Jennifer Brooks Hutchinson
Senior Counsel

May 1, 2015

VIA HAND DELIVERY & ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Docket 4451 - National Grid Electric and Gas Energy Efficiency Programs
2014 Year-End Report

Dear Ms. Massaro:

Enclosed are ten (10) copies of National Grid's[1] 2014 Energy Efficiency Year-End Report. This report summarizes the gas and electric results, program highlights, and customer experiences over the 2014 program year. An electronic copy of this report has also been provided to the parties in this proceeding.

The Company will also be providing a document with an overview of trends in electric and gas energy efficiency program participation, including an analysis of cumulative portfolio participation for program years 2012-2014 under separate cover.

Thank you for your attention to our filing. Please contact me if you have any questions regarding this matter at 401-784-7288.

Very truly yours,

Jennifer Brooks Hutchinson

Enclosures

cc: Docket 4451 Service List
Steve Scialabba, Division
Leo Wold, Esq.

[1] The Narragansett Electric Company d/b/a National Grid (National Grid or the Company).

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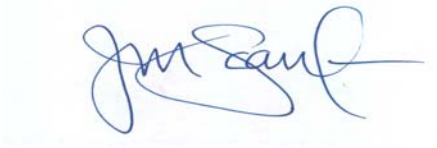
Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

Paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.



Joanne M. Scanlon

May 1, 2015
Date

Docket No. 4451 & 4366 - National Grid - 2014 Energy Efficiency Program Plan
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The Narragansett Electric Company
d/b/a National Grid

2014 Energy Efficiency Year-End Report
RIPUC Docket No. 4451

May 1, 2015

nationalgrid

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NATIONAL GRID
2014 ENERGY EFFICIENCY YEAR-END REPORT

Overview

2014 was a successful year for the Narragansett Electric Company d/b/a National Grid's (Company) energy efficiency (EE) portfolio of programs and initiatives. This Year-End report summarizes the gas and electric results, program highlights and customer experiences over the entire year. The electric and gas programs are described more fully in the "Settlement of the Parties," filed in Docket No. 4451 on November 1, 2013, and approved by the Rhode Island Public Utilities Commission (PUC) in Order No. 21298, issued December 24, 2013.

The primary goal set forth in the 2014 "Settlement of Parties" was to "create economic value and cost savings for Rhode Islanders through energy efficiency.[1]" The charts below summarize the electric and gas program benefit cost ratios, savings and expenditures compared to planned benefit cost ratios, savings goals, and budgets respectively. The benefit cost ratios greater than 1 indicate that the Company's programs created positive value out of every dollar invested in 2014. In total the 2014 programs will create electric bill savings of $377 million and gas bill savings of $50 million for Rhode Island customers over the life of the installed energy efficiency measures.

Another goal of the 2014 Plan was to achieve electric and gas savings targets established in the 2014 EE Program Plan, which were consistent with the goals established for 2014 in the 2012-2014 Three Year Least Cost Procurement Plan. The 2014 electric savings target was 255,314 MWh. At year's end, the Company achieved 268,468 MWh energy savings which represents 105.2% of that goal. The savings goal represents 3.2% of the reference 2009 load, making Rhode Island the nation's leader in energy savings as a percentage of load. This is due in large part to the combined heat and power (CHP) project that came on-line at the Toray Plastics America, Inc. The Company also established a benchmark of 49,773 annual kW savings and at year's end it had achieved 38,693 kW.

The 2014 gas savings target was 329,963 annual MMBtu. At year's end, the Company achieved 409,029 annual MMBtu which represents 124% of that goal. Detailed savings information can be found in Attachment 1, tables E-1, E-2 and Attachment 2, tables G-1 and G-2.

Additional cost and savings information can be found in Attachment 1, tables E-1 and E-3, and Attachment 2, tables G-1 and G-3.

	2014 Goal/Benchmark[2]	2014 Actual[3]	% of Goal
Electric			
Annual MWh Savings	255,314	268,468	105.2%
Annual kW Savings	49,773	38,693	77.7%
Lifetime Benefits ($Mil)	$367.4	$314.7	86%
Benefit/Cost Ratio	3.15	2.69	85%
Gas			
Annual MMBtu	329,963	409,029	124%
Lifetime Benefits ($Mil)	$49.0	$74.3	151%
Benefit/Cost Ratio	1.70	2.41	142%
	2014 Budget ($Mil)[4]	**2014 Actual ($Mil)[5]**	**% of Goal**

[1] Energy Efficiency Program Plan (EEPP) for 2014, Settlement of the Parties, November 1, 2013, Docket 4451, page 1
[2] See 2014 EEPP Settlement of the Parties, Docket No. 4451
[3] Actual savings in 2014
[4] See 2014 EEPP Settlement of the Parties, Docket No. 4451

Electric			
Total Expenditures[6]	$87.1	$85.3	98%
Total Expenditures Excluding Commitments[7]	$87.1	$85.3	98%
Total Implementation Expenses[8]	$81.9	$80.3	98%
Gas			
Total Expenditures	$23.5	$21.5	92%
Total Implementation Expenses	$22.1	$20.0	91%

To achieve the primary goal described above, the Company employed four strategies initially introduced in the 2012-14 Energy Efficiency and System Reliability Procurement Plan (Three Year Plan) in Docket 4284. Below are highlights from the implementation of these four strategies. Details on these strategies, other programs, and initiatives are found in subsequent sections of this Year End Report.

The first strategy was "Energy Efficiency is for Everyone." It focused on broadening the portfolio of programs and removing participation barriers so that every Rhode Island customer could benefit and more would participate. The Company was successful in increasing participation in its programs throughout the year. For example, National Grid targeted customers who move into new homes to receive a tailored welcome and series of home energy reports. In 2014, customers who received this New Movers experience saved energy at higher rates and reported higher awareness of energy efficiency programs.

The second strategy was "Reaching Customers Where They Live and Work." In this strategy, the Company focused on bringing energy efficiency offerings to customers in ways that increased the value of energy efficiency specifically for them. Two examples are the Manufacturing Initiative and the Rhode Island Energy Challenge. First, the Company introduced an initiative to promote energy efficiency to manufacturers in 2013. This year, the Company was able to conduct technical assessments for seven large industrial manufacturing customers with potential savings of 7.5 Million kWh and 800,000 therms. The focus of the technical assessments was on HVAC and process energy improvements. Based on this success, the Company plans to expand this service to all large and medium sized manufacturing/industrial customers in Rhode Island in the coming years. Second, the Rhode Island Energy Challenge continued its grassroots outreach in 2014. It focused on engaging towns, businesses, organizations, and churches by asking members to pledge four simple energy saving actions. The Energy Challenge had 6,021 face-to-face customer interactions at over 58 events and 3,618 people signed up online to take the Challenge. More than 22 organizations sent specialized newsletter communications to membership or employees on the Challenge's behalf to an approximate audience of 41,000 people.

The third strategy was innovation. The Company gleaned new customer and technological insights from two pilots completed in 2014 – the Automatic Temperature Control and Energy Monitoring pilots. The Company also continued the ECM pump monitoring pilot to determine if high efficiency variable speed pumps can provide gas and electric savings. The Company also launched the Heat

[5]Actual spend in 2014
[6]Includes implementation expenses, EERMC and OER costs, shareholder incentive, commitments, and evaluation expenses
[7]Total expenditures excluding expenses from committed applications (electric programs only) as of December 2014
[8]Includes all DSM program-related expenses, i.e. incentives, administration and general expenses, marketing, sales, technical assistance and training.

Pump Dryer pilot to test this new product and learn from customers' experience with them. This year, the Company also formally rolled out the Office of the Future initiative. This initiative, previously in the pilot stage, was opened to all customers in 2014 under the new name, Sustainable Office Design Initiative. The initiative targets tenant fit-out office spaces that are greater than 7,500 square feet.

The fourth strategy was economic growth. In addition to the bill savings and benefits described above, the Company looked for new ways to contribute to the addition of jobs in Rhode Island. The Company also expanded financing for commercial and industrial projects, injecting another $1 million in funds into the electric commercial and industrial (C&I) revolving loan fund and partnering with the State on the Rhode Island Public Energy Partnership (RI PEP), where RGGI funds were designated for financing state and municipal projects. An additional $200,000 was also injected into the gas C&I revolving loan fund. The Company quantified the impact of its 2014 energy efficiency programs in the 2014 Jobs Study, included in Attachment 4 of this report. The study concluded that 639.4 direct full-time equivalent (FTE) employees were supported in 2014 by energy efficiency programs in Rhode Island. This is an increase of 17% percent over FTEs resulting from the 2013 energy efficiency programs.

The following sections outline the highlights for the different programs and initiatives that comprise the 2014 Rhode Island Energy Efficiency Portfolio. Many activities undertaken in 2014 laid the foundation for inclusion in the 2015 Energy Efficiency Program Plan, which was approved by the PUC in Docket 4527, Order 21854 issued on March 19, 2015.

Residential Programs

Overview

In 2014, the residential sector was cost-effective with total resource benefit cost (B/C) ratios of 2.52 for electric programs and 2.55 for gas programs. The Company spent 103.4% of the electric residential implementation budget, achieved 119.9% of electric targeted annual energy savings and achieved 67.4% of electric targeted annual demand savings. The Company spent 103.1% of the gas residential implementation budget and achieved 133.9% of gas targeted annual energy savings. The Company was able to administer the programs so that the sector had a strong finish in both fuel types. Additional details on spending and savings by program can be found in Attachment 1, tables E-1, E-2, E-3 and Attachment 2, tables G-1, G-2 and G-3.

Residential New Construction

The Rhode Island Residential New Construction (RI RNC) program is designed to guide building professionals and homeowners through the process of designing and building a quality, high-efficiency, homes. This process is done through educational outreach, no-cost plan analysis, and in-the-field technical assistance. In 2014, the Company continued to offer four tiers of high-performance energy efficient new construction incentives for both new construction and renovation/rehabilitation projects. All tiers were offered the following no-cost services: third party blower door and duct blasting testing, installation of high-efficiency lighting (CFLs and LEDs) in all appropriate fixtures and locations, offering of efficient showerheads, advanced energy consulting, and a HERS (Home Energy Rating System) Index rating.

Overview of Performance

2014 proved to be a very successful year for the RI RNC program. Not only did the program exceed the goal for completed projects, but it exceeded the number of enrollments by 35%. In addition, about 20% of the completed projects were for income eligible properties.

	2014 Goals	2014 Total
Total Enrollments	500	768
Total Completions	500	573

In 2014, the level of efficiency of completed projects continued to shift from Tier 1 to Tier 2 which indicates that more contractors have learned how to design and build higher efficiency homes; and homeowners are make more aggressive decisions in regard to their energy efficiency.

Type of Construction	Final Inspections	# of Projects
NEW CONSTRUCTION	Tier 1 15 - 24%	33
	Tier 2 25 - 44%	59
	Tier 3 45%+	7
RENO/REHAB	Tier 1 15 - 24%	13

	Tier 2 25 - 44%	49
	Tier 3 45%+	2

Highlights

Zero Net Energy Events: The first annual Rhode Island Pro Tour, sponsored by National Grid and organized by NESEA and National Grid's lead vendor Conservation Services Group, brought together building professionals, interested homeowners and students on a tour of energy efficient homes. The Pro Tour featured two home sites, a presentation on one of the sites, and a question and answer session with the tour guides. The first site was a home in Jamestown designed to be zero energy, with a 12 kW PV array powering both the geothermal heat pump and the plug loads of the house. The tour of this home was led by the principals of Newport Renewables, the design/build team for the project. The second tour consisted of two net zero homes in the Sandywoods Farm development in Tiverton. The Project Manager for Church Community Housing Corporation gave a tour of two net zero home sites under construction, and then gave a presentation on the process through which they are achieving net zero. The tour concluded with a reception and a question and answer session at Sandywoods Center for the Arts, where participants had an opportunity to network with each other and ask the tour guides from both sites more in depth questions.

Site One: Jamestown

Site Two: Sandywoods, Tiverton

Success Story in Sturbridge, RI: Late in 2013, Sturbridge Home Builders enrolled their first RI RNC project, a 9 unit single family development in Warwick. The first 6 homes achieved significant savings (over 25% better than the user defined reference home (UDRH)) but did not meet all additional program requirements. By providing a Code Plus incentive for these first homes and continuing to work closely with the builder in 2014, RI RNC was able to persuade the builder to improve and correct certain issues. By adhering to all Thermal Enclosure Checklist (TEC) requirements, installing appropriate ventilation and working with their HVAC contractor to meet rigorous duct sealing standards, the last 3 homes qualified for Tier II incentives. This builder is now poised to achieve Tier II for his next project - Reynolds Farm, a Traditional Neighborhood Development (TNC).

Collaboration: In addition to providing trainings throughout the year to builders, developers, architects, HVAC contractors, and clients, National Grid RI RNC participated in many events to promote energy efficiency, including:

- Rhode Island Building Officials Association
- Rhode Island Builders Association
- JLC (Journal of Light Construction) Live
- Rhode Island Home Show
- Green and Healthy Homes Initiative of Rhode Island
- North East Sustainable Energy Association Night
- Realtors Office, East Greenwich
- Coventry Lumber
- Rhode Island Nursery and Landscape Association's Green Market Festival

RI RNC continued to expand its influence in the building community in 2014 working directly with a number of new builders.

Education:

- Zero-Energy-Ready Home Training: Sam Rashkin, Chief Architect of the Building Technologies Office at DOE, presented a comprehensive overview of zero-energy-ready home construction including the business case, detailed specifications, and opportunities to be recognized as industry leaders. Over 60 building professionals, town officials, and homeowners attended the training.
- Technical and Job Support Training: 56 students from Woonsocket Area Career and Tech Center participated in classroom and hands-on training to learn about energy efficiency.
- Energy Efficiency through STEM: Throughout the year the RNC program provides training and outreach with many organizations in Rhode Island. Over the summer of 2014, members of RI RNC team hosted two New England middle school math and science teachers under a STEM (Science, Technology, Engineering & Mathematics) Externship. The program was developed to provide the teachers with an opportunity to experience green/renewable occupations in action and then use these experiences to improve their teaching and mentoring skills. Teachers trying to offer an answer for "when will I ever use this?" could bring their students examples of real life application of STEM academics with respect to energy efficient residential design and construction, and also share ways for students to save energy in their own homes. Over a period of three weeks the teachers shadowed the RI RNC team (both field technicians and office staff), to observe building plan reviews, energy modeling, savings calculations, field inspections and data collection. In October an event for STEM educators was held at Bristol Community College as part of the Marion Institute's "Connecting for Change" Conference. The final event included a panel discussion for those involved in these externships to share their experiences, as well as a presentation given by the participating teachers on "Analyzing Home Energy Use and Utility Costs".

EnergyWise

EnergyWise is an outreach and education program with customer satisfaction remaining high with well above 90% of participants stating they would recommend the program to family and friends.[9] Participants of an EnergyWise home energy assessment receive a no-cost, in-home educational experience that demonstrates how households can save energy while improving their home's comfort. During the assessment, the assessor will survey the entire home with the customer while discussing ways to reduce energy use or minimize energy loss. Immediate energy savings are achieved by installing energy efficient lighting, advanced power strips and pipe insulation as needed. Water saving opportunities are also addressed during the assessment. Deeper savings are also identified during this first visit. The assessment evaluates heating equipment and appliances for efficiency levels and determines whether it may be more cost effective to replace the items with newer, more efficient products. The home's insulation levels and air infiltration levels are also studied. Opportunities to increase insulation levels and reduce air leakage are presented in an energy plan with any available incentives. The in-home assessor also presents financing opportunities and other incentives and programs that could benefit the home based on their discussion with the homeowner.

Overview of Performance

The EnergyWise program had robust customer demand in 2014 demonstrating the success of promoting energy efficiency throughout the state and strong public interest in controlling energy costs. Recommendations from past participants encouraged new customers to take the final step in scheduling a home energy assessment. A new customer may have heard of the program at customer outreach events or through marketing, but knowing a friend or family member that has experienced the benefits really convinces people to make an appointment. Cross promotion from the home energy reports have also successfully increased the number of participants. Customers can first learn how their homes perform compared to similar neighbors and then are given the tools to implement the change with the home energy assessment. As a result of increased customer demand, gas incentive levels were reduced from 75% of project cost (up to $2,000) down to 50% of project cost (up to $2,000) at the beginning of the third quarter.

As part of EnergyWise Single Family, the Company continued to offer 0% interest HEAT loans in 2014 to finance the installation of more efficient heating systems, hot water systems, and insulation upgrades. In total, there were 1,003 loans secured in 2014 from five private lending institutions.

EnergyWise also delivered weatherization assistance to homes heated with oil, propane, or other delivered fuels in 2014 in accordance with the OER's 2013 Plan for the Allocation and Distribution of Regional Greenhouse Gas Initiative Auction Proceeds. Through this initiative, residents who heat with oil and propane could request a free home energy assessment from the EnergyWise program. Once the home energy assessment is completed, participants had 90 days to complete the installation of recommended improvements and submit their request for incentive payment. The Company was able to serve 482 participants with the $800,000 allocated for this effort, resulting in oil savings totaling 12,763 MMBtu.

Highlights

The EnergyWise program was incredibly busy in 2014 with a strong focus on keeping the program operating throughout the year while serving as many customers as possible. In 2014 the customer

[9] Percentage is from RISE survey it gives to customers after an audit is completed.

demand exceeded available budgets which resulted in a mid-year reduction in gas weatherization incentives, allowing more customers to benefit from gas incentives. National Grid participated in a regional direct install lighting procurement that reduces the price of lighting products used in both EnergyWise and Income Eligible direct install services. The reduction in cost, particularly for light emitting diode (LED) bulbs, resulted in nearly one-third of lighting products installed to be LEDs.

Relationships with Independent Insulation Contractors (IIC) remain strong and resulted in more contractors participating in EnergyWise. Ten IICs were awarded DOE and EPA Century awards for completing 100 or more weatherization projects in 2013. In 2014, a pilot was also tested with Ocean State Energy Audits providing no-cost air sealing on the same day as the home energy assessment. The program allows for no-cost air sealing when participants proceed to weatherization of their home. The pilot was developed to assess the costs and benefits of providing the air sealing component for homes where there is a high potential savings that could be realized from air sealing. This pilot will continue in 2015 and then be evaluated for cost effectiveness as well as sustainability within the program.

Almost 323 customers signed up for home energy assessments during the Energy Expo at the Rhode Island Home Show. Seminars about the EnergyWise experience were also well attended. A summary of the first $5,000 Home Energy Makeover recipient from the Energy Expo is included in Attachment 3.

ENERGY STAR® Lighting

ENERGY STAR® Lighting provides midstream (retailer) and upstream (manufacturer) rebates for high efficiency lamps and fixtures. The lead vendor provides manufacturer and retailer outreach, recruits retail partners, conducts retail trainings, oversees point-of-purchase placement, supports special events, and coordinates the buy-down and markdown contracts. A mail-order catalog and online store is also available to customers for purchasing lighting.

Overview of Performance

The ENERGY STAR® Lighting program achieved 85.8% of the savings goal while reaching 226,860 participants. This was due to two factors. The first being a drop in retailers occurred from 2013 to 2014 due to a lack of promotion at a major drug store chain. Second, a program change at the beginning in 2014, that reclassified one type of specialty compact fluorescent bulb (CFL) into the standard CFL category, contributed to a reduction in savings. Overall, the lighting program made great progress in 2014. In total, 35 new memorandums of understanding (MOUs) were added to the program in 2014, bringing the number of active MOUs to 87. In addition, the number of new lighting partners increased from 20 manufacturers in 2013 to 25 manufacturers in 2014, and 3 new retailers were added. The program also progressed with strong interest in light emitting diode (LED) technology from both consumers and retailers. High sales resulted from a pop-up retailer at the Energy Expo at the Rhode Island Home Show as well as through social media campaigns.

Highlights

The 2014 residential lighting program continued promoting alternative retail channels in Rhode Island which were well received by consumers. In addition to promoting and selling energy efficient products at the Energy Expo, the pop-up retailer was also located at two malls in Rhode Island for limited periods as well as twenty-three other business employee events or customer oriented gatherings. These retail events allow the program to educate the public about all the changes in the

lighting market, ensure that customers select the best product for specific lighting needs, and learn additional ways to save money beyond efficient lighting.

Reaching out to the youngest population in Rhode Island, twenty-nine schools took advantage of the School Fundraiser program. The school fundraiser consists of an energy savings seminar for the students that helps them identify energy wasters in their homes and empowers them to become ambassadors of energy efficiency. Proceeds from the sale of energy efficient items are used in the schools to support student operations or activities.

Similar to 2013, social media campaigns were used to spark customer interest in efficient lighting. The items promoted in various monthly promotions were so well received they frequently reached the maximum number of items allowed for the promotion within a few days of publicity.

Finally, the ENERGY STAR® lighting program leveraged relationship with retailers by sponsoring twelve customer events at Home Depots and Lowes throughout the state. These informational events took place in November and were designed to inform customers about winter rate increases and ways to lower electricity consumption.

ENERGY STAR® Appliances

This program is part of a regional, joint effort by Program Administrators and energy efficiency organizations to encourage the purchase of ENERGY STAR® qualified major appliances and electronics, which include, but are not limited to, refrigerators, freezers, monitors, room air cleaners, advanced power strips, pool pumps, and televisions.

Overview of Performance

The ENERGY STAR® Appliances program exceeded program savings goals while remaining within planned budgets.

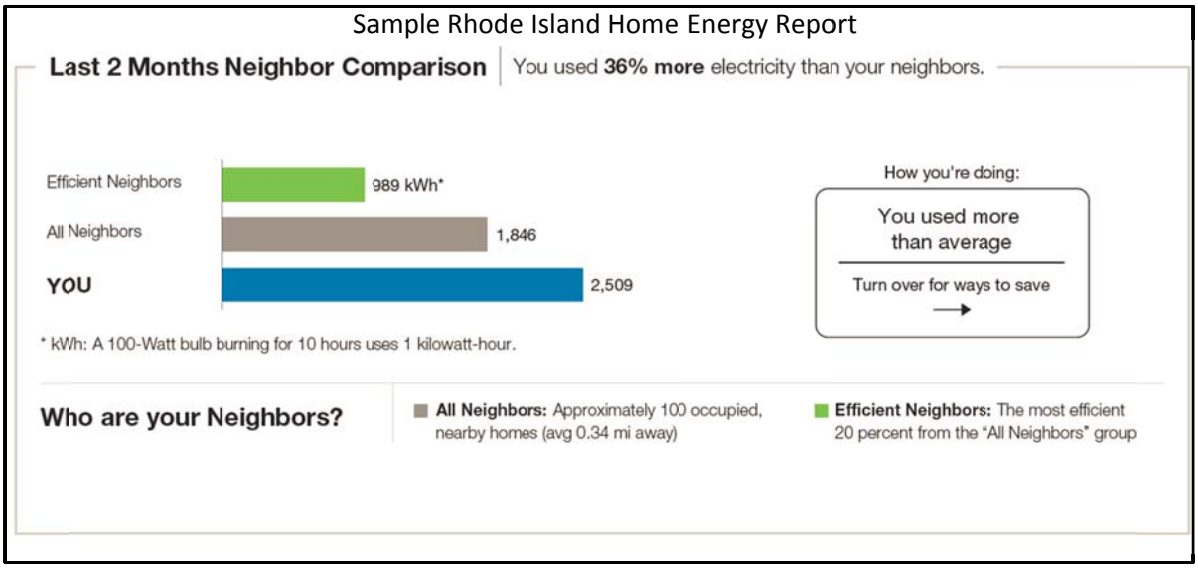
Highlights

The ENERGY STAR® Appliances program also had a very successful year with the introduction of numerous new products and promotions. A special enhanced incentive was well subscribed during the traditionally slow months of January and February for refrigerator recycling. Dehumidifiers and clothes washers were added as new product offerings. Pool pumps had a very strong customer response during the year.

Home Energy Reports

The Rhode Island Home Energy Reports (HER) program encourages energy efficient behavior via personalized print (see below) and email reports that document energy consumption patterns and contain a normative comparison to similarly sized and similarly heated homes, as well as to an energy reduction goal for the subject household. More than 283,000 Rhode Island households currently receive print reports (nearly 40% receive a single report for both electric and gas).

Sample Rhode Island Home Energy Report



Overview of Performance

In 2014, the HER program helped customers save 36,307 MWh and 56,694 MMBtu. In a recent survey, 73% of participants reported reading their reports (a 9% increase over 2013) and of those customers, 57% reported being motivated to discuss the report and ways to save with members of their household.[10]

Highlights

National Grid's HER program is unique because every National Grid residential customer has access to personalized energy usage information, including basic social comparison, and the ability to directly link with National Grid's other residential energy efficiency programs and services. Rhode Island is the first state in the country to take such a program completely statewide, and is also an early adopter of other innovative program features, including:

- Cross-Portfolio Program Promotion: In 2014, HERs began including targeted marketing modules to encourage participation in National Grid's other energy efficiency programs. In a July 2014 survey, 49% of HER recipients reported awareness of the EnergyWise program, whereas only 38% of non-HER recipients were familiar with the program.
- New Movers experience: An exciting new program element launched in 2014, whereby customers who move into Rhode Island receive a tailored welcome through a series of reports that explains the HER program and provides immediate assistance in helping them save energy. This is a key moment to communicate with customers because behavioral science research shows that customers are more willing to change

[10] Source: Opower Customer Engagement Survey, July 2014.

longstanding habits after a move – including their energy usage.[11] In 2014, customers who received the New Movers experience saved at higher rates and reported higher awareness of energy efficiency programs.

- Points and Rewards pilot: A select group of customers received points for every kWh of electricity saved, which can then be applied for modest rewards (e.g. $3-5 to Starbucks), or can be donated to different charities. In 2014, Points and Rewards customers were nine times more likely to login to the portal to view their energy usage and over 15% of customers who redeemed their rewards points elected to use those rewards as a donation to a charity.

High Efficiency HVAC (Heating, Ventilation, and Air Conditioning)

The High-Efficiency HVAC Programs (Gas Heat [heating] and CoolSmart [cooling]) provide a seamless customer experience that result in direct energy efficiency improvements. The Programs promote the installation of high efficiency gas heating, gas water heating, and electric cooling systems via tiered rebate levels. The Programs also provide in-depth contractor training for design, installation, and testing of high efficiency systems. Furthermore, the program provides quality installation verification training, ensuring that all equipment is properly sized, installed, sealed, and performing optimally.[12]

Overview of Performance

In 2014 the Rhode Island Gas Heat and CoolSmart programs exceeded savings goals as well as increased the number of contractors participating in the program. Contractor interest in both the Gas Heat and CoolSmart programs continues to increase due to ongoing contractor training opportunities and customer demand.

Highlights

In the beginning of 2014, National Grid models showed that the Gas High Efficiency Heating Program would exceed budget and savings before the end of the year. In order to keep the Gas High Efficiency Heating Program open to residential customers, rebates were reduced in the summer of 2014 for the remainder of 2014. Reducing the rebates allowed the Program to continue to serve customers, achieve savings, and continue strong relationships with supply houses and contractors.

On July 31, 2014, the Gas Heat rebates for some lower savings products were eliminated and incentives for the remaining gas heat measures were reduced by 50%. These modifications were thoroughly communicated with the contractor community, supply houses, and customers who had already entered into the Program. Although the rebate changes were significant, the Gas Heat Program saw continued high level of participation and the Program was suspended in October for the remainder of 2014. The suspension was in terms of processing rebates. All applications were accepted; however, they will be processed and paid in 2015. All applicants received a letter upon submission of their rebate explaining that the rebate will be processed in 2015 when new funding is available.

Throughout the year, the combo condensing boilers, gas-only WI-FI themostats, and heat pump water heaters proved to generate the highest number of rebates.

[11] Source: Opower Customer Insights Survey: New Movers, April 2014.
[12] Residential programs do not promote or fund fuel switching. It is only after a customer decides to switch to natural gas that they are eligible for an energy efficiency rebate. At the time the customer switches from another fuel to natural gas, they become eligible for an energy efficiency incentive that covers part of the incremental cost of higher efficiency gas equipment.

Due to the success in 2013 of the instant rebate process for the popular WI-FI thermostats (including Nest thermostats), the offering remained in place for 2014. The instant rebate strategy attracts customers by streamlining the process and eliminating several time-consuming steps to receive a rebate check. WI-FI thermostats are a cost-effective energy saving measure that enable the customer to better control and manage their energy usage. In addition to creating savings now, as detailed in the most recent evaluation included in Attachment 6, thermostats are an investment in the future of energy efficiency. WI-FI enabled thermostats are a potential platform for applications like demand response, direct load control, and behavioral savings. As the State looks to address volatile peak prices and infrastructure constraints, tools that enable reduction in energy usage at peak times like WI-FI thermostats will become increasingly important.

In 2014, contractor engagement remained an important component of the success of the program. In March the Program hosted a Rhode Island Contractor breakfast held in Warwick. During the breakfast National Grid's lead vendor, CSG, presented updates, best practices, and answered questions from the participants.

Multifamily

The Multifamily program exceeded all savings and participation targets in 2014. Program enhancements which began in 2012 and continued through 2013 laid the foundation for this offering's success. Participants now experience a simplified experience where comprehensive incentive opportunities are presented during the first assessment

Highlights

Multifamily received external technical assistance from the American Council for an Energy Efficient Economy (ACEEE) to report on findings related to:

- Marketing and outreach
- Multifamily building energy benchmarking
- Innovative incentive design

The goal of ACEEE's research was to identify best practices in the industry as well as any inherent barriers in incorporating the best practices. The research also provided the Company with contacts at other organizations where we could discuss practical application of the practices.[13]

In mid-year the Company developed and launched an energy benchmarking pilot for Rhode Island affordable multifamily housing buildings. $30,000 in funds were leveraged from the JPB Foundation whose goal was "To enhance the quality of life in the United States through transformational initiatives that promote the health of our communities by creating opportunities for those in poverty, promoting pioneering medical research, and enriching and sustaining our environment." With a Company match in funding, up to 400 affordable multifamily housing buildings will be benchmarked in 2015.

Community Based Initiative: Rhode Island Energy Challenge: Find Your Four!

January 2014 marked the second year of the Rhode Island Energy Challenge: Find Your Four! campaign, a working relationship between National Grid and SmartPower focused on achieving meaningful change in peoples' energy use behaviors. Continued from the first year in 2013, the 2014

[13] Source: ACEEE delivered the following three reports to National Grid in 2014: Effective Marketing and Outreach Strategies for Multifamily Energy Efficiency Programs, Recommendations and Best Practices for Revising Incentive Structure, and Effective Strategies for Benchmarking Multifamily Buildings.

program focused efforts on driving municipal residents (customers who live in the town where the Challenge is active), organization members, and employees to commit to find four ways to save energy in their daily lives.

Overview of Performance

The 2014 results were very impressive as the Challenge succeeded in meeting its goal of 5% of municipal residents and employees pledging to Find Your Four. In 2014 the Challenge increased its efforts and asked for a 10% commitment from businesses and organizations. This 10% goal was met time and again. Employees from 2013 business partners including Arpin Group and Blue Cross & Blue Shield of Rhode Island re-engaged in 2014, while new partnerships were created with Fidelity Investments, GTECH, and UPS of Warwick. All partners achieved 10% of employees pledging to be more energy efficient.

Also expanded in 2014 was a renewed focus working with the faith community. The Company's efforts with participating churches and their congregations resulted in five churches signing up 10% of their congregation and subsequently being awarded a $500 grant from National Grid for energy efficiency upgrades to their facilities. This has deepened the relationship with program partner Rhode Island Interfaith Power & Light, which has supported the Challenge's unique appeal and the concrete value it offers congregation members.

Highlights

Rhode Island Energy Challenge outreach in 2014 centered heavily on organizing at the grassroots level including: engaging community leaders to speak on the Challenge's behalf; working with a targeted Community Action Program (CAP) agency as a pilot; and embedding the Challenge in the faith community. These efforts, combined with social media and traditional media outreach, resulted in these key results:

- 6,021 face-to-face customer interactions at over 58 events
- 3,618 people signed up online to take the Challenge
- Over 22 organizations sent specialized newsletter communications to membership or employees on the Challenge's behalf to an approximate audience of 41,000 people
- 187 meetings to advance partnerships and encourage participation
- Earned media in 25 newspapers and publications
- Posted to social media 256 times for over 559,000 total views

Education and Outreach

As a new way to reach the broader Rhode Island communities and create excitement around the Find Your Four program, the Rhode Island Video Challenge was created and launched in 2014. This unique contest added a new creative component of the Campaign and was designed to engage students in middle school, high school and college. The Video Challenge asked students to document

and publically share what unique energy savings actions they took through the creation of a personalized 30 to 60 – second video. The Video Challenge proved very successful with the submission of 36 videos and over 10,000 people who voted for their favorite videos. Winners will be announced in early 2015 and the first place winner will be showcased via the NewportFILM Green Screen.

Income Eligible Services

National Grid helps reduce electricity and heating costs for income eligible customers without any financial obligation from the customer.

Income Eligible Services are delivered by local Community Action Program (CAP) agencies for residential customers, who are currently on the A-60 Low Income rate, those customers who qualify for LIHEAP funds from the State, and/or whose household income level falls below 60% of the Area Median Income (AMI). Services offered to Income Eligible Customers include (1) an energy assessment of lighting, appliances and behavior to determine baseline consumption, (2) an inspection of existing insulation to identify opportunities for weatherization, and (3) an inspection of the customer's heating system for potential replacement if applicable. All customers receive all services and equipment upgrades at no cost.

Overview of Performance

In 2014, the Income Eligible program was cost-effective with total resource B/C ratios of 1.9 for electric programs and 3.08 for gas programs. The Company spent approximately 103% of the electric low income implementation budget, achieved 134.6% of electric targeted annual energy savings and achieved 117.1% of electric targeted annual demand savings. The Company spent 93.3% of the gas low income implementation budget and achieved 127.4% of gas targeted annual energy savings. Additional details on spending and savings by program can be found in Attachment 1, tables E-1, E-2, E-3 and Attachment 2, tables G-1, G-2 and G-3.

2014 was a very successful year for the Income Eligible Services program and the CAPs exceeded the Program savings goals – 126% and 124% savings in gas and electric respectively. Several factors contribute to the success, the first being that program management continued to improve in 2014 with ongoing implementation of technical trainings, distribution of resources based on need within respective communities, and the development of statewide training manuals. The Program continued to focus on training and enhancing technical knowledge of tradespeople to perform thorough and consistent home energy assessments; installation of energy efficient lighting, appliances, heating systems, domestic hot water equipment, and weatherization measures.

Highlights

In 2014, the Heating System Repair and Replacement Operations Manual was developed and produced through a collaborative process with DHS and National Grid's lead vendor, CLEAResult. The manual provides guidance to ensure safe, effective and efficient heating system repair and replacement across the state.

To further the consistency among the Income Eligible contractors, Department of Human Services (DHS), and National Grid selected Saturn Management to provide the Rhode Island Weatherization Field Guide. The field guide will be aligned with the new Department of Energy Standardized Work System and will be published in the first quarter of 2015.

Training

In 2014, several training opportunities were made available to the Rhode Island Community Action Program teams. Jules Junker, a leader energy-efficient building and owner of Thermal Works in Johnson, Vermont, provided his Rhode Island training program (1 day classroom, 2 days field) to all CAPs.

A statewide ASHRAE 62.2 – 2013, Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings, training with Paul Raymer, building science expert, was developed in partnership with Rhode Island Housing (RIH), Department of Human Services, and National Grid. The training included over 40 RIH and CAP employees. Paul Raymer's training consisted of 1 day of classroom training and two days of equipment selection & field training. This training will help to ensure that as homes become tighter as a result of energy efficiency, that there are steps taken to ensure that the home receives proper ventilation.

The Weatherization Technical Committee (WTC) met quarterly in 2014 to review consistent audit protocol and implementation of weatherization and insulation services. Each of these meetings was conducted on-site at a CAP location and provided real examples of work done in the field in order to teach the contractors about quality, consistency and completeness.

Commercial & Industrial Programs

Overview

In 2014, the Commercial & Industrial (C&I) sector was cost-effective with total resource B/C ratios of 2.93 for electric programs and 2.07 for gas programs. The Company spent approximately 94% of the electric C&I implementation budget, achieved 97.6% of electric targeted annual energy savings and achieved 83.6% of electric targeted annual demand savings. The Company spent 73.4% of the gas C&I implementation budget and achieved 115.5% of gas targeted annual energy savings. Additional details on spending and savings by program can be found in Attachment 1, tables E-1, E-2, E-3 and Attachment 2, tables G-1, G-2 and G-3.

Large Commercial New Construction

This program promotes energy efficient design and construction practices in new and renovated commercial, industrial, and institutional buildings. It also promotes the installation of high efficiency equipment in existing facilities during building remodeling and at the time of equipment failure and replacement. The program offers technical and design assistance and rebates to reduce the incremental cost of high efficiency equipment over standard efficiency equipment. Large Commercial New Construction is known as a "lost opportunities" program because a customer who does not install energy efficient equipment at the time of new construction or equipment replacement will likely never make the investment for that equipment or will make the investment at a much greater cost at a later time. Commissioning or quality assurance is also offered to ensure that the equipment and systems operate as intended.

Overview of Performance

The Company met its 2014 electric New Construction program savings goals. The largest portion of which is attributed to the Bright Opportunities (Upstream Lighting) initiative, highlighted in a section below. The Company also met its New Construction Gas savings goals. In early 2014, the Company also launched its enhanced new construction services to customers and the building industry. This generated a lot of interest in the new construction industry. Several applications were generated

this year but because new construction projects typically have a long completion cycle, these projects are expected to complete between 2015 and 2017. In 2014, the Company also formally rolled out the Office of the Future program. This initiative, previously in the pilot stage, was opened to all customers in 2014 under the new name, Sustainable Office Design Initiative. The initiative targets tenant fit-out office spaces that are greater than 7,500 square feet.

Upstream Lighting

2014 was the third year of the Rhode Island Commercial & Industrial Upstream Lighting Initiative (more commonly referred to as Upstream Lighting.) This initiative lowers barriers to commercial and industrial customers adopting Energy Star certified LED lamps and Consortium for Energy Efficiency (CEE) approved high performance linear fluorescent lamps by eliminating the application required for a customer to acquire these products. Through an agreement with participating electrical distributors, a portion of the higher cost of select eligible lamps is paid directly to the distributor by National Grid after the distributor successfully submits lamp and customer data. This means that commercial lighting customers get premium replacement technology for the price of a conventional product if they provide the required data. In addition to being popular with customers, the initiative provided approximately 22,375 MWh of savings for the Company's New Construction Program in 2014 which is a major share of this program's savings.

Street Lighting

During 2014, the Company participated and provided comments in the Customer-Owned Street & Area Lighting proceeding (Docket No. 4442). A technical session was held at the Rhode Island Public Utilities Commission on May 6, 2014 to examine metering of customer-owned LED street lighting. On August 1, 2014, the customer-owned street lighting tariff went into effect. The Company's Rhode Island Jurisdiction and Energy Efficiency staff have received training on the process for municipal customers to purchase the streetlights from the Company. The Company is now presenting at various meetings and sharing information on incentive levels for converting to LED street lighting. A separate docket is now in place to establish a pilot metering program for municipal-owned streetlights (Docket No. 4513).

Large Commercial Retrofit

This is a comprehensive retrofit program designed to promote the installation of energy efficient electric equipment such as lighting, motors, and heating, ventilation and air conditioning (HVAC) systems in existing buildings. All commercial, industrial, and institutional customers greater than 200 kW average demand are eligible to participate. The Company offers technical assistance to customers to help them identify cost-effective conservation opportunities, and pays rebates to assist in defraying part of the material and labor costs associated with the energy efficient equipment.

Overview of Performance

The Company had a very successful year in the retrofit program with 93.7% of the electric savings goals and 106.4% of the gas savings goals, while focusing on comprehensive upgrades.

Highlights

In addition to the regular service provided to all customers, the Company pursued different strategies in energy efficiency for the following market sectors.

Manufacturing/Industrial: In 2013 the Company introduced a third party vendor to help promote energy efficiency and to help sell the concept of how to bring longer-term energy savings to this

sector. In 2014, the Company built upon this and was able to conduct technical assessments for seven large industrial customers with potential savings in the order of 7.5 Million kWh and 800,000 therms. The focus of the technical assessments was on HVAC and process energy improvements. Based on this success, the Company plans to expand this service to all large and medium sized manufacturing/industrial customers in Rhode Island in the coming years.

Industrial Case Study: The Company in partnership with its industrial expert vendor conducted a detailed technical assessment for one of the seven large customers enrolled in our industrial initiative. A comprehensive analysis of the facility included HVAC compressed air and other process energy improvements. A total of 1.7 Million kWh of electric and 354,050 Therm gas savings opportunities were identified. The assessment process started in 2013 but because manufacturing facilities have a longer cycle of completion of projects, the customer was able to complete some measures by 2014. The customer will continue to pursue additional measures in the coming years. Approximately 900,000 kWh were saved between 2013 and 2014 (365,104 kWh occurring in 2014).

Strategic Energy Management Plan (SEMP): SEMP, or Strategic Energy Management Plan, is a multi-year approach to planning energy optimization opportunities for the customers' building portfolio, in a way that aligns closely to their organizational goals and financial criteria. The Company continued to work with its three SEMP customers (Brown University, Lifespan Hospitals, and URI). No new customers were enrolled in this initiative specifically in 2014.

Customer Highlight: Partnership with the Lifespan Hospital Group (comprising of Rhode Island's five largest hospitals). Keeping the customer's cost-barrier as the primary challenge in mind, the Company worked collaboratively with Lifespan and came up with a solution which included financing in the form of zero-interest on-bill repayment. After iterations, the Company designed a multi-year phasing of projects which, through a combination of incentives and two-year on-bill repayments, essentially made this a cash-neutral investment for Lifespan, thus enabling them to take advantage of the energy efficiency opportunities.

Through SEMP the Company was able to offer additional support to Lifespan's projects through:

- Technical/engineering expertise.
- Dedicated project management support for implementation.
- Predictable yearly incentives that help in budget planning.

Currently, the Company is in the second year of the 3 year non-binding SEMP agreement with Lifespan. Over the course of three years, this SEMP aims to achieve 7.9 Million kWh in electricity savings, and 897,000 therms in gas savings. Lifespan's estimated investment of $4.6 Million in the proposed projects is offset by National Grid's estimated incentives of $3.1 Million and zero-percent on-bill financing amount of $1.5 Million. With the successful SEMP partnership with National Grid that commenced in November 2013, Lifespan Hospitals is already making broad institutional changes that are resulting in positive environmental impacts for the healthcare community, and building systems improvements that will result in sustained cost savings going forward. At this point in the project implementation schedule, Lifespan is about 53% and 39% towards meeting its energy saving goals, for electric (kWh) and gas (therms) respectively.

Municipal/State Initiative and RIPEP Partnership

Customer Highlights: The City of Warwick Rhode Island received incentives to complete lighting and HVAC upgrades at a public library and several schools. In addition, there was a lighting retrofit at

City, turbo blowers were installed at the sewer department, and the town pool installed variable speed drives and HVAC units. All together, the city will be is saving two million kWh each year.

The US Postal Service Main Processing Center in Providence replaced its metal halide lighting interior and exterior LEDs. They received an incentive of $600,000 and will achieve savings of 1,851,477 kWh. The Company is working on strategic sales approach to implement efficiency over multiple years including new chillers, VFDs on air handling units, and making upgrades to the energy management system.

Grocery Initiative (EnergySmart Grocer)

Through the Company's dedicated market sector delivery for its grocery customers (called the EnergySmart Grocer initiative), National Grid saved more than 2.2 million kWh and 14,577 therms for its grocery customers in 2014. This is more than twice the kWh than was saved last year. In addition, 75% of the savings in 2014 came from non-lighting measures.

Customer highlight: The Company's regional accounts representative and third party implementer worked with a large regional grocery store chain to complete numerous energy efficiency upgrades like: LED track lighting, case lighting, troffers and parking lot lighting, ECM motors, floating suction controls, and night covers. All of these upgrades will result in an annual "gross" kWh savings of 2,616,536 kWh with annual bill savings of $254,244 per year. The customer will receive a total of $513,181 in incentives this year. Since this is a regional account, the Company's sales person worked with the various project managers in different locations for this store. All applications this year were scattered throughout the Rhode Island in Providence, Pawtucket, Newport, Warwick, Cranston, and Cumberland.

Multifamily Buildings

In 2014, the Company continued simplifying the customer experience by providing a primary point-of-contact at the Lead Vendor. However, accounting of savings and spend remained separated between residential and commercial multifamily programs. For the commercial sector, the Company achieved greater participation in the multifamily gas initiative compared to previous years. Through the program's single point of contact implementation process, the Company enrolled about 15 large multifamily projects. An example of this success is the Rumford Court Apartments in East Providence that participated in the comprehensive gas retrofit program. The complex installed demand circulators, thermostats, insulation and air sealing among other energy efficiency improvements. National Grid and its lead vendor had been in constant communication with the complex owner for several years prior to the customer deciding to move forward with upgrades in 2014.

Combined Heat and Power

In 2014, the Company completed its first project with the installation of the Toray Plastics America, Inc. (Toray) combined heat and power (CHP) system in North Kingstown, Rhode Island. This unprecedented project consisted of the installation of two Kawasaki reciprocating engines, a 5 megawatt (MW) engine and a 7.5 MW engine. In total these engines will provide 12.5 MW of cogeneration, while generating 11,500 pounds per hour of 135 psig steam and 1,000 tons of chilled water.

The project came online in fall 2014 and is already providing 80,000 megawatt-hours (MWh) of net annual savings to Toray. It will save the company $6.9 million dollars each year. In addition, compared to Toray's existing systems and grid-supplied energy, the project is expected to conserve approximately 65,000 decatherms (Dth) of natural gas per year. The Company will complete the system commissioning in 2015.

Small Business Direct Install

Small Business Direct Install, named exemplary program by ACEEE in 2013, provides direct installation of energy efficient lighting and non-lighting retrofit measures, including gas measures. Customers with an average monthly demand of less than 200 kW are able to participate. The customer pays 30% of the total cost of a retrofit. This amount is discounted 15% for a lump sum repayment or the customer has the option of repaying the financing over a two-year period with its bill payments, interest free.

Overview of Performance

The Small Business Direct Install program had a challenging year in 2014. 2014 was the first time in several years that the program failed to meet its goal. There are a few of reasons for this shortfall, one is directly related to the program, another has to do with the saturation of measures, and the third has to do with the Upstream Lighting initiative as detailed below.

1. There was miscalculation by the implementation vendor of the staff it would need to meet the goal that was set forth in the plan. This affected achievement of both gas and electric goals. National Grid spoke with the vendor and it believes that this has been corrected for the 2015 program year.
2. Saturation of several popular small business gas measures is high. While this means the market for those measures is nearly transformed, the challenge will be filling their place with other measures.
3. The Upstream Lighting initiative eroded small business program savings. The Company examined the data from the Upstream Lighting initiative and found that a significant portion of the sales, in excess of 50%, were being made to small businesses. While this means that small business customers were served at a reduced cost, the small business program savings did not meet plan expectations.

Highlights

Below is a small sample of the projects the Company helped its customers complete in 2014.

- South County YMCA (Peace Dale, RI) – this customer received an interior and exterior lighting upgrade with LED fixtures and equipment. A web-based Energy Management System (EMS) was installed to replace the existing standalone thermostats that had no setbacks. The EMS allows the customer to monitor all of its HVAC equipment, enable CO2 based demand control ventilation, check performance, set temperature, schedules, and enable a holiday schedule. With estimated savings of almost 125,000 kWh and 1,000 therms, this upgrade will save the YMCA well over $20,000 annually.
- Refocus (Providence, RI) – this customer was able to address the building's weatherization needs through the installation of 7,000 square feet of R-30 cellulose insulation into an un-insulated attic floor cavity. The work also included air sealing to the attic chases, plumbing and wiring penetrations and other leakage points to reduce heat loss via thermal by-pass and air infiltration/exfiltration. With estimated yearly savings of 2,341 therms and over 20,000 kWh, this upgrade will save Refocus over $6,400 annually.
- Douglas Wine and Spirits (North Providence, RI) – this customer was served by the new Comprehensive delivery channel option that was introduced into the program in 2014. In addition to a comprehensive lighting upgrade, the independent contractor also replaced

fractional horsepower motors in refrigerated cases with premium efficiency units, resulting in total yearly savings of almost 59,000 kWh, at a total project cost of about $27,000.

A larger list of project types and case studies in both Rhode Island (and elsewhere in New England) can be found at: https://www1.nationalgridus.com/smallbusiness.

The program also supported energy efficiency projects at community buildings (a public building that houses a not for profit organization such as, but not limited to, boys and girls clubs, community healthcare centers and are used for public/community purposes) with the help of RGGI funds. Through December 31, 2014, 83 energy efficiency projects at community buildings had been supported with supplemental incentives totaling $363,931 from the 2013 RGGI allocation resulting in 1,611,727 kWh of electricity savings.

Codes and Standards

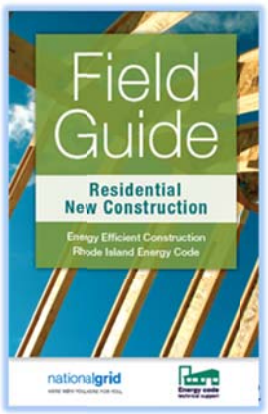
The Rhode Island Code Compliance Enhancement Initiative (CCEI) was designed to increase the ability and desire of architects, engineers, contractors, builders, construction managers, and energy specialists to comply with the locally mandated residential and commercial building energy codes as well as improve the ability of local building code officials to enforce the code. The CCEI completed its second year in 2014 and experienced a number of significant accomplishments during the year.

Overview of Performance

2014 was a successful year for the Rhode Island CCEI. A total of 45 CCEI training events (classroom, on-site, and web-based) were held during 2014 for residential and commercial design, construction, and code enforcement groups. Actual attendance at energy code trainings exceeded planned target goals. These events attracted:

- 509 residential attendees (270 target goal)
- 282 commercial attendees (180 target goal)
- 791 total energy code training attendees

The energy code technical support toll-free "circuit rider" number helped clarify any confusion or misunderstanding that building design and construction professionals or building code officials had regarding energy codes, and supported their efforts to better understand and execute code compliant building designs. This important service fielded 22 residential and 10 commercial related telephone inquiries. The majority of these inquiries were successfully resolved via the phone, while 10 inquiries resulted in field visits to actual job sites or office consultations. The CCEI efforts in Rhode Island most importantly realized savings during 2014. The CCEI realized residential sector savings of 123 MWh and 14,098 therms and commercial sector savings of 2,885 MWh and 68,416 therms.



Highlights

Aside from attendance at energy code trainings in 2014, the Rhode Island CCEI had many additional highlights during the year. The initiative developed and supported consistent documentation tools such as the Rhode Island Residential New Construction Field Guide, technical

bulletins ("Build Tight and Ventilate Right" and "Air Sealing for Savings"), residential and commercial Frequently Asked Questions (FAQs) guides, software tools, checklists, and code check protocols for adoption by jurisdictions as a mean of code compliance enhancement.

Two building tours co-sponsored with the AIA and USGBC Rhode Island Chapters occurred in 2014. These included a new building tour of the Met Center in Newport and the renovated Building for Engineering and Technology (BERT) at Brown University. Both tours focused on challenging areas for code compliance (daylighting and lighting controls along with building enclosure).

Pilots and Other Initiatives

Residential Pilots

During 2014, National Grid completed the Automatic Temperature Control and Energy Monitoring demonstrations. The pilot resulted in different saving results for the same thermostats that are deployed in different ways. This substantiates the assumption that thermostat savings may change based on the information provided to a customer. In general, the Company found customers very motivated to accept new technologies, and that customers' main concern is saving money on their energy bill. Results demonstrated that customers continued to interact with the thermostats on a regular basis after a two year period and customers changed behavior with the installation of the thermostat.

The Company also began a Heat Pump Dryer demonstration in 2014. The Company began testing an efficiency washer along with the heat pump dryer to test the performance, reliability and customer satisfaction of the unit. The Company is testing (7) total units, four (4) units in Massachusetts, two (2) units in Rhode Island, and two (2) units in a lab environment to be run with controlled testing. The overall customer satisfaction to date has been very positive.

The final ongoing pilot involved the installation of ECM Pump monitoring equipment to determine if high efficiency variable speed pumps can provide gas savings in addition to electric savings. The Company installed equipment on existing systems for measuring pre-installation energy use to establish a baseline and pilot contractor will begin installing pumps during the first quarter of 2015 in these single family homes. In parallel, the Company started evaluating pumps on multifamily installations. These systems will be used to evaluate pump performance in a similar manner. The pumps which are being tested are new to the marketplace in 2014. National Grid is working closely with the manufacturers to insure the pumps will achieve optimal savings while achieving high customer satisfaction results.

Residential Energy Efficiency Education Programs

In 2014, National Grid continued its support of the energy education curriculum and teacher professional development in partnership with the National Energy Education Development (NEED) Project. Rhode Island teachers had the opportunity to attend full-day workshops that focused on the science of energy, energy efficiency, and the generation of electricity. The workshops, which hosted 65 teachers, allowed K-12 educators to improve and enhance their science and energy skills while helping students understand energy and ways to be more efficient at home and at school.

Teachers received hands-on kits for the classroom and curriculum. The kits provided to teachers included topics such as Exploring Wind, Exploring Photovoltaics, Exploring Hydropower, Building Science and The Science of Energy. Educators were able to select the resources they felt were most appropriate for their classroom goals.

System Reliability Procurement

System Reliability Procurement (SRP) entails identifying transmission or distribution needs that can be deferred by non-wires alternatives (NWA) projects. These projects are customer-based and can include some measures that are also offered through the Company's statewide EE programs.

In 2012, the Company launched its first SRP project in the form of a pilot in Little Compton and parts of Tiverton called DemandLink™. The pilot's primary objective is to implement a combination of energy efficiency and demand response measures in customer homes and businesses in order to reduce 1MW of load on the specific substation that serves that area by the end of 2017, thereby deferring the need to upgrade the substation by four years.

The pilot was approved for a third year by the PUC on December 24, 2013 and implemented throughout 2014. The Company maintained the same portfolio of incentives as the previous year, hoping to continue the rate of recruitment. The only addition was an expansion of LED offerings so that pilot-eligible customers could receive unlimited free LED bulbs as part of their home energy assessment. The Company also continued to leverage its statewide EnergyWise and Small Business Direct Install programs in the promotion and delivery of these measures. In 2014, the pilot's marketing tactics placed additional focus on keeping participants engaged in the demand response components, which officially began over the summer months. While the summer proved to be milder than expected, three demand response events were called for engagement and evaluation data purposes. By the end of the 2014, preliminary results show that 38 Wi-Fi programmable controllable thermostats were installed in homes with central air conditioning, 104 plug load devices were installed in homes with window air conditioning units, 15 new window AC purchases were rebated and 47 window AC units were recycled. Adding the savings from these measures and the associated home and business assessments that took place in the pilot area, the total load reduction amount is projected to be at 145% of the 2015 target. Additional SRP details on 2014 activities and 2015 plans can be found in the Company's 2015 System Reliability Procurement Report filed in Docket 4528 and approved by the PUC on December 19, 2014.

Financing

The Company offered a variety of finance options to both commercial and residential customers. The two commercial revolving loan funds, both started in 2011, continued to allow customers to pay for their portion of an energy efficiency project through their monthly bills. The funds allowed participants to remain cash-flow positive and helped relieve pressure on the DSM charge by reducing incentive budgets.

In 2014, the Company offered $4.1 million in on-bill financing to 47 Large Commercial customers resulting in electric savings of 9,178 annual MWh. At the end of 2014, the fund had a balance of $5.75 million, money that will be available for more loans in 2015.

Of the 960 customers that participated in the Small Business Direct Install program, each received financing to cover 30% share of the project costs, either over 24 months at zero (0) percent interest or a lump sum payment with a 15% discount. Overall, the Small Business Revolving Loan fund was able to provide $2.4 million in loans that led to more than 18,000 MWh in energy savings. At year end, the fund had a balance of $2.46 million.

The Company also continued offering a 0% interest Heat Loan to residential customers to finance their portions of residential energy efficiency projects. The interest buy-down program was initially funded by RGGI funds in 2011. As of 2012, The RGGI funds had been fully utilized and the EnergyWise program began to provide the needed funds.

In 2014 there were five lenders participating in the initiative: Greenwood Credit Union, Coventry Credit Union, Bay Coast Bank, Navigant Credit Union and the Capital Good Fund. The Heat Loan can be used for Insulation and/or Air Sealing Upgrades, Energy Efficient Heating System Replacements, Duct Sealing and Duct Insulation, Energy Efficient Domestic Hot Water Systems, or ENERGY STAR® Thermostats. Depending on the lender, customers are eligible to receive 0% interest loans up to $25,000 for period of up to 7 years. In total, 1,003 Heat Loans were secured, valued at approximately $6.8 million.

The Company also injected $200,000 into the gas G&I revolving loan fund during 2014. There is now $700,000 available for financing and customers will begin utilizing the fund in 2015. An overview of 2014 financing is included in tables E-6 and E-7.

Rhode Island Comprehensive Marketing

In 2014, the Rhode Island comprehensive marketing campaign “We Can Help” achieved its goal of increasing customer awareness of the availability of Energy Efficiency program offerings to National Grid Rhode Island customers. This determination is based on market research surveys conducted during the pre and post campaign time frame.

2014 was the fourth year of a statewide marketing campaign with the goal of increasing awareness of and participation in National Grid’s energy efficiency programs throughout the state of Rhode Island. The 2014 campaign targeted residential, commercial and industrial customers. The goal of this year’s awareness campaign continued to be the support and amplification of individual energy efficiency program marketing tactics. National Grid optimized its marketing efforts by reviewing tactical digital and awareness metrics. All media placements and buys were based on channel reporting. This year’s marketing mix included the following tactics: radio, print, out-of-home, and digital. The 2014 Rhode Island Comprehensive campaign "We Can Help" ran from February 3 through November 24, 2014.

Jobs Impacts

National Grid hired Peregrine Energy Group, Inc. to conduct a study of the job impacts from National Grid’s energy efficiency programs in 2014. The study estimates the number of full-time equivalent (FTE) employees engaged in all aspects of energy efficiency programs where National Grid provided funding support in 2014. The FTE counts cover a wide range of energy efficiency services, including independent contractors and plumbers, rebate processers, engineers, and National Grid Staff. The study also includes counts of Weatherization Assistance Program (WAP) FTEs that are employed by the Community Action Program agencies that deliver low-income energy efficiency services.

Peregrine determined that 639.4 full-time equivalent (FTE) employees had work in 2014 as a result of investments by National Grid in energy efficiency programs provided to its Rhode Island electricity and natural gas customers. Most of the jobs created as a result of energy efficiency investments were local because they were tied to installation of equipment and other materials.

The study identified 899 companies and agencies involved in National Grid’s 2014 energy efficiency programs, 77% of which were located in Rhode Island. The companies identified include those whose employees are counted in the FTE analysis, as well as additional companies who assisted customers to secure equipment rebates, for example through the New Construction or High Efficiency HVAC programs.

Full-Time Equivalent (FTE) Employment Supported by Energy Efficiency Programs in Rhode Island in 2014

Programs	Total FTEs
Electric Programs	
Commercial and Industrial	207.4
Residential Income Eligible	38.6
Residential Non-Income Eligible	108.8
Gas Programs	
Commercial and Industrial	20.5
Residential Income Eligible	26.2
Residential Non-Income Eligible	166.3
National Grid EE Staffing	38.9
Community Action Agency staff	32.5
Total all 2014 Rhode Island FTEs	639.4

The study's findings were developed through interviews with energy services and equipment vendors and National Grid contractors, as well as through a detailed review of National Grid's records of all energy efficiency measures installed in homes, apartment buildings, businesses, and industries throughout the state in 2014. Peregrine Energy Group calculated the labor hours required for each installation based on industry standards and discussions with contractor experts.

One FTE equals 1,760 work hours, or the total of one person working 8 hours a day for 220 work days in an average year. Because a "full-time equivalent" employee often represents the labors of more than one person over the course of a year, the number of individual workers employed as result of Rhode Island energy efficiency programs funded by National Grid is far larger than the total of FTEs. The study and a complete list of businesses are included as Attachment 4.

Shareholder Incentive

The Company's Shareholder Incentive earnings are determined by its performance against the established annual savings goals documented in the 2014 EEPP. The Company has earned a total of $5,585,429 for the successful implementation of its energy efficiency programs in 2014.

The Shareholder Incentive is earned by sector. An incentive is earned if savings in a sector fall between 75% and 125% of the savings goal for the sector. An enhanced incentive up to 125% of the target incentive is available for achieving greater savings than the savings target. All sectors earned an incentive for their 2014 performance. All gas sectors earned over 100% of the target incentive. For electric, income eligible and non-income eligible earned over 100% of the target incentive.

More details on the Company's Shareholder Incentive achievements can be found in Attachments 1 and 2, tables E-4 and G-4.

Attachment 1
Electric Year-End Results

Attachment 1

Electric Summary Tables of Year End Results

NATIONAL GRID ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-1: Summary of 2014 Target and Year End Results

Sector and Program	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Demand Reduction (Annual kW)			Energy Savings (Annual MWh)			Customer Participation			Implementation Expenses ($ 000)				
Commercial & Industrial	**Target**	**Actual**	**Pct Achieved**	**Target**	**Actual**	**Pct Achieved**	**Approved Target**	**Actual**	**Pct Achieved**	**Budget**	**Actual**	**Pct Achieved**	**Lifetime MWh**	**$/kWh**
Large Commercial New Construction	9,679	7,243	74.8%	27,472	34,236	124.6%	2,192	2,499	114.0%	$8,336.0	$8,730.5	104.7%	381,872	$0.023
Large Commercial Retrofit	15,273	14,368	94.1%	124,275	116,460	93.7%	833	432	51.9%	$25,218.1	$24,701.9	98.0%	1,998,582	$0.012
Small Business Direct Install	4,997	3,435	68.7%	21,170	18,089	85.4%	1,510	960	63.6%	$12,120.5	$9,886.0	81.6%	199,318	$0.050
Community Based Initiatives - C&I										$41.5	$25.0	60.3%		
Commercial Pilots										$364.1	$67.1	18.4%		
Comprehensive Marketing - C&I										$150.2	$213.7	142.3%		
Finance Costs										$1,000.0	$1,000.0	100.0%		
SUBTOTAL	**29,950**	**25,046**	**83.6%**	**172,917**	**168,785**	**97.6%**	**4,535**	**3,891**	**85.8%**	**$47,230.3**	**$44,624.2**	**94.5%**	**2,579,773**	**$0.017**
Income Eligible Residential														
Single Family - Income Eligible Services	419	456	108.8%	3,967	4,911	123.8%	2,450	2,982	121.7%	$7,207.0	$7,291.1	101.2%	58,435	$0.125
Income Eligible Multifamily	154	214	138.9%	2,113	3,276	155.0%	3,520	5,977	169.8%	$2,092.3	$2,258.8	108.0%	33,634	$0.067
SUBTOTAL	**572**	**670**	**117.1%**	**6,080**	**8,186**	**134.6%**	**5,970**	**8,959**	**150.1%**	**$9,299.3**	**$9,549.9**	**103%**	**92,069**	**$0.104**
Non-Income Eligible Residential														
Residential New Construction	62	130	209.1%	631	813	128.9%	458	573	125.1%	$910.3	$1,081.2	118.8%	10,652	$0.101
ENERGY STAR® HVAC	194	389	200.6%	726	1,639	225.8%	1,946	2,445	125.6%	$1,009.7	$1,581.1	156.6%	22,365	$0.071
EnergyWise	1,445	2,686	185.9%	7,674	13,242	172.6%	7,600	9,898	130.2%	$6,448.4	$8,684.8	134.7%	150,247	$0.058
EnergyWise Multifamily	232	172	74.1%	2,888	3,559	123.2%	4,500	5,322	118.3%	$2,419.8	$2,668.1	110.3%	36,053	$0.074
Home Energy Reports	13,182	5,566	42.2%	25,028	36,307	145.1%	227,600	266,111	116.9%	$2,445.2	$2,417.0	98.8%	36,307	$0.067
ENERGY STAR® Lighting	3,712	3,314	89.3%	35,731	30,668	85.8%	247,240	226,860	91.8%	$7,389.7	$5,378.3	72.8%	310,492	$0.017
ENERGY STAR® Products	425	721	169.5%	3,639	5,269	144.8%	13,285	27,823	209.4%	$2,426.0	$2,245.2	92.5%	40,129	$0.056
Energy Efficiency Education Programs										$50.7	$35.9	70.8%		
Residential Products Pilot										$158.8	$23.6	14.8%		
Community Based Initiatives - Residential										$226.4	$174.5	77.1%		
Comprehensive Marketing - Residential										$581.9	$598.9	102.9%		
SUBTOTAL	**19,251**	**12,977**	**67.4%**	**76,317**	**91,497**	**119.9%**	**502,629**	**539,032**	**107.2%**	**$24,066.9**	**$24,888.5**	**103.4%**	**606,245**	**$0.041**
Regulatory														
OER										$565.6	$609.2	107.7%		
EERMC										$816.7	$649.2	79.5%		
SUBTOTAL										**1,382.3**	**1,258.4**	**91.0%**		
TOTAL	**49,773**	**38,693**	**77.7%**	**255,314**	**268,468**	**105.2%**	**513,134**	**551,882**	**107.6%**	**$81,978.9**	**$80,321.0**	**98.0%**	**3,278,088**	**$0.025**
System Reliability Procurement										**$279.2**	**$240.4**	**86.1%**		

Notes

(1)(4) Approved Target from 2014 EEPP, Attachment 4, Table E-6. In the 2014 Plan, the kW goal for Home Energy Reports was miscalculated. If the goal were consistent with the actual kW/kWH in 2014, it would have been approximately 5,255 kW.

(3) Pct Achieved is Column (2)/ Column (1).

(6) Pct Achieved is Column (5)/ Column (4).

(7) Approved Target from 2014 EEPP, Attachment 5, Table E-7

(9) Pct Achieved is Column (8)/ Column (7).

(10) Approved Implementation Budget from 2014 EEPP, Revised Attachment 4, Table E-5, adjusted to reflect "The Narragansett Electric Company, d/b/a National Grid 2014 Energy Efficiency Program Plan Transfer of Funds Request" dated September 26, 201 and approved by the Division of Public Utilities and Carriers on November 19, 2014.

(12) Pct Achieved is Column (11)/ Column (10).

(14) $/lifetime kWh = Column (11)/Column (13)

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-2: Summary of Value, kW, and kWh by Program
2014 Program Year

	Value (000's)												kW Saved				MWh Saved	
		Capacity					Energy											
		Generation					Winter		Summer			Non-Electric Benefits	Maximum Annual	Winter	Summer	Lifetime	Annual	Lifetime
Commercial & Industrial	**Total**	**Summer**	**Winter**	**Trans**	**MDC**	**DRIPE**	**On Peak**	**Off Peak**	**On Peak**	**Off Peak**	**DRIPE**							
Large Commercial New Construction	$46,039	$6,984	$0	$3,234	$13,879	$585	$10,517	$5,746	$5,035	$2,527	$4,183	($6,651)	7,206	5,458	7,243	79,147	34,236	381,872
Large Commercial Retrofit	$135,265	$27,684	$0	$10,031	$43,044	$1,168	$43,752	$45,766	$21,100	$20,372	$12,060	($89,713)	14,368	13,233	14,368	248,978	116,460	1,998,582
Small Business Direct Install	$25,781	$3,182	$0	$1,500	$6,436	$271	$5,483	$2,962	$2,629	$1,314	$2,232	($228)	3,435	2,822	3,435	36,936	18,089	199,318
SUBTOTAL	**$207,084**	**$37,850**	**$0**	**$14,765**	**$63,359**	**$2,024**	**$59,751**	**$54,474**	**$28,764**	**$24,213**	**$18,475**	**($96,592)**	**25,010**	**21,513**	**25,046**	**365,062**	**168,785**	**2,579,773**
Income Eligible Residential																		
Single Family - Income Eligible Services	$16,177	$593	$0	$241	$1,034	$32	$1,321	$1,257	$575	$537	$471	$10,117	420	969	456	5,542	4,911	58,435
Income Eligible Multifamily	$3,365	$183	$0	$88	$380	$16	$815	$709	$270	$248	$342	$314	325	897	214	3,069	3,276	33,634
SUBTOTAL	**$19,542**	**$777**	**$0**	**$329**	**$1,414**	**$47**	**$2,136**	**$1,966**	**$845**	**$785**	**$813**	**$10,431**	**746**	**1,867**	**670**	**8,611**	**8,186**	**92,069**
Non-Income Eligible Residential																		
Residential New Construction	$2,643	$229	$0	$85	$366	$10	$208	$259	$106	$112	$73	$1,195	130	181	130	2,124	813	10,652
ENERGY STAR® HVAC	$6,686	$620	$0	$238	$1,021	$32	$446	$457	$340	$180	$182	$3,170	389	947	389	5,892	1,639	22,365
EnergyWise	$31,901	$1,295	$0	$802	$3,441	$131	$3,543	$3,341	$1,359	$1,308	$1,251	$15,428	2,600	6,435	2,686	18,016	13,242	150,247
EnergyWise Multifamily	$3,417	$129	$0	$66	$285	$13	$1,023	$525	$459	$218	$424	$276	172	253	172	1,632	3,559	36,053
Home Energy Reports	$3,663	$129	$0	$229	$981	$0	$884	$699	$316	$272	$153	$0	5,566	7,624	5,566	5,566	36,307	36,307
ENERGY STAR® Lighting	$34,047	$2,799	$0	$1,364	$5,853	$224	$6,330	$7,106	$2,634	$2,977	$2,683	$2,079	3,314	6,628	3,314	33,640	30,668	310,492
ENERGY STAR® Products	$5,690	$330	$0	$223	$956	$47	$806	$748	$412	$366	$492	$1,310	721	742	721	5,468	5,269	40,129
SUBTOTAL	**$88,047**	**$5,533**	**$0**	**$3,007**	**$12,903**	**$456**	**$13,240**	**$13,135**	**$5,626**	**$5,433**	**$5,258**	**$23,457**	**12,891**	**22,810**	**12,977**	**72,337**	**91,497**	**606,245**
TOTAL	**$314,673**	**$44,159**	**$0**	**$18,101**	**$77,675**	**$2,528**	**$75,127**	**$69,576**	**$35,235**	**$30,431**	**$24,546**	**($62,704)**	**38,646**	**46,190**	**38,693**	**446,010**	**268,468**	**3,278,088**

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-3: Summary of B/C Ratios, Value and Costs ($000's)
2014 Program Year

Commercial & Industrial	(1) Benefit/ Cost	(2) Total Value	(3) Program Implementation Expenses	(4) Customer Contribution	(5) Evaluation Expenses	(6) Shareholder Incentive
Large Commercial New Construction	4.75	$46,038.6	$8,730.5	$743.8	$219.2	
Large Commercial Retrofit	2.84	$135,264.5	$24,701.9	$22,774.8	$161.7	
Small Business Direct Install	2.59	$25,781.0	$9,886.0	$0.0	$55.3	
Community Based Initiatives - C&I			$25.0			
Comprehensive Marketing - C&I			$213.7			
Commercial Pilots			$67.1			
Finance Costs			$1,000.0			
SUBTOTAL	**2.93**	**$207,084.0**	**$44,624.2**	**$23,518.6**	**$436.2**	**$2,176.4**
Income Eligible Residential						
Single Family - Income Eligible Services	2.18	$16,177.3	$7,291.1	$0.0	$117.3	
Income Eligible Multifamily	1.49	$3,364.7	$2,258.8	$0.0	$2.0	
SUBTOTAL	**1.91**	**$19,542.1**	**$9,549.9**	**$0.0**	**$119.2**	**$586.8**
Non-Income Eligible Residential						
Residential New Construction	2.38	$2,643.5	$1,081.2	$0.0	$28.9	
ENERGY STAR® HVAC	2.44	$6,686.0	$1,581.1	$1,151.2	$8.0	
EnergyWise	3.23	$31,900.7	$8,684.8	$1,162.0	$14.5	
EnergyWise Multifamily	1.28	$3,417.4	$2,668.1	$7.6	$2.0	
Home Energy Reports	1.46	$3,663.1	$2,417.0	$0.0	$99.4	
ENERGY STAR® Lighting	3.16	$34,046.9	$5,378.3	$5,354.4	$32.9	
ENERGY STAR® Products	1.98	$5,689.6	$2,245.2	$627.3	$4.6	
Energy Efficiency Education Programs			$35.9		$0.0	
Residential Products Pilot			$23.6		$58.0	
Community Based Initiatives - Residential			$174.5			
Comprehensive Marketing - Residential			$598.9			
SUBTOTAL	**2.52**	**$88,047.0**	**$24,888.5**	**$8,302.5**	**$248.3**	**$1,460.1**
Regulatory						
OER			$609.2			
EERMC			$649.2			
SUBTOTAL			**$1,258.4**			
TOTAL	**2.69**	**$314,673.1**	**$80,321.0**	**$31,821.0**	**$803.7**	**$4,223.3**

Notes:

(1) RI Total Resource Cost test Benefit/Cost Ratio = Total Value/(Program Implementation Expenses + Customer Contribution + Evaluation Cost + Shareholder Incentives).

(2) Year-End Value Total from Table E-2.

(3) Year-End Implementation Expenses by Program from Table E-1.

(5) Evaluation Costs include outside contractor services.

(6) Shareholder incentives from Table E-4.

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-4: National Grid 2014 EE Incentive Calculation

Incentive Rate: 5.00%

Sector	(1) Approved Spending Budget	(2) Target Incentive	(3) Annual kWh Savings Goal	(3a) Actual Spending	(3b) % of Approved Spending	(3c) Budget adjusted target kWh savings	(4) Threshold kWh Savings
Income Eligible Residential	$9,388,969	$469,448	6,079,828	$ 9,669,135	103.0%	6,079,828	4,559,871
Non-Income Eligible Residential	$24,356,843	$1,217,842	76,316,827	$ 25,136,807	103.2%	76,316,827	57,237,620
Commericial & Industrial	$46,890,155	$2,344,508	172,917,343	$ 44,060,382	94.0%	172,917,343	129,688,007
Total	**$80,635,967**	**$4,031,798**	**255,313,998**	**$ 78,866,324**		**255,313,998**	**191,485,499**

Sector	(5) Actual kWh	(6) % of Target Savings	(7) Savings Eligible for Incentive	(8) Total Earned Incentive	(9) % of Target Incentive Achieved
Income Eligible Residential	8,186,376	134.6%	7,599,785	$ 586,811	125.0%
Non-Income Eligible Residential	91,496,527	119.9%	91,496,527	$ 1,460,075	119.9%
Commercial & Industrial	168,785,323	97.6%	168,785,323	$ 2,176,435	92.8%
Total	**268,468,226**		**267,881,635**	**$ 4,223,321**	**104.8%**

Notes

(1) Budget from 2014 EEPP. Includes Implementation and Evaluation Expenses; excludes EERMC Costs, Commitments and Copays and Outside Finance Costs.

(2) Equal to the incentive rate (5.0%) x Column (1)

(3) Approved savings goal from 2014 EEPP

(3a) Actual spending includes actual Implementation Expenses from Table E-1 and Evaluation Expenses from Table E-3. It excludes EERMC costs and Outside Finance Costs.

(3b) Column (3a)/ Column (1)

(3c) Column (3) * (3b), only if 100% of Target Savings were achieved in Column (3)

(4) 75% of Target kWh Savings

(5) Year End Savings from Table E-1

(6) Column (6)/ Column (3c)

(7) If Column (7) is less than 75%, Column (8) = 0,
If Column (7) is between 75% and 125%, Column (8) = Column 6;
If Column (7) is greater than 125%, Column (8) = 125% of Column (3c) due to the incentive cap.

(8) The shareholder is calculated as follow, where SB is the Spending Budget in the sector:
From 75% of savings to 100% of savings: Shareholder Incentive = SB x (0.15 x % of savings achieved – 0.10)
From 100% of savings to 125% of savings: Shareholder Incentive = SB x (0.05 x % of savings achieved)

(9) Column (9) / Column (2)

National Grid: **NECO**

TABLE E-5

2014 DEMAND - SIDE MANAGEMENT FUND BALANCE

		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	TOTAL
1. Start Of Period Balance	$	16,493,541	$21,057,213	$24,882,558	$24,500,685	$26,160,699	$27,295,400	$16,493,541
2. Revenue		$6,420,661	$5,447,761	$7,643,140	$5,235,033	$5,286,415	$5,918,445	$35,951,454
3. Monthly C&LM Expenses		$1,885,131	$1,656,845	$8,073,321	$3,624,576	$4,204,005	$6,300,111	$25,743,989
4. Cash Flow Over/(Under)		$4,535,530	$3,790,916	($430,180)	$1,610,457	$1,082,410	($381,666)	$10,207,466
5. End Of Period Balance Before Interest		$21,029,071	$24,848,129	$24,452,378	$26,111,142	$27,243,109	$26,913,734	$26,701,007
6. Interest		$28,142	$34,429	$48,307	$49,557	$52,291	$53,080	$265,807
7. End Of Period Balance After Interest		$21,057,213	$24,882,558	$24,500,685	$26,160,699	$27,295,400	$26,966,814	$26,966,814

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	YEAR END TOTAL
8. Start Of Period Balance	$26,966,814	$28,623,802	$29,790,113	$31,023,877	$18,815,320	$21,239,543	$16,493,541
9. Revenue	$7,257,902	$5,595,651	$6,011,791	$5,575,458	$5,774,220	$5,907,251	$72,073,727
10. Monthly C&LM Expenses	$5,655,293	$4,486,481	$4,837,516	$17,832,768	$3,389,179	$19,179,544	$81,124,770
11. Cash Flow Over/(Under)	$1,602,609	$1,109,170	$1,174,275	($12,257,310)	$2,385,040	($13,272,294)	($9,051,043)
12. End Of Period Balance Before Interest	$28,569,423	$29,732,972	$30,964,388	$18,766,567	$21,200,361	$7,967,249	$7,442,498
13. Interest	$54,379	$57,141	$59,489	$48,753	$39,182	$28,598	$553,349
14. End Of Period Balance After Interest	$28,623,802	$29,790,113	$31,023,877	$18,815,320	$21,239,543	$7,995,847	**$7,995,847**
15. 2014 Incentive							**$4,223,321**
16. Ending Balance after Incentive							**$3,772,526**

1. Previous year's ending balance
2. Business Objects queries for revenues
3. SAP queries for expenses
4. Line 2 minus Line 3
5. Line 1 plus Line 4
6. Interest applied
7. Line 5 plus Line 6
8. Previous month's ending balance
9. Business Objects queries for revenues
10. SAP queries for expenses
11. Line 9 minus Line 10
12. Line 8 plus Line 11
13. Interest applied
14. Line 12 plus Line 13
15. 2014 Incentive plus prior period true-ups

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-6: National Grid 2014 Revolving Loan Funds

Large C&I Revolving Loan Fund

(1)	Projected 2014 Funds Available	$6,858,467
(2)	Actual 2014 Funds Available	$6,442,205
(3)	Paid	$4,121,076
(4)	Repayments	$3,433,198
(5)	Number of loans	75
(6)	Participants	44
(7)	Savings (MWh)	9,178
(8)	Available Year-End 2014	$5,754,327

Small Business Revolving Loan Fund

(1)	Projected 2014 Funds Available	$3,241,378
(2)	Actual 2014 Funds Available	$2,608,657
(3)	Paid	$2,573,272
(4)	Repayments	$2,430,092
(6)	Participants	960
(7)	Savings (MWh)	18,089
(8)	Available Year-End 2014	$2,465,477

Rhode Island Public Energy Partnership (RI PEP)

(9)	2014/2015 Loan Budget	$1,000,000
(10)	Paid	$196,336
(11)	Savings (MWh)	563
(12)	Participants	5
(13)	Available	$803,664

Notes

1 Amount Company estimated in 2014 Plan, Table E-10

2 2013 Year-End Fund Balance from Revised 2013 Year-End Report, Table E-6 and E-7. Large C&I includes additional $1M injected into the fund in 2014.

3 As of December 31, 2014

4 Repayments occuring during 2014

5 As of December 31, 2014

6 Unique customer names for large business and unique accounts small business.

7 As of December 31, 2014

8 Available funds as of December 31, 2014. Does not include projected repayments to be made in 2015.

9 RI PEP funding is over two years

10 As of December 31, 2014

11 As of December 31, 2014

12 As of December 31, 2014

13 Available funds as of December 31, 2014.

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND

Table E-7: 2014 Heat Loans

(1)	Number of loans	1,003
(2)	Loan amount	$6,780,169
(3)	Measures	
	Pre-Weatherization	19
	Weatherization	807
	Heatsystems	799
	DHW	78
(4)	Percentage of audits from weatherization	38%

Notes

1 Equals the number of participants. As of December 31, 2014

2 Total amount of loans dispersed in 2014.

3 Measures financed through loans.

4 Percentage of Heat Loan recipients that went through with weatherization after audit.

Attachment 2
Gas Year-End Results

Attachment 2

Gas Summary Tables of Year End Results

NATIONAL GRID ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table G-1: Summary of 2014 Target and Year End Results

Sector and Program	(1) Energy Savings (MMBtu) Approved Target	(2) Energy Savings (MMBtu) Actual	(3) Energy Savings (MMBtu) Pct Achieved	(4) Customer Participation Approved Target	(5) Customer Participation Actual	(6) Customer Participation Pct Achieved	(7) Implementation Expenses ($ 000) Approved Budget	(8) Implementation Expenses ($ 000) Actual	(9) Implementation Expenses ($ 000) Pct Achieved	(10) Lifetime MMBtu	(11) $/Lifetime MMBtu
Commercial & Industrial											
Large Commercial New Construction	31,863	51,958	163.1%	192	115	59.9%	$ 2,096.7	$ 1,313.7	62.7%	1,062,975	$ 1.24
Large Commercial Retrofit	121,592	129,434	106.4%	606	159	26.2%	$ 3,672.5	$ 3,316.7	90.3%	1,659,387	$ 2.00
Small Business Direct Install	10,496	8,171	77.8%	316	297	94.0%	$ 545.9	$ 136.2	25.0%	60,606	$ 2.25
Commercial & Industrial Multifamily	5,511	6,121	111.1%	745	1,040	139.6%	$ 488.8	$ 330.7	67.6%	95,966	$ 3.45
Comprehensive Marketing - Commercial and Industrial							$ 173.6	$ 212.4	122.4%		
Commercial and Industrial Pilots							$ 398.8	$ 52.1	13.1%		
Community Based Initiatives - C&I							$ 30.0	$ 25.0	83.4%		
Finance Costs							$ 200.0	$ 200.0	100.0%		
SUBTOTAL	**169,463**	**195,684**	**115.5%**	**1,859**	**1,611**	**86.7%**	**$ 7,606.4**	**$ 5,586.8**	**73.4%**	**2,878,935**	**$ 1.94**
Income Eligible Residential											
Single Family - Income Eligible Services	6,395	8,039	**125.7%**	400	535	**133.8%**	$ 2,784.0	$ 2,732.6	98.2%	160,770	$ 17.00
Income Eligible Multifamily	16,824	21,532	**128.0%**	2,200	3,090	**140.5%**	$ 1,767.6	$ 1,514.2	85.7%	359,591	$ 4.21
SUBTOTAL	**23,219**	**29,571**	**127.4%**	**2,600**	**3,625**	**139.4%**	**$ 4,551.5**	**$ 4,246.8**	**93.3%**	**520,361**	**$ 8.16**
Non-Income Eligible Residential											
Energy Star® HVAC	20,344	33,962	166.9%	2,584	3,037	117.5%	$ 2,551.1	$ 2,547.6	99.9%	569,683	$ 4.47
Energy*Wise*	30,120	69,335	230.2%	2,000	2,737	136.9%	$ 4,920.5	$ 5,414.7	110.0%	1,513,263	$ 3.58
EnergyWise Multifamily	9,256	16,668	180.1%	2,000	2,496	124.8%	$ 1,314.7	$ 1,256.7	95.6%	261,304	$ 4.81
Home Energy Reports	73,877	56,694	76.7%	180,000	129,649	72.0%	$ 286.0	$ 252.3	88.2%	56,694	$ 4.45
Residential New Construction	3,683	7,115	193.2%	392	500	127.6%	$ 373.6	$ 290.8	77.8%	158,141	$ 1.84
Comprehensive Marketing - Residential							$ 4.7	$ 21.6	458.9%		
Community Based Initiatives - Residential							$ 44.4	$ 23.9	53.7%		
Residential Products Pilot							$ 34.2	$ 21.4	62.7%		
SUBTOTAL	**137,281**	**183,774**	**133.9%**	**186,976**	**138,419**	**74.0%**	**$ 9,529.3**	**$ 9,829.1**	**103.1%**	**2,559,085**	**$ 3.84**
Regulatory											
EERMC							$ 245.4	$ 195.9	79.8%		
OER							$ 163.6	$ 175.0	107.0%		
SUBTOTAL							**$ 409.0**	**$ 370.9**	**90.7%**		
TOTAL	**329,963**	**409,029**	**124.0%**	**191,435**	**143,655**	**75.0%**	**$ 22,096.2**	**$ 20,033.6**	**90.7%**	**5,958,381**	**$ 3.36**

NOTES

(1) Approved Target from 2014 EEPP Attachment 5 - Revised, Table G-6

(3) Pct Achieved is Column (2)/ Column (1).

(4) Approved Target from 2014 EEPP, Attachment 5 - Revised, Table G-7.

(6) Pct Achieved is Column (5)/ Column (4).

(7) Approved Budget from 2014 EEPP, Attachment 5 - Revised, Table G-5, adjusted to reflect "The Narragansett Electric Company, d/b/a National Grid 2014 Energy Efficiency Program Plan Transfer of Funds Request" dated September 26, 2014, and approved by the Division of Public Utilities and Carriers on November 19, 2014.

(9) Pct Achieved is Column (8)/ Column (7).

(11) $/ Lifetime MMBtu is Column (8)/ Column (10)

NATIONAL GRID NATURAL GAS ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table G-2: Summary of Value and MMBTU Saved by Program
2014 Program Year

	Value ($000)			MMBTU Gas Saved	
	(1) **Total Value**	(2) **Natural Gas Benefits**	(3) **Non-Gas Benefits**	(4) **Annual**	(5) **Lifetime**
Commercial & Industrial					
Large Commercial New Construction	$8,386	$8,384	$1	51,958	1,062,975
Large Commercial Retrofit	$13,887	$12,684	$1,203	129,434	1,659,387
Commercial & Industrial Multifamily	$1,303	$859	$1,449	6,121	95,966
Small Business Direct Install	$1,124	$445	$679	8,171	60,606
SUBTOTAL	**$24,700**	**$22,372**	**$3,332**	**195,684**	**2,878,935**
Income Eligible Residential					
Single Family - Income Eligible Services	$3,219	$1,466	$1,753	8,039	160,770
Income Eligible Multifamily	$11,014	$3,243	$7,771	21,532	359,591
SUBTOTAL	**$14,233**	**$4,709**	**$9,524**	**29,571**	**520,361**
Non-Income Eligible Residential					
Energy Star® HVAC	$9,334	$5,029	$4,305	33,962	569,683
Energy*Wise*	$18,326	$14,046	$4,280	69,335	1,513,263
EnergyWise Multifamily	$5,603	$2,338	$3,265	16,668	261,304
Home Energy Reports	$454	$454	$0	56,694	56,694
Residential New Construction	$1,646	$1,469	$177	7,115	158,141
SUBTOTAL	**$35,363**	**$23,336**	**$12,027**	**183,774**	**2,559,085**
TOTAL	**$74,296**	**$50,417**	**$24,883**	**409,029**	**5,958,381**

Notes:

(1) Total Benefits equal Natural Gas Benefits plus Non-Gas Benefits.

(3) Non-Gas Benefits include electric benefits and non-resource benefits

NATIONAL GRID NATURAL GAS ENERGY EFFICIENCY PROGRAMS IN RHODE ISLANI
Table G-3: Summary of B/C Ratios, Value and Costs ($000's)
2014 Program Year

	(1) Benefit/ Cost	(2) Total Value	(3) Program Implementation Expenses	(4) Customer Contribution	(5) Evaluation Expenses	(6) Shareholder Incentive
Commercial & Industrial						
Large Commercial New Construction	2.99	$8,385.8	$1,313.7	$1,457.2	$34.3	
Large Commercial Retrofit	1.82	$13,887.0	$3,316.7	$4,272.9	$41.8	
Small Business Direct Install	5.97	$1,124.1	$136.2	$45.7	$6.5	
Commercial & Industrial Multifamily	3.85	$1,303.3	$330.7	$8.0	$0.1	
Comprehensive Marketing - Commercial and Industrial			$212.4			
Commercial and Industral Pilots			$52.1			
Community Based Initiatives - C&I			$25.0			
Finance Costs			$200.0			
SUBTOTAL	**2.07**	**$24,700.3**	**$5,586.8**	**$5,783.8**	**$82.8**	**$473.8**
Income Eligible Residential						
Single Family - Income Eligible Services	1.16	$3,218.8	$2,732.6	$0.0	$31.1	
Income Eligible Multifamily	7.04	$11,014.3	$1,514.2	$49.2	$0.3	
SUBTOTAL	**3.08**	**$14,233.1**	**$4,246.8**	**$49.2**	**$31.4**	**$286.2**
Non-Income Eligible Residential						
Energy Star® HVAC	2.00	$9,333.9	$2,547.6	$2,111.4	$13.9	
EnergyWise	2.77	$18,325.7	$5,414.7	$1,193.3	$1.7	
EnergyWise Multifamily	4.10	$5,603.1	$1,256.7	$109.9	$0.8	
Home Energy Reports	1.69	$454.1	$252.3	$0.0	$16.8	
Residential New Construction	5.64	$1,645.8	$290.8	$0.0	$1.2	
Residential Products Pilot			$21.4		$5.0	
Community Based Initiatives - Residential			$23.9			
Comprehensive Marketing - Residential			$21.6			
SUBTOTAL	**2.55**	**$35,362.6**	**$9,829.1**	**$3,414.6**	**$39.4**	**$602.1**
Regulatory						
EERMC			$195.9			
OER			$175.0			
SUBTOTAL			**$370.9**			
TOTAL	**2.41**	**$74,296.0**	**$20,033.6**	**$9,247.6**	**$153.7**	**$1,362.1**

Notes:

1) RI Total Resource Cost test Benefit/Cost Ratio = Total Value/(Program Implementation Expenses + Customer Contribution + Evaluation Cost + Shareholder Incentives).

(2) Year-End Value Total from Table G-2.

(3) Year-End Implementation Expenses by Program from Table G-1.

(5) Evaluation Costs include outside contractor services.

(6) Shareholder incentives from Table G-4.

NATIONAL GRID NATURAL GAS ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table G-4: National Grid 2014 EE Incentive Calculation

Incentive Rate: 5.00%

Sector	(1) Approved Spending Budget	(2) Target Incentive	(3) Annual Savings Goal (MMBTU)	(3a) Actual Spending	(3b) % of Approved Spending	(3c) Budget Adjusted target MMBtu Savings	(4) Threshold MMBtu Savings
Income Eligible Residential	$ 4,579,718	$ 228,986	23,219	$ 4,278,262	93.4%	21,691	16,268
Non-Income Eligible Residential	$ 9,633,725	$ 481,686	137,281	$ 9,868,492	102.4%	137,281	102,961
Commercial & Industrial	$ 7,580,285	$ 379,014	169,463	$ 5,469,614	72.2%	122,277	91,708
Total	**$ 21,793,728**	**$ 1,089,686**	**329,963**	**$ 19,616,368**	**90.0%**	**281,249**	**210,937**

Sector	(5) Actual MMBtu	(6) % of Target Savings	(7) Savings Eligible for Incentive	(8) Earned Savings Incentive	(9) % of Target Incentive Achieved
Income Eligible Residential	29,571	136.3%	27,113	$286,232	125.0%
Non-Income Eligible Residential	183,774	133.9%	171,601	$602,108	125.0%
Commercial & Industrial	195,684	160.0%	152,847	$473,768	125.0%
Total	**409,029**	**145.4%**	**351,561**	**$1,362,108**	**125.0%**

Notes:

(1) Budget from 2014 EEPP. Includes Implementation and Evaluation Expenses. Exludes EERMC, OER, Finance Costs and Shareholder Incentive.
(2) Equal to the incentive rate (5.0%) x Column (1).
(3) Approved savings goal from 2014 EEPP
(3a) Actual spending includes actual Implementation Expenses Table G-1, and Evaluation Expenses from Table G-3. Excludes Finance Costs.
(3b) Column (3a)/ Column (1)
(3c) Column (3) * (3b), only if 100% of Target Savings were achieved in Column (3)
(4) 75% of Target MMBtu Savings
(5) Year End Savings from Table G-1
(6) Column (5)/ Column (3c)
(7) If Column (6) is less than 75%, Column (8) = 0,
If Column (6) is between 75% and 125%, Column (7) = Column 5;
If Column (6) is greater than 125%, Column (7) = 125% of Column (3c) due to the incentive cap.
(8) The shareholder incentive will be calculated as follow, where SB is the Spending Budget in the sector:
From 75% of savings to 100% of savings: Shareholder Incentive = SB x (0.15 x % of savings achieved – 0.10)
From 100% of savings to 125% of savings: Shareholder Incentive = SB x (0.05 x % of savings achieved)
(9) Column (9) / Column (2)

National Grid: RIG

TABLE G-5

2014 DEMAND - SIDE MANAGEMENT FUND BALANCE

		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	TOTAL
1. Start Of Period Balance	$	(2,027,648)	$620,745	$3,815,847	$5,094,959	$5,783,470	$6,292,089	($2,027,648)
2. Revenue		$2,991,453	$3,681,331	$3,369,938	$2,591,933	$1,339,093	$793,919	$14,767,668
3. Monthly C&LM Expenses		$342,006	$489,555	$2,099,543	$1,914,065	$842,286	$1,316,150	$7,003,603
4. Cash Flow Over/(Under)		$2,649,447	$3,191,777	$1,270,396	$677,869	$496,807	($522,230)	$7,764,065
5. End Of Period Balance Before Interest		$621,800	$3,812,522	$5,086,243	$5,772,828	$6,280,277	$5,769,859	$5,736,418
6. Interest		($1,054)	$3,325	$8,717	$10,641	$11,812	$11,811	$45,252
7. End Of Period Balance After Interest		$620,745	$3,815,847	$5,094,959	$5,783,470	$6,292,089	$5,781,669	$5,781,669

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	YEAR END TOTAL
8. Start Of Period Balance	$5,781,669	$2,907,581	$2,745,429	$2,212,966	$1,418,906	$1,786,984	($2,027,648)
9. Revenue	$287,685	$1,051,821	$482,793	$1,038,422	$1,187,460	$2,632,763	$21,448,613
10. Monthly C&LM Expenses	$3,170,274	$1,219,502	$1,020,107	$1,836,035	$822,518	$5,115,229	$20,187,267
11. Cash Flow Over/(Under)	($2,882,589)	($167,681)	($537,314)	($797,613)	$364,942	($2,482,466)	$1,261,346
12. End Of Period Balance Before Interest	$2,899,081	$2,739,899	$2,208,115	$1,415,353	$1,783,848	($695,482)	($766,302)
13. Interest	$8,500	$5,530	$4,850	$3,553	$3,136	$1,069	$71,889
14. End Of Period Balance After Interest	$2,907,581	$2,745,429	$2,212,966	$1,418,906	$1,786,984	($694,413)	**($694,413)**
15. 2014 Incentive							**$1,362,108**
16. Ending Balance after Incentive							**($2,056,521)**

1. Previous year's ending balance
2. Business Objects queries for revenues
3. SAP queries for expenses
4. Line 2 minus Line 3
5. Line 1 plus Line 4
6. Interest applied
7. Line 5 plus Line 6
8. Previous month's ending balance
9. Business Objects queries for revenues
10. SAP queries for expenses
11. Line 9 minus Line 10
12. Line 8 plus Line 11
13. Interest applied
14. Line 12 plus Line 13
15. 2014 Incentive plus prior period true-ups

Attachment 3
Case Studies

Attachment 3

Case Studies

Home Energy Makeover Winner has no cost home energy assessment

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Single Family Home — Chepachet, RI

Kelly Rodgers was the winner of a Home Energy Makeover Promotion at the Energy Expo that was part of the Rhode Island Home Show in April 2014. She won $5,000 toward energy improvements.

To find out what improvements needed to be made, Kelly had a no cost home energy assessment completed at her Ranch style home that was built in 1978 and consists of approximately 1,200 sq/ft.

The Energy Specialist determined that the home required additional attic insulation and several hours of air sealing. Kelly was eligible for $1,300 in efficiency incentives and used $1,700 of the $5000 toward the remaining costs of the insulation work. She still has close to $3,300 to spend on more energy efficiency improvements, which she plans to spend on new energy efficient applicances.

Energy Efficiency Solutions

- 10.5 Hours of Air Sealing
- 934 sq/ft of Attic insulation
- 33 ENERGY STAR® light bulbs

Savings Summary

The Need – Improve efficiency and reduce utility costs.

The Solution – Installed insulation, efficient light bulbs, and sealed air leaks with the help of rebates and no cost measures from National Grid. Kelly now has a more comfortable home and is saving on her energy bills.

As a National Grid customer, you may be eligible for a Home Energy Assessment, at no cost to you. The assessment will measure your home's energy efficiency and put you on the path to reducing costs and saving big on home energy improvements.

The result:	
Total project cost	$3680.60
National Grid incentive	$1977.65
Funds used from prize winnings:	$1702.95
Remaining prize money to be used towards energy efficient appliances:	$3,297.05

Chepachet, RI

"The program has been great! It was quick and convenient. The auditor came to our house within a few weeks and the contractor was updating the house soon after. Everyone we worked with was great. They were very professional, neat, and knowledgeable. We have absolutely noticed a difference! We didn't have to run our air conditioners as much and have only turned the heat on twice! I would definitely recommend the program to others. We plan on buying new appliances with our remaining money."

- Kelly Rodgers

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To schedule a home energy assessment: **1-888-633-7947** | **www.nationalgridus.com/energywiseri**

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Large Business Program

Blue Cross Blue Shield of Rhode Island

Blue Cross & Blue Shield RI

Since 1939, Blue Cross & Blue Shield of Rhode Island, a non-profit corporation, has been dedicated to improving the health of its members, strengthening relations with providers and simplifying its business processes. As a LEED New Construction Gold recipient, the new Blue Cross & Blue Shield RI headquarters treads lightly on the environment while offering a heathier, more comfortable workplace for employees and a sound investment for the company.

Energy Efficiency Solutions

High Efficiency Lighting Systems and Controls

- High efficiency lighting design layout and system equipment
- Curtainwall fenestration design to optimize the use of daylight and reduce demand on the electrical lighting
- Occupancy sensors
- Daylight dimming controls

High-Performance

- Building Envelope
- Improved curtainwall system thermal value
- Additional Insulation at Opaque envelope
- Additional roof insulation
- Cool roof: Reflective roof membrane and green vegetated roof

Efficient Mechanical Equipment and Systems

- High-performance HVAC Chilled water system
- Premium energy efficiency motors in fan boxes
- Static pressure reset
- Dual enthalpy economizer
- Data room water-side economizer
- Premium-efficient motors
- CO_2 Sensors
- Chemical-free water treatment
- Energy Management System
- Measurement and verification program

The result:	
Total Project cost	$612,557
National Grid incentive	$382,338
Cost to customer	$230,220
Annual kWh savings	80,577 kWh
CO_2 lifetime reduction	94,718 tons
Annual electric cost savings	$118,368

Strategic Partner
Symmes Maini & McKee Associates
1000 Massachusetts Avenue
Cambridge, MA 02138-5397

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Large Business Program

Citizens Bank

Citizens Bank

Citizens Bank traces its origins in Providence to 1828. Since then, Citizens has grown to become one of the largest commercial banks in the United States, serving customers throughout New England, the Mid-Atlantic, and the Midwest.

National Grid's technical representatives worked alongside Citizens contractors, technical engineers, and energy consultants to determine appropriate efficiency measures.

Energy Efficiency Solutions

Citizens Bank embarked on an extensive efficiency program involving all its major Rhode Island locations and operations centers, including more than 80 branch offices.

These measures included, lighting and lighting controls, exterior lighting, HVAC – rooftop units, and EMS additions.

- HVAC – rooftop units
- EMS
- Interior lighting with controls
- Exterior Lightings

Citizens Bank over the last several years has put a plan in place to reduce their energy consumption across all their RI locations (large data centers and branches).

They are committed to a continued plan of installing energy efficiency measures at their data centers by continually tying in additional systems to their current EMS systems, updating lighting with more efficient, lower wattage T8 systems with controls and Also updating exterior lighting with low-wattage LED technology.

The result:	
Project Cost	$1,033,724
Mass Save Sponsor Incentive	$ 390,772
Annual Energy Savings	1,673,397 kWh

RBS CITIZENS

As National Grid Rhode Island President, Timothy F. Horan, told the Providence Journal, "For more than 25 years, Rhode Island has led the way in creating innovative energy efficiency programs that have cut our customers' energy costs and benefited our environment. Now, we have the data to prove that energy efficiency is driving the state's economy."

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Combined Heat and Power

Toray Plastics America, Inc.

Toray Plastics America, Inc. (Toray), located in North Kingstown, Rhode Island, consists of the Torayfan® Polypropylene Film and Lumirror® Polyester Film Divisions. As the only U.S. manufacturer of precision-performance polyester, polypropylene, metallized, and bio-based films, the company produces 188 million pounds of film annually for flexible and rigid packaging, lidding, graphic, industrial, optical, and electronic applications.

In March 2012, Toray, Waldron Engineering, and National Grid jointly participated in a Technical Assistance (TA) Study to investigate the optimal CHP system for Toray based on their 2011 energy uses and anticipated energy and preventive maintenance costs, as an eligible custom energy efficiency measure in National Grid's Commercial and Industrial (C&I) Retrofit program.

The TA Study concluded that the optimal CHP was a pair of Kawasaki reciprocating engines, a 5 megawatt (MW) engine and a 7.5 MW engine, providing 12.5 MW of cogeneration while generating 11,500 Pounds per Hour of 135 psig steam and 1,000 Tons of chilled water.

The TA Study further estimated that Toray would need to spend a total of $22.7 million to install the CHP System, in addition to operations and maintenance cost, and increased fuel costs on site. Starting with the 2013 Energy Efficiency program plan, National Grid began providing incentives to encourage the development of efficient CHP facilities of any size in Rhode Island, consistent with legislation passed in 2012, subject to certain eligibility and cost effectiveness criteria. To support the development of the Toray project, National Grid provided a $15.9 million incentive package that covered 70% of the project's total cost. The incentive package consisted of:

- $13,500,000 installation incentive (the "Installation Incentive") from energy efficiency funds;
- $1,800,000 rebate payment from Advanced Gas Technology (AGT) funds; and
- $590,000 performance-based incentive to be paid out after the project is in operation.

The project is expected to provide over 80,000 megawatt-hours (MWh) of net annual savings to Toray, saving the company $6.9 million dollars each year. In addition, compared to Toray's existing systems and grid-supplied energy, the project is expected to conserve approximately 65,000 decatherms (Dth) of natural gas per year.

Attachment 4
2014 Jobs Study

Attachment 4

2014 Employment Supported by Energy Efficiency in Rhode Island Report

PEREGRINE
ENERGY GROUP

ANALYSIS OF JOB CREATION
from 2014 Expenditures for Energy Efficiency in Rhode Island by National Grid

Prepared for National Grid

Prepared by:

Peregrine Energy Group, Inc.
2 Oliver Street
Boston, Massachusetts 02109

April 27, 2015

Table of Contents

Executive Summary

In 2014, National Grid spent a total of $101,683,507 on electric and gas energy efficiency programs and services in Rhode Island. These programs aimed at reducing energy use, saving money for customers, improving the environment, and improving the health, comfort, and safety of homes and businesses. Delivering the 2014 energy efficiency programs required the active involvement of a broad range of workers across a wide array of businesses, including not-for-profits, contractors, plumbers, rebate processors, state agencies, engineering firms, marketing firms, and others.

In order to quantify the number of direct workers involved, National Grid commissioned Peregrine Energy Group, Inc. ("Peregrine") to conduct a study of the job impacts of National Grid's energy efficiency programs delivered to Rhode Island electricity and natural gas customers in 2014. Peregrine had conducted a like study for National Grid in Rhode Island in 2013.

Peregrine determined that 639.4 full-time equivalent (FTE) workers were employed in 2014 as a result of investments by National Grid in energy efficiency programs provided to its Rhode Island electricity and natural gas customers. Most of the jobs created as a result of energy efficiency investments were local because they were tied to installation of equipment and other materials.

The 2014 FTE total was 17 percent greater than the 544.7 FTE workers that Peregrine had attributed to National Grid's Rhode Island energy efficiency program investments in 2013. Total energy efficiency program spending rose from $80,297,958 in 2013 to $101,683,507 in 2014. During this period, electric savings from energy efficiency programs increased from 2.1% to 3.6% of 2009 sales, while natural gas savings from energy efficiency programs increased from 0.86% to 1.1% of 2009 sales. While National Grid's programs and delivery strategies were not substantively different in these years, increased customer participation and demand for the energy efficiency services resulted in the involvement of a higher number of FTE workers.

The study identified 899 companies and agencies involved in National Grid's Rhode Island programs, 77% of which were located in Rhode Island. The companies identified include those whose employees are counted in the FTE analysis, as well as additional companies who assisted customers to secure equipment rebates, for example through New Construction or High Efficiency HVAC programs. A full list of companies involved in the 2014 Rhode Island energy efficiency programs is included at the end of this report.

These findings confirm that job creation is an additional significant benefit that National Grid's investment in energy efficiency has contributed to Rhode Island's economy and to business owners and their employees that participate in and deliver these programs and services. One FTE equals 1,760 work hours, or the total of one person working 8 hours a day for 220 work days in an average year. Because a "full-time equivalent" employee often represents the labors of

more than one person over the course of a year, the number of individual workers employed as result of Rhode Island energy efficiency programs funded by National Grid is far larger that the total of FTEs.

Employers whose workers were supported by these program included organizations across a broad range of companies involved in energy program design, management and delivery. These include National Grid itself, program design consultants, energy program management specialists, marketing and advertising specialists, equipment manufacturers and suppliers, equipment and appliance retailers, architectural firms and developers, engineers and energy analysts, installation companies and independent contractors, quality assurance inspection companies, utility rebate processing houses, waste material recyclers, and program evaluators. In addition, Community Action Program agencies under contract to the state Department of Human Services delivered low-income energy efficiency services for the federal Weatherization Assistance Program (WAP).

Introduction

National Grid's Rhode Island energy efficiency programs focus on delivering cost-effective energy savings to residential customers, low-income residential customers, small and large commercial businesses, and industrial customers. In 2014, National Grid spent a total of $101,312,039 on electric and gas energy efficiency programs in Rhode Island. It is important to note that this funding does not include the customer share of installation costs and other leveraged funding such as Regional Greenhouse Gas Initiative (RGGI) and the Low Income Heating Assistance Program (LIHEAP).

For the second year in a row, National Grid commissioned Peregrine Energy Group, Inc. ("Peregrine") to conduct a study of the job impacts of National Grid's energy efficiency programs and services delivered to Rhode Island electricity and natural gas customers in 2014. The objective of the research was to count or estimate the number of direct jobs attributable to National Grid's 2014 energy efficiency programs. While job creation is not a formal goal of National Grid's energy efficiency programs and services, this study illustrates the additional economic benefits that investments in energy efficiency contribute to Rhode Island and to the businesses participating in National Grid's programs. This study meets the requirements of General Law 39-2-1.2, enacted by the Rhode Island General Assembly in 2012.

An additional objective of the 2014 study was to try to identify and explain changes in job impacts attributable to National Grid investments, compared to last year's results. Both studies have endeavored to find and count the full-time equivalent (FTE) employees engaged in all aspects of National Grid's energy efficiency programs. Peregrine has assumed that one FTE equals 1760 work hours, or the equivalent of one person working 8 hours a day for 220 work days in an average year.

Unlike the energy savings resulting from these programs that are predicted, analyzed, measured, and recorded, the job impacts of energy efficiency improvements are identified, if they are counted at all, as an expense. Types of employees and number of hours worked to deliver programs and services are not captured, except by employers themselves for payroll and business planning purposes. For this reason, calculating job impacts can be more art than science.

This study's findings were developed through interviews with managers at energy services companies, equipment vendors, and contractors identified by National Grid for Peregrine or identified as sub-contractors by companies that Peregrine interviewed. These companies voluntarily shared information on how they staff their contracts and services and even researched payroll records to provide FTE counts. Where possible, the study cites the companies that provided information to Peregrine.

Peregrine also completed a detailed review of National Grid's records of all energy efficiency measures installed in homes, apartment buildings, businesses and industrial facilities throughout Rhode Island in 2014. Peregrine then calculated typical labor hours required for each installed energy savings measure, based on industry standards and discussions with the contractors themselves and other experts, and extrapolated total FTE employment using total counts of measures installed.

The report is divided into four primary sections:

1. An Efficiency Workforce Overview that describes the types of companies and workers engaged in providing efficiency program-related services and support in Rhode Island
2. The Delivery Approach used for individual programs
3. Summary Counts of FTEs with observations on their significance
4. Attachments describing Peregrine's methodology in more detail, providing Peregrine's interview guide, and listing specific companies that supplied the workforce

Efficiency Workforce Overview

Peregrine recognized two main categories of employers/employees that participated in the delivery of National Grid's energy efficiency programs. These categories are:

1. Program Support Service Providers: Those involved in program planning and administration, marketing, rebate processing, and evaluation and market research.
2. Direct Service Providers: Those responsible for sales, technical assistance and training, and for supplying and installing approved efficiency measures that National Grid promoted and encouraged with incentives and rebates.

Program Support Service Providers

The Program support services provider category includes:

- Companies engaged to provide marketing, outreach, public information, and other related support services, including media placement and design of collateral marketing materials;
- Specialized firms processing and paying out rebates offered for purchase and installation of install high efficiency equipment; and
- Evaluators of the overall performance of and savings associated with the National Grid programs.

National Grid

National Grid staff in this category included individuals engaged in program design, regulatory matters, administrative management of contractors, support for marketing activities, and program evaluation. Peregrine is reporting National Grid FTEs as a separate category for purposes of this study and not allocating them to specific programs or groups of programs.

Support Services Contractors

Peregrine interviewed the majority of lead vendors who supported National Grid in these activities to obtain information on their roles and responsibilities in program delivery and FTE counts. Often, these FTEs represented the aggregation of small numbers of hours by many employees. This was because a contractor's role may have been limited in duration and/or required contributions from a multi-disciplinary team. Depending on the nature of the services the vendor provided and whether the support provided could be associated with specific programs, contractor time was allocated according to the overall allocation of gas and electric spend by program sector (Residential, Income Eligible Residential, Commercial and Industrial), or allocated to a specific program sector.

Program Planners and Administrators

Vermont Energy Investment Corporation (VEIC) and its subcontractors Optimal Energy and Energy Futures Group are the primary vendors in this sub-category. VEIC served as consultant to Rhode Island's Energy Efficiency and Resource Management Council and their services were paid for out of system benefits charges and the energy efficiency budget. Optimal Energy provided services out of its offices in Providence, Rhode Island.

Marketers

Kelliher Samets Volk (KSV) was National Grid's primary marketing consultant in 2014, providing comprehensive marketing campaigns to generate awareness among customers about the breadth of National Grid's energy efficiency programs, campaigns directed at trade allies, or targeted campaigns that focused on specific programs. KSV's role included media placement, web-based initiatives, organizing social media campaigns, and organizing phone messaging. National Grid had relied on multiple marketing consultants in prior years, but consolidated marketing responsibilities under KSV in 2014.

KSV identified 11 individual job titles that touched the Rhode Island marketing account, including a brand manager, project manager, creative director, copywriter, production designer, art director, traffic manager, media director, associate media buyer, media strategist, and brand strategies. In 2014, KSV added a full-time brand manager, based in Little Compton, Rhode Island, to support National Grid. Together, the contributions of these individuals totaled 3.4 FTEs.

Additional marketing vendors in 2014 with narrow responsibilities included Questline Inc., Ideas Agency Inc., Integrated Marketing Services, and InnerWorkings, Inc. Marketing FTEs are allocated across all programs.

Rebate Processors

National Grid contacted with Minnesota-based Parago, now Blackhawk Engagement Solutions, to process rebates offered for a variety of energy efficient products. Parago also supported other National Grid programs in Massachusetts and New York, as well as other clients nationwide. Parago scanned, data-entered, and validated rebate applications, processed payments, and cut and mailed checks. All told, Parago required 2.32 FTEs, equal to over 4,000 hours, for rebate application scanning, data entry, customer service, quality assurance, processing services, reward fulfillment, account management, and technology support.

Evaluators

Contracted firms specializing in utility program evaluation were also paid for out of energy efficiency program funds. These firms included DNVGL (formerly KEMA), Opinion Dynamics, Cadmus Energy Services, NMR Group, Inc., Illume Advising, and others. Generally, outside evaluator time was attributed to specific programs and the FTEs associated with those hours added to program totals.

Direct Service Providers

The Direct Service Providers category is comprised of contractors hired by National Grid to deliver and promote Rhode Island energy efficiency programs, specialized technical support providers, and suppliers and installers of energy saving equipment. This category included, but was not limited to

- **National Grid account managers** providing outreach and direct technical assistance to customers, particularly for large commercial and industrial retrofits, and new construction;
- **Energy services companies specializing in field services and installation program management** who were engaged by National Grid to deliver programs, providing schedulers, technical specialists, engineers, trades people, project managers, warehouse managers and materials handlers, supervisors, quality assurance inspectors, bookkeepers, and data handlers;
- **Energy services companies** hired by National Grid to engage, support, manage, and coordinate product suppliers and distributors, retail store offerings, and service networks;
- **Electrical and mechanical engineers** employed by contracted consulting firms and dispatched to identify potential projects, quantify savings, and recommend actions that customers should take;

- **Equipment suppliers and installation contractors** providing energy efficient equipment and approved materials across multiple market sectors for National Grid customers.

The role and contributions of these Direct Service Providers is described in detail in the next section.

Energy Efficiency Program Delivery

This section describes how National Grid electric and gas energy efficiency programs and services were delivered in 2014. National Grid's energy efficiency program delivery strategy varied for different market sectors and sub-sectors, based on fuel type, customer rate class, end-use technology, and whether the objective was to affect energy efficiency of current operations or to reduce energy use in new construction.

Residential Programs

In 2014, National Grid offered a variety of residential programs ranging from home energy audits to rebates for high efficiency appliances and lighting. These programs were designed to reduce energy use by electric and gas customers living in single-family dwellings, 2 to 4 unit buildings, and larger multi-family residences.

National Grid's residential programs were primarily delivered by contractors that specialized in supporting utility energy efficiency programs. The contractors' role was to educate a range of market players, buyers and sellers, and bring them in line with National Grid's energy efficiency objectives through education, training, and technical support. Information on each program's delivery mechanism is detailed below.

In 2014, the installation of residential energy efficiency measures significantly increased compared to 2013, reflecting increased levels of participation by customers. These increases in spending and installations also resulted in increases in jobs associated with program and service delivery.

EnergyWise Single Family (gas and electric)

In 2014, EnergyWise offered customers living in single-family (1 to 4-unit) homes a comprehensive energy assessment of their energy use, followed by recommendations of various was to improve the energy efficiency or their home.

- Participants in this program received recommendations, technical assistance, and financial assistance to improve building insulation and replace inefficient lighting fixtures, appliances, and thermostats with high efficiency models.

- As part of the energy assessment, contractors installed energy efficient lighting, low-flow showerheads, faucet aerators and smart power strips.
- After the installation of insulation and heating equipment, quality assurance inspections were provided to confirm that equipment was installed properly.
- The program continued to offer the Rhode Island Heat Loan, which provides 0% interest financing to eligible single-family customers to support the adoption of recommendations made during the assessment. Customers who live in one to four unit single-family residences are eligible for a 0% interest loan of a minimum of $2,000 up to $25,000 with terms up to seven years.

Delivery:

In 2014, National Grid contracted with RISE Engineering, based in Cranston, Rhode Island, to manage and deliver the EnergyWise Single Family program. RISE employees included: a program manager, office and field staff supervisors, field auditors, field installers and technicians, field inspectors, intake staff and schedulers, warehouse and material management staff, electricians, quality assurance / quality control inspectors, and accounting and contract oversight personnel. Overall RISE staffing increased around 5% in 2014 above 2013 levels in response to program growth.

Field staff completed 8,654 home energy audits (a greater than 10% increase over 2013). This activity was driven by continued increases in the cost of heating for residential customers. Work orders written by auditors resulted in 3,005[1] customers proceeding with weatherization services (i.e. insulation and air sealing), an increase of over 20% over 2013). RISE sub-contracted with Ocean State Energy Audits to perform 300 of the single-family audits and related installation work. In 2014, 30 independent insulation contractors installed the insulation and air-sealing materials recommended by RISE. Insulation crews were led by a BPI-certified crew chief. RISE received a program management fee for its services for this program that included a fee per audit, a fee per item installed by RISE staff, and a percentage mark-up (i.e. cost plus) on insulation work completed by contractors.

Independent heating contractors installed heating system components. As part of EnergyWise Single Family, RISE helped customers to secure HEAT loans to finance the installation of more efficient heating systems, hot water systems, and insulation upgrades. There were 1,003 loans secured in 2014 from private lending institutions, providing financing for 779 new high-efficiency heating systems[2].

[1] Source: Peregrine interview with RISE Engineering

[2] Many additional heating systems were installed in 2014 for audit recipients who did not elect to finance their purchases through the HEAT program.

Competitive Resources, Inc., based in Ashland, Massachusetts, provided quality assurance inspections of a sample of these residential installations, visiting 278 National Grid electric customers and 392 National Grid natural gas customers[3].

EnergyWise Multifamily (gas and electric)

In 2014, EnergyWise Multifamily provided comprehensive energy services to multifamily customers in buildings with five or more units, including energy assessments, incentives for heating and domestic hot water systems, cooling equipment, lighting, and appliances. These same services were offered to market rate and income-eligible multifamily properties. The programmatic approach for serving existing multifamily properties included using a designated primary point-of-contact to manage and coordinate services offered through the full portfolio of National Grid programs, including EnergyWise, Large Commercial Retrofit, Income Eligible Services (i.e. Low Income), and ENERGY STAR® HVAC.

Delivery:

RISE Engineering managed the EnergyWise Multifamily program for National Grid. RISE staff included a program manager, a technical services director, field coordinators, field auditors, electricians, and project intake and coordination staff. This same staff was responsible for the Income Eligible Multifamily Program described below. RISE engagements in this sector resulted in 3,400 market rate and 4,000 income eligible multifamily units[4] benefiting from this program in 2014. RISE staff served as project managers for retrofit projects, meeting with building facility managers, making presentations to condominium boards and owners, and writing work orders and scopes of work (e.g. for air sealing, attic insulation, lighting fixtures, and even replacement refrigerators from retailers for low-income residents).

Independent contractors installed weatherization materials (insulation and air sealing) and heating equipment components. There were ten pre-qualified insulation contractors that bid on this work. This program was coordinated with the Commercial Multi-family program for gas heating systems. Plumbers and electricians were engaged as sub-contractors as needed.

Residential New Construction (gas and electric)

This program promoted the construction of high-performing energy efficient single family, multifamily, and low-income homes in both 1 to 4 unit buildings and multifamily buildings up to five stories. To that end, it educated builders, developers, housing agencies, tradesmen,

[3] Source: Competitive Resources Inc.

[4] Source: RISE Engineering

designers, and code officials regarding the construction requirements, performance benefits, and costs for such buildings. Changes driven by the Residential New Construction program improve lifecycle energy performance. This is primarily attributable to better materials selection and improved construction methods. Builders say that the incremental cost of these enhancements are more than offset by faster home sales and fewer call backs to address owner concerns.

In 2013, the program had adopted a performance-based tier structure with corresponding financial incentives and began to capture savings from the Renovation/Rehabilitation and Deep Energy Retrofit offerings. This continued in 2014, with additional incentives being offered, but with increases in performance verification as well. Incentives paid were based on the percentage of improvement over an established baseline.

Delivery:

For program year 2014, National Grid again contracted with Conservation Services Group (CSG), based in Westborough, Massachusetts, to deliver this program. Staff located at the Westborough office focused on program management, data management, and administrative responsibilities, while three field and training personnel were based in East Greenwich (Warwick), Rhode Island. Field personnel provided trainings and reviewed plans submitted by builders and developers. A continued emphasis has been to try to reach out to all Rhode Island builders to continue to expand the impacts of the program statewide.

CSG also modeled proposed buildings and completed inspections that verified and certified that construction practices for participating buildings receiving performance ratings. In 2014, 573 units of housing and homes received HERS ratings[5], an increase of 100 units over 2013. Much of this increase was attributed by CSG to the participation of a new developer rehabbing large mill buildings as multifamily housing. In 2014, 300 of the housing units rated were multifamily units.

With approval from National Grid, Peregrine did not include labor hours for this program beyond the program implementation services provided by CSG. While incentives offered by National Grid influence the installation of more efficient materials and products in a new home, such installations do not substantially increase the labor hours. The labor needed to construct a high-efficiency home is more or less the same as for buildings that meet current code requirements. In addition, these new homes would have been built anyway without the intervention and support of the program, even though they would not achieve the same standards for efficiency in their design and function. Therefore, no construction labor

[5] Source: Conservation Services Group

component is counted for purposes of this study.

Residential Codes and Standards Initiative

The Codes and Standards Initiative's goal has been to provide information and technical support to the construction / design community and to code officials in municipalities to increase code compliance and promote advanced and stretch codes like the Rhode Island Green Construction Code.

Delivery:

National Grid continued to contract with Conservation Services Group (CSG) to lead this initiative, in parallel with the Residential New Construction program. CSG trainers conducted 18 seven-hour trainings for targeted audiences[6]. They also provided compliance tools and had a circuit rider to provide on-site technical assistance as needed.

Education Programs (electric)

The Company continued to promote energy education to private and public schools and youth groups through the National Energy Education Development (N.E.E.D) Program. This program provided curriculum materials and training to students and teachers in grades K-12.

Funds provided for this effort did not result in any readily identifiable Rhode Island labor activity.

Residential Home Energy Report Program (gas and electric)

National Grid began offering Home Energy Reports (HER) statewide to all residential customers in April 2013. The Rhode Island HER program, the first statewide behavior program in the country, uses historical energy usage benchmarking and social comparisons to encourage energy efficient behavior in the homes of residential customers. The program provides customers with access to personalized energy usage information and the ability to directly link with National Grid's other residential energy efficiency programs and services.

Delivery:

OPower, with offices in Arlington, Virginia, delivered the Rhode Island HER program, using proprietary behavioral analysis and energy audit software. In 2014, OPower was staffed with behavioral scientists, marketing experts, engineers, and software product developers, with support staff, operating in cross-functional teams to develop and deliver these audit reports in

[6] Source: Conservation Services Group

Rhode Island and elsewhere across the U.S. Opower developed and distributed data-driven, software-generated reports to 250,000 residential customers (out of a total of 400,000 statewide). The objective of these reports was to generate actual energy savings by providing "tips" for reducing energy use and to increase demand for and participation in other residential programs offered by National Grid. Comparing participants to a control group, OPower estimated that their reports result in a 10 – 20% lift in program participation[7]. OPower also created an online engagement platform, documenting savings and working with existing Company systems.

Residential Community Based Initiatives (gas and electric)

The initiative leveraged trusted community partnerships and developed targeted marketing strategies in order to promote all residential (and commercial) energy efficiency programs, in specific, targeted communities (or business sectors). Community-based initiatives resemble political campaigns that are trying to get out the vote. They are run through communities as municipality-wide initiatives, as well as through major employers, with the goal of increasing awareness of National Grid offerings and driving residential customers to sign up for audits and to make behavioral changes that reduce energy use.

Delivery:

Connecticut-based Smart Power coordinated community-based initiatives, including the Rhode Island Energy Challenge, which encouraged communities to establish energy efficiency goals and take steps to achieve them. The program had a Rhode Island-based manager, supported by operations staff in Connecticut. At the community level, the program enlisted volunteers to promote participation, though these volunteers are not counted for purposes of this study. Major initiatives in 2014 targeted the City of Newport and Warwick. Employer-based initiatives worked with Blue Cross / Blue Shield, Fidelity, and G-Tech. A church-based initiative promoting "Energy Sundays" was also launched with Rhode Island Interfaith Power and Light.

ENERGY STAR® Lighting (electric)

ENERGY STAR® Lighting is a point-of-purchase initiative implemented jointly with other regional utilities. It provided discounts to customers for the purchase of ENERGY STAR® compact fluorescent lamps and fixtures and solid state lighting through instant rebates and special promotions at retail stores. A mail-order catalog and online store were also available to customers for lighting purchasing.

[7] Source: Interview of Asher Burns-Berg of OPower on February 10, 2015.

Delivery:

In 2013, National Grid had hired The Cadmus Group of Waltham, Massachusetts to provide diversified marketing assistance and an awareness campaign for this initiative. Cadmus employed a staff of specialists to support this program, as well as the high efficiency appliance program described below. Cadmus, in turn, used sub-contractors to assist with media purchasing, public relations, and social media-oriented strategies. Cadmus's involvement continued through July 2014 when all marketing support was consolidated under a single contract with KSV.

Lockheed Martin Services, with an office in Marlborough, Massachusetts, was likewise engaged by National Grid to support the residential consumer lighting initiative, providing direct outreach and education to both product retailers and manufacturers, including having a full-time field representative based in Providence to work with retailers statewide, providing product information, training them to upsell to more efficient products, offering staff events, conducting in-store surveys and point-of-sale promotions. Lockheed Martin also employed a school fundraising coordinator that helped organize school-based lighting product and power strip purchasing and distribution.

Massachusetts-based Energy Federation, Inc. provided a product catalogue and online store for National Grid and other regional utilities to promote and supply qualified products and to provide technical assistance to customers. This fulfillment function employed a manager, required a call center that took orders, and included warehouse personnel serving orders from Rhode Island customers, customers from elsewhere in New England, and nation-wide.

As outlined in the program description, ENERGY STAR® Lighting employed a number of avenues to encourage the purchase of energy efficient lighting to residential customers. Part of this region-wide initiative focused on retail outlets. However, retail outlet employees were not counted for this study since the sale of these products had no discernible incremental effect on store employment (i.e. it primarily resulted in different lighting choices by consumers).

ENERGY STAR® Appliances (electric)

In 2014, ENERGY STAR® Appliances was again run in collaboration with other regional utilities to promote the purchase of high efficiency household appliances, including kitchen appliances, and electronics. These appliances carry an ENERGY STAR® label. The program also offered refrigerator recycling, which helped address a significant barrier to purchasing a more efficient refrigerator, while removing non-efficient units from the market, recycling their components, and capturing and properly disposing of refrigerants.

Delivery:

As was the case with ENERGY STAR® Lighting, ENERGY STAR® Appliances was primarily a retail-store based initiative. And as was the case with ENERGY STAR® Lighting, retail outlet employees were not counted for this study since the sale of these products had no discernible incremental effect on store employment (i.e. it primarily resulted in different appliance choices by consumers). Again, as with ENERGY STAR® Lighting, the program was supported by The Cadmus Group and their sub-contractors for marketing and increasing consumer awareness, using a range of media and direct outreach strategies; and Lockheed Martin Services engaged major retail outlets, providing the same support as for ENERGY STAR® Lighting.

National Grid and the other regional utilities contracted with JACO Environmental to recycle refrigerators as part of the holistic strategy to encourage the purchase of energy efficient refrigerators. JACO has a regional facility in Franklin, Massachusetts for refrigerator collection, dismemberment, and recycling. JACO employed a local program manager to service the regional program, staffed a large warehouse in Franklin, and had staff dedicated to New England utility customers at its call center in Washington State. JACO employed Appliance Distribution, Inc. as a sub-contractor to pick up discarded refrigerators from customers, using two-person crews to bring them to the Franklin warehouse. In 2014, 7,091 Rhode Island refrigerators and freezers were collected (vs. 6,074 in 2013)[8], according to JACO, and an estimated 95% of components of collected appliances were recycled.

ENERGY STAR® HVAC (gas and electric)

The High-Efficiency HVAC programs (*Gas Heat* [heating] and *CoolSmart* [cooling]) promoted the installation of high efficiency gas heating and electric cooling systems via tiered rebate levels for more efficient technologies including ductless mini-splits, heat pumps, heat pump water heaters, boilers, furnaces, Wi-Fi thermostats, boiler reset controls, and furnaces equipped with high efficiency fans. The program provided in-depth contractor training for design, installation, and testing of high efficiency systems. Furthermore, the program provided quality installation verification training, ensuring that all equipment is properly sized, installed, sealed, and performing.

Delivery:

National Grid hired Westborough, Massachusetts-based Conservation Services Group (CSG) to deliver this Program, which included three related initiatives: *Cool Smart*, the *Rhode Island Gas Heat Program*, and *Commercial Upstream Cooling*. Both *Cool Smart* and *Rhode Island Gas Heat*

[8] Source: Peregrine interview with JACO

Program focused on contractors, with Conservation Services Group providing training, technical support, and marketing assistance to help encourage customers to upgrade to higher efficiency systems. *Cool Smart* also provided quality control inspections. 1,495 Cool Smart rebates[9] were approved in 2014 (vs. 1,476 in 2013). For *Commercial Upstream Cooling*, a circuit rider was used to provide field support.

Lockheed Martin Services was also involved in this program, promoting advanced thermostats and energy efficient water heaters to big box home improvement retailers.

In evaluating FTEs associated with the program, Peregrine counted the employees of vendors under direct contract to National Grid, but did not include labor associated with installation of this equipment, since it did not increase incrementally as a result of the Program.

Income Eligible Residential Programs

Income Eligible (low-income) programs were offered to National Grid customers in single family (1-4 unit) dwellings and multifamily (5 or more unit) buildings or developments that were eligible for the Low Income Heating Assistance Program (LIHEAP). Because this target audience was already being provided with some energy related assistance already through federal and state programs, National Grid's strategy was to piggyback on and complement and support these existing programs.

In 2014, incentives issued by National Grid for measures installed for income eligible residential customers increased significantly when compared to 2013, reflecting increased participation. These increases in spending and installations also resulted in increases in jobs associated with program and service delivery.

Specific 2014 Income Eligible Residential Programs, included:

Income Eligible Single Family (gas and electric)

The Income Eligible Single Family program provided low-income customers with home energy assessments, installation of energy efficient lighting, appliances, heating systems, domestic hot water equipment, and weatherization measures.

Delivery:

Income Eligible Single Family was delivered through local Community Action Program (CAP)

[9] Source: Peregrine interview with Conservation Services Group

agencies under contract to the Rhode Island Department of Human Services (DHS) to deliver federally funded Weatherization Assistance Program (WAP) and the Low Income Heating Assistance Program (LIHEAP). All seven Rhode Island CAP agencies participated in and delivered Single Family Income Eligible Services. They provided three types of building audits: audits focused on lighting and appliances only that installed lighting products, audits providing detailed recommendations and work orders for insulation contractors, heating system installers, and fans; and comprehensive audits that did both. BPI-certified auditors completed building assessments and work orders. Special AMP (appliance management program) auditors installed lights and refrigerator measures.

Independent weatherization contractors installed the insulation and completed air sealing for the CAP agencies. These contractors were selected off a state-approved list and offered fixed pricing statewide for installed measures. Each agency had three to five insulation contractors it typically worked with. The CAP auditing staff inspected completed insulation work post-installation to ensure it was properly installed. Heating system upgrades were put out to bid to heating contractors, and heating contractors also were used for post-installation inspections.

In July 2013, CLEAResult, with offices in Providence, Rhode Island, became the manager of the Income Eligible Residential program and continued in that role in 2014. CLEAResult has been responsible for training, quality control, and oversight of National Grid-funded services and installations delivered through CAP agencies. CLEAResult also served as the conduit for National Grid payments to the CAP agencies, and they worked closely with the Rhode Island DHS staff to coordinate delivery of National Grid-funded services and traditional Weatherization Assistance. CLEAResult staffing included a program manager, an installation quality assurance / quality control inspector, and administrative support.

ACTION, Inc., based in Massachusetts, was hired to manage the refrigerator replacement service provided to income eligible residential customers. This included product procurement, ordering, delivery, removal and disposing of old appliances, and conducting quality assurance surveys.

Income Eligible Multifamily (gas and electric)

In 2013, the Company consolidated energy efficiency offerings for income eligible multifamily properties with five or more units into the Income Eligible Multifamily program, which continued in 2014. This suite of programs addressed both gas and electric opportunities, which were previously offered as part of EnergyWise or Large Commercial Retrofit. Comprehensive energy services available to these customers included energy assessments, incentives for heating and domestic hot water systems, cooling equipment, lighting and appliances. Services are coordinated with delivery of the EnergyWise Multifamily program, but tracked separately. Additionally, the Residential New Construction program worked with Rhode Island Housing, local housing authorities, and developers of income-eligible housing to encourage construction of energy efficient properties.

Delivery:

As was the case with EnergyWise Multifamily, RISE Engineering, based in Cranston, Rhode Island, has been the primary point-of-contact to coordinate Income Eligible Multifamily services. RISE staff serve as project managers for retrofit projects, meeting with building facility managers, making presentations to condominium boards and owners, and writing work orders and scopes of work (e.g. for air sealing, attic insulation, lighting fixtures, and even replacement refrigerators from retailers for low-income residents. Independent contractors installed weatherization materials (insulation and air sealing) and heating equipment components.

Commercial and Industrial Programs

In 2014, National Grid's Commercial and Industrial (C&I) programs employed a range of delivery mechanisms, described below, to achieve National Grid energy efficiency goals in new building construction and building retrofits for large and small businesses. C&I budgets also supported energy efficiency in municipal facilities.

Small Business Direct Install (electric)

The Small Business Direct Install program provided direct installation of prescriptive and custom energy efficient lighting, non-lighting retrofit measures, and minor gas efficiency measures. Electric customers with average monthly demand of less than 200 kW were eligible to participate. The customer share of the cost was 30% of the total cost of a retrofit, with the remaining 70% as On Bill Repayment (OBR). The customer could choose to spread its share over a two-year period interest free and be billed monthly for the amortized OBR amount.

The Direct Install program also included the SBS Coolers sub-program, which provided refrigeration controls and other refrigeration improvements to eligible customers. These measures included fan controls, cooler and freezer door heaters, smart defrost technology, EC motors, night shut off controls for novelty coolers, and LED lighting for refrigerator applications.

Delivery:

The Direct Install program's lighting and non-refrigeration measures were delivered by RISE Engineering of Cranston, Rhode Island and sourced from one product vendor (Rexel, formerly Monro Distributing). Both RISE and Rexel were selected through a competitive bidding process.

RISE had a contract to provide turnkey installation services to this sub-market, with a formal budget and annual goals. Approximately 1,050 customers participated in 2014,[10] around five

[10] Source: RISE Engineering

percent more than in 2013. RISE staff included employees responsible for marketing and lead generation and staffing an intake center that was responsible for pre-qualifying potential customers. RISE energy specialists performed field audits of customers' facilities, and data entry staff used completed audits to generate proposals for customers. Audits also resulted in referrals to the Commercial and Industrial Gas Program, described below. RISE also employed Energy Source, LLC, based in Providence, Rhode Island, to assist with lead generation. When a customer accepted a proposal, RISE project managers took over, ensuring that sufficient product was available, issuing that product to installer/electricians, and ultimately closing out the work when the installation was completed. RISE maintained a warehouse for material distribution with warehouse managers and materials handlers. Electricians were a combination of RISE employees and sub-contractor, Superior Electric, employees. RISE also employed back office and accounting staff to service this program. In general, RISE employees supporting this program were salaried or hourly, while subcontractors were paid for installation work on a piece basis. Customers could also elect to use their own preferred electrician through a "Customer Directed Option", and 87 customers took advantage of this option, working with 11 separate firms[11]. RISE also used two HVAC firms as controls subcontractors.

National Resource Management (NRM), based in Canton, Massachusetts, delivered the SBS Coolers sub-program, which focused on controls and equipment upgrades for commercial refrigeration. NRM staff included administration and support personnel (some with technical specialties), sales representatives, and equipment installers. Sales staff worked out of their homes in Rhode Island.

Veolia ES Technical Solutions LLC, based in West Bridgewater, Massachusetts, was responsible in 2014 for recycling fluorescent lamps and ballasts that were removed and replaced under the Rhode Island Small Business Direct Install program and other National Grid programs. Material to be recycled was packed by installers in packaging provided by Veolia. Each week, Veolia sent a truck to pick up package materials and brought them to the West Bridgewater facility where they were broken down for recycling or appropriate disposal of component parts. The same facility also recycled lamps and ballasts from all other National Grid programs in New England and New York, as well similar material generated by other New England utilities' energy efficiency programs.

National Grid also hired Competitive Resources to provide quality assurance inspections of small business projects. A total of 266 small business inspections were completed in 2014[12].

[11] Source: RISE Engineering

[12] Source: Interview with Competitive Resources

Large Commercial Retrofit (electric)

Large Commercial Retrofit was a comprehensive retrofit program designed to promote the installation of prescriptive and custom configurations of energy efficient electric equipment such as lighting, motors, and heating, ventilation and air conditioning (HVAC) systems in existing buildings. All commercial, industrial, and institutional customers were eligible to participate. Participating customers tended to be larger (i.e. having a monthly demand of 200 KW or more) or were pursuing electricity saving measures that were not offered through the Direct Install program ("custom measures"). National Grid offered technical assistance to customers to help them identify cost-effective conservation opportunities and paid incentives to assist with defraying part of the material and labor costs associated with installing energy efficient equipment. Incentives available through this program were generally less generous than through the Direct Install program described above, with customers paying a larger percentage of the installed cost of measures.

Delivery:

The Large Commercial Retrofit program was primarily a market-based initiative with no formal program administrator or designated suppliers. Customers chose their own suppliers and installation vendors. National Grid offered technical assistance to customers to help them identify cost-effective conservation opportunities, and paid rebates to assist in defraying part of the material and labor costs associated with the energy efficient equipment.

While there was no lead vendor for the program, National Grid-approved project expeditors pursued, secured, and installed the majority of the lighting projects completed under this program. A number of these expeditors, notably Energy Source and RISE Engineering, engaged dedicated sales / project management staff, and aggressively pursued potential customers. Energy Source reported that 98 percent of company revenues were associated with Large Commercial Retrofits and that business volume was 51 percent higher in 2014 than 2013. Energy Source employed 10 sales and project management staff in 2014, with all field labor subbed out to licensed electrical contractors receiving unit-based fees for installations.

Customers that wanted to replace equipment with more energy efficient technology also initiated some of the Large Commercial Retrofit projects themselves. The largest such project in 2014 was a 12.5 MW combined heat and power installation by Toray Plastics America, Inc. in North Kingston, Rhode Island, developed as a custom measure under the program. These "custom" applications for projects required modeling and special analysis to determine the electricity savings that would result and what level of incentive was justified.

Other vendors of products and services used the program as a means to induce customers to upgrade existing systems to improve energy efficiency or purchase and install qualifying energy efficient equipment. These vendors included general energy contractors and energy services

companies, as well as purveyors of energy saving technologies, such as energy management systems, advanced lighting systems, process equipment, HVAC components, etc.

In support of this program, National Grid contracted with consulting engineers who could be assigned at the request of an account manager to assist a customer with identifying potential custom projects and evaluate or model the energy savings that would result, including completing required program applications. Some of these consultants brought expertise in such specialties as data center energy efficiency improvement or laboratories and clean room technology. In other situations, the customer could propose his own engineer with a scope of work that National Grid might elect to support. Additional like support was available from contracted consulting engineers to witness project commissioning, confirm that the installed measures were operating and performing as anticipated, and ensure that predicted savings would be achieved. Competitive Resources Inc. completed an additional 143 inspections of large commercial retrofit installations[13].

In a similar vein, National Grid contracted with CLEAResult, the new parent company of Portland, Oregon-based PECI, through its Massachusetts office, to offer the Energy Smart Grocer sub-program. Working in 60 kW or larger supermarkets, generally part of larger supermarket chains, CLEAResult focused on refrigeration improvement and some lighting. CLEAResult employed auditors and other technical staff to identify and develop refrigeration improvement projects, engage contractors to complete upgrades, provide technical support as needed, and perform quality assurance inspections of installations. In total, 73 projects were completed in 2014, up from 69 projects completed in 2013[14]. Customers selected their own contractors to complete work recommended by the program.

National Grid also provided a Commercial and Industrial Upstream Lighting program in Rhode Island to encourage customers to choose higher efficiency lighting products at the point of purchase. As with New Construction efforts described below, the goal of this program is to bring the incremental cost of the more efficient products in line with now-conventional products so customers opt for high efficiency and another lost opportunity can be avoided. The Upstream Lighting program was offered through numbers of distributors of lighting products. No incremental job increases were assumed for lighting distributors as lighting would most likely have been purchased anyway. However, the labor associated with a portion of these high performance fluorescent lamps purchased and installed was counted because it was assumed that the T8s and most other fluorescents purchased through Upstream Lighting were replacing existing lamps before burnout.

[13] Source: Competitive Resources, Inc.

[14] Source: Peregrine interview with CLEAResult

National Grid hired ECOVA to manage, support, and promote Upstream Lighting. ECOVA engaged manufacturers and calling on distributors. They offered incentives from National Grid to reduce list prices of certain energy efficient products to electrical contractors and businesses, with the goal of transitioning and transforming stocking behavior. ECOVA processed incentives and managed a quality assurance process to ensure that recorded sales were legitimate. National Grid contracted with Competitive Resources to conduct 148 inspections to confirm that the purchased product had been installed[15].

Large Commercial New Construction (electric)

The Large Commercial New Construction program encouraged energy efficient design and construction practices in new and renovated commercial, industrial, and institutional buildings. The program also promoted the installation of high efficiency equipment in existing facilities during building remodeling and at the time of equipment failure and replacement. The program offered incentives to eliminate or significantly reduce the incremental cost of high efficiency equipment over standard efficiency equipment and provided technical support to assist customers to identify opportunities for incremental efficiency improvement in eligible buildings.

Delivery:

The New Construction program is administered internally by National Grid and provides both technical and design assistance to help customers identify efficiency opportunities in their new building designs and to help them refine their designs to pursue these opportunities. Outside consultants are brought in to assist customers to identify and incorporate energy efficiency solutions into new construction designs and to complete detailed studies that model and quantify energy savings. Commissioning or quality assurance is also offered to ensure that the equipment and systems operate as intended. One such technical consultant, SMMA, worked on an Advanced Buildings initiative targeting non-profits, schools, or municipal buildings between 20,000 and 50,000 square feet in area. In collaboration with National Grid's strategy team, SMMA helped identify and provided outreach to potential customers and reviewed and critiqued proposed construction projects to help optimize long-term energy performance. For purposes of this study, as is the case with Residential New Construction, construction jobs associated with commercial new construction are not being counted. Construction-related employment does not measurably increase in these projects as a result of National Grid's involvement.

[15] Source: Competitive Resources, Inc.

Commercial and Industrial Gas Programs

Commercial and Industrial Gas programs supported installation of energy efficient gas heating and water heating systems, certain thermal envelope measures, and custom gas systems in existing buildings and in new construction. The program guidelines for measure eligibility were the same as for the Large Commercial Retrofit program and the New Construction program. Retrofit measures must demonstrate that they will result in added efficiency beyond existing still functional equipment. For new construction or with failed equipment, the "lost opportunity" rules apply. New equipment, to be eligible for incremental incentives, must exceed the efficiency of what codes require. All commercial, industrial, and institutional customers were eligible to participate.

The Commercial and Industrial Gas programs also offered technical assistance to customers to help them identify cost-effective conservation opportunities and paid incentives to assist in defraying part of the material and labor costs associated with the energy efficient equipment.

Delivery:

RISE Engineering also served as National Grid's Regional Program Administrator for gas programs. RISE employees working on this project included a program manager and project coordinator, mechanical and electrical engineers, field staff performing audits and minor installations, and administrative personnel and support staff. RISE Engineering's Program Manager described RISE's role in the program as "the gears that keep moving applications forward." In 2014, a total of 200 Large Commercial and Industrial projects were completed and closed out,[16] a slight increase over 2013.

RISE received leads from a variety of sources, including project expeditors, mechanical contractors, and suppliers of equipment such as steam traps. RISE would then generate a Program application and as necessary or appropriate, review the customer proposal or undertake a scoping study. If the project proposed was acceptable (i.e. met National Grid's standards), RISE issued an offer letter to the customer authorizing the project to proceed. Customers had responsibility for arranging for and completing the installation. RISE performed a post-installation inspection and closed out the application so that the rebate could be issued.

[16] Source: RISE Engineering

Employment Impacts of National Grid Programs

Peregrine found that an estimated 639.4 full-time equivalent jobs or "FTEs"[17] resulted from National Grid's Rhode Island energy efficiency programs in 2014. The table on the following page summarizes the job impacts of the 2014 electric and gas energy efficiency programs, by program and by program sector.

In the table, Program Support Service Provider FTEs have been allocated and integrated into individual program FTE counts and program sector FTE counts based on spend. These are added to the Direct Service Provider count for each program. Smaller programs with limited FTE counts, including pilots and community initiatives were combined into the category titled "other". Community Action weatherization assistance program staff and National Grid staff are counted in the 639.4 total, but presented separately in the table.

While it was not possible to develop head counts of the individual workers participating, Peregrine determined, based on interviews with companies directly involved in the implementation of National Grid's energy efficiency programs and though our analysis of field delivery, that the number of individual workers employed as result of Rhode Island energy efficiency programs is far larger than the total of FTEs. As described in the Energy Efficiency Program Delivery section, many companies told Peregrine that they employed multiple individuals with specialized skills or in discrete roles for only a portion of their annual hours.

For example, National Grid calculated that it had 38.9 FTE employees who worked on Rhode Island energy efficiency programs in 2014. This total is comprised of employees dedicated to Rhode Island, and also included numbers of National Grid employees with system-wide or other state responsibilities who contribute fractionally to the FTE total.

For some program service providers, whose business focus is supporting utility initiatives and providing utility program services, the number of FTEs and the number of staff contributing to those counts may be almost the same. For example, RISE Engineering was the lead vendor for many of the largest programs offered in Rhode Island by National Grid, including EnergyWise Single Family and Multifamily, Small Business Direct Install, and the Commercial and Industrial Gas programs. The larger size of these programs enabled RISE to employ full-time staff to serve in specific program roles, such as auditors and inspectors. Also, similarities between staffing needs across multiple programs, e.g. engineering, materials handling, or accounting, allowed RISE to pool staff to provide higher levels of utilization and

[17] Peregrine and National Grid have defined a FTE as 1,760 annual hours of employment (or 220 total days of employment per FTE).

2014 Full Time Equivalents by Program

PROGRAMS	2014 SPEND	TOTAL FTES
ELECTRIC PROGRAMS		
COMMERCIAL & INDUSTRIAL (C&I) TOTAL		**206.8**
Large Commercial New Construction	$8,949,711	1.2
Large Commercial Retrofit	$24,863,591	144.6
Small Business Direct Install	$9.941,271	56.3
Other	$305,808	4.7
LOW-INCOME RESIDENTIAL TOTAL		**38.5**
Single family Income Eligible Services	$7,408,345	30.6
Income Eligible Multifamily	$2,260,790	6.9
RESIDENTIAL TOTAL		**108.4**
Energy Wise	$8,699,362	72
EnergyStar Appliances	$2,249,807	10.8
EnergyWise Multifamily	$2,670,109	5
Home Energy Reports - Residential	$2,516,334	12.5
Residential New Construction	$1,110,088	2.9
Energy Star HVAC	$1,589,084	0.3
Energy Star Lighting	$5,411,133	2.3
Other	$890,889	2.6
NATURAL GAS PROGRAMS		
COMMERCIAL & INDUSTRIAL (C&I) TOTAL		**20.5**
Large Commercial New Construction	$1,347,986	2.8
Small Business Direct Install - Gas	$142,739	0.5
Large Commercial Retrofit	$3,358,502	15.7
Commercial & Industrial Multifamily	$330,801	1
Other	$289,585	0.5
LOW-INCOME RESIDENTIAL TOTAL		**26.2**
Single family Income Eligible Services	$2,763,747	21.9
Income Eligible Multifamily	$1,514,515	4.3
RESIDENTIAL TOTAL		**166.2**
Energy Star HVAC	$2,561,512	0.6
Energy Wise	$5,416,512	159.2
EnergyWise Multifamily	$1,257,509	3.2
Home Energy Reports - Residential	$269,098	1.3
Residential New Construction	$292,060	0.8
Other	$71,851	1.1
COMMUNITY ACTION WEATHERIZATION STAFF		**32.5**
NATIONAL GRID STAFF		**38.9**
GRAND TOTAL		**639.4**

improved staffing economies. Further, similarities in technical needs between programs, e.g. for electricians, allowed RISE to employ a baseline number of full-time technical specialists, but then supplemented them on an as needed basis with sub-contracted assistance. On the other hand, as business opportunities in neighboring states have emerged, RISE has been able to shift specialized staff back and forth between states as demand for services dictates, further increasing the efficiency of staff utilization and improving labor economics.

As the table shows, the number of FTEs attributable to different programs was not necessarily proportionate to the relative size of program spending. For example, the Large Commercial Retrofit program included a significant installer labor component because the program replaces fully functional equipment. On the other hand, point-of-purchase programs like Upstream Lighting use incentives to change buyer choices and supplier behaviors, but assume that lighting would have been changed out regardless, thereby not increasing labor significantly. Likewise, both residential and commercial New Construction programs impact the choice of materials, equipment, and construction techniques, but do not significantly increase amount of labor and time needed to construct the building.

Another factor influencing the number of FTEs associated with program spend was whether the energy efficiency measures installed, on a per dollar spent basis, were more labor intensive or equipment intensive. For example, weatherization materials (e.g., cellulose insulation, caulking, foam) to improve thermal performance and reduce air leakage in residential buildings (i.e. for installed insulation and air sealing) are simple and inexpensive. Most of the cost associated with weatherization is labor during the installation process. Other energy efficiency measures such as energy management controls systems, chiller and boiler replacement, or major HVAC upgrades deploy sophisticated, factory-manufactured equipment where the equipment is perhaps the greatest portion of the measure cost. While these measures often require design engineering as well as field labor to install, the considerable manufacturing labor hours is not represented in program FTE counts, so the FTEs per dollar spent is lower.

However, a large project can create numerous FTEs, even if its cost is predominantly hardware. For example, the 12.5 MW combined heat and power plant installed at Toray Plastics America, Inc. in North Kingston, Rhode Island had a ratio of equipment expense to labor expense of 1.75:1. Even with such a large portion of the costs coming from manufactured components, almost 42 FTE jobs resulted. The project had labor expenses, equal to about 65,000 construction person-hours and Toray spent an estimated $1 million for project engineering labor, equal to 8,330 hours, from project design through final commissioning[18].

[18] Source: Toray Plastics America, Inc.

A countermanding force in terms of job impacts was the desire of all parties involved (regulators, National Grid, installers, and even customers) to improve the cost-effectiveness of energy saved for each dollar spent. National Grid used a competitive bidding process where practical to secure materials and labor vendors, requiring would-be contractors to devise strategies to tighten their belts and budget their workforce cost effectively. Further, contractors were paid on a fixed fee or a performance basis, encouraging them to keep their costs down, not only to be more competitive, but also to maximize margins. Then, once a vendor was selected to deliver a program or perform an installation, unless compensated on an hourly basis, the vendor looked for ways to maximize worker productivity. Perhaps the best example of this phenomenon is commercial lighting retrofits, where electrical contractors are paid by National Grid per unit installed, but pay their electricians on an hourly basis. The net result is that electrical contractors have developed strategies for deploying teams of qualified electricians (including master electricians, journeyman electricians, and apprentices) that enables them to retrofit or replace lighting in ever decreasing amounts of time, resulting in less labor required overall for each dollar spend to achieve kWh reduction goals.

The last observation, generated as much from interviews with service providers as from the FTE counts, is about economies of scale and the impact it has on service delivery and job impacts in a smaller state like Rhode Island. National Grid continues to provide nearly the same programs in Rhode Island that it provides in Massachusetts to a much larger customer base. National Grid's ability to offer programs in Rhode Island as part of regional collaborations with other utilities or across multiple states greatly increases the cost effectiveness of Rhode Island programs, but reduces the number of FTEs that would otherwise be needed to provide them.

One example of this scenario is found in the implementation of the Residential New Construction program. The program is administered by Conservation Services Group (CSG), which is the lead vendor for this program and has Rhode Island-based staff that provides field services. However, CSG staff administering this program for Rhode Island also has the same responsibilities in Massachusetts. These three full-time administrative staff persons only charge 10 percent of their time to the Rhode Island program, bringing the full benefits and expertise of program management without the cost of full time managers. A number of contractors told Peregrine that they would not have been able to offer services of the same quality and at an acceptable price if they were not also under contract to provide similar services elsewhere in the region.

Comparing 2013 and 2014 FTEs

Peregrine found that an estimated 639.4 full-time equivalent jobs or "FTEs"[19] resulted from National Grid's Rhode Island energy efficiency programs in 2014, compared to 544.7 FTE jobs in 2013, a 17 percent increase. Total energy efficiency program spending by National Grid in Rhode Island rose to $101,312,039 in 2014 from $80,297,958 in 2013. The larger spend corresponded with increased energy savings over 2013. Electric savings increased from 2.1% to 3.6% of 2009 sales, while gas savings increased from 0.86% to 1.1% of 2009 sales. National Grid's programs and delivery strategies were not substantively different in these years. The additional job impacts reflect expanded customer participation in National Grid programs and increased demand for the energy efficiency services National Grid promoted and provided. Specifically, this resulted in increased incentive expenditures in Single Family EnergyWise, Income Eligible Programs (gas and electric), and the Large Commercial Retrofit Program (electric).

FTE Job Impacts by Program, 2014 and 2013

	2014 FTEs	2013 FTEs
Electric Programs		
Residential Non-Income Eligible	**108.8**	**98.9**
Residential Income Eligible	**38.6**	**23.3**
Commercial and Industrial	**207.4**	**160.2**
Gas Programs		
Residential Non-Income Eligible	**166.3**	**150.8**
Residential Income Eligible	**26.2**	**18.5**
Commercial and Industrial	**20.5**	**23.8**
Community Action Agency Staff	**32.5**	**30.7**
National Grid Staff	**38.9**	**38.5**
TOTAL RHODE ISLAND FTE JOBS	**639.4**	**544.7**

[19] Peregrine and National Grid have defined a FTE as 1,760 annual hours of employment (or 220 total days of employment per FTE).

Comparing FTEs generated in 2014 with those in 2013 results in several notable observations:

EnergyWise Single Family (electric and gas): FTEs associated with the EnergyWise Single Family program increased 11 percent over 2013. The FTE counts include RISE staff and subcontractors, independent weatherization and heating contractors, and post-installation inspectors employed by Competitive Resources, Inc. National Grid connects these increases to growing concerns over rising energy costs. The number of home energy audits provided through RISE increased by seven percent, with a commensurate increase in on-site installations and work orders written. Weatherization projects completed (insulation and air sealing) increased by 28 percent, and heating system installations also increased as motivated customers elected to move forward with home improvements that would reduce energy costs.

Income Eligible Single Family (electric and gas): FTEs associated with installation of weatherization measures and heating systems increased by nearly 22 FTEs in 2014 or by over 50 percent, compared to 2013. This increase reflects a large increase in the number of installations of heating systems and insulation and air sealing. This increase is consistent with the approximate 50% increase in incentives paid to customers as reported by National Grid.

Large Commercial Retrofit (electric): FTEs associated with the Large Commercial Retrofit program increased by over 25% in 2014, compared to 2013. A big driver in this increase was the estimated 65,000 hours in construction labor and $1,000,000 in engineering services associated with Toray Plastic America's 12.5 MW combined heat and power project in North Kingston, Rhode Island. This project alone resulted in 42 FTEs.

Large Commercial Retrofit (gas): On the other hand, there was a modest decline in FTE jobs associated with the Large Commercial Retrofit program for natural gas customers, even though the total spending increased for this program. This reflects changes in the installed measure mix in 2014 and 2013 and the varying job impacts that installation of different measures creates.

Attachment A: Methodologies used for Assessing Employment

Program Support Service Providers

National Grid

National Grid provided to Peregrine a summary of FTE counts of its employees engaged in Rhode Island energy efficiency programs. Responsibilities identified for these employees included program planning and development, program administration, regulatory affairs, marketing, evaluation, and market research. Peregrine is reporting National Grid FTEs as a separate category for purposes of this study and not allocating them to specific programs or groups of programs.

Support Services Contractors

Peregrine interviewed most of the larger contractors who supported National Grid in these activities, and they described their roles and responsibilities and provided FTE counts. Often, these FTEs represented the aggregation of small numbers of hours by many employees. This was either because the contractor's role was limited in duration and/or required contributions from a multi-disciplinary team. Depending on the nature of the services they provided and whether the support provided could be associated with specific programs, contractor time is assigned to programs according to the overall allocation of gas and electric spend by program sector (Residential, Residential Income Eligible, Commercial and Industrial), or allocated to a specific program sector.

Direct Service Providers

As noted above, interviews of primary contractors engaged by National Grid to support Rhode Island programs was a major source of information about type and number of personnel involved. Jobs counts reported by interviewed Direct Service Providers was supplemented with calculated FTE job numbers. These calculated FTE job numbers for individual programs were built using counts of installed energy conservation measures (ECMs) in 2014 that were either provided to Peregrine by National Grid or secured from other knowledgeable sources (e.g. Rhode Island Department of Human Services). The FTEs were then calculated by multiplying the average time required (in person-hours or person-days) for each installation by the number of installations and converting the result to FTEs based on an assumed 1,760 work hours per year or 220 work days per year. Where actual installer hours of work was tracked and provided to Peregrine, those actual hours or days of work were used instead of calculated FTEs.

Residential Programs

EnergyWise Residential Program

For the EnergyWise Residential program, Peregrine spoke with RISE Engineering's program manager who provided an overview of how the program functions and counts of RISE employees in various roles. RISE provided FTE counts for these staff based on payroll tracking. RISE was also helpful in sharing some general rules of thumb for how weatherization contractor crews and heating contractors perform site work. These numbers were borne out by direct interviews with a sample of the insulation installation companies and interviews with community action program supervisors with similar responsibilities for low-income residential services.

Peregrine learned that it takes a crew made up of three insulation contractors an average of two days to complete a weatherization job (insulation and air sealing). National Grid provided counts of numbers of insulation jobs completed by each participating insulation contractors. We used the total counts of insulation jobs and the average number of man-days required for each installation to estimate the total number of FTEs (again, assuming work 220 days per person per year) providing insulation services in 1-4 unit buildings. We then allocated this total number of FTEs to gas and electric programs.

For heating system installations, we learned that it requires a two-person team four days on average to remove and replace a heating system. Peregrine secured counts of high efficiency heating systems and related equipment installed in 2014 from Blackhawk Engagement Solutions, formerly Parago, which processes the incentives paid out for these installations. Since Peregrine had differentiated counts for replacements furnaces and boilers, Peregrine assigned less installation time to replacement furnaces (due to less piping work) and adjusted time estimates accordingly. Replacement residential gas equipment was allocated to the gas program and replacement residential oil or propane heating equipment was treated as an expense of the electric program. Average number of hours required for an installation was multiplied by the total number of items installed. The total number of calculated hours was then divided by 1,760 hours to convert it to FTEs, and the FTEs were marked up by 20% to account for a contractor's support and management staff.

EnergyWise Multifamily Program

As with the EnergyWise Residential Program, Peregrine interviewed RISE's program manager and was provided with staffing counts. In addition to general program supervision, responsibilities included technical leadership, auditing, field coordination and inspections, and electrical installation work. Again, RISE was able to convert staff counts to FTEs associated with this particular program. As was the case with the EnergyWise Residential program, Peregrine relied on installation counts from National Grid to determine numbers of individual measures

that had been installed by independent insulation contractors and heating contractors in these buildings. And was the case for contractors installing ECMs in 1 to 4 unit buildings, these counts were multiplied by average times for installations in hours or portions or hours, and the resulting total hour counts were divided by 1,760 hours per FTE to arrive at annual FTE counts.

Residential New Construction
Residential Home Energy Report Program
Residential Community Based Initiatives
ENERGY STAR® HVAC Program

The residential programs in this grouping were all funded in 2014 by both residential gas and electric year-end spend. For each of these programs, there was no significant incremental labor impact associated with product installed or purchased because the program did not so much affect whether product was installed as which product was installed. Peregrine generated FTE counts through interviews with individual businesses that provided support services (e.g. marketing assistance, informational mailings, technical assistance and training, quality assurance inspections). These businesses provided staffing counts for 2014 from their accounting records. Total FTEs were then allocated to gas or electric based on the ratio of spending in each residential gas and electric program.

ENERGY STAR® Lighting
ENERGY STAR® Products

Both of these programs were funded solely through the residential electric budget. For both programs, there was no significant incremental labor impact associated with amount of product installed or purchased. Further, retailers' staff engaged at the point-of-sale were not counted as incremental FTEs. Peregrine generated FTE counts through interviews with individual businesses that supplied support services (e.g. marketing assistance, refrigerator recycling). These businesses provided staffing counts for 2014 from their accounting records. Total FTEs were then allocated to the residential electric spend.

Low Income Residential Programs

Income Eligible Residential

FTE counts for this program for 2014 include program management staff by the program vendor CLEAResult, Community Action Program (CAP) agency staff counts, and calculated labor required to complete installations. CLEAResult staff FTEs came from direct interviews. Total CAP agency staffing was developed from discussions with Rhode Island Department of Human Services, which provided Peregrine with counts of staff in different roles by CAP agency. Both National Grid and Department of Human Services provided the counts of weatherization and heating system installations completed in 2014. CAP agencies provided guidance on contractor crew

sizes and installation practices that Peregrine used to calculate the numbers of FTE installers who performed this work.

Income Eligible Multifamily

Peregrine used the same approach to calculating FTEs for the Income Eligible Multifamily program as for the EnergyWise Multifamily program since both programs were administered by RISE Engineering and used the same delivery strategy.

Commercial and Industrial Programs

Small Business Direct Install Program

Peregrine used counts of employees provided by RISE Engineering, the regional program administrator, to generate FTEs for RISE staff involved in program management and measure installations and for their sub-contractors as well. No actual measure counts and calculated FTEs were used to compile job counts attributable to this program, as all workers were accounted for without a piecework analysis.

CLEAResult provided staff counts for the Smart Grocer sub-program. National Resource Management (NRM) tallied total hours of individual support staff by responsibility, as well as provided FTE counts of installers it employed.

Similarly, Veolia provided staffing numbers for lamp and ballast recycling services.

Large Commercial Retrofit Program (electric)

As described in the section on energy program delivery, the Large Commercial Retrofit program was the most market-based of all electric programs provided. There was no program manager under contract to facilitate or organize installation work. Customers initiated projects, as did businesses that had products or services they were trying to sell.

Peregrine used National Grid's descriptions and counts of technical assistance and installations performed during 2014 to calculate workforce impacts. They only exception to this approach was counts Peregrine secured from interviews with Project Expeditors regarding sales and project management staff they were employing to secure and oversee projects.

National Grid provided engineering services to customers through retained contractors, in particular where "custom" energy efficiency solutions required technical support to determine what could be done, what should be done, what energy savings would result, and what incentive levels were appropriate. To calculate the FTEs associated with technical assistance support provided by engineers under contract to National Grid, Peregrine took the total dollars

paid out for this work and calculated how many hours of labor it represented at an assumed $120 per hour. Total hours were then converted to FTEs.

Installation work performed was treated in a number of ways, depending on how much information was available to Peregrine in the data sets supplied by National Grid. For Upstream Lighting, National Grid provided counts of product sold, which Peregrine converted to installation hours using per unit labor requirements. Large Commercial Retrofit projects that were identified as part of a specific technology group (e.g. lighting, motors) and that had counts of products installed were the easiest to develop FTE estimates for. In other cases, particularly "custom" projects where installation numbers might be missing or no separate labor cost component of projects is identified to National Grid for these projects, Peregrine extrapolated labor required from total cost.

Peregrine used the average installation times provided to us by installation vendors to estimate workforce requirements and number of hours or days (for more labor intensive projects) per installation and converted this to FTEs. In doing these calculations, Peregrine did not concern itself about whether the contractor of record for the job was a customer, a general contractor, or an installation contractor. We assumed that installation contractors who were motivated to work as efficiently as possible were doing the installation work.

For larger, more complex custom projects, the energy efficiency project component of the total cost may only be a portion of the total project cost identified in the National Grid database so Peregrine used incentive levels paid out to tease out the total efficiency project cost. This required comparing incentives paid for simple projects and the complex custom projects covered by the program to determine the efficiency project size. Once the size of the efficiency project was determined, we could apply assumptions about the ratios of labor cost to material cost for different technologies and calculate the type and number of labor hours this represented, aggregate the total hours, and convert them to FTEs.

Finally, for the largest single custom project in 2014, the 12.5 MW combined heat and power plant installed by Toray Plastics America, Inc. in North Kingston, Peregrine developed FTE counts using data on total construction hours and total engineering spend for the project.

Commercial and Industrial Gas Programs

The Commercial and Industrial Gas programs were managed for National Grid by RISE Engineering, and Peregrine interviewed RISE to secure counts of RISE employees and FTEs. A variety of contractors installed energy efficiency measures installed. Peregrine used measure counts that National Grid provided to calculated how many FTEs of labor they represented, applying average installation times provided to us by installation vendors, determining how many hours or days were required in aggregate, and converting these hours or days to full-time equivalent jobs.

Attachment B: Interview Guide

National Grid 2014 RI Labor Study
Organization Interviews

National Grid Program:

Supplier company/organization:

Interviewee/Position/Contact info:

Program overview and how delivered:

Company function (i.e. services provided):

Changes from prior year?

Location(s) of office(s) providing services and activities:

NH based staff?: Yes/No. Head count? _____

How long has company been involved in the effort? ____

Staff assigned:

- Title/Roles Number / FTE Pay (salary, hourly, piece, commission)?

Are sub-contractors used?

- Names Roles compensation type Contact info

Are there installation contractors involved in service delivery to Nat Grid customers?

- Names Roles compensation type Contact info

Does Program result in increased employment or additional hours for RI contractors?

Additional comments:

Attachment C: Participating Companies

The list includes contractors and subcontractors performing work directly for National Grid Energy Efficiency programs in 2014 that were counted in the FTE analysis and additional companies who assisted customers to secure equipment rebates, for example through the New Construction or High Efficiency HVAC programs. The list also includes the Community Action Program agencies and their subcontractors involved with the delivery of the low-income program, whether under National Grid funding or WAP/LIHEAP/ARRA funding.

Of the 899 companies, agencies, contractors and sub-contractors listed here, 696 (77%) are either headquartered in Rhode Island, or have a physical presence in Rhode Island. The list is organized first by state (alphabetically), and then alphabetically by company name. To find the Rhode Island companies, move the first appearance of "RI" in the far right column.

Vendor	Town	State
Interviewing Service of America	Van Nuys	CA
Waypoint Building Group	San Francisco	CA
E Source Companies LLC	Boulder	CO
Competitive Resources Inc.	Yalesville	CT
DDLC Energy	New London	CT
George Chartress	Norwich	CT
Irvin McLaughlin EBD	North Grosvenor Dale	CT
JK Muir LLC	Durham	CT
Lantern Energy LLC	Norwich	CT
Mystic Plumbing and Heating	Mystic	CT
Praxis Research Partners	Fairfield	CT
Shannon NRG Resource	Waterbury	CT
Upland Construction Group	North Stonington	CT
Viridian Energy & Environmental LLC	Norwalk	CT
Wattsaver Lighting Products Inc.	East Hartford	CT
American Council for an Energy-Efficient Economy	Washington	DC
Energy Solutions Center	Washington	DC
SmartPower	Washington	DC
Pro. Unlimited Inc.	Boca Raton	FL
Construction Market Data Group LLC	Norcross	GA
2D2C Inc.	Lincolnshire	IL
Innerworkings Inc.	Chicago	IL
Reed Construction Data	Carol Stream	IL
3-D Lighting	Franklin	MA
A & M Electrical Mechanical Inc.	Fall River	MA
Action Inc.	Fall River	MA

Alternative Creative Energy and HVAC Inc.	Blackstone	MA
Alternative Weatherization Inc.	Fall River	MA
American Plant Maintenance	Woburn	MA
Anctil Plumbing and Heating Inc.	Somerset	MA
Andelman and Lelek Engineering Inc.	Norwood	MA
Anthony F Vieira III Heating and Air Conditioning	Attleboro	MA
Apollo Brothers LLC	Fitchburg	MA
B.L. Mechanical Inc.	Douglas	MA
B2Q Associates Inc.	Andover	MA
Barnett Heating and Cooling	Fall River	MA
BDL Heating and Cooling Inc.	North Attleboro	MA
Bruin Corporation	North Attleboro	MA
Building Science & Construction	Braintree	MA
Caliber Building and Remodeling	Sandwich	MA
Center for Ecological Technology	Florence	MA
Champion Resources	Ipswich	MA
Champion Transportation Services	Woburn	MA
CMC Design Build	Quincy	MA
Compressed Air Technologies Inc.	Shrewsbury	MA
Computer Sciences Corporation	Waltham	MA
Conservation Services Group Inc.	Westborough	MA
Consolidated Marketing Services	Burlington	MA
Consortium for Energy Efficiency	Boston	MA
Copland Mechanical Service Inc.	South Attleboro	MA
Copperline Plumbing and Heating	Rehoboth	MA
Demand Management Institute Inc.	Newton	MA
DMI	Wellesley	MA
Don Dalpe Plumbing	Blackstone	MA
ECOVA INC.	Boston	MA
Einhorn Yaffee Precott Architecture	Boston	MA
ENE Systems Inc.	Canton	MA
Energy & Resource Solutions Inc.	North Andover	MA
Energy Federation Inc.	Westborough	MA
Energy New England	Foxborough	MA
Energy Systems Design Inc.	Wayland	MA
Enernoc Inc.	Boston	MA
Engineered Solutions Inc.	Natick	MA
Engineering PC	Boston	MA
F.L. Machado Plumbing and Heating LLC	Seekonk	MA
Ferreira Builders	Attleboro	MA
Forest Hills Electrical Supply Inc.	Randolph	MA
George Obrien Company Inc.	South Dennis	MA

Graybar	Boston	MA
Greenleaf Associates Inc.	Weston	MA
IBM Corp.	Cambridge	MA
Indresano Energy Company	Wellesley Hills	MA
Inline Plumbing and Heating	Fall River	MA
Insulate 2 Save	Fall River	MA
Insulation R Us	Fall River	MA
JACO Environmental	Franklin	MA
Jalette Plumbing and Heating	Fairhaven	MA
Jaquez General Contractor	Lynn	MA
Jarosz Plumbing and Heating	Rehoboth	MA
Jay Sheldons Heating	Seekonk	MA
Kaeser Compressors Inc.	South Easton	MA
Kelliher Samets Volk	Boston	MA
KEMA	Burlington	MA
Kilojolts Consulting Group Inc.	Lexington	MA
kWhOURS Inc.	Cambridge	MA
Larry's Heating and Air Conditioning	Rehoboth	MA
Lavoie	Seekonk	MA
Lenticular Solutions Inc.	Concord	MA
Lewis Rheaume Plumbing and Heating	Seekonk	MA
Lexicon Energy Consulting Inc.	Lexington	MA
Litemor	Norwood	MA
Lockheed Martin	Burlington	MA
Long Built Homes	New Bedford	MA
M Sardinha and Sons Plumbing and Heating Inc.	Fall River	MA
Matt Machado Plumbing and Heating	Dighton	MA
Maurice Richard Plumbing and Heating	Attleboro	MA
Miguel Plumbing and Heating	Swansea	MA
Mike Doucette Plumbing	North Attleboro	MA
MJ Electric And Refrigeration LLC	Rehoboth	MA
National Resource Management	Canton	MA
NESCO	Canton	MA
New Ecology Inc.	Boston	MA
New England Energy Management Inc.	Leominster	MA
New England Weatherization LLC	Attleboro	MA
Nexant Inc.	Burlington	MA
Next Step Living	Boston	MA
NMR Group Inc.	Somerville	MA
NORESCO	Westborough	MA
Northeast Efficiency Supply (NES)	Sutton	MA
Northeast Energy Efficiency Partnerships	Lexington	MA

O'Brien & Neville Inc.	Holliston	MA
Olean Mechanical	Seekonk	MA
O'Neill Mechanical Services	Seekonk	MA
Opinion Dynamics Corporation	Waltham	MA
Peregrine Energy Group	Boston	MA
Piper Electrical Company Inc.	Leominster	MA
Prism Energy Service	Quincy	MA
Quality Climate Control Inc.	Fall River	MA
R.G. Vanderweil Engineers LLP	Boston	MA
Rebello Weatherization Inc.	Swansea	MA
Rethinking Power Management	Boston	MA
Retrofit Insulation	Seekonk	MA
Rhode Island Sheet Metal LLC	Rehoboth	MA
Richard and Sons Plumbing and Heating	Seekonk	MA
Richie's Insulation	Westport	MA
River Energy Consultants	Fall River	MA
Robert Main	Seekonk	MA
Rockingham Electrical Supply	Amesbury	MA
Rodenhiser Plumbing	Holliston	MA
Ronald Houde	Somerset	MA
Sacks Exhibits	Wilmington	MA
Savio Lighting/TW Lighting	Needham	MA
SK & Associates	Canton	MA
Southeastern Gas Services LLC	Swansea	MA
Standard Electric	Wilmington	MA
Stateline Fuel and Burner	Seekonk	MA
Steam Trap Systems	Amesbury	MA
Sullivan & McLaughlin	Boston	MA
Symmes Maini & McKee Associates	Cambridge	MA
Tetra Tech MA Inc.	Boston	MA
The Cadmus Group Inc.	Waltham	MA
The Green Engineer Inc.	Concord	MA
The Heating Man	Rehoboth	MA
The Maricor Group New England Inc.	Hudson	MA
The Royal Flush Plumbing Inc.	Seekonk	MA
Theroux Mechanical	South Attleboro	MA
TJ's Plumbing and Heating Inc.	Attleboro	MA
TNZ Energy Consulting Inc.	Stoughton	MA
Total Comfort Heating and Cooling Inc.	Mansfield	MA
Triangle Refrigeration	Fall River	MA
UTS Energy Engineering	Quincy	MA
Vaughan Plumbing	Dedham	MA

Veolia ES Technical Solutions LLC	Boston	MA
Wiedenbach-Brown	Norwood	MA
William Matos Heating	Assonet	MA
Z-Lights	Woburn	MA
Bulbs.com	Worcester	MA
Earth Networks Inc.	Germantown	MD
Nielson Audio Inc.	Columbia	MD
Synagro-WWT Inc.	Baltimore	MD
Boyko Engineering Inc.	Gorham	ME
Douglas C Baston	Alna	ME
Energy Management Collaborative LLC	Plymouth	MN
Jacobs Engineering	St. Louis	MO
Alpha Event Marketing Services	Raleigh	NC
Carrier Corporation	Charlotte	NC
Exposure Control Technologies	Cary	NC
Ingersol Rand Company	Davidson	NC
Leonard Automatics	Denver	NC
Daniels Equipment	Auburn	NH
IMMI (International Marketing Management, Inc.)	Portsmouth	NH
Weller & Michal Architect	Harrisville	NH
Clear Energy LLC	Bloomfield	NJ
G Square Marketing Inc.	Livingston	NJ
Ideas Agency Inc.	Blairstown	NJ
Wu & Associates Inc.	Cherry Hill	NJ
AM Home Delivery	Brooklyn	NY
ConEdison Solutions	New York	NY
Gardner Nelson & Partners	New York	NY
Impressions ABA Industries	Mineola	NY
Integral Group	New York	NY
Integrated Marketing Services Inc.	Liverpool	NY
MRY US LLC	New York	NY
Owens Kopilak Klein Lurie	New York	NY
RAM Marketing	Saint James	NY
Rensselaer Research Admin	Troy	NY
SPPRO Inc.	Bronx	NY
Questline Inc.	Columbus	OH
Ecobee Inc.	Toronto	ON
EID Passport Inc.	Hillsboro	OR
Social Enterprises Inc.	Portland	OR
Genesis Engineers Inc.	Plymouth Meeting	PA
Real Winwin Inc.	Philadelphia	PA
Dunsky Energy Consulting	Montréal	QC

3Q Holdings LLC	Manville	RI
A & C Burner Service HVAC	East Providence	RI
A & L Plumbing Mechanical and Consulting	Westerly	RI
A & M Compressed Air Products Inc.	Providence	RI
A To Z Plumbing and Heating Air Conditioning Inc.	Riverside	RI
A.R. Heating and Cooling Inc.	Providence	RI
A/Z Corporation	Riverside	RI
AA Electric	Charlestown	RI
AA Insulation	Johnston	RI
AAA Refrigeration Service	North Scituate	RI
ABC Refrigeration & Air Conditioning Inc.	Newport	RI
Acorn Maintenance	Warwick	RI
ACR Construction and Management Corporation	Pawtucket	RI
ADI Energy	Ashaway	RI
Advance Electrical Corporation	Providence	RI
Advanced Comfort Systems Inc.	North Smithfield	RI
AEE	Providence	RI
Aegis Energy Services	West Warwick	RI
Aero Mechanical Inc.	Johnston	RI
Affordable Building and Weatherization Inc.	East Greenwich	RI
Affordable Heating and Air Conditioning Services	Providence	RI
Affordable Insulation Inc.	Providence	RI
AFM Electric LLC	Providence	RI
Ahlborg Construction	Providence	RI
AIA and Sons Construction	Warwick	RI
AIARI	Providence	RI
Air Conditioning Services	Cranston	RI
Air Energy Inc.	West Warwick	RI
Air Metalworks Ltd	North Providence	RI
Air Synergy Cooling and Heating Systems Specialist	Providence	RI
Air Tech Heating and Air Conditioning	Rumford	RI
Aire Services of Central Rhode Island	Pawtucket	RI
Alan Jerauld	North Providence	RI
Albaco LLC	North Providence	RI
Albert S Gizzarelli Plumbing and Heating Inc.	Greenville	RI
ALC	Middletown	RI
A-LED-Lights LLC	Providence	RI
All In One Plumbing and Heating	Coventry	RI
All Seasons Heating and Air Inc.	Johnston	RI
Allan Menard Plumbing LLC	Pawtucket	RI
Allen Plumbing and Heating	Providence	RI
Alliance Plumbing and Heating Inc.	Cumberland	RI

Almeida Plumbing Heating and Air Inc.	Greenville	RI
Alpha Electrical Contractors Inc.	Riverside	RI
Alpha Mechanical	East Providence	RI
Al's Plumbing and Heating	West Warwick	RI
Ameresco	Providence	RI
American Development Institute Inc.	Warwick	RI
American Electric Service Inc.	Cranston	RI
American Home Heating and Air Conditioning Inc.	Providence	RI
Amgen	West Greenwich	RI
AMJ Contracting	Cranston	RI
ANA Construction	Cranston	RI
Anchor Insulation	Pawtucket	RI
Anchor Plumbing and Heating Company Inc.	Providence	RI
Andy's Overhead Electric	Kingston	RI
Angell Heating and Cooling	Peace Dale	RI
Anibal Ramos	Providence	RI
Anne The Plumber	Woonsocket	RI
Anthony Berard	Cumberland	RI
Anthony Januario Heating Company	Bristol	RI
Anthony Zullo	Johnston	RI
Anthony's Quick Plumbing and Heating	North Providence	RI
Anytime Plumbing Service	Harrisville	RI
APlus Plumbing Rooter and Heating Services	Providence	RI
Apple Valley Alarms LLC	Providence	RI
Applied Energy Engineering & Commissioning	Providence	RI
Apuzzo Plumbing and Heating	North Scituate	RI
Arden Engineering Constructors LLC	Pawtucket	RI
Ardente Supply Company Inc.	Providence	RI
Armor Plumbing	Exeter	RI
Arthur Lettieri	Providence	RI
ATC Inc.	Cranston	RI
Aten Energy	Providence	RI
Atlantic Controls	North Kingstown	RI
Atlantic Plumbing and Heating Supply Inc.	Coventry	RI
Atlantis Comfort Systems Corporation	Smithfield	RI
Atlas Copco Compressors	Providence	RI
Atlas Insulation	North Scituate	RI
Autiello Plumbing and Heating	Cranston	RI
Automatic Heating Equipment Inc.	Cranston	RI
Automatic Temperature Controls Inc.	Providence	RI
Aztec Energy Partners	Johnston	RI
B & B Consumers Natural Gas Service	Woonsocket	RI

B.C. Plumbing & Heating	Pascoag	RI
Baltic Trail Engineering	Providence	RI
Barlow Heating LLC	Warwick	RI
Barrington Plumbing and Heating	Barrington	RI
Baseline US LLC	Cumberland	RI
Bay Plumbing Service Inc.	North Kingstown	RI
Baynes Electric	Westerly	RI
Beauchemin Design	North Smithfield	RI
Bell and Tiasczyk Plumbing and Heating	Narragansett	RI
Beneficial Energy Products Company	Pawtucket	RI
Berard Heating and Plumbing	Warwick	RI
Bermudez Plumbing and Heating	Pawtucket	RI
Bert Gardiner	Charlestown	RI
Bertrand Plumbing Inc.	Pascoag	RI
Best Energy Plumbing Heating Air Conditioning	Westerly	RI
Big Dog Plumbing And Heating	Ashaway	RI
Bileau HVAC Inc.	Woonsocket	RI
Bill Ellis Plumbing and Heating	Johnston	RI
Bill The Plumber	North Smithfield	RI
Bill's Heating Service	Warwick	RI
Blackstone Valley Community Action	Pawtucket	RI
Bluestone Energy Services Ltd	Providence	RI
Bob Larisas Plumbing and Heating Inc.	Barrington	RI
Bob Matrel Plumbing and Heating	Central Falls	RI
Bodell Plumbing and Heating	South Kingstown	RI
Boss Heating	Westerly	RI
Boucher HVAC	Wakefield	RI
Boulevard Plumbing and Heating	Middletown	RI
Bradley R Highling LLC	North Kingstown	RI
Brady Sullivan Contracting	Providence	RI
BRH Electric	East Providence	RI
Brian Amadon	Coventry	RI
Brian Cargill HVAC Inc.	Cumberland	RI
Brians Heating Concepts Inc.	Tiverton	RI
Bridge Group LLC	North Providence	RI
Bristol County Plumbing and Heating LLC	Bristol	RI
BriteSwitch LLC	Warwick	RI
Brito Enterprises Inc.	Bristol	RI
Brookside Electric	Westerly	RI
Bruno & Son Electric Inc.	Providence	RI
BSH Heating and Appliance	Barrington	RI
Buckley Heating and Cooling	Wakefield	RI

Build Pros	Pawtucket	RI
Butler and Sons Plumbing and Heating Inc.	Providence	RI
C & D Mechanical	Cranston	RI
C & K Electric Company Inc.	Providence	RI
C.D. Heating Inc.	Cranston	RI
C.H. Nickerson & Company Inc.	Newport	RI
C.J. Nemes Inc.	Woonsocket	RI
C.W. Cummings Plumbing Company Inc.	Coventry	RI
Cal Supply Company	North Kingstown	RI
Calcourt Heating Inc.	Little Compton	RI
Caldwell & Johnson Inc.	North Kingstown	RI
Calyx Homes	Lincoln	RI
Candela Systems	Cranston	RI
Capitol Plumbing Company	Cumberland	RI
Capwell Heating and Air Conditioning	Greene	RI
Carbone Plumbing and Heating and Air LLC	Cranston	RI
Carello Plumbing	East Providence	RI
Carjon Air Conditioning and Heating Inc.	Smithfield	RI
Carl Mancuso Construction & Plumbing Inc.	Warwick	RI
Carl Pecchia Heating Contractor LLC	Johnston	RI
Carter Bros Inc.	Pascoag	RI
Carton Plumbing and Heating	Warrensburg	RI
Cassana HVAC LLC	North Providence	RI
Century Electric Company	Westerly	RI
Century Heating	Smithfield	RI
Charland Oil	Pawtucket	RI
Charles Doherty	Warwick	RI
Charlies Heating LLC	East Greenwich	RI
Chaves Plumbing & Heating	Middletown	RI
Cipriano Plumbing and Heating	Wakefield	RI
CLEAResult	Providence	RI
Climate Masters	Providence	RI
Cmags Heating and Air Conditioning	Warwick	RI
Coldmasters Temperature Control	Providence	RI
Comfort Systems	West Kingston	RI
Comfort Zone Inc.	Hopkinton	RI
Community Action Partnership of Providence	Providence	RI
Compass Electric LLC	Cranston	RI
Comprehensive Community Action	Cranston	RI
Continental Engineering Inc.	Johnston	RI
Copy Stedman and Kazounis	Charlestown	RI
Corrigan Plumbing	Warwick	RI

Cox Communications	West Warwick	RI
Cox Electric LLC	Narragansett	RI
CRM Modular Homes LLC	Johnston	RI
Cross Insulation	Cumberland	RI
Crown Petroleum Plumbing and Heating Inc.	Barrington	RI
Crystal Plumbing and Heating Inc.	Providence	RI
CSV Mechanical Inc.	Wakefield	RI
Cumberland MG Land LLC	Cumberland	RI
D & D Electric Company	East Greenwich	RI
D & D Home Industrial Services	North Providence	RI
D & D Metal Works	Cranston	RI
D & J Plumbing and Heating Inc.	Cumberland	RI
D & V Mechanical Inc.	Westerly	RI
D. Costa Electric Company LLC	East Providence	RI
D. F. Pray	West Warwick	RI
D. Gallagher Plumbing	Coventry	RI
D.K. Plumbing	Pawtucket	RI
D.L. Poulin	North Providence	RI
D.S. Plumbing	West Warwick	RI
Dan Bracewell	Lincoln	RI
Danfoss LLC	Johnston	RI
Daniel Charette Plumbing	Hope Valley	RI
Daniels Plumbing	Warwick	RI
David E Berardinelli Plumbing and Heating	Providence	RI
David LeBlanc Electric	Middletown	RI
David Narcisi Plumbing and Heating	Warwick	RI
David W Bradley Plumbing and Heating Inc.	East Providence	RI
Davidsons Plumbing and Heating	Warwick	RI
Deal Electric	East Greenwich	RI
Decosta Electric Company LLC	East Providence	RI
DELS Plumbing and Heating	North Scituate	RI
Delta Electro Power	Cumberland	RI
Delta Mechanical	Providence	RI
Desmarais Plumbing and Heating Inc.	Johnston	RI
DFS Plumbing Services	West Greenwich	RI
Dimeglio Builders LLC	Cranston	RI
Dionne and Sons	Coventry	RI
Dirocco Plumbing Services LLC	North Providence	RI
Divona Plumbing and Heating Company	Cranston	RI
Dk Power Inc.	West Warwick	RI
DLD Plumbing & Mechanical Company Inc.	Tiverton	RI
Don Jordan Construction	Foster	RI

Don Larbriole	Coventry	RI
Donovan and Sons Inc.	Middletown	RI
Dorcas International	Providence	RI
Douglas Oil Company	Providence	RI
Drivers Plumbing and Mechanical Inc.	Providence	RI
Ds Plumbing	Coventry	RI
DSA Mechanical	Barrington	RI
Dumas Electric Inc.	East Providence	RI
Dupuis Energy	Cranston	RI
Durante Electric	Smithfield	RI
Dynamic Air Systems Inc.	East Providence	RI
E Whitford Plumbing Services	Exeter	RI
E.A. Marcoux and Son Inc.	Woonsocket	RI
E.W. Burman	Providence	RI
East Bay Community Action Program	Riverside	RI
East Greenwich Oil Company Inc.	East Greenwich	RI
Eastern Plumbing Company	North Kingstown	RI
Eastland Electric	Riverside	RI
Ecologic Spray Foam Insulation Inc.	Jamestown	RI
Eddy's Construction	Providence	RI
Edge Services LLC	Cranston	RI
Ed's Plumbing and Heating	North Providence	RI
Edward A Tomolillo	North Providence	RI
Edward Henderson	Lincoln	RI
Electrical Construction & Contracting Inc.	Johnston	RI
Electrical Technologies	Warwick	RI
Electrical Wholesaler Inc.	Cranston	RI
Elias Abi Aad	Pawtucket	RI
Ellis Electric	Wakefield	RI
Elmhurst Engineering Inc.	Providence	RI
Emcor Services	Pawtucket	RI
Enercon Inc.	Cranston	RI
Energy 4 Life	Smithfield	RI
Energy Conservation Inc.	South Kingstown	RI
Energy Efficient Exteriors Inc.	Lincoln	RI
Energy Machinery	Bristol	RI
Energy Management & Control Services Inc.	Providence	RI
Energy One Southern Mechanical	West Warwick	RI
Energy Source LLC	Providence	RI
Engineered Security Systems Inc.	Narragansett	RI
Englel Machinery Inc.	Bristol	RI
ESCO Energy Services Company	Newport	RI

Eurotech Climate Systems LLC	Pawtucket	RI
Evergreen Plumbing and Heating Company Inc.	Warwick	RI
Excell Feeders LLC	Smithfield	RI
F.G. Lees and Son Plumbing and Heating	Providence	RI
F.M. Properties Inc.	Middletown	RI
Feather HVAC	Cumberland	RI
Feula Plumbing and Heating LLC	Johnston	RI
First Choice Plumbing	East Providence	RI
Fitzgerald Building and Remodeling	Riverside	RI
Five Star Plumbing and Heating	Johnston	RI
Fleet Plumbing and Heating Inc.	North Scituate	RI
Fletcher Heating Burner Repairs	Ashaway	RI
Francis Heating and Hydronics	East Providence	RI
Frank Lombardo and Sons	North Providence	RI
Fred Manuppelli Plumbing and Heating	Johnston	RI
Fredrick Bailey Plumbing and Heating	Johnston	RI
Fullport Plumbing and Heating	Rumford	RI
Furtado Electric	Tiverton	RI
G Hill Plumbing and Heating Fire Protection	Westerly	RI
G.M. Perron and Sons Inc.	North Smithfield	RI
Gas Doctor	Providence	RI
Gas Master Inc.	Little Compton	RI
Gas Pro Inc.	Cumberland	RI
Gasman NC	Warwick	RI
Gasperts	Smithfield	RI
Gem Air Services Inc.	Pawtucket	RI
Gem Plumbing and Heating Services Inc.	Lincoln	RI
General Growth	Providence	RI
Gerard Levesque Jr Plumbing and Heating	Coventry	RI
Gilbane Building Company	Providence	RI
Globex Industries Inc.	Narragansett	RI
Goulart Petroleum Inc.	Little Compton	RI
Grainger Lighting Services	Warwick	RI
Granite City Electric Supply Inc.	Pawtucket	RI
Greanseal Insulation	North Kingstown	RI
Green Hill Builders Inc.	Narragansett	RI
Greene Construction Inc.	Johnston	RI
Greener U	Providence	RI
Greenville Insulation Company Inc.	Smithfield	RI
Greenwich Insulation	Coventry	RI
Gregg Blanchette	North Smithfield	RI
Groom Energy Solutions	Providence	RI

Gtech Corporation	Providence	RI
Guardian Energy Management Solutions	Middletown	RI
Guy Clermont Plumbing and Heating	Cranston	RI
H & I Custom Remodeling Inc.	Hope	RI
H.F. Robinson and Sons Plumbing and Heating	Cranston	RI
H.K. Heating Inc.	Greene	RI
H.M. Lei and Associates Inc.	Woonsocket	RI
H.V. Holland Inc.	Jamestown	RI
Handfield Dairy Equipment	West Greenwich	RI
Harrington Plumbing and Heating	Westerly	RI
Harris Plumbing and Heating Inc.	Narragansett	RI
Hawkes Plumbing and Heating Company Inc.	Chepachet	RI
HD Supply Facilities Maintenance	Warwick	RI
Heat Tech LLC	Warwick	RI
Heavenly Homes Plumbing and Heating	Cranston	RI
Heffernan Mechanical Services	Warwick	RI
Henderson Electric	Warwick	RI
HH Heating	Lincoln	RI
Hill Electrical Services	Cumberland	RI
Holiday Home Builders	Lincoln	RI
Home Style Construction	North Providence	RI
Horizon Solutions LLC	Smithfield	RI
Houle Plumbing and Heating	Greene	RI
Howard's Heating Service	North Kingstown	RI
Hybrid Heat	Providence	RI
Ianniello Plumbing and Heating Co	Cranston	RI
Iasimone Plumbing-Heating & Drain Cleaning Inc.	North Providence	RI
Icon International	Smithfield	RI
ICS Corp	Warwick	RI
ICSNE Inc.	Warwick	RI
IMEC Inc.	Smithfield	RI
Incontrol Inc.	Middletown	RI
Industrial Burner Service Inc.	Providence	RI
Industrial Control Service Corporation	Cranston	RI
Infill Development LLC	Providence	RI
Interstate Electrical Services	Warwick	RI
IPS	Cranston	RI
Ironman Heating and Cooling	Riverside	RI
Iwire Electrical Services and Fire Alarm	Providence	RI
Izzo & Sons Electric	Providence	RI
J & M Plumbing LLC	Coventry	RI
J & R Contractors Inc.	Coventry	RI

J Gallant Enterprises LLC	Greenville	RI
J Joyce Plumbing and Heating Inc.	Warwick	RI
J.P. Ari Pereira	Middletown	RI
Jacob Talbot, Inc.	Little Compton	RI
Jacobson Energy Research LLC	Providence	RI
Jay's Electric	Providence	RI
JD Mechanical Inc.	Greenville	RI
JD Mello Plumbing and Heating Inc.	Newport	RI
Jed Electric Inc.	Greene	RI
Jeff Berard Heating	Warwick	RI
Jenkins Heating	Smithfield	RI
Jimenez Plumbing And Heating	Providence	RI
JKL Engineering Company Inc.	Providence	RI
JMAC Plumbing and Heating Inc.	Warwick	RI
Joe Chaves Heating and Plumbing	Middletown	RI
Joe Falcone Plumbing & Heating	Westerly	RI
Joe Palombo Plumbing Heating and Cooling	West Kingston	RI
Joe Roy's Plumbing and Heating	Millville	RI
Joe Soave	Providence	RI
Joel Matzner Residential Plumbing and Heating	Warwick	RI
John Babcock Plumbing Heating Unlimited	Westerly	RI
John Casale and Sons Painting	Cranston	RI
John E Jackson	Cumberland	RI
John Farren	Johnston	RI
John Lowell	Foster	RI
John Nicholson Mechanical Contractor	North Scituate	RI
John Perrault	Woonsocket	RI
John S Babcock Plumbing Heating Unlimited	Ashaway	RI
Johnny Home Solutions LLC	Central Falls	RI
Johnny's Oil and Heating Inc.	Providence	RI
John's Heating	Riverside	RI
Johnson and Johnson Plumbing and Heating Inc.	Saunderstown	RI
Johnson Controls Lighting Services	Lincoln	RI
Jone Construction	Providence	RI
Joseph A Gelinas Plumbing	Warwick	RI
Joseph Anthony	Rumford	RI
Joseph Giorno Plumbing and Heating	Cranston	RI
Jouberts Heating and Air Conditioning	Warwick	RI
Julio De La Rosa	Providence	RI
Just Heat	Portsmouth	RI
K & B HVAC LLC	North Providence	RI
Kafin Oil Company Inc.	Woonsocket	RI

Kenneth Hallberg	Warwick	RI
Kens Heating	Providence	RI
Kesslers Sheet Metal Company Inc.	Cranston	RI
Kevin Barry	Warwick	RI
Kevin Cilley	Westerly	RI
Kevin L Masse	Johnston	RI
Kevin Lahane	Tiverton	RI
Kirk Rerick	Providence	RI
Kittredge	Lincoln	RI
KMB Plumbing Inc.	Warwick	RI
KPMG LLP	Providence	RI
Kwik Plumbing and Heating	Johnston	RI
L & B Remodeling	Warwick	RI
L & F Plumbing LLC	Cranston	RI
L.J. Giorgi Plumbing and Heating Inc.	North Providence	RI
Lance Plumbing and Heating	Scituate	RI
Lawrence Air Systems Inc.	Barrington	RI
Lawrence Builders	Narragansett	RI
LED Lights LLC	North Kingstown	RI
Leddy Electric Inc.	Providence	RI
Leidos Engineering	Newport	RI
Lemay Framing & Remodeling	North Smithfield	RI
Lennox NAS	Warwick	RI
Leveille Electric	Smithfield	RI
Liberty Plumbing and Heating	Jamestown	RI
Lighthouse Contracting Services	Johnston	RI
Lighthouse Propane Inc.	East Greenwich	RI
Lincoln Construction	Pawtucket	RI
Lincoln Energy Mechanical Services Inc.	West Warwick	RI
Loeb Lighting Services	Warwick	RI
Louis Avarista Jr Plumbing	Cranston	RI
Luso Plumbing and Heating Inc.	Cumberland	RI
M & G Correias	East Providence	RI
M & M Electric	Richmond	RI
M Deltufo Plumbing and Heating Inc.	East Greenwich	RI
M Faria Plumbing and Heating	Cranston	RI
M.J. Bouchard Heating and Air Conditioning	Greenville	RI
M.R.D. Construction	West Kingston	RI
Major Electric Supply	Cranston	RI
Maloney Oil	Pawtucket	RI
Manning Plumbing	Warwick	RI
Marcel Multi Services	Pawtucket	RI

Marco Construction Company	Warwick	RI
Mark Quinn Electric	Warwick	RI
Martel Plumbing and Heating	Lincoln	RI
Mastro Electric Supply Co Inc.	Providence	RI
Mastrocinque and Sons Plumbing and Heating LLC	Portsmouth	RI
Matts Mechanical	Greenville	RI
MC Sign Company	Johnston	RI
McCormick Electrical	North Kingstown	RI
McKee Brothers Oil Corporation	Cumberland	RI
MCL Home Improvement	Johnston	RI
McQuay Services	Providence	RI
MD Heating and Air Conditioning	North Providence	RI
Meditech	Cumberland	RI
Megawatt Energy	Providence	RI
Michael Freitas Plumbing and Mechanical	Pascoag	RI
Michael Greene	North Kingstown	RI
Michael Newbury	Tiverton	RI
Michael Virgillo General Contractor	Narragansett	RI
Micheletti Oil Service	Johnston	RI
Mike McIntosh	Warwick	RI
Mike Simone Plumbing and Heating LLC	Cranston	RI
Mill City	Lincoln	RI
Miller Mechanical Inc.	Rumford	RI
MJF Plumbing and Heating	Bristol	RI
Modern Mechanical LLC	Woonsocket	RI
Morrair Heating and Air Conditioning	Warwick	RI
MPG Mechanical LLC	Charlestown	RI
Mr. Rooter Plumbing	Warwick	RI
Multi State Restoration Inc.	North Providence	RI
Mustrocinque and Sons Plumbing and Heating LLC	Newport	RI
Mutual Engineering Service Company	Warwick	RI
National Lighting	Esmond	RI
National Refrigeration Inc.	Warwick	RI
New Concepts Construction	Lincoln	RI
New England Insulation	Woonsocket	RI
New England Plumbing Heating and Air LLC	Greenville	RI
New England Sheet Metal Inc.	Cranston	RI
New England Trane	Warwick	RI
Newbury New England LLC	Westerly	RI
Newport Plumbing and Heating Gas Company	Portsmouth	RI
Nexgen Mechanical Inc.	Cranston	RI
NexRev Inc.	Middletown	RI

NGB Electric	Smithfield	RI
Nicholas Fizzano	Ashaway	RI
Nicolas Bermudez	Pawtucket	RI
Nolin Electric Incorporated	Providence	RI
North Atlantic Heating Inc.	Coventry	RI
Northeast Contracting	Cumberland	RI
Northeast Electrical Distributors	Cumberland	RI
Northeast Energy	Lincoln	RI
Northeast Heating and Cooling	North Scituate	RI
Northern Energy Services Inc.	Providence	RI
O.A. Pagnozzi and Sons Inc.	Smithfield	RI
Ocean State Energy Audits	Riverside	RI
Oliveira Plumbing and Heating LLC	Smithfield	RI
Optimal Energy	Providence	RI
Orange Energizing Solutions	Providence	RI
P & D Plumbing	Providence	RI
P & S Electric Inc.	East Greenwich	RI
Packaging & Insulation Corporation	Providence	RI
Pajan Services Inc.	Woonsocket	RI
Patrick Bragg	Warwick	RI
Patriot Plumbing Inc.	Coventry	RI
Paul Hoxsie	Coventry	RI
PC Construction	Cranston	RI
Pecchia Plumbing And Heating	Warwick	RI
PECI	Portsmouth	RI
Pellegrino Plumbing and Heating	Westerly	RI
Pelletier and Son Plumbing and Heating Inc.	North Kingstown	RI
Perclvalle Electric	Warwick	RI
Perry Plumbing and Heating	North Kingstown	RI
Peter Bibby	Providence	RI
Petes Plumbing Inc.	North Smithfield	RI
Petrarca Plumbing and Heating	Warwick	RI
Petro Heating and Air Conditioning Services	East Greenwich	RI
Petronelli Plumbing and Heating	Cranston	RI
Phil Paul Plumbing and Heating	North Smithfield	RI
Philips Precision Plumbing LLC	Greene	RI
Phillip J Bolster Plumbing and Heating	Wakefield	RI
Phillips Plumbing and Mechanical Inc.	Cranston	RI
Phil's Heating and Air Conditioning	Westerly	RI
Pickles Plumbing and Heating LLC	Mapleville	RI
Pinnacle Plumbing and Heating	Greenville	RI
Plumbing and Heating Solutions LLC	East Greenwich	RI

Plumbing R Us	Newport	RI
Plumbing with Merritt	Warwick	RI
Polar Air	Wakefield	RI
Polytop LLC	Slatersville	RI
Portland Group	Providence	RI
Power Comm System Inc.	Bristol	RI
Pratt Plumbing and Heating LLC	Harrisville	RI
Preferred Heat Inc.	Providence	RI
Premair HVAC	Warwick	RI
Premier Heating and Cooling	Lincoln	RI
Priority Plumbing and Heating Inc.	Providence	RI
Prism Consulting Inc.	Providence	RI
Pro Plumbing of Rhode Island	West Warwick	RI
Professional Services	Lincoln	RI
Proscan Technologies Plus Inc.	Cranston	RI
Providence Mechanical Services LLC	Smithfield	RI
R & M Electric Inc.	Richmond	RI
R.B. Queern Company Inc.	Portsmouth	RI
R.E. Coogan Heating Inc.	Warwick	RI
R.F. Heating and Cooling	Exeter	RI
R.M. Services LLC	Wyoming	RI
Ralph Devivo Plumbing and Heating	North Smithfield	RI
Ralph E Geiselman Plumbing And Heating	Pawtucket	RI
Ralph Ferra Plumbing	North Smithfield	RI
RAM Mechanical LLC	North Kingstown	RI
Randy Pomeroy	Pascoag	RI
Ray Christopher	Foster	RI
Rayco Electric	Providence	RI
Raymond J Reinsant Plumbing and Heating	Lincoln	RI
RB Homes	Johnston	RI
RCS Energy Services	Providence	RI
Reddy Piping Concepts Inc.	Cranston	RI
Regan Heating & Air Conditioning Inc.	Providence	RI
Reichert and Sons Fuel Oil Inc.	Chepachet	RI
Reilly Electrical Contractors	Providence	RI
Reinhold	Johnston	RI
REL Services Plumbing and Heating	Johnston	RI
Reliable Plumbing and Mechanical Inc.	North Providence	RI
Resendes Heating Service LLC	Coventry	RI
Resource Construction Inc.	Jamestown	RI
Restivos Heating and Air Conditioning	Johnston	RI
Rexel Energy Solutions (Munro Distributing)	Cranston	RI

Rhode Island Electrical Rooter and Plumbing	Providence	RI
Rhode Island Green Building Council	Providence	RI
Rhode Island Insulation	Providence	RI
Rhode Island Interfaith Power and Light	North Kingstown	RI
Rhode Island Plumbing and Heating Inc.	Cumberland	RI
Rhode Island Rooter and Plumbing	Smithfield	RI
Rhody Electric	Warwick	RI
Rhody Plumbing	Smithfield	RI
Richard Migliori	Newport	RI
Richard R Lavey	Warren	RI
RISE Engineering	Cranston	RI
RJS Development	Wakefield	RI
Robert Colaluca Plumbing	Johnston	RI
Robert Dionne Electrical Contractor	Providence	RI
Robert Schnaible	Hope	RI
Robinson and Son Heating and Plumbing	East Greenwich	RI
Rock House Construction LLC	Johnston	RI
Roger Buteau	Pawtucket	RI
Roland and Son Building and Remodeling	Saunderstown	RI
Roland M Belanger Plumbing and Heating	Pascoag	RI
Ron Lima	Rumford	RI
Ronald Stamp	Johnston	RI
Roofing Concepts	East Greenwich	RI
Rooter Man Plumbing Heating Drains	Cumberland	RI
Rooter Man Plumbing Heating Drains	Providence	RI
RSC Plumbing LLC	Exeter	RI
RST Mechanical	North Kingstown	RI
RTJM LLC	Johnston	RI
Rumford Mechanical Systems LLC	Rumford	RI
Ryan Electric Construction	Warwick	RI
S & C Boilers	West Warwick	RI
S & K Electrical Inc.	Charlestown	RI
S & P Machine	West Warwick	RI
Sakonnet Plumbing and Heating Inc.	Little Compton	RI
Sal Maggiacomo Plumbing and Heating Inc.	Cranston	RI
Sal Manzi and Son Plumbing and Heating Inc.	Cranston	RI
Santoro Oil Company Inc.	Providence	RI
Sasa Energy	Johnston	RI
Savard Oil Company Inc.	East Providence	RI
Schneider Electric/Johnson Controls, Inc.	North Providence	RI
Schwagler and Sons Plumbing and Heating Inc.	Slatersville	RI
Sega Construction Inc.	Providence	RI

Sergio Alves	Central Falls	RI
Shamrocks Plumbing	Pawtucket	RI
Shawmut Design and Construction	Smithfield	RI
Shearman Oil	Portsmouth	RI
Siemens Industry	Cranston	RI
Sine Plumbing and Heating Company Inc.	East Providence	RI
Site Tech Corporation	Providence	RI
Sizemore Plumbing and Heating	Johnston	RI
Small's Plumbing Inc.	Woonsocket	RI
SMC Mechanical	East Providence	RI
Smithfield Plumbing and Heating Supply Company Inc.	Greenville	RI
Sosa and Son Heating Air Conditioning and Refrigeration	Woonsocket	RI
Sound Building Corporation	Portsmouth	RI
South County Community Action	Wakefield	RI
South County Post and Beam	West Kingston	RI
Specialty Lighting Group LLC	Smithfield	RI
Spencer's Plumbing	East Greenwich	RI
St Angelo Plumbing	Barrington	RI
Stable Heating and Air Conditioning and Air Quality	Providence	RI
Stafford Electric	Pawtucket	RI
Standish Heating and Air Conditioning	Coventry	RI
State Of Rhode Island	Providence	RI
Statewide Insulation	North Smithfield	RI
Stedman & Kazounis Plumbing and Heating	Charlestown	RI
Stephen Freitas Plumbing and Heating	Lincoln	RI
Stephen Larochelle	Cumberland	RI
Sterling Mechanical Services	Greene	RI
Steve Dupre Plumbing	Pawtucket	RI
Stevens Plumbing Company	Barrington	RI
Sturbridge Home Builders Inc.	Warwick	RI
Suburban Heating and Cooling	Tiverton	RI
Sumitomo Demas	Woonsocket	RI
Sunrise Plumbing and Heating	Johnston	RI
Sunshine Fuels and Energy Services Inc.	Bristol	RI
Sunsystems Inc. Building Company	Narragansett	RI
Super Green Solutions	North Kingstown	RI
Superior Comfort Inc.	Bristol	RI
Superior Electric	Providence	RI
Superior Insulation	Narragansett	RI
Superior LED Light LLC	Warwick	RI
Superior Plumbing and Heating	Cranston	RI
Supermarket Energy	North Smithfield	RI

Supply New England	Pawtucket	RI
Sustainable Energy Solutions	Providence	RI
Sylvania Lighting Services	Johnston	RI
Sylvester Sheet Metal Inc.	West Warwick	RI
Synagro Technologies Inc.	Woonsocket	RI
T & J Heating Air Conditioning and Plumbing Inc.	Bellingham	RI
T Gomes Heating and Cooling	Providence	RI
T.A. Gardiner Plumbing and Heating Inc.	Bristol	RI
T.W. Johnston Plumbing and Heating	West Warwick	RI
Tenacity Construction	Johnston	RI
The Electric Connection Inc.	Middletown	RI
The Metalworks Corporation	Tiverton	RI
The Plumber Company LP	Cranston	RI
Thermal Energy Inc.	Cranston	RI
Therrien Mechanical Systems	Lincoln	RI
TJ Homebuilders, Inc.	Exeter	RI
Tobey Waste & Recycling. A Division of Fusion Steel LLC	Providence	RI
Tom Peters Plumbing and Heating Inc.	Portsmouth	RI
Toms Plumbing LLC	Manville	RI
Tops Electric Supply	Providence	RI
Total Control HVAC LLC	Cranston	RI
Trac Builders	Providence	RI
Travers Plumbing and Heating Incorporated	Portsmouth	RI
Tri-Town Community Action	Johnston	RI
UG Nasons Inc.	Middletown	RI
United Burner Services Inc.	West Warwick	RI
United Mechanical Inc.	Cranston	RI
United Oil Burners Service Inc.	West Warwick	RI
Universal Insulation	Providence	RI
Uzzi Plumbing And Heating	Westerly	RI
V&L Construction	Providence	RI
Valcourt Heating Inc.	Tiverton	RI
Valley Heating and Cooling Inc.	Hope Valley	RI
Valmer D Montoya Air Heating and Cooling Inc.	Central Falls	RI
Vaughn Oil Company Inc.	Smithfield	RI
Venancio Brothers Plumbing and Heating	Middletown	RI
Vicmir and Sons Heating and Air Conditioning Controls	Riverside	RI
Victor Allienello	East Providence	RI
Victory Heating and Air Conditioning Company Inc.	Bellingham	RI
Victory Mechanical Services Inc.	Cumberland	RI
Villa Lighting	Middletown	RI
Vincent Heating & Air Inc.	Cranston	RI

Vintage Plumbing	Riverside	RI
Vivona Plumbing and Heating Inc.	Portsmouth	RI
W.E. Hill Plumbing and Heating Inc.	Bristol	RI
Wakefield Heating Service LLC	Wakefield	RI
Wakefield Plumbing LLC	Newport	RI
Waldo Plumbing and Heating LLC	Lincoln	RI
Warroom Document Solution	Providence	RI
Waterworks Plumbing and Services LLC	Johnston	RI
Wesco Oil & Propane Inc.	Esmond	RI
West Bay Community Action Partnership	Warwick	RI
West End Plumbing Inc.	Cranston	RI
Westchester Properties LLC	Providence	RI
Wicked Watts LLC	Providence	RI
Wickford Appliance and Lighting Inc.	Pawtucket	RI
William Carceri	Cranston	RI
William Francis	Bristol	RI
William J Riley Plumbing and Heating	Warwick	RI
William Merritt Plumbing And Heating LLC	North Kingstown	RI
William N Harris Inc.	Providence	RI
William S Ferrara	East Providence	RI
Woods Heating Service	East Providence	RI
Wordell Heating and Cooling LLC	Little Compton	RI
Zawadzki Plumbing and Heating Inc.	Warwick	RI
Zompa Plumbing and Heating	Barrington	RI
Blackhawk Engagement Solutions	Lewisville	TX
Compressed Air Challenge	Alexandria	VA
ICF Consulting Inc.	Fairfax	VA
Opower Inc.	Arlington	VA
The Center for Research and Public Policy	Ludlow	VT
Vermont Energy Investment Corporation	Burlington	VT
New Buildings Institute Inc.	White Salmon	WA
Northwest Energy Efficiency Council	Seattle	WA
Illume Advising LLC	Verona	WI

Attachment 5
2014 RGGI Auction Rept

Attachment 5

2014 RGGI Auction Proceeds Report

Rhode Island
Regional Greenhouse Gas Initiative, Inc. Auction Proceeds
2014 Year End Report
Presented by National Grid
May 1, 2015

Introduction

From the beginning of the Regional Greenhouse Gas Initiative (RGGI) through the end of 2014, Rhode Island (RI) has received approximately $35.7 million from CO2 Allowance Auctions.[1] As of February 2014, National Grid received $13.9 million of those funds in order to expand energy efficiency (EE) efforts throughout the state.

Under the OER's 2013 Plan for the Allocation and Distribution of Regional Greenhouse Gas Initiative Auction Proceeds, the Company received $1,427,713. As specified in the Plan, the proceeds were used to continue support of energy efficiency opportunities in community buildings; provide rebates to homes heated with deliverable fuels (oil and propane); and, provide rebates to commercial businesses, including the agricultural sector, that use deliverable fuels (oil and propane) for heat.

National Grid incorporated this funding into its planned energy efficiency programmatic activity in 2014. In addition, the Company continues to administer the $1,487,948 from the 2012 RGGI allocation to promote the Rhode Island Public Energy Partnership (RI PEP).

This report provides results from these initiatives through December 31, 2014. The results from prior allocations of RGGI funds have been described in prior Year End Reports.

Community Buildings

Not for profit organizations typically do not have funds available to fund their portion of energy efficiency project costs. Recognizing this, the 2013 RGGI Plan allocated $427,713 to energy efficiency projects at community buildings (a public building that houses a not for profit organization such as, but not limited to, boys and girls clubs, community healthcare centers and are used for public/community purposes).

Through December 31, 2014, 83 energy efficiency projects at community buildings had been supported with supplemental incentives totaling $363,931 from the RGGI allocation (See the attached table). These supplemental incentives allowed projects that would not have been otherwise completed due to lack of customer funds to have been completed and contributed 1,611,727 kWh of electricity savings. Projects such as efficient air distribution and energy management systems also had secondary benefits of gas savings, achieving savings of 13,124 of therms. The remaining funds have been committed for work to be completed during 2015.

[1] Source: http://www.rggi.org/market/co2_auctions/results

Residential Deliverable Fuels

The 2013 RGGI Plan allocated $800,000 for a Residential Deliverable Fuels Program. National Grid delivers these incentives through its EnergyWise program to residents who heat their homes with oil, propane, or other deliverable fuels to receive weatherization assistance. The goal of the program is to save energy, create environmental benefits, lower residential heating bills and keep houses warmer. Through the program, residents who heat with oil and propane can request a free home energy assessment from National Grid's EnergyWise program. Once the home energy assessment is completed, participants will have 90 days to complete the installation of recommended improvements and submit their request for incentive payment.

As of September 30, 2014, the total $800,000 has been spent. This resulted in serving 482 participants, resulting in oil savings totaling 12,763 MMBtu.

Agriculture

The 2013 RGGI Plan allocated $200,000 to provide energy efficiency rebates to commercial businesses, including the agricultural sector, that use deliverable fuels (oil and propane) for heat.

During the fourth quarter, National Grid continued to work with OER and a technical consultant to help farms and other agricultural entities with measures that will reduce their delivered fuel consumption and electricity consumption. In total $1,600 was spent in 2014 on technical consulting services. The Company has already completed a number of audits and will begin training RISE to perform these audits in the first quarter of 2015.

Rhode Island Public Energy Partnership

RIPEP builds on a Department of Energy Grant and is intended to help state agencies and local governments attain high levels of energy savings and improved building operations. The primary objectives of RIPEP are to:

- Create a comprehensive inventory of energy consumption in public facilities, both state and municipally owned or managed;
- Implement energy efficiency measures in approximately 100 facilities and attain an average of 20% energy reduction; and
- Identify and mitigate barriers to efficiency improvements in the public sector. Initial priority will be given to water supply facilities, schools, and state buildings, followed by other municipal facilities.

The inventory will identify electric and natural gas efficiency opportunities and be used to prioritize and implement efficiency services offered by the Company. The 2012 Allocation Plan added $1,487,948 for RIPEP, to be administered by National Grid.

During the fourth quarter the Office of Energy Resources together with National Grid redefined the goals of RIPEP to track 20% improvements based on either electric or gas, or duel fuel, instead of just tracking a duel fuel 20% reduction. As of the fourth quarter, there are now approximately 75 Rhode Island public buildings that have reduced their electric or gas, or duel

fuel, energy consumption by at least 15% and often exceeding 20%. The target for the RIPEP partnership is an average reduction of 20% for a total of 100 buildings before the end of 2015. The company and the RIPEP team are confident that the DOE goals will be met.

All of the buildings achieving the 20% reduction used National Grid incentives and some used the municipal on-bill repayment program. As of the fourth quarter, five participants utilized $196,336 in RGGI RIPEP on-bill repayment funds for electricity saving measures. These projects achieved savings of 563 MWh. It is expected next year that more projects under the RIPEP will utilize the RGGI on-bill repayment funds.

Spending & Reporting

The following table illustrates the 2011, 2012 and 2013 budgets and spending through December 31, 2014.

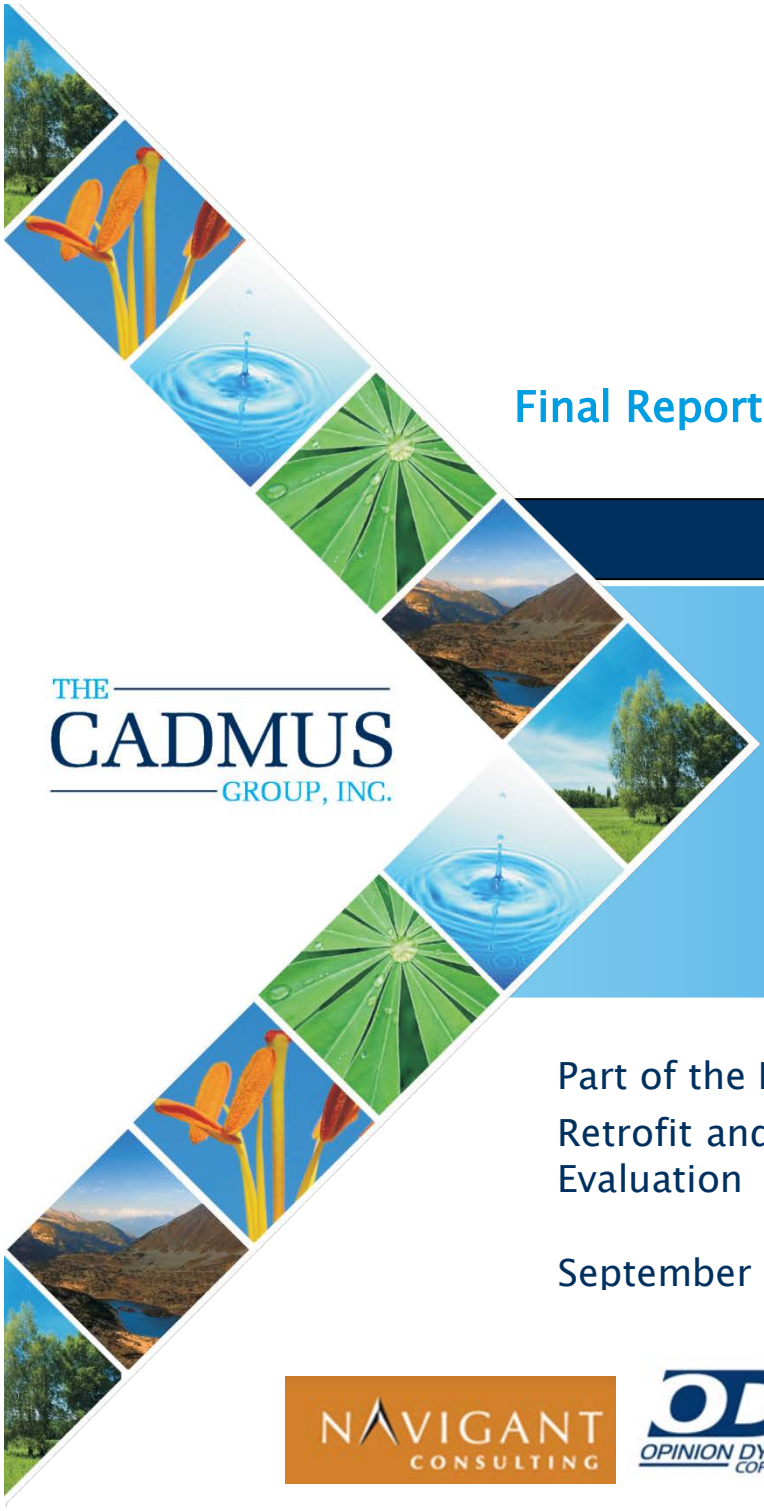
Auctions	Received	EE Funding	Initiative	Budget	2011 Spend	2012 Spend	2013 Spend	2014 Spend
1-5	March 2010	$ 3,950,152	Program Spending	$ 3,950,152	$ 3,950,152			
	December 2010	$ 2,633,434	Heat Loan	$ 449,463	$ 146,698	$ 302,765		
			Homes Tier III Pilot	$ 65,000	$ -	$ -		
			Deep Energy Retrofit Pilot	$ 260,000	$ 27,848	$ 297,152*		
			Small Bus. Revolving Loan Fund	$ 1,858,971	$ 1,843,371	$ 15,600		
6-10	January 2012	$ 4,034,678	Small Bus. Revolving Loan Fund	$ 2,300,000	n/a	$ 2,300,000		
			Large Bus. Revolving Loan Fund	$ 1,734,678	n/a	$ 1,734,678		
11-14	August 2013	$ 1,813,732	RI Public Energy Partnership	$ 1,487,948			$ -	$ 196,336
			Small Bus Community Bldgs	$ 372,288			$ 303,851	
15-18	February 2014	$ 1,427,713	Residential Delivered Fuels	$ 800,000				$ 800,000
			Agricultural Delivered Fuels	$ 200,000				$ 1,600
			Small Bus Community Bldgs	$ 427,713				$ 363,931
Total				**$ 13,906,213**	**$ 5,968,069**	**$ 4,650,195**	**$ 303,851**	**$ 1,361,867**

*Deep Energy Retrofit Pilot includes funds from Homes Tier III Pilot as detailed in the 2012 RGGI Report to OER

Attachment 6
Wi-Fi Evaluation

Attachment 6

Wi-Fi Programmable Controllable Thermostat Pilot Program Evaluation



Final Report

Wi-Fi Programmable Controllable Thermostat Pilot Program Evaluation

Part of the Massachusetts 2011 Residential Retrofit and Low Income Program Area Evaluation

September 2012

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Table of Contents

1. Executive Summary

This report presents the impact and process evaluation of the 2011 Wi-Fi Programmable Controllable Thermostat Pilot Program conducted by The Cadmus Group, Inc. (Cadmus). The findings, conclusions, and recommendations have been drawn from data collection activities that included billing analyses, site visits, and interviews with program administrator (PA) staff, contractors, and participating customers. Key findings of this evaluation include:

- **The gas savings for single thermostat installations (11% per thermostat) are considerably larger than for two thermostat installations (8% per thermostat)**. The multiple thermostats likely are controlling the same heating system but in a different lower usage zone or possibly serving a secondary heating system.
  - **Recommendation:** If a full scale Wi-Fi thermostat program is rolled out, consider these saving differentials during the program design and planning process.
- **The gas savings for non-programmable thermostat replacements (10% per thermostat) are larger than for programmable thermostat replacements (8% per thermostat**). As expected when the Wi-Fi thermostats are replacing programmable thermostats, the percent savings are lower than for non-programmable thermostats. The Wi-Fi savings for programmable thermostat replacements form the lower bound of the heating season savings expected from the Wi-Fi thermostat installations.
  - **Recommendation:** If a full scale Wi-Fi thermostat program is rolled out, use separate percent savings estimates for heating with non-programmable and for heating with programmable thermostats.
- **The electric savings for non-programmable thermostat replacements are effectively equal to those for programmable thermostat replacements.** Not all occupants use the full functionality of their programmable thermostats. In cases where an occupant has a programmable thermostat but declines to use the schedule and set point functionality the thermostat is effectively a non-programmable thermostat.
  - **Recommendation:** If a full scale Wi-Fi thermostat program is rolled out, record the baseline set points and schedule as well as recording whether the baseline thermostat was programmable or non-programmable. Use this information to assess whether the baseline thermostat behavior was equivalent to a programmable thermostat or not.
- **Electric savings associated with Wi-Fi enabled thermostats vary significantly from one house to another**. The savings are very dependent on occupant behavior and baseline set point information. This baseline set point information was based on participant recollections of prior set points, which may be incorrect. To improve evaluability and increase confidence in savings, pre- and post-metered data are preferred.
  - **Recommendation:** Install energy metering equipment on air conditioner and air handler units belonging to program participants covering a period including pre-installation and post-installation time periods. Use this information to estimate program savings. This would increase confidence in the program savings estimate by showing how much energy is consumed for cooling prior to thermostat installation.

The exact savings for each site could be calculated without making baseline assumptions or relying on participants to remember prior set points and schedules.

- **For some participants the energy savings benefits of a Wi-Fi enabled thermostat are similar to those of a standard programmable thermostat.** Whether a participant saves more energy with a Wi-Fi thermostat than they would with a programmable thermostat is difficult to quantitatively predict as the savings are reliant on participant behavior.
  - **Recommendation:** Determine the portion of participants that are using the programmable functionality of their thermostats when the Wi-Fi thermostats were installed. When a participant installs a Wi-Fi thermostat, continue to gather information about the baseline system including thermostat type and program status for future program evaluation purposes.
- **Participant training process.** Although there was general satisfaction among participants regarding training, a few suggested a more intensive training session.
  - **Recommendation:** The installer should ask if the participant would like the installer to spend more time explaining technical aspects of thermostats at installation and/or to provide step-by-step instructions on how to use the Web portal. The participant would then have a chance to get more in-depth training if desired.
  - **Recommendation:** For participants who require more assistance operating the Wi-Fi thermostat, online tutorials or videos should be made available. Links to these tutorials on the Web portal could be distributed at installation.
- **Web portal.** Survey respondents were asked about potential improvements to the Web portal. Most respondents used the Website and reported that it was easy to use. Several participants recommended improvements.
  - **Recommendation:** The Web portal interface should be more user-friendly and this may be facilitated by improving the visibility of button functions and thereby lessening confusion when navigating the Website. The Web portal's help tutorial should also have a highly visible link to a FAQ page to answer common questions. The Web portal should be easier to use by households with two thermostats so each thermostat's activity is distinguishable.
- **Program processes.** In general, participants expressed satisfaction with the Wi-Fi pilot program processes. Only a few participants made suggestions for program improvements.
  - **Recommendation:** A few participants noted that most of their acquaintances who are also National Grid customers were not aware of the Wi-Fi thermostat pilot program. National Grid should provide more marketing materials, such as press releases or bill inserts, to increase awareness of the program.

2. Introduction

Overview of the Wi-Fi Thermostat Pilot Program

The Wi-Fi Programmable Controllable Thermostat Pilot Program, designed and implemented by National Grid, offers customers a free Wi-Fi thermostat that can be programmed and controlled remotely. The Ecobee Wi-Fi thermostat used in this pilot program has several unique features many of which help customers save energy. The thermostat:

- Allows remote access to the unit and control of the heating and cooling (HVAC) system from a Web portal or smartphone application.
- Offers the option to program a custom schedule to reduce energy use when the user is away from the home.
- Reports on performance of the HVAC system.
- Alerts users when a problem arises with their HVAC system or when it is time for equipment maintenance.
- Displays the current weather and five-day forecast.

The goal of the pilot program is to assess the gas and electric savings associated with Wi-Fi thermostats and the feasibility of implementing a full scale program. Eligible participants must own a home heated by a natural gas furnace and must use a wireless internet router. It is preferred that customers have an AC unit that is controlled by the same thermostat as their furnace, but this is not a requirement.

Gem Plumbing and Heating (Gem), a subcontractor to National Grid, installed the Wi-Fi thermostats in participants' homes. During the installation process, the installer presented a short overview to the participant about the thermostat unit and how to set schedules and set points. The installer also programmed the schedules and set points at the participant's request. A total of 86 households participated in the program accounting for 123 thermostats. Sixty-nine households were located in Massachusetts and 17 households were located in Rhode Island.

Evaluation Objectives

Cadmus conducted both an impact and a process evaluation of the Wi-Fi Programmable Controllable Thermostat Pilot Program. The goal of the impact evaluation was to determine the level of gas savings attributable to the installation of the controllable thermostat and also assess electric savings for homes that used the same thermostat to control their AC unit. The primary objective of the process evaluation was to gain insight into the effectiveness of the program from participant, contractor, and program manager perspective and to inform recommendations for improving future program delivery. Our methodology and findings are described below.

3. Methodology

Impact Evaluation

The goal of the impact evaluation was to estimate the gas and electric savings attributable to the Ecobee Wi-Fi thermostat. To estimate gas savings, we conducted a billing analysis on 66 participant homes; to estimate electric savings we conducted analysis on site-specific data collected at 14 participant homes.

Estimating Gas Savings

National Grid provided Cadmus with monthly gas billing data from January 2009 through April 2012 for the Massachusetts and Rhode Island participants. To achieve the most accurate results, a billing analysis should include data for the 12 months immediately before and immediately following installation. For this analysis, complete billing data was available for almost all sites.

Cadmus obtained daily temperature weather data from the National Oceanic and Atmospheric Administration's National Climatic Data Center for the three weather stations, Providence – RI, Worcester – MA, and Concord – MA, which corresponded to the pilot participants' zip codes. From the daily weather data, we calculated the base 65 reference temperature heating degree days (HDDs).[1] We then matched the participant billing data to the nearest weather station by zip code and matched each monthly billing period to the associated base 65 HDDs.

In order to normalize for the different billing cycles and varying meter read dates, we allocated the gas usage (in therms) and the associated HDDs to calendar months. In our monthly allocation process, we first obtained the average daily usage and HDDs from the billing periods that spanned each month. Next, we multiplied the average daily usage and HDDs by their associated number of days in the calendar month to obtain the total usage and total HDDs for each calendar month.

Next, we applied the data screening and criteria shown in Table 1. If a participant failed any of these screens, we excluded that site's data from our billing analysis. We also excluded homes from our analysis that consumed less than an average of one therm per day in either the pre- or post-installation period, as this may indicate insufficient heating usage or that the participant home was vacant. Also, upon examining the summer base load months, we removed sites with substantial increases in usage since that could indicate there were additional occupants or that another water heater had been installed.

[1] This is defined as the number of degrees below 65 Fahrenheit. For example, the base 65 HDD for a daily temperature of 50 degrees Fahrenheit is 15.

Table 1. Participant Screening for Gas Analysis

Site-Level Screening Criterion	Number of Participants Dropped
Fewer than six paired months in the pre or post period	8
Base load increase in summer months	8
Heating energy usage changed by more than 70% after implementation[2]	2
Heating energy averaged less than 1 therm per day either in pre- or post-installation period	1
Pool and spa usage patterns	1
Total Participants Screened Out	20
Total Participants Used in Analysis	66

Using these criteria, we screened out 20 of 86 participants, or 23%. Sixty-six participants had sufficient billing data for our analysis, and these sites are used in our regression modeling.

Table 2 lists the characteristics of the Ecobee Wi-Fi thermostat installation pilot participant homes. As shown in the table, the characteristics of the entire population of pilot participants are very similar to the group of 66 participants we selected as a sample for the billing analysis. Since separate models are estimated for participants installing a single thermostat and two thermostats, those averages are also presented.

Table 2. General Characteristics of Wi-Fi Thermostat Pilot Participants

Group	Number of Participant Homes	Number of Thermostats Installed	Average Home Area (sf)	Average Furnace Capacity (BTU per Home)	Average Furnace Age (Years)	Average Number of Thermostats Installed per Home
Population	86	123	2,267	104,210	10	1.43
Billing Analysis Group (1 Thermostat)	43	43	1,916	96,849	12	1.00
Billing Analysis Group (2 Thermostats)	23	46	2,706	111,630	8	2.00
Billing Analysis Group Overall	66	89	2,191	102,000	10	1.35
Billing Analysis Group (Non-Programmable Thermostats)	23	30	2,211	96,783	11	1.30
Billing Analysis Group (Programmable Thermostats)	43	59	2,180	104,791	10	1.37

[2] The extreme percent change screens are often applied in billing analysis to remove sites with unexpected percent changes. In this case, both of these large percent changes were due to prolonged vacancies and zero readings in either the pre or post periods. These sites were dropped from the final model group because they skewed the model savings by their inclusion and did not yield representative insights to what the thermostat savings were for the sites.

To determine gas savings, we used the fixed-effects modeling method shown below. This method pooled monthly time-series billing data, which corrected for differences between the pre- and post-installation period weather and in the usage magnitudes among participants. The fixed-effects model normalized this usage variation across the participants by using a separate intercept for each customer in the model estimation.

$$ADC_{it} = \alpha_i + \beta_1 AVGHDD_{it} + \beta_2 POST * AVGHDD_{it} + \beta_{3..13}.MONTH_t + \varepsilon_{it}$$

Where, for each participant 'i' and calendar month 't,'

ADC_{it}	=	average daily gas consumption during the pre- and post-installation periods.
α_i	=	average daily non-weather-sensitive base load for each participant that is part of that fixed-effects specification.
β_1	=	average daily gas usage per HDD in the pre-installation period.
$AVGHDD_{it}$	=	average daily base 65 HDDs based on home location.
β_2	=	gas heating savings per HDD as a result of thermostat installation(s).
$POST_t$	=	a dummy variable that is 0 in the pre-period and 1 in the post-period.
$POST_t * AVGHDD_{it}$	=	an interaction of $POST_t$ and $AVGHDD_{it}$.
$\beta_3 - \beta_{13}$	=	incremental pre-period average daily usage for each billing month compared to December.
$MONTH_t$	=	an array of bill month dummy variables (Jan, Mar, …, Nov), 0 otherwise[3]
ε_{it}	=	the modeling estimation error.

The model directly estimates the thermostat savings (β_2). The inclusion of the interaction of the HDDs and the post-variable *($POST_t$)* allows for the possibility of obtaining weather-normalized savings by specifically isolating only the heating energy savings. For this billing analysis, Cadmus used the most recent 15 years of Typical Meteorological Year (TMY3) data (1991-2005) to calculate normalized HDDs and weather-normalized savings estimates.[4] Separate models were estimated for participants installing a single thermostat and two thermostats.

Estimating Electric Savings

Cadmus performed site visits at 14 homes where Wi-Fi thermostats controlled AC units. At three of the homes, two thermostats had been installed, bringing the total number of thermostats we

[3] We excluded one of the dummy variables (December) from the independent variables to avoid the 12 monthly indicators forming perfect co-linearity with the intercepts. The remaining 11 individual intercepts include the seasonality from December.

[4] This TMY3 series (1991-2005) is the latest available normal weather series. The 30-year TMY2 (1971-2000) series shows higher normal HDDs (6,468), but we deemed the TMY3 series to be more appropriate as it reflects the warming trend evident in more recent years.

observed to 17.[5] Site visits were performed in September 2011, after the Ecobee thermostat had been installed.

Data Collection

During site visits, Cadmus collected data on parameters such as equipment, occupant behavior, and environmental conditions. For the equipment data collection, we performed a spot measurement of the true power of both the outdoor AC unit and the fan. We also recorded information from the name plates of the furnace, outdoor AC unit, and evaporator coil. For the occupant behavior data collection, we observed thermostat settings at the time of the site visit and asked the participants about their historical thermostat settings (before the Wi-Fi thermostat was installed). For the environmental data collection, we recorded outdoor air conditions at the time of the power test.

Cadmus obtained trend data from Ecobee, the manufacturer of the installed thermostats. This data included time-stamped information on equipment run times, system status (cooling/heating/off), indoor and outdoor air conditions, and thermostat set points. The analysis was performed using trend data, recorded every five minutes, from March through October 2011.

We also contacted air conditioner manufacturers to obtain specification sheet data about the identified units at each visited site.

Calculation Methodology

Cadmus used Ecobee trend data (see example data in Appendix A) and data from the site visit to calculate electric energy savings on a site-by-site basis. Using the trend data, we first determined a relationship between equipment run time and the difference between outside air and thermostat set point temperature (ΔT). For each ΔT value we determined a percent runtime for the cooling system. We then used the true power test reading to adjust manufacturer data that related outside air temperature to system power for each specific unit. When manufacturer spec sheets were not available (as for older units), we used a default curve fit value that we had established in a previous Cadmus study by metering the true power and outside air conditions for existing units. An example of the power curve adjustment can be found in Appendix A.

The outside air versus thermostat set point temperature (ΔT) was easily calculated in the post-installation case because the Ecobee trend data included both temperatures over the season. In the pre-installation (baseline) case, the ΔT was calculated using the schedule and set point information taken from the participants' surveys. When this information was not available, we predicted a likely baseline set point from information recorded by the thermostat.[6] In the absence of participant responses about their typical setback/setup patterns, we assumed that the baseline set point applied to all hours.

The participants included in the electric savings analysis had a mix of programmable and non-programmable thermostats before the installation of the Wi-Fi thermostat. Of the 12 thermostats analyzed, six were previously programmable and six were previously non-programmable. For purposes of this analysis, the important distinction was not whether the participant had a

[5] Each thermostat controlled a different central air conditioning system.

[6] The thermostats record data including indoor and outdoor air temperature, which is available through Ecobee's web portal. Ecobee shared this data with Cadmus for analysis purposes.

programmable or non-programmable thermostat but how the thermostat was used. For example, a programmable thermostat may be held at one temperature throughout the cooling season (this was observed at three of 12 analyzed sites). By the same token, a non-programmable thermostat may be adjusted up and down on a daily basis by an attentive occupant (this was observed at one of 12 analyzed sites). For these reasons the baseline case was calculated based on schedule and set point information taken from the participants' surveys or predicted from thermostat information, as discussed above.

The difference in savings between sites whose prior equipment was a programmable thermostat and sites with a non-programmable thermostat was found to be minimal. Due to the small sample size no quantitative results were found comparing savings between programmable and non-programmable thermostats. Because thermostat installation savings rely on behavioral factors it is important for the analysis to know the previous schedule and set points whenever possible.

The resulting curve fit, which compares actual spot-checked outside air temperature to actual spot-checked true system power usage, is referred to as the adjusted curve fit. We used the adjusted curve fit to estimate unit power consumption by multiplying recorded run time (from trend data) by the calculated unit power at the outside air temperature recorded by the thermostat (also from trend data) over the cooling season.

To determine run time in the baseline case, we multiplied the probability that the system would run at a particular ΔT value by the time interval at each ΔT value through the season. The adjusted curve fit was used to predict system power consumption at that particular outside air temperature. To ensure a consistent comparison, we used the same methodology to forecast unit consumption in the post-installation case, and a percent savings was developed (percent reduction in run time). This percent savings was applied to the system power calculation to obtain savings for each site.

Some sites were excluded from the analysis because they lacked sufficient data; the specific reasons are listed in Table 3.

Table 3. Participant Screening for Electric Analysis

Site-Level Screening Criterion	Number of Participants Dropped
Thermostat did not record cooling data	2
Unable to complete spot metering while onsite	1
Poor regression characteristics impeded analysis	2
Total Thermostats Screened Out	5
Total Thermostats Used in Analysis	12

Process Evaluation

Cadmus conducted a process evaluation to assess how well the pilot program worked from the perspectives of program staff, contractors, and participants. The process evaluation also examined the influence of the Wi-Fi thermostat on participants' behavior, as well as on overall participant satisfaction. Cadmus conducted interviews with program staff, contractors, and participants as part of the process evaluation.

Program Manager Interview

Cadmus conducted an interview with the program manager at National Grid to evaluate program design and implementation. The interview focused on:

- Motivation for implementing the pilot program
- Goals for the program
- Marketing materials for the program
- Experience working with contractors

Contractor Interviews

Cadmus interviewed a manager and two installers from Gem Plumbing and Heating, the contractor that installed the Wi-Fi thermostats. These interviews discussed:

- Satisfaction with the program and delivery methods
- Ease of installation
- Wi-Fi thermostat saturation levels and common applications
- Clarifications needed to complete the program evaluation

Participant Surveys

Cadmus administered 25 surveys (meeting the 90% confidence and 15% precision level) after selecting a random sample from the pool of pilot program participants. Prior to the pilot program, eight of the surveyed participants had used a non-programmable thermostat and 17 had used a programmable thermostat. The surveys for participants were the same and differed only for specific questions about the previously installed unit.

The survey comprised a series of questions regarding program awareness, training and installation, system configuration, and program satisfaction. The survey also included questions about the type of thermostat, if any, the participant would have purchased without the pilot program. These questions are intended to determine the level of freeridership in the program.

4. Impact Evaluation Findings

Estimating Gas Savings

Table 4 shows the Wi-Fi thermostat gas savings, which averaged 110 therms per household. The per thermostat savings for the single thermostat installations are higher than the two thermostat installations. Since our billing analysis sample (n=66) averaged 1.35 Ecobee thermostats installed per household, the savings per thermostat is 82 therms. The calculation of a 90 percent confidence interval around the overall savings yields an estimate of 63 to 100 therms per thermostat. Each thermostat achieved 10% savings over the average annual pre-installation gas usage of 858 therms per household. Each participant household achieved 13% savings over the average (110/858 therms). When WI-FI thermostats replaced non-programmable thermostats the savings are 87 therms or 10% per thermostat, while when they replaced programmable thermostats the savings are 66 therms or 8% per thermostat.[7]

[7] Low sample sizes did not permit model estimation of savings into both quantity of thermostats installed and replaced thermostat type (non-programmable or programmable).

Table 4. Wi-Fi Thermostat Gas Billing Analysis Savings Summary

Billing Analysis Group	Number of Participants (Billing Analysis)	Savings (Therms per HDD)	Normal HDD TMY3	Savings Per Household (Therms)	Savings Per Thermostat (Therms)	Pre-Period Usage	Savings as % of Pre-Period Usage	90% Precision	Savings Lower 90% CI	Savings Upper 90% CI
1 Thermostat	43	0.01409	6,117	86	86	802	11%	31%	60	113
2 Thermostats	23	0.02513	6,167	155	77	964	8%	28%	55	100
Overall*	66	0.01794	6,135	110	82	858	10%	23%	63	100
Non-Programmable Thermostats	23	0.01837	6,146	113	87	890	10%	31%	60	113
Programmable Thermostats	43	0.01470	6,129	90	66	842	8%	34%	43	88

*The overall savings estimates are determined as the weighted average of the participants installing one thermostat and two thermostats. These do not necessarily equal the weighted average savings across programmable and non-programmable thermostats.

Table 5 through Table 8 present the regression output of the Wi-Fi thermostat models.

Table 5. Wi-Fi Thermostat Billing Analysis Regression Model Output (Single Thermostat)

Source	Analysis of Variance				
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	56	6930.25229	123.75451	288.86	<.0001
Error	924	395.86028	0.42842		
Corrected Total	980	7326.11257			
Root MSE	0.65454		R-Square	0.946	
Dependent Mean	2.03626		Adj R-Square	0.9427	
Coeff Variance	32.14415				
Source	Parameter Estimates				
	DF	Parameter Estimates	Standard Error	t value	Prob. T
Average Intercept*	43	0.41035	0.42420	0.96	0.3371
AvgHDD	1	0.11742	0.01195	9.83	<.0001
PostHDD	1	-0.01409	0.00264	-5.33	<.0001
Jan	1	0.27711	0.1216	2.28	0.0229
Feb	1	0.36519	0.10252	3.56	0.0004
Mar	1	-0.03873	0.15168	-0.26	0.7985
Apr	1	-0.30679	0.23448	-1.31	0.1911
May	1	-0.09559	0.32779	-0.29	0.7706
Jun	1	0.06002	0.3876	0.15	0.877
Jul	1	0.00060453	0.40173	0	0.9988
Aug	1	-0.06839	0.39963	-0.17	0.8642
Sep	1	-0.23755	0.3631	-0.65	0.5131
Oct	1	-0.46314	0.26156	-1.77	0.0769
Nov**	1	-0.3668	0.15263	-2.4	0.0164

* Since we ran the model with a fixed-effects specification, each participant has a unique intercept. Due to the large amount of output produced when showing the model coefficients for each of the 43 intercepts, the model output in this table presents the average of the separate intercepts.

** The December indicator is not included in the model otherwise there would be perfect co-linearity with the intercept.

Table 6. Wi-Fi Thermostat Billing Analysis Regression Model Output (Two Thermostats)

Source	Analysis of Variance				
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	36	5399.77855	149.99385	339.91	<.0001
Error	486	214.46053	0.44128		
Corrected Total	522	5614.23908			
Root MSE	0.66429		R-Square	0.9618	
Dependent Mean	2.49978		Adj R-Square	0.959	
Coeff Variance	26.57386				
Source	Parameter Estimates				
	DF	Parameter Estimates	Standard Error	t value	Prob. T
Average Intercept*	23	3.49219	0.73894	4.73	<.0001
AvgHDD	1	0.05258	0.02153	2.44	0.0149
PostHDD	1	-0.02513	0.00435	-5.78	<.0001
Jan	1	0.81605	0.17879	4.56	<.0001
Feb	1	0.48815	0.14415	3.39	0.0008
Mar	1	-0.98801	0.26382	-3.75	0.0002
Apr	1	-2.01597	0.4099	-4.92	<.0001
May	1	-2.65145	0.58801	-4.51	<.0001
Jun	1	-2.79124	0.69987	-3.99	<.0001
Jul	1	-2.86533	0.726	-3.95	<.0001
Aug	1	-2.91501	0.72139	-4.04	<.0001
Sep	1	-2.86028	0.65895	-4.34	<.0001
Oct	1	-2.44958	0.47118	-5.2	<.0001
Nov**	1	-1.30793	0.25634	-5.1	<.0001

* Since we ran the model with a fixed-effects specification, each participant has a unique intercept. Due to the large amount of output produced when showing the model coefficients for each of the 23 intercepts, the model output in this table presents the average of the separate intercepts.

** The December indicator is not included in the model otherwise there would be perfect co-linearity with the intercept.

Table 7. Wi-Fi Thermostat Billing Analysis Regression Model Output (Existing Non-Programmable Thermostats)

Source	Analysis of Variance				
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	36	4729.55337	131.37648	333.17	<.0001
Error	484	190.85489	0.39433		
Corrected Total	520	4920.40827			
Root MSE	0.62796		R-Square	0.9612	
Dependent Mean	2.31921		Adj R-Square	0.9583	
Coeff Variance	27.07629				
Source	Parameter Estimates				
	DF	Parameter Estimates	Standard Error	t value	Prob. T
Average Intercept*	23	1.52294	0.54126	2.83	0.0046
AvgHDD	1	0.10138	0.01577	6.43	<.0001
PostHDD	1	-0.01837	0.00343	-5.35	<.0001
Jan	1	0.56511	0.15557	3.63	0.0003
Feb	1	0.47075	0.13263	3.55	0.0004
Mar	1	-0.34649	0.20740	-1.67	0.0954
Apr	1	-0.91062	0.31330	-2.91	0.0038
May	1	-1.01346	0.42724	-2.37	0.0181
Jun	1	-0.94073	0.50595	-1.86	0.0636
Jul	1	-1.0155	0.52487	-1.93	0.0536
Aug	1	-1.09273	0.52168	-2.09	0.0367
Sep	1	-1.18292	0.47561	-2.49	0.0132
Oct	1	-1.2323	0.34437	-3.58	0.0004
Nov**	1	-0.70872	0.20098	-3.53	0.0005

* Since we ran the model with a fixed-effects specification, each participant has a unique intercept. Due to the large amount of output produced when showing the model coefficients for each of the 23 intercepts, the model output in this table presents the average of the separate intercepts.

** The December indicator is not included in the model otherwise there would be perfect co-linearity with the intercept.

Table 8. Wi-Fi Thermostat Billing Analysis Regression Model Output (Existing Programmable Thermostats)

Source	Analysis of Variance				
	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	56	7569.11612	135.16279	277.62	<.0001
Error	926	450.82727	0.48685		
Corrected Total	982	8019.94339			
Root MSE	0.69775		R-Square	0.9438	
Dependent Mean	2.13282		Adj R-Square	0.9404	
Coeff Variance	32.7149				
Source	Parameter Estimates				
	DF	Parameter Estimates	Standard Error	t value	Prob. T
Average Intercept*	43	0.84523	0.50991	1.66	0.0969
AvgHDD	1	0.11026	0.01446	7.62	<.0001
PostHDD	1	-0.0147	0.00307	-4.79	<.0001
Jan	1	0.3189	0.13466	2.37	0.0181
Feb	1	0.3519	0.11101	3.17	0.0016
Mar	1	-0.17757	0.17615	-1.01	0.3137
Apr	1	-0.5617	0.27754	-2.02	0.0433
May	1	-0.45177	0.39842	-1.13	0.2571
Jun	1	-0.32689	0.47218	-0.69	0.4889
Jul	1	-0.35746	0.4895	-0.73	0.4654
Aug	1	-0.41083	0.48697	-0.84	0.3991
Sep	1	-0.56182	0.44278	-1.27	0.2048
Oct	1	-0.71291	0.31658	-2.25	0.0246
Nov**	1	-0.49409	0.17761	-2.78	0.0055

* Since we ran the model with a fixed-effects specification, each participant has a unique intercept. Due to the large amount of output produced when showing the model coefficients for each of the 43 intercepts, the model output in this table presents the average of the separate intercepts.

** The December indicator is not included in the model otherwise there would be perfect co-linearity with the intercept.

Estimating Electric Savings

The electric savings per thermostat averaged 104 kWh per year. However, since our electric analysis sample (12 thermostats, 11 participants) averaged 1.1 Ecobee thermostats installed per home, the savings per participant is 113 kWh. The average estimated pre-installation usage in the selected sample was 640 kWh per year, although the participants in this pilot program used less electricity, on average, than a typical residential customer in the region. Overall, the savings from the Wi-Fi thermostat were on average 16% of the estimated cooling season energy usage. Table 9 summarizes electric savings results.

Table 9. Wi-Fi Thermostat Electric Savings Analysis Savings Summary

Number of Thermostats (Included in Electric Analysis)	Number of Participants (Selected for Electric Analysis)	Average Usage, Pre (kWh)	Average Usage, Post (kWh)	Savings Per Thermostat (kWh)	Savings Per Participant (kWh)	Savings Per Thermostat (%)
12	11	640	536	104	113	16%

The average pre-installation usage is somewhat lower than the regional average due to lower than average typical run times. The equivalent full load hours (EFLH)[8] for Massachusetts, according to the 2012 MA Technical Reference Manual, is 360 hours. Cadmus calculated EFLH for each system examined in the electric savings analysis; the average EFLH across the sample was 170 hours. This lower EFLH value shows that the sample's usage is lower than regional averages due to reduced air conditioner run times. This may be due to sample self-selection for energy-efficient behavior (those interested in participating in energy-efficiency pilot programs may be more likely to have pursued energy-efficiency measures or operate their systems more efficiently than the general population).

As discussed in the Impact Evaluation Methodology section, these results do not differentiate between sites with a programmable thermostat baseline and sites with a manual thermostat baseline. This is due to the behavioral issues observed during site visits and surveys which showed that it is relatively common for a programmable thermostat to be used in such a way that the programmable functionality is ignored.

[8] The equivalent full load hours (EFLH) represents the number of hours that an air conditioner that is designed exactly for the peak load would run at full load to satisfy the annual cooling load.

5. Process Evaluation Findings

Program Awareness

National Grid recruited eligible participants to the Wi-Fi Programmable Controllable Thermostat Pilot Program through advertisements e-mailed to its customers. In Massachusetts, survey participants were asked about the e-mail and how the description of the program encouraged them to participate. Participants reported they were interested in:

- Testing out a new technology at no cost
- Conserving energy
- Saving money on energy bills
- Having more control over their thermostat, including the ability to change the unit remotely

Overall, survey respondents reported that the enrollment process was very easy. Customers who were eligible and interested in participating in the program filled out a short online application that was submitted to National Grid. A few respondents made suggestions for improvements. Some respondents suggested that in the future, the program administrator should:

- Clarify that two-zone systems are covered in the program
- Recruit participants through phone calls instead of e-mail
- Provide follow-up contact between application submission and approval

Training and Installation

National Grid selected Gem Plumbing and Heating to install the Wi-Fi programmable controllable thermostats. The program manager reported that the communication and coordination process has gone smoothly with Gem. National Grid, after receiving and accepting a customer's application, sent it to Gem who in turn contacted the participant. The turnaround time for this application process was about a one week. The program manager reported receiving no negative feedback from program participants about this process.

Cadmus interviewed a manager and two installers with Gem. Gem was provided with contact names and addresses after National Grid screened participants for eligibility. Prior to installation, installers received one session of training from National Grid; they reported the training was straight-forward and helpful. The Gem manager and installers also described the installation process as very smooth. Gem received calls from only two customers requesting further assistance with their thermostat. One thermostat was faulty and had to be replaced. The other customer had damaged wiring that was affecting use of the thermostat. The Gem manager was impressed at how few call-backs they received even though over 100 units were installed through the program.

Participant survey respondents were asked about the installation process and reported general satisfaction. About half of those surveyed reported that the thermostat installer explained how to use both the thermostat and the Ecobee Website. About 36% of respondents (9 of 25) reported that the installer explained how to use the thermostat only. Only one respondent reported that the installer did not explain how to use either the thermostat or the Website. Respondents also

reported that the installer referred them to additional reference sources such as the user's manual or a call number. One installer reported that he showed the participants how to use both the thermostat settings and the Website. The other installer did not specify if he explained how to use the Website in detail, but he expressed that the participants he interacted with were "tech savvy."

About half of the respondents reported that the contractor helped set up the thermostat schedule and set points; the majority of these respondents said the contractor did so at the unit itself. The other half of the respondents set up the schedule and set points themselves and said they generally did so on the day of installation. The majority of these participants (9 of 13) used the Website to set up the thermostat.

Survey respondents were asked what was most helpful about the information given during the thermostat and Ecobee Website training. Answers included:

- Instruction on how to set the different programs
- Explanation on how to temporarily alter settings
- Detailed description of the vacation feature

The majority of respondents reported that they did not require any explanation on how to use the thermostat or Website and that they easily understood the device. When asked to rank their satisfaction with the installation and training process on a 0 to 10 scale (where 0 is extremely dissatisfied and 10 is extremely satisfied), the majority (14 of 25) categorized their satisfaction as a 10 (Figure 1).

Figure 1. On a scale from 0 to 10, where 0 is extremely dissatisfied and 10 is extremely satisfied, how would you rate your satisfaction with the installation and training process?

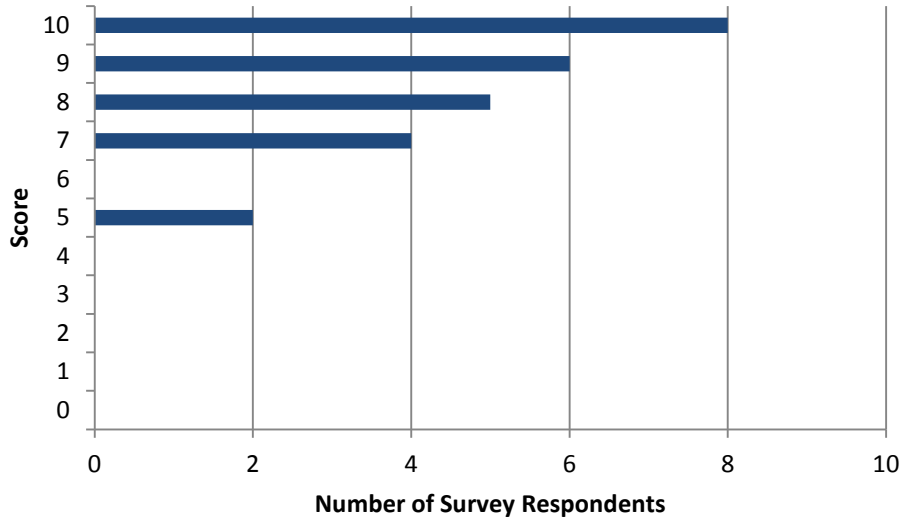
The only negative response came from one respondent who reported a lack of necessary information about updating the system. This individual explained that he received e-mails about updates but did not receive direct help in the training process. Although he ranked the training process a 2, he ranked the installation process a 10.

Participants suggested that the training and installation process could be improved if the installer:

- Spent more time explaining technical aspects of thermostats at installation
- Provided step-by-step instructions on how to use the Website

Survey respondents were asked about their experience with the Ecobee thermostat Web portal. They were asked to rank the Web portal's ease of use on a scale from 0 to 10, where 0 is very difficult and 10 is very easy. The majority of respondents ranked the Web portal's ease of use favorably, with 19 respondents assigning a ranking between 8 and 10 (Figure 2).

Figure 2. On a scale from 0 to 10, where 0 is very difficult and 10 is very easy, how would you rate the Ecobee Thermostat Web portal's ease of use?



Survey respondents were also asked if they had any suggestions to improve the Web portal. Respondents suggested that the Web portal should:

- Send notifications whenever reprogramming occurs
- Improve visibility of button functions
- Provide more flexible programming capability, such as a time resolution that is more frequent than every half hour and alternative week programming
- Add a FAQ page in the help tutorial
- Improve Ecobee's Web portal for systems with two thermostats
- Include more days in the reports or a one-month range[9]

[9] Although one participant responded that reports should provide data for a time period greater than one month, the Web portal does provide the ability to access reports over a year period. This feedback from the respondent is likely due to a misunderstanding of what data the Web portal provides, but is valuable in identifying potential Web portal improvements (i.e., more user-friendly reports).

System Configuration

Survey respondents were asked a series of questions to compare the system configuration of their previous thermostat to their new Wi-Fi thermostat. The majority of respondents set schedules and set points on their new thermostat for when they are at home, away, asleep, and/or awake.

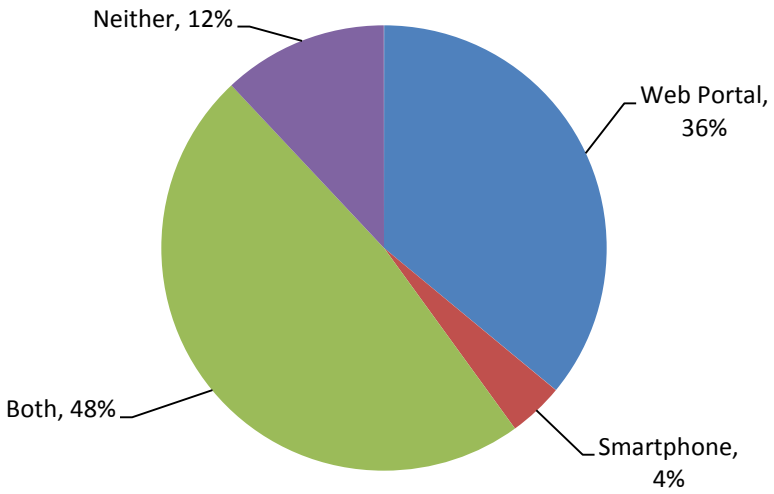
Participants were asked specifically how they determined which schedule and set points to use for their new Wi-Fi thermostat. The majority of respondents who previously owned a programmable thermostat indicated that the contractor programmed their new Wi-Fi thermostat to the same schedule as the old unit. Five of these 17 respondents subsequently adjusted the schedule of the new thermostat. Participants stated that their reasons were to:

- Reduce heat usage based on data from the thermostat
- Program a different temperature schedule for weekends
- Warm the house before waking up and before coming home from work
- Set different upstairs and downstairs temperatures

Wi-Fi Features

Participants were asked if they ever access thermostat settings through the Web portal or a smartphone app (Figure 3). The majority of respondents (12 out of 25) reported they access thermostat settings through both the Web portal and the smartphone app. Nine respondents reported they have accessed thermostat settings through the Web portal (but never the smartphone app), one respondent reported they access settings through the smartphone app (but never the Web portal), and three respondents reported they access settings through neither the Web portal nor the smartphone app.

Figure 3. Do you ever access thermostat settings through the Web portal or a smartphone app?



Participants were also asked how the Wi-Fi capability had changed their approach to regulating temperature in their home compared to their previous thermostats. The majority (21 out of 25

people) indicated that their new Wi-Fi thermostat changed their approach to regulating temperature in their home. Changes in approaches included:

- Programming the thermostat to set different temperatures for different weekdays
- Using the smartphone app to set the thermostat temperature when away from home
- Checking the Web portal to see reports of energy usage and adjusting temperature accordingly
- Checking the system when away from the home for extended periods of time

The vacation feature is another popular option, according to survey respondents. Fourteen of 25 respondents indicated that they used the vacation feature to set back their thermostat. Of those fourteen respondents, the majority (six individuals) reported that they use the vacation feature when they are away from the home for more than three nights. Five individuals reported that they use the vacation feature every time they are away from their home overnight. Only one person used the vacation feature when they are away from their home for more than a week.

Several participants noted the ability to remotely alter their household's temperature as one of the most useful features. Seventeen of 25 respondents indicated that they interact with the Web portal when they are away from the home, typically to check the outside or inside temperature (11 respondents) or to adjust settings (12 respondents). Survey respondents who claimed they do not interact with the thermostat when they are away from the home reported it is not necessary because they are not away from the home for long periods of time.

Respondents were asked if they view the reports from the thermostat and, if so, how this review affects their energy usage. About half of the respondents (13 of 25) reported that they view the reports, but the majority of these respondents (10 of 13) claimed it has not significantly affected their energy usage. Most of the participants who view the reports claimed they do so out of curiosity and only three of those respondents claimed it affected their use of the thermostat.

The majority of respondents also reported that the Wi-Fi thermostat is easier to set than their previous thermostat; only one person reported that it is not easier to set. Explanations given for the Wi-Fi thermostat's ease of use include:

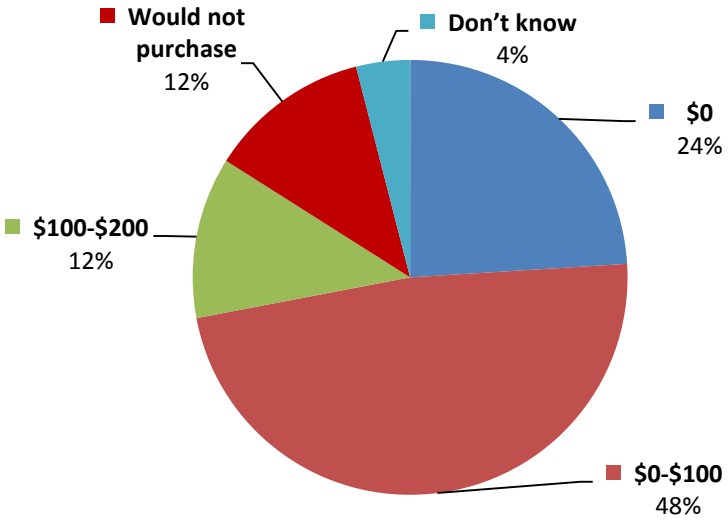
- Ability to set a higher resolution in terms of time
- Ability to set the thermostat from outside the home
- Ease of scheduling vacation mode
- User-friendly interface

Direct Install Net-to-Gross

The pilot program has a net-to-gross value of 0.96. Eighty-four percent of respondents (21 of 25) reported they were not planning to purchase a new thermostat and 16% (4 of 25) of respondents reported they were. Of the four people planning to purchase a new unit, one reported he was planning to purchase a Wi-Fi programmable thermostat. The other three were planning to purchase programmable units (all had previously owned non-programmable thermostats). When asked why they were not considering a Wi-Fi programmable thermostat, two of the three reported they had not heard of Wi-Fi thermostats before. The third respondent reported he thought his household did not need the additional functionality of a Wi-Fi thermostat.

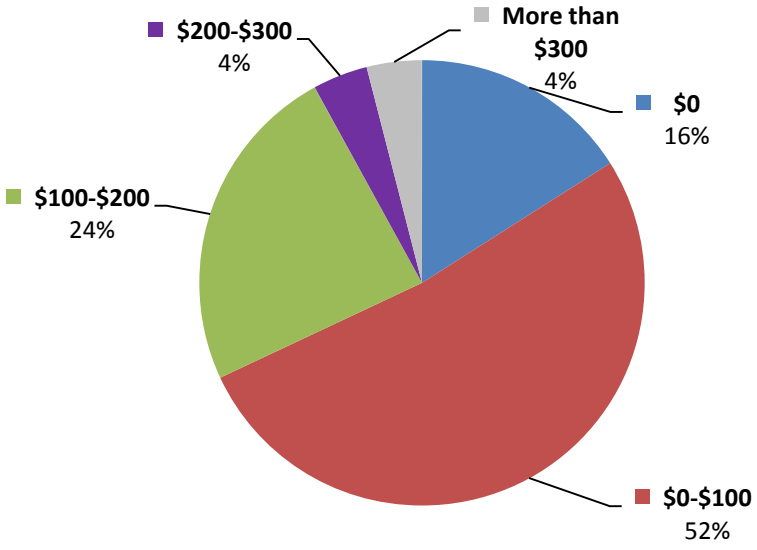
Respondents were also asked about their willingness to pay for a Wi-Fi programmable thermostat before they learned about the National Grid pilot program. The majority of respondents (12 of 25) reported that they would have paid between $0 and $100 (Figure 4).

Figure 4. If the cost of a non-Wi-Fi programmable thermostat was $200 including installation, how much more would you have been willing to pay for the Wi-Fi feature before you learned about the National Grid Wi-Fi thermostat pilot?



Survey respondents were then asked about their willingness to pay for a Wi-Fi programmable thermostat *after* they learned about the National Grid pilot program. More respondents reported a willingness to pay more money than if they had never heard about the program. For example, 52% of respondents (13 of 25) would pay between $0 and $100 and 24% of respondents (6 of 25) would pay between $100 and $200 (Figure 5).

Figure 5. Now that you have had a chance to use the Wi-Fi thermostat, if the cost of a non-Wi-Fi programmable thermostat was $200, how much more would you have been willing to pay for the Wi-Fi feature?

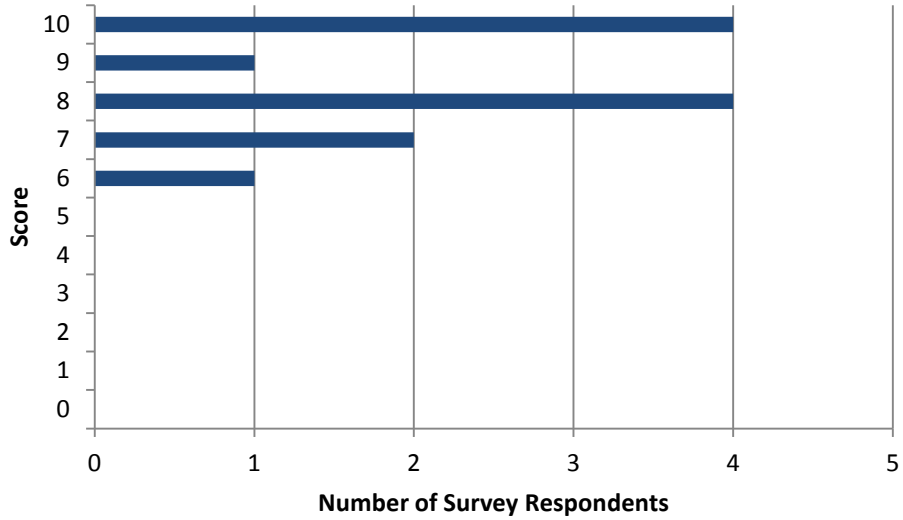


Energy Savings

Survey respondents were asked if they noticed a reduction in energy bills since participating in the pilot program. Nearly half of respondents (12 of 25) reported that they did notice a reduction in their bills, while only seven respondents reported they did not notice a difference. Other respondents did not know if they had seen a change.

Of those respondents who reported that they observed a change in their energy bills, the majority rated their satisfaction with the changes highly (Figure 6).

Figure 6. On a scale from 0-10, where 0 is "extremely dissatisfied" and 10 is "extremely satisfied," how satisfied are you with the energy savings you have seen by participating in the National Grid Wi-Fi thermostat pilot?



Non-Energy Benefits

Respondents were also asked about the non-energy benefits they observed in their households over the course of the pilot program. The majority reported that they did not observe a change in thermal comfort. Those who did report a change in thermal comfort rated it as a positive change; no respondent reported a negative change.

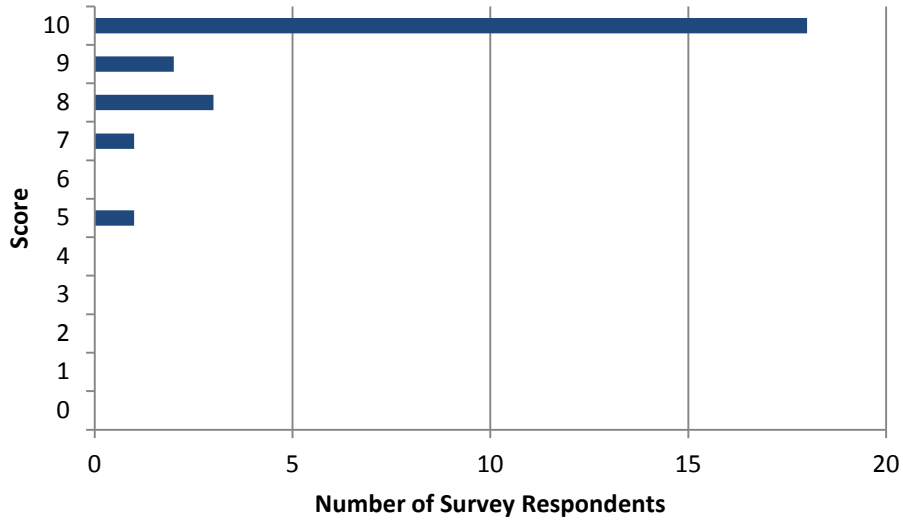
Although half of the respondents reported that they did not experience any non-energy benefits since participating in the program, some respondents did notice a change. Several reported that since installing the thermostat, they have:

- Become more aware of the temperature in their home
- Become more likely to adjust the temperature due to the thermostat's ease of use
- Observed household light usage and outside weather reports more closely

Program Satisfaction

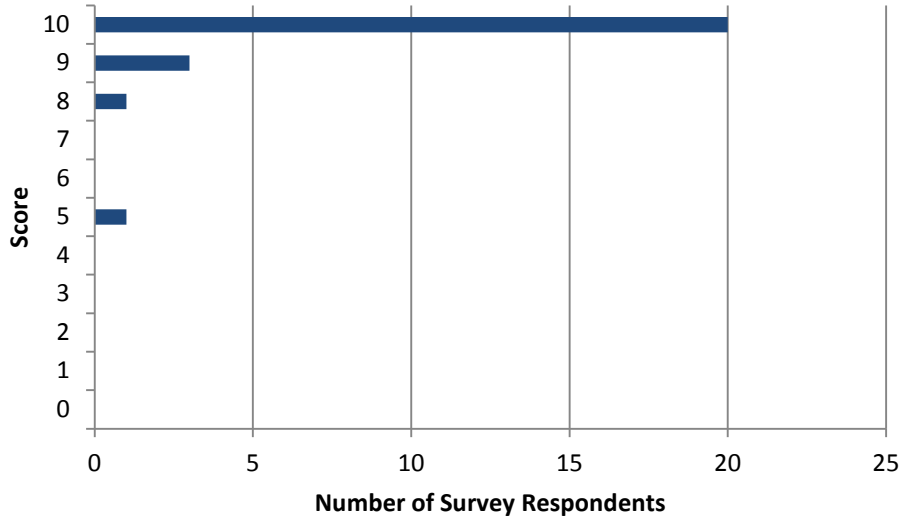
The majority of survey respondents rated their satisfaction with the Wi-Fi thermostat highly. The majority of people (18 of 25) rated their thermostat a 10 on a scale from 0 to 10 (Figure 7).

Figure 7. On a scale from 0 to 10, where 0 is extremely dissatisfied and 10 is extremely satisfied, how satisfied are you with your Wi-Fi thermostat?



Survey respondents' satisfaction with the program follows the same general pattern as their satisfaction with the thermostat unit, although respondents overall rated the program slightly higher than the thermostat (Figure 8).

Figure 8. On a scale from 0 to 10, where 0 is extremely dissatisfied and 10 is extremely satisfied, how satisfied are you with the National Grid Wi-Fi Thermostat Pilot Program?



Survey respondents suggested that the program could be improved by:

- Expanding the program to accept more participants from a wider area
- Improving the Web interface for households with two thermostats (i.e., making each thermostat's activity separately distinguishable)

- Providing more marketing materials (i.e., press releases, ads) to the general public
- Creating online tutorials or videos for participants who are not as knowledgeable about technology

6. Conclusions and Recommendations

Impact Evaluation

Both gas and electric savings were achieved through the pilot program. Based on our evaluation Cadmus recommends the following:

- **The gas savings for single thermostat installations (11% per thermostat) are considerably larger than for two thermostat installations (8% per thermostat)**. The multiple thermostats likely are controlling the same heating system but in a different lower usage zone or possibly serving a secondary heating system.
  - **Recommendation:** If a full scale Wi-Fi thermostat program is rolled out, consider these saving differentials during the program design and planning process.
- **The gas savings for non-programmable thermostat replacements (10% per thermostat) are larger than for programmable thermostat replacements (8% per thermostat).**). As expected when the Wi-Fi thermostats are replacing programmable thermostats, the percent savings are lower than for non-programmable thermostats. The Wi-Fi savings for programmable thermostat replacements form the lower bound of the heating seasons savings expected from the Wi-Fi thermostat installations.
  - **Recommendation:** If a full scale Wi-Fi thermostat program is rolled out, use separate percent savings estimates for heating for non-programmable or programmable thermostats.
- **The electric savings for non-programmable thermostat replacements are effectively equal to those for programmable thermostat replacements.** Not all occupants use the full functionality of their programmable thermostats. In cases where an occupant has a programmable thermostat but declines to use the schedule and set point functionality the thermostat is effectively a non-programmable thermostat.
  - **Recommendation:** If a full scale Wi-Fi thermostat program is rolled out, record the baseline set points and schedule as well as recording whether the baseline thermostat was programmable or non-programmable. Use this information to assess whether the baseline thermostat behavior was equivalent to a programmable thermostat or not.
- **Electric savings associated with Wi-Fi enabled thermostats vary significantly from one house to another**. The savings are very dependent on occupant behavior and baseline set point information. This baseline set point information was based on participant recollections of prior set points, which may be incorrect. To improve evaluability and increase confidence in savings, pre- and post-metered data are preferred.
  - **Recommendation:** Install energy metering equipment on air conditioner and air handler units belonging to program participants covering a period including pre-installation and post-installation time periods. Use this information to estimate program savings. This would increase confidence in the program savings estimate by showing how much energy is consumed for cooling prior to thermostat installation. The exact savings for each site could be calculated without making baseline assumptions or relying on participants to remember prior set points and schedules.

- **For some participants the energy savings benefits of a Wi-Fi enabled thermostat are similar to those of a standard programmable thermostat.** Whether a participant saves more energy with a Wi-Fi thermostat than they would with a programmable thermostat is difficult to quantitatively predict as the savings are reliant on participant behavior.
  - **Recommendation:** Determine the portion of participants that are using the programmable functionality of their thermostats when the Wi-Fi thermostats were installed. When a participant installs a Wi-Fi thermostat gather information about the baseline system including thermostat type and program status for future program evaluation purposes.

Process Evaluation

The process evaluation revealed that, in general, program participants and contractors were satisfied with their experiences in the program. However, based on participant responses, Cadmus recommends several actions for future Wi-Fi pilot programs.

- **Participant training process.** Although there was general satisfaction among participants regarding training, a few suggested a more intensive training session.
  - **Recommendation:** The installer should ask if the participant would like the installer to spend more time explaining technical aspects of thermostats at installation and/or to provide step-by-step instructions on how to use the Web portal. The participant would then have a chance to get more in-depth training if desired.
  - **Recommendation:** For participants who require more assistance operating the Wi-Fi thermostat, online tutorials or videos should be made available. Links to these tutorials on the Web portal could be distributed at installation.
- **Web portal.** Survey respondents were asked about potential improvements to the Web portal. Most respondents used the Website and reported that it was easy to use. Several participants recommended improvements.
  - **Recommendation:** The Web portal interface should be more user-friendly and this may be facilitated by improving the visibility of button functions and thereby lessening confusion when navigating the Website. The Web portal's help tutorial should also have a highly visible link to a FAQ page to answer common questions. The Web portal should be easier to use by households with two thermostats so each thermostat's activity is distinguishable.
- **Program processes.** In general, participants expressed satisfaction with the Wi-Fi pilot program processes. Only a few participants made suggestions for program improvements.
  - **Recommendation:** A few participants noted that most of their acquaintances who are also National Grid customers were not aware of the Wi-Fi thermostat pilot program. National Grid should provide more marketing materials, such as press releases or bill inserts, to increase awareness of the program.

7. Appendix A

Table 10. Example Ecobee Thermostat Data Export

Date	Time	Program Mode	Cool Set Temp (F)	Heat Set Temp (F)	Current Temp (F)	Current Humidity (%RH)	Outdoor Temp (F)	Outdoor Humidity (%RH)	Cool Stage 1 Run Time (sec)	Cool Stage 2 Run Time (sec)	Heat Stage 1 Run Time (sec)	Heat Stage 2 Run Time (sec)	Fan Run Time (sec)
5/24/2011	21:15:00	Home	75	45	73.7	40	73	66	300	0	0	0	300
5/24/2011	21:20:00	Home	75	45	73.6	41	73	66	300	0	0	0	300
5/24/2011	21:25:00	Home	72.2	54.3	73.7	40	73	66	300	0	0	0	300
5/24/2011	21:30:00	Sleep	70	62	73.7	40	73	66	300	0	0	0	300
5/24/2011	21:35:00	Sleep	70	62	74.1	41	73	66	300	0	0	0	300
5/24/2011	21:40:00	Sleep	70	62	74.2	40	71.1	68	300	0	0	0	300
5/24/2011	21:45:00	Sleep	70	62	74.1	40	71.1	68	300	0	0	0	300
5/24/2011	21:50:00	Sleep	70	62	74.1	40	71.1	68	300	0	0	0	300
5/24/2011	21:55:00	Sleep	70	62	74	40	71.1	68	300	0	0	0	300
5/24/2011	22:00:00	Sleep	70	62	73.9	40	71.1	68	300	0	0	0	300
5/24/2011	22:05:00	Sleep	70	62	73.7	39	71.1	68	300	0	0	0	300
5/24/2011	22:10:00	Sleep	70	62	73.3	40	71.1	68	300	0	0	0	300

Figure 9. Condenser Power Curve