with the electric Residential Cooling and Heating Equipment (“Cool SmartSM”) program and incorporated breakout sessions to include such topics as electronically commutated motors, brushless fan motor technology, hydronic heating, on-demand

⁴ Prior to 2012 this program was called Massachusetts New Construction with ENERGY STAR.

water heating, condensing and modulating boilers, near boiler piping, system sizing, renewables and codes and standards updates.

- Mass Save/Weatherization – Program Year 2012 was the first full year of the market model. Two groups of Mass Save participating contractors, Home Performance Contractors (“HPCs”) and Independent Installation Contractors (“IICs”), with over 90 contractor companies statewide, provided services in addition to those offered by the lead vendors.

The Contractor Best Practices Working Group continued to highlight the PAs’ commitment to ongoing communication with participating contractors in the program. The group served as a forum to provide an open line of communication between HPCs, IICs, lead vendors and PAs to discuss any matters related to the program with an independent third-party facilitator.

In 2012, the HEAT Loan program continued to offer loans (\$500-\$25,000), and the offerings were expanded to include central air conditioning and residential electric customers in individually metered condominium units. PAs saw an increase in both the average loan amount and the number of customers financing multiple measures. In addition, the PAs implemented various initiatives throughout the year including pre-weatherization and early boiler replacement incentives, sales and technical trainings, and marketing bonuses.

- Multi-Family Retrofit – At the conclusion of 2012 most PAs were close to or exceeded program goals. Energy efficient lighting, instant savings measures, and weatherization continued to be in high demand. The multi-family working group, consisting of representatives from both residential and C&I, coordinated between the two sectors to deliver comprehensive, whole facility, energy efficiency services.

The Multi-Family Market Integrator continued to be an invaluable resource to the multi-family program in 2012 as illustrated in a year-over-year increase of 25 percent in incoming calls for multi-family services. This trend of successfully enrolling facilities can be credited to capitalizing on previously established relationships with facility owners/property managers, as well as the increased effort to create brand recognition through statewide marketing efforts.

A more detailed discussion of each of the above programs follows.

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 or major renovations.

Definition of Program Participant: A participant is defined as a unique gas account served under this program. For residential new construction the account represents a newly constructed dwelling unit.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

- Heating
- Air Duct
- Hot Water
- Envelope

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 contractor was responsible for tracking and reporting program activity and advised the JMC on necessary program changes and enhancements. A separate third-party vendor conducted quality assurance/quality control of field activities. The JMC utilized a market-based network of trained contractors who offered energy efficiency and rating services to homebuilders.

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 Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.A.4⁵ provides information on the performance of the Residential New Construction and Major Renovation program.

Table II.A.4: Residential New Construction & Major Renovations							
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	\$	3,086,423			3,558,742		15%
Performance Incentive	\$	146,325			148,542		2%
Participants	Homes	1,111			1,369		23%
Program Cost / Participant	\$	2,778			2,600		-6%
Savings & Benefits							
Gas							
Lifetime	therms	6,229,022	6,529,228	5%	6,507,986	0%	4%
Annualized	therms	269,051	280,844	4%	278,720	-1%	4%
Average Measure Life	yrs	23	23	0%	23	0%	1%
Electric							
Annualized Energy	kWh	492,801	770,058	56%	533,046	-31%	8%
Annualized Demand							
Summer	kW	113	112	-1%	82	-26%	-28%
Winter	kW	80	114	43%	76	-34%	-5%
Non-Gas Non-Electric Benefits (Lifetime)	\$	4,621,759	5,736,275	24%	5,679,703	-1%	23%
Cost-Effectiveness							
TRC Benefits	\$	10,824,591			12,128,924		12%
TRC Costs	\$	4,264,867			7,129,833		67%
Net Benefits	\$	6,559,724			4,999,091		-24%
BCR	n/a	2.54			1.70		-33%

There are several factors to recognize for the increase of 23% in actual participation versus planned. First, a rebound in the new construction market over the last few years has resulted in many more participants than originally planned. In addition, Stretch Code adoption in many municipalities across the Commonwealth (over 100 by December 31, 2012), has resulted in the uptake in program participation. A majority of the early adopters of Stretch Code were located in National Grid's territory and builders were informed the program could assist with training and incentives, thus driving up participation rates. Lastly, the uptick in Stretch Code adoption caused the market to respond by increasing the number of HERS raters in 2010-2012. The increase in the rater market promoting the Program and providing technical assistance to builders also can be attributed to increased participation.

Preliminary Annual kWh savings were 56% higher than the planned value, based on the majority of the electricity savings in the gas Residential New Construction program coming from energy efficient lighting. The Company installed more compact fluorescent bulbs, fixtures, and LED fixtures than planned. Moreover, the Company completed and incentivized more homes at higher tier levels than anticipated. These higher-tiered homes yielded higher savings than planned.

Preliminary Winter kW demand savings were 43% higher than planned due to more installed lighting measures, and more homes participating in the program.

⁵ 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.

Preliminary Lifetime Non-Gas Non-Electric Benefits increased 24% from planned values, which is also a result of installing more lighting measures than planned due to a one-time non-energy impact associated with lighting O&M.

Evaluated Annual kWh savings were 31% lower than preliminary results due to the application of a lighting free-ridership factor of 23%, and refrigerator and dishwasher free-ridership factor of 86% derived from the *Massachusetts 2011 Baseline Study of Single-Family Residential New Construction* previously filed in the Boston Gas Company and Colonial Gas Company d/b/a National Grid 2013-2015 Energy Efficiency Three Year Plan, D.P.U. 12-103, which also impacted demand savings values. Demand savings values were further altered by the new *Demand Impact Model User Manual*, which was previously filed in the Boston Gas Company and Colonial Gas Company d/b/a National Grid 2011 Energy Efficiency Annual Report, D.P.U. 12-56.

The *MA RNC Incremental Cost Report* provided revised costs that were higher than prior values. This new cost study was a significant driver of the TRC Costs increasing by 67% relative to planned values and negatively impacts the cost-effectiveness of the program.

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

- *MA RNC Program Incremental Cost Report*
This report provides estimates of the incremental costs per square foot involved in building high efficiency homes that meet the criteria of the MA RNC Program. Incremental costs (costs above those of typical homes built outside the program) are estimated for single family, low-rise multifamily buildings of three or fewer stories, and mid- to high-rise multifamily buildings of four stories or more for each incentive option offered by the Program. The study had no impact on savings. The study is discussed in more detail in Section III, Study 1.
- *Lighting Onsite Inventory and Saturation Study*
The objective of this study was to perform lighting inventories and estimate socket saturations in Massachusetts homes. The study also examined lighting purchase behavior and searched for evidence of incandescent bulb stockpiling. Saturation increased for all energy-efficient light bulbs, including CFLs, LEDs, and fluorescent tubes, was 39% in 2013. The results of this study will increase energy savings by increasing the number of bulbs found in indoor fixtures. The study is discussed in more detail in Section III, Study 7.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

b. Residential Heating and Water Heating

Purpose/Goal: The purpose of the Residential Heating and Water Heating program was to overcome market barriers to the installation of energy efficient heating/hot water equipment and to increase program awareness among consumers, plumbing/heating contractors, and home builders/developers, by means of rebates, marketing, and training courses.

Targeted Customers: The program targeted residential home owners with natural gas heating/hot water heating equipment (both new construction and existing homes), home designers/architects, engineers, plumbing and HVAC contractors and technicians, high efficiency heating equipment and related parts/accessory suppliers, manufacturers, and distributors, and new home building and remodeling contractors.

Definition of Program Participant: A participant is defined as the number of measures installed.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses: The end-uses targeted by this program were space and water heating fueled by natural gas.

Delivery Mechanism: The program was administered by each Program Administrator in its service territory and coordinated regionally through the GasNetworks collaborative. GasNetworks utilized a third-party contractor secured through a competitive bidding process to administer rebate processing. This vendor was also responsible for tracking and reporting program activity to the Program Administrators. The program also has a second third-party contractor who provided trade ally outreach and program participant training to supply houses and manufacturers of natural gas high efficiency heating and water heating equipment.

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 Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.A.5 provides information on the performance of the Residential Heating and Water Heating program.

Table II.A.5: Residential Heating and Water Heating							
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	\$	16,108,231			17,619,706		9%
Performance Incentive	\$	732,304			458,309		-37%
Participants	Rebates	35,560			25,942		-27%
Program Cost / Participant	\$	453			679		50%
Savings & Benefits							
Gas							
Lifetime	therms	45,881,548	41,903,698	-9%	42,282,876	1%	-8%
Annualized	therms	2,540,706	2,339,673	-8%	2,459,062	5%	-3%
Average Measure Life	yrs	18	18	-1%	17	-4%	-5%
Electric							
Annualized Energy	kWh	71,581	(6,517)	-109%	(6,517)	0%	-109%
Annualized Demand							
Summer	kW	209	0	-100%	-	-100%	-100%
Winter	kW	0	1	113%	(2)	-324%	-576%
Non-Gas Non-Electric Benefits (Lifetime)	\$	21,434,900	28,202,059	32%	10,429,844	-63%	-51%
Cost-Effectiveness							
TRC Benefits	\$	60,530,517			45,390,744		-25%
TRC Costs	\$	33,320,636			33,281,677		0%
Net Benefits	\$	27,209,882			12,109,067		-55%
BCR	n/a	1.82			1.36		-25%

Preliminary Annual kWh and summer kW were 109% and 100% lower than planned, respectively while Winter kW and Non-Gas Non-Electric Benefits were 113% and 32% higher than planned, respectively. These variances are driven by the mix of measures rebated in this program. The Company had included rebates for Wi-Fi thermostats in its 2012 plan, resulting in forecast energy and demand savings from cooling savings. However, the Company did not rebate this measure in 2012. Conversely, the Company rebated more heat recovery ventilators than planned, which have negative electric savings.

In 2012, the number of program participants was 27% lower than planned. A participant in this Program is defined as the number of rebates paid to customers. Overall, fewer rebates were processed in 2012 than expected, thus the lower participation results. However, the cost per participant is 50% higher than planned because the Company planned a measure mix that did not account for as many higher cost rebates. In addition, those higher cost measures/rebates also have higher savings values (i.e. heating systems). The Company rebated more of the higher cost/savings measures than expected, which in turn balanced the shortfall in participation.

These higher cost/higher savings measures also have higher net-to-gross ratios, resulting in a 32% increase from planned to preliminary Non-Gas Non-Electric benefits.

Evaluated Non-Gas Non-Electric Benefits were 63% lower than preliminary values. This decrease is primarily due to the combined effects of the *Residential Heating and Water Heating Net-to-Gross Study* and the *Massachusetts Residential Non-Energy Impacts (NEIs): Deemed NEI Values Addressing Differences in NEIs for Heating, Cooling, and Water Heating Equipment that is Early Replacement Compared to Replace on Failure*, detailed further below. The studies showed that the full NEI values cannot be applied to all program rebated equipment, which was the planning assumption used in the preliminary values. The discounted NEI values have been applied to the evaluated results.

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

- *Residential Heating and Water Heating 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing*
The study updated Net-to-Gross (“NTG”) ratios for certain prescriptive equipment available in the Residential Heating & Water Heating and Residential Cooling & Heating Equipment Programs. It also analyzed net market effects (“NME”) and looked into the timing of equipment replacement. Results indicate that NTG ratios are slightly higher than previously estimated for many measures. Further, NME analyses and data provide qualitative evidence to support this finding. The study also found program induced accelerated replacement of equipment that was not being captured in savings estimates, however the level of replacement varied by equipment being installed. The net effect for the Company was to increase energy savings and decrease benefits for the 2012 evaluated results. The study is discussed in more detail in Section III, Study 2.
- *Massachusetts Residential Non-Energy Impacts (NEIs): Deemed NEI Values Addressing Differences in NEIs for Heating, Cooling, and Water Heating Equipment that is Early Replacement Compared to Replace on Failure*
This memorandum provides adjusted deemed NEI values that address the differences in NEIs for residential heating, cooling, and water heating equipment that is early replacement compared to replace on failure. These deemed NEIs update the NEIs provided in the residential NEI report submitted to the PAs on August 15, 2011. The results of this study decreased net lifetime benefits for 2012 evaluated results. The study is discussed in more detail in Section III, Study 25.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

c. Residential Mass Save/Weatherization

Purpose/Goal: The purpose of the Mass Save/Weatherization program (also known as the Home Energy Services (“HES”) 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 HES target market is all non-low-income residential customers living in single-family houses or one- to four-unit buildings that are not part of a larger site where an

association exists (such as a condominium association with multiple four-unit buildings). The program aims to reach the aforementioned customers who are interested in making their homes more energy efficient. The HES program is fuel-blind.

Definition of Program Participant: A participant in Weatherization is defined as a unique account that received insulation and/or blower door air sealing jobs completed. A participant in Mass Save is defined as a unique gas account served under this program, which is equal to a residential audit.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

- Building Envelope (Deeper Retrofit Measures)
- HVAC/mechanical systems
- Hot Water

Delivery Mechanism: The Mass Save and Gas Weatherization programs were fully integrated in 2011 and were implemented by each PA's competitively procured lead vendor. The PAs incorporated both HPCs (to provide audits and weatherization work) and IICs (to implement weatherization work) into the program.

The program was delivered by lead vendors selected through a competitive bidding process. Lead vendors were responsible for managing and training market based participants such as participating IICs and HPCs. Additional lead vendor responsibilities include:

- Consistent statewide training
- Data reporting
- Achieving aggressive savings
- Customer satisfaction
- Quality control standards
- Scheduling requirements
- Technical assistance
- Maintain and report health and safety information

Two groups of Mass Save participating contractors, HPCs and IICs, provided services in addition to those services offered by the lead vendor. All participating contractors had to meet program eligibility and requirements. HPCs independently recruited customers, provided Home Energy Assessments ("HEAs"), and implemented weatherization measures. IICs provided installation of weatherization measures for those customers who received an HEA from the lead vendor. IICs also had the opportunity to independently recruit customers and refer them to the lead vendor for the HEA.

In order to receive incentives or program rebates, customers were required to have an HEA through either the PA's lead vendor or via a participating HPC to identify and prioritize all cost-effective energy efficiency improvements. Insulation work, whether performed by an HPC or IIC, is subject to quality control inspection(s) performed by the PA-vendor or third-party vendor. This ensured that high quality was maintained, and that installations met Building Performance Institute standards or similar standards set by the PAs.

The gas and electric PAs remained under contract with Competitive Resources, Inc., a third-party Quality Control ("QC") vendor responsible for performing QC inspections of program implementation vendors and participating contractors. The QC vendor provided valuable information and feedback to the Program Administrators on program successes and identified areas of possible improvement.

The Program Administrators are working together toward a "best practices" approach to provide a more coordinated statewide training to reinforce quality installation techniques for the HES program. It is expected that training requirements for contractors to retain their status as a HES participating contractor will increase over time. Additionally, contractors must maintain a high level of customer satisfaction to continue in the program.

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 Gas Energy Efficiency Plan, filed October 30, 2009 and the Company's 2011 RCS Budget Petition, filed November 1, 2010. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1 and Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 11-RCS-09, respectively. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121 and on December 27, 2011 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 11-RCS-09, respectively.

Table II.A.6 provides information on the performance of the residential Mass Save program and Table II.A.7 provides information on the performance of the Weatherization program.

Table II.A.6: MassSAVE						
Performance Category	Units	Planned Value	Preliminary Year-End Results		Evaluated Results	
			Value	% Change from Planned	Value	% Change from Preliminary
Expenses						
Total Program Costs	\$	3,134,665			4,569,672	46%
Performance Incentive	\$	-			-	0%
Participants	Audits	11,200			19,323	73%
Program Cost / Participant	\$	280			236	-16%
Savings & Benefits						
Gas						
Lifetime	therms	-		0%	0%	0%
Annualized	therms	-		0%	0%	0%
Average Measure Life	yrs	-	-	0%	-	0%
Electric						
Annualized Energy	kWh	n/a	n/a	n/a	n/a	n/a
Annualized Demand						
Summer	kW	n/a	n/a	n/a	n/a	n/a
Winter	kW	n/a	n/a	n/a	n/a	n/a
Non-Gas Non-Electric Benefits (Lifetime)	\$	-	-	0%	0%	0%
Cost-Effectiveness						
TRC Benefits	\$	-			-	0%
TRC Costs	\$	3,134,665			4,569,672	46%
Net Benefits	\$	(3,134,665)			(4,569,672)	46%
BCR	n/a	-			-	0%

The Mass Save program experienced a significant increase in home energy assessments in 2012 compared to the number planned. The Company realized mid-year that the demand was stronger than the 2012 Mid-Term Modification (D.P.U. 11-109) budget could support, and filed an updated budget with the Department on July 17, 2012 in D.P.U. 11-RCS-09. More assessments were performed due to increased marketing efforts and an increased effort to expand the number of Home Performance Contractors (HPCs) statewide who were qualified to perform these assessments.

With the increase in Mass Save energy assessments, there is a correlation with the increased participation in the Company's Weatherization program. The increased number of weatherization jobs in 2012 shows that customers are installing recommended weatherization measures.

Table II.A.7: Weatherization Program							
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	\$	11,129,559			15,778,034		42%
Performance Incentive	\$	517,561			600,078		16%
Participants	Accounts	3,360			6,517		94%
Program Cost / Participant	\$	3,312			2,421		-27%
Savings & Benefits							
Gas							
Lifetime	therms	30,223,872	46,076,457	52%	32,120,270	-30%	6%
Annualized	therms	1,303,949	2,084,970	60%	1,512,376	-27%	16%
Average Measure Life	yrs	23	22	-5%	21	-4%	-8%
Electric							
Annualized Energy	kWh	n/a	-	n/a	-	n/a	n/a
Annualized Demand							
Summer	kW	n/a	-	n/a	-	n/a	n/a
Winter	kW	n/a	-	n/a	-	n/a	n/a
Non-Gas Non-Electric Benefits (Lifetime)	\$	6,479,372	13,572,086	109%	11,804,934	-13%	82%
Cost-Effectiveness							
TRC Benefits	\$	32,259,487			39,092,202		21%
TRC Costs	\$	15,710,905			21,456,939		37%
Net Benefits	\$	16,548,582			17,635,263		7%
BCR	n/a	2.05			1.82		-11%

The majority of the variances between actual and planned Program Costs and Participants, as well as preliminary and planned Lifetime Therm savings and Annual Therm savings are directly correlated to the fact that the Company performed more audits than planned in the Mass Save program. A portion of audits performed in the Mass Save program is then converted into weatherization jobs in this program. Additionally, the Company did not forecast savings estimates in its plan for thermostats or domestic hot water measures installed at time of the audit (such as showerheads and faucet aerators), but did include these savings in its preliminary results. Preliminary Lifetime Non-Gas Non-Electric Benefits were 109% greater than planned due the combination of both increased participation and the inclusion of additional water savings.

The actual results of cost per participant variance of 27% lower than planned is due to actual job costs being lower than planned. The Company forecast its planned participants based on an assumption that each participant would receive insulation and air sealing through the program while in actuality more program participants than anticipated opted for insulation or air sealing, and not both. Thus the program had a larger number of participants at a lower cost per participant.

Evaluated Lifetime and Annual Therm savings were 30% and 27% lower than preliminary estimates, respectively. These decreases were due to the results of *HES Realization Rate Results Memo*, described below, which produced realization rates for air sealing and insulation that were less than 100%, and the *Home Energy Services Impact Evaluation*, filed in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 12-103, which produced deemed savings values for other program measures.

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

- *HES Realization Rate Results Memo*
This study produced PA-specific realization rates (the ratio of ex ante to ex post savings) used to adjust insulation and air-sealing savings. The study decreased program savings for the Company's 2012 evaluated results. The study is discussed in more detail in Section III, Study 3.
- *2012 Home Energy Services Pre-Weatherization Initiative Evaluation*
This evaluation assessed the impact of additional incentives on a customer's decision to overcome pre-weatherization barriers (overcoming these barriers make them eligible to install certain recommended HES measures). The results of this study did not impact the 2012 evaluated results. The study is discussed in more detail in Section III, Study 9.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

d. 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 market rate sector.

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

Definition of Program Participant: A participant is defined as the total number of dwelling units within a participating facility.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

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

Delivery Mechanism: The program was administered cooperatively by the gas and electric

Program Administrators. The Multi-Family Market Integrator was responsible for facilitating the delivery of program services as well as acting as the conduit for participant inquiries to ensure that participants were not inconvenienced by having to contact multiple parties directly throughout 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 Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.A.8 provides information on the performance of the Residential Multi-Family program.

Table II.A.8: 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	\$	2,920,158			2,511,670		-14%
Performance Incentive	\$	100,066			97,954		-2%
Participants	Units	3,575			5,424		52%
Program Cost / Participant	\$	817			463		-43%
Savings & Benefits							
Gas							
Lifetime	therms	2,522,520	3,975,630	58%	3,502,709	-12%	39%
Annualized	therms	126,126	264,395	110%	238,349	-10%	89%
Average Measure Life	yrs	20	15	-25%	15	-2%	-27%
Electric							
Annualized Energy	kWh	n/a	-	n/a	-	n/a	n/a
Annualized Demand							
Summer	kW	n/a	-	n/a	-	n/a	n/a
Winter	kW	n/a	-	n/a	-	n/a	n/a
Non-Gas Non-Electric Benefits (Lifetime)	\$	5,371,039	5,286,933	-2%	4,383,760	-17%	-18%
Cost-Effectiveness							
TRC Benefits	\$	7,513,194			7,345,490		-2%
TRC Costs	\$	3,178,239			2,880,558		-9%
Net Benefits	\$	4,334,955			4,464,932		3%
BCR	n/a	2.36			2.55		8%

Preliminary Lifetime and Annual Therm savings were 58% and 110% higher than planned, respectively. There were two main drivers to explain the higher gas savings. First, the Company experienced greater participation than planned after increasing program incentive levels from 50% of insulation costs in 2011 to 75% of insulation costs in 2012. Second, the Company forecast its 2012 planned savings using limited historic data, due to the program’s newness. Actual vendor estimates used for preliminary year-end savings were higher than the estimates used in the plan.

The 25% decrease in planned to preliminary Average Measure Life was due to the measure mix of projects between insulation (which has a 25 year measure life) and air sealing (which has a 15 year measure life).

Although there are no significant changes between preliminary year end and evaluated results, *Massachusetts Multifamily Program Impact Analysis* which was previously filed in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 12-56 pertained to this program during the 2012 calendar year.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

e. Behavior Feedback

Purpose/Goal: The purpose of the Behavior Feedback program was to lower residential customer energy consumption by educating and motivating customers to take energy saving actions and modify their behaviors.

Targeted Customers: The program targeted residential customers with high energy usage.

Definition of Program Participant: A participant is defined as one residential household.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses: The program targets all residential end-uses.

Delivery Mechanism: Participants received information on their household energy consumption compared to similar households through monthly Home Energy Reports and an Energy Insider website. The program was administered independently by National Grid. The vendor was OPower.

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 Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121 (Pre-Hearing Statement - Attachment 2). The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.A.9 provides information on the performance of the Behavior Feedback program.

Table II.A.9: Behavior/Feedback Program							
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	\$	2,678,785			2,739,543		2%
Performance Incentive	\$	30,988			20,962		-32%
Participants	Accounts	300,000			276,626		-8%
Program Cost / Participant	\$	9			10		11%
Savings & Benefits							
Gas							
Lifetime	therms	4,150,005	4,023,211	-3%	3,496,154	-13%	-16%
Annualized	therms	4,150,005	4,023,211	-3%	3,496,154	-13%	-16%
Average Measure Life	yrs	1	1	0%	1	0%	0%
Electric							
Annualized Energy	kWh	n/a	-	n/a	-	n/a	n/a
Annualized Demand							
Summer	kW	n/a	-	n/a	-	n/a	n/a
Winter	kW	n/a	-	n/a	-	n/a	n/a
Non-Gas Non-Electric Benefits (Lifetime)	\$	-	-	0%	-	0%	0%
Cost-Effectiveness							
TRC Benefits	\$	3,285,823			2,768,126		-16%
TRC Costs	\$	2,709,772			2,760,504		2%
Net Benefits	\$	576,050			7,621		-99%
BCR	n/a	1.21			1.00		-17%

There were no significant variances from planned to preliminary or preliminary to evaluated values in this program.

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

- Massachusetts Cross-Cutting Behavioral Program Evaluation Integrated Report*
This report includes impact findings of behavior/feedback programs and pilots administered by National Grid, NSTAR, Western Massachusetts Electric Company and Cape Light Compact during the 2012 program year. It also includes process findings for CLC's Smart Home Energy Monitoring Pilot (SHEMP) from 2009-2012. The study also established savings estimate ratios to adjust implementer estimates in order to report savings in future years. The net effect of the study was to decrease savings for the Company. The full report is included in Section III, Study 22.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

3. Residential Pilots

a. Deep Energy Retrofit

Description of Pilot/Specific Activities Intended to Study: The Deep Energy Retrofit (“DER”) 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 in order for the Program Administrators to study a new approach to achieving energy savings. The Program Administrators analyze the information gathered from the pilot to determine market viability, cost-effectiveness, and, if applicable, adoption rates. Following completion of the pilot, the Program Administrators utilize these pilot results to determine the future of the pilot and whether it will be adopted either as a stand alone program or as an additional measure offering within an existing program.

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 Program Participant: A participant is defined as a unique gas account served under this program.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

- Heating (deeper energy retrofit measures)
- Hot Water
- Envelope (deeper energy retrofit measures)
- End Use Behavior

Delivery Mechanism: Project design details and assistance were provided to Deep Energy Retrofit contractors performing the work. The projects were handled through technical specialist contractors, program managers 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: The overall goal of the Pilot was to attract participants into this “broader and deeper” energy-savings initiative, knowing that costs and project complexities can be barriers to deep energy retrofit participation. Ultimately, achievement of this goal is measured by the pilot’s cost-effectiveness. Based on data collected by National Grid and shared with all Program Administrators, the incremental cost of the Deep Energy Retrofit measures

are cost-effective when performed at the time of roof-replacement, siding-replacement, and basement-fitout. The pilot served a wide array of customers in a variety of home types. Over half the participating dwelling units in some PAs' territory were owner-occupied two-family and three-family homes. An average single family project was 2,645 SF (includes conditioned basement). For example, the average size of all National Grid DER projects dwelling units was 1,476 SF (includes conditioned basement).

Docket/Exhibit where the Program is Discussed and Approved: The pilot is discussed in detail in the Company's 2010-2012 Three-Year Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.A.10 provides information on the performance of the 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	\$	613,889			375,866			-39%
Participants	TBD	28			10			-64%
Program Cost / Participant	\$	21,925			37,587			71%
Savings & Benefits								
Gas								
Lifetime	therms	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Annualized	therms	n/a	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	n/a
Electric								
Annualized Energy	kWh	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Annualized Demand								
Summer	kW	n/a	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	n/a
Non-Gas Non-Electric								
Benefits (Lifetime)	\$	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Cost-Effectiveness								
TRC Benefits	\$	n/a	n/a	n/a	n/a			n/a
TRC Costs	\$	613,889		-100%	624,224			2%
Net Benefits	\$	n/a	n/a	n/a	n/a			n/a
BCR	n/a	n/a	n/a	n/a	n/a			n/a

In 2012, total program costs and participation were 39% and 64% lower than planned, respectively. This variance is due to the significant upfront cost of participating in the pilot combined with the long average project duration. This in turn drove up the cost per participant.

There are no EM&V studies included in the Annual Report that apply to this pilot.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015.

The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

b. Community-Based Pilots

Description of Pilot/Specific Activities Intended to Study: The term “Community-Based Pilots” encompassed a number of unique partnerships in 2012 between the Program Administrators and local communities designed to harness the power of community-based outreach to achieve broader participation in the Commonwealth’s energy efficiency programs. National Grid participated in a number of community initiatives in its service territory in 2012 including those in Nantucket, Boston, Wellesley, Metropolitan Springfield (Palmer, Monson, East Longmeadow, Belchertown, Hampden, Longmeadow, Wilbraham), and Western Massachusetts (Great Barrington, Lenox, North Adams, Williamstown, Stockbridge, Amherst). The Company also issued an RFP in Q3 of 2012 to municipalities in its dual fuel territory and selected Medford and Swampscott to launch initiatives in late 2012. These initiatives are scheduled to run through 2013.

Why Implemented on Pilot Basis rather than as a Full Program: The community-based initiatives are intended to drive leads into existing energy efficiency programs, in particular, the Home Energy Services Program. While best practices are catalogued, replicated, and scaled, design for these initiatives by necessity remains fluid to meet the needs of individual communities and demographics.

Targeted Customers: The Program Administrators and interested stakeholders selected communities with the greatest opportunities for success, based on an assessment of the proposal submitted. Targeted customers generally included customers residing in 1-4 single family homes in towns where previous participation was lower than anticipated.

Definition of Program Participant: There are no defined participants in this pilot. This pilot drives participants into other programs, such as the Mass Save / Weatherization programs.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses: The end-uses targeted by the community based pilots included the same end-uses addressed under the Company’s existing home energy assessment, weatherization, and heating and hot water programs.

Delivery Mechanism: Program outreach was conducted by local community groups. Measures were installed through the Company’s existing lead vendors. **Significant Differences in Actual Program Design from Approved Program Design:** None.

How Achievement of the Pilot’s Stated Goal was Measured: Leads were tracked from the marketing tactics developed by the different initiatives. As those leads moved forward to home energy assessments and installed measures, those customers were tagged.

Docket/Exhibit where the Program is Discussed and Approved: The pilot is discussed in detail in the Company’s 2010-2012 Three-Year Gas Energy Efficiency Plan, filed October 30, 2009. See

Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.A.11 provides information on the performance of the Community Based pilots. 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.13: Community Based Pilots							
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	\$	208,373			96,011		-54%
Participants	TBD	-			-		0%
Program Cost / Participant	\$	-			-		0%
Savings & Benefits							
Gas							
Lifetime	therms	n/a	n/a	n/a	n/a	n/a	n/a
Annualized	therms	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
Electric							
Annualized Energy	kWh	n/a	n/a	n/a	n/a	n/a	n/a
Annualized Demand							
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
Non-Gas Non-Electric Benefits (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	\$	208,373			96,011		-54%
Net Benefits	\$	n/a			n/a		n/a
BCR	n/a	n/a			n/a		n/a

Activity in Boston remained strong, despite the end of ARRA funding to cover customer costs. This is significantly attributable to the substantial resources the City continues to bring to the table to offset PA marketing costs. Boston also remains the city in National Grid's territory with the highest number of low to moderate income customers. The Company plans to continue its partnership with Boston with a special focus on 2-3 family homes in 2013. However, the initiative will be fully integrated within various programs within the Residential sector in 2013 and will not continue as a separate, stand-alone pilot.

There are no EM&V studies included in the Annual Report that apply to this pilot.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

c. Residential Building Practices & Demonstration

Description of Pilot/Specific Activities Intended to Study: The goal of the Residential Building Practices and Demonstration Program is to participate in funding for demonstration projects that apply to new or underutilized technologies. New and emerging technologies were reviewed for their potential cost effectiveness for inclusion in future energy efficiency programs. Specific technologies which have been implemented were Boiler Load Controls (BLC). Solar Thermal heating systems and Programmable Controllable Thermostats (PCT) were evaluated for cost effectiveness and customer satisfaction. A program design and a marketing plan were developed for Load Shifting Control Thermostats (LSCT).

Why Implemented on Pilot Basis rather than as a Full Program: This pilot is used to test new measures and technologies prior to implementation.

Targeted Customers: Residential customers who use natural gas as their primary heating source.

Definition of Program Participant: A participant is defined as the number of billing accounts that received one or more of the eligible measures under this pilot.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

- Residential natural gas heating equipment
- Advanced building shell

Delivery Mechanism: Solar Thermal was installed by contractors chosen by the customer. The systems have met specific minimum criteria requirements to receive a rebate. The rebates were issued by a third party contractor. A third party evaluation contractor is evaluating the savings levels being achieved by doing a billing analysis comparison from previous years.

PCT units were installed by a third party contractor. The systems needed to have natural gas as a primary heating source. A third party evaluation contractor is being used to evaluate the product. BLC units were installed and implemented within a specific geographic area to minimize installation costs. Customers sign up through a web portal by answering some questions. Customers are then selected on criteria that will allow us to evaluate the participant as an average customer in the service area based on home square footage and gas usage. A third party evaluation contractor was identified to perform the evaluation of the product.

LCST unit will be marketed to customers within a specific geographic area targeting customers who are both electric and natural gas customers of National Grid. Customers will need to have at a minimum, gas consumption of an average customer account in Massachusetts. Customers will also need to have had an energy audit performed within the past 5 years on their residence.

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

How Achievement of the Pilot’s Stated Goal was Measured: The Solar Thermal demonstration is determining the types of applications that will allow solar thermal to be cost effective. National Grid will be able to determine what type of installations can be pursued for future installations that will be cost effective. Evaluation results will define the stated goal.

The PCT demonstration is determining whether customers will interact with controllable thermostats and use the enhanced options that will result in increased gas savings. The results will determine if a greater percentage of customers utilize the programmable option. Evaluation results will determine if National Grid has met its goal.

The BLC demonstration has the potential to provide better control and more efficient equipment operation for most non condensing boilers. The evaluation and customer satisfaction results will provide confirmation that the stated objective of providing gas savings is being met.

The LSCT demonstration has several characteristics, the first goal is for customers to realize their heating and cooling run time versus degree days, and present this information so that customers understand their system operation. Customers will also see a Thermal Load profile of their home, the Company is interested in seeing whether customers who didn’t install insulation when recommended by Mass Save auditors, are influenced to install insulation when receiving a thermal rating on their home via their thermostat. The final goal is to determine whether the Company can provide load reduction while minimizing customer discomfort during high peak days of energy usage.

Docket/Exhibit where the Program is Discussed and Approved: The pilot is discussed in detail in the Company’s 2010-2012 Three-Year Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.A.11: Residential Building Practices and Demonstration Program							
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	\$	357,779			87,213		-76%
Participants	TBD	0			11		0%
Program Cost / Participant	\$	#DIV/0!			7,928		#DIV/0!
Savings & Benefits							
Gas							
Lifetime	therms	n/a	n/a	n/a	n/a	n/a	n/a
Annualized	therms	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
Electric							
Annualized Energy	kWh	n/a	n/a	n/a	n/a	n/a	n/a
Annualized Demand							
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
Non-Gas Non-Electric Benefits (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	\$	357,779			87,213		-76%
Net Benefits	\$	n/a			n/a		n/a
BCR	n/a	n/a			n/a		n/a

The results for the PCT demonstration confirmed that savings exist for both heating and cooling that exceed anticipated savings. The measure, which was implemented in 2013 based on the mid-year results, will continue to be offered with the confirmation of the 2012 full year Wi-Fi evaluation results that was filed in the Company's 2013-2015 Energy Efficiency Plan, D.P.U. 12-103.

The Solar Thermal savings were slightly less than anticipated, resulting in the measure not being cost-effective. The Company will not continue to offer the Solar Thermal measure in future program years. The Company will continue to monitor the costs of panels and equipment, and will re-evaluate as technology and efficiencies change.

The Boiler Load Control Demonstration achieved savings below published results that had been claimed by manufacturers. The results do confirm that there are limited savings which can be achieved from non-condensing boilers by modulating boiler water temperature. Savings do exist, although on average at a lower level than being claimed. The PAs will be considering this measure for program implementation as they develop future program offerings. The Boiler Load Control demonstration will be expanded further by allowing some previously installed units to have outdoor air reset sensors installed. The Company will analyze the impact on the savings from previous results comparing degree days/fuel usage to determine if there are additional savings. The Company will utilize a third party evaluator to assess the product addition.

The Load Shifting Control Thermostat is just entering the implementation phase so there are currently no results to consider. The Load Shifting Control Thermostat is in the implementation phase and testing will continue. The Load Control Thermostat will be studied further with installations beginning in 2013. The units will be monitored for heating and cooling savings. A control algorithm will be implemented beyond a traditional thermostat which will allow for weather conditions to interact with the thermostat operation. Predictive modeling will be used to determine the run time operation of the unit based on local weather conditions. Cooling peak demand shifting will also be part of this evaluation. The Company is interested in whether customers maintain a comfort level during the period savings are optimized, and whether customer behavioral messaging on the portal and thermostat have any impact on the level of savings that they are able to achieve. A third party evaluation contractor will evaluate this project.

There are no EM&V studies included in the Annual Report that apply to this pilot.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

B. Low-Income Sector Programs

1. Summary

In 2012, the Company implemented the Low-Income Retrofit program which consisted of two initiatives: the Low-Income Single-Family Retrofit initiative and the Low-Income Multi-Family initiative.⁶ The Company did not offer any pilots in the low-income sector during 2012.

Tables II.B.1 and II.B.3 provide summary information on the performance of the low-income program at the sector and program/initiative levels, respectively. Please note the gas Program Administrators do not track data by end use, and, therefore, are not required to provide the information in Table II.B.2.

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	\$	18,011,695			23,257,555		29%
Performance Incentive	\$	371,560			803,108		116%
Savings & Benefits							
Gas							
Lifetime	therms	12,461,640	24,485,388	96%	28,902,248	18%	132%
Annualized	therms	623,082	1,332,855	114%	1,553,698	17%	149%
Electric							
Annualized Energy	kWh	239,546	206,014	-14%	581,876	182%	143%
Annualized Demand							
Summer	kW	1	1	-14%	439	56246%	48508%
Winter	kW	-	26	0%	186	615%	0%
Non-Gas Non-Electric Benefits (Lifetime)							
	\$	13,629,312	19,398,183	42%	24,478,549	26%	80%
Cost-Effectiveness							
TRC Benefits	\$	24,644,149			52,271,719		112%
TRC Costs	\$	18,383,255			24,060,663		31%
Net Benefits	\$	6,260,895			28,211,057		351%
BCR	n/a	1.34			2.17		62%

As shown in Table II.B.1 above, there were significant variances in the Low-Income sector between planned and preliminary year-end results. Lifetime Therms, Annual Therms, and Non-Gas Non-Electric Benefits were 96%, 114% and 42% higher than planned, respectively. Moreover, evaluated Annual kWh, Summer kW, Winter kW and Non-Gas Non-Electric Benefits were all significantly higher than preliminary year-end results. Overall, these changes contributed to actual TRC Benefits which were 112% of planned with an increase of only 31% to TRC Costs, resulting in a higher than planned BCR. These variances were due to individual program performance and evaluation results. Section II.B.2 provides more detailed information on the performance of the Low-Income program.

⁶ In their 2012 Mid-Term Modification filings the Program Administrators proposed a consolidation of the low-income single-family retrofit and low-income multi-family retrofit programs in order to form one low-income retrofit program, noting the expected benefits of increasing flexibility to meet customer needs.

Table II.B.3: Low-Income Program Summary				
Program / Performance Category	Units	Planned Value	Evaluated Results	
			Value	% Change from Planned
Low-Income Retrofit				
TRC Benefits	\$	24,644,149	52,271,719	112%
TRC Costs	\$	17,908,642	23,860,652	33%
Net Benefits	\$	6,735,507	28,411,067	322%
BCR	n/a	1.38	2.19	59%
TOTAL				
TRC Benefits	\$	24,644,149	52,271,719	112%
TRC Costs	\$	18,383,255	24,060,663	31%
Net Benefits	\$	6,260,895	28,211,057	351%
BCR	n/a	1.34	2.17	62%

Section II.B.2 provides detailed information on the performance of the low-income program.

Low-Income Sector Performance Highlights

In 2012, the Program Administrators continued to leverage funds from the Department of Energy’s Weatherization Assistance Program that is administered by the Department of Health and Human Services for their low-income energy efficiency programs. This approach provided simplicity through a seamless, integrated experience for the participants, deeper efficiency penetration consistent with a whole house/building approach, as well as the ability to reach as many low-income residents as practicable with the greatest amount of eligible services.

In addition to public housing authorities and non-profit facilities, “for profit” multi-family facilities were also eligible to participate in the Low-Income Multi-Family Retrofit initiative in 2012, as long as 50 percent of the occupants qualified as low-income, and provided that the PA had budget dollars to serve this new market in its territory.

A more detailed discussion of the above program follows.

2. Low-Income Retrofit Program

Purpose/Goal: Two initiatives, the Low-Income Single Family (“LISF”) Retrofit initiative and the Low-Income Multi-Family (“LIMF”) Retrofit initiative, were incorporated in the Low-Income Retrofit program.

The purpose of the LISF Retrofit initiative was to increase energy efficiency and reduce the energy cost burden for income-eligible customers through the installation of gas energy efficiency measures to achieve deeper and broader energy savings consistent with a comprehensive, whole house approach.

The purpose of Low-Income Multi-Family Retrofit initiative was to deliver energy efficient products and services directly to income-eligible residential customers living in multi-family facilities with five or more dwelling units.

Targeted Customers: The LISF Retrofit initiative targeted residential gas customers living in one- to four-unit dwellings who were at or below 60 percent of the state median income level and who qualified to receive fuel assistance and/or utility-discounted rates. For two- to four-unit dwellings, 50 percent of the occupants had to qualify as low-income.

The LIMF Retrofit initiative targeted public housing authorities, non-profit housing developers, for-profit housing developers, landlords, property managers, and residential customers at, or below, 60 percent of median income living in multi-family properties consisting of five or more units.

Definition of Program Participant: For the Low-Income Single Family initiative, a participant is defined as a unique electric account served under this initiative. The unique account is tied to the low-income audit. For the Low-Income Multi-Family initiative, participants are defined as the total number of dwelling units in a participating facility.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

- Heating
- Hot water
- Envelope

Delivery Mechanism: PAs used a lead vendor and/or worked closely with their respective Community Action Program (“CAP”) agencies on all aspects of the program design and implementation. All PAs worked in conjunction with the Low-Income Energy Affordability Network (“LEAN”) as well as the Multi-Family Advisory Committee comprised of LEAN, Community Development Corporations, Public Housing Authorities and other nonprofit owners of low-income non-institutional multi-family housing. The Multi-Family Advisory Committee was tasked with prioritizing low-income multi-family projects for each PA, using benchmarking software called WegoWise. The lead vendor/CAP agencies were responsible for providing coordination of energy efficiency services to the customers, working with installation contractors to ensure that the proper initiative guidelines were enforced, ensuring that the customers met the eligibility requirements for program participation, and providing the CAP and/or PA with the required documentation of all work performed.

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 Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.B.4 provides information on the performance of the Low-Income Retrofit program.

Table II.B.4: Low-Income 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	\$	17,537,083			23,057,545		31%
Performance Incentive	\$	371,560			803,108		116%
Participants	Jobs	3,164			8,366		164%
Program Cost / Participant	\$	5,543			2,756		-50%
Savings & Benefits							
Gas							
Lifetime	therms	12,461,640	24,485,388	96%	28,902,248	18%	132%
Annualized	therms	623,082	1,332,855	114%	1,553,698	17%	149%
Average Measure Life	yrs	20	18	-8%	19	1%	-7%
Electric							
Annualized Energy	kWh	239,546	206,014	-14%	581,876	182%	143%
Annualized Demand							
Summer	kW	1	1	-14%	439	56246%	48508%
Winter	kW	-	26	0%	186	615%	0%
Non-Gas Non-Electric Benefits (Lifetime)	\$	13,629,312	19,398,183	42%	24,478,549	26%	80%
Cost-Effectiveness							
TRC Benefits	\$	24,644,149			52,271,719		112%
TRC Costs	\$	17,908,642			23,860,652		33%
Net Benefits	\$	6,735,507			28,411,067		322%
BCR	n/a	1.38			2.19		59%

Due to lower participation than expected in 2010 and 2011, the Company ramped up marketing efforts to help meet the goals in 2012 and in turn, exceeded the number of planned participants by 164%. Because of the increase in participation, Lifetime Therms and Annual Therms increased 96% and 114% respectively, while actual Program Costs increased 31% from planned. In addition to increased marketing efforts, the Company determined that in order to have a more coordinated effort in the Low Income Multi-Family initiative, it was necessary to initiate a new process for implementation services. The Company in turn contracted with a single lead vendor to implement the initiative in 2012. Previously, there were three lead vendors implementing assessment and installation services for the Low Income Multi-Family initiative. Actual cost per participant for 2012 was 50% lower than planned. This was due to the actual costs of serving a multi-family unit being less than planned, as well as serving 164% more customers at only a 31% increase in budget. A greater proportion of participants installed heating systems and hot water measures, in addition to the air sealing and insulation jobs originally planned for, leading to an increase in preliminary year-end Lifetime and Annual Therm savings of 96% and 114%, respectively.

Evaluated Annual kWh was 182% higher than preliminary; while both Summer and Winter kW savings were significantly higher than preliminary. These increases were due to the combined effects of the *Low Income Single Family Program Impact Evaluation* which estimated electric savings for some measures and the *Demand Impact Model User Guide* which were previously filed in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 12-56. It should be noted that both values for preliminary and evaluated electric kW savings are small, and even a slight change between the two values results in a high percentage variance.

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

- *Status of Ongoing Low Income Lighting and Heating Metering Study*
This study assesses lighting hours of use and the prevalence of secondary heating in low income households in Massachusetts. The two overarching objectives of the study are to determine a daily low income-specific lighting hours-of-use (HOU) value to replace the current assumption, and to determine the prevalence of low income customers who use a secondary heating source to warm their homes (and how best to incorporate secondary heating usage into future evaluations). This is a preliminary result; the study is ongoing and will be finalized by early September. The results of this study did not impact the 2012 evaluated results. The study is discussed in more detail in Section III, Study11.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

C. Commercial and Industrial Sector Programs

1. Summary

During 2012, the Company implemented the following Commercial and Industrial (“C&I”) programs:

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

The Company did not offer any C&I pilots in 2012.

Tables II.C.1 and II.C.3 provide summary information on the performance of the C&I programs at the sector and program levels, respectively. Please note the gas Program Administrators do not have end-use data available, and, therefore, are not required to provide the information in Table II.C.2.

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	\$	19,219,397			14,645,723		-24%
Performance Incentive	\$	908,652			915,270		1%
Savings & Benefits							
Gas							
Lifetime	therms	63,859,299	60,128,633	-6%	66,463,967	11%	4%
Annualized	therms	5,107,294	4,573,300	-10%	4,982,209	9%	-2%
Electric							
Annualized Energy	kWh	n/a	n/a	n/a	n/a	n/a	n/a
Annualized Demand							
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
Non-Gas Non-Electric Benefits (Lifetime)	\$	10,373,921	11,044,159	6%	12,750,847	15%	23%
Cost-Effectiveness							
TRC Benefits	\$	64,254,046			66,216,224		3%
TRC Costs	\$	37,626,584			26,360,723		-30%
Net Benefits	\$	26,627,462			39,855,501		50%
BCR	n/a	1.71			2.51		47%

As shown in Table II.C.1 above, there were no significant variances between planned and preliminary results or preliminary to evaluated results. However, there are variances which are due to individual program performance and evaluation results. Section II.C.2 provides more detailed information on the individual performance of these programs.

Table II.C.3: C&I Program Summary				
Program / Performance Category	Units	Planned Value	Evaluated Results	
			Value	% Change from Planned
C&I New Construction & Major Renovation				
TRC Benefits	\$	24,283,315	18,524,743	-24%
TRC Costs	\$	10,816,705	7,420,675	-31%
Net Benefits	\$	13,466,610	11,104,068	-18%
BCR	n/a	2.24	2.50	11%
C&I Retrofit				
TRC Benefits	\$	36,957,738	44,891,416	21%
TRC Costs	\$	25,200,918	18,187,974	-28%
Net Benefits	\$	11,756,820	26,703,441	127%
BCR	n/a	1.47	2.47	68%
C&I Direct Install				
TRC Benefits	\$	3,012,993	2,800,066	-7%
TRC Costs	\$	486,455	179,377	-63%
Net Benefits	\$	2,526,539	2,620,688	4%
BCR	n/a	6.19	15.61	152%
Workforce Development				
TRC Benefits	\$	n/a	n/a	n/a
TRC Costs	\$	60,534	19,976	-67%
Net Benefits	\$	n/a	n/a	n/a
BCR	n/a	n/a	n/a	n/a
Deep Energy Retrofit				
TRC Benefits	\$	n/a	n/a	n/a
TRC Costs	\$	190,591	19,787	-90%
Net Benefits	\$	n/a	n/a	n/a
BCR	n/a	n/a	n/a	n/a
TOTAL				
TRC Benefits	\$	64,254,046	66,216,224	3%
TRC Costs	\$	37,626,584	26,360,723	-30%
Net Benefits	\$	26,627,462	39,855,501	50%
BCR	n/a	1.71	2.51	47%

Section II.C.2 provides detailed information on the performance of each C&I program.

C&I Sector Performance Highlights

During 2012, the Program Administrators built upon existing C&I gas energy efficiency programs and significantly expanded initiatives to increase participation in all C&I programs. In order to provide appropriate customer incentives, the gas and electric Program Administrators continued to collaborate on projects in overlapping service territories by sharing both the costs and the results of technical assistance studies. The Program Administrators also held a *Gas Strategy Summit* to identify barriers to customer participation and any other program issues. PA efforts continued in

2012 to transform the workforce, including holding regional and local training events for plumbers, contractors, homeowners and business owners through the Program Administrators' GasNetworks[®]/Mass Save event schedule. The Program Administrators collectively evaluated emerging technologies through a series of shared seminars and discussions. Additional, more formal channels of testing and evaluation are being performed by individual Program Administrators, with resultant information being shared amongst the PAs. GasNetworks/Mass Save and the Massachusetts Technical Assessment Committee collaborated on a more formal process for emerging gas technologies. The following highlights the Program Administrators' efforts in the C&I gas energy efficiency arena during the 2012 program year:

- Annual Training - On September 20, 2012, the PAs sponsored their 12 Annual GasNetworks[®]/Mass Save Fall Conference and Trade Show in Randolph, MA. Attendees included over 400 HVAC contractors, trainers, and inspectors from across the Commonwealth, as well as 32 exhibitors. The Program Administrators coordinated a full-day agenda of training sessions and seminars on the latest high efficiency natural gas HVAC technologies and installation and maintenance practices. Participants also learned about opportunities to save energy and participate in PA programs.
- Commercial Food Equipment Market - The PAs participated in various food equipment shows throughout the Commonwealth. In 2012, the gas PAs contacted commercial food service equipment dealers, distributors and manufacturers in Massachusetts on over 600 different occasions, including contacts with more than 50 trade partners, to build support and participation in the GasNetworks/Mass Save program. Approximately 2,580 pieces of program collateral and rebate forms were distributed to partners and end users resulting in 200 rebates being processed through the program. PAs also staffed a number of special events in 2012 to help build awareness and participation in the program. These events included the New England Food Service Expo and the College Sustainability Conference, both in Boston, MA, and the Perkins Trade Show in Foxboro, MA. The PAs also engaged trade partners in promoting the program through their existing marketing vehicles. As a result, the GasNetworks/Mass Save program was featured in partner newsletters on four different occasions in 2012. Qualified equipment lists were also maintained and updated on a quarterly basis based on changes to the ENERGY STAR[®] and Food Service Technology Center websites. The PAs continue to research and analyze the market for efficient food service equipment, monitor developments in the industry and emerging technologies, and collect data to help evaluate the program's impact.
- Statewide Training on Steam Systems - GasNetworks/Mass Save was represented at several contractor training days, refrigerant system training days, and supply house vendor and product shows. Information on contractor and other training, as well as the annual fall event to kick off the heating season, can be found throughout the year on masssave.com and gasnetworks.com. The PAs are proud to endorse renowned hydronic and steam heating expert Dan Holohan who has been a lead GasNetworks/Mass Save trainer and ally for several years.

- Commercial Custom Steam Program - The PAs completed a survey of each PA's steam trap program. Using these survey results, the PAs aligned the implementation of their programs for consistency throughout the Commonwealth. This has increased participation in some service territories.
- Statewide Forms Review for 2013 - The gas Program Administrators worked collectively to make changes to prescriptive offerings necessitated by market changes and efficiency standards testing issues. GasNetworks/Mass Save offered support to the vendor community with respect to information flow for the Northeast Furnace Standards Rule and the suspension, due to a flaw in the test procedure, of the Air-Conditioning, Heating and Refrigeration Institute and ENERGY STAR listings of modulating condensing boilers.
- C&I Gas Summit - GasNetworks/Mass Save hosted a C&I Gas Summit on July 26, 2012, which included participation from all Program Administrators and key stakeholders. Improved methods of administering programs and emerging technologies were identified. Specifically, improved collaboration between gas and electric PAs whose territories overlap was identified as a requirement to more effectively and efficiently deliver savings to customers. A matrix was developed that categorized the results of the Summit into the four guiding principles including: Emerging Technologies, Behavioral Motivators, Forms and Process Improvements, and Collaboration. The results were shared amongst the PAs to help address barriers that were common to all. The issues and barriers identified fell into three categories: Specific Measures, Collaboration and Trade Allies and Forms and Program Issues.
- Market Characterization and Segmentation - The gas Program Administrators analyzed different market segments including those in service territories shared with electric PAs. Technical teams developed lists of specific measures for different customer segments that will offer the best overall comprehensive efficiency opportunities. They also developed specific groups of measures that will be marketable to different customer segments. The PAs have been using technical assistance vendors to help identify savings for these newer measures, which is costly. For that reason, the PAs have been developing savings estimating tools for all of the PAs to share in order to lower the cost of technical assistance. Examples of these tools include the steam trap custom tool, the dual-fuel screening tool, the rooftop controller tool, and the energy recovery ventilation tool. The Program Administrators are collectively seeking and providing training opportunities for the design communities and strategic vendors to familiarize them with these tools and measures.

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

2. C&I Programs

a. C&I New Construction and Major Renovation

Purpose/Goal: The C&I New Construction and 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 including commercial, industrial, institutional, and government customers.

Definition of Program Participant: A program participant is defined as a unique billing account that has received a financial incentive for the completed implementation of one or more gas energy efficiency measures.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

- Lighting
- Motors & Drives
- HVAC
- Refrigeration
- Envelope
- Compressed Air
- Hot Water
- Process
- Combined Heat & Power

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 Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

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 & 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	\$	7,821,338			5,657,851		-28%
Performance Incentive	\$	359,180			254,224		-29%
Participants	Accounts	1,634			543		-67%
Program Cost / Participant	\$	4,787			10,420		118%
Savings & Benefits							
Gas							
Lifetime	therms	28,186,120	18,948,486	-33%	21,702,688	15%	-23%
Annualized	therms	1,352,734	945,690	-30%	1,050,980	11%	-22%
Average Measure Life	yrs	21	20	-4%	21	3%	-1%
Electric							
Annualized Energy	kWh	n/a	-	n/a	-	n/a	n/a
Annualized Demand							
Summer	kW	n/a	-	n/a	-	n/a	n/a
Winter	kW	n/a	-	n/a	-	n/a	n/a
Non-Gas Non-Electric Benefits (Lifetime)	\$	232,647	621,471	167%	663,656	7%	185%
Cost-Effectiveness							
TRC Benefits	\$	24,283,315			18,524,743		-24%
TRC Costs	\$	10,816,705			7,420,675		-31%
Net Benefits	\$	13,466,610			11,104,068		-18%
BCR	n/a	2.24			2.50		11%

Preliminary Annual therms and lifetime therms were 33% and 30% lower than planned, respectively. Moreover, actual results show that total accounts participating in the program were substantially lower than planned, while per participant spending was more than planned; the net effect is that overall program participation and costs were lower than planned. There were more water savings from cooking appliances than was forecast, leading to significantly higher preliminary Non-Gas Non-Electric Benefits than planned.

Although the *Prescriptive Gas Impact Evaluation* increased savings in relation to preliminary results, these changes were not significant.

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

- C&I Customer Profile Project*

This study characterizes the Massachusetts energy efficiency market by analyzing recent customer usage and program participation data. The study relied on comprehensive billing and tracking data for all C&I customers to estimate the extent to which customers of various sizes and types participated in energy efficiency programs in 2011. The results of this study did not impact the 2012 evaluated results. The study is discussed in more detail in Section III, Study 17.
- Mid-Sized Customer Needs Assessment - Interim Results*

The study is investigating the extent to which current program offerings effectively serve the needs of mid-sized customers by conducting interviews with PAs and implementation contractors and analyzing available customer billing and tracking

data to examine differences in participation rates across customer size groups. The interim results of this study do not impact the 2012 evaluated results. The study is discussed in more detail in Section III, Study 18.

- *Impact Evaluation of 2011 Prescriptive Gas Measures*
This report presents the results of the impact evaluation of C&I prescriptive gas measures installed during program year 2011. The evaluation consists of on-site monitoring and verification of the savings for a sample of participants for four of the top five measures installed (based on total savings). The net effect for the Company was to increase energy savings. The study is discussed in more detail in Section III, Study 19.
- *Standard Boiler Research Plan and Interview Results Memo*
This document summarizes the plan, execution, and the decision to re-scope a planned boiler baseline assessment. The study intended to identify baseline boiler features and operation for both prescriptive and custom boiler measures, followed by measurement and verification of non-program boilers. However, the team was unsuccessful at locating any customers with a relatively recently installed standard efficiency boiler that was willing to participate in the study. The study had no impact on savings. The study is discussed in more detail in Section III, Study 20.
- *Impact Evaluation of 2011 Custom Gas Installations*
This study produced updated realization rates for custom commercial gas measures for NSTAR and PAs that use the statewide custom gas realization rate. There was no effect on savings for the Company. The study is discussed in more detail in Section III, Study 21.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

b. C&I Retrofit

Purpose/Goal: The C&I 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 a unique billing account that has received a financial incentive for the completed implementation of one or more gas energy efficiency measures.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

- Lighting
- Motors and Drives
- HVAC
- Compressed Air and Processes
- Envelope
- Water Heating

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 commissioning services, and the actual measure installations, including turn-key services.

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 Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

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

Table II.C.5 C&I 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	\$	9,839,715			8,285,932		-16%
Performance Incentive	\$	471,369			613,422		30%
Participants	Accounts	3,630			2,247		-38%
Program Cost / Participant	\$	2,711			3,688		36%
Savings & Benefits							
Gas							
Lifetime	therms	34,300,833	40,161,524	17%	43,673,515	9%	27%
Annualized	therms	3,562,888	3,500,319	-2%	3,795,297	8%	7%
Average Measure Life	yrs	10	11	19%	12	0%	20%
Electric							
Annualized Energy	kWh	n/a	-	n/a	-	n/a	n/a
Annualized Demand							
Summer	kW	n/a	-	n/a	-	n/a	n/a
Winter	kW	n/a	-	n/a	-	n/a	n/a
Non-Gas Non-Electric Benefits (Lifetime)	\$	8,275,613	8,841,714	7%	10,090,931	14%	22%
Cost-Effectiveness							
TRC Benefits	\$	36,957,738			44,891,416		21%
TRC Costs	\$	25,200,918			18,187,974		-28%
Net Benefits	\$	11,756,820			26,703,441		127%
BCR	n/a	1.47			2.47		68%

While total participants were 37% lower than planned, preliminary year-end Lifetime and Annual Therm savings were 17% higher and 2% lower than planned, respectively. The savings for this program were primarily driven by custom, site-specific projects. The Company forecast planned savings from custom projects by primarily using a historic average of therms saved per project. However, actual projects yielded more savings per participant than planned. There were a few, very large projects that significantly increased the average savings and cost per participant.

There are no significant variances between preliminary and evaluated results.

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

- C&I Customer Profile Project*
This study characterizes the Massachusetts energy efficiency market by analyzing recent customer usage and program participation data. The study relied on comprehensive billing and tracking data for all C&I customers to estimate the extent to which customers of various sizes and types participated in energy efficiency programs in 2011. The results of this study did not impact the 2012 evaluated results. The study is discussed in more detail in Section III, Study 17.
- Mid-Sized Customer Needs Assessment - Interim Results*
The study is investigating the extent to which current program offerings effectively serve the needs of mid-sized customers by conducting interviews with PAs and implementation contractors and analyzing available customer billing and tracking data to examine differences in participation rates across customer size groups. The interim results of this study do not impact the 2012 evaluated results. The study is discussed in more detail in Section III, Study 18.

- *Impact Evaluation of 2011 Prescriptive Gas Measures*
This report presents the results of the impact evaluation of C&I prescriptive gas measures installed during program year 2011. The evaluation consists of on-site monitoring and verification of the savings for a sample of participants for four of the top five measures installed (based on total savings). The net effect for the Company was to increase energy savings. The study is discussed in more detail in Section III, Study 19.
- *Standard Boiler Research Plan and Interview Results Memo*
This document summarizes the plan, execution, and the decision to re-scope a planned boiler baseline assessment. The study intended to identify baseline boiler features and operation for both prescriptive and custom boiler measures, followed by measurement and verification of non-program boilers. However, the team was unsuccessful at locating any customers with a relatively recently installed standard efficiency boiler that was willing to participate in the study. The study had no impact on savings. The study is discussed in more detail in Section III, Study 20.
- *Impact Evaluation of 2011 Custom Gas Installations*
This study produced updated realization rates for custom commercial gas measures for NSTAR and PAs that use the statewide custom gas realization rate. There was no effect on savings for the Company. The study is discussed in more detail in Section III, Study 21.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

c. C&I Direct Install

Purpose/Goal: The primary objective of the C&I Direct Install 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: The target market for this program was direct install retrofit business customers with electric consumption below 300kW.

Definition of Program Participant: A program participant is defined as a unique billing account that installed one or more of the eligible Direct Install measures.

Beginning in 2013, the Program Administrators will use consistent participant definitions, as set forth in Appendix M to the 2013-2015 Three-Year Plan in D.P.U. 12-100 through 12-111.

Targeted End-Uses:

- Lighting
- HVAC
- Hot Water
- Motors & Drives
- Refrigeration
- Envelope

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, loaded 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 Gas Energy Efficiency Plan, filed October 30, 2009. See Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121, Exhibit NG-1. The program was approved by the Department on January 28, 2010 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 09-121.

Table II.C.6 provides information on the performance of the C&I Direct Install program.

Table II.C.6 C&I Direct Install							
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	\$	435,838			129,244		-70%
Performance Incentive	\$	78,103			47,625		-39%
Participants	Accounts	500			327		-35%
Program Cost / Participant	\$	872			395		-55%
Savings & Benefits							
Gas							
Lifetime	therms	1,372,346	1,018,622	-26%	1,087,765	7%	-21%
Annualized	therms	191,672	127,291	-34%	135,931	7%	-29%
Average Measure Life	yrs	7	8	12%	8	0%	12%
Electric							
Annualized Energy	kWh	n/a	-	n/a	-	n/a	n/a
Annualized Demand							
Summer	kW	n/a	-	n/a	-	n/a	n/a
Winter	kW	n/a	-	n/a	-	n/a	n/a
Non-Gas Non-Electric Benefits (Lifetime)	\$	1,865,661	1,580,974	-15%	1,996,259	26%	7%
Cost-Effectiveness							
TRC Benefits	\$	3,012,993			2,800,066		-7%
TRC Costs	\$	486,455			179,377		-63%
Net Benefits	\$	2,526,539			2,620,688		4%
BCR	n/a	6.19			15.61		152%

Note: The Company updated its planned participants in the table above compared to the Company's 2012 Mid-Term Modification filing, D.P.U. 11-109. The 2012 MTM incorrectly had quantity of measures rather than program participants.

The Direct Install program is led by the electric PA, so gas savings is a function of participation in the electric program.

Preliminary Lifetime and Annual Therm savings were 26% and 34% lower than planned. There were two main drivers to the lower than planned savings. First, lower participation reduced preliminary savings in relation to planning estimates. Second, the measure mix of rebated measures varied greatly from the planning estimates. The Company rebated fewer spray valves than anticipated, but rebated many more faucet aerators. Faucet aerators have lower savings per unit than spray valves, but cost far less. Due to this measure mix, Program Costs were 70% lower than planned.

Evaluated Non-Gas Non-Electric Benefits were 26% higher than preliminary results. This increase is due to the application of results from the *Commercial and Industrial Non-Energy Impacts Study*, which was previously filed in the Boston Gas Company and Colonial Gas Company d/b/a National Grid 2013-2015 Three-Year Energy Efficiency Plan, D.P.U. 12-103. The study identified that certain gas C&I Direct Install efficiency measures such as thermostats and duct insulation, had applicable operations and maintenance benefits associated with them, which increased the overall Non-Gas Non-Electric Benefits for this program.

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

- *C&I Customer Profile Project*
This study characterizes the Massachusetts energy efficiency market by analyzing recent customer usage and program participation data. The study relied on

comprehensive billing and tracking data for all C&I customers to estimate the extent to which customers of various sizes and types participated in energy efficiency programs in 2011. The results of this study did not impact the 2012 evaluated results. The study is discussed in more detail in Section III, Study 17.

- *Mid-Sized Customer Needs Assessment - Interim Results*

The study is investigating the extent to which current program offerings effectively serve the needs of mid-sized customers by conducting interviews with PAs and implementation contractors and analyzing available customer billing and tracking data to examine differences in participation rates across customer size groups. The interim results of this study do not impact the 2012 evaluated results. The study is discussed in more detail in Section III, Study 18.

The Company regularly reviews best available information to adjust strategies in order to achieve energy efficiency goals. With respect to 2012 program performance information, the Company incorporated the best available information into its 2013-2015 energy efficiency plan. With respect to the results of EM&V studies that were completed for 2012, the Company will review those results and make any necessary adjustments to ensure it remains on track to achieve its goals for 2013-2015. The Company will continue to monitor program performance to determine if any evaluation is significant enough to trigger a modification under the new MTM guidelines established in D.P.U. 11-120-A (Phase II) (2013).

III. EVALUATION MEASUREMENT AND VERIFICATION ACTIVITIES

A. Summary

The Massachusetts Program Administrators completed 25 evaluation studies for the 2012 Energy Efficiency Annual Report. The studies that had the most significant influence on the final evaluated data for gas Program Administrators were the:

- C&I Customer Profile Project study
- HES Realization Rate Results evaluation
- 2012 Residential Heating, Water Heating and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing study
- Impact Evaluation of 2011 Custom Gas Installations study
- Impact Evaluation of 2011 Prescriptive Gas Measures study

The C&I Customer Profile Project sought to characterize the Massachusetts energy efficiency market by looking at past customer participation, billing data, and customer usage. Overall, the study found the vast majority of savings in 2011 came from custom projects in the custom end-use, which supports a continuation of impact evaluation work to verify these savings. In addition, the study made several other key observations. One, there is an indication of opportunity for more savings in some customer sectors, for example the health care sector where the percent of participating customers is low (1.8 percent of electric and 3 percent of gas) while the savings achieved by participating customers is higher than average. However, while the study identified areas which appear to represent opportunity, it did not seek to answer why participation was low in the sectors. Two, participation rates appeared to increase as account size increased for both gas and electric, reflecting the individualized attention paid to these customers by PA account managers. However, the average savings percent was found to be highest for small gas and electric customers. Finally, the participation rate for gas customers with the same electric PA was found to be 2.6 percent, which was higher than the 1.6 percent participation rate for those with different electric PAs. Additional information on this process evaluation is discussed in more detail in Appendix C, Study 17.

The HES Realization Rate study is a supplemental evaluation following up on the larger 2011 HES Impact Study, which was completed in 2012. This evaluation was needed to provide specific PA realization rates and account for improvements in some vendor software. The HES Realization Rate study targeted two measures: insulation and air sealing. As a background, the savings for these measures are provided by the vendor, who utilizes proprietary software to calculate savings based on the existing conditions compared to the upgraded conditions. The study compared the vendor calculated savings with billing analysis in order to calculate realization rates. The study results showed overall higher savings and higher realization rates when compared with the 2011 impact study. This is due in part to increased adoption of recommended weatherization measures by study participants. This study is discussed in more detail in Appendix C, Study 3.

The 2012 Residential Heating, Water Heating and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing Study sought to determine net-to-gross (“NTG”) ratios and early replacement timing for measures in the Residential Heating and Water Heating and Cool Smart programs. The results indicated that the NTG ratios are slightly higher than previously estimated for many measures. Further, the Net Market Effects (“NME”) analyses and data show evidence that the primary cause of improved NTG ratios is the strong equipment rebate levels that moved the market towards higher tiered efficiency. The study also examined if the program incentives are causing the early replacement of existing equipment prior to failure, thus taking an inefficient equipment offline before the end of its useful life. While the study showed program induced early replacement occurring, the levels of such early replacement were not aligned with the non-energy impacts (“NEIs”) assigned to various measures. Overall, this resulted in a modest increase in savings from early replacement, but a sharp decrease in NEIs associated with several measures. This study is discussed in more detail in Appendix C, Study 2. The NEI application is discussed in more detail in Appendix C, Study 25.

The Impact Evaluation of 2011 Custom Gas Installations and the Impact Evaluation of 2011 Prescriptive Gas Measures sought to test the accuracy of estimated savings of installed C&I custom and prescriptive gas measures. Historically, gas impact work generally found the gas savings estimates to be unpredictable. However, these two new studies showed results appear to be stabilizing. While some measure variation remains, the statewide custom realization rate on annual gas therm savings was found to be 82.1 percent of forecasted savings and the overall statewide prescriptive evaluated savings were found to be 102 percent of forecasted savings. These studies are discussed in more detail in App. C, Study 19 and 21.

Table III.A summarizes the EM&V studies that have not been included in previous Annual Reports. Please note: Studies 4, 5, 6, 8, 10, 13, 14, 15 and 16 apply to electric energy efficiency programs only and are not included in the table below.

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			
MA RNC Program Incremental Cost Report	App. C, Study 1	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	All Studies are implemented as planned
2012 Residential Heating, Water Heating and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing	App. C, Study 2	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	
HES Realization Rate Results Memo	App. C, Study 3	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100	

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)
		through D.P.U. 12-111	
Results of the Massachusetts Onsite Lighting Inventory	App. C, Study 7	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	
Residential Pilot Studies			
2012 Home Energy Services Pre-Weatherization Initiative Evaluation	App. C, Study 9	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	All Studies are implemented as planned
Low-Income Program Studies			
Status of Ongoing Low Income Lighting and Heating Metering Study	App. C, Study 11	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	All Studies are implemented as planned
Commercial & Industrial Program Studies			
Massachusetts Small Business Direct Install: 2010-2012 Impact Evaluations	App. C, Study 12	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	All Studies are implemented as planned
Customer Profile Project	App. C, Study 17	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	
Mid-Sized Customer Needs Assessment - Interim Results	App. C, Study 18	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	
Impact Evaluation of 2011 Prescriptive Gas Measures	App. C, Study 19	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	

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)
Standard Boiler Research Plan and Interview Results Memo	App. C, Study 20	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	
Impact Evaluation of 2011 Custom Gas Installations	App. C, Study 21	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	
Special & Cross Sector Studies			
Massachusetts Cross-Cutting Behavioral Program Evaluation Integrated Report	App. C, Study 22	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	All Studies are implemented as planned
2012 Massachusetts Statewide Marketing Campaign Evaluation Report	App. C, Study 23	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	
2013 Massachusetts Statewide Marketing Campaign: Pre-Campaign Snapshot	App. C, Study 24	Study was approved in January 2013 with the 2013-2015 Three-Year Plan, D.P.U. 12-100 through D.P.U. 12-111	
Massachusetts Residential Non-Energy Impacts (NEIs): Deemed NEI Values Addressing Differences in NEIs for Heating and Cooling Equipment that is Early Replacement Compared to Replace on Failure	App. C, Study 25	Study not submitted for approval	

B. Residential Program Studies

1. MA RNC Program Incremental Cost Report

Type of Study: Technology Evaluation
Evaluation Conducted by: NMR Group
Date Evaluation Completed: 6/11/2013

Evaluation Objective and High Level Findings: This report provides estimates of the incremental costs per square foot involved in building high efficiency homes that meet the criteria of the 2013 MA Residential New Construction (RNC) Program. Incremental costs above the costs of typical homes being built outside the program are estimated for single family (SF), low-rise multifamily buildings of three or fewer stories (MF 1-3), and mid- to high-rise multifamily buildings of four stories or more (MF 4+) for each of the incentive options offered by the program.

The evaluation provides the following incremental cost per square foot for homes built through the program.

MA RNC Single Family Incremental costs	Prescriptive		Performance		
	I	II	Tier I	Tier II	Tier III
Single Family Detached	\$ 1.54	\$ 6.39	\$ 1.19	\$ 4.57	\$ 9.33

MA RNC Multi-family 1-3 story Incremental Costs	Prescriptive		Performance	
	I	II	Tier I	Tier II
Single Family Attached	\$ 1.38	\$ 5.61	\$ 1.03	\$ 1.27
Multifamily 1-3 No Master Meter	\$ 0.10	\$ 1.50	\$ 0.65	\$ 1.18
Multifamily 1-3 Master Meter Gas	\$ 0.08	\$ 1.48	\$ 0.79	\$ 1.35
Multifamily 1-3 story Overall	\$ 0.60	\$ 3.10	\$ 0.86	\$ 1.29

MA RNC Multi-family 4+ Story Incremental Costs	Residential In-unit Prescriptive	Whole bldg Simple Prescriptive	Whole bldg Interactive Prescriptive
Multifamily 4+ story	\$ 0.14	\$ 1.21	\$ 1.65

MA RNC Incremental Costs By Sector	Single Family	Multi-Family 1-3 story	Multi-Family 4+ story
Overall Incremental cost/SF	\$ 2.31	\$ 0.95	\$ 1.00

Programs to which the Results of the Study Apply:

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

Evaluation Recommendations and Program Administrator Response: No recommendations were offered.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: No recommendations were offered.

Savings Impact: The study had no impact on savings.

Formulas Used in Impact Analysis: Historical RNC program participant data was used to inform differential pricing estimates and weighting.

Application of Results: Retroactively

How the Study Came to the Recommended Conclusions: No recommendations were offered.

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

2. 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing

Type of Study: Market Assessment, Market Characterization

Evaluation Conducted by: Navigant, ODC, and Cadmus

Date Evaluation Completed: 6/19/2013

Evaluation Objective and High Level Findings: The objectives of this evaluation were to:

1. Determine free-ridership (FR), spillover (SO), and net-to-gross (NTG) values by program measure,
2. Estimate the net market effects (NME) for each measure, and
3. Estimate the timing of equipment replacement (ER) across early replacement, replace on failure (ROF), and “in-between” categories. There is also a fourth category (“new”) which is either a first-time installation of the end-use or new construction.

The high level findings are as follows:

FR, SO, and NTG estimates for Cool Smart and Residential Heating and Water Heating (HEHE) equipment measures are shown in Table 1. The results indicated that the NTG ratios are slightly higher than previously estimated for many measures. Further, the NME analyses and data provide qualitative evidence supporting this finding, and that the primary cause of improved NTG results is a better alignment of equipment efficiency tiers and associated rebate levels – and appropriate changes over time – to move the market.

Table 1: Average FR, SO, and NTG Estimates

Measure	FR	SO	NTG
Boilers, AFUE 90-95.9%	0.32	0.08	0.76
Boilers, AFUE \geq 96%	0.31		0.77
Boilers, Overall	0.31		0.77
Furnaces, AFUE \geq 95%	0.41	0.22	0.81
Central Air Conditioners/Heat Pumps, SEER 14.5-14.9	0.35	0.28	0.93
Central Air Conditioners, SEER \geq 16	0.42		0.86
Central Air Conditioners, Overall	0.40		0.88
Ductless Mini-Splits	0.45	0.07	0.62
Storage Water Heaters, Energy Factor \geq 0.67	0.13	0.13	1.00
Tankless Water Heaters, Energy Factor \leq 0.94	0.37	0.26	0.89
Tankless Water Heaters, Energy Factor \geq 0.95	0.28		0.98
Tankless Water Heaters, Overall	0.32		0.93
Integrated Space Heaters/Water Heaters with a Condensing Boiler	0.34	0.08	0.74

This study also addressed the Quality Installation Verification components of the Cool Smart Program. Table 2 provides a summary of the QIV FR, SO, and NTG values as follows:

Table 2: Quality Installation Verification NTG

Measure	Average FR	Average SO	NTG
Manual J Central Air Conditioners and Heat Pumps	0.38	0.16	0.78
Manual J Heating	NA	0.15	NA
Airflow Testing/Duct Sealing	0.15	0.07	0.92
Refrigerant Testing	0.22	0.24	1.02
Overall QIV	0.25	0.16	0.91

The measures responsible for the majority of savings due to equipment installations in the HEHE and Cool Smart programs are central HVAC systems: natural gas boilers, natural gas furnaces, central air conditioning, and heat pumps. As shown in Table 3, participants replacing equipment early (4 or more years of remaining life) represent more than 30% of boiler and 23% of furnace installations, but just 8% of central air conditioner and heat pump installations. Early replacement shares among integrated boiler/hot water units, storage water heaters, and tankless water heaters range from 20 to 33%. There is virtually no early replacement among ductless mini-split installations. More than 95% of these are either first-time cooling installations or are replacing window air conditioners. There are also a significant number of HEHE participants who are neither early nor replace-on-failure (ROF). These in-between installation estimates range from 15 to 25% across all of the program’s major equipment measures.

Table 3. Equipment Replacement Timing in HEHE and Cool Smart Programs

Equipment Replacement Timing Shares				
Measure	Early	New	ROF	In-Between
Boiler	30.6%	0.0%	44.9%	24.5%
Furnace	23.1%	0.0%	61.5%	15.4%
Central Air Conditioner / Heat Pump	8.0%	50.4%	29.2%	12.4%
Ductless Mini-Split	2.5%	95.1%	0.0%	2.5%
Integrated Boiler / Water Heater	20.0%	0.0%	55.7%	24.3%
Storage Water Heater	33.3%	0.0%	50.0%	16.7%
Tankless Water Heater	28.0%	0.0%	54.8%	17.2%

Programs to which the Results of the Study Apply:

- Residential Cooling and Heating Equipment (CoolSmart) (Electric)

Evaluation Recommendations and Program Administrator Response: The following recommendations were made by the evaluators conducting this study. The initial response from the Company to these recommendations is summarized below.

Recommendation 1: The evaluators want to acknowledge the lack of consensus on NTG algorithms, and recommend that the PAs and EEAC develop clear protocols across all residential and non-residential program categories to look at NTG issues more holistically.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: All recommendations are being considered for adoption at this time. The PAs have not formally adopted or rejected any recommendations that require changes to program design and operations. The PAs are considering undergoing an initiative in the Cross Cutting Sector to encourage methodological consensus.

Application of Results: Retroactively

How the Study Came to the Recommended Conclusions: The evaluators estimated measure-specific FR, SO and NTG via what is commonly referred to as the Self-Report Approach (SRA). The SRA method was also used to estimate the NME and ER estimates. The evaluators relied on surveys with heating, cooling and water heating distributors and contractors, as well as surveys with program participants.

A copy of the complete study can be found in Appendix C, Study 2.

3. Home Energy Services Realization Rate Calibration

Type of Study: Impact Evaluation

Evaluation Conducted by: The Cadmus Group, Inc.

Date Evaluation Completed: 6/28/2013

Evaluation Objective and High Level Findings: The objective of the evaluation was to develop realization rates (the ratio of *ex ante* and *ex post* savings) that each Program Administrator (PA) could use to adjust insulation and air-sealing savings, as estimated by the most recent home auditing software employed by each HES implementer, to more closely reflect evaluated savings.

The evaluation yielded the following realization rates by PA (where appropriate and when sufficient data were available) for each of the four assessed heating fuel types.

Natural Gas

PA	n	Model Precision (at 90% confidence)	<i>Ex Ante</i>	<i>Ex Post</i>	Realization Rate
Berkshire Gas	182	±17%	161	137	0.85
Columbia Gas	294	±10%	209	131	0.63
National Grid	2,889	±4%	188	140	0.74
New England Gas	18	±83%	107	119	1.11
NSTAR	1,344	±5%	165	139	0.84
Unitil	22	±21%	256	175	0.68
Commonwealth-wide	4,749	±3%	183	139	0.76

Electric

PA	n	<i>Ex Ante</i>	<i>Ex Post</i>	Realization Rate
Cape Light Compact	101	2,693	1,360	0.51
National Grid	383	2,423	1,459	0.60
NSTAR	124	2,712	1,468	0.54
Commonwealth-wide	608	2,527	1,445	0.57

Heating Oil

PA	n	<i>Ex Ante</i>	<i>Ex Post</i>	Realization Rate
Cape Light Compact	748	16.4	16.4	1.00
National Grid	5,365	18.9	16.7	0.88
NSTAR	4,192	19.8	16.8	0.85
Unitil	128	38.6	13.9	0.36
WMECo	329	34.7	19.0	0.55
Commonwealth-wide	10,762	19.8	16.8	0.85

Propane

PA	n	<i>Ex Ante</i>	<i>Ex Post</i>	Realization Rate
Cape Light Compact	70	14.3	12.2	0.86
National Grid	216	14.3	12.6	0.88
NSTAR	91	14.2	13.5	0.95
Unitil	5	63.2	12.7	0.20
WMECo	10	33.4	14.6	0.44
Commonwealth-wide	391	15.4	12.8	0.83

Programs to which the Results of the Study Apply:

- Residential Mass Save (Home Energy Services) (Electric & Gas)

Evaluation Recommendations and Program Administrator Response: No recommendations were offered.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: No recommendations were offered.

Savings Impact: The PAs will use the results of this evaluation to retroactively adjust vendor provided *ex ante* savings estimates for insulation and air sealing measures.

Formulas Used in Impact and Process Analysis: The evaluation assessed *ex post* savings for both measures using two approaches: a billing analysis and an engineering analysis. A brief description of each follows:

- **Billing Analysis.** The evaluators developed a fixed-effects conditional savings regression model, using paired pre- and post-participation months to estimate savings for insulation and air sealing installed in homes heated by natural gas. The analysis utilized participation records from the High Efficiency Heating and Water Heating, Cool Smart, and OPower programs to ensure it did not misattribute the efficiency measures installed or behavioral changes resulting from those programs to the two HES measures.
- **Engineering Analysis.** For homes heated by electricity, heating oil, or propane, the evaluators estimated savings using PA- and fuel-specific U.S. Department of Energy (DOE-2) based simulation models, calibrated using each PA's average observed pre-program energy consumption. The simulation models were updated using detailed measure data and home characteristics recorded by HES implementers as well as a variety of weather files selected to best represent each PAs service territory.

Application of Results: Retroactively

How the Study came to the Recommended Conclusions: No recommendations were offered.

A copy of the complete study can be found in Appendix C, Study 3.

4. Massachusetts Consumer Survey Results Winter -2012

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

5. Residential Lighting Shelf Survey and Pricing Analysis.

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

6. Lighting Retailer, Supplier Perspectives on the Massachusetts ENERGY STAR Lighting Program

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

7. Lighting Onsite Inventory and Saturation Study

Type of Study: Technology Evaluation
Evaluation Conducted by: NMR Group

Date Evaluation Completed: 6/7/2013

Evaluation Objective and High Level Findings: The objective of this study was to perform lighting inventories and estimate socket saturations in Massachusetts homes. The study also examined lighting purchase behavior and searched for evidence of incandescent bulb stockpiling.

The main conclusions of the study are as follows:

- Most households used at least one CFL in 2013, even if some of them were dissatisfied with the products or not even aware they were using CFLs.
- The percentage of sockets filled with CFLs in 2013 was 28%, which was statistically similar to the 26% observed in 2009. The stagnation in CFL saturation can in part be explained by households replacing burned out CFLs with newly purchased CFLs.
- Saturation of all energy-efficient light bulbs, including CFLs, LEDs, and fluorescent tubes, increased to 39% in 2013.
- LED saturation remained low, at 2% of the total, but doubled from Spring 2012 to Spring 2013. Most LEDs were the under-the-cabinet type, not A-shaped bulbs.
- About 61% of sockets remaining in homes could theoretically be filled with an energy efficient light bulbs; about 57% of the remaining potential rests with standard bulbs, while the other 43% rests with specialty applications (i.e., dimmable or three-way control or does not have the A-shape).
- Households stored about two CFLs on average in 2013.
- The average onsite household bought about three CFLs in 2012—two of them were standard CFLs and one was a specialty CFL.
- The evaluators found evidence of stockpiling of incandescent bulbs; households stored an average of four incandescent bulbs, particularly 60-Watt bulbs. However, none of the onsite participants tied this behavior to EISA but instead explained that they just like to have extra bulbs on hand.

Programs to which the Results of the Study Apply:

- Residential ENERGY STAR Lighting® (Electric)
- Residential New Construction (Both)
- Low Income Residential New Construction (Electric)
- Multi-Family Retrofit (Both)

Evaluation Recommendations and Program Administrator Response: The following recommendations were made by the evaluators conducting this study. The initial response from the Program Administrator to these recommendations is summarized below.

Recommendation 1: Continue tracking the Massachusetts lighting market through regular consumer surveys, onsite saturation studies, shelf stocking surveys, and supplier interviews.

Recommendation 2: The PAs should perform a net-to-gross study as one has not been performed since 2010. This study will help to clarify whether current program-supported sales are helping to prevent backsliding to incandescents or incandescent halogen bulbs or whether they represent a high amount of free ridership.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: All recommendations are being considered for adoption at this time. The PAs have not formally adopted or rejected any recommendations that require changes to program design and operations.

The PAs will continue to track the lighting market to evaluate the impact of EISA. The PAs will also continue to work within the EMC to determine the correct timing to conduct a NTG study on the evolving lighting market.

Savings Impact: The report estimated the number of bulbs in indoor fixtures for all bulb types to be 1.49.

Formulas Used in Impact Analysis: There are no savings impacts, but PAs will update the assumed number of bulbs for indoor fixtures to be 1.49.

Application of Results: Retroactively

How the Study Came to the Recommended Conclusions: The study involved performing onsite visits to 150 homes in Massachusetts. Trained technicians took detailed notes about all lighting sockets and light bulbs found in the home, including bulbs found in storage. Households also provided information on when and where they purchased bulbs, why they stored bulbs, and the intended use of bulbs found in storage. The evaluators analyzed the data in Excel spreadsheets and in the Statistical Package for Social Sciences (SPSS) to arrive at the study conclusions.

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

8. Massachusetts ENERGY STAR® Lighting Program: Early Impacts of EISA

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

9. 2012 Home Energy Services Pre-Weatherization Initiative Evaluation

Type of Study: Process Evaluation

Evaluation Conducted by: The Cadmus Group, Inc.

Date Evaluation Completed: 4/19/2013

Evaluation Objective and High Level Findings: The objective of the evaluation was to assess the impact of initiative additional incentives on customer's decision to overcome pre-weatherization barriers (which then made them eligible to install certain recommended HES measures). The initiative targeted three common, low-cost pre-weatherization barriers: evidence of knob and tube wiring, general combustion safety, and improper dryer venting. The evaluation also assessed the delivery of the initiative itself. Key conclusions included:

Conclusion 1: The initiative data did not show a significant change in the measure adoption rate for National Grid and NSTAR customers who faced the knob and tube wiring barrier. Although these findings suggest that the initiative may not have influenced the measure adoption rate, it is important to remember that the provided data only represent a subset of HES customers, and the evaluators' analysis was limited to two PAs and only one barrier.

Conclusion 2: While the turnkey option offers customers easy access to approved contractors, the PAs and lead vendors that offered the turnkey option were uncertain of the delivery option's long-term viability. These PAs and lead vendors cited difficulties identifying and enrolling contractors given the limited financial opportunities for these contractors. In other words, the level of work for contractors generated by the initiative (to inspect knob and tube wiring and clear other pre-weatherization barriers) was not substantial enough to interest and enlist a sufficient number of approved turnkey contractors. PAs and lead vendors also cited the administrative burden, such as managing and updating the list of qualified contractors willing to participate in the program, as a challenge to turnkey viability. Further, according to Phase 2 participant survey respondents, only a small number of participants used this delivery option.

Conclusion 3: Non-participants indicated confusion about what the initiative actually covered for knob and tube wiring. During the survey, even after being told the incentive was only to check the wiring, non-participants still wanted a higher incentive: they were not able to differentiate between the cost of the inspection and the cost of potentially replacing the knob and tube wiring (if live).

Conclusion 4: PA stakeholders and customers that employed a 30-day deadline for initiative enrollment indicated that additional time would have helped. Specifically, survey respondents that were given the 30-day deadline indicated that the timeframe presented a challenge for addressing the initiative barriers (12%, n=13). However, an analysis of acceptance rates revealed that customers who were given a 30-day deadline had higher acceptance rates than those offered the 90-day deadline.

Conclusion 5: Interviews with PAs and lead vendors indicate that elements of the initiative's design and delivery varied across PAs. Examples of variation included marketing materials, participant forms, incentive amounts, and the timing of when participants received the rebate for clearing a barrier.

Programs to which the Results of the Study Apply:

- Residential Mass Save (Home Energy Services) (Electric & Gas)

Evaluation Recommendations and Program Administrator Response:

The following recommendations were made by the evaluators conducting this study.

Recommendation 1: The evaluators suggest that the PAs should work closely with their lead vendors to determine the long-term viability and effectiveness of the turnkey option.

Recommendation 2: The evaluators suggest that the PAs identify ways to better communicate what the cost of checking knob and tube actually covers and how it differs from the cost to actually replace the knob and tube wiring.

Recommendation 3: The evaluators suggest that the PAs consider a compromise deadline of 45 or 60 days that keeps some of the benefits of the immediacy of the deadline, but makes it more realistic for customers to meet the deadline.

Recommendation 4: While some variation may be necessary, the evaluators suggest that the PAs should discuss these variations, determine best practices, and standardize design and delivery as much as possible across the state.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: In an effort to standardize design and delivery, the PAs have adopted a 60 day deadline for acceptance of the incentive. All other recommendations are being considered for adoption at this time. The PAs have not formally adopted or rejected any of the other recommendations that require changes to program design and operations.

Savings Impact: There are no savings impacts.

Formulas Used in Impact and Process Analysis: There are no savings impacts.

Application of Results: Prospectively

How the Study Came to the Recommended Conclusions: The Pre-Weatherization Initiative evaluation included PA program manager interviews, program vendor staff interviews, 118 participant and nonparticipant customer surveys, and a review of pilot and historical program data. Based on information obtained through these data collection methods, the evaluators used their professional judgment and experience evaluating energy efficiency programs to offer recommendations aimed at improving program processes where appropriate.

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

10. Residential Lighting Controls Initiative Evaluation

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

C. Residential Pilot Studies

There are no EM&V studies included in the Annual Report that apply to pilots.

D. Low-Income Program Studies

11. Low Income Hours of Use and Heating Study

Type of Study: Impact Evaluation

Evaluation Conducted by: The Cadmus Group, Inc.

Date Evaluation Completed: 6/28/2013

Evaluation Objective and High Level Findings: The objective of the study is to assess lighting hours of use (HOU) and the prevalence of secondary heating among low income customers. The study is currently underway and will be completed by September 6, 2013.

While the study is ongoing, the evaluators can offer the following preliminary findings at this time:

- The preliminary low income-specific HOU of 2.66 is slightly less than the current program assumption of 2.8 hours/day.
- Low income seniors use their lights less (2.12 hours per day) than low income non-senior (2.88).
- Homes with secondary heating sources appear to supplement their primary heating when heating their home. As a result, future evaluations should consider the impact of program measures on both primary and secondary heating.

The following caveats are important to consider given the study's status:

- The study is ongoing and all preliminary findings are subject to change. The evaluators do not anticipate significant changes to the key results presented in this memo, but acknowledge these results may shift slightly following a complete review process.
- The preliminary findings may also change based on agency's bulb installation practices. Discussions to date indicate that some agencies may install efficient lighting in any available sockets, while others may target specific high-use room or fixture types. The agency's collective installation practices have ramifications on the appropriateness of the preliminary HOU of 2.66, which represents average usage across all sockets in low income homes.

Programs to which the Results of the Study Apply:

- Low-Income New Construction (Electric)
- Low-Income 1-4 Family Retrofit (Electric & Gas)
- Low-Income Multi-Family Retrofit (Electric & Gas)

Evaluation Recommendations and Program Administrator Response: No recommendations were offered, but the status memo does state that future low income impact evaluations should include secondary heating fuels when estimating total program savings.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: The PAs will include secondary heating fuels where appropriate in future low income impact evaluations.

Savings Impact: No savings impacts are offered at this time.

Formulas Used in Impact and Process Analysis: The preliminary study findings are based on analysis of 261 site visits at randomly sampled low income customer homes across the Commonwealth of Massachusetts.

At each home, trained technicians completed a whole-home lighting inventory and installed up to 10 lighting loggers per home. The technicians also installed a meter that assesses thermostat usage (for both manual and programmable thermostats) and meters that monitored heating equipment. In total, more than 2,000 lighting loggers and 800 meters were installed on heating equipment and collected usage information from November 29, 2012, through May 2, 2013.

The raw data collected through this robust metering process were reviewed, weighted, and annualized to estimate annual usage.

Application of Results: Prospectively

How the Study Came to the Recommended Conclusions: No formal recommendations were offered.

A copy of the complete study can be found in Appendix C, Study 11.

E. C&I Program Studies

12. Massachusetts Small Business Direct Install: 2010-2012 Impact Evaluations

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

13. Prescriptive VSD Impact Evaluation

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

14. Impact Evaluation of 2010 Prescriptive Lighting Installations

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

15. Impact Evaluation of 2011 Custom Refrigeration, Motor and Other Installations

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

16. Process Evaluation of the 2012 Bright Opportunities Program

This study applies to electric energy efficiency programs only and is, therefore, not included in the Gas PAs' Energy Efficiency Annual Reports.

17. C&I Customer Profile Project

Type of Study: Market Characterization
Evaluation Conducted by: DNV KEMA
Date Evaluation Completed: 6/20/2013

Evaluation Objective and High Level Findings: The primary goals of the C&I Customer Profile project were to:

- Characterize the Massachusetts energy efficiency market by analyzing recent customer usage and program participation data.
- Collect comprehensive billing and tracking data for all C&I customers to develop a single database to provide a consistent source of program tracking and billing data to support ongoing evaluation efforts.
- Estimate the extent to which customers of various sizes and types participated in energy efficiency programs during 2011.
- Document the processes used to consolidate and normalize PA data, and recommend enhancements to tracking systems to improve accuracy of results in future studies.

Highlights of the results of the analyses of participation by sector include:

- Custom vs. Prescriptive: The vast majority of savings in 2011 came from custom projects (64% of electric and 81% of gas). This would support a continuation of impact evaluation work of customer projects to ensure that methods used to calculate savings are effective.
- End Uses: On the electric side, the end use categories with the highest 2011 savings were lighting, combined heat and power (CHP) and heating, ventilation and air-conditioning (HVAC). While impact evaluations are underway for lighting and CHP, it has been several years since the last HVAC study. For gas projects, most 2011 savings came from HVAC.
- Business Type: The reliability of the estimated participation and savings rates by business type is limited by the fact that only 59% of billing accounts could be assigned to a business type. However, it appears that while only 1.8% of electric accounts classified as healthcare

participated, their average savings was 23%. Similarly for gas, of the 3% of accounts classified as healthcare and education, the average savings was high. This may indicate the potential for significantly more savings in these sectors.

- **Account Size:** Participation rates increase as account size increases for both gas and electric, reflecting the individualized attention paid to these entities by PA account managers. However, the average savings percent is highest for small gas and electric accounts.
- **Same PAs:** The participation rate for gas customers with the same electric PA is 2.6%, which is higher than the 1.6% participation rate for those with different electric PAs. This may be an indication of the challenges faced in coordinating marketing efforts between PAs.

Programs to which the Results of the Study Apply:

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

Evaluation Recommendations and Program Administrator Response: The following recommendations were made by the evaluators conducting this study. The initial response from the Program Administrator to these recommendations is summarized below.

Recommendation 1: Standardization of tracking database information about end uses and building types would increase the accuracy of any information derived from the records received.

Recommendation 2: In order to evaluate overall customer participation, it is necessary to build the capability to link accounts across fuels.

Recommendation 3: Leverage the baseline information collected here for other market characterization projects and efforts to estimate savings opportunities in each sector.

Recommendation 4: Incorporate checks to ensure that account numbers entered into tracking systems are accurate, and correspond to those in billing systems.

Recommendation 5: If there is a need for more reliable information by business type, explore services and software to use names and addresses to lookup business type rather than relying on PA designations.

Recommendation 6: Build on this one year snapshot with additional data going forward to accumulate program participation history.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: All recommendations are being considered for adoption at this time. The PAs have not formally adopted or rejected any recommendations that require changes to program design and operations.

Savings Impact: Not applicable. This is a market characterization study.

Formulas Used in Impact Analysis: Not applicable. This is a market characterization study.

Application of Results: Prospectively

How the Study Came to the Recommended Conclusions: The project involved the collection, organization and analysis of 2011 energy efficiency project tracking data and billed energy usage for all Massachusetts Commercial and Industrial (C&I) gas and electric customers. The statewide database developed from this project has already provided information upon which other C&I impact and process evaluation work has been based. Once the data were collected and consolidated, it was analyzed to produce summaries that characterize the current energy efficiency market in Massachusetts.

A copy of the complete study can be found in Appendix C, Study 17.

18. Mid-Sized Customer Needs Assessment - Interim Results

Type of Study: Market Characterization

Evaluation Conducted by: DNV KEMA

Date Evaluation Completed: 6/28/2013

Evaluation Objective and High Level Findings: This study provides results to date for the Massachusetts Mid-Sized Customer Needs Assessment for 2011 C&I customers. The study aims to investigate the extent to which current program offerings effectively serve the needs of mid-sized customers. In addition, if it is found that mid-sized customers or pockets of customers are underserved, the study will explore whether variations to existing program offerings or additional programs would be needed to optimally serve these customers. DNV KEMA completed research activities that addressed the following three objectives:

- Determine how Massachusetts PAs currently address mid-sized customers;
- Identify and describe the population of mid-sized customers across PAs (on-going);
- Estimate program participation rates for the largest, smallest, and mid-sized customers.

Programs to which the Results of the Study Apply:

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

Evaluation Recommendations and Program Administrator Response: The following preliminary recommendations were made by the evaluators conducting this study. The initial response from the Program Administrator to these recommendations is summarized below.

Recommendation 1: *Improve processes for linking multiple accounts to customers* – The PA’s ability to accurately and consistently classify customers depends upon their ability to track multiple account customers within and across PAs. The PAs employ a range of tools to help them link customers; however, these tools did not provide sufficient support to enable the research team to link account representatives to the accounts they manage by account number. Moreover, we found large discrepancies between the segments that the PAs felt they were managing and those we were able to match with account representatives.

Recommendation 2: *Standardize classification and marketing approaches to multi-account customers* – The research found that multiple account customers were treated differently across PAs, and also within a PA, across customers. The lack of standardized approaches for treating multiple account customers limits our ability to isolate segments of customers based on size and complicates the PA’s ability to effectively market to those customers.

Recommendation 3: *Link electric and gas customers* – Because much of the identification and marketing to Direct Install customers is handled through the electric PAs, the gas-only PAs lose some autonomy regarding how their customers are marketed. Consequently, some large gas customers are not identified until after they receive Direct Install prescriptive solutions from installation contractors. Improved coordination of tracking systems across PAs would reduce the risk of this occurring. DNV KEMA found that the PA’s ability to link accounts across firms is constrained by legal privacy issues that must be addressed before this will be possible.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: All recommendations are being considered for adoption at this time. The PAs have not formally adopted or rejected any recommendations that require changes to program design and operations.

This memorandum provides preliminary results of this mid-sized customer needs assessment. The findings were limited to those relating to the in-depth interviews with PA staff and implementation contractors, and limited analysis of the C&I Customer Profile Project database. Continued research efforts include a detailed data mining exercise to investigate the relationship between in-depth interview responses and the customer billing and program tracking records as well as implementation of a survey of participants and non-participants to test various hypotheses developed based on the PA interviews and data analysis conducted to date. Results of these analyses will be reported in the final report which is expected to be completed in the second half of 2013.

Savings Impact: Not applicable. This is a market characterization study.

Formulas Used in Impact Analysis: Not applicable. This is a market characterization study.

Application of Results: Prospectively

How the Study Came to the Recommended Conclusions: Interviews with each PA and 5 implementation contractors provided a set of criteria used to segment customers by size. In addition to reviewing the interview findings, DNV KEMA used the available customer billing and tracking data to examine differences in participation rates across the three size groups.

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

19. Impact Evaluation of 2011 Prescriptive Gas Measures

Type of Study: Technology Evaluation
Evaluation Conducted by: DNV KEMA
Date Evaluation Completed: 6/28/2013

Evaluation Objective and High Level Findings: This report presents the results of the impact evaluation of the Program Year 2011 (PY2011) Massachusetts Prescriptive Gas Measures Program. The evaluation consists of on-site monitoring and verification of the savings for a sample of participants for four of the top five measures installed, in terms of savings.

The overall relative performance for the four measures was about 102% and the relative precision was about ±15.6%. The condensing furnace and condensing boiler measures both had relative performance greater than 100%, at about 160% and 107 % respectively. Since they represent about 85% of total program savings their performance offset the lower relative performance observed for the other two measures. Indirect water heater and infrared heating measures had lower relative performance of 79% and 20% respectively.

Programs to which the Results of the Study Apply:

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

Evaluation Recommendations and Program Administrator Response: The following recommendations were made by the evaluators conducting this study. The initial response from the Program Administrator to these recommendations is summarized below.

Recommendation 1: Condensing Boiler Savings Recommendations:

Size	Efficiency Requirement	Report 2010 Savings (MMBtu)	Report 2011 Savings (MMBtu)	Report 2012 Savings (MMBtu)
<= 300 MBH	>= 90% AFUE	22.1	29.8	30.6
301-499 MBH	>=90% Thermal Efficiency	42.3	56.9	58.4
500-999 MBH	>=90% Thermal Efficiency	77.1	104.6	107.3
1000-1700 MBH	>=90% Thermal Efficiency	142.6	192.1	197.2
1701+ MBH	>=90% Thermal Efficiency	249.0	336.2	345.1

Recommendation 2: Recommended Condensing Furnace Savings

Furnace Efficiency	Report 2010 Savings (MMBtu)	Report 2011 Savings (MMBtu)	Report 2012 Savings (MMBtu)
Furnace AFUE =>92%	21.1	5.9	7.5
Furnace AFUE =>92% w/ECM	19.6	5.5	6.9
Furnace AFUE =>94% w/ECM	23.6	6.2	8.5
Furnace AFUE =>95% w/ECM	NA	NA	9.0
Furnace AFUE =>96% w/ECM	NA	NA	9.5
Furnace AFUE =>97% w/ECM	NA	NA	9.9

Recommendation 3: Recommended Infrared Heater Savings

Measure Type	Report 2010 Savings (MMBtu)	Report 2011 Savings (MMBtu)	Report 2012 Savings (MMBtu)
Infrared Heater	74.4	22.3	12.0

Recommendation 4: Recommended Indirect Water Heater Savings

Measure Type	Report 2010 Savings (MMBtu)	Report 2011 Savings (MMBtu)	Report 2012 Savings (MMBtu)
Indirect Water Heater	30.4	20.7	19.0

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: PAs plan to incorporate recommendations

Savings Impact: The overall relative performance for the four measures was about 102% and the relative precision was about ±15.6%. The condensing furnace and condensing boiler measures both had relative performance greater than 100%, at about 160% and 107 % respectively. Since they represent about 85% of total program savings their performance offset the lower relative performance observed for the other two measures. Indirect water heater and infrared heating measures had lower relative performance of 79% and 20% respectively.

Formulas Used in Impact Analysis:

$$\Delta MMBtu = \Delta MMBtu$$

Application of Results: Retrospectively

How the Study Came to the Recommended Conclusions: The evaluation consists of on-site monitoring and verification of the savings for a sample of participants for four of the top five measures installed, in terms of savings. The sample sites were monitored for about eight weeks in an attempt to capture seasonally sensitive variations in energy consumption between the winter and swing seasons. The first monitoring equipment was installed in the first week of December 2012 and recovery was completed during the second week of March 2013. The on-site sample design was designed to achieve a relative precision of ± 20% at the 80% confidence interval using a two-tail test for the overall program savings.

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

20. Standard Boiler Research Plan and Interview Results Memo

Type of Study: Technology Evaluation

Evaluation Conducted by: DNV KEMA

Date Evaluation Completed: 5/28/2013

Evaluation Objective and High Level Findings: This document summarizes the plan, execution, and the decision to re-scope the Boiler Baseline Assessment for the Massachusetts Energy Efficiency Programs' Large Commercial & Industrial Evaluation. This study was commissioned to identify the base line boiler features and operation for both prescriptive and custom boiler measures. The research was intended to encompass two elements: first boiler distributors were to be interviewed to determine the characteristic features of new code-compliant boilers and also to provide leads for standard code-compliant boilers. Secondly, a sample of standard code compliant boilers would be metered to determine characteristic performance, with a particular interest in cycling boilers (vs. modulating firing rate). The second stage of research was expected to be M&V of non-program boilers. However, the team was unsuccessful at locating any customer both with a relatively recently installed standard efficiency boiler and willing to participate in the study through distributors, contractors, and other efficiency partners contacted.

Programs to which the Results of the Study Apply:

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

Evaluation Recommendations and Program Administrator Response: The following recommendations were made by the evaluators conducting this study. The initial response from the Program Administrator to these recommendations is summarized below.

Recommendation 1: It is important to note that the initial scoping does not provide conclusive evidence on the absence of standard efficiency boilers in the Massachusetts market, and further research on existing installed stock and recent sales data is warranted.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: PAs plan to incorporate recommendations. The Evaluation Working Group agreed to re-direct some of the funds not spent on metering to a boiler market investigation which would encompass a more rigorous interview sample, seek manufacturer sales data, and utilize other techniques to provide a more reliable view of the market. The results of this investigation will be presented and/or filed at a later date.

Savings Impact: Not applicable. This is a market characterization study.

Formulas Used in Impact Analysis: Not applicable. This is a market characterization study.

Application of Results: Prospectively

How the Study Came to the Recommended Conclusions: The evaluators were unable to find base case boilers to monitor, therefore the focus turned to characterize the Massachusetts boiler market.

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

21. Impact Evaluation of 2011 Custom Gas Installations

Type of Study: Impact Evaluation

Evaluation Conducted by: DNV KEMA

Date Evaluation Completed: 6/17/2013

Evaluation Objective and High Level Findings: This study aims to quantify the actual energy savings due to the installation of Custom Gas measures installed through the Massachusetts Energy Efficiency Program Administrators' (PAs) Commercial and Industrial (C&I) Lost Opportunity and Large Retrofit programs in 2011.

The realization rates will be used for planning and program reporting, including program year 2012 annual reporting and any 2013-2015 program planning and subsequent year reporting, unless replaced by results from a subsequent study.

The scope of work for this impact evaluation included NSTAR's 2011 Custom Gas measures. NSTAR's 2011 results were combined with those from the other gas PAs, which were based on the 2010 program year.

Key findings include the following:

- Statewide realization rate on annual gas therms savings was 82.1% with a relative precision of $\pm 9.4\%$ at 80% confidence.
- NSTAR realization rate on annual gas therms savings was 84.4% with a relative precision of $\pm 6.9\%$ at 80% confidence.

Programs to which the Results of the Study Apply:

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

Evaluation Recommendations and Program Administrator Response: The following recommendations were made by the evaluators conducting this study. The initial response from the Program Administrator to these recommendations is summarized below.

Recommendation 1: Project documentation should include savings estimates in the native file form and support the claimed baseline.

Recommendation 2: Controls measures, particularly EMS based strategies, must be verified for proper operation, setpoints, and applicability. Savings estimates for these types of measures should include all necessary assumptions and operating characteristics well outlined. Post verification metering should be considered where savings justify the added expense or be included as a requirement of the project.

Recommendation 3: Estimated savings for measures such as combustion controls, which are based on a savings a fixed percentage of total gas used should include not only the percentage savings, but the baseline and projected as-built efficiencies and the billed gas usage. The baseline, if currently installed, should be demonstrated using combustion gas efficiency tests or other measure of the baseline. The resulting parameters can be easily checked against acceptable ranges to validate the measure.

Recommendation 4: The evaluators recommend that PA implementers consider using the results of the savings fraction analysis performed as part of the desk review process as a sanity check of individual application savings estimates and as indicator where a deeper review of an application may be required.

Recommendation 5: Consider some summer metering for measures which involve summer gas use such as industrial processes or re-heat operations.

Recommendation 6: In considering evaluation activities for the PY2012 program, the Evaluation Group may want to consider an additional round of on-site M&V impact evaluations for all the PAs except NSTAR. It is reasonable to conclude that the realization rates may not have stabilized statewide due to the rapid and continued expansion of the programs and the intent of the PAs to improve savings estimate processes.

Recommendation 7: However, before proceeding with the on-site M&Vs, the evaluators recommend repeating the desk-review task to further test the validity of the desk review method for triggering more expensive impact evaluations.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: All recommendations are being considered for adoption at this time. The PAs have not formally adopted or rejected any recommendations that require changes to program design and operations.

Savings Impact: This impact evaluation produced an 84% realization rate for NSTAR, which is an improvement on the previous impact evaluation result of 47%, found one year earlier. As a result, the statewide realization rate also improved to 82%.

Formulas Used in Impact Analysis: Evaluated savings were determined through custom engineering analysis similar to how tracking savings were developed.

Application of Results: Retrospectively

How the Study Came to the Recommended Conclusions: Data collection included pre and post installation billing data, power metering, temperature metering, and in some cases, trend data collected from customer energy management systems. The sample was designed to achieve 80/10% precision at the statewide level, and 80/20% at the larger PA level (Columbia Gas, National Grid, NSTAR). This sample design included 50 sites statewide. Following a desk review process, which helped determine that NSTAR would be the only PA to proceed with full M&V activities, the NSTAR sample was increased from the proposed 13 sites to 16 sites to ensure that the goal of 80/20% precision was met.

A copy of the complete study can be found in Appendix C, Study 21.

F. Special & Cross Sector Studies

22. Massachusetts Cross-Cutting Behavioral Program Evaluation Integrated Report

Type of Study: Impact and Process Evaluation

Evaluation Conducted by: Opinion Dynamics with Navigant Consulting and Evergreen Economics

Date Evaluation Completed: 6/20/2013

Evaluation Objective and High Level Findings: This report includes impact findings of behavior/feedback programs and pilots administered by National Grid, NSTAR, Western Massachusetts Electric Company (WMECo) and Cape Light Compact (CLC) during the 2012 program year. It also includes process findings for CLC's Smart Home Energy Monitoring Pilot (SHEMP) from 2009 - 2012.

The evaluation includes the following findings:

- The 2012 impacts for the National Grid and NSTAR behavior/feedback programs range from 41 kWh to 258 kWh per household for the electric cohorts and from 0.28 MMBtus to 1.90 MMBtus for the gas cohorts.
- OPower electric programs have demonstrated an average adjusted net savings gain of 27% from program year (PY) 1 to PY2, and 16% from PY2 to PY3. Gas programs have demonstrated an average adjusted net savings gain of 20% from PY1 to PY2, and 23% from PY2 to PY3.
- Since 2009, the National Grid and NSTAR behavior/feedback programs using OPower have channeled 24,122 additional participants into other residential programs and resulted in a savings of 5,298 MWh and 28,581 MMBtus. The additional savings are a result of the OPower program driving increased participation in other residential programs.
- For National Grid and NSTAR behavior/feedback programs, the report provided savings estimate ratios to adjust implementer estimate of savings based on comparison of treatment and control group usage for each month of participation. The savings estimates range between 90% - 111%.

- The WMECo program achieved a total overall savings of 2,263 MWh in 2012 attributable to “passive” participants that receive energy saving reports (mailers), and “activated” participants that interact with an online web platform.
- The WMECo program has had a substantial positive impact on participation in other energy efficiency programs. For instance, online activation of the web portal has increased participation in the Mass Save program by 431 customers in 2012.
- CLC’s SHEMP Pilot using the Tendril in-home displays had significant savings differences between the older Legacy cohort and the more recent Energize cohort. Legacy customers’ savings range from 7.8%-8.8% average savings per household. Comparatively, Energize savings estimates are significantly lower, ranging from 1.49%-1.99% average savings per household.
- CLC’s SHEMP Pilot had differences between Legacy and Energize cohorts’ cross-program participation levels. Legacy customers demonstrated a sharp increase in cross-program participation during the Legacy participation period. Energize customers’ monthly cross-program participation dropped during the treatment period.

Programs to which the Results of the Study Apply:

- Behavior/Feedback (Electric & Gas)

Evaluation Recommendations and Program Administrator Response: There were no recommendations as part of this report.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: Not applicable

Savings Impact: For the National Grid and NSTAR behavior/feedback programs, the net savings increase or decrease slightly compared to the 2012 TRM for various cohorts. Please see Table 2 on page 10 in the report for additional information.

Similarly for WMECo, net savings increase or decrease compared to planned values, with passive participants exhibiting increased savings while activated participants exhibiting decreased savings. Please see Table 14 in the report for additional information

CLC’s SHEMP pilot results do not impact savings.

Formulas Used in Impact Analysis:

Impact analysis for Behavior/Feedback programs using OPower HER, and for passive participants in the WMECo program:

$$ADC_{it} = \alpha_i + \beta_1 Post_t + \beta_2 Treatment_i \cdot Post_t + \epsilon_{it} \quad (\text{Equation 1})$$

where:

ADC_{it} = Average daily consumption (kWh) for household i at time t

α_i = Household-specific intercept

β_1 = Coefficient for the change in consumption between pre- and post-periods

β_2 = Coefficient for the change in consumption for the treatment group in the post-period compared to the pre-period, and to the comparison group. This is the basis for the net savings estimate.

Please refer to section 3.1.2 of the report for additional information.

Developing Savings Estimate Ratio for Behavior/Feedback programs using OPower HER:

$$\text{Savings Estimate Ratio}_{u,f} = \frac{(\text{Estimated Modeled Savings}) = \sum_{i=0}^3 n * kWh Savings_{u,c,i,f}}{(\text{OPOWER Reported Savings}) = \sum_{i=0}^3 n * kWh Savings_{u,c,i,f}}$$

(Equation 3)

where:

n is the average number of participants in a given cohort

u is a given utility

c is a given cohort

i is a given time period

f is a given fuel type

Please refer to section 3.1.2 of the report for additional information.

Impact Analysis for WMECo's Activated Participants:

The matching method was employed to calculate savings for WMECo's activated participants. The matching method follows the approach summarized in Imbens and Wooldige (2009) and applied in Abadie and Imbens (2011). In this model, the effect of the activation in month t is the difference between the energy use of participant k and its estimated counterfactual (baseline) consumption.

Impact Analysis for CLC's SHEMP Pilot -- Model 1:

$$kWh_{kt} = \alpha_{0t} + \alpha_1 Treatment_{kt} + \alpha_2 PREkWh_{kt} + \sum_{j=1}^J \beta^j EE_{kt}^j + \varepsilon_{kt}$$

where:

kWh_{kt} is the average daily electricity use by household k during month t;

all Greek characters denote coefficients to be estimated, and in particular α_{0t} is a monthly fixed effect.

$Treatment_{kt}$ is an indicator variable taking a value of 1 if customer k is a SHEMP participant, and 0 otherwise;

$PREkWh_{kt}$ is the average daily electricity use by household k during the most recent month before household k enrolled in SHEMP that is also the same calendar month as month t. For

instance, if household k enrolled in August 2011, the value of $PREkWh_{kt}$ for June 2012 is June 2011.

EE_{kt}^j is an indicator variable for energy efficiency program j , taking a value of 1 if customer k is in the program in period t and 0 otherwise. In the analysis we consider four EE programs (that is, $J=4$), denoted by the following variables in regression results reported in Appendix C (of the Evaluation Report):

LISF= Low Income Single Family program;

MFR= Multi-Family Retrofit program;

RHE= Residential Home Energy program;

RP= Residential Products program.

ε_{kt} is the error term

In this model α_1 indicates average daily savings generated by the program for participants over the course of the initiative.

Please refer to section 3.3.4 of the report for additional information.

Impact Analysis for CLC's SHEMP Pilot -- Model 2:

$$Savings_{kt} = kWh_{kt} - \hat{k}Wh_{kt}^C$$

$$\hat{k}Wh_{kt}^C = kWh_{kt}^M + \hat{\beta}(\mathbf{X}_{kt} - \mathbf{X}_{kt}^M)$$

where:

kWh_{kt} = the average daily electricity use by household k during month t ;

$\hat{k}Wh_{kt}^C$ = the estimated counterfactual energy use by household k during month t ;

kWh_{kt}^M = the energy use by household k 's match during month t ;

\mathbf{X}_{kt} = the values for household k in month t of the independent variables \mathbf{X} affecting energy use;

\mathbf{X}_{kt}^M = the values of \mathbf{X} in month t for household k 's match.

$\hat{\beta}$ = the factors used to adjust household k 's energy use to reflect differences between household k and its match in the value of \mathbf{X} .

Please refer to section 3.3.4 of the report for additional information.

Application of Results:

- The National Grid and NSTAR Behavior/Feedback results will be applied in the 2012 Annual Report.
- The National Grid and NSTAR Behavior/Feedback savings estimate ratio will be applied in 2013 and going forward.
- The WMECo Behavior/Feedback results will be applied in the 2012 Annual Report.

- CLC SHEMP is a pilot program that will not directly affect savings for any program during this annual report year.

How the Study Came to the Conclusions: For the National Grid and NSTAR Behavior/Feedback programs and WMECo passive participants, the evaluation developed its savings estimate based on a billing analysis of the entire program population and its randomly assigned control groups using a linear fixed effects regression. A channeling analysis was then performed to determine what portion of HER savings, as measured through the billing analysis, were captured in other programs. For more information, please see section 3.1 of the study.

For the WMECo Western Mass Saves (WMS) activated participants, the matching method was employed to calculate savings. More details can be found in Section 3.2.2 of the study.

For CLC's SHEMP pilot process evaluation, the evaluation findings are based on a literature review, survey research from pre and post treatments surveys and an additional survey to a comparison group. For CLC's impact analysis, the evaluation uses a billing analysis of the opt-in treatment group to a matched comparison group. For more information, please see section 3.3 of the study.

A copy of the complete study can be found in Appendix C, Study 22.

23. 2012 Massachusetts Statewide Marketing Campaign Evaluation Report

Type of Study: Market Assessment

Evaluation Conducted by: Opinion Dynamics Corporation

Date Evaluation Completed: 1/11/2013

Evaluation Objective and High Level Findings: This report presents results from the post 2012 statewide umbrella marketing survey effort conducted by Opinion Dynamics. The primary goal of this research is to enable the PAs to track changes in Mass Save awareness over time as well as to measure the effectiveness of the campaign. As such, this report presents the results from residential and C&I quantitative surveys conducted immediately following the 2012 campaign, which ran from April 2 to August 19, 2012. A comparison of results from the pre- and post-campaign surveys indicates that there have been some changes in Mass Save awareness or familiarity as a result of 2012 campaign activities. However, there are differing results within the residential and commercial populations.

Overall, the team found divergent results within the residential and C&I populations, with C&I customers showing greater changes in awareness and other metrics over time. For example, there has been a significant increase in Mass Save awareness among C&I customers compared to awareness prior to the 2012 campaign launch. The August 2012 survey shows that awareness among C&I customers has risen from 33% pre-campaign to 40% post-campaign. However, awareness of and familiarity with Mass Save has not changed significantly among residential PA customers since the pre-campaign survey. In addition, there has been little change in residential familiarity compared to the 2010 baseline study conducted by the campaign implementer.

Programs to which the Results of the Study Apply:

- Residential New Construction and Major Renovation (Electric & Gas)
- Residential Cooling and Heating Equipment (Electric & Gas)
- Residential Multi-Family Retrofit (Electric & Gas)
- Residential Mass Save (Home Energy Services) (Electric & Gas)
- Residential ENERGY STAR® Lighting (Electric)
- Residential ENERGY STAR® Appliances (Electric)
- C&I New Construction and Major Renovation (Electric & Gas)
- C&I Large Retrofit (Electric & Gas)
- C&I Small Retrofit (Electric & Gas)
- Behavior/Feedback Program (Electric & Gas)

Evaluation Recommendations and Program Administrator Response: There were no recommendations from this report as it was designed to track changes in awareness from the campaign and to measure the campaigns effectiveness.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: Not applicable.

Savings Impact: No savings impact.

Formulas Used in Impact Analysis: Not applicable.

Application of Results: Prospectively.

How the Study Came to the Recommended Conclusions: A telephone survey was conducted with a random sample of 402 residential customers between August 20 and September 9, 2012, immediately following the conclusion of the 2012 marketing campaign. The sample of customers was based on files that the PAs provided to the evaluators, which merged PA Customer Information System (CIS) data with program tracking databases to develop a master file of all PA residential customers. The evaluators used the merged customer database to create a sample frame containing all unique residential accounts with valid contact information. From this frame, a random sample was created and survey quotas set for each PA combination, in proportion to their representation in the overall population to ensure that the sample was representative of the overall customer base.

Weights were developed and applied to the residential telephone survey data to match the composition of customers within the Massachusetts population based on home ownership.

The evaluators also conducted a telephone survey among PA business customers to assess changes in awareness, familiarity, and associations with Mass Save. The team surveyed a simple random sample of 295 C&I customers in August and September 2012. The fielding of the survey was timed to take place immediately following the 2012 marketing campaign. The team based the sample of C&I customers on customer files provided by the PAs. Given the lack of readily available population-level data on Massachusetts businesses, the evaluators conducted an unweighted analysis of the commercial survey data.

A copy of the complete study can be found in Appendix C, Study 23.

24. 2013 Massachusetts Statewide Marketing Campaign Pre-Campaign Results

Type of Study: Market Assessment

Evaluation Conducted by: Opinion Dynamics Corporation

Date Evaluation Completed: 6/5/2013

Evaluation Objective and High Level Findings: This report presents results from the pre-2013 statewide umbrella marketing survey effort conducted by Opinion Dynamics. The goal of the research is to document current levels of awareness of Mass Save against which to measure changes over time.

The pre-campaign survey indicates that unaided awareness of Mass Save among residential customers remains moderate (36%) and has not changed since the post 2012 campaign survey. Further, consistent with prior surveys, the percentage of residential customers who consider themselves somewhat or very familiar with Mass Save, remains relatively low (19%). Just under half of residential (46%) customers aware of Mass Save identify utilities or energy efficiency service providers as sponsors.

Among C&I customers, unaided awareness of Mass Save is moderate with 47% reporting that they have seen or heard the term before. This represents an increase since the last statewide marketing survey when awareness was 40%. Additionally, just over half of commercial customers (55%) aware of Mass Save identify utilities or energy efficiency service providers as sponsors.

Programs to which the Results of the Study Apply:

- Residential New Construction and Major Renovation (Electric & Gas)
- Residential Cooling and Heating Equipment (Electric & Gas)
- Residential Multi-Family Retrofit (Electric & Gas)
- Residential Mass Save (Home Energy Services) (Electric & Gas)
- Residential ENERGY STAR® Lighting (Electric)
- Residential ENERGY STAR® Appliances (Electric)

- C&I New Construction and Major Renovation (Electric & Gas)
- C&I Large Retrofit (Electric & Gas)
- C&I Small Retrofit (Electric & Gas)
- Behavior/Feedback Program (Electric & Gas)

Evaluation Recommendations and Program Administrator Response: There were no recommendations from this report as it was designed to establish baseline campaign awareness.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: Not applicable.

Savings Impact: No savings impact.

Formulas Used in Impact Analysis: Not applicable.

Application of Results: Prospectively

How the Study Came to the Recommended Conclusions: Evaluators conducted a telephone survey with a random sample of 504 residential PA customers. The team drew the sample from multiple data files provided by the PAs. The team integrated customer data to create a sample frame containing all unique residential accounts with valid contact information. From this frame, the team drew a random sample and set survey quotas for each PA combination in proportion to their representation in the overall population to ensure that the sample was representative of the overall customer base.

Similar to the 2012 surveys, the team developed and applied weights to the residential telephone survey data to match the composition of customers within the Massachusetts population based on homeownership.

The team also surveyed a random sample of 456 PA C&I customers in March of 2013. The team drew the sample of C&I customers from customer data provided by the PAs.

Given the lack of readily available population-level data on Massachusetts businesses, the evaluators did not weight the results of the commercial survey. However, the team also considered whether weighting the survey results to those from the first survey with this group was necessary. The team determined that it was appropriate to leave the data unweighted due to the fact that the team spoke with similar firms across each of the survey waves, and the fact that there is no consistent or significant relationship between any of the firmographics and Mass Save awareness across the waves.

A copy of the complete study can be found in Appendix C, Study 24.

25. Massachusetts Residential Non-Energy Impacts (NEIs): Deemed NEI Values Addressing Differences in NEIs for Heating, Cooling, and Water Heating Equipment that is Early Replacement Compared to Replace on Failure

Type of Study: Impact Evaluation

Evaluation Conducted by: NMR Group

Date Evaluation Completed: July 15, 2013

Evaluation Objective and High Level Findings: Non-Energy Impacts (NEIs) associated with heating, cooling, and water heating equipment may differ according to whether the program-sponsored equipment is an early replacement measure, a measure that is replacing failed equipment, or equipment that was scheduled to be replaced.

This memorandum provides adjusted deemed NEI values that address the differences in NEIs for residential heating, cooling, and water heating equipment that is early replacement compared to replace on failure. These deemed NEIs update the NEIs provided in the residential NEI report submitted to the PAs on August 15, 2011⁷.

Programs to which the Results of the Study Apply:

- Residential Cooling & Heating Equipment (Electric)
- Residential Heating and Water Heating (Gas)

Evaluation Recommendations and Program Administrator Response: The study did not offer any recommendations.

Explain Whether or Not the PA Decided to Adopt Recommendations from the Study: The study did not offer any recommendations.

⁷ NMR Group, Inc. (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for the Electric and Gas Program Administrators of Massachusetts. (http://www.ma-eaac.org/Docs/8.1_EMV%20Page/2011/2011%20Residential%20Studies/Mass%20Crosscutting%20NEIs%20Final%20Report%20081511.pdf)

Savings Impact:

Measure Category	Measure	NEI	Duration	Full NEI Value (\$/Year)	EE Portion of NEI	ROF NEI Value (\$/Year)	Percent ROF	Overall NEI Value (\$/Year)
Cooling System	Central Air Conditioner/ Heat Pump	Noise Reduction	Annual	\$2.83	67%	\$1.90	35.4%	\$2.50
		Home Durability	Annual	\$1.54	33%	\$0.51		\$1.17
		Property Value Increase	One Time	\$62.65	50%	\$31.33		\$51.56
Heating and Cooling System	Ductless Mini-Split	Noise Reduction	Annual	\$1.42	67%	\$0.95	1.3%	\$1.41
		Home Durability	Annual	\$1.98	33%	\$0.65		\$1.96
		Property Value Increase	One Time	\$80.69	50%	\$40.35		\$80.19
Heating System	Boilers between 90 and 96% AFUE	Home Durability	Annual	\$17.42	33%	\$5.75	86.5%	\$7.33
		Property Value Increase	One Time	\$678.52	50%	\$339.26		\$385.23
	Boilers greater than or equal to 96% AFUE	Home Durability	Annual	\$17.42	33%	\$5.75	86.8%	\$7.30
		Property Value Increase	One Time	\$678.52	50%	\$339.26		\$384.21
	Furnaces greater than or equal to 95% AFUE	Home Durability	Annual	\$17.42	33%	\$5.75	88.4%	\$7.10
		Property Value Increase	One Time	\$678.52	50%	\$339.26		\$378.61
Heating and Hot Water	Integrated Boiler / Water	Home Durability	Annual	\$0.72	33%	\$0.24	67.9%	\$0.39

Measure Category	Measure	NEI	Duration	Full NEI Value (\$/Year)	EE Portion of NEI	ROF NEI Value (\$/Year)	Percent ROF	Overall NEI Value (\$/Year)
System	Heater	Property Value Increase	One Time	\$29.17	50%	\$14.59		\$19.27
Hot Water System	Storage Water Heater	Home Durability	Annual	\$2.13	33%	\$0.70	58.4%	\$1.30
		Property Value Increase	One Time	\$82.56	50%	\$41.28		\$58.47
	Tankless Water Heater	Home Durability	Annual	\$2.13	33%	\$0.70	63.4%	\$1.23
		Property Value Increase	One Time	\$82.56	50%	\$41.28		\$56.39

Measure Category	Measure	NEI	Duration	Full NEI Value (\$/Year)	EE Portion of NEI	ROF NEI Value (\$/Year)	Final Adjustment	Adjusted NEI Value (\$/Year)
Cooling System	Central Air Conditioner / Heat Pump	Thermal Comfort	Annual	\$3.92	100%	\$3.92	= 2	\$1.96
		Health Benefits		\$0.13		\$0.13		\$0.07
Heating and Cooling System	Ductless Mini-Split	Thermal Comfort	Annual	\$5.05	100%	\$5.05	= 2	\$2.53
		Health Benefits		\$0.16		\$0.16		\$0.08
Heating System	Boilers between 90 and 96% AFUE	Thermal Comfort	Annual	\$48.63	100%	\$48.63	= 2	\$24.32
		Health Benefits		\$1.56		\$1.56		\$0.78
	Boilers greater than or equal to 96% AFUE	Thermal Comfort	Annual	\$48.63	100%	\$48.63	= 2	\$24.32
		Health Benefits		\$1.56		\$1.56		\$0.78

Measure Category	Measure	NEI	Duration	Full NEI Value (\$/Year)	EE Portion of NEI	ROF NEI Value (\$/Year)	Final Adjustment	Adjusted NEI Value (\$/Year)
	Furnaces greater than or equal to 95% AFUE	Thermal Comfort	Annual	\$48.63	100%	\$48.63	= 2	\$24.32
		Health Benefits		\$1.56		\$1.56		\$0.78
Heating and Hot Water System	Integrated Boiler / Water Heater	Thermal Comfort	Annual	\$1.83	100%	\$1.83	= 2	\$0.92
		Health Benefits		\$0.06		\$0.06		\$0.03

Formulas Used in Impact Analysis:

$$\text{Overall NEI Value} = [(\text{EE Portion of NEI} * \text{Full NEI Value}) * \text{ROF\%}] + [\text{Full NEI Value} * (1 - \text{ROF\%})]$$

Application of Results: Retroactively

How the Study Came to the Recommended Conclusions: First, NMR developed a method based on industry knowledge and published literature in order to attribute a portion of the NEIs associated with heating, cooling, and water heating systems to the measure’s “newness” and a portion to the measure for being energy efficient.

Second, using the attribution factors, NMR estimated the value of the portion of NEIs for heating, cooling, and water heating measures associated with the energy efficiency of the measure for systems that are replaced on failure. Then, using data from the current Residential Heating and Water Heating and Cool Smart programs evaluation,⁸ the percentage of program participants that replaced failed systems was determined and the adjusted NEI values was attributed to these participants.

A copy of the complete study can be found in Appendix C, Study 25.

G. Future Studies

⁸ Cadmus. 2013. 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing (Draft Final Report). June 2013. Prepared for The Electric and Gas Program Administrators of Massachusetts.

Table III.B summarizes the studies expected to be included in next year’s Annual Report. There are a number of other studies which have been identified and are in the process of being scoped, however it is not known at this time whether they will be completed in time for the next Annual Report.

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		
Residential New Construction Net Savings	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
Multifamily Process Evaluation	Study is planned but not yet submitted for approval.	Yes
Home Energy Services Home Performance Contractor and Lead Vendor Analysis	Study is planned but not yet submitted for approval.	Yes
Regional Hours of Use Lighting Logger Study	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
LED Market Effects Baseline Study (Residential and C&I)	Study is planned but not yet submitted for approval.	Yes
Understand Current Stagnation of Lighting Saturation	Study is planned but not yet submitted for approval.	Yes
Lighting Market Assessment	Study is planned but not yet submitted for approval.	Yes
Incremental Cost Assessment for Lighting and Products	Study is planned but not yet submitted for approval.	Yes
Top 10 Products Impact Assessment	Study is planned but not yet submitted for approval.	Yes
Residential Pilot Studies		
Low-Income Studies		
Low Income Hours of Use	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
Low Income Multi-family Impact Scoping Study	Study is planned but not yet submitted for approval.	Yes

Table III.B: Evaluation Studies in Next Annual Report		
Studies	Docket & Exhibit Approving Planned Evaluation Studies	Expected to be Implemented as Approved? (yes/no)
Commercial & Industrial Studies		
Mid-Sized Customer Needs Assessment - Final Report	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
CHP Impact Evaluation	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
Existing Buildings Market Characterization	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
Whole System Approach Study	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
Codes & Standards Research using Existing New Construction Data	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
Lighting Controls Scoping Study	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
LED Market Effects Baseline Study (Residential and C&I)	Study is planned but not yet submitted for approval.	Yes
Market Assessment of Roof Top Units	Study is planned but not yet submitted for approval.	Yes
Learning from Successful Projects	Study is planned but not yet submitted for approval.	Yes
Documentation of Program Administrator Differences	Study is planned but not yet submitted for approval.	Yes
C&I Customer Profile - 2012 Data	Study is planned but not yet submitted for approval.	Yes
Characterization of Supply Side Population	Study is planned but not yet submitted for approval.	Yes
Commercial Real Estate Market Characterization	Study is planned but not yet submitted for approval.	Yes
Process Evaluation of Direct Install Delivery Method	Study is planned but not yet submitted for approval.	Yes

Table III.B: Evaluation Studies in Next Annual Report		
Studies	Docket & Exhibit Approving Planned Evaluation Studies	Expected to be Implemented as Approved? (yes/no)
Impact Evaluation of Custom HVAC Installations	Study is planned but not yet submitted for approval.	Yes
Impact Evaluation of Prescriptive Non-Lighting Installations	Study is planned but not yet submitted for approval.	Yes
Special & Cross-Cutting Studies		
2013 Massachusetts Statewide Marketing Campaign Post-Campaign Results	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
Efficient Neighborhoods Plus	Study is planned but not yet submitted for approval.	Yes
Serrafix CMI (Northampton/Pittsfield)	Study was approved in January 2013 with the 2013-2015 Three Year Plan. D.P.U. 12-100 through D.P.U. 12-111	Yes
Brand Assessment Analysis of Gas Networks and CoolSmart	Study is planned but not yet submitted for approval.	Yes
New Construction Non Energy Impact Study	Study is planned but not yet submitted for approval.	Yes
Analysis of Non Energy Impacts for C&I Marketing	Study is planned but not yet submitted for approval.	Yes
Top Down Net to Gross Scoping Study	Study is planned but not yet submitted for approval.	Yes
Codes and Standards Scoping Study	Study is planned but not yet submitted for approval.	Yes

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

General Laws c. 25, § 19(a) requires the Department, when authorizing energy efficiency programs, to ensure that such programs minimize administrative costs to the fullest extent practicable. Administrative costs, also commonly referred to as Program Planning & Administration (“PP&A”) costs, have traditionally been defined as all in-house and outsourced costs associated with planning activities and program administration. These include costs associated with developing program plans, and day-to-day program administration, including labor, overhead costs, and any regulatory costs associated with energy efficiency activities.

The most significant factor in the PA approach to minimizing administrative costs is the statewide collaborative process, which is used by the Program Administrators to coordinate planning, the adoption of consistent programs and processes, program design, EM&V studies, statewide marketing, regulatory proceedings, and the development and sharing of all best practices. Sharing of these costs, which would otherwise be borne by each Program Administrator individually, results in economies of scale that reduce the cost for each Program Administrator. For example, joint releases of Requests for Proposals (“RFPs”) lead to minimization of administrative costs in that the cost for preparation and release of the RFP are shared by the PAs. The Program Administrators also minimize administrative costs by coordinating energy efficiency program delivery, where appropriate, with other customer service activities such as customer acquisition, key account management and trade ally relationships.

Notwithstanding any appropriate coordination with other customer service departments, it is necessary and appropriate for all Program Administrators to maintain a skilled and dedicated administrative staff in order to ensure successful delivery of programs, compliance with the Green Communities Act, timely responses to the directives of the Council, Department, and DOER; and documentation and achievement of substantial savings. The Program Administrators seek to balance the need to minimize administrative costs to the extent prudent with the need to maximize program quality and oversight. Councilors have emphasized the need to devote sufficient administrative resources to successfully implement the aggressive programs called for in the three-year plans.

While the economies of scale and other steps taken by the PAs to minimize costs are effective, and administrative costs incurred by the PAs are transparent and are presented in each Program Administrator’s narrative and supporting tables, exact quantification of the minimization of administrative costs is not possible in a meaningful way. This is because the continuous scaling up and evolution of the plans make it impossible to establish a solid baseline for a comparison. When

the variables are constantly (and necessarily) shifting, there is no opportunity to make a meaningful quantitative comparison or to estimate a counterfactual. Further, a direct quantitative comparison would not be useful because it would only provide a comparison of two points in time; the mandate of the Green Communities Act, however, is to seek administrative efficiencies, which is a continuous process that evolves along with energy efficiency planning and programming, whereas costs and administrative efficiency opportunities are always changing. The Program Administrators seek to minimize costs at all available opportunities, and not just from one point in time to another.

Please refer to Table IV.A.

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 Renovations	134,554	4%	91,165	3%	(43,389)	-2%
Residential Heating and Water Heating	134,554	1%	497,430	3%	362,877	2%
MassSAVE	134,554	4%	39,490	1%	(95,064)	-3%
Weatherization Program	39,058	0%	411,475	3%	372,416	2%
Multifamily Retrofit	134,554	5%	60,671	2%	(73,883)	-2%
Behavior/Feedback Program	134,554	5%	105,164	4%	(29,390)	-1%
Deep Energy Retrofit	234,554	38%	10,495	3%	(224,058)	-35%
Residential Building Practices and Demonstration Program	134,554	38%	9,645	11%	(124,909)	-27%
Energy Analysis: Internet Audit Program	-	0%	-	0%	-	0%
Community based pilots	134,554	65%	3,734	4%	(130,819)	-61%
Workforce Development	-	0%	-	0%	-	0%
Statewide Marketing & Education	-	0%	-	0%	-	0%
EEAC Consultants	423,192	100%	102,534	100%	(320,658)	0%
DOER Assessment	208,124	100%	193,972	100%	(14,152)	0%
Sponsorships & Subscriptions	184,632	100%	104,135	100%	(80,497)	0%
Residential Total	2,031,436	5%	1,629,911	3%	(401,525)	-2%
Low-Income						
Low-Income Retrofit	269,107	2%	171,034	1%	(98,073)	-1%
Statewide Marketing & Education	-	0%	-	0%	-	0%
Low Income Energy Affordability Network Funding	310,404	100%	75,731	100%	(234,673)	0%
Low Income DOER Assessment	89,196	100%	69,913	100%	(19,283)	0%
Low-Income Total	668,708	4%	316,678	1%	(352,030)	-2%
Commercial & Industrial						
C&I New Construction & Major Renovation	139,638	2%	430,670	8%	291,032	6%
C&I Retrofit	139,638	1%	595,593	7%	455,955	6%
C&I Direct Install	139,638	32%	22,912	18%	(116,726)	-14%
Workforce Development	60,534	100%	1,414	7%	(59,120)	-93%
Business Energy Analyzer	-	0%	-	0%	-	0%
Deep Energy Retrofit	139,638	73%	10,394	53%	(129,244)	-21%
Statewide Marketing & Education	-	0%	-	0%	-	0%
EEAC Consultants	350,880	100%	94,731	100%	(256,149)	0%
DOER Assessment	247,474	100%	163,129	100%	(84,345)	0%
Sponsorships & Subscriptions	46,534	100%	26,034	100%	(20,501)	0%
C&I Total	1,263,974	7%	1,344,877	9%	80,903	3%
GRAND TOTAL	3,964,117	5%	3,291,466	4%	(672,652)	-1%

The change from planned to actual percent of Total Program Costs was calculated as the difference of the other two percentages in the table above. The same calculation was performed at the sector level. No sector showed a variance greater than ten percent between planned and actual Program, Planning & Administration costs as a percent of total program costs.

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	2,202,611	19%	4,758,895	49%	4,871,447	51%	9,630,341	81%	11,832,952
Actual	2,639,302	19%	2,903,901	26%	8,271,806	74%	11,175,707	81%	13,815,008
% Difference from Planned to Actual	20%	118%	-39%	-243%	70%	435%	16%	0%	17%
Low-Income									
Planned	946,863	20%	962,751	26%	2,797,291	74%	3,760,042	80%	4,706,905
Actual	113,434	2%	407,294	9%	4,154,230	100%	4,561,524	98%	4,674,958
% Difference from Planned to Actual	-88%	-18%	-58%	-17%	49%	25%	21%	18%	-1%
Commercial & Industrial									
Planned	3,954,605	47%	1,442,151	33%	2,952,231	67%	4,394,382	53%	8,348,987
Actual	1,939,154	37%	1,741,611	52%	1,593,817	96%	3,335,429	63%	5,274,583
% Difference from Planned to Actual	-51%	-11%	21%	19%	-46%	29%	-24%	11%	-37%
TOTAL									
Planned	7,104,079	29%	7,163,796	40%	10,620,969	60%	17,784,765	71%	24,888,845
Actual	4,691,890	20%	5,052,807	26%	14,019,853	74%	19,072,659	80%	23,764,550
% Difference from Planned to Actual	-34%	-9%	-29%	-14%	32%	14%	7%	9%	-5%

As shown in the right hand column in Table IV.B, "Total Activities," overall spending on combined PP&A, sales, technical assistance, and training, evaluation and marketing services were less than planned in the Low-Income and C&I sectors in 2012. For these sectors, the Company was able to perform these services and deliver energy savings while spending less than budgeted amounts. The difference from planned to actual spending on Total Outsource Activities and Total In House Activities generally tracked the difference in the spending on Total Activities for the same reason. In the Residential sector, actual spending for "Total Activities" was more than planned in 2012. The primary driver for the higher than planned spending was sales, technical assistance, and training spending in both the Mass Save and Weatherization programs. See Section II. A. 2. c. for additional details.

D. Low-Income Spending

Table IV.C: Customer Sector Budget Allocation						
Customer Sector	Planned		Actual		Change from Planned to Actual	
	Total Sector Program Costs	% of Total Program Costs	Total Sector Program Costs	% of Total Program Costs	Value	% Change
Residential	\$ 41,225,367	53%	\$ 47,872,896	56%	\$ 6,647,528	3%
Low-Income	\$ 18,011,695	23%	\$ 23,257,555	27%	\$ 5,245,860	4%
Commercial & Industrial	\$ 19,219,397	24%	\$ 14,645,723	17%	\$ (4,573,674)	-7%
TOTAL	\$ 78,456,459	100%	\$ 85,776,174	100%	\$ 7,319,715	0%

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

V. PERFORMANCE INCENTIVES

The performance incentive mechanism includes three components: the Savings Mechanism, the Value Mechanism, and other Performance Metrics. The Savings Mechanism provides an incentive for achieving dollar benefits from energy efficiency program efforts at or above threshold levels. The Value Mechanism provides an incentive for achieving net benefits equal to or in excess of the threshold level of performance. Performance metrics establish a focus on specified program outcomes or plan development, with each metric stating the specific requirements for reaching each level of the metric. Table V summarizes the performance incentives earned by the Company by component for its successful delivery of energy efficiency programs in 2012.

Incentive Components	Threshold	Design	Exemplary	Actual Incentive
Savings Mechanism	\$ 1,210,507	\$ 1,614,009	\$ 2,017,512	\$ 1,775,230
Value Mechanism	\$ 596,723	\$ 795,631	\$ 994,539	\$ 955,433
Performance Metrics	\$ 298,362	\$ 397,815	\$ 497,269	\$ 313,558
Total Incentive (before-tax)	\$ 2,105,592	\$ 2,807,455	\$ 3,509,319	\$ 3,044,221
Total Incentive (after-tax)	\$ 1,279,673	\$ 1,706,231	\$ 2,132,789	\$ 1,850,126

The planned values referenced in the Performance Incentives Summary Table above were originally filed in the performance incentives model set forth at Exhibit D, Attachment 2 to the Company's 2012 Mid-Term Modification filed with the Department on October 28, 2011 in Boston Gas Company and Colonial Gas Company d/b/a National Grid, D.P.U. 11-109 ("2012 MTM"). The Company earned \$3,044,221 in actual before-tax incentives, which is 108% of design level. The tax rate used to calculate the after-tax total incentive is 0.39225.

All supporting documentation for each performance incentive component, including detailed information on the Company's clear and distinct role in achieving the performance metrics, can be found in Appendix D.

For the Savings and Value components of the performance incentive, the Company calculated its earned performance incentive in accordance with the incentive mechanism included in the 2012 MTM, using the post-evaluation benefits. The Company achieved 110% of its planned benefits and 120% percent of its planned net benefits at the portfolio level, surpassing the 75 percent threshold required in order to earn both the savings and value mechanisms of the performance incentive. Using evaluated results, the Company calculated the lifetime benefits and net benefits that each program achieved. The benefits were multiplied by the savings payout rate of \$0.0079 and the net benefits were multiplied by the value payout rate of \$0.0093 per the 2012 MTM. Although performance under both the Savings and Value Mechanisms is assessed at the portfolio level, this calculation was done at the sector level, as shown in Appendix D, to facilitate the allocation of earned performance incentives in the cost-effectiveness calculations. The incentive dollars earned from performance metrics were allocated to sectors consistent with the allocation presented in the 2012 MTM. A model illustrating the calculation of the performance incentives in accordance with this methodology is included in Appendix D, Section 1.

A summary of the Company's performance for each Performance Metric is set forth below. Achievement of performance metrics relate to the metrics filed in Exhibit D, Attachment 1 to the

2012 MTM. Additional supporting documentation related to performance metrics is included at Appendix D, Section 3.

2012 SUMMARY OF PERFORMANCE METRIC ACHIEVEMENT

The chart below summarizes the Company’s achievement level for each performance metric in 2012. Supporting documentation for each metric follows this summary page.

Residential Metric Number And Name	Achievement Level	Notes
1. MassSAVE/Weatherization: Deeper Savings {Electric & Gas} – Statewide	Exemplary (125% of design)	2012 Conversion Rate = 33%
2. MassSAVE/Weatherization: Lost Opportunity/ Market Opportunity {Electric & Gas} – Statewide	Exemplary (125% of design)	See Supporting Documentation
Low-Income Metric Number And Name	Achievement Level	Notes
1. Best Practices Program Strategies Research & Technical Review of Potential New Measures {Electric & Gas} – Statewide	Exemplary (125% of design)	See Supporting Documentation
2. Multi-family Building Inventory Electric & Gas} – Statewide	Exemplary (125% of design)	See Supporting Documentation
Commercial & Industrial Metric Number And Name	Achievement Level	Notes
C&I #1 Retrofit -- Depth of savings	Did not meet threshold	X=18, Y=110% (threshold) X*Y=20
C&I #2 New Construction -- Comprehensiveness and depth of savings	Did not meet threshold	X=51%, Z=100% (threshold) X*Y=51%
C&I #3 Direct Install Electric and Gas Integration	Did not meet threshold	X=21%, Z=110% (threshold) X*Z=23%
C&I #4 Combined Heat & Power	Did not meet threshold	X=10, Y=110% (threshold) X*Y=11
Other Funding Metric Number And Name	Achievement Level	Notes
1. “Other financing capital” metric	Did not meet threshold	
2. Cost Efficiency of Program Expenditures	99% of Design	2.71

Please see Appendix D, Section 2.

VI. AUDITS

Other than the Navigant Consulting, Inc. audit filed with the Company's 2010 Gas Energy Efficiency Annual Report, there were no other audits performed.

VII. APPENDICES

- A. Glossary of Defined Terms – includes Types of Costs in each Budget Category and a Glossary of Terms and Abbreviations.
- B. Cost-Effectiveness Supporting Tables and Documentation – includes the D.P.U. 08-50 Tables, the Screening Tool, and Technical Reference Manual.
- C. Program and Pilot Program EM&V Studies – includes evaluation studies for the residential, low-income, and C&I sector programs and pilot programs.
- D. Performance Incentives Supporting Documentation – includes documentation that supports the Company’s determination of actual performance incentives earned through the performance metrics.
- E. Other Supporting Documentation – includes additional supporting documentation with regard to competitive procurement activities in 2012.
- F. Lost Base Revenue Information – includes a reference to the information on savings on which LBR is based.