Raquel Webster
Senior Counsel

May 15, 2019

BY HAND DELIVERY AND ELECTRONIC MAIL

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

RE: Docket 4755 - National Grid Electric and Gas Energy Efficiency Programs
2018 Year-End Report

Dear Ms. Massaro:

I have enclosed ten copies of National Grid's[1] 2018 Energy Efficiency Year-End Report (Year-End Report), which summarizes the electric and natural gas results, program highlights, and customer experiences during the 2018 program year. The Company has provided a copy of the Year-End Report to the parties in this proceeding.

Thank you for your attention to this matter. If you have any questions, please contact me at 781-907-2121

Sincerely,

Raquel J. Webster

Enclosures

cc: Docket 4755 Service List
Jon Hagopian, Esq.
John Bell, Division

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

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The Narragansett Electric Company
d/b/a National Grid

2018 Energy Efficiency Year-End Report

May 15, 2019

nationalgrid

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Attachments:

Overview

2018 was successful for National Grid's[1] 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. 4755 on November 1, 2017 and approved by the Rhode Island Public Utilities Commission (PUC) at its open meeting on January 9, 2018.

The primary goal set forth in the 2018 Settlement of Parties was to "create energy and economic cost savings for Rhode Island consumers through energy efficiency.[2]" 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 are far greater than 1, indicating that the Company's programs created positive value to Rhode Island for every dollar invested in 2018. In total, the 2018 programs will create electric cost savings of $196.4 million and gas cost savings of $75.3 million for Rhode Island customers over the life of the installed energy efficiency measures.

In addition to cost savings, the 2018 energy efficiency programs created significant economic benefits to Rhode Island. The programs supported 804 full-time equivalent (FTE) workers in 2018. 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. In fact, of the 1,109 companies and agencies involved in National Grid's 2018 energy efficiency programs, 73% were located in Rhode Island.[3] In addition, the 2018 energy efficiency programs will add over $74.4 million to Rhode Island's Gross State Product (GSP).

Another goal of the 2018 Plan was to achieve electric and gas savings targets established in the 2018 EE Program Plan, which were consistent with the goals established for 2018 in the 2018-2020 Three Year Least Cost Procurement Plan. The 2018 electric savings target was 186,855 MWh. At the end of the year, the Company achieved 206,209 MWh energy savings, which represents 110.4% of that goal. The achieved savings equal 2.75% of the referenced 2015 electric load. The Company also had an annual kW savings goal of 24,802 kW, and at the end of the year, it had achieved 28,811 kW savings, which represents 116.2% of that goal.

The 2018 gas savings target was 414,795 annual MMBtu. At year's end, the Company achieved 497,119 annual MMBtu, which represents 119.8% of that goal. The achieved savings represents 1.21% of the referenced 2015 natural gas load. 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.

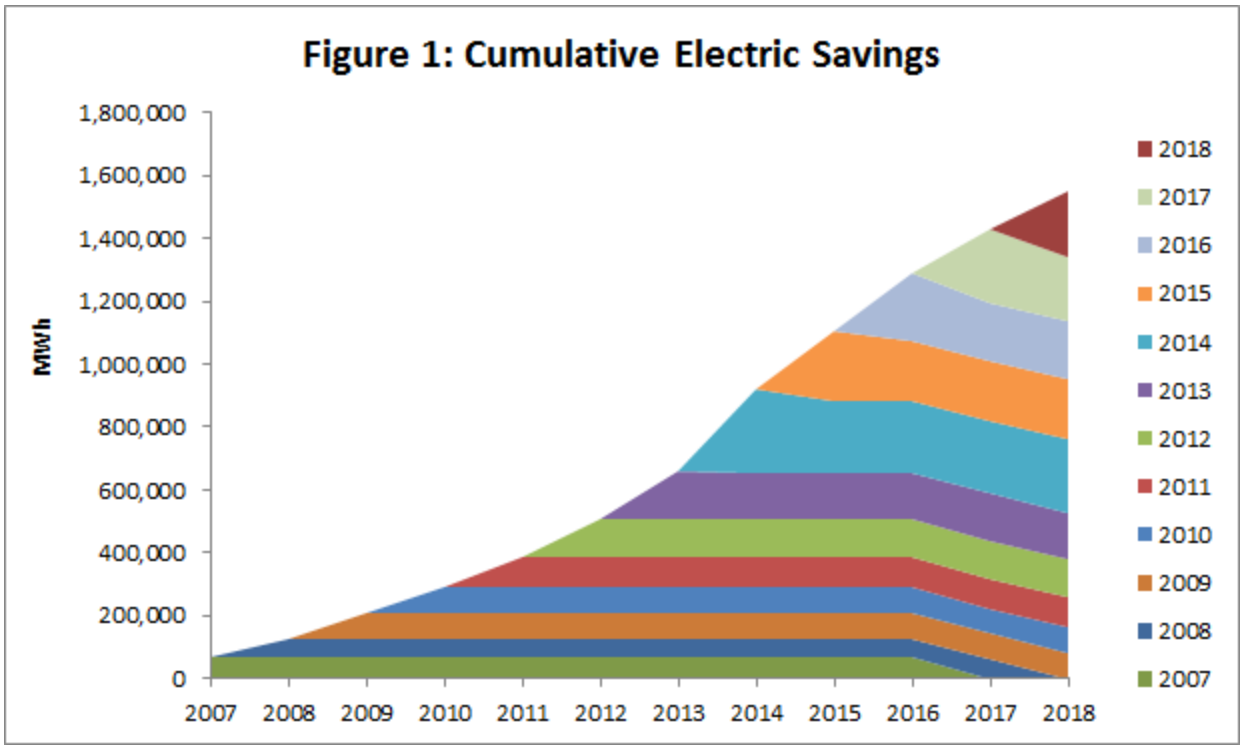
[1] The Narragansett Electric Company d/b/a National Grid (National Grid or Company).
[2] Energy Efficiency Program Plan (EEPP) for 2018, Settlement of the Parties, November 1, 2017, Docket 4755, page 1.
[3] Peregrine Energy, Analysis of Job Creation from 2018 Expenditures for Energy Efficiency in Rhode Island by National Grid, April 2019. Copy included in Attachment 5.

	2018 Goal/Benchmark[4]	2018 Actual[5]	% of Goal
Electric			
Annual MWh Savings	186,855	206,209	110.4%
Annual kW Savings	24,802	28,811	116.2%
Lifetime Benefits ($Mil)	$342.4	$369.8	108%
RI Test Benefit/Cost Ratio	2.84	2.99	105%
Gas			
Annual MMBtu	414,795	497,119	119.8%
Lifetime Benefits ($Mil)	$101.5	$113.1	111%
RI Test Benefit/Cost Ratio	2.76	3.11	113%
	2018 Budget ($Mil)[6]	**2018 Actual ($Mil)[7]**	**% of Goal**
Electric			
Total Expenditures[8]	$94.6	$93.0	98%
Total Implementation Expenses[9]	$90.2	$88.1	98%
Gas			
Total Expenditures	$28.1	$28.8	102%
Total Implementation Expenses	$26.8	$27.2	101%

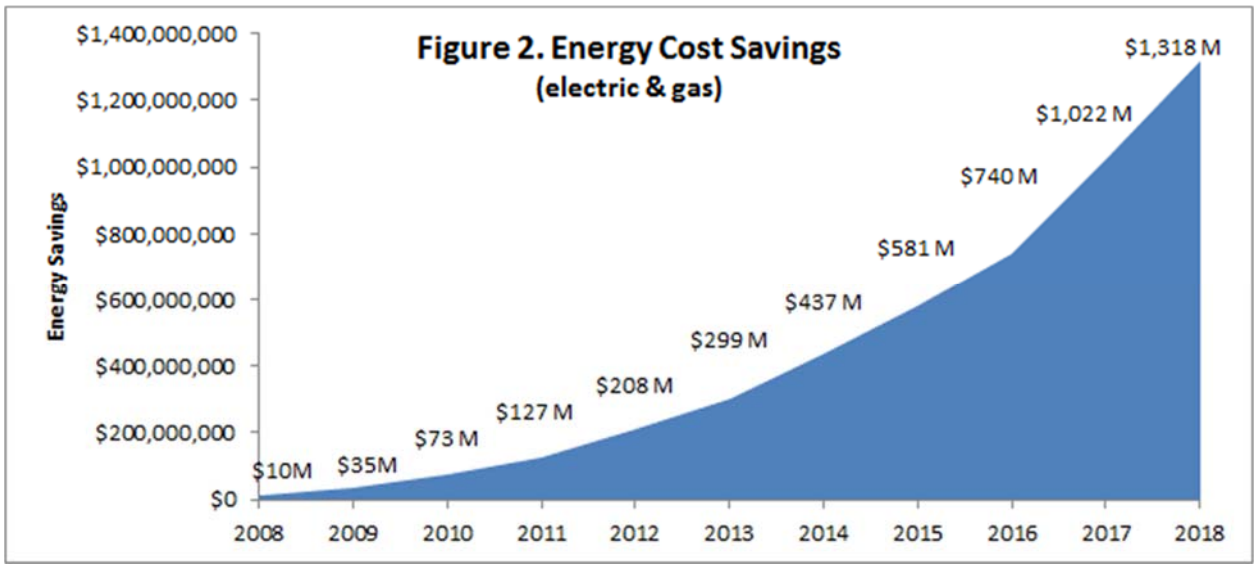
A few key factors helped to drive the electric and gas sectors to exceed their 2018 electric and gas savings goals. On the electric side, the transformation of the residential LED market continued, with LED prices falling below $1/bulb, contributing to the portfolio's strong performance. Additionally, the budget cap requirement set forth in House Bill 5175 Sub A served to limit the budget and goal for the portfolio. Without the budget cap the portfolio's goals would have been higher and the % of MWh goal achieved would have been smaller. On the gas side, the strong performance was principally driven by the Home Energy Reports gas program. The program well-exceeded its goal due to the fact that gas savings per household continued to ramp up from previous years. Savings goals for both the ENERGY STAR® Lighting and Home Energy Reports programs have been adjusted upwards for the 2019 Annual Plan to account for their strong performances in 2018.

The energy savings achieved as part of the 2018 Plan provided a meaningful contribution to Rhode Island's electricity needs. Since 2007, energy efficiency has saved over 8.5 million MWh at a cost lower than the cost of supply. As shown in Figure 1 below, these savings accumulate over the average ten-year lifetime of the installed measures. The only exception is the savings from Home Energy Reports. This program only has a one-year measure life and is counted as such in Figure 1. At the end of 2018, the cumulative energy savings met 17% of Rhode Island's electric load.

[4] See 2018 EEPP Settlement of the Parties, Docket No. 4755.
[5] Actual savings in 2018.
[6] See 2018 EEPP Settlement of the Parties, Docket No. 4755.
[7] Actual spend in 2018.
[8] Includes implementation costs, EERMC and OER costs, and shareholder incentive.
[9] Includes all program-related expenses, i.e. incentives, administration and general expenses, marketing, sales, technical assistance, evaluation, and training. Also includes Finance Costs and payments to the Rhode Island Infrastructure Bank (RIIB) as detailed in Tables E-3 and G-3 in this report.



Since 2008, natural gas energy efficiency programs have also created significant cumulative savings. From 2008 to 2018, over 15.5 million MMBTUs of natural gas were saved. The combination of electric and natural gas savings, procured at a cost that is less than the cost of supply, has created significant savings for customers. As shown in Figure 2, cumulative electric and natural gas savings since 2008 have saved Rhode Islanders $1.32 billion in energy costs.



To achieve the 2018 energy savings goals, the Company employed four strategies initially introduced in the 2018-2020 Energy Efficiency and System Reliability Procurement Plan (Three-Year Plan) in Docket 4684. 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 focused on the "Customer." By focusing first and foremost of the needs of the customer in all segments, the Company sought to provide services which enables customers to control their energy usage, reduce their bills, and help support their financial well-being. For example, the flagship EnergyWise program introduced a new language line, allowing customers fluent in languages besides Spanish and Portuguese to more easily utilize the program's services. The Home Energy Reports program enrolled 24,961 customers in Non-AMI (Advanced Meter Infrastructure) High Bill Alerts where customers were sent emails when they were deemed to be on track for a high bill, allowing them to take action to reduce energy usage prior to receiving a high bill. Approximately 132,000 high bill email alerts were delivered in 2018. Enhancements were also made to the multifamily sector in 2018, including customized condo website portals to improve accessibility to the multifamily program that has traditionally been underrepresented. For commercial and industrial customers, the Rhode Island Digital Application Portal was rolled out in 2018 to give customers and vendors the ability to submit incentive forms electronically without having to scan or mail multiple forms for the installation of different types of energy efficient equipment. By focusing on the needs of the customer first, the Company seeks to continually improve services to customers and make it easier for them to participate in energy efficiency programs and reduce their energy usage and bills.

The second strategy was "Least Cost" which seeks to deliver energy efficiency services as cost-effectively as possible through optimizing finance and promoting upstream initiatives. Examples of promoting cost efficiency included leveraging numerous financial tools including On Bill Repayment (OBR), Heat Loans, the Efficient Building Fund (EBF), taking advantage of LEDs below $1/bulb, and enhancing code trainings. A notable finance offering addition was the establishment of a $500,000 revolving loan fund with the Capital Good Fund to support financing of energy efficiency measures moderate-income customers. In 2018, 756 loans were processed totaling approximately $4.4 million in project costs. In 2018, National Grid also began discussing Metrus Energy's Efficiency as a Service offering and a MOU was signed with Metrus in 2019. Metrus has completed projects with numerous Fortune 500 companies across the United States.

The third strategy was focusing on the "Environment." Maximizing energy efficiency savings provides the greatest contribution energy efficiency programs make to reducing Rhode Island's greenhouse gas emissions and contributing to the state's clean energy policy goals. As a part of these efforts there were several specific actions taken in 2018 which contributed to greenhouse gas reductions. In October 2018, National Grid's HVAC program launched a high efficiency electric heat initiative to incentivize the replacement of carbon-incentive delivered fuels with Air Source Heat Pumps (AHSP). This initiative is expected to ramp up over the next several years. In addition, delivered fuel customers received parity in incentive levels for weatherization in the EnergyWise program in the second half of the year, helping to drive more participation and create additional greenhouse gas emissions reductions. In total, the

electricity, delivered fuel, and natural gas savings delivered by the 2018 Plan save over 1,266,000 tons of carbon over the life of the installed measures.

"Innovation" was the final strategy pursued in 2018. Continually innovating to capture energy efficiency savings from new technologies and program process improvements is critical to the long-term sustainability of the Company's nation-leading energy efficiency programs. As such the Company pursued several areas to pave the way for future energy savings while seeking integration with energy efficiency, demand response, and renewable energy. In 2018, National Grid kicked off the Path to Zero Ready Demonstration to complement the Residential New Construction Program and also to provide new opportunities to support the growth of the zero-energy home market. Zero Energy Ready homes are designed with additional focus on air sealing, insulation, ventilation, and being PV and EV ready. In 2018 the Company also concluded its demand response (DR) demonstration for commercial customers the program reduced peak loading on the grid by 18 MW. Due to the success of this program, the company proposed to transition this demonstration to a regular energy efficiency program in 2019. The Pilots and Other Initiatives section of the year end reports highlights additional innovative efforts pursued by the Company in 2018.

The following sections in this report outline the highlights for the different programs and initiatives that comprise the 2018 Rhode Island Energy Efficiency Portfolio. Many activities undertaken in 2018 laid the foundation for inclusion in the 2019 Energy Efficiency Program Plan, which the PUC approved in Docket 4888 at the Open Meeting on December 20, 2018.

Residential Programs

Overview

In 2018, the residential sector was cost-effective with RI Test benefit cost (B/C) ratios of 2.57 for electric programs and 2.35 for gas programs. The Company spent 102.0% of the electric residential implementation budget, achieved 118.3% of electric targeted annual energy savings, and achieved 122.4% of electric targeted annual demand savings. The Company spent 96.0% of the gas residential implementation budget and achieved 141.8% 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.

EnergyWise

Energy*Wise* provides in-home outreach and education to customers interested in pursuing energy efficiency improvements in their home. During the initial visit, known as the home energy assessment, energy specialists spend two-to-three hours educating the customer about their home's performance. A comprehensive, whole-house approach is taken where the major energy components of a home are considered and the interactions between systems are explained. Rhode Island customers are fortunate to benefit from two-person assessment teams in most cases. During the two-person assessment, one staff member focuses on upgrading instant-savings opportunities such as installation of energy efficient lighting, pipe insulation, efficient water savings devices, and advanced power strips. The second

assessment team member is dedicated to learning about the customer's concerns with their home such as high energy usage, drafty areas, or cold rooms. The specialist then brings the customer through the home identifying opportunities to improve the systems (heating, water heating, and appliances) and building envelope, the exterior structure of the residence where air leakage can occur, and educates them on how these improvements will improve household comfort while saving on energy bills. Information about the home's heating fuel source, age of systems, and solar system feasibility are captured to leverage with other efficiency programs. At the completion of the assessment, the customer receives and Energy Action Plan that indicates additional energy savings opportunities and any incentives or financing that are available towards the energy efficiency upgrades. The two-person team minimizes the length of time at the customer home with a dedicated specialist focused on answer a customer's questions and educating about their home's energy use.

Customers that proceed to the next phase of Energy*Wise* receive weatherization upgrades. These improvements seal areas where unconditioned air leaks into the home and conditioned air leaks out, and increase insulation in the walls, attic, and basement areas as needed. Weatherization brings a noticeable difference in the comfort level of a customer's home if the residence was previously drafty or lacking in insulation. This upgrade also provides efficiency savings for the next twenty years regardless of who occupies the residence. Homeowners that complete weatherization upgrades improve comfort while saving money on energy costs.

Overview of Performance

2018 was an outstanding year for the Energy*Wise* program. The combination of a cooler winter and improving economy encouraged customers to invest in energy efficiency improvements. Delivered fuel customers received parity in incentive levels in Q3 and Q4. Over 10,000 customers received home energy assessments and more than 3,700 customers proceeded with weatherization. 756 customers financed energy efficiency upgrades with the 0% Heat Loan totaling $4.4 million in improvements.

Highlights

In 2018, Energy*Wise* was awarded the Sustained Excellence, ENERGY STAR® Partner of the Year award for Energy Efficiency Program Deliver by the U.S. Environmental Protection Agency and the Department of Energy for the third consecutive year. Sixteen Independent Insulation Contractors also received the Century Club Award from ENERGY STAR® for completing 100 or more weatherization projects during 2017. Rhode Island is a recognized leader in protecting the environment through energy efficiency and for the outstanding quality control process that customers receive in Rhode Island.

In 2018 the program also had the following enhancements:

- A revolving loan fund was established at the Capital Good Fund to enhance energy efficiency financing opportunities for moderate income customers.
- A new language line was introduced that will accommodate languages beyond Spanish and Portuguese.
- In the second year of offering Wi-Fi thermostat installations, nearly 1,000 thermostats were installed.

- The U.S. Department of Energy's Home Energy Score test was initiated with 71 completed scores by year end. At the request of RI's Office of Energy Resources, National Grid is testing the DOE's Home Energy Score results in lieu of the Energy*Wise* Action Plan. The data presented on the reports are slightly different with the Home Energy Score focused on presenting a single value between 1 to 10 that describes how much energy that specific home uses. In 2019 the Company will see if the Home Energy Score resulted in a change in customers moving on to weatherization.

ENERGY STAR® Lighting

The successful transformation of the Rhode Island residential lighting market has been supported by the efforts of Rhode Island's ENERGY STAR® Lighting Program. Starting in 2017 when the program exclusively provided incentives to light emitting diode (LED) technology, Rhode Island customers have responded by purchasing these bulbs in high volume from retailers, via flash sale promotions, at a pop-up retailer, and through other specialized channels such as direct sales with students in the School Fundraiser campaigns or receiving free bulbs at local food banks. The majority of lighting products in 2018 were sold at Rhode Island retailers through upstream buydowns between lighting manufacturers and the retailer. The bulk purchase and presence of the Rhode Island lighting incentive provides quality LED lighting products at lower shelf prices for customers. The Lighting Program's goal to provide affordable and accessible efficient lighting is paired with providing education so consumers select a lighting product that meets their needs and expectations.

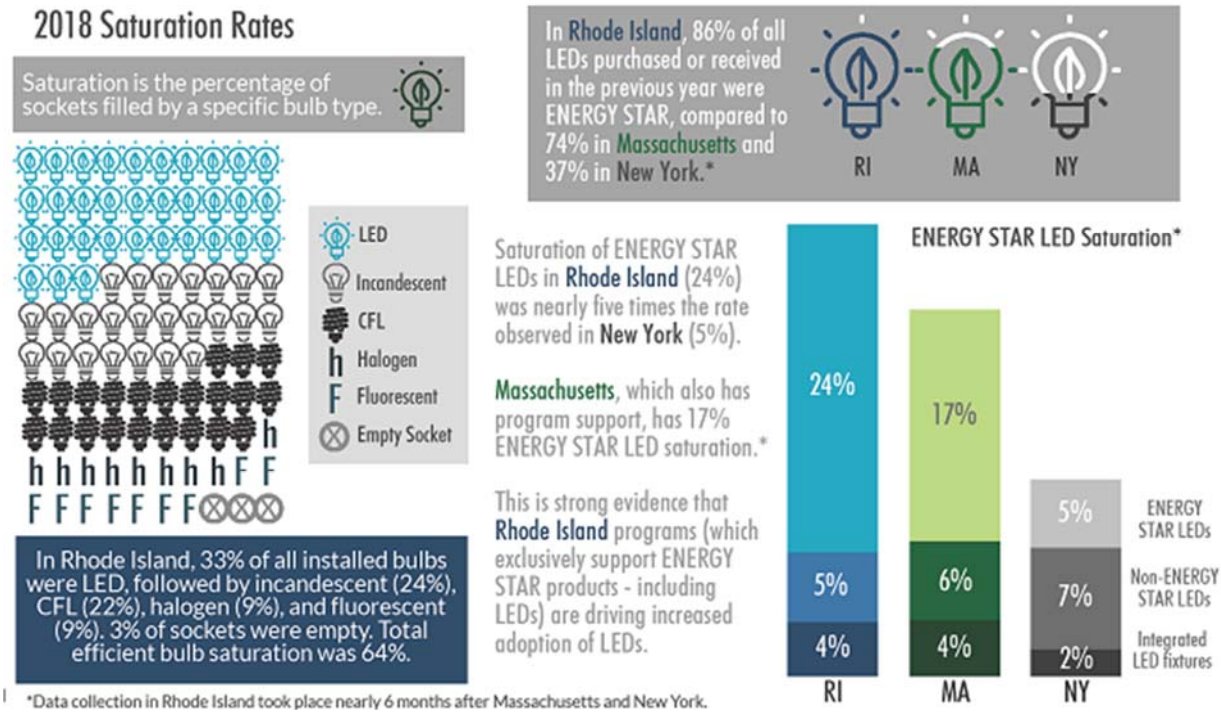
Overview of Performance

In 2018, the program supported a good portion of the State Appropriations on 2018 EE Plan Electric Portfolio set forth in House Bill 5175 Sub A. The overall result was a reduction to the ENERGY STAR Lighting budget. In order to meet retailer expectations for program support, a decision was made in February to suspend all flash sales which have been a very popular channel for lighting purchases. The benefit is that the majority of lighting sales took place at local retail stores. The ENERGY STAR® Lighting program achieved 139% of the savings goal while reaching over 430,000 participants.

Highlights

There were a lot of interesting, external interactive effects on lighting in 2018. While LED prices appeared to have stabilized after a great rush in 2017 to reach the $0.99 per bulb pricing, there were some indicators that LED prices may increase somewhat in 2019. The largest potential impact comes from a U.S. tariff on Chinese imports, where the majority of LED bulbs are manufactured. Some manufacturers were considering moving production to tariff-free countries when possible.

Evaluation studies analyzing 2017 lighting data found Rhode Island's market share sales of LEDs accounted for 55% of all bulb sales which is the second highest rate in the nation. In-home visits during 2018 found that the saturation rate (defined as the percentage of sockets filled with a specific bulb type) of all LEDs was 33% and for ENERGY STAR specific LEDs it was 24%. These data are compared against NY state saturation levels where there are no residential lighting incentives for LEDs. Important to note beyond the much higher saturation rate in RI is also the stronger presence of ENERGY STAR LEDs in RI, which are the products receiving Rhode Island LED incentives.



The school fundraiser component of the program, which allows students to sell energy efficient products to raise funds for their school, was redesigned. Rather than selling individual lights, packages were designed that simplified the purchasing decision. Each school participating in the fundraiser program also received an energy efficiency training where kids were taught how to identify energy waste and reduce that waste around their home.

2018 was the second consecutive year of providing LED lamps to local RI Food Banks. Each food bank customer receives a two-pack of LEDs and information about the income eligible program where the customer can have no-cost energy efficiency upgrades in their home.

In 2018 and continuing into 2019, National Grid will be working closely with its Lead Vendor, retailers, manufacturers, the EERMC consulting team, and other leading lighting experts to develop a smooth transition plan for the best time to exit a transformed market.

ENERGY STAR® APPLIANCES

In 2018, the ENERGY STAR® Appliances program focused on efficient dehumidifiers, dryers, room air cleaners, room air conditioners, pool pumps, advanced power strips, refrigerator and freezer recycling, dehumidifier recycling, and efficient shower heads. This program works in tandem with ENERGY STAR® Lighting by leveraging resources with in store retailer visits and social media campaigns when appropriate, however in 2018 with lighting constrained by budget, ENERGY STAR Appliances benefitted with additional flash sales. An online training platform is used within this program and ENERGY STAR Lighting to train retail sales staff about products and functions as a critical resource for retailers when there are numerous products and features associated with the different appliances.

Overview of Performance

The ENERGY STAR® Appliances program reached 149% of its savings goal while serving over 19,600 participants.

Highlights

The ENERGY STAR® Appliances program had a successful year with strong performance in dehumidifier incentives and recycling, dryer, room air cleaners, room air conditioner, and Tier 2 advanced power strip incentives, and the mid-stream pool pump initiative. Flash sales of advanced power strips, dehumidifiers, and room air conditioners performed well. The humid summer also supported sales of dehumidifiers in the state. Monthly consumer outreach tables were staffed in different retailer locations throughout the year to engage with customers during their everyday shopping experience and to promote energy efficiency.

Home Energy Reports

In its sixth year running, the Rhode Island Home Energy Reports (HER) program continues to encourage energy efficiency behavior through personalized print and email reports, and a seamlessly integrated website. Each of the communication channels displays energy consumption patterns and contains a normative comparison to similarly sized and similarly heated homes, as well as to an energy reduction goal for each customer. 282,593 Rhode Island customers received reports in 2018.

Overview of Performance

In 2018, the HER program saved customers 23,527 MWh and 132,562 MMBtu, reaching 94% and 172% of the Company's electric and gas goals, respectively. The reports not only provide valuable EE savings, but also provide a communication the customer finds valuable; in fact, less than 2% of all customers have opted out of the program.

The gas program continued to perform better than expected. A high savings rate was especially notable in the heavy-usage / high-savings months of January thru March. Gas usage variability is largely due to the influence of weather on gas heating, and this is another contributing factor in the Company's over-performance on the gas side. The gas savings goal for Home Energy Reports program has been adjusted upwards for the 2019 Annual Plan to account for its strong performance in 2018.

Highlights

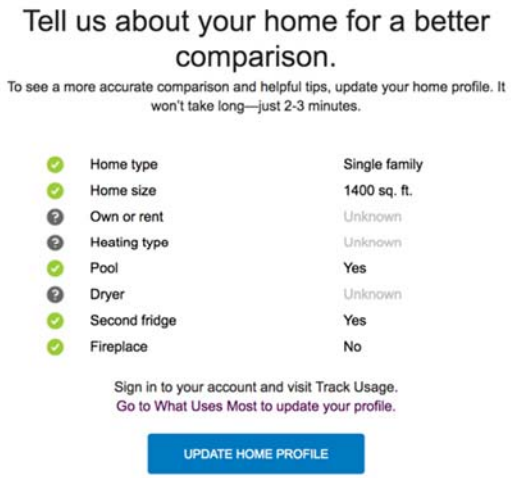
In 2018, Rhode Island continued to be a leader in behavioral energy efficiency innovation and customer engagement. National Grid expanded and improved email Non-AMI High Bill Alerts for customers, released an email Personal Tracker module, cross-promoted their paperless billing program, and ran a home energy audit campaign.

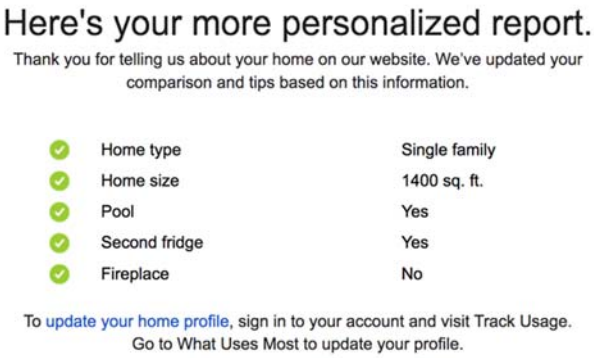
- **Email Non-AMI High Bill Alerts:** Rhode Island enrolled 24,961 customers in Non-AMI High Bill Alerts, layering them on top of the Home Energy Report program to maximize savings. These alert emails, which use weather data and historical usage data, were sent to customers when they were

deemed to be on track for a high bill. During 2018, the algorithm was refined to provide more accurate bill forecasts. Approximately 132,000 email alerts were delivered in 2018.

- **Email Personal Tracker Module:** The email personal tracker module was created and added to the Email Home Energy Reports (eHER) of all Rhode Island customers. The experience allows a customer to see their usage over time, and compare that usage to similar time periods from the previous year. This helps customers see their performance over time, and creates a more personalized experience for each customer.

- **Paperless Billing:** In June of 2018, National Grid ran a campaign in the eHER to cross promote the paperless billing program. This module was delivered to all eHER customers. During the campaign, 40% of National Grid Rhode Island customers that signed up for paperless billing had navigated to the program through their Email Home Energy Report.
- **Home Energy Audit Campaign**: In February of 2018, a campaign was run to drive customers to fill out their online Home Energy Audit (HEA). Customers were presented with the current information in their home profile and were prompted to fill out the online HEA to provide more information. This information provides a better user experience with more accurate tips and a more accurate neighbor comparison. During the campaign, National Grid Rhode Island saw a 97% increase in the number of customers that had completed the online HEA.





Residential New Construction

The Rhode Island Residential New Construction (RNC) program guides building professionals and homeowners through the process of designing and building an energy efficient home. The RNC process includes educational outreach, no-cost plan analysis, advanced energy consulting, in-field technical assistance, insulation and air sealing analysis, third-party blower door and duct blaster testing, installation of high-efficiency lighting (LEDs), energy-saving showerheads, a HERS (Home Energy Rating System) Index rating and energy performance-based incentives.

A new program baseline to determine savings for the RNC program was developed in 2017. All projects completed in 2018 were held to the new, significantly more stringent 2017 baseline. RNC representatives worked closely with participants to determine the impact on each of their projects and offered technical guidance on how to improve their performance to meet the higher standards of the program.

To ease the transition, the incentive structure for RNC was changed in 2018. The new incentive levels were designed to:

- Keep project teams engaged in the program and maintain participation
- Soften the impact on better performing projects
- Provide achievable steps to facilitate performance improvement

2017	Savings Over Baseline		2018	Savings Over Baseline
Tier 1	15 – 30%		Tier 1	15 – 24%
Tier 2	31 – 44%		Tier 2	25 – 34%
Tier 3	45%		Tier 3	35 - 44%
			Tier 4	45%

Overview of Performance

2018 goals were based upon a three-tiered incentive structure. Despite the adoption of a more stringent baseline the savings goals for 2018 were met. The RNC program reached 157% of its electric savings goal and 289% of its gas savings goal while serving 458 customers. The program's overperformance can be attributed to successful execution of a new incentive structure in response to an updated program baseline. The RNC program's 2018 savings targets were based on the assumption that the program's traditional three tier incentive structure would continue unchanged despite a significant program baseline update set to take effect in 2018. However, National Grid designed and deployed a new four tier incentive structure for 2018 to better align with the new program baseline. This four-tier incentive structure was especially successful in encouraging builders of single family homes, more than 90% of which heat with gas or propane, to achieve levels of performance beyond the new program baseline comparable to their previous projects relative to the previous baseline.

	2018 Goal**	**2018 Total**
Tier I 15-29% savings*	159	242
Tier II 30-44% savings*	197	196
Tier III 45+% savings*	10	8

* Based on the 2017 User Defined Reference home

** Based upon three levels of savings

Highlights

2018 continued to see a high number of non-gas heated homes. Several large developers chose to install heat pumps instead of gas heat systems. 36% of total completed units were heated by electric air source heap pumps, which is a similar level to 2017 (38%), but much higher than in prior years.

National Grid successfully supported the expansion of the local HERS Rater community resulting in a 100% increase in the number of certified raters. The objective was to train, certify and mentor Rhode Island based individuals and companies, and provide them with the opportunity to perform HERS ratings on behalf of the RNC program. This will create a larger local network of energy efficiency professionals, promote workforce training and development, and can facilitate the successful transition to a fully open-rater program model in which Rhode Islanders can compete effectively with experienced HERS raters from surrounding states.

- Phase 1 - Market Assessment (Q1 2018): RI-based companies were identified and contacted to gage interest, and meetings were held with each company to provide an overview of the RNC program and associated opportunities. Primary candidates were individuals who were known to provide third party verification in the state, including those who perform energy code compliance testing, and those who have Building Performance Institute (BPI) certifications.
- Phase 2 - Training (Q2 2018): A no-cost, five-day, HERS Rater training session was delivered by a RESNET (Residential Energy Services Network) accredited Rater Trainer from CLEAResult. The

course included both classroom and infield training, culminating in a final written exam on the sixth day.

- Phase 3 - Certification (Q3 2018): RNC program HERS Raters provided technical guidance and mentorship to help participants complete the final steps towards their official certification, which included several online exams, performing the required supervised HERS ratings and offering access to RESNET certified Providership.
- Phase 4 – Program Participation (Q4 2018): Three new HERS Raters became officially certified and are now able to perform ratings for the RNC Program. This will enable them to broaden the scope of their services as third party energy specialists which can be instrumental in increasing the energy efficiency of homes across the state.

National Grid developed a new offering specifically for adaptive reuse projects. Significant renovation and rehabilitation efforts are currently underway throughout the state of Rhode Island, many of which involve converting abandoned mill and factory buildings into residences. While several adaptive reuse projects representing hundreds of units have participated in National Grid's RNC program to date, many of these types of projects want to preserve their historic characteristics, which can make it challenging for them to meet certain RNC program specifications. The decision to convert these types of buildings from one use to another presents a critical opportunity during the life of the building during which design and construction choices can have a major impact on energy efficiency. Due to the inherent complexity of these structures and the potential constraints, RNC developed a set of prescriptive options specifically for these types of buildings. This new offering, with a tiered incentive structure based on energy savings, is currently being launched as the Adaptive Reuse Initiative and has been offered to several upcoming mill renovations.

High Efficiency "HVAC" (Electric and Gas) - Heating, Cooling and Hot Water

The High-Efficiency Heating and Cooling Programs promote the installation of high efficiency gas and electric space heating and cooling equipment, water heating measures, and controls through the use of tiered customer rebates. The programs also provide contractor training and incentives for proper equipment sizing, quality installation verification and distribution system improvements.[10]

Overview

In 2018, the ENERGYSTAR® HVAC (Heating and Cooling) program, the Gas Heating program achieved savings slightly over goal at 105%, and the electric heating and cooling program achieved slightly under goal at 95%.

The program's lead vendor maintained strong relationships throughout the year with trade allies. Field and outreach support, as well as contractor trainings, were offered to expand on efforts to promote quality installations best practices. Rebate forms and summary sheets were distributed at supply houses and networking events to ensure HVAC industry partners were able to communicate program offerings to their customers.

[10] 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.

Several program enhancements and offerings were introduced in 2018, each of which support National Grid's efforts to reduce CO_2 emissions in oil and propane heating systems and electrical consumption of air source heat pumps.

Overview of Performance

The High-Efficiency Heating and Cooling Programs reached 95% of its electric savings goal and 105% of its gas savings goal and served over 5,700 electric and gas participants.

Highlights

- To improve customer satisfaction, and streamline rebate processing, National Grid changed rebate fulfilment centers towards year end for the Heating and Cooling rebate offers. This same vendor also processes the Heating and Cooling rebates for National Grid's Massachusetts programs.
- In October 2018, National Grid launched a high efficiency electric heat program with incentives for Air Source Heat Pumps (AHSP) to encourage the replacement or displacement high CO_2 heating fuels. AHSPs provide retrofit customers with energy efficient space heating (and cooling) solutions. In addition, pairing an ASHP with Integrated Controls can help to effectively and efficiently prioritize the use of the ASHP as the primary heating source and calling on the oil or propane systems when back up is needed. The electric heat program requires a completed Energy*Wise* assessment and completed weatherization measures. Customers can apply for 0% financing for up to $15k over 7 years through the Heat Loan program to help offset the cost of the ASHP system. As proper sizing and installation is paramount with ASHP, the Program trained four Rhode Island-based HVAC contactors to launch this initiative. The four contractors attended training focused on proper equipment sizing and selection, installation guidelines, integrated control specifications and homeowner education. In 2018, a total of 11 customers completed ASHP installations, totaling over $30k in rebates.
- Mini-Split (MS) Check**,** a contractor-incentivized offer, became a new measure for 2018. The new diagnostic testing procedure ensures the proper charge of mini-split heat pump (MSHP) systems, improves the confidence of contractors who install the product and reduces customer call backs. With the installation of MSHP steadily increasing, the MS Check test will ensure that savings are accurate, and equipment is working properly. Due to a late launch, and the seasonality of the testing, five MS Checks were completed in 2018. With the 2019 increased electrification offerings for MSHPs in 2019, this volume is expected to increase dramatically.
- The program's lead vendor worked with internal developers to design a new web-based portal, HVAC Check, to support the reporting of AC Check and MS Check diagnostic tests. Launched in August 2018, this new database offers a wide range of contractor benefits including visibility into their test activity. In addition to reporting and monitoring of test data, the portal tracks all trained technicians' certification start and end dates, and monitors participation to verify eligible candidates for the Rhode Island list of trained contractors. HVAC Check saves contractor and technician time in the field by eliminating the need to phone in their tests. Participants now have

the ability to enter test data directly into the portal from their smart phone, tablet or laptop for immediate pass/fail test results. A total of 64 tests were performed by RI contractors in 2018, including MS Check and AC Check, and were reported in the new portal.

- The Annual Rhode Island Trade Alley event was held in Feb 2018. The number of contractors invited to the event increased over 43% and pre-registration increased approximately 7% from 2017.

- 2018 RI Contractor Training Recap:

Training Type	# of Sessions	# of Contractors	# of Technicians
AC Check	4	7	28
MS Check	5	21	67
AC Check Refreshers	2	2	11
Total	**11**	**30**	**106**

Multifamily

The Rhode Island Multifamily Retrofit program serves market rate and income eligible gas and electric customers as well as commercial gas customers.

Overview of Performance

The Market Rate Multifamily Retrofit program achieved 67% of the electric goal and 93% of the gas goal. The Income Eligible Multifamily Retrofit program achieved 75% of the electric goal and 146% of the gas goal. The C&I Multifamily Gas program had a very solid year finishing at 224% of goal.

Broadly speaking the multifamily program exceled in meeting and exceeding most of the gas goals by identifying numerous opportunities for heating boilers. In contrast, the income eligible and market rate multifamily areas were challenged in meeting their electric goals in part due to declining opportunities for lighting savings, which make up a significant portion of the program's savings goals.

The program served a wide audience, with 1/3 of the all facilities served being complexes with less than 25 dwellings. Of the complexes served in 2018, 102 were apartment complexes and 91 were condominium complexes. In addition, 21 of the facilities served utilized oil, propane or kerosene heating, and their participation in the program contributed to a reduction in fossil fuel usage for heating these facilities.

Highlights

Customized Condo Website Portals:

One notable advancement in the program was the use of customized condo website portals to improve accessibility for this customer segment. Overall, 91 condominium facilities were served in 2018.

Increase in participation for market rate buildings with over 20 units:

Many of the of the facilities enrolled in the market rate program in second half of the year were large complexes with over 20 units. As the program continues to mature the Company anticipates many more 5-20 unit buildings will participate in the market rate area.

Lockwood Plaza Apartment Complex

Several measures were completed at the Lockwood Plaza Apartment complex which includes 209 dwellings. Measures installed included: 50 domestic hot water heaters with new smart-circulator pumps, 29 roof top high efficiency exhaust fans with integrated speed controls, and two large boilers servicing the facility. This facility qualified for the multifamily low-income program.

Huntington Towers Mini-Split Heat Pumps

In 2018, 106 ductless mini-split heat pumps were installed at the Huntington Towers Apartment Complex in Providence which includes 106 dwellings. The installation of these heat pumps led to energy savings of 286 net annual MWh for the apartments' residents. This facility also qualified to participate in the multifamily low-income program.

Community Based Initiative

The Company's community-based energy efficiency initiative launched a refreshed model in 2018 with the City of Woonsocket and the Town of Warren signing on as participants. This improved model asked the municipalities to hit specific measure-level metrics and program participation to earn a grant to be used for energy efficiency improvements on public property. In years past, residents committed to being more efficient in their homes. In 2017, the program took the step of requiring increases in home energy assessments to earn the grant. In 2018, the municipalities were provided with very specific metrics such as energy assessments, weatherizations, mini-split heat pump installations, refrigerators recycled, and more. Further, Small Business promotions were also included as part of the 2018 program.

Overview of Performance

The Company began the year by celebrating the successes of the 2017 participating communities at the Company's Customer Listening Forum. The Towns of Smithfield, North Kingstown, Cumberland, and Richmond were all celebrated for their efforts in promoting the benefits of energy efficiency and signing up residents for energy assessments. Next, the Town of Warren and City of Woonsocket signed on as program participants and began on-the-ground activities.

Customized marketing materials were created for both Woonsocket and Warren, as well as energy efficiency communications to be included in residential and small business customer utility bills. Both communities approached baseline goals for measure adoption by all and continued to push to ensure their stretch goals were achieved by year end, thus earning the full potential of the grant monies.

In the fourth quarter of 2018, Woonsocket ran ads on two local radio stations as well as in the local paper. This culminated in the city achieving 147% of its stretch goal for assessments and 134% of its stretch goal for weatherizations. The town of Warren hosted events at Autumn Fest, mailed flyers through the Department of Public Works, and hosted a "walkabout" event. These actions resulted in Warren surpassing their stretch goal for assessments at 140% and their weatherization goal at 106%. Notably, Warren also set an ambitious goal for mini-split heat pump installations and came in at 88%, helping the Company learn more about promoting these products in the coming years.

Highlights of the 2018 Community Based Initiative

- Created stretch goals for program participation resulting in:
    - 558 requests for home energy assessments in partner-towns.
    - 118 weatherization jobs.
    - 43 small business projects
- Included Small Businesses in the program for the first time.
- Program promotions with the Northern Rhode Island Chamber of Commerce, local radio and newspaper promotions, and program informational inserts in all resident utility bills.

Rhode Island Energy Innovation Hub

The Energy Innovation Hub (Hub) is a community engagement destination designed to provide a hands-on opportunity for customers to learn about energy efficiency, renewable technologies, electric vehicles, state energy goals, and a vision for a clean energy future. The Hub content, and knowledgeable staff, provide information to customers to empower them to take action to reduce their energy use, adopt smart technologies and learn about renewable power and electric vehicles. The space and its exhibits showcase: (a) energy solutions accessible to all customers; (b) innovative advancements for system reliability; and (c) a vision of a sustainable energy future. Visitors learn about technologies available to create smart, energy-efficient homes and businesses, renewable technologies, demand response, electric vehicles, storm management, and core services that the Company provides. In 2018, the Energy Innovation Hub hosted 2,600 customers via on-site meetings, trainings, tours, events and walk-in customers.

Residential Energy Efficiency Education Programs

In 2018, the National Energy Education Development (NEED) Project that trains RI teachers in energy education curriculum was funded by the Energy Efficiency and Resource Management education funding. As a result of high customer demand for energy efficiency, the National Grid education funds were reallocated to customer incentives.

Income Eligible Services

The Income Eligible Services (IES) program helps reduce electricity and heating costs for residential income eligible customers without any financial obligation from the customer. Income Eligible Services are delivered by Rhode Island's six local Community Action Program (CAP) agencies to customers who are currently on the A-60 or 1301 Low Income rate; qualify for LIHEAP funds from the State; and 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 and potential replacement if applicable, (2) an inspection of existing insulation to identify opportunities for weatherization, and (3) a safety and energy efficiency inspection of the customer's heating/cooling system for potential replacement if eligible. All customers receive all services and equipment upgrades at no cost.

The Income Eligible Program (IES) program continued to benefit from program improvements resulting in an increase in the number of assessments by 2% from 2017 to 2018 – to a total of 2,703 assessments. A long awaited heating solution for electric resistance heat customers was introduced with the Cold Climate Air Source Heat Pumps to replace electric resistance heat and displace oil/propane heat. This heating solution will create significant cost savings for customers. To support consistency in the delivery of program services across the RI Community Action Program, The RI WAP/IES (Weather Assistance Program/Income Eligible Services) Field Guide was updated and approved. IES initiated the development of an Appliance Management Program (AMP) Manual that will outline the steps and goals of the AMP Assessment. This manual is designed to increase consistency with AMP Assessments across the six CAPs. Overall, in 2018, IES exceeded the gas goal (105% of energy savings), and the electric goal (104% of energy savings).

Income Eligible Program/WAP Collaborative

National Grid's Income Eligible Services are administered along with related and complementary federal, state, and local programs in collaboration with Rhode Island Department of Human Services (DHS), the CAP agencies, and other local agencies. The alignment of IES with these programs allows a leveraging of funds to provide energy services to income eligible customers in Rhode Island. The leveraging of funds, and coordination between the programs listed below, allows more customers to receive comprehensive energy assessments of appliances, weatherization, and heating systems.

- **Low Income Home Energy Assistance Program (LIHEAP)** The Low-Income Home Energy Assistance Program (LIHEAP) block grant is funded through the U.S. Department of Health and Human Services. LIHEAP funds assist income eligible households in meeting the increasing costs of home energy and reduce the severity of any energy-related crisis. Rhode Island's LIHEAP is administered by the Rhode Island Department of Human Services (DHS) Individual and Family Support/Community Services Division. LIHEAP intake and outreach is provided by the six local CAP agencies. Households are determined eligible for LIHEAP assistance according to income guidelines established by DHS.
- When customers inquire about, or apply for, LIHEAP assistance, the CAP agencies also provide information about the Income Eligible Energy Efficiency Services to help customers to reduce their energy consumption and energy costs.
- LIHEAP funds are leveraged with the IES program funds to provide weatherization and heating system replacements.
- **Weatherization Assistance Program.** The Weatherization Assistance Program (WAP) enables income eligible families to reduce their energy bills (and helps LIHEAP funds go farther) by making their homes more energy efficient, while addressing health and safety concerns. Funds are used to improve the energy performance of income eligible dwellings using the most advanced technologies and testing protocols available in the industry. WAP is funded through annual appropriations from the U.S. Department of Energy's Weatherization Assistance Program and the U.S. Department of Health and Human Services. The state allocates 15% of its annual LIHEAP funding to weatherization.

Commercial & Industrial Programs

Overview

In 2018, the Commercial & Industrial (C&I) sector was cost-effective with RI Test B/C ratios of a 3.33 for electric programs and 4.20 for gas programs. The Company spent 92.2% of the electric C&I implementation budget, achieved 105.4% of electric targeted annual energy savings and achieved 111.0% of electric targeted annual demand savings. The Company spent 109.2% of the gas C&I implementation budget and achieved 105.4% 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.

The electric commercial programs had over 4,100 participants and gas commercial programs had over 1,200 participants in 2018.

Large Commercial and Industrial Programs

National Grid offers three principle programs for commercial and industrial customers:

The Large Commercial and Industrial New Construction Program, the Large Commercial Retrofit program and the Small Business Direct Install program.

Customers with an average monthly peak demand in excess of 200kW can participate in the Large Commercial and Industrial New Construction program and the Large Commercial and Industrial Retrofit program. Each program contains a few common elements:

1. National Grid offers incentives to reduce the incremental cost barrier to investing in energy efficiency.
2. The programs are integrated to offer assistance with gas and electric projects at the same time.
3. National Grid reduces barriers to participation by offering a range of technical assistance from identifying opportunities to improving a company's manufacturing process.
4. Depending on the program year and budget, National Grid may also have funds available to provide business owners with zero interest loans for a defined period of time with on-bill payback.

Education and Outreach

National Grid offers training and education to various entities that enable energy efficiency in the marketplace and communities in Rhode Island. These include architects, engineers, lighting professionals and HVAC. In 2018 five gas related trainings were held for RI and MA technical staff, sales staff, vendors, and project expeditors. Seminars were also held on topics including ZNE, cannabis, energy efficiency programs, multifamily infiltration reduction, as well as strategic electrification and VRFs. These events are great educational and outreach opportunities for our regional stakeholders.

In RI, eleven commercial trainings as part of the Code Compliance Enhancement Initiative were held. A Level I Building Operator Certification (BOC) class was held as well as multiple webinars.

Large Commercial and Industrial New Construction

The Commercial New Construction Program encourages energy efficiency in new construction, major renovations, planned replacement of aging equipment, and replacement of failed equipment through financial incentives and technical assistance to developers, manufacturers, vendors, customers, and design professionals. The program supports both the commercial and industrial new construction projects with proactive technical assistance during design with energy modeling and analysis.

New Construction projects typically have a longer time cycle from inception to contruction. The challenge with these projects is addressing energy efficiency in the concept or early stages of the project to maximize the energy savings. When new construction projects participate in energy efficiency program in later stages of design the savings potential drops tremendosly. To address this particular challenge in 2018 the Company launched a new demonstration called Accelerate Performance for New Construction projects. Accelerate Performance is a performance-based procurement process whereby the Company engages with developers and building owners early in the project process and helps the owner set Energy Use Intensity (EUI) goals before an RFP is issued to engage a design team. This goal of this demonstration is to achieve deeper energy efficiency savings for New Construction projects.

Overall in 2018 there were more projects covering a range of building types demonstrating the ongoing increase in commercial and industrial development in Rhode Island. Projects included mid-size multifamily, university buildings, garage buildings and large commercial projects.

One example of a New Construction gas project completed in 2018 where the customer commitment was made in the first quarter was the installation of condensing boilers at Rhodes Technology, resulting in savings of 8,151 net annual therms.

Upstream foodservices resulted in 226 gas unit installations which is equivalent to 86,819 therms saved for the year as well as 60 electric units installed which is equivalent to 98,241 net annual kWh saved. These numbers include the results of a successful mail promotion targeted to customers.

Large Commercial and Industrial Retrofit

The Large Commercial Retrofit Program encourages the replacement of existing equipment and systems with energy-efficient alternatives when the customer is not otherwise planning any investments. The program offers solutions ranging from steam trap repair, Combined Heat and Power (CHP), to multiyear

Strategic Energy Management Plans (SEMPs) with some of National Grid's largest customers, and a variety of Upstream programs.

In 2018, National Grid had several notable developments in the Large Commercial and Industrial space. The Company broadened the program by expanding the Upstream Products Initiatives, continued its partnership and goals with its two SEMP customers, and engaged more customers in the industrial, grocery, and municipal verticals. The Company continued work on the SEMP with the State of Rhode Island that began in 2017. In 2018, 9 scoping studies and 5 retro-commissioning studies were performed in state facilities. In 2018 the Company also had a SEMP in place with Dunkin'® at around 80 participating locations in the state.

In 2018 National Grid committed to supporting the Providence Energy Challenge for the first Zero Energy Building (ZEB) in Providence and for energy reduction commitments from commercial customers of 20% by 2025. National Grid is supporting these efforts with automated data uploads for benchmarking buildings in EPA portfolio Manager, and with its Large C&I Retrofit program for energy reduction and the ZEB demonstration offerings.

In November of 2018 a $250,000,000 school building improvement bond was approved. National Grid is exploring a SEMP with Rhode Island Department of Education in 2019 to help capture energy efficiency savings as part of the school improvements. It is estimated that the energy efficiency work will represent about 25% of the total school building improvements planned.

During 2018, a college completed a boiler upgrade including burner replacements, a stack economizer, and heat recovery resulting in 20,000 therms saved. A hospital replaced and repaired steam traps, saving 10,725 net annual therms.

Challenges and Next Steps

Gathering post inspection data from the vendor installing LED street lighting was a challenge. Controls associated with these street lighting apps are expected to be completed in 2019. There was a settlement between the town of Johnston and National Grid regarding the payment of electricity for street lights on state owned roads. Although this settlement only affects the town of Johnston, many other towns in the process of purchasing their street lights have paused the process due to this issue.

The internal team will focus on ensuring there is an EE component to the school renovations associated with the school improvement bond.

In 2018, the Company also launched a Strategic Energy Management (SEM)/ Continuous Energy Improvement (CEI) demonstration for industrial customers whereby a cohort of industrial customers meet regularly and share best practices for operation and maintenance of their facilities.

This program also includes an industrial initiative with world-renowned engineering firm Leidos and training for trade allies among many other efforts.

Industrial Initiative

The Industrial Initiative in Rhode Island had another very successful year. Goals for electric and gas were exceeded and delivered substantial savings to Rhode Island manufacturers. A total of 96 incentive

applications were paid (78 electric and 18 gas) resulting in savings for 59 large industrial customers. The program continues to focus on custom process measures with most of the applications relating to process, HVAC, VFDs and other custom process measures. The Industrial Initiative also assisted several smaller customers (under 400 kW) with energy efficiency measures. The customers included a beer distributor and paving company and the measures were related to refrigeration and dust/particle collection. The Industrial Initiative team also assisted the beer distributor in identifying electric heat that was being left on during unoccupied hours. With the aid of interval data, the team was able to show the customer the resultant savings from shutting the heat off during unoccupied hours.

Energy Smart Grocer

The EnergySmart Grocer (ESG) initiative delivered cost effective, comprehensive energy savings in the Grocery market segment in 2018 by providing nearly 6,300 MWh and 1,100 MMBtus in annual savings. Stop & Shop continued to rollout anti-sweat heater controls in their Rhode Island stores which accounted for over 1,400 MWh in annual savings. Dave's Marketplace also continued its effort to make their stores more energy efficient with projects at all ten of their locations. Upgrades included adding doors to their display cases, replacing their lights in their walk-in boxes and adding floating controls to their refrigeration systems. In total, Dave's Marketplace achieved over 1,000 MWh and 500 MMBtus in annual savings. The initiative also continued to find opportunity with the smaller grocers. Sizeable refrigeration projects were completed at Clements, Dino's Park-n-Shop, and McQuade's Marketplace which, in total, achieved over 400 MWh in annual savings.

Destratification fans were added to the initiative in late 2018. This technology provides gas savings by delivering warmer air from the ceiling to the ground. EnergySmart Grocer will discuss this measure with customers, where appropriate, and expects to see a significant uptake of this technology in 2019.

Combined Heat and Power (CHP)

Several **Combined Heat and Power (CHP)** projects were pursed in 2018. Two projects, that were initiated and completed in 2017 were commissioned in 2018. They were the Crown Plaza, 150kW, and Avalon Center Place, 75 kW. In 2019 a pipeline of CHP projects will be developed, and several TA studies will be

completed. In 2018, the Company notified the PUC of an incentive for CHP greater than $3,000,000 for Naval Station Newport. In January 2019, the Company withdrew the notification.

Community Initiative

Due to the Community Initiative being expanded to include small businesses, there was a joint effort with the Northern RI Chamber of Commerce for Woonsocket to educate small business customers about energy efficiency. Forty projects were completed in Woonsocket and Warren resulting in an annual reduction of 525 MWh, saving approximately $73,500 in energy annually. For the Commercial New Construction program, a large financial institution built a new campus using the Comprehensive Design approach. The total project included nine Energy Conservation Measures (ECMs) with over 1,200 annual MWh saved.

For communities, the town of Coventry received a Lead by Example Energy Award from the Office of Energy Resources for investing $5,000,000 over a five-year period in energy efficiency improvements to schools. For the Communities Initiative the town of Warren began on the ground promotions beginning in the second quarter with customized marketing materials being created for both Woonsocket and Warren.

Commercial Customer Initiatives

The development of a RI digital application portal (RIDAP) started in the first quarter and was rolled out in October of 2018. This gives customers and vendors the ability to submit incentive forms electronically without the need to submit multiple forms for the installation of different types of energy efficient equipment.

Street Lighting

In 2015 National Grid launched a **Solid-State Street Light Initiative** that provided energy efficiency incentives for solid state street lighting and controls to municipal customers. There are two options for participating in this initiative, customer owned, and Company owned.

- Customer Owned Street Lighting- Rhode Island municipal customers are now eligible to purchase their own street lights from National Grid. Incentives are being offered for solid state lighting and controls, as funding allows. National Grid worked closely with RI OER as well as the cities and towns.
- Company Owned Street Lighting – National Grid filed a company owned street lighting tariff in 2016. This tariff's effective date was January 2017. If the municipal customer prefers to continue leasing their street lights from National Grid, the customer will receive the incentive and the Company will claim the savings.

The streetlighting incentive for the town of Tiverton helped the town to close their fiscal year in the black. Other towns installing LED street lighting during 2018 included W. Warwick, Westerly, N. Providence, Central Falls, Hopkinton & Cumberland. Close to $800,000 in incentives were awarded resulting in energy savings of nearly 4,000 MWh.

Commercial and Industrial Finance

For C&I Finance, please see the section of report that speaks specifically to finance mechanisms and activities.

Small Business Direct Install Program

National Grid's Small Business Direct Install program is a retrofit program that provides turnkey services to customers with less than 200 kW average monthly peak electrical demand. As part of the program, customers receive a free on- site energy assessment and a customized report detailing recommended energy efficient improvements. National Grid then completes retrofit installations at the customer's convenience. In 2018, the program served small businesses of all types including restaurants, non-profits, and small offices.

National Grid pays up to 70% of installation and equipment costs and customers can finance the remaining share of the project over as many as 60 months (typically 24) on their electric bill, interest free, using the Small Business Revolving Loan Fund, providing that funds are available.

The Company would like to highlight several projects that were completed in 2018 for small business customers.

1. The program completed a project at metals recycling facility. This small industrial site transitioned all of their lighting over to LED technology, with sensors, for both their office and warehouse space. This project captured approximately 63 MWh in savings and the customer was very complementary about how the technology transformed the site, especially the low bay fixtures with sensors in their warehouse.
2. RISE installed both gas and electric energy efficiency measures at the Brewed Awakenings coffee shop in Cranston. The lighting was upgraded to LEDs. This will save the shop the nearly 7,400 kWh annually (or $1,300/yr.) Simple water saving measures were also installed, saving 500 therms, equating to an additional $700 of annual cost savings for the shop. Other Brewed Awakening sites in Johnston and Wakefield were also upgraded.
3. RISE completed a weatherization and insulation project at St Martin's Church, creating a more comfortable environment for the parishioners and saving the church over 3,000 therms of gas use annually, or roughly $3,000 off their annual energy bills.

Although the program has traditionally focused on lighting and refrigeration, National Grid is constantly updating the program to apply other measures such as energy management systems, roof-top HVAC unit replacement, and new heating systems. At the end of 2018, National Grid began to explore how to deploy a non-chain restaurant offering in the Small Business space.

In 2018, National Grid has also been actively pursuing new models that serve segments of the small business sector in more tailored and cost-effective ways. The Company's success with schools, national and regional chains, food retailers, and upstream lighting customers demonstrate a more strategic approach to engaging with these customer segment.

In 2018, National Grid continued to utilize the existing contractor/electrician base through the Customer Directed Option (CDO) where customers are allowed to use their own contractors in conjunction with the expertise of the lead vendor in the Small Business Program. These additional "feet on the street" are helping the program maintain its success even as some segments continue to be successfully served through other paths. In 2018, 38% of savings in the SMB/DI program came from CDO contractors.

Codes and Standards

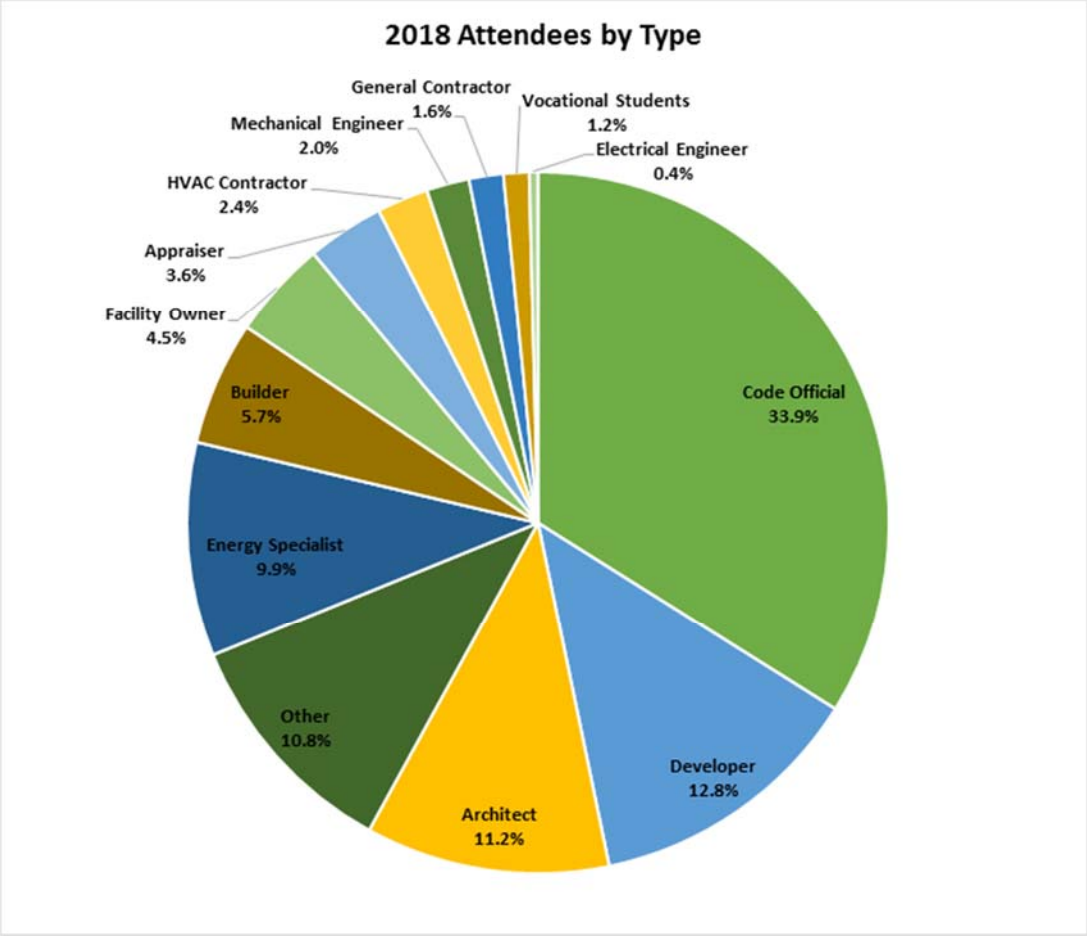
National Grid's Codes and Standards initiative is an innovative efficiency offering that provides targeted stakeholder outreach and technical guidance to:

1. Improve compliance with existing minimum efficiency requirements for buildings and the energy-using products that comprise them; and
2. Accelerate the improvement of these minimum efficiency requirements.

In 2018 the Company continued to provide its energy code compliance enhancement services and reached important new stakeholder groups. The Company also prepared for efforts to increase the company's assistance for improved state energy codes and product standards in coming years, thereby unlocking new opportunities to save energy on behalf of customers.

Performance Overview

Code Compliance Enhancement Initiative (CCEI): In 2018 CCEI conducted 40 training events across the state with 532 total attendees (an increase from 31 and 513 in 2017, respectively).



This initiative includes robust stakeholder engagement and industry outreach, classroom and hands-on trainings, project-specific technical assistance, and development and dissemination of documentation/compliance tools to reduce energy savings lost to noncompliance with the state's energy code. In 2019, CCEI will continue to focus its activities on remaining code compliance gaps identified in the 2017 new construction evaluations as well as preparing stakeholders for Rhode Island's energy code update, which is scheduled to go into effect this August.

Energy Codes

Energy Code Development Support: In 2018 the Company began to prepare code changes it will propose when the state launches its 2018 IECC code adoption process, which is currently scheduled for fall 2019. These changes would increase the energy savings potential of the state's future code, with compliance support from CCEI helping to realize these savings.

Stretch Code Support: When the R.I. Stretch Code was published in early 2018, the Company shifted its support to increasing use of this new guide for high performance new residential and commercial construction. The Company provided education and outreach through our CCEI program, including promotion at every training event, to increase market awareness of this brand new tool. The Company also began financially incentivizing its increased use by aligning our new construction programs with the Stretch Code; new homes, for example, are eligible for a "bonus" incentive if they demonstrate compliance with the Stretch Code.

Appliance and Equipment Standards

Appliance & Equipment Standards Support: In 2018 the Company increased its role in supporting the adoption of new state appliance standards compared to preceding years. While 2018's appliance standards bill was ultimately unsuccessful, it proceeded farther through the legislative process than its predecessors. In 2019 the Company will continue to provide technical support to proposed product standards legislation. The Company will also work with stakeholders to adapt for use in RI a methodology currently under development in Mass. to claim savings for product standards support in a similar manner to code compliance enhancement. The Company also proposes to continue ramping up efforts to partner with other stakeholders in the northeast as well as efficiency program administrators in California in advancing federal appliance standards.

Demonstrations

Residential Demonstration and Research and Development

Connected Device Demonstration

In 2018, the Company decreased costs of the residential Connected Solutions pilot by conducting a competitive procurement process to acquire a new residential DERMS (Distributed Energy Resource Management System) platform, and renegotiating rates with all device manufacturers. The Company continued to add thermostats to the program, going from 930 in 2017 to 1,800 in 2018. A new third-party evaluation completed in the Company's Massachusetts service area has shown that the savings per thermostat have increase by 57% due to better program management in connecting to devices and removing thermostats from the program that are not valid because they are not connected to central air conditioners. Due to the success of this demonstration, the company proposed that this program be moved out of the demonstration phase and into a standard program. This was approved in the 2018 Energy Efficiency Plan.

Energy Storage

The Company ran a battery-enabled demand response pilot with seven customers in 2018. The demonstration allowed the Company to design incentives associated with this technology and test the ability for batteries to export stored power to the grid, thereby unlocking the benefits of batteries. The Company also paid for the installation of a battery in Rhode Island from a new, New England battery vendor. This will be used for communications testing so that the vendor can be added to the pilot. Energy Storage will be included in the Residential Connected Solutions program in 2019.

Emerging Lighting Controls

National Grid completed the Emerging Lighting Controls research in 2018 with 85 customers in RI and MA. Participants in the demonstration received a smart hub that would coordinate the controllable devices including approximately 15 smart lamps per home, motion sensors, and geo-fencing sensors. The smart lamps allowed customers to remotely control lighting while the sensors captured other characteristics such as: lighting levels, occupancy levels, room temperature, motion, and remaining battery life of equipment. The demonstration was conducted in two phases. Phase one lasted from October 2017 through January 2018 and captured a baseline activity period where the equipment was installed, but consumers operated their lights manually as they would with non-connected lights. Phase two began in February 2018 when customers were trained in how to operate the automatic controls of their "smart" lights and concluded in December 2018 when data was no longer captured from the demonstration activities.

The research found that during the baseline period, rooms with smart lamps were occupied 55% of the time while during the occupant-controlled period occupancy increased to 65%. 83.5% of demonstration participants activated the smart lighting controls during phase two of the demonstration and 96% of the active participants had smart lights turn off when a geo-fencing sensor indicated that occupants were

away from the home. Lighting savings from the research were estimated to be over 200 kWh per year when extrapolating to the whole home. The savings include moving customers from inefficient lighting to controllable lights.

Residential Energy Monitoring

In 2018 National Grid began to test a residential energy monitoring study to investigate customer insights from real-time disaggregated energy usage. Three hundred and thirty-nine devices were installed into customer homes in early summer. The monitors will be studied for a full year with an evaluation of the demonstration beginning in 2019. One interesting insight is there is an "always on" load of 23% of electricity consumption in the demonstration homes.

Zero Energy Homes

In 2018, National Grid kicked off the Path to Zero Ready Demonstration Program to complement the Residential New Construction Program and also to provide new opportunities to support the growth of the zero energy home market. The Path to Zero Ready Demonstration Program focused on four key elements:

Education and awareness

In an effort to raise awareness of the design, construction, benefits and beauty of zero energy homes in RI, 11 Zero Energy presentations were held in 2018 with over 160 attendees. In addition, tours of zero energy homes were conducted to provide hands on learning for building professional and customers.

A select group of Rhode Island designers, architects, builders, developers and other industry professionals were provided passes to attend the annual Passive House Institute US (PHIUS, http://www.phius.org;) conference in Boston that focused on "The Path to Zero Energy".

Workforce Development

In 2018, the Zero Energy Advisory Group was created. The Group is comprised of eight Rhode Island construction professionals at different stages of understanding of the zero-energy building market. A spirit of collaboration is the hallmark of the group as they strive to create momentum in the zero energy and zero energy-ready markets. Members meet periodically over the year to refine best practices and marketing opportunities.

Support for architectural drawing revisions as well as a design charrette were conducted through this program to provide technical support to facilitate decision-making as project teams evaluate the opportunity to build a zero-energy ready project.

A series of infield trainings were held at a development in North Kingstown to demonstrate Zero Energy construction techniques including the framing stage, the rough stage before insulation, and at the point of final inspection.

Project Incentives

In addition to the technical support and financial incentives provided through the RNC program, a project that commits to zero energy ready can receive additional technical support as well as additional incentives for meeting the RI Stretch Code or being PV and EV ready.

Marketing

National Grid held a strategic planning session to gather input and insights as to how to create a market for Zero Energy Homes – who to target, how to learn from and leverage what's currently working and develop priorities and next steps to move the local market forward.

Demonstration	Goals	2018 Findings	Budget Filed	Budget Spent
Connected Device Demonstration	• Reduce program administration, marketing, software, and vendor costs • Maintain customer incentives • Achieve cost effectiveness	• The pilot was found to be successful and will become a program in 2019. • Benefit Cost Ratio above 1.0 (filed in 2019 with a 3.24 BC ratio)	$300,096	$171,639
Energy Storage	• Consumer research on intersection of distributed generation, battery storage, and electric vehicles	• Qualitative research built on existing household pain points and had customers describe what would alleviate stressful household tasks • Distributed generation, batter storage, electric vehicles too large a leap, so research focused more on connected devices • Company conducted tests on residential battery systems including a test site for a New England battery manufacturer	$137,000	$54,966

Emerging Lighting Controls	• Customer total electric bill savings • Customer satisfaction • Customer assessment of technology benefits • Likelihood of a customer recommending participation in a similar program to fellow Rhode Islanders	• Customers behaved differently when they were able to control the smart lighting versus baseline period • High rate of pilot customers used smart lighting controls • Modest savings observed with smart lamps	$76,000	$30,120
Residential Energy Monitoring	• Deploy devices in customers' homes • Measure customers' energy usage • Potential savings through use of energy monitor • Customer satisfaction • Usage patterns • Device accuracy	• Many customers with continuous always on loads • Additional research to determine drivers of continuous loads	$167,000	$205,840
Zero Energy Homes	• Stakeholder training and engagement • Develop an all-electric offering • Incorporate RI Stretch Code	• Conducted a Seminar on Zero Energy Building with presentations from four industry experts, in the Fall of 2018, that was attended by 50 building professionals (with C&I) • Sponsored 15 building professional to attend the Passive House US certification, a path to Zero Energy Buildings (with C&I). • All-electric offer and stretch code became clear additions for zero energy offerings.	$242,500	$135,680

		• Continued to build relationships to seek out ZEB project interest with builders, customers and developers.		

Commercial and Industrial Demonstration and Research and Development

Demand Response Demonstration

The Company's demand response demonstration program for C&I customers aims to reduce their energy use when the electric grid is at peak demand. Demand Response reduces cost of peak supply for all customers and allows ISO-NE to acquire less generation capacity and reduce customers' 3rd supply costs.

The Company and its vendors help customers to identify strategies and technologies to which allow them to reduce their energy use at peak times. Through a competitive RFP process the Company has selected three approved curtailment service providers (CSPs) to guide customers through this process. Through another competitive RFP process, the company has procured a demand response management system (DRMS) to identify when the grid will be at peak, notify vendors and customers of peak events, and measure each customer's reduction in energy use during demand response events.

The program runs every year in June, July, August, and September. The company can call demand response events on any weekday (except holidays) between the hours of 2-5pm. On average 3-5 demand response events will be called every year. The Company will not call more than 7 events in a single year.

Customers and vendors are paid incentives based on their performance. The vendors and customers split the incentive amounts based on negotiations between the customers and the vendor. However, historically customers have always received the majority of the incentives paid.

In 2018, the Company continued and concluded its demand response (DR) demonstration for commercial customers. The company started the commercial customer section of this demonstration in 2017. In 2017 the program reduced peak load on the grid by 12MW. In 2018 the program reduced peak loading on the grid by 18MW. Due to the success of this program, the company proposed to transition this demonstration to a regular energy efficiency program and received approval from the RI PUC in the 2019 Energy Efficiency Plan.

Demonstration	Goal	Findings in 2018	Budget Filed	Budget Spend
Zero Energy Demonstration	Education, outreach and training for stakeholders on Zero Energy Buildings (ZEB) Provide technical and incentive support for two projects that will achieve Zero Energy Building certification	Sponsored 15 building professional to attend the Passive House US certification, a path to Zero Energy Buildings (with Residential) Conducted a Seminar on Zero Energy Building with presentations from four industry experts, in the Fall of 2018, that was attended by 50 building professionals (in conjunction with Residential) Continued to build relationships to seek out ZEB project interest with builders, customers and developers.	$148,750	$81,843
Performance Based Procurement	Performance Based Procurement results in deep energy savings and sets energy performance targets with customer early in the project concept stage. The goal was to launch this solution for customer in 2018, train sales team on process and acquire three projects	Solution was launched in September of 2018. Training was conducted in the fall of 2018 with the National Grid sales team. The sales team conducted outreach to acquire projects but in 2018 were unable to generate enough interest for participation. This demonstration will continue in 2019 and the Company will continue outreach to customers for projects.	$50,200	$0

Demand Response Demonstration (electric)	Achieve 10 MW of gas demand reduction in 2018 by engaging with Large C&I customers	In 2018, the Company continued and concluded its demand response (DR) demonstration for commercial customers. The company started the commercial customer section of this demonstration in 2017. In 2017 the program reduced peak loading on the grid by 12MW. In 2018 the program reduced peak loading on the grid by 18MW. Due to the success of this program, the company proposed to transition this demonstration to a regular energy efficiency program in 2019.	$524,000	$690,308
Demand Response/Connected Solutions Small Business Direct Load Control	Install 300 Wi-Fi Thermostats in 2018	In 2018, we did an email marketing campaign to enroll small business customers into the DLC DR program. We enrolled 14 customers into this program and will continue our marketing efforts in 2019.	$ 52,600	$4,802
Energy Efficiency Upgrades in pumping systems for water/wastewater plants	Goal was to include two stations	Based on a demonstration in MA that was successful, this demonstration was moved as an offering in the retrofit program after 2018 EE plan approval. Hence it was discontinued as a demonstration and budgets were moved to other demonstration initiatives	$100,000	$0

Behavior Change through education of small-medium business plant personal	6 customer sites	In 2018 the Company designed the demonstration and identifying potential customers who can participate in this demonstration. This demonstration will continue in 2019	$38,000	$165
Power over Ethernet (PoE) Lighting systems for new construction and major renovation	Understand the potential for PoE systems as a way to achieve energy efficiency through lighting controls and energy management via lighting systems.	While this solution was explored in concept, the Company was unable to secure projects to demonstrate energy efficiency and control benefits with such a solution.	$10,000	$147,283
Secure Lighting Spec	Outreach to five manufacturers	The Company designed this demonstration and reached out to several manufacturers in 2018 to move this demonstration forward and will continue these efforts to implement this demonstration in 2019	$11,500	
Lighting as a Service	Explore concept	The Company engaged with customers to determine a business case for this demonstration and has not seen an uptake on this offering in 2018. This demonstration will continue in 2019	$10,000	
One-Fit – Lighting Manufacturer Based Turn-Key lighting Design	Outreach to three manufacturers	The Company designed this demonstration in 2018 and is the process of identifying manufacturers and contractors to implement this solution. This demonstration will continue in 2019	$9,760	

Lighting Re-Specification Incentive	Explore concept	This demonstration was discontinued in 2018 due to lack of opportunity with customers	$10,000	
Automated Window Shade Systems	Explore concept	The Company explored this concept for EE savings in 2018 and determined that it will continue to explore this demonstration in 2019	$10,000	
Web Based Performance Lighting Plus App	Increase participation in Performance Lighting Plus program via an online application process	This solution was discontinued as a separate demonstration and will be combined with the RIDAP online application process that was launched in 2018	$8,200	
Online Trade Ally Training on Advanced Lighting Systems	The goals with the online trade alley training on advanced lighting systems was to provide training for proper installation and persistence in savings for existing EE programs	Training material for the online platform was developed and an online platform service was secured. This training will be offered to trade alleys in 2019. This initiative will no longer continue in 2019 as a demonstration but will transition as an education and training initiative.	$8,500	$0.00 (Project was contracted with solution vendor in 2017 and materials were developed in 2018)
Underutilized EE Technologies in Mechanical Power Transmission Systems (Not included in 2018 Plan, but proposed during the year)	Explore concept	The Company designed this solution and will continue with this demonstration in 2019 with outreach to customers	$49,321	$331
Gas DR	Outreach to commercial customers, specifically with process-only equipment to determine customer interest in gas DR. 50 DTh/hr reduction/ year	Enrolled one large customer in the gas DR demonstration in 2018 and called 4 events in 2018-2019 winter season. Achieved a reduction of 33 Dtherms.	$ 357,356	$898

Evaluation, Measurement and Verification Studies

To verify the impacts that programs are having on energy savings, the Company hires third party, independent consulting firms to regularly conduct program evaluations as part of its measurement and verification process. These evaluations include engineering analysis, metering analysis, billing analysis, site visits, surveys, and market studies to realize the actual energy savings that particular measures have. PDF versions of completed evaluations can be found on the Energy Efficiency Resource Management Council's website (https://rieermc.ri.gov/plans-reports/evaluation-studies/)

In 2018, thirteen evaluation studies were completed and filed in the 2019 plan. Some highlights include:

C&I Evaluation Studies

- Impact Evaluation of PY2013-2015 Custom CDA Installations.
    - This study quantified the electric energy savings and demand reduction attributable to the Comprehensive Design Approach program, which aids customers in incorporating energy efficiency in the design of new buildings. Extensive data collection, including on-site observation, metering, building automation system data, and utility bills, was performed and used to update building simulation models. This study found an energy realization rate of 47%. Savings were found to be lower than initially estimated due to two primary factors: many customers are installing efficient lighting as common practice, and building systems and controls were often found to not be operating as designed.
- Impact Evaluation of PY2015 RI C&I Upstream Lighting Initiative.
    - This study quantified the electric energy savings and demand reduction attributable to the Rhode Island C&I Upstream Lighting Program. In general, it found the program was achieving slightly higher savings that initially estimated by National Grid. The study updated impact factors for the Upstream Lighting initiative.

Residential Evaluation Studies

- 2018 Rhode Island Lighting Market Assessment.
    - This study estimated lighting saturation and other critical market indicators in Rhode Island. The results show that National Grid programs have had a strong impact on LED adoption. The study found that 64% of all installed bulbs are efficient with saturation rates of 33% LEDs, 22% CFLs and 9% halogens.
- 2014-2017 Rhode Island HEAT Loan Assessment.
    - This study assessed the extent to which HEAT Loan encourages uptake of weatherization and HVAC projects through the EnergyWise program. The study found that the 0% interest HEAT Loan generated energy savings that would not have otherwise occurred and offered recommendations to further increase uptake of measures offered through the EnergyWise and HVAC programs.

- 2018 Rhode Island Residential Appliance Saturation Survey.
    - This study assessed saturation and penetration of residential end-uses, including appliances, consumer electronics, heating and cooling equipment and thermostats. The study also sought to estimate the technical potential for mini-split heat pumps (MSHP) and found that opportunities for MSHP appear plentiful.
- 2015-2016 Rhode Island Income Eligible Energy Services Single Family Impact Evaluation
    - This study updated gross savings of electric and gas measures offered through the Income Eligible Services Single Family program. The Company adopted the deemed savings values in the 2019 program plan.
- 2017 Residential Wi-Fi Thermostat Demand Response.
    - This study evaluated the controllable thermostats as a demand response technology offered through Massachusetts and Rhode Island ConnectedSolutions programs. The study found average demand savings of 0.44 kW per thermostat in Massachusetts and 0.52 kW per thermostat in Rhode Island. The Company adopted the deemed savings values in the 2019 program plan.

In addition, several studies from the 2019 Energy Efficiency Program Plan are already underway in 2019, some of the highlights include:

- Primary Data Collection for the Technical Potential Study.
    - This effort involves on-site data collection at C&I facilities to determine the types, ages, and efficiencies of typical lighting, HVAC, DHW, VSDs, and steam traps across the state. This data will serve as one input to the 2019 Technical Potential Study, which will be managed by the Office of Energy Resources.
- Impact Evaluation of PY2017 Custom Gas Installations
    - Site visits and meter installation are in progress. The objective of this impact evaluation is to provide verification of natural gas energy savings estimates for a sample of custom gas projects through site-specific inspection, metering, and analysis. The results of this study will be used to determine the realization rates for custom gas energy efficiency offerings based on installations from 2017. This is the second year of “rolling” evaluations of custom gas projects, where the first year was a “full” study in coordination with Massachusetts (as has historically been done every 3 years), while subsequent years evaluate roughly 1/3 of the number of sites, which will keep the realization rates updated yearly.
- 2018 Process Evaluation of Income Eligible Energy Services Single Family Program.
    - The objectives of this study are to assess effectiveness of program delivery procedures, determine barriers to program delivery and participation and identify practical approaches to improve the overall effectiveness of the program. Stakeholder interviews, data review and participant surveys are currently underway.

System Reliability Procurement

Through System Reliability Procurement (SRP), the Company identifies customer and grid-side opportunities that are safe and reliable, environmentally responsible, cost-effective, and provide the path to lower supply and delivery costs to customers in Rhode Island. As part of meeting this purpose, the Company develops and implements non-wires alternative (NWA) projects.

Non-Wires Alternative (NWA) is the inclusive term for any electrical grid investment that is intended to defer or remove the need to construct or upgrade components of a distribution and/or transmission system, or "wires investment". NWAs involve identifying distribution and/or transmission needs that have the potential to be deferred by alternative solutions, such as distributed energy resources (DERs), with a specified timeline. These projects are customer-focused and can include measures that are also offered through the Company's statewide energy efficiency (EE) programs, as part of a targeted EE approach in an NWA portfolio solution.

Calendar year 2018 held the final evaluation of the Tiverton NWA Pilot, which was launched in 2012. This final evaluation catalogued the year-over-year program activities, customer engagement, and impacts of the Tiverton NWA Pilot.

The Company went live with the Rhode Island System Data Portal (Portal) through the SRP program on June 30, 2018. The Portal is an online, interactive mapping tool that provides information on National Grid's electric distribution system in Rhode Island. The Portal further provides detail on the approximate loading level of lines and substations. The Company went live with the Hosting Capacity map resource on September 28, 2018, which is a major update that illustrates how much distributed generation (DG), such as solar or battery storage installations, can be implemented on specific lines and substations. A public landing page for the Portal is located on the customer-facing National Grid website.[11]

A corresponding Marketing and Engagement Plan was developed and implemented in the SRP program to promote the Portal to third-party solution providers. This effort aims to increase industry knowledge of the Portal and incentives available through existing Company and state programs for NWA, energy conservation, peak load relief, and renewable energy projects in highly-utilized areas. The Company implemented marketing and engagement for the Portal in calendar year 2018 and plans to continue outreach and engagement in 2019.

The Company issued two new NWA requests for proposals (RFPs) in December 2018, to help address electric grid need in the town of Narragansett, Rhode Island. The Narragansett 42F1 NWA RFP seeks third-party market solutions to provide 2.1 megawatts (MW) load relief for the Bonnet 42F1 feeder. The Narragansett 17F2 NWA RFP seeks solutions to provide 1.8 MW load relief for the Wakefield Substation 17F2 feeder.

Additional details on 2018 SRP activities and the 2019 SRP Plan can be found in the Company's 2019 System Reliability Procurement Plan Report filed in Docket 4889 and approved by the PUC on December 20, 2018.

[11] See Rhode Island System Data Portal. *National Grid US*, National Grid USA Service Company, Inc., 2018, www.nationalgridus.com/Business-Partners/RI-System-Portal.

Financing

In 2018, the Company offered a variety of finance options to both commercial and residential customers. Since 2011, the Company has managed several revolving loan funds that allow customers to pay for their portion of an energy efficiency project through their monthly bills. The funds allowed most participants to remain cash-flow positive and helped relieve pressure on the Energy Efficiency Program (EEP) charge by reducing incentive budgets. In 2014, the Company began managing a revolving loan fund for state and municipal customers as part of the RI Public Energy Partnership (RI PEP). Those efforts and financial resources associated with them have been redirected into the Efficient Buildings Fund (EBF). In 2015, the Company extended opportunities for gas projects through the Large Commercial & Industrial (LC&I) gas revolving loan fund.

Large C&I Revolving Loan Fund

Through the electric LC&I revolving loan fund, the Company offered $5.28 million in on-bill financing to 65 Large Commercial customers through 77 loans resulting in electric savings of 11,887 net annual MWh. At the end of 2018, the fund had a balance of $10.0 million, money that will be available for more loans in 2019 and in the future.

In 2018, National Grid began Financial Test One. The purpose of this test, as outlined in the 2018 EE plan, was to determine if customers were willing to accept a lower incentive if they were allowed to "finance" the balance of their project costs through OBR. From the beginning of the test to the end of 2018, 35 applications had been processed from 26 unique customers for a savings of $68,773.

Through the gas LC&I revolving loan fund, the Company offered $1.17 million in loans to 21 Large Commercial customers resulting in gas savings of 22,906 net annual MMBtu. At the end of 2018, the fund had a balance of $1.19 million, money that will be available for more loans in 2019 and in the future.

The Company continued to manage a revolving loan fund in support of the RI PEP. No customers participated in this offering in 2018. At the end of 2018, the fund had a balance of $66,060. $1,046,058 was returned to RI OER as per the December 17th request.

Small Business Revolving Loan Fund

Of the 759 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 $3.10 million in loans that led to more than 10,321 MWh in net annual energy savings. At the end of 2018, the fund had a balance of $1.92 million.

Efficient Buildings Fund (EBF): Since 2015, National Grid, the Rhode Island Office of Energy Resources (OER), and the Rhode Island Infrastructure Bank (RIIB) have been working together to leverage system benefit charge (SBC) funds and drive energy improvements in facilities in cities and towns across Rhode Island.

The seed money to support this unique revolving loan fund came from a $1.8 million allocation of rate-payer (SBC) funds, mandated by the law, and $3.0 million in funds from the Regional Greenhouse Gas

Initiative (RGGI) controlled by OER. In addition, National Grid, based on a request from RIIB, and working in conjunction with the Collaborative each program year, agreed to transfer $5 million in energy efficiency program funds to RIIB in 2018 and in 2019 to support EBF. These transfers were included in their respective Energy Efficiency Plan and related budgets.

In 2018, the EBF helped support many energy efficiency projects in the towns/cities of Pawtucket, Warren, and East Providence.

- The EBF helped Pawtucket complete installations of energy efficient lighting, energy management systems, and boilers in several city buildings.
- The town of Warren utilized the EBF to convert their street lights from various old technologies to LEDs.
- The city of East Providence used the EBF to install gas and electric measures in several city buildings.

Commercial Property Assessed Clean Energy (C-PACE): National Grid continued to work with RIIB and its program administrator, Sustainable Real Estate Solutions (SRS), to advance the concept of C-PACE in the market, with our salespeople, and among vendors. In 2018, RIIB, SRS, Greenworks Lending, and National Grid co-wrote a presentation for National Grid sales professionals. The presentation, given by Greenworks and SRS, was well received by the National Grid sales team, enhanced their understanding of the mechanism, and cleared up some previous misconceptions. National Grid also hosted SRS and Greenworks Lending at a Project Expeditor (turn key vendors for C&I customers) meeting in August 2018. National Grid joined RIIB and Greenworks on a panel speaking about the benefits of C-PACE on a panel at the RI Infrastructure Summit in September 2018.

As of the end of 2018 one small C-PACE project had been completed and a larger one was still in the design phase.

Ascentium: In 2018 National Grid continued working with Ascentium Capital, a specialty financing firm who is a leader in equipment and technology financing solutions, to offer customers another way to finance their projects. A simple, rapid approval loan process allows customers to use their incentive to buy down interest on loans (typically to zero percent depending on the term) for up to $250,000. The company saw some interest in this offering, but no projects were funded in 2018.

However, in 2018, a school in Rhode Island completed a substantial retrofit project with a creative rental offering from Ascentium. The Company will continue to offer both loan and rental options in 2019.

Other Commercial Financial Developments

National Grid is committed to making sure that customers have a robust selection of financial mechanisms that have proven themselves successful in other programs across the United States and Canada. In 2018, National Grid began discussing Metrus Energy's Efficiency as a Service offering. Metrus has completed projects with numerous Fortune 500 companies across the United States. Metrus has restricted this offer to customers with a combined energy gas and electric spend of greater than $1,000,000 annually.

Heat Loan

The HEAT loan provides zero-percent financing to qualified residential customers to address upfront, initial costs associated with energy efficiency upgrades in their homes and spreads the cost over multiple years. The Energy*Wise* or HVAC programs pay the negotiated interest for the customer cost portion of the loan. There is a lender of last resort, The Capital Good Fund (CGF), that provides financing to customers with less than perfect credit. In 2018, a $500,000 revolving loan fund was established with the CGF to support financing of moderate-income customers. There were 756 loans processed in 2018 totaling approximately $4.4 million in project costs. One contributing factor to a reduction in HEAT loan usage was the increase in incentives to deliverable fuel customers. Deliverable fuel customers received the same incentive as gas and electric heating customers. The larger incentive reduced the customer cost and it is likely fewer customers found a need to finance their energy efficiency upgrades.

An Evaluation of the HEAT loan in 2018 found:

- The current HEAT Loan model with 0% interest for customers over seven years is well-liked by customers, contractors, and lenders. Contractors were not interested in offering their own financing and lenders were not interested in a loan loss reserve model. Half of HEAT Loan recipients would not have used the loan if it included interest.
- The HEAT Loan is generating energy savings for National Grid that would not have otherwise occurred. HEAT Loan projects typically included more measures than non-HEAT Loan projects and HEAT Loan projects substantially enabled natural gas savings for the EnergyWise program. The HEAT Loan availability was very important in those loan customers' decisions to install measures following their home energy assessment. Without the HEAT Loan, three-quarters of loan recipients would have canceled, postponed, or reduced their home energy project scope. Very few customers use other loan products to finance energy efficiency upgrades in their homes. Contractors reportedly would not sell as much efficient HVAC equipment without the HEAT Loan.
- There is widespread interest in the HEAT Loan, and customers want to be able to finance other upgrades with it**.** More than half of HVAC program participants reported interest in using the HEAT Loan to finance for future upgrades and surveyed participants wanted to be able to use the HEAT Loan to finance efficient air conditioning, window replacements, and solar installations.
- There is an opportunity to improve customer education on the HEAT Loan process. Some customers are reportedly unclear about the HEAT Loan process, including the home energy assessment requirement, rebates, and how the contractor is paid. Lenders report receiving numerous customer questions they say should not be their responsibility to answer and thought that better education and outreach by National Grid would improve customer understanding.

Rhode Island Comprehensive Marketing

In 2018, National Grid continued to increase awareness of Energy Efficiency programs for Rhode Island residential and commercial customers through a comprehensive campaign. The campaign communicated the ways customers could save energy and money with National Grid's Energy Efficiency programs. The comprehensive campaign utilized mass media tactics, email and bill inserts. Mass media tactics included television, video ads, radio, print and social media. According to market research studies conducted, energy efficiency familiarity levels among Rhode Island customers continued to increase year over year across both segments.

Awareness campaign complemented programmatic marketing efforts, which drove participation in the Company's Energy Efficiency programs. These marketing efforts utilized targeted email, out of home advertising, social media and digital ads.

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 2018. 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 2018. 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 804 full-time equivalent (FTE) employees had work in 2018 supported by 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 1,109 companies and agencies involved in National Grid's 2018 energy efficiency programs, 73% 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, Commercial Upstream Lighting, or High Efficiency HVAC programs.

Full-Time Equivalent (FTE) Employment Supported by Energy Efficiency Programs in Rhode Island in 2018

Programs	Total FTEs
Electric Programs	
Commercial and Industrial	250.0
Residential Income Eligible	45.8
Residential Non-Income Eligible	170.9
Gas Programs	
Commercial and Industrial	31.9
Residential Income Eligible	39.4
Residential Non-Income Eligible	191.6
National Grid EE Staffing	39.5
Community Action Agency staff	35.0
Total all 2018 Rhode Island FTEs	804.1

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 2018. 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 5.

Shareholder Incentive

The Company's Shareholder Incentive earnings are determined by its performance against the established annual savings goals documented in the 2018 EEPP. Under the current incentive structure, the Company can earn a target based-incentive rate equal to 5.0% of the eligible spending budget in a program year for achieving electric and gas energy savings goals.

Beginning in 2015, the incentive structure was changed for the electric portfolio to promote both energy and demand savings. This structure allows the Company to earn a target-based incentive rate equal to 3.5% of the eligible annual spending budget for achieving MWh savings goals and 1.5% of the annual spending budget for achieving MW savings goals.

For the gas portfolio, where there is no demand savings component, the original target-based incentive rate equal to 5.0% of the eligible annual spending budget for achieving MMBtu savings goals remained in place.

The Shareholder Incentive is earned by sector. An incentive is earned if savings in a sector are 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 2018 performance. All gas sectors earned over 100% of the target incentive. For electric MWh, all sectors earned over 100% of the target incentive, and for the electric MW, income-eligible and residential earned over 100% of the target.

The Company has earned a total of $6,481,658 for the successful implementation of its energy efficiency programs in 2018.

In 2018 a correction was also made to savings factors for the EnergyWise Electric Program that also impacted 2017 savings. The result of this correction decreased the 2017 year-end electric savings for the EnergyWise Electric Program by net annual 287,735 kWh (4.2%) and the Residential Electric Sector by 0.3%. This correction decreases the 2017 shareholder incentive slightly by $3,347. The Company believes that this amount should be refunded to customers and has therefore reduced the 2018 earned shareholder incentive by $3,347. The above total of $6,481,658 includes this deduction of $3,347.

More details on the Company's Shareholder Incentive achievements are included in Attachments 1 and 2 and tables E-4 and G-4.

Attachment 1
Electric Year-End Results

Attachment 1

Electric Summary Table of Year-End Results

NATIONAL GRID ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-1: Summary of 2018 Target and Year End Results

Sector and Program	(1) Demand Reduction (Annual kW)			(4) Energy Savings (Annual MWh)			(7) Customer Participation			(10) Implementation Expenses ($ 000)			(13)	(14)
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	1,728	2,116	122.4%	13,959	14,017	100.4%	139	149	106.9%	$6,111.7	$5,177.0	84.7%	218,617	$0.024
Large Commercial Retrofit	11,910	12,471	104.7%	75,616	80,591	106.6%	2,193	3,299	150.4%	$24,030.7	$22,657.2	94.3%	952,429	$0.024
Small Business Direct Install	1,034	1,697	164.0%	9,940	10,321	103.8%	565	679	120.2%	$6,924.5	$5,982.3	86.4%	126,524	$0.047
Commercial Demonstration and R&D										$993.8	$938.0	94.4%		
Community Based Initiatives - C&I										$40.9	$2.0	4.8%		
RI Infrastructure Bank										$5,000.0	$5,000.0	100.0%		
SUBTOTAL	**14,673**	**16,284**	**111.0%**	**99,515**	**104,929**	**105.4%**	**2,897**	**4,126**	**142.4%**	**$43,101.6**	**$39,756.4**	**92.2%**	**1,297,570**	**$0.031**
Income Eligible Residential														
Single Family - Income Eligible Services	696	973	139.9%	4,185	4,336	103.6%	2,750	3,850	140.0%	$9,329.3	$9,871.9	105.8%	45,094	$0.219
Income Eligible Multifamily	170	211	124.2%	3,287	2,480	75.4%	4,800	3,875	80.7%	$2,557.4	$2,590.5	101.3%	28,903	$0.090
SUBTOTAL	**865**	**1,184**	**136.9%**	**7,472**	**6,816**	**91.2%**	**7,550**	**7,725**	**102.3%**	**$11,886.7**	**$12,462.5**	**104.8%**	**73,997**	**$0.168**
Non-Income Eligible Residential														
Residential New Construction	49	70	143.3%	619	972	157.1%	501	458	91.4%	$764.6	$767.0	100.3%	14,961	$0.051
ENERGY STAR® HVAC	433	972	224.6%	2,091	1,992	95.3%	1,794	3,057	170.4%	$2,206.6	$1,857.1	84.2%	27,709	$0.067
EnergyWise	286	414	144.7%	6,157	6,684	108.6%	10,000	11,838	118.4%	$14,916.3	$13,406.7	89.9%	46,499	$0.288
EnergyWise Multifamily	329	240	72.8%	4,207	2,834	67.4%	6,000	2,415	40.3%	$3,062.6	$2,195.9	71.7%	29,788	$0.074
Home Energy Reports	3,325	2,748	82.6%	25,054	23,527	93.9%	213,750	208,594	97.6%	$2,629.3	$2,568.6	97.7%	23,527	$0.109
ENERGY STAR® Lighting	4,413	6,141	139.1%	38,891	54,211	139.4%	292,150	430,649	147.4%	$6,768.6	$10,704.8	158.2%	304,000	$0.035
Residential Consumer Products	429	759	176.9%	2,849	4,243	149.0%	9,682	19,609	202.5%	$1,831.1	$1,906.5	104.1%	30,794	$0.062
Energy Efficiency Education Programs										$40.0	$0.0	0.0%		
Residential Demonstration and R&D										$922.6	$598.2	64.8%		
Community Based Initiatives - Residential										$163.0	$70.6	43.3%		
Comprehensive Marketing - Residential										$556.7	$456.5	82.0%		
SUBTOTAL	**9,264**	**11,343**	**122.4%**	**79,868**	**94,464**	**118.3%**	**533,877**	**676,620**	**126.7%**	**$33,861.5**	**$34,532.0**	**102.0%**	**477,278**	**$0.072**
Regulatory														
OER										$686.1	$686.0	100.0%		
EERMC										$686.1	$686.1	100.0%		
SUBTOTAL										**1,372.1**	**1,372.1**	**100.0%**		
TOTAL	**24,802**	**28,811**	**116.2%**	**186,855**	**206,209**	**110.4%**	**544,324**	**688,471**	**126.5%**	**$90,221.9**	**$88,122.9**	**97.7%**	**1,848,845**	**$0.048**
Municipal LED Street Lights										*$802.3*	$861.3	*107.3%*		
System Reliability Procurement										*$399.3*	$237.3	*59.4%*		

NOTES

(1)(4)(7) Targets from Docket 4755 - Revised Attachment 5, Table E-7 (electric)

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

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

(8) Participation was planned and is reported in 'net' terms which takes into account free-ridership and spillover.

Beginning in 2017, Home Energy Reports participation was counted as the number of customers receiving reports (i.e., the “treatment group”) adjusted by the “Read Rate” of 75% from the most recent Customer Engagement Tracker Survey.

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

(10) Approved Budget includes Implementation and Evaluation budgets from Docket 4755, Attachment 5 Table E-2 (electric)

(11) Year To Date Expenses.

The Company received $1,525,000 from the State for municipal street lights to pay out to municipal customers on its behalf. An additional $350,000 will be transferred in 2019.

System Reliability Procurement targets from Docket 4755 - Attachment 5, Table E-7 (electric), not included in Expenses Total

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

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

(13) Planned $/lifetime kWh - Attachment 5, Table E-5 (electric)

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-2: Summary of Value, kW, and kWh by Program
2018 Program Year

	Value (000's)														kW Saved				MWh Saved		MMBtu of Oil	
		Capacity					Energy					Non-Electric		Value								
		Generation					Winter		Summer													
Commercial & Industrial	Total	Summer	Winter	Trans	MDC	DRIPE	On Peak	Off Peak	On Peak	Off Peak	DRIPE	Non-Electric Benefits	Economic Benefits	Non-embedded Electric CO2 Reductions	Maximum Annual	Winter	Summer	Lifetime	Annual	Lifetime	Annual	Lifetime
Large Commercial New Construction	$36,670	$5,444	$0	$503	$3,010	$0	$7,031	$4,061	$3,225	$1,606	$6	($913)	$2,951	$9,746	1,993	1,207	2,116	31,813	14,017	218,617		
Large Commercial Retrofit	$143,005	$21,962	$0	$2,233	$13,361	$0	$29,466	$17,146	$12,714	$6,711	$35	($15,997)	$12,915	$42,459	10,952	10,906	12,471	128,788	80,591	952,429		
Small Business Direct Install	$21,970	$3,012	$0	$310	$1,857	$0	$3,869	$2,314	$1,674	$910	$4	($1,030)	$3,410	$5,640	1,697	1,723	1,697	20,615	10,321	126,524		
SUBTOTAL	**$201,644**	**$30,417**	**$0**	**$3,046**	**$18,227**	**$0**	**$40,366**	**$23,521**	**$17,613**	**$9,228**	**$46**	**($17,941)**	**$19,275**	**$57,846**	**14,642**	**13,836**	**16,284**	**181,215**	**104,929**	**1,297,570**		
Income Eligible Residential																						
Single Family - Income Eligible Services	$35,720	$1,532	$0	$153	$918	$0	$1,219	$953	$601	$359	$2	$20,791	$7,108	$2,082	975	737	973	10,222	4,336	45,094	16,885	323,031
Income Eligible Multifamily	$7,536	$469	$0	$44	$265	$0	$858	$699	$259	$190	$1	$1,560	$1,865	$1,327	210	384	211	2,947	2,480	28,903	1,679	28,836
SUBTOTAL	**$43,256**	**$2,001**	**$0**	**$198**	**$1,183**	**$0**	**$2,077**	**$1,653**	**$861**	**$549**	**$3**	**$22,350**	**$8,973**	**$3,409**	**1,184**	**1,121**	**1,184**	**13,170**	**6,816**	**73,997**	**18,564**	**351,867**
Non-Income Eligible Residential																						
Residential New Construction	$4,028	$239	$0	$20	$123	$0	$430	$526	$95	$59	$0	$1,323	$552	$660	70	58	70	1,379	972	14,961	-	-
ENERGY STAR® HVAC	$15,178	$1,999	$0	$187	$1,120	$0	$588	$717	$455	$192	$1	$7,325	$1,337	$1,257	972	1,326	972	12,490	1,992	27,709	198	2,970
EnergyWise	$37,804	$330	$0	$37	$219	$0	$1,164	$792	$641	$390	$3	$22,286	$9,653	$2,289	414	1,644	414	2,414	6,684	46,499	29,538	543,962
EnergyWise Multifamily	$13,703	$350	$0	$37	$222	$0	$893	$639	$312	$193	$1	$8,063	$1,581	$1,412	240	620	240	2,463	2,834	29,788	2,062	19,689
Home Energy Reports	$5,082	$510	$0	$42	$251	$0	$501	$379	$157	$122	$9	$0	$1,849	$1,262	2,748	3,764	2,748	2,748	23,527	23,527		
ENERGY STAR® Lighting	$42,114	$4,696	$0	$528	$3,160	$0	$9,200	$4,362	$3,639	$1,602	$26	($8,468)	$7,707	$15,661	6,141	7,866	6,141	34,797	54,211	304,000	-	-
Residential Consumer Products	$7,027	$775	$0	$87	$518	$0	$606	$509	$455	$328	$1	$831	$1,373	$1,543	759	609	759	5,722	4,243	30,794	1,358	9,508
SUBTOTAL	**$124,935**	**$8,898**	**$0**	**$938**	**$5,613**	**$0**	**$13,382**	**$7,924**	**$5,754**	**$2,886**	**$41**	**$31,361**	**$24,053**	**$24,084**	**11,343**	**15,888**	**11,343**	**62,014**	**94,464**	**477,278**	**33,156**	**576,128**
TOTAL	**$369,835**	**$41,316**	**$0**	**$4,182**	**$25,023**	**$0**	**$55,825**	**$33,098**	**$24,227**	**$12,663**	**$90**	**$35,771**	**$52,301**	**$85,338**	**27,169**	**30,845**	**28,811**	**256,399**	**206,209**	**1,848,845**	**51,720**	**927,995**

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-3: Summary of B/C Ratios, Value and Costs ($000's)
2018 Program Year

Commercial & Industrial	(1) Benefit/ Cost	(2) Total Value	(3) Program Implementation Expenses	(4) Customer Contribution	(5) Shareholder Incentive
Large Commercial New Construction	6.01	$36,669.7	$5,177.0	$921.5	
Large Commercial Retrofit	3.84	$143,004.5	$22,657.2	$14,598.3	
Small Business Direct Install	2.50	$21,969.7	$5,982.3	$2,805.7	
Commercial Demonstration and R&D			$938.0		
Community Based Initiatives - C&I			$2.0		
RI Infrastructure Bank			$5,000.0		
SUBTOTAL	**3.33**	**$201,643.9**	**$39,756.4**	**$18,325.5**	**$2,446.0**
Income Eligible Residential					
Single Family - Income Eligible Services	3.62	$35,719.8	$9,871.9	$0.0	
Income Eligible Multifamily	2.91	$7,536.5	$2,590.5	$0.0	
SUBTOTAL	**3.33**	**$43,256.2**	**$12,462.5**	**$0.0**	**$529.3**
Non-Income Eligible Residential					
Residential New Construction	4.67	$4,027.6	$767.0	$96.1	
ENERGY STAR® HVAC	5.00	$15,177.9	$1,857.1	$1,181.1	
EnergyWise	2.43	$37,803.6	$13,406.7	$2,121.7	
EnergyWise Multifamily	5.69	$13,702.6	$2,195.9	$211.6	
Home Energy Reports	1.98	$5,082.4	$2,568.6	$0.0	
ENERGY STAR® Lighting	2.28	$42,114.0	$10,704.8	$7,796.6	
Residential Consumer Products	2.65	$7,026.7	$1,906.5	$741.4	
Energy Efficiency Education Programs			$0.0		
Residential Demonstration and R&D			$598.2		
Community Based Initiatives - Residential			$70.6		
Comprehensive Marketing - Residential			$456.5		
SUBTOTAL	**2.57**	**$124,934.7**	**$34,532.0**	**$12,148.4**	**$1,965.1**
Regulatory					
OER			$686.0		
EERMC			$686.1		
SUBTOTAL			**$1,372.1**		
TOTAL	**2.99**	**$369,834.8**	**$88,122.9**	**$30,473.8**	**$4,940.4**

Notes:

(1) RI Test B/C Ratio = (Energy + Capacity + Resource Benefits + Economic Benefits + Carbon Benefits) / (Program Implementation + Customer Contribution + Shareholder Incentive)

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

(3) Year-End Implementation Expenses by Program from Table E-1 including payments to RIIB and Finance Costs.

(4) Shareholder incentives from Table E-4.

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-4: National Grid 2018 EE Incentive Calculation

Energy Incentive Rate:	3.50%						
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	$11,886,678	$416,034	7,471,934	$ 12,462,456	104.8%	7,471,934	5,603,951
Non-Income Eligible Residential	$32,938,889	$1,152,861	79,868,307	$ 33,933,722	103.0%	79,868,307	59,901,230
Commercial & Industrial	$42,107,870	$1,473,775	99,515,244	$ 38,818,458	92.2%	91,741,242	68,805,931
Total	**$86,933,437**	**$3,042,670**	**186,855,485**	**$ 85,214,635**		**179,081,483**	**134,311,112**

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	6,815,571	91.2%	6,815,571	$ 306,396	73.6%
Non-Income Eligible Residential	94,463,945	118.3%	94,463,945	$ 1,360,195	118.0%
Commercial & Industrial	104,929,296	114.4%	104,929,296	$ 1,685,635	114.4%
Total	**206,208,812**	**115.1%**	**206,208,812**	**$ 3,352,226**	**110.2%**

Demand Incentive Rate:	1.50%						
Sector	(1) Approved Spending Budget	(2) Target Incentive	(3) Annual kW Savings Goal	(3a) Actual Spending	(3b) % of Approved Spending	(3c) Budget adjusted target kW savings	(4) Threshold kW Savings
Income Eligible Residential	$11,886,678	$178,300	865	$ 12,462,456	104.8%	865	649
Non-Income Eligible Residential	$32,938,889	$494,083	9,264	$ 33,933,722	103.0%	9,264	6,948
Commercial & Industrial	$42,107,870	$631,618	14,673	$ 38,818,458	92.2%	13,526	10,145
Total	**$86,933,437**	**$1,304,002**	**24,802**	**$ 85,214,635**		**23,656**	**17,742**

Sector	(5) Actual kW	(6) % of Target Savings	(7) Savings Eligible for Incentive	(8) Total Earned Incentive	(9) % of Target Incentive Achieved
Income Eligible Residential	1,184	136.9%	1,081	$ 222,875	125.0%
Non-Income Eligible Residential	11,343	122.4%	11,343	$ 604,938	122.4%
Commercial & Industrial	16,284	120.4%	16,284	$ 760,363	120.4%
Total	**28,811**	**121.8%**	**28,708**	**$ 1,588,176**	**121.8%**

Notes

(1) Budget from 2018 EEPP. Includes Implementation; excludes Regulatory Costs, Residential and Commercial Demonstration and R&D costs, and Shareholder Incentive.

(2) Equal to the incentive rate (3.5% for Energy, 1.5% for Demand) x Column (1)

(3) Approved savings goal from 2018 EEPP

(3a) Actual spending includes actual Implementation Expenses from Table E-1. It excludes excludes Regulatory Costs, Residential and Commercial Demonstration and R&D costs, and Shareholder Incentive.

(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)
x 0.7 for energy savings
x 0.3 of demand savings
From 100% of savings to 125% of savings: Shareholder Incentive = SB x (0.05 x % of savings achieved)

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

(10) In 2018 a correction was made to savings factors for the EnergyWise Electric Program that also impacted 2017 savings. The result of this correction decreased the 2017 year-end electric savings for the EnergyWise Electric Program by 287,735 kWh (4.2%). This correction decreases the 2017 shareholder incentive slightly by $3,347. The Company believes that this amount should be refunded to customers and has therefore reduced the 2018 earned shareholder incentive by $3,347.

National Grid: NECO

TABLE E-5

OVERALL ANALYSIS OF ELECTRIC ENERGY EFFICIENCY FUND BALANCE

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	TOTAL
1. Start Of Period Balance	$9,414,783	$11,428,548	$16,485,604	$16,734,576	$18,441,959	($4,123,277)	$9,414,783
2. Revenue	$8,329,103	$6,980,686	$7,174,282	$6,915,537	($5,719,472)	$7,328,626	$31,008,762
3. Monthly EE Expenses	$6,331,305	$1,945,015	$6,957,530	$5,242,272	$16,859,651	($3,367,631)	$33,968,142
4. Cash Flow Over/(Under)	$1,997,798	$5,035,671	$216,752	$1,673,266	($22,579,123)	$10,696,257	($2,959,380)
5. End Of Period Balance Before Interest	$11,412,580	$16,464,219	$16,702,356	$18,407,842	($4,137,164)	$6,572,980	$6,455,403
6. Interest	$15,968	$21,384	$32,220	$34,117	$13,888	$2,378	$119,955
7. End Of Period Balance After Interest	$11,428,548	$16,485,604	$16,734,576	$18,441,959	($4,123,277)	$6,575,358	$6,575,358

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	YEAR END TOTAL
8. Start Of Period Balance	$6,575,358	$9,605,878	$13,683,249	$16,478,255	$12,579,252	$10,642,758	$9,414,783
9. Revenue [19]	$10,097,555	$10,354,113	$8,587,161	$7,976,456	$8,110,730	$8,313,561	$84,448,338
10. Monthly EE Expenses	$7,082,729	$6,299,330	$5,821,408	$11,903,643	$10,069,747	$13,839,178	$88,984,176
11. Cash Flow Over/(Under)	$3,014,826	$4,054,783	$2,765,753	($3,927,186)	($1,959,016)	($5,525,617)	($4,535,838)
12. End Of Period Balance Before Interest	$9,590,184	$13,660,661	$16,449,002	$12,551,069	$10,620,235	$5,117,141	$4,878,945
13. Interest	$15,694	$22,588	$29,253	$28,183	$22,523	$15,300	$253,496
14. End Of Period Balance After Interest	$9,605,878	$13,683,249	$16,478,255	$12,579,252	$10,642,758	$5,132,441	**$5,132,441**
15. 2018 Incentive							**$4,940,402**
16. Ending Balance after Incentive							**$192,039**

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. Includes payments of $861,260 to municpal customers for street light upgrades from the $1.525M in state funds.
11. Line 9 minus Line 10
12. Line 8 plus Line 11
13. Interest applied
14. Line 12 plus Line 13
15. Estimated 2018 Incentive plus prior period true-ups

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-6: National Grid 2018 Revolving Loan Funds

Large C&I Electric Revolving Loan Fund

	Income Statement	
(1)	2018 Funds Available	$9,283,015
(2)	2018 Loan budget	$10,000,000
(3)	Committed	$54,449
(4)	Paid	$5,278,219
(5)	Repayments	$6,067,670
(6)	Available 12/31/18	$10,018,017
(7)	Outstanding loan volume	$10,527,993
(8)	Loan defaults during period ($)	$0
(9)	Arrears over 120 days at period end ($)	$6,561
	Program Impact	
(10)	Number of loans	77
(10b)	Participants	65
(11)	Savings (Gross MWh)	14,167
(12)	Savings (Net MWh)	11,887
(13)	Lifetime Savings (Gross MWh)	168,083
(14)	Lifetime Savings (Net MWh)	144,447
(15)	Savings (Gross kW)	1,523
(16)	Saving (Net kW)	1,576
(17)	Total associated incentive volume ($)	$3,140,364
(18)	Total annual estimated energy cost savings ($)	$1,915,521

Small Business Electric Revolving Loan Fund

	Income Statement	
(1)	2018 Funds Available	$2,767,799
(2)	2018 Loan Budget	$4,400,000
(3)	Committed	$438,904
(4)	Paid	$3,097,009
(5)	Repayments	$2,687,171
(6)	Available 12/31/18	$1,919,057
(7)	Outstanding loan volume	$1,822,187
(8)	Loan defaults during period ($)	$0
(9)	Arrears over 120 days at period end ($)	$38,485
	Program Impact	
(10b)	Participants	759
(11)	Savings (Gross MWh)	10,641
(12)	Savings (Net MWh)	10,321
(13)	Lifetime Savings (Gross MWh)	129,880
(14)	Lifetime Savings (Net MWh)	126,524
(15)	Savings (Gross kW)	1,839
(16)	Saving (Net kW)	1,697
(17)	Total associated incentive volume ($)	$4,972,860
(18)	Total annual estimated energy cost savings ($)	$1,570,767

Rhode Island Public Energy Partnership (RI PEP)

	Income Statement	
(1)	2018 Funds Available	$805,153
(2)	2018 Budget	$0
(3)	Committed	$0
(4)	Paid	$0
(4a)	Funds Returned to OER	$1,046,058
(5)	Repayments	$306,965
(6)	Available 12/31/18	$66,060
(7)	Outstanding loan volume	$450,410
(8)	Loan defaults during period ($)	$0
(9)	Arrears over 120 days at period end ($)	$0
	Program Impact	
(10)	Number of loans	0
(10b)	Participants	0
(11)	Annual Savings (Gross MWh)	0
(12)	Annual Savings (Net MWh)	0
(13)	Lifetime Savings (Gross MWh)	0
(14)	Lifetime Savings (Net MWh)	0
(15)	Savings (Gross kW)	0
(16)	Saving (Net kW)	0
(17)	Total associated incentive volume ($)	$0
(18)	Total annual estimated energy cost savings ($)	$0

Notes

1 Amount available as of January 1, 2018.
2 Budget adopted by Sales Team for 2018 operations. Budget includes projections of repayments made during 2018.
3 As of December 31, 2018. Committed in 2018 but to be paid in 2019. Savings not included in 2018.
4 As of December 31, 2018. This includes all projects paid in 2018 and the OBR associated with those projects. OBR payment are processed once the associated incentive has been paid usually in batches.
4a Funds returned to RI OER as requested in March 2018 and December 2018.
5 As of December 31, 2018
6 Fund balance as of December 31, 2018. Committed funds are subtracted from this amount.
7 Total outstanding loan balance. Loans lent out that still need to be paid back. This includes loans from previous years.
8 Total loan value in default during period.
9 Total loan value in arrears for over 120 days as of December 31, 2018.
10 As of December 31, 2018
10b Unique customer names for large business (one customer name can have multiple sub accounts as is in the case of a franchise). Customer accounts used for small business (not adjusted for net-to-gross).
11 As of December 31, 2018
12 As of December 31, 2018
13 As of December 31, 2018
14 As of December 31, 2018
15 As of December 31, 2018
16 As of December 31, 2018
17 Incentives paid out with loans
18 Estimated energy cost savings to loan fund participants

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table E-7: 2018 Heat Loans

(1)	Number of loans	757
(2)	Loan amount	$4,439,342
(3)	Measures	
	Pre-Weatherization	16
	Weatherization	470
	Heatsystems	419
	DHW	32
(4)	Percentage of weatherization in loans	62%

Notes

1 Equals the number of participants. As of December 31, 2018

2 Total amount of loans dispersed in 2018.

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 Table of Year-End Results

NATIONAL GRID ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table G-1: Summary of 2018 Target and Year End Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Sector and Program	**Energy Savings (MMBtu)**			**Customer Participation**			**Implementation Expenses ($ 000)**				
Commercial & Industrial	**Approved Target**	**Actual**	**Pct Achieved**	**Approved Target**	**Actual**	**Pct Achieved**	**Approved Budget**	**Actual**	**Pct Achieved**	**Lifetime MMBtu**	**$/Lifetime MMBtu**
Large Commercial New Construction	42,764	55,639	130.1%	105	105	99.4%	$ 2,658.1	$ 2,787.5	104.9%	967,065	$ 2.88
Large Commercial Retrofit	186,780	178,576	95.6%	158	112	70.6%	$ 3,643.3	$ 4,257.5	116.9%	2,218,766	$ 1.92
Small Business Direct Install	3,059	3,138	102.6%	30	81	265.2%	$ 132.5	$ 143.0	107.9%	26,691	$ 5.36
Commercial & Industrial Multifamily	6,643	14,893	224.2%	1,698	954	56.2%	$ 410.2	$ 814.9	198.7%	160,581	$ 5.07
Commercial Demonstration and R&D							$ 482.1	$ 5.3	1.1%		
Community Based Initiatives - C&I							$ 9.8	$ 0.1	0.6%		
SUBTOTAL	**239,246**	**252,246**	**105.4%**	**1,992**	**1,251**	**62.8%**	**$ 7,335.9**	**$ 8,008.2**	**109.2%**	**3,373,103**	**$ 2.37**
Income Eligible Residential											
Single Family - Income Eligible Services	12,620	13,201	104.6%	675	615	91.1%	$ 4,032.4	$ 4,224.6	104.8%	264,024	$ 16.00
Income Eligible Multifamily	16,222	23,649	145.8%	3,500	3,010	86.0%	$ 2,349.5	$ 2,420.1	103.0%	358,114	$ 6.76
SUBTOTAL	**28,842**	**36,850**	**127.8%**	**4,175**	**3,625**	**86.8%**	**$ 6,382.0**	**$ 6,644.7**	**104.1%**	**622,138**	**$ 10.68**
Non-Income Eligible Residential											
Energy Star® HVAC	27,513	28,952	105.2%	1,557	2,740	176.0%	$ 1,730.4	$ 1,980.5	114.5%	472,057	$ 4.20
Energy*Wise*	26,787	26,279	98.1%	2,275	3,684	161.9%	$ 8,370.8	$ 7,859.9	93.9%	607,145	$ 12.95
EnergyWise Multifamily	12,069	11,214	92.9%	2,500	1,811	72.4%	$ 1,267.1	$ 1,036.0	81.8%	170,965	$ 6.06
Home Energy Reports	77,220	132,562	171.7%	104,250	88,062	84.5%	$ 428.7	$ 417.1	97.3%	132,562	$ 3.15
Residential New Construction	3,117	9,017	289.3%	255	249	97.6%	$ 587.4	$ 640.3	109.0%	135,530	$ 4.72
Comprehensive Marketing - Residential							$ 73.7	$ 73.3	99.5%		
Community Based Initiatives - Residential							$ 39.2	$ 10.6	27.0%		
Residential Demonstration and R&D							$ 19.6	$ -	0.0%		
SUBTOTAL	**146,706**	**208,024**	**141.8%**	**110,837**	**96,547**	**87.1%**	**$ 12,516.7**	**$ 12,017.6**	**96.0%**	**1,518,259**	**$ 7.92**
Regulatory											
EERMC							$ 279.8	$ 280.2	100.1%		
OER							$ 279.8	$ 279.9	100.0%		
SUBTOTAL							**$ 559.6**	**$ 560.0**	**100.1%**		
TOTAL	**414,795**	**497,119**	**119.8%**	**117,004**	**101,423**	**86.7%**	**$ 26,794.3**	**$ 27,230.6**	**101.6%**	**5,513,499**	**$ 4.94**

NOTES

(1)(4) Targets from Docket 4755 - Revised Attachment 6, Table G-7 (gas).

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

(4) Participation was planned and is reported in 'net' terms which takes into account free-ridership and spillover.

Beginning in 2017, Home Energy Reports participation will be counted as the number of customers receiving reports (i.e., the “treatment group”) adjusted by the “Read Rate” of 75% from the most recent Customer Engagement Tracker Survey.

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

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

(11) $/lifetime MMBtu = Column (8)*1000/Column (10)

NATIONAL GRID NATURAL GAS ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table G-2: Summary of Value and MMBTU Saved by Program
2018 Program Year

	Value ($000)				MMBTU Gas Saved	
	(1) Total Value	(2) Natural Gas Benefits	(3) Non-Gas Benefits	(4) Economic Benefits	(5) Annual	(6) Lifetime
Commercial & Industrial						
Large Commercial New Construction	$14,407	$12,803	$15	$1,589	55,639	967,065
Large Commercial Retrofit	$31,984	$29,548	$9	$2,427	178,576	2,218,766
Commercial & Industrial Multifamily	$3,035	$2,243	$327	$464	14,893	160,581
Small Business Direct Install	$595	$347	$167	$81	3,138	26,691
SUBTOTAL	**$50,022**	**$44,942**	**$518**	**$4,562**	**252,246**	**3,373,103**
Income Eligible Residential						
Single Family - Income Eligible Services	$14,116	$3,768	$7,306	$3,042	13,201	264,024
Income Eligible Multifamily	$9,465	$5,093	$2,630	$1,742	23,649	358,114
SUBTOTAL	**$23,581**	**$8,862**	**$9,936**	**$4,784**	**36,850**	**622,138**
Non-Income Eligible Residential						
Energy Star® HVAC	$8,919	$6,705	$789	$1,426	28,952	472,057
Energy*Wise*	$18,912	$8,688	$4,565	$5,659	26,279	607,145
EnergyWise Multifamily	$7,179	$2,431	$4,002	$746	11,214	170,965
Home Energy Reports	$2,012	$1,711	$0	$300	132,562	132,562
Residential New Construction	$2,492	$1,928	$104	$461	9,017	135,530
SUBTOTAL	**$39,514**	**$21,462**	**$9,459**	**$8,592**	**208,024**	**1,518,259**
TOTAL	**$113,117**	**$75,266**	**$19,913**	**$17,938**	**497,119**	**5,513,499**

Notes:
(1) Total Benefits equal Natural Gas Benefits plus Non-Gas Benefits plus Economic Benefits. Carbon value is embedded in Natural Gas Benefits.
(3) Non-Gas Benefits include electric benefits and non-resource benefits (excluding economic benefits listed seperately)

NATIONAL GRID NATURAL GAS ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table G-3: Summary of B/C Ratios, Value and Costs ($000's)
2018 Program Year

	(1) Benefit/ Cost	(2) Total Value	(3) Program Implementation Expenses	(4) Customer Contribution	(5) Shareholder Incentive
Commercial & Industrial					
Large Commercial New Construction	3.00	$14,407.4	$2,787.5	$2,012.7	
Large Commercial Retrofit	5.73	$31,984.0	$4,257.5	$1,325.0	
Small Business Direct Install	3.69	$595.4	$143.0	$18.5	
Commercial & Industrial Multifamily	3.07	$3,035.1	$814.9	$174.1	
Commercial Demonstration and R&D			$5.3		
Community Based Initiatives - C&I			$0.1		
SUBTOTAL	**4.20**	**$50,021.9**	**$8,008.2**	**$3,530.3**	**$361.3**
Income Eligible Residential					
Single Family - Income Eligible Services	3.34	$14,116.2	$4,224.6	$0.0	
Income Eligible Multifamily	3.91	$9,465.2	$2,420.1	$0.0	
SUBTOTAL	**3.35**	**$23,581.4**	**$6,644.7**	**$0.0**	**$398.9**
Non-Income Eligible Residential					
Energy Star® HVAC	2.19	$8,919.4	$1,980.5	$2,101.6	
EnergyWise	1.95	$18,912.0	$7,859.9	$1,816.4	
EnergyWise Multifamily	6.60	$7,178.6	$1,036.0	$51.2	
Home Energy Reports	4.82	$2,011.6	$417.1	$0.0	
Residential New Construction	3.47	$2,492.4	$640.3	$78.4	
Residential Demonstration and R&D			$0.0		
Community Based Initiatives - Residential			$10.6		
Comprehensive Marketing - Residential			$73.3		
SUBTOTAL	**2.35**	**$39,513.9**	**$12,017.6**	**$4,047.6**	**$781.1**
Regulatory					
EERMC			$280.2		
OER			$279.9		
SUBTOTAL			**$560.0**		
TOTAL	**3.11**	**$113,117.2**	**$27,230.6**	**$7,577.9**	**$1,541.3**

Notes:

(1) RI Test B/C Ratio = (Natural Gas Benefits + Non-Gas Benefits + Economic Benefits + Carbon Benefits) / (Program Implementation + Customer Contribution + Shareholder Incentive)

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

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

(5) Shareholder incentives from Table G-4.

NATIONAL GRID NATURAL GAS ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table G-4: National Grid 2018 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	$ 6,381,972	$ 319,099	28,842	$ 6,644,721	104.1%	28,842	21,632
Non-Income Eligible Residential	$ 12,497,166	$ 624,858	146,706	$ 12,017,644	96.2%	146,706	110,030
Commercial & Industrial	$ 6,853,797	$ 342,690	239,246	$ 8,002,947	116.8%	239,246	179,435
Total	**$ 25,732,935**	**$ 1,286,647**	**414,795**	**$ 26,665,312**	**103.6%**	**414,795**	**311,096**

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	36,850	127.8%	36,053	$398,873	125.0%
Non-Income Eligible Residential	208,024	141.8%	183,383	$781,073	125.0%
Commercial & Industrial	252,246	105.4%	252,246	$361,309	105.4%
Total	**497,119**	**119.8%**	**471,681**	**$1,541,255**	**119.8%**

Notes:

(1) Budget from 2018 EEPP. Includes Implementation; excludes Regulatory Costs, Residential and Commercial Demonstration and R&D costs, and Shareholder Incentive.

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

(3) Approved savings goal from 2018 EEPP

(3a) Actual spending includes actual Implementation Expenses from Table G-1. It excludes excludes Regulatory Costs, Residential and Commercial Demonstration and R&D costs, and Shareholder Incentive.

(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

OVERALL ANALYSIS OF NATURAL GAS ENERGY EFFICIENCY FUND BALANCE

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	TOTAL
1. Start Of Period Balance	($4,888,962)	$13,364,867	$15,515,302	$16,780,711	$17,376,937	$17,694,247	($4,888,962)
2. Revenue	$18,825,179	$3,762,038	$4,191,024	$3,059,120	$1,507,686	$1,068,460	$32,413,508
3. Monthly EE Expenses	$580,171	$1,641,655	$2,960,304	$2,501,989	$1,230,516	$2,027,729	$10,942,364
4. Cash Flow Over/(Under)	$18,245,008	$2,120,383	$1,230,720	$557,131	$277,171	($959,269)	$21,471,144
5. End Of Period Balance Before Interest	$13,356,047	$15,485,250	$16,746,022	$17,337,843	$17,654,107	$16,734,978	$16,582,182
6. Interest	$8,820	$30,052	$34,690	$39,094	$40,140	$41,315	$194,111
7. End Of Period Balance After Interest	$13,364,867	$15,515,302	$16,780,711	$17,376,937	$17,694,247	$16,776,293	$16,776,293

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	YEAR END TOTAL
8. Start Of Period Balance	$16,776,293	$15,137,138	$13,906,083	$12,497,747	$12,862,084	$13,551,122	($4,888,962)
9. Revenue	$970,194	$910,328	$780,141	$1,894,701	$3,157,151	$971,036	$41,097,060
10. Monthly EE Expenses	$2,649,191	$2,177,641	$2,221,770	$1,564,659	$2,503,832	$5,171,175	$27,230,634
11. Cash Flow Over/(Under)	($1,678,997)	($1,267,313)	($1,441,629)	$330,042	$653,319	($4,200,139)	$13,866,426
12. End Of Period Balance Before Interest	$15,097,296	$13,869,824	$12,464,454	$12,827,789	$13,515,403	$9,350,983	$8,977,464
13. Interest	$39,842	$36,259	$33,293	$34,295	$35,720	$31,872	$405,391
14. End Of Period Balance After Interest	$15,137,138	$13,906,083	$12,497,747	$12,862,084	$13,551,122	$9,382,855	**$9,382,855**
15. 2018 Incentive							**$1,541,255**
16. Ending Balance after Incentive							**$7,841,600**

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. Estimated 2018 Incentive plus prior period true-ups

NATIONAL GRID ELECTRIC ENERGY EFFICIENCY PROGRAMS IN RHODE ISLAND
Table G-6: National Grid 2018 Revolving Loan Funds

Large C&I Gas Revolving Loan Fund

	Income Statement	
(1)	2018 Funds Available	$2,009,110
(2)	2018 Loan budget	$2,000,000
(3)	Committed	$392,218
(4)	Paid	$1,171,476
(5)	Repayments	$750,560
(6)	Available 12/31/18	$1,195,976
(7)	Outstanding loan volume	$1,483,484
(8)	Loan defaults during period ($)	$0
(9)	Arrears over 120 days at period end ($)	$2,475
	Program Impact	
(10)	Number of loans	32
(10b)	Participants	21
(11)	Annual Savings (Gross MMBtu)	27,664
(12)	Annual Savings (Net MMBtu)	22,906
(13)	Lifetime Savings (Gross MMBtu)	321,415
(14)	Lifetime Savings (Net MMBtu)	266,136
(17)	Total associated incentive volume ($)	$360,521
(18)	Total annual estimated energy cost savings ($)	$281,584

Rhode Island Public Energy Partnership (RI PEP) Gas

	Income Statement	
(1)	2018 Funds Available	$94,217
(4)	Paid	$0
(4a)	Funds Returned to OER	$95,456
(5)	Repayments	$1,652
(6)	Available 12/31/18	$413
(7)	Outstanding loan volume	$4,131
(8)	Loan defaults during period ($)	$0
(9)	Arrears over 120 days at period end ($)	$0
	Program Impact	
(10)	Number of loans	
(10b)	Participants	0
(11)	Savings (MMBtu)	0

Notes

1 Amount available as of January 1, 2018.
2 Budget adopted by Sales Team for 2018 operations. Budget includes projections of repayments made during 2018.
3 As of December 31, 2018. Committed in 2018 but to be paid in 2019. Savings not included in 2018.
4 As of December 31, 2018. This includes all project paid in 2018 and the OBR associated with those projects. OBR payment are processed once the associated incentive has been paid usually in batches.
4a Funds returned to RI OER as requested on December 17, 2018.
5 As of December 31, 2018
6 Fund balance as of December 31, 2018. Committed funds are subtracted from this amount.
7 Total outstanding loan balance. Loans lent out that still need to be paid back. This includes loans from previous years.
8 Total loan value in default during period.
9 Total loan value in arrears for over 120 days as of December 31, 2018.
10 As of December 31, 2018
10b Unique customer names for large business (one customer name can have multiple sub accounts as is in the case of a franchise).
11 As of December 31, 2018
12 As of December 31, 2018
13 As of December 31, 2018
14 As of December 31, 2018
15 As of December 31, 2018
16 As of December 31, 2018
17 Incentives paid out with loans
18 Estimated energy cost savings to loan fund participants

Attachment 3
Case Studies

Attachment 3

Case Studies

nationalgrid

Town of Coventry

Improved work and learning environment through energy efficiency

No easy feat for a small town facilities team, Coventry embarked on a $5 million energy upgrade project.

The combination of aging infrastructure of the municipal buildings and schools, deferred maintenance and rising energy costs prompted the town of Coventry, R.I. (population 35,000), to jumpstart essential energy upgrades.

In 2012, a $5 million energy upgrade bond was passed. Roughly $3.2 million was earmarked for town facility upgrades while $1.8 million was allocated for school buildings. Coventry facilities staff partnered with National Grid to make this extensive upgrade possible.

Making change happen

National Grid initiated energy audits and cost-benefit analysis by bringing in Energy Conservation, Inc. (ECI) for municipal projects and RISE Engineering for the school projects. There were no architects or builders involved. The energy audits (scoping studies) led to a list of recommendations. The upgrade involved eight municipal buildings (town hall and annex, garages, library, parks, police department and senior center) totaling close to 200,000 square feet and the school district comprised of five elementary schools, one middle school and a 296,000-square-foot high school.

"Any energy savings we can secure are crucial to school operations. I think this shows our commitment to the community, to the families — about energy efficiency conservation, and that we can put most of our resources toward improving student performance."
— Craig Levis, Superintendent, Public Schools, Coventry, R.I.

Turning plans into action

After analyzing energy savings projections and payback periods, the town made the following upgrades:

- **Installed air sealing in municipal buildings.** This proved to be a core part of the project and supported the overall upgrade of energy end-use equipment.
- **Upgraded indoor classroom and common area lighting and outdoor parking lot and stadium lighting.**
- **Added Energy Management Systems to five older municipal buildings.** Monitoring energy use (gas and electric) identified other unknown deficiencies (for instance, pumps that needed to be replaced).
- **Replaced the boilers in the town hall annex**, which boosted heating efficiency from 75% to over 90%.
- **Replaced hot water and one steam boiler in the high school.** The new steam boiler operates at 85% efficiency compared to 60% efficiency in the old unit.
- **Recommissioned pneumatic thermostat control in the high school and fixed air leaks and recalibrated sensors.**
- **Implemented Variable Speed Drives (VSDs) on HVAC units.**

A proactive focus

The nearly 20-year ongoing partnership between National Grid and the Coventry community proved invaluable throughout the project. Utilizing a hands-on, proactive approach, the National Grid team worked with key stakeholders to ensure the upgrade process went as smoothly as possible. From securing a contractor to install equipment to monitoring progress, every step of the process involved careful coordination between the National Grid team, town facilities staff and the turnkey energy solutions providers (ECI and RISE Engineering).

In addition to technical advice and project expediting, National Grid was able to offer both prescriptive and custom incentives totaling $591,000. This funding allowed the town to purchase energy end-use components and controls of higher quality and significantly expand the scope of the energy upgrades. The town also received a subsidy from the Rhode Island Energy Office for scoping studies.

Leaders in clean energy

In 2018, the Town of Coventry and Coventry Schools received a Lead By Example Energy Award from the Rhode Island Office of Energy Resources. This significant achievement recognizes public sector facilities that have implemented clean energy initiatives.

Improved learning environments

Non-energy benefits included improved working conditions and learning environment for students/staff (e.g., increased comfort, productivity) as well as reduced maintenance costs.

Town of Coventry directors Kevin McGee and Jason Martin made the following recommendation to anyone looking at upgrading their facilities, especially in municipalities:

> *"Get all decision makers involved at the outset. Then communicate early and often. No surprises to stakeholders!"*

Improve the work and learning environment through energy efficiency

National Grid can make your energy efficiency goals a reality. Let our technical experts work with you to identify the right projects.

In addition, our **Strategic Energy Management Plan (SEMP)** can help you fund them. Along with the incentives to reduce capital costs, we offer financial options to help fund the net cost after incentives. This allows you to afford the upgrades you need.

nationalgrid

Calise Bakery

Energy efficiency upgrades ensure next generation success

National Grid helps Calise & Sons Bakery with a major equipment upgrade.

In business for over 100 years, Calise & Sons Bakery in Lincoln, R.I., is renowned for its commitment to the highest quality products – a mission known as the "Calise Way." To help ensure continued success in the future, the leadership team embarked on a large-scale upgrade to the facility's aging HVAC, refrigeration, compressed air and lighting systems. In addition to a focus on safety, the company is passionate about reducing its environmental footprint.

All in the family

Founded in the early 1900s, the family-run wholesale bakery is currently in its **fourth generation**. Calise Bakery's products are sold to grocery retailers, sub shops, schools and hospitals throughout New England, New York and Virginia.

"This year, Calise Bakery will be celebrating 110 years," says Peter Petrocelli, Chief Financial Officer. "It is truly remarkable how the company has stayed in the family after all these years. It has grown from a small neighborhood bakery in Rhode Island to a major wholesaler."

"This project is a pillar that supports the 'Calise Way,' which is our mission to produce high-quality breads and rolls in a safe and clean environment." – Peter Petrocelli, Chief Financial Officer, Calise & Sons Bakery

Teamwork at its best

Equipping the bakery for another 100 years of success, Calise leadership partnered with National Grid, Leidos Inc. and RISE Engineering to get started.

National Grid covered nearly **30 percent** of costs through the National Grid incentive program – a significant savings for the bakery. Leidos consulted with Calise's Chief Engineer John Almagno to identify energy efficiency measures. RISE Engineering handled the lighting component, including ordering materials and installation. Leidos identified the mechanical measures and assisted with energy savings calculations and incentives paperwork. Almagno managed the overall project, including scheduling.

Ready, set, upgrade

The year-long project consisted of four major upgrades to the HVAC, refrigeration, compressed air and lighting systems:

HVAC: Due to aging equipment, the existing chiller and HVAC systems needed to be replaced. According to Almagno, maintaining the right temperature and humidity in the bakery is essential for product quality.

In addition, an HVAC system maintains positive pressure, which prevents outdoor air contaminants from entering the facility. This is an important requirement for the bakery's BRC and GFSI food safety accreditations. With the new system, programmable logic controls and added air intakes better maintain positive pressure.

Refrigeration: Calise Bakery has about 1,500 square feet of refrigeration space, including one large freezer and two walk-in coolers. To increase energy efficiency, Freeaire upgraded the condenser and evaporator fan controls. With the new refrigeration system, the bakery has saved more than **$10,000 per year** in energy costs.

Compressed Air: Compressed air is a critical part of manufacturing operations. However, this is an inherently inefficient process, as shown in a compressed air survey conducted at the facility. The company previously added a large compressor to augment two smaller compressors. A larger, more efficient compressor was installed. Air leaks were identified and repaired, all incentivized by National Grid. The result added to the energy savings.

Lighting: From improving energy efficiency to enhancing product quality, lighting plays an important role in daily operations. The bakery originally used metal halide high-bay lights before switching to fluorescent bulbs about 10 years ago. Now, they were ready to upgrade to LEDs for significant energy cost and maintenance savings and improved light quality.

RISE Engineering changed the facility's fluorescent lights to LEDs. In addition, exterior lighting was upgraded to increase employee safety and security.

In the 55,000-square-foot production area – nearly the size of a football field – the brighter LED lighting allows for more accurate inspections of product colors and textures. The greater visibility also increases employee safety. According to Petrocelli, the old lighting created a dark and dreary facility. Now, the aesthetically pleasing environment has improved employee morale and retention.

A busy bakery

Operating 24 hours a day, six days a week, Calise Bakery is a fast-paced, large-volume manufacturer. As a result, one of the biggest challenges was accommodating the installation around the busy production schedule.

"Due to food safety protocol, we couldn't have them install equipment around our products," says Petrocelli. "The installation had to be completed when we had down time on Sundays and Tuesdays. Although this extended the timeframe, RISE Engineering was very accommodating with our schedule."

PROJECT FAST FACTS:

Final cost of Installed ECMs	$383,052
Authorized Incentive	$103,442
Customer Cost	$279,629
Annual kWh Reduction	543,071 kWh
Annual Carbon Reduction	200 metric tons CO^2 @ 810 pounds per MWh
Annual Savings	$70,600 @ $0.13/kWh
Return on Investment (ROI)	25%

A catalyst for change

For bakery management, the partnership with National Grid, RISE Engineering and Leidos was the key to success. Instead of tackling it on their own, bakery employees were able to focus on what they do best: producing quality breads and rolls.

"It would be very difficult to do the equipment upgrades on our own," says Almagno. "In a DIY project, there is always the potential to make mistakes. It was helpful to work with experts who understand what is required and ensure we qualify for the food safety accreditations."

These equipment upgrades have had a major impact on the bakery, such as significant energy cost savings of **over $60,000 annually**, improved product quality and safety, and a reduced carbon footprint. "Many customers ask about our sustainability efforts, so it's great to be able to talk about these upgrades," Petrocelli says. "This project has helped us pave the way for continued success now and in the future."

Give your manufacturing facility an upgrade

National Grid can help your efficiency projects come to light. We offer technical guidance and can help you learn the best opportunities for energy efficiency.

And when you're ready to make a change, technical energy advisors are available at no cost through National Grid's industrial initiative in Rhode Island and Massachusetts.

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Lifespan Case Study

Collaboration drives significant energy and non-energy benefits

Lifespan is always on the lookout for energy improvements.

With four major hospital campuses, multiple offsite facilities (ambulatory care, MRI buildings, offices) and buildings ranging in age and size, Lifespan was facing many energy efficiency challenges in identifying and prioritizing projects that would be suitable for its overall strategic energy management plan.

Collaborative Process

National Grid approached Lifespan to help examine energy savings solutions. This was based on a multi-year examination of opportunities that would support the growth of the hospital in an efficient, asset management-driven process. **When individual projects were considered holistically as part of an overall strategic energy management plan, the puzzle pieces fit and served as a catalyst for National Grid and Lifespan to move forward together.**

Along with National Grid, **B2Q Engineering** was instrumental in making this project a reality through **technical assessment studies.** Using these studies and Lifespan's in-house design capabilities, they developed a cost-feasible plan that took into account project risk, available capital and the financial payback period.

Invisible Yet Invaluable

With ten project groups, each with multiple measures across Lifespan campuses, the behind-the-scenes improvements were the real game changers. **These largely invisible upgrades included, but were not limited to:**

- Implementing and optimizing outside air reset control
- Repairing non-functioning economizers
- Reducing air handling unit (AHU) fan speed during unoccupied hours
- Installing or repairing variable-frequency drives (VFDs) for fans and pumps
- Tying HVAC systems into the building management system (BMS)

"The project was successful, the energy savings are great and all disciplines worked together to achieve scale. These upgrades also aligned with our commitment to environmental stewardship."
- Thomas Magliocchetti, Vice President, Facilities Services

These upgrades allowed for **greater command over critical systems,** such as heating and cooling, resulting in improved energy efficiency. In addition, controls that monitored temperature and fan speed translated into non-energy benefits, notably greater patient comfort.

Part of this project also consisted of a significant lighting upgrade to all of Lifespan's campus facilities, including parking lots. Among the non-energy benefits, the project produced a positive change for patients, visitors and staff. Doctors and other hospital employees immediately remarked about the brighter lighting throughout the hospital campuses.

These improvements strengthened the efficiency of Lifespan's basic operating systems. At the heart of the strategic energy management plan, this comprehensive project provided a cost-feasible approach that considered project risk, available capital and financial payback. When all the individual projects were bundled together, the result proved to be an attractive return on investment.

Improvements Abound in an Environment of Care

There are many ways Lifespan's upgrades have benefited patients, staff and visitors.

Greater cooling capacity enables a more comfortable environment.

More even temperatures and lighting levels improve the sense of well-being.

The lighting upgrades create better visibility and ambience.

The new integrated BMS has the ability to efficiently regulate system functions while reducing the health system's overall operating costs and environmental impact.

How National Grid and Lifespan Made This Happen Together

Of all the projects recommended, Lifespan went forward with 60% of the projects initially. **National Grid was able to provide Lifespan with generous financial incentives through its Strategic Energy Management Plan (SEMP) initiative** which helped offset a significant portion of the equipment and installation costs. The combination of these incentives and an attractive on-bill financing option helped Lifespan secure the necessary capital to invest deeply in energy efficiency and patient care, while also reaching an attractive return on investment for the hospitals.

Lifespan achieved 8 to 10 percent in savings. This equates to roughly $1.4 million annually.

When asked if companies should consider National Grid for their future projects, a representative from Lifespan said, *"I would highly recommend this thoughtful approach for energy planning and environmental stewardship. The energy savings are great, and all disciplines worked together to achieve scale."*

After the success of their last project, Lifespan is working with National Grid again to enable implementation of the remaining projects. The collaborative partnership between Lifespan, National Grid, and B2Q Engineering made this a **rewarding endeavor, benefiting Lifespan's patients, visitors, employees and finances.**

With a team of technical experts, financial incentives to drive down capital costs, and resources to help you every step of the way, there's no better way to achieve the scale required to improve energy efficiency.

Ready to take the first step? Contact National Grid:

Call: **1-855-236-7052**
Email: **energysavings@nationalgrid.com**

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National Grid HEAT Loan Assessment

research into action inc

National Grid's HEAT Loan in Rhode Island provides financing for space heating, water heating, and weatherization (Wx) upgrades to qualified customers participating in the EnergyWise program. Customers can borrow up to $25,000 for up to seven years at 0% interest.

OBJECTIVE: Understand the extent to which HEAT Loans enable HVAC and Wx projects; and identify opportunities to enable higher uptake of measures.

METHODS

- Program Database Analysis
- Participant Survey
- HVAC Contractor In-Depth Interviews
- HEAT Loan Lender In-Depth Interviews

KEY FINDINGS

- **3,354 customers** (19% of EnergyWise participants) received a HEAT Loan from 2014 to 2017.
- 71% of surveyed EnergyWise participants were **aware of the HEAT Loan**.
- **No surveyed customers** would be interested in the HEAT Loan at ≥ 5% interest. Lenders and contractors said 3% interest is where most customers would lose interest.
- Substantial interest in **expanding HEAT Loan** offering to AC and windows.
- HEAT Loans **enabled greater natural gas savings** per HVAC and/or Wx project compared to non-HEAT Loan recipients, but not greater electric savings.*
- Without HEAT Loan, **76% would delay**, reduce or cancel their project.
- Contractors and lenders report some **customer confusion** about HEAT Loan steps and requirements.

* The study did not include analysis of oil/propane savings

CONCLUSIONS AND RECOMMENDATIONS

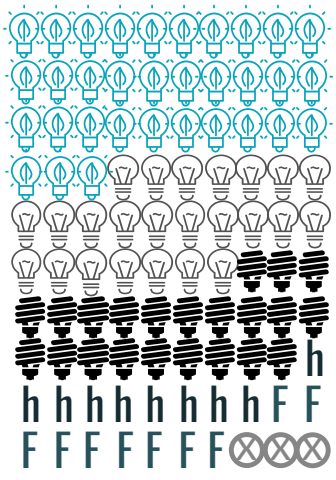
- HEAT Loan enabled energy efficiency investments that otherwise would not have happened.
- Customers, contractors, and lenders liked the 0% interest aspect of the loan.
- Conduct educational outreach to clarify customer participation process and emergency replacement policy.
- Determine additional cost-effective measures for HEAT Loan.

Rhode Island Residential Lighting Market Assessment

This study updated estimates of lighting saturation and assessed the lighting market in Rhode Island. NMR visited 75 homes in April and May of 2018 to collect data on lighting use, storage, and purchasing behavior. The results show that National Grid programs have had a strong impact on LED adoption. LED saturation and penetration rates in the comparison area (New York) continued to lag behind the rates measured in Rhode Island. In addition, ENERGY STAR LEDs (the only LEDs supported by the programs) accounted for the majority of the difference in LED saturation between the states. There were nearly five times as many ENERGY STAR LEDs in use in Rhode Island compared to New York.*

2018 Saturation Rates

Saturation is the percentage of sockets filled by a specific bulb type.



LED
Incandescent
CFL
Halogen
Fluorescent
Empty Socket

In Rhode Island, 33% of all installed bulbs were LED, followed by incandescent (24%), CFL (22%), halogen (9%), and fluorescent (9%). 3% of sockets were empty. Total efficient bulb saturation was 64%.

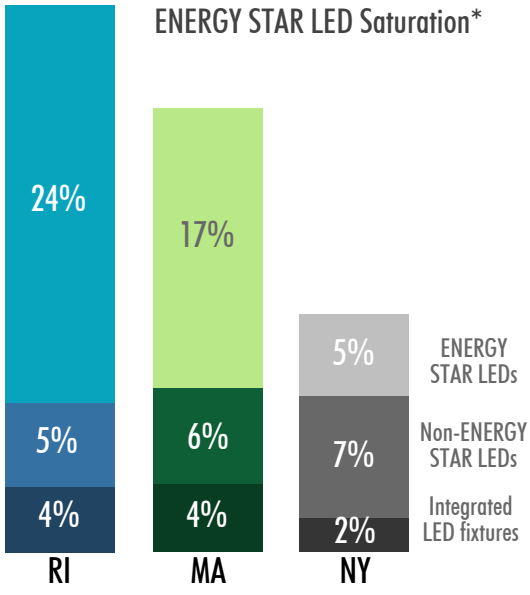
In Rhode Island, 86% of all LEDs purchased or received in the previous year were ENERGY STAR, compared to 74% in Massachusetts and 37% in New York.*

Saturation of ENERGY STAR LEDs in Rhode Island (24%) was nearly five times the rate observed in New York (5%).

Massachusetts, which also has program support, has 17% ENERGY STAR LED saturation.*

This is strong evidence that Rhode Island programs (which exclusively support ENERGY STAR products - including LEDs) are driving increased adoption of LEDs.

ENERGY STAR LED Saturation*



*Data collection in Rhode Island took place nearly 6 months after Massachusetts and New York.

In Rhode Island, LEDs are installed in all room types; even the rooms with the lowest penetration still had some LEDs.

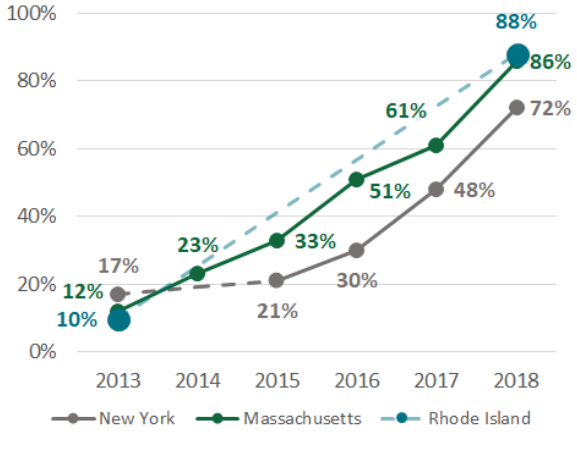
The rooms with the highest LED penetration were offices, dining rooms, and bedrooms.

70% 68% 65%

The rooms with the lowest LED penetration were garages, closets, and utility/laundry rooms, besides "other" room types.

32% 31% 22%

LED Penetration Rates



Rhode Island Prospective NTG

Net-to-gross (NTG) is a ratio that indicates how much of a program's savings the program is actually responsible for.

Standard	Reflector	Specialty	All LEDs
2019: 35%	2019: 45%	2019: 45%	2019: 39%
2020: 30%	2020: 40%	2020: 40%	2020: 34%

Attachment 4
Year-End Memo.

Attachment 4

Year-End Participation Memo

2018 Year-End Participation Memo

I. Participation Overview

National Grid recognizes the importance of program participation in designing efficiency services, reaching diverse markets, meeting customer demand, and finding all efficiency opportunities. Complementary to the gas and electric savings that the Company seeks to achieve each year, participation contextualizes the impact of efficiency. It reveals who is benefiting from the programs and how. The objective of this memo is to measure unique participants, participation over time, and total customers reached over time.

The Company offers several types of services that enable customers to participate in a variety of ways and this complicates how to measure participation. Programs and initiatives such as EnergyWise and EnergySmart Grocer (ESG) retrofit a home or business in a deep way which may include a technical assessment and multiple measures are installed. The Company also delivers efficiency to a large number of customers through broad channels that make efficient products accessible to customers. These broad efforts tend to focus on one measure at a time and are intended to transform the market so that customers make energy efficient choices. Examples include the ENERGY STAR® Lighting program and the Commercial and Industrial (C&I) Upstream Lighting initiative. For these broad offerings, it is difficult to precisely measure participation levels cumulatively and compare to participation in other deeper programs. Therefore, this memo focuses on participation levels in deep services that offer customers the most benefits.

Programs and initiatives are designed and delivered in very specific ways in order to maximize their potential to achieve energy savings. Therefore, specific data differs among programs and what is defined as a 'participant' may differ as well. A breakdown of participation units used for reporting gas and electric programs in 2018 is found below. The participation numbers found in Tables E-1 and G-1 in Attachments 5 and 6, respectively, of Docket 4755 - National Grid Electric and Gas Energy Efficiency Program Plan, filed with the Commission on November 1, 2017, are in these units.

Participation Reporting Units

Fuel	Sector	Program	Participation Unit
Gas	Commercial & Industrial	Large Commercial New Construction	Unique Account
		Large Commercial Retrofit	Unique Account
		Small Business Direct Install	Unique Account
		C&I Multifamily	Housing Units
	Income Eligible Residential	Single Family – Income Eligible Services	Unique Account
		Income Eligible Multifamily	Housing Units
	Residential	Energy Star® HVAC	Unique Account
		EnergyWise	Unique Account

		EnergyWise Multifamily	Housing Units
		Home Energy Reports	Unique Account
		Residential New Construction	Housing Units
Electric	Commercial & Industrial	Large Commercial New Construction	Unique Account
		Large Commercial Retrofit	Unique Account + Unique Customer names from Upstream Lighting
		Small Business Direct Install	Unique Account
	Income Eligible Residential	Single Family – Income Eligible Services	Unique Account
		Income Eligible Multifamily	Housing Units
	Residential	Energy Star® HVAC	Unique Account
		EnergyWise	Unique Account
		EnergyWise Multifamily	Housing Units
		Home Energy Reports	Unique Account
		Residential New Construction	Housing Units
		ENERGY STAR® Lighting	Estimated Housing Units
		ENERGY STAR® Products	Number of Rebates

As the table shows, participation is counted in different ways depending on the program.

1. Unique billing accounts: The predominate means for tracking participants. This is defined as one electric or gas account number.

2. Housing units: This method is used in the electric and gas Residential New Construction program and multifamily programs. For New Construction programs, buildings are typically under construction, so accounts do not yet exist. National Grid, therefore, tracks the number of housing units for participation. This method is also applied to all multifamily programs, where complexes and not individual apartments tend to have accounts. These programs are focused on the impact to the apartment dwellers, so from a program design perspective, understanding the number of housing units affected, is of greater interest. Please note that for the gas programs only gas-heated units are counted as participants. In the case that an electric or delivered-fuel-heated dwelling is part of the impacted complex, it would not be counted as a participant.

3. Rebates: In the ENERGY STAR® Products program, the Company reports the number of rebates processed because not every rebate contains account information.

4. Estimated bulbs per home: Within the ENERGY STAR® Lighting program, retailers do not disclose information identifying their customers, thereby precluding the connection of bulb purchases to

utility accounts. The number of bulbs, therefore, is translated into an estimate of participants based on purchasing pattern research[1].

5. Unique customer names: This method is used in the C&I Upstream Lighting Initiative. Customer account information is not collected at the point of sale as it would delay the process and can be a potential barrier to the success of the program. Therefore, the Company must analyze unique customer names and addresses to determine unique participants.

II. Unique Cumulative Participation

Objective

The integration of efficiency services, from the identification of HVAC opportunities during home audits to product offerings through the Home Energy Reports web portal, means that a single customer may be counted as a participant in multiple programs. Continued interest in efficiency, moreover, may lead that customer to participate in consecutive years. Such overlap in participation, both over time and across programs, has become important to National Grid and its stakeholders as it is important in understanding the progress that energy efficiency programs have made in benefitting Rhode Island electric and gas customers.

Methodology

The tables and graphs below show the unique annual and cumulative customer accounts associated with certain efficiency programs, sector, and fuel for the period 2012-2018. The tables are organized using the following:

- Annual Program Counts
    - Represents the unique accounts associated with an individual program in a given year. It removes all double counting within a given program within a given year. For example, if a customer participated in the HVAC program twice in 2016, they would only be counted once.
    - Please note that some overlap exists within the home audit programs, but not because of repeat audits. Program policy requires customers wait three years before receiving another audit. However, follow-up work to an audit in 2013, such as weatherization, could occur in 2014. One account, therefore, would appear as a unique participant in two different years.
    - For the Company's 2012 and 2013 Year End Reports, the program participation counts did not remove this double counting. The program participation counts for 2012 and 2013 below, therefore, may differ from how they were reported in the 2012 and 2013 Year End Reports.

[1] 2016-2018 Massachusetts Joint Statewide Three Year Electric and Gas Energy Efficiency Plan. Appendix J. Participant Definitions: Residential Lighting Assumptions

- Additive
    - The sum of Annual Program Counts.

- Cumulative
    - Eliminates all double counting within a program across multiple years. For example, if a customer participated in the HVAC program in 2013 and then again in 2016, they would only be counted once. Therefore, the cumulative count may be less than the additive count since it removes customers that participate in the same program more than once.

- Sector (Residential, Income Eligible, and Commercial) Subtotals
    - Eliminates all double counting across programs for a given year. For example, if a customer participated in the HVAC program and the EnergyWise program in 2018, they would only be counted once. Therefore, the sector subtotal may be less than the sum of all the annual program counts in a given year.

- Portfolio Total
    - Eliminates all double counting across sectors for a given year. For example, if a customer participated in the Income Eligible Single-Family Program and also the ENERGY STAR® Products program in 2018, they would only be counted once. Therefore the portfolio total may be less than the sum of all annual participant counts.

- Percent Unique Accounts:
    - This represents the ratio of cumulative to additive program participation counts. The result is the percentage of customers that only participated in a given program one time from 2012-2018.

- Percent Unique Program Participants:
    - This represents the ratio of the sector subtotal (unique counts) to the sum of annual participant counts in a given year. The result is the percentage of customers that only participated in one program during a given year.

- Portfolio Cumulative
    - The set of unique accounts across all programs and years, with all overlap removed. For example, if an account is found in EnergyWise for 2013 and ENERGY STAR® Products for 2014, it would only appear once in the Portfolio Cumulative Count.

- Important Exclusions
    - The counts shown below do not include participants in Home Energy Reports, ENERGY STAR® Lighting, and C&I Upstream Lighting (an initiative tracked under Commercial New Construction before 2016 and under Commercial Retrofit starting in 2016). While Home

Energy Reports is an important program that reaches broad participation and savings while driving customers to other program opportunities, it was excluded because its hundreds of thousands of participants would overwhelm the cumulative counts, thereby obscuring any trends that could otherwise be observed. Neither ENERGY STAR® Lighting nor Commercial Upstream Lighting collects account information so neither could be included in this analysis. The electric and gas participants for these programs, however, are included in tables E-1 and G-1 in Attachments 1 and 2 respectively.

- Not all rebates processed through the ENERGY STAR® Products contain account information. Therefore, rebates without account information are not included in this analysis. For this reason, annual program counts below are lower than the total number of customers that participated in this program. For example, in 2016, 25,171 rebates were processed through the program compared to 2,622 participants shown below. Likewise, the number of rebates in the ENERGY STAR® Products program reported in E-1 will be higher than the number of accounts detailed below because not all rebates include account information.
- In the year-end report, the Company counts EnergyWise Multifamily and EnergyWise Multifamily Income Eligible participation by units in treated buildings. When units are used, if 51% of the building is income-eligible, the whole building and all units within are treated and counted as income eligible. However, since this analysis uses account numbers, and account numbers track with a rate class, the results below will show a higher split of market rate to income eligible multifamily participants. Multifamily programs are included in this unique account analysis to remove overlaps with other programs to the best extent possible.
- 2012 was chosen as the baseline year because it represents the first year of 2012-2014 Three Year Plan.

Trends in EE Program Participation

The tables and figures below provide insight into participation trends across programs and years. Overall, 2018 program participation at the sector-level remained at a similar level to 2017 participation. The program-specific observations on participation trends from 2017 and 2018 are highlighted below.

- Residential electric and gas HVAC participation both increased slightly (<10%) after seeing participation grow by more than 50% from 2016-2017. This growth since 2016 was primarily driven by increased use of WIFI thermostats and Electronically Commutated Motors. Energy Star Products participation decreased slightly (6%) after more than doubling participation from 2016-2017. This shows a year over year stabilization in participation in these programs after significant growth the year prior. The Company will continue to offer a wide array of energy efficiency measures through these programs to reach customers.
- For single family programs, EnergyWise participation increased by 18% for electric and 29% for gas while Income Eligible Services participation increased by 25% for electric and decreased by 12% for gas, resulting in the some of the highest levels of participation since the creation of

these programs. The Company will continue to focus on marketing and promotions of these programs to encourage participation.

- For multifamily programs, EnergyWise participation increased by approximately 34% for electric and stayed level for gas. On the other hand, income eligible participation decreased by 45% for electric and increased by 72% for gas. The decline in the number of electric accounts served under income eligible services program is due to a decrease in the opportunities for lighting savings, whereas the gas program saw an increase in participation, driven in part by boiler projects at large multifamily facilities.
- For C&I programs, new construction participation declined by approximately 11% for electric and increased by 15% for gas, while retrofit participation slightly decreased for electric (2%) and by 14% for gas. The C&I retrofit gas participation also includes the C&I multifamily program. The increase in the large new construction gas program over the past year has been driven by increased upstream participation.
- Overall, the Company reached approximately 166,162 electric customers and 61,793 gas customers from 2012 to 2018. This figure is reflective of the "Important Exclusions" section above.

Examining the percentage of unique program participants in a single year, it is evident that there is little overlap between programs. This trend is seen across all three sectors (C&I, Income Eligible, Residential). These results are not surprising in the Income-Eligible Sector where customers would either participate in the single family or multifamily program, nor are they in the C&I sector where programs are more segmented. However, in the residential sector, customers are encouraged to participate in multiple programs in any given year. These results indicate there may be more the Company can do in terms of cross-program promotion to drive more participation in the same year. In addition, these results can be shared with the marketing team to further promote a collaborative approach. The Company recently brought back the cross-vendor meeting to encourage promoting all programs across vendor channels.

In 2018, National Grid continued to increase awareness of Energy Efficiency programs for Rhode Island residential and commercial customers through a comprehensive campaign. The campaign communicated the ways customers could save energy and money with National Grid's Energy Efficiency programs. According to market research studies conducted, energy efficiency familiarity levels among Rhode Island customers continued to increase year over year across both residential and commercial sectors. In the future the Company looks to continue its comprehensive campaign effort to drive increased awareness and participation across all sectors.

The multifamily program-level trends are not likely representative due to the fact that the Company generally counts all units in a participating facility. In Spring 2016, the Company started tracking participating units in addition to counting all units in a multi-family facility. Section III of this memo provides details on units served through the multifamily programs.[2]

[2] The Company continues to examine multifamily program-level trends, participation and methodology to determine if any adjustments to multifamily program counts are necessary.

Table 1. Electric Cumulative Participation 2012-2018

Participation by Accounts

		Annual Counts							Additive	Cumulative	% Unique Accounts
Sector	**Program**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2012-2018**	**2012-2018**	
Residential	**Energy Star® HVAC**	1,414	3,049	2,445	2,091	1,978	3,023	3,269	17,269	16,094	93%
	ENERGY STAR® Products	9,520	6,254	6,922	4,461	2,622	6,630	6,249	42,658	39,686	93%
	EnergyWise	6,760	8,645	9,898	11,665	9,567	10,159	11,961	68,655	60,047	87%
	EnergyWise Multifamily	2,626	3,531	5,277	8,014	11,408	7,472	10,014	48,342	32,425	67%
	Residential Subtotal	19,726	20,774	23,776	25,561	25,103	26,368	30,551	171,862	132,596	77%
	% Unique Participants	97%	97%	97%	97%	98%	97%	97%			
Income Eligible	**Single Family – Income Eligible Services**	2,654	2,646	3,054	2,851	3,016	3,074	3,850	21,145	17,305	82%
	Income Eligible Multifamily	1,410	2,010	3,104	1,383	1,999	2,289	1,256	13,451	9,878	73%
	Income Eligible Subtotal	4,062	4,656	6,158	4,234	5,015	5,359	5,103	34,587	27,142	78%
	% Unique Participants	100%	100%	100%	100%	100%	100%	100%			
Commercial	**Large Commercial New Construction**	162	167	169	236	251	195	173	1,353	1,090	81%
	Large Commercial Retrofit	405	350	432	459	400	593	579	3,218	2,251	70%
	Small Business Direct Install	1,282	1,175	960	1,049	797	807	760	6,830	5,854	86%
	Commercial Subtotal	1,808	1,651	1,513	1,682	1,380	1,554	1,492	11,080	8,425	76%
	% Unique Participants	98%	98%	97%	96%	95%	97%	99%			
Portfolio Total		25,545	27,032	31,307	31,448	31,449	33,177	36,995	216,953	166,162	77%

Table 2. Gas Cumulative Participation 2012-2018

Participation by Accounts

		Annual Counts							Additive	Cumulative	% Unique Accounts
Sector	**Program**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2012-2018**	**2012-2018**	
Residential	**Energy Star® HVAC**	6,383	4,865	3,037	1,980	1,652	2,949	3,113	23,979	22,403	93%
	EnergyWise	1,413	1,946	2,737	2,830	3,252	3,387	4,329	19,894	18,303	92%
	EnergyWise Multifamily	1,792	762	3,146	4,291	5,394	4,332	4,394	24,111	15,585	65%
	Residential Subtotal	9,338	7,352	8,662	8,909	10,112	10,413	11,594	66,380	52,402	79%
	% Unique Participants	97%	97%	97%	98%	98%	98%	98%			
Income Eligible	**Single Family – Income Eligible Services**	388	398	539	529	722	700	615	3,891	3,701	95%
	Income Eligible Multifamily	48	261	531	532	1,121	282	486	3,261	2,702	83%
	Income Eligible Subtotal	436	659	1,070	1,061	1,841	982	1,101	7,150	6,400	90%
	% Unique Participants	100%	100%	100%	100%	100%	100%	100%			
Commercial	**Large Commercial New Construction**	112	161	115	134	206	268	309	1,305	1,210	93%
	Large Commercial Retrofit[1]	431	476	159	656	611	240	206	2,779	2,457	88%
	Small Business Direct Install	160	111	297	121	50	122	82	943	912	97%
	Commercial Subtotal	678	725	549	892	852	614	575	4,885	4,166	85%
	% Unique Participants	96%	97%	96%	98%	98%	97%	96%			
Portfolio Total		10,437	8,728	10,271	10,462	12,406	11,962	13,244	77,510	61,793	80%

[1]Includes C&I multifamily program

Figure 1. Electric and Gas Participation by Sector, 2012-2018

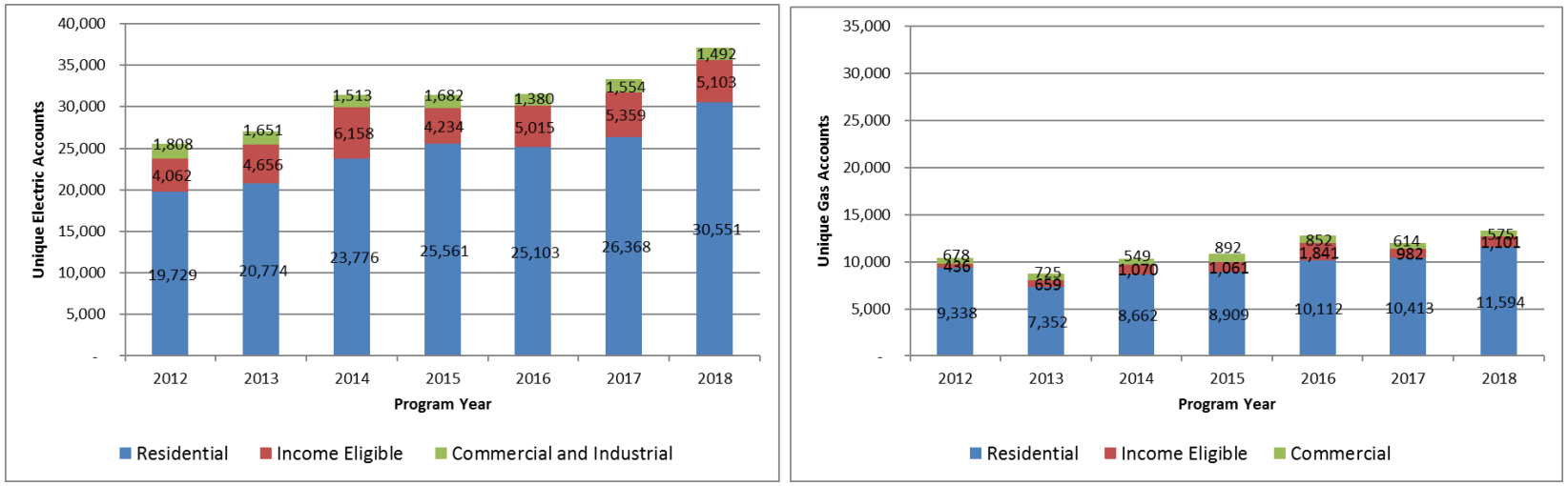


Figure 2. Electric and Gas Participation, Residential Sector by Program, 2012-2018

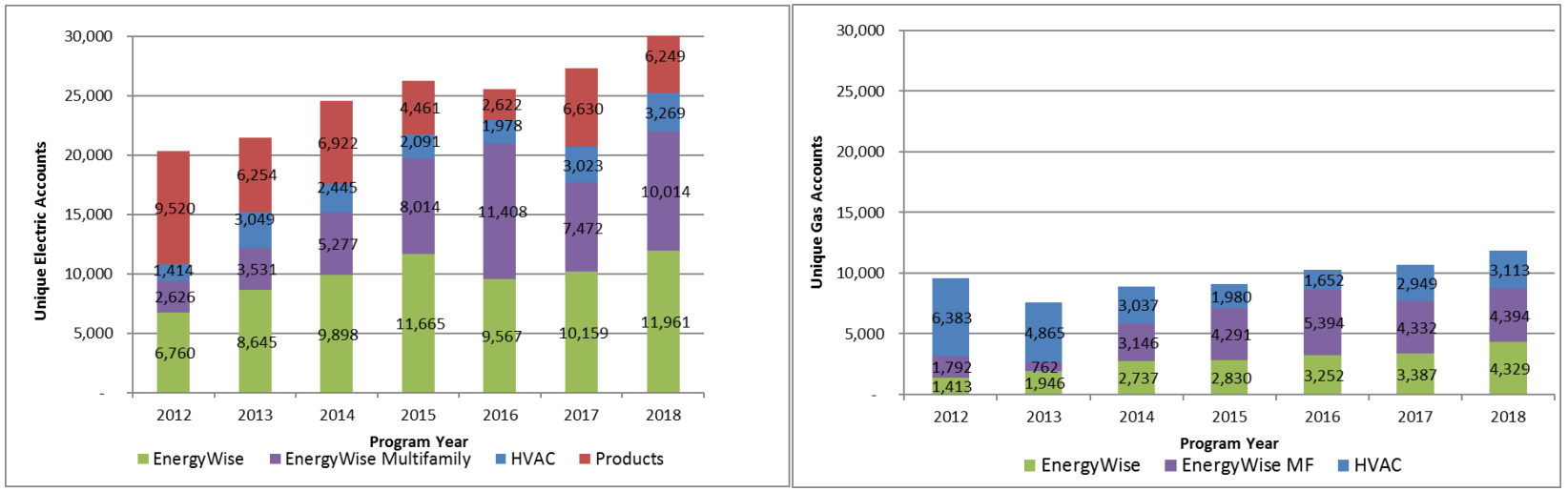
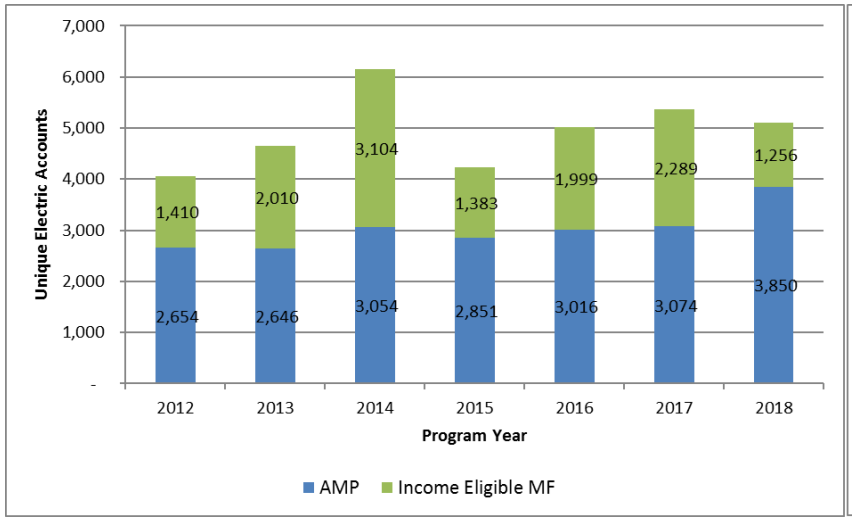


Figure 3. Electric and Gas Participation, Income-Eligible Sector by Program, 2012-2018



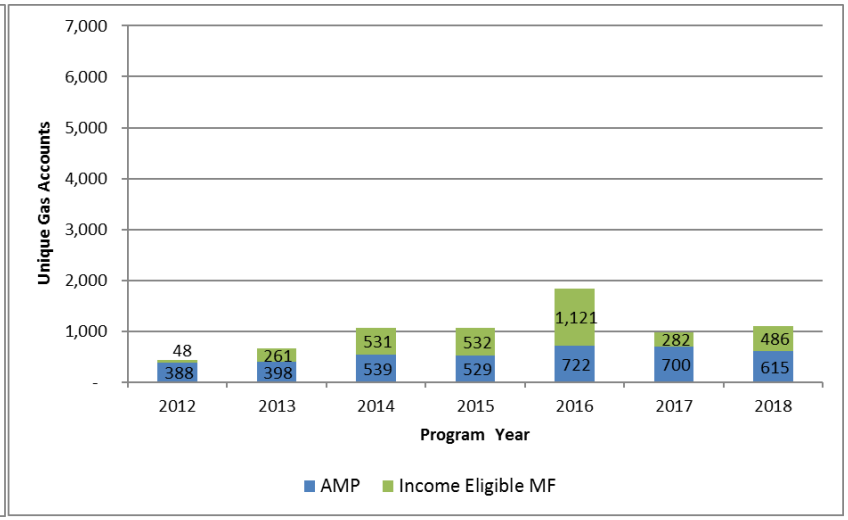
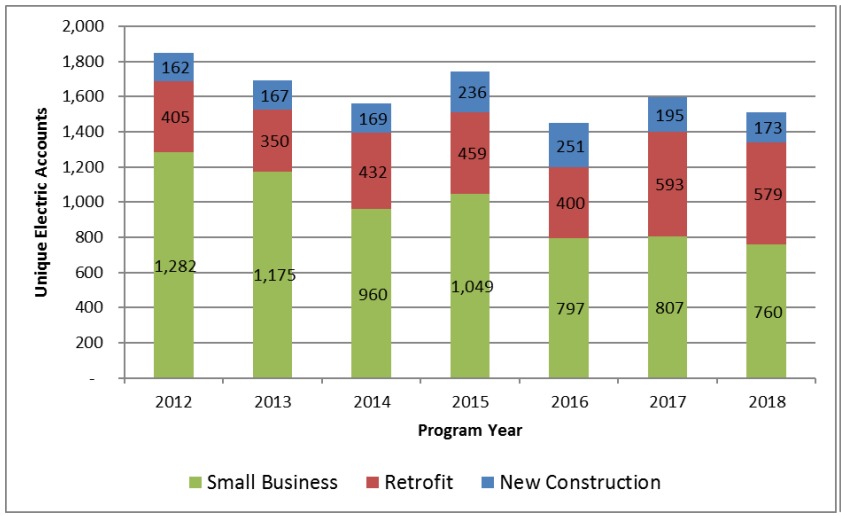
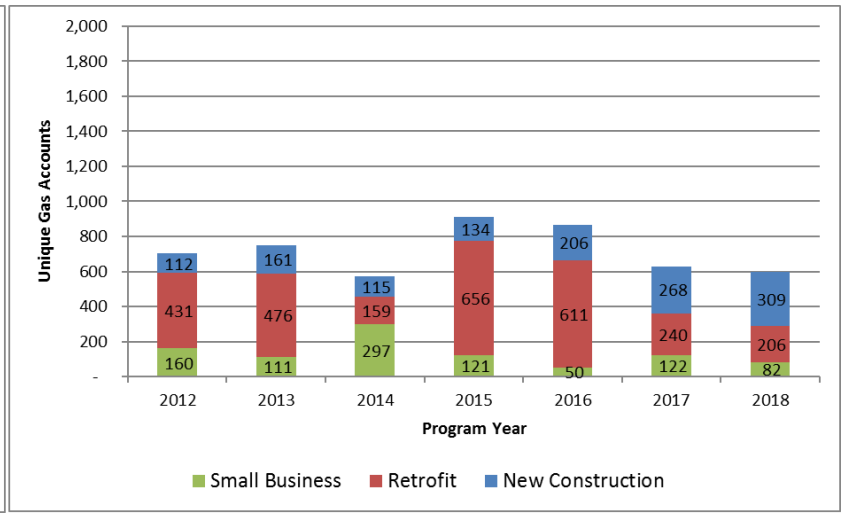


Figure 4. Electric and Gas Participation, Commercial Sector by Program, 2012-2018





III. Housing Units

The annual housing units are defined as unique in the same sense as billing accounts. Housing units are presented below for the Electric and Gas EnergyWise Multifamily program, Electric and Gas Income Eligible Multifamily program, the Commercial and Industrial (C&I) Multifamily Gas program, and the Electric and Gas Residential New Construction Program.

In multifamily programs, the unique number of account shown in the previous section (Tables 1 and 2) do not fully represent the participation trend for these programs. That is because not all individual units have separate accounts as a building might be master metered. Therefore, in Table E-1 and G-1 of the year-end report, the Company counts all housing units in treated buildings for participation, which is also shown below. Please note that multifamily housing units cannot be shown as cumulative because the Company does not have specific unit data within a treated facility and therefore cannot remove overlap between years.

Participation in the Residential New Construction program is also defined by housing units since accounts do not yet exist. In this program, housing units are only reported once, at the time of completion, so there is no overlap between units across multiple years. Therefore, the Company can show this program in terms of cumulative unique participation.

Table 3. Electric Participation by Housing Units

		Annual Housing Units*						Additive
Program	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2012-2018**
Residential New Construction	406	473	573	442	526	680	458	3,558
EnergyWise Multifamily	2,660	3,539	5,322	7,710	7,783	3,557	2,415	32,986
Income Eligible Multifamily	3,878	5,370	5,977	4,610	5,366	5,162	3,875	34,238
Portfolio Total	**6,944**	**9,382**	**11,872**	**12,762**	**13,675**	**9,399**	**6,748**	**70,782**

*For multifamily programs, 2016 - 2018 counted only participating housing units in participating facilities while 2012-2015 counted all housing units in a participating facility.

Table 4. Gas Participation by Housing Units

		Annual Housing Units*						Additive
Program	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2012-2018**
C&I Multifamily	0	1,066	939	2,345	2,982	1,997	954	9,329
Residential New Construction	252	425	500	366	341	353	249	2,237
EnergyWise Multifamily	1,569	984	2,496	3,147	2,232	3,984	1,811	14,412
Income Eligible Multifamily	977	2,773	3,090	3,956	4,701	3,840	3,010	19,337
Portfolio Total	**2,798**	**5,248**	**7,025**	**9,814**	**10,256**	**8,262**	**6,024**	**45,315**

* For multifamily programs, 2016 - 2018 counted only participating housing units in participating facilities while 2012-2015 counted all housing units in a participating facility.

IV. Estimate of Customers Reached 2012-2018

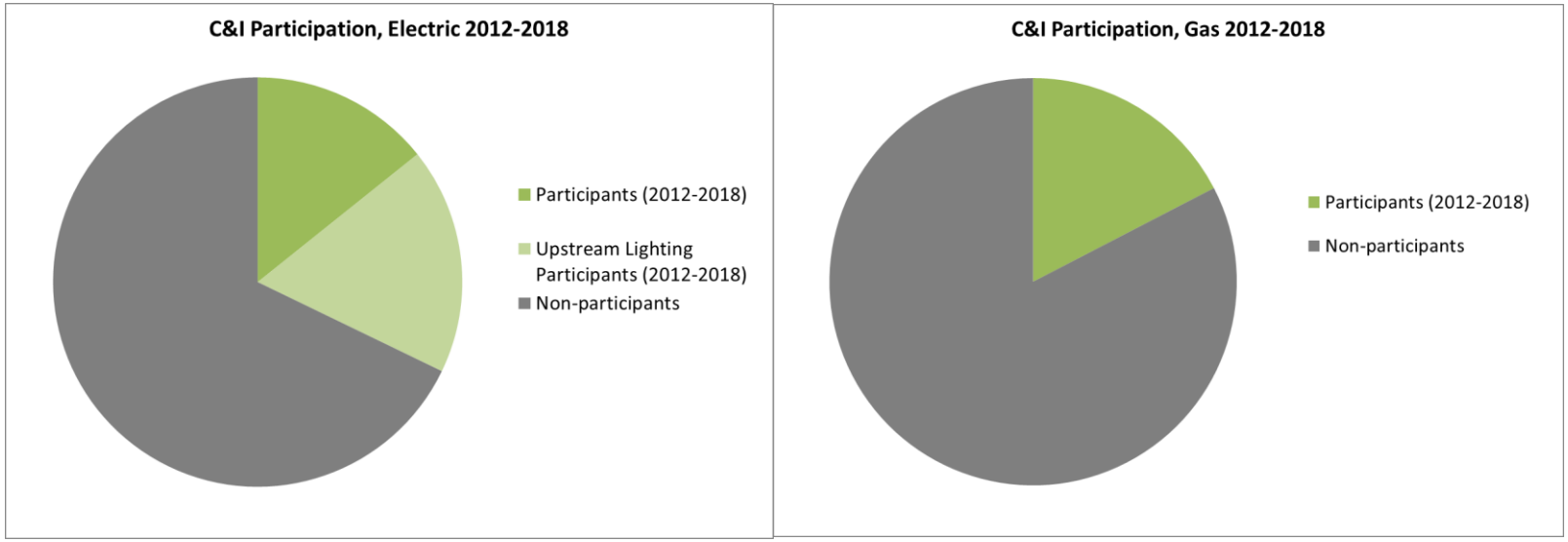
This section estimates the portion of each customer class that has participated in an energy efficiency program from 2012-2018. Figures 9 to 12 represent a visual estimate of the combination of unique participant counts from 2012-2018, plus residential new construction units, Home Energy Reports, and C&I upstream lighting. ENERGY STAR® Lighting participants are excluded from the counts because the program's broad participation among a large number of customers would overwhelm the data, making it difficult to analyze participation in other programs. Purchasing pattern research indicates that an estimated 430,649 participants purchased efficient bulbs through the program in 2018 alone. Similarly, C&I upstream lighting is also excluded from the unique participation count since the Company does not have detailed information and cannot remove overlap with other C&I programs. The Company does have customer information to remove overlap across years and includes an estimate of unique C&I upstream lighting participants in the graphs below.

The graphs show that from 2012 through 2018, 34% of electric customers and 24% of gas customers participated in National Grid's energy efficiency programs at least once. This is significant when one considers this analysis does not include data back to 2009, when energy efficiency programs under the construct of Least Cost Procurement began, and does not include ENERGY STAR® Lighting. Had this data been included, the penetration rates would undoubtedly be higher.

When Home Energy Reports and C&I upstream lighting participation is added to these counts, a total of 88% of electric customers and 76% of gas customers participated over this period. Home Energy Reports are included here because the program offers significant savings and benefits to customers as well as drives customers to participate in other energy efficiency programs.

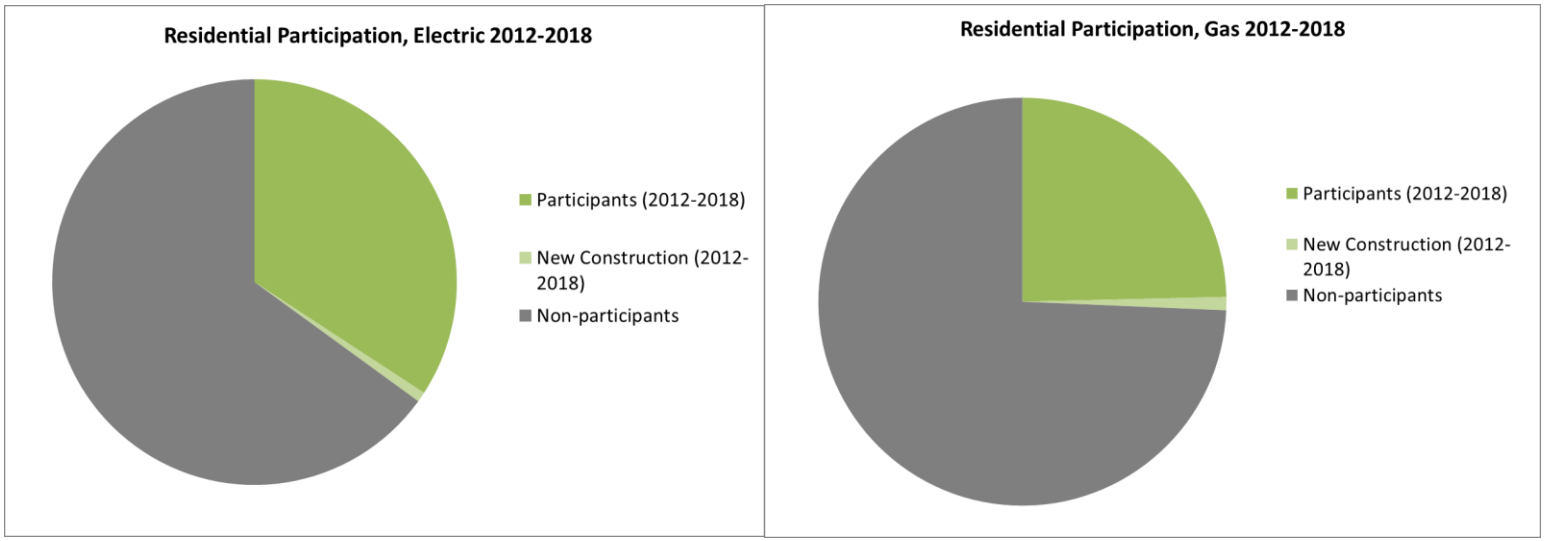
The Company will continue to conduct this analysis each year to help provide more visibility around participation levels to help gain insight into programmatic changes and improvements to reach even more customers in the future.

Figure 9. Commercial and Industrial (C&I)



*While cumulative counts remove overlap between years (2012-2018), it is not possible to remove overlap between upstream lighting and other C&I programs. Therefore, there may be customers in the upstream count that are also captured in the unique participation counts for 2012-2018.

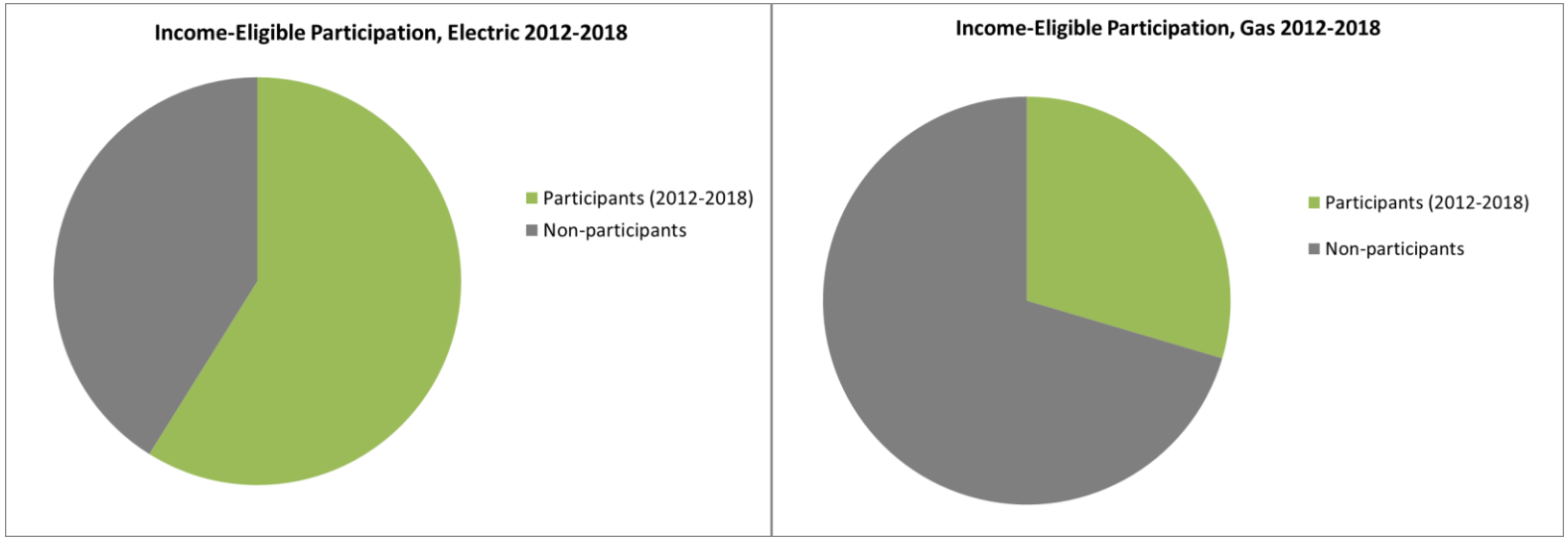
Figure 10. Residential Participation



*Does not include ENERGY STAR® Lighting and Home Energy Reports

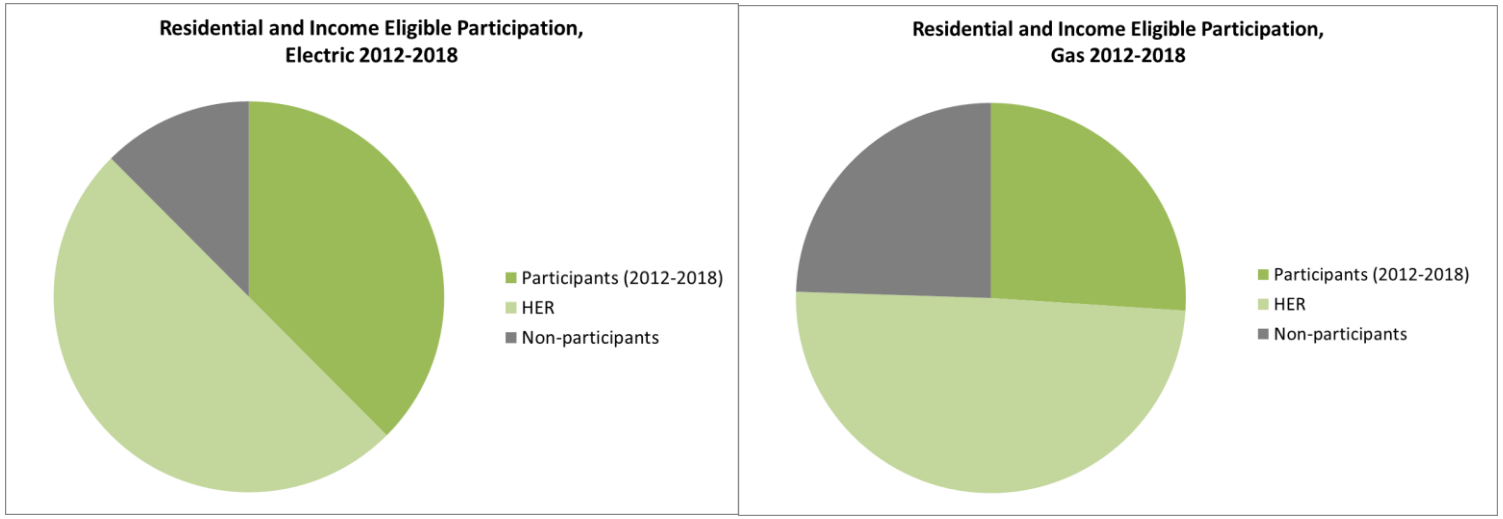
**Does not include ENERGY STAR® Products Program rebates that did not contain detailed level information

Figure 11. Income Eligible Participation



*While the Company counts Home Energy Reports, ENERGY STAR® Products, and ENERGY STAR® HVAC participation in the market rate residential sector, it's important to note that Income Eligible customers also participate in these programs as well as in the ENERGY STAR® Lighting program. Therefore, the above graphs likely under-represent the total number of Income Eligible customers served.

Figure 12. All Residential and Income Eligible Services including Home Energy Reports Program



*Home Energy Report participation has been reduced to account for estimated cross particpation with other programs based on 2017 evaluation results[3].

[3] Rhode Island Home Energy report Program Impact and Process Evaluation. Illume Advising. 2017.

Attachment 5
Workforce RI EEP

Attachment 5

Workforce Associated with Rhode Island Energy Efficiency Programs Analysis and Recommendations

Analysis and Recommendations regarding the Current and Future Workforce associated with Rhode Island Energy Efficiency Programs

Prepared for National Grid

Prepared by:

Peregrine Energy Group, Inc.
85 Merrimac Street
Boston, Massachusetts

Final

May 3, 2019

Table of Contents

Executive Summary

National Grid engaged Peregrine Energy Group, Inc. (Peregrine) to study the workforce associated with Rhode Island electric and gas energy efficiency programs (Programs) delivered in 2018. This study addresses the requirements of General Law 39-2-1.2, enacted by the Rhode Island General Assembly in 2012. In 2018, National Grid spent a combined $116,214,809 on the Rhode Island Programs that saved 206,209 annual megawatt hours of electricity and 497,119 million British thermal units of natural gas.

Peregrine's focus in this study is less *what* was accomplished by National Grid Programs in 2018 than *how* it was done and by whom. This workforce assessment reports on numbers and types of workers associated with National Grid's Programs in Rhode Island in 2018 and compares 2018 with past years. Also, it explores what workforce adjustments may be required to deliver future programs, including barriers to these adjustments, and workforce development needs. Peregrine calculated that 804.1 full-time equivalent (FTE)[1] workers were associated with National Grid expenditures in 2018 for the Rhode Island Programs, equal to a total 1,415,216 hours of actual work. Since a "full-time equivalent" employee often represents the combined labors of more than one person over the course of a year, the actual numbers of individual workers is far greater than the number of FTEs.

The success of the Programs is dependent on the efforts of many workers in multiple roles. Design, management, and delivery of the 2018 Programs required participation by a broad range of workers and a diverse set of employers. In 2018, these employers, in addition to National Grid, included: program design consultants; energy program management specialists; marketing and advertising professionals; equipment manufacturers, distributors, and suppliers; equipment and appliance retailers; architectural firms and property developers; engineers and energy analysts; project expeditors; independent electrical, plumbing, HVAC, and weatherization contractors; quality assurance inspection companies; utility rebate processing houses; waste material recyclers; and program evaluators. Peregrine's report identifies and lists 1,109 companies and agencies involved in the Programs. 73% are either headquartered in Rhode Island or have a physical presence in Rhode Island.

National Grid Programs and delivery strategies were substantively the same in 2018 as they had been in 2017, but there were some differences, up and down, in total associated FTEs. The charts below show numbers of FTE jobs by market sector (residential, residential income eligible, and commercial and industrial) from 2014 to 2018. With regards to residential

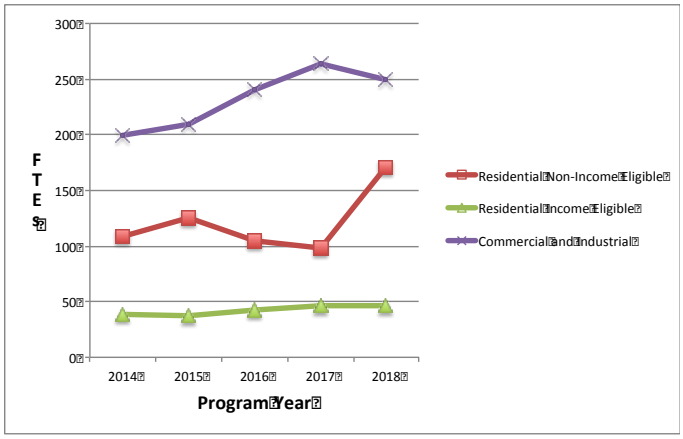
[1] One FTE equals 1,760 hours of actual work (i.e., not including holiday, sick, or vacation time), the equivalent of one (1) person working eight (8) hours a day for 220 work days in an average year.

programs, both gas and electric program FTEs associated with program delivery increased significantly in 2018. Differences in residential program FTEs are attributable to: increased staffing by program manager RISE Engineering to achieve 2018 goals; increased customer participation and investment in weatherization and heating system replacement; an increase in incentives available for residential retrofits to customers heating with oil and propane; and changes to National Grid's allocation of program costs between electric and gas budgets. For income eligible single and multifamily residential programs, total FTE's remained more or less unchanged from 2017 totals. Finally, for commercial and industrial retrofit programs, FTE employment associated with electric programs continued to be strong, driven by continuing conversion of lighting to LED technology. FTE employment associated with the delivery of commercial and industrial gas programs showed little change from 2017.

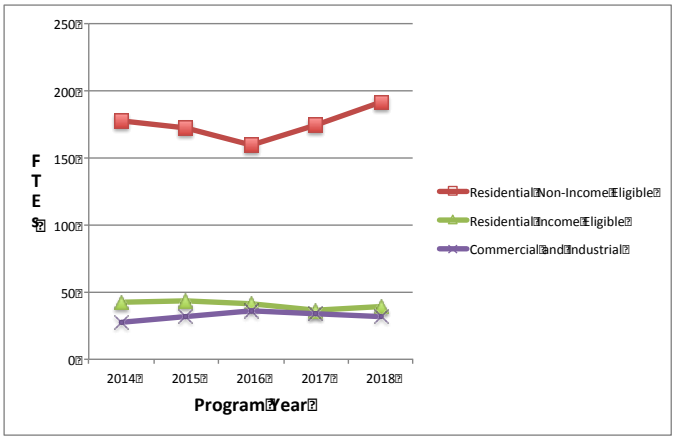
Looking forward, National Grid has asked Peregrine to consider the workforce implications of potential changes to future programming that National Grid is considering in response to emerging opportunities for savings and the successes at market transformation by existing programs. Peregrine has identified some initial workforce issues and barriers that deserve the attention of program planners and designers as they craft future programs. These issues and barriers (and probably others as yet undefined) should receive further study and analysis, with mitigation strategies defined, as future program designs and goals are finalized. This will help ensure that trade ally workforce capacity, capabilities, and needs are reflected in final program plans, enabling this workforce make the optimal contribution to the programs' success. Key recommendations to National Grid include:

- Improve two-way communications with trade allies to provide them with timely information of potential changes to programs and ensure that their knowledge of markets is incorporated in program design decisions.
- Consider the potential impacts of market saturation and program design changes on existing skilled energy efficiency workers and take steps to conserve this workforce to support future planned and proposed energy efficiency initiatives.
- As part of the 2019 launch of the new electric heating initiative, proceed with the approved 2019 Heat Pump Market Assessment to better understand market needs and opportunities, including future workforce development.
- With respect to future Rhode Island workforce development, commission a comprehensive study of workforce labor and training needs for all future programs, including issues and barriers and strategies to mitigate them.
- Finally, with respect to the future role of cold climate air source heat pumps and other HVAC technologies in Programs, convene a stakeholder task force to develop a common understanding of and address future workforce opportunities and challenges, including specific training needs.

Electric Program FTEs 2014 to 2018



Gas Program FTEs 2014 to 2018



Introduction

As mandated by and with the formal approval of the State of Rhode Island, National Grid provides a state-approved portfolio of energy efficiency programs and services referred to in state enabling legislation as "demand-side management programs" (the Programs) to all market sectors it serves in Rhode Island, funded by Ratepayers through a utility surcharge. The Rhode Island Programs focus on both new construction and retrofit of existing buildings. Programs deliver cost-effective services and energy savings to building owners and tenants, to residential customers residing in single family and multifamily buildings, to government and non-profit institutions, to small and large commercial businesses, and to manufacturers.

Overall, the 2018 Program offerings and budgets were very similar to those in 2017, with modest adjustments based on past experience and emerging opportunities. In 2018, National Grid spent a total of $116,336,687 on electric and gas energy efficiency programs in Rhode Island, within one percent of the previous year's expenditures. 23% of 2018 Program expenditures, or $27,306,799, was for gas Programs, while 77%, or $89,029,888, was for electric programs. These programs created 497,119 million British thermal units (MMBtu) of natural gas savings and 206,209 megawatt hours (Mwh) of electricity savings).

General Law 39-2-1.2, enacted by the Rhode Island General Assembly in 2012, requires that "each year, the office [RI Office of Energy Resources] and the council [EERMC] shall submit to the governor, the president of the senate, and the speaker of the house of representatives, separate financial and performance reports regarding the demand-side management programs, including the specific level of funds that were contributed by the residential, municipal, and commercial and industrial sectors to the overall programs; the businesses, vendors, and institutions that received funding from demand-side management gas and electric funds used for the purposes in this section; and the businesses, vendors, and institutions that received the administrative funds."

In fulfillment of this requirement, National Grid has prepared for submission a number of financial and performance reports on the Programs. National Grid has also developed a list of businesses, vendors, and institutions that received funding from Program funds, and businesses, vendors, and institutions that received administrative funds. In addition to fulfilling those specific financial and performance reporting requirements, National Grid has undertaken and is submitting this Report, "Analysis and Recommendations regarding the Current and Future Workforce Associated with 2018 Rhode Island Energy Efficiency Programs." This is the sixth consecutive year that National Grid has provided a narrative report that describes the jobs associated with these expenditures and the workforce that delivers the energy efficiency programs that National Grid offers.

Although employment directly associated with National Grid Programs, is not a formal program goal, it is a significant additional economic benefit that investments in energy efficiency contribute to Rhode Island and to participating businesses. Furthermore, without the availability and contributions of a workforce to deliver programs, identify opportunities for energy efficiency, and install energy efficiency improvements, the demand-side savings that General Law 39-2-1.2 is intended to create will largely not occur.

Accurately calculating the numbers of these jobs is very challenging because they are not typically part of the metrics of energy efficiency programs. While energy savings resulting from the Programs are formally predicted, analyzed, measured, and recorded, there is no such accounting of associated employment. Number and types of employees engaged, be they full-time or part-time, and numbers of hours worked to deliver Programs may be captured by employers for payroll and business planning, but they are not reported to National Grid unless for billing purposes.

This report is intended to be a "report card" on jobs associated with Programs and is not as quantitatively rigorous as a detailed evaluation study that verifies savings levels achieved. The report describes the work and workforce associated with program development, design, marketing, management, delivery, and evaluation and attempts to count or otherwise estimate the number of jobs directly associated with National Grid's 2018 expenditures for Programs. Should Rhode Island as some point determine that a more rigorous assessment of employment associated with National Grid energy efficiency programs is necessary, quantitative standards and requirements for employment-related data collection and reporting will be needed.

Peregrine Energy Group, Inc. (Peregrine) has prepared this study. This is the sixth year Peregrine has conducted this analysis. As in prior years, Peregrine is again in this report presenting workforce counts as "full-time equivalent (FTE) employees." Peregrine assumes, as in past years, that one FTE, regardless of job type or responsibilities, equals, for purposes of this study, 1,760 actual work hours (in addition to vacation, sick, holidays or other leave time), or the equivalent of one (1) person working eight (8) hours a day for 220 work days in an average year. In many instances, if not most, each FTE counted as associated with a National Grid Program represents the actual part-time labors of multiple individuals who are associated with delivery of Programs in Rhode Island, but also may be engaged in other work-related endeavors. These other endeavors may, perhaps, be related to energy or utility-related services, but perhaps not; or these other endeavors may be associated with energy efficiency, but not in Rhode Island.

With respect to the question of whether program-related employment described in this report was "caused by" the Programs, Peregrine has elected to describe the workforce engaged in program delivery as being "associated with" energy efficiency programs, rather than as "resulting from" those programs. This is because, while Peregrine can confirm that program budgets have funded employers that National Grid contracted with to support and manage 2018

programs, no information was provided to Peregrine describing motives and drivers that caused each individual participating National Grid customer to choose to replace older inefficient equipment with new efficient equipment. Therefore, to eliminate the question of causality, Peregrine is describing its FTE counts as employment "associated" with the Programs.

As has been the case with prior years' studies, this year's study findings have been developed through direct interviews with employers and through analysis of installed energy efficiency improvements that had been documented by National Grid. Peregrine interviewed managers at energy services companies, equipment vendors, and contractors identified to Peregrine by National Grid or identified as sub-contractors by companies that Peregrine interviewed. These companies voluntarily shared information on how they staff their contracts and services. In some cases, employers researched payroll records to provide Rhode Island-specific payroll hours and FTE counts. In other cases employers looked at the number of Rhode Island National Grid customers served as a proportion of their total customer base and applied that percentage to their total workforce to determine a Rhode Island labor allocation. Where possible, the study cites the companies that provided information to Peregrine.

Peregrine also has been provided and has reviewed National Grid annual reports of energy efficiency measures installed in homes, apartment buildings, businesses and industrial facilities throughout Rhode Island in 2018. Peregrine has applied typical or average labor hours required for each installed energy savings measure to the total counts. These installation times are based on industry standards and on discussions with the contractors themselves and other experts. Peregrine then extrapolated and calculated total FTE employment associated with programs based on project expenditures and unit counts of installed measures reported by National Grid, labor rates or time required for each installation, and a standard 1,760 hours per FTE.

The remainder of this report is divided into five 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. Descriptions of the delivery strategies used for individual Programs and of the employers and employees that provide program services
3. Summary counts of 2018 FTE jobs, comparing 2018 to previous years' study results, with observations on their significance and discussion of year-to-year changes in job counts.
4. A Look Forward that begins to consider potential employment-related implications, issues, and impacts associated with planned or proposed changes to the Programs.
5. Attachments: Study methodology; Interview guide; List of participating companies.

The Energy Efficiency Workforce

Peregrine found that in 2018 an estimated 804.1 full-time equivalent jobs or "FTEs" were associated with National Grid Programs in Rhode Island. A "full-time equivalent" employee often represents the combined labors of more than one person over the course of a year. The actual numbers of individual workers associated with program expenditures is far greater than the total number of FTEs.

Peregrine recognizes two main categories of employers/employees that participate in delivery of National Grid's Programs. We delineate them as "Support Services Providers" and "Direct Services Providers." Support Services Providers are employers and employees involved in Program planning, administration, marketing, rebate processing, evaluation, and market research. Direct Services Providers are responsible for sales, technical assistance, training, supply and distribution, and installation of approved efficiency improvements that National Grid promotes and encourages with incentives and rebates.

Support Services Providers

Support Services Providers include:

- National Grid employees directly involved in energy efficiency program design and delivery, including regulatory matters, administrative management of contractors, marketing, and evaluation;
- Entities under contract to National Grid to provide marketing, outreach, public information, and other related services, including media placement and design of collateral marketing materials;
- Specialized firms that process rebate or incentive applications and make payments to contractors, distributors, and manufacturers that promote, provide, purchase, or install targeted high efficiency equipment;
- Independent program design consultants who assist National Grid with creation of annual program strategies, plans, and goals; and
- Evaluators of National Grid Program performance against those annual goals.

Peregrine interviewed National Grid's lead vendors who provide program support services to obtain information on their roles and responsibilities as well as counts of their own or their sub-contractor employees. Often, the FTE staff numbers represent the aggregation of small numbers of hours by many employees. In some instances, this was because a contractor's role may have been limited in duration and/or required contributions from a multi-disciplinary team. In other instances, it was because a vendor team with the multi-disciplinary capabilities necessary to provide effective program support, will, for reasons of cost effectiveness, deliver similar services to National Grid in multiple states, including Rhode Island; or the team supports National Grid

and one or more other utility companies; or the vendor's customers also include multiple businesses other than utility companies.

Depending on the nature of the services the vendor provided and whether the support provided could be associated with specific programs, labor hours and FTEs of Support Services Providers were allocated to a specific program sector or were allocated across the three major program sectors (Residential, Income Eligible Residential, Commercial and Industrial), consistent with the ratios of actual 2018 gas and electric program expenditures by program sector.

National Grid Employees

Peregrine has counted and reported National Grid participation in energy efficiency programs as a Support Services function. National Grid employees touch all aspects of energy efficiency programs and services provided to gas and electric customers in Rhode Island from program design to delivery to evaluation and to reporting to regulators. Some of these National Grid employees are dedicated to only Rhode Island's energy efficiency programs, and others are dedicated to energy efficiency program matters in multiple states. Still other employees are involved part-time in energy efficiency-related efforts in the context of their other National Grid responsibilities. ***Information provided by National Grid for 2018 identified 79,566 person-hours of time spent on Rhode Island energy efficiency program activities, equal to 39.5 FTEs.*** This aggregates the involvement of many times that number of individual employees, many of whom are based in Rhode Island.

Program Design and Planning Consultants

Optimal Energy (Optimal), with the support of multiple specialized subcontractors, served as the primary consultants to Rhode Island's Energy Efficiency and Resource Management Council (EERMC) in 2018 and collaborated with National Grid on program design and development. Optimal took over this role in 2018 after Vermont Energy Investment Corporation, which had served in this lead role for many years, withdrew from this line of work. Optimal, though headquartered in Hinesburg, Vermont, primarily serves Rhode Island from a Providence office where four employees are based. The firm also provides like services for other state energy efficiency initiatives nation-wide.

Over the course of 2018, 12 staff from the combined Optimal team, most of them market sector specialists, provided services, equal to approximately 2.35 FTEs of time.[2] In collaboration with National Grid, the Public Utilities Commission, and the Office of Energy Resources, they assisted with ongoing Program planning and refinement. They also coordinated measurement

[2] Source: Optimal Energy

and verification of savings and Program evaluation, supported the deliberations of the EERMC, and helped with Program oversight. Most of these same firms on the team were concurrently providing similar support and services for energy efficiency program design and oversight of utility programming in Massachusetts.

Marketers

National Grid's energy efficiency marketing and advertising spend for Rhode Island in 2018 was $4,042,833, down by just under 20% from $4,997,870 in 2017. Most of marketing budget spending continued to be for media message placement, printing and direct mailing, and electronic communications.

Kelliher Samets Volk (KSV), a Vermont-based, regional marketing firm specializing in the utility sector, continued for the tenth year as National Grid's primary marketing consultant for energy efficiency, managing most of the marketing and advertising budget. Additional firms that provided energy efficiency marketing support for Rhode Island in 2018 included Questline Inc. and Innerworkings Inc. among others. KSV collaborated and coordinated with Direct Service Providers to help them maintain and regulate demand for program services. In addition to coordinating its own media placement, web-based initiatives, social media campaigns, and phone messaging with activities of other specialized marketing firms engaged by National Grid, KSV's role included developing marketing strategies and designing targeted brand marketing campaigns directed at residential, commercial and industrial customer segments. Campaigns targeted trade allies and other implementers to encourage them to use National Grid incentives and product discounts National Grid had secured to expand their business with National Grid customers.

While KSV hours for Rhode Island energy efficiency marketing equaled only 3 FTEs[3], as many as thirty individuals at the firm touched the Rhode Island account in one way or another, including: brand and project managers; creative, art, and media directors; media and brand strategists; media buyers; a production designer, video producer, and copywriters; and the KSV executive leadership team. Among these was a three-quarter (0.75 FTE) time Senior Brand Manager based in Little Compton who focused on trade ally relationships.

Marketing FTEs calculated for Rhode Island totaled 3.6 FTEs, included the efforts of all marketing firms engaged by National Grid. Marketing FTEs have been allocated across all program sectors, consistent with the ratios of actual 2018 gas and electric program spending.

[3] Source: Kelliher Samets Volk

Rebate Processing Companies

National Grid contacted with two firms in 2018, Blackhawk Engagement Solutions (Blackhawk), based in Texas, and Energy Federation, Inc. (EFI), based in Westborough, Massachusetts, to process rebates and incentives offered to Program participants. Program participants include both consumers, i.e. National Grid customers who purchase targeted products and then apply for rebates and equipment installers who promote and encourage National Grid customers to choose higher efficiency products. Also, increasingly, National Grid offers instant rebates though point-of-sale efficiency initiatives, also called "upstream programs," described in detail in the Program Delivery discussion below. Rebate processors also coordinate payments to equipment distributors and suppliers who support the point-of-sale programs.

Blackhawk processed incentives offered by National Grid for purchase of preferred energy efficient products installed under residential heating programs (Gas High Efficiency Heating Equipment Rebate and Programmable & WI-FI Thermostat Offer), commercial heating programs (Commercial Kitchen Equipment Incentive and Commercial High Efficiency Heating Equipment Incentive), and the Rhode Island Heating and Cooling Program. Blackhawk scanned, data-entered, and validated rebate applications, processed payments, and cut and mailed checks. The staffing roles required included a senior manager, account manager, data entry operators, quality assurance specialists, customer service, reward fulfillment staffing, and IT support. ***All told, Blackhawk staffing totaled approximately 1.7 FTEs to service Rhode Island programs.*** [4]Blackhawk also supports National Grid energy efficiency programs in other states as well as other utility clients nationwide.

Energy Federation Inc. provided rebate processing for energy efficiency programs provided by National Grid in both Massachusetts and Rhode Island, with Rhode Island accounting for about 20% of the total workforce hours for this effort. ***The Rhode Island's share of EFI's combined incentive processing operation for the two states was about 1.7 FTEs.***[5] EFI invested in a new IT platform in 2018 to enhance rebate-processing performance and their customers' experience. They developed and implemented new software that has enabled them to accelerate rebate payments, provide better reporting to National Grid and other customers, and offer a new client-facing portal.

Initiatives supported by EFI included Rhode Island Pool Pump and Upstream Circulator Pump Distributor Programs, ENERGY STAR® Appliances, and ENERGY STAR® Lighting. They also provided call center support for the Rhode Island appliance program that focuses on high efficiency clothes dryers and dehumidifiers. Supporting the ENERGY STAR® Lighting program was

[4] Source: Blackhawk Engagement Solutions

[5] Source: Energy Federation Inc.

far and away EFI's largest rebate processing effort for National Grid. Working closely with Lockheed Martin which managed ENERGY STAR® Lighting, EFI reimbursed manufacturers and others for point-of-sale discounts provided to residential customers. In 2019, to produce additional economies of scale, National Grid has reassigned Blackhawk's Rhode Island rebate-processing responsibilities to EFI, because EFI already had the same rebate-processing role for like-National Grid programs in Massachusetts.

Evaluators

To measure the performance of Rhode Island Program offerings against annual goals, National Grid contracts with independent consulting firms specializing in utility program evaluation. Many of these firms support National Grid evaluation needs in other states as well. DNVGL, based in Burlington, MA, provided most of the Rhode Island evaluation support in 2018. Additional firms providing targeted evaluation services were Cadeo Group, Opinion Dynamics Corporation, Brattle Group, and Research into Action, Inc., as well as other firms with smaller roles. ***Peregrine calculated 3.9 FTEs associated with evaluator activity in 2018.*** Peregrine adds the FTEs associated with outside evaluator time to individual market sector FTE totals or allocates them across gas and electric market sectors FTE counts, depending on the specific evaluation work completed.

Direct Service Providers

The Direct Service Providers are specialized firms, sometimes contracting directly to National Grid, that may provide some or all of the following Program services: promoting, managing, and delivering individual Rhode Island energy efficiency programs; contributing engineering and other technical support to energy efficiency project development; supplying and/or installing energy saving material and equipment, and providing quality assurance inspections. This category includes, but is not limited to:

- **National Grid account managers.** National Grid staff provides outreach and direct technical assistance to customers, particularly for large commercial and industrial retrofits and new construction.[6]

- **Energy services companies specializing in providing field services and installation program management.** National Grid has contracts with such firms to deliver individual Programs to particular market sectors. In this capacity, they will often provide a "turnkey" service that

[6] National Grid is included as both a Support Services Provider and a Direct Services Provider because of the many different roles it has in the Programs. All National Grid FTEs are segregated and presented a separate category, rather than integrated into FTE counts for markets and programs.

includes: outreach and intake of customer requests; scheduling site visits; technical assistance; engineering; material and equipment installations; referrals to and engagements with trades people; administration, management and supervision; warehouse materials purchasing and handling; quality assurance inspections; bookkeeping; and data entry and tracking. National Grid has, for many years, used RISE Engineering, based in Cranston, Rhode Island, in this comprehensive turnkey role to deliver Rhode Island Programs to both residential and commercial customers.

- **Energy services companies specializing in logistical management and support.** These firms engage, manage, and coordinate product suppliers and distributors, retail store offerings, and service networks. These firms often manage similar programs in both Rhode Island and Massachusetts to achieve acceptable economies of scale, are likely to work out of a Massachusetts office, but will likely also spend significant time in Rhode Island working with local businesses.

- **Electrical and mechanical engineers employed by contracted consulting firms.** National Grid assigns and dispatches technical specialists to identify potential projects in customer facilities, quantify potential costs and savings, recommend actions that customers should take, and perform post-installation inspections to ensure that installed measures are performing as intended. The larger firms with the greatest capacity to provide these services are often based in Massachusetts, where there is a higher volume of business opportunity and activity.

- **Equipment suppliers and retailers.** National Grid encourages and provides incentives to equipment distributers, suppliers, and retailers throughout the Rhode Island service territory to market and sell specific, targeted energy efficient equipment and materials directly to National Grid customers and installation contractors. An increasing number of suppliers and installation contractors participate in National Grid-sponsored “upstream” point-of-sale programs offering instant rebates. These equipment suppliers and retailers typically have Rhode Island storefronts, though they may be part of a regional or even national business entity.

- **Project expediters.** Project expediters or “PEX”, as they are sometimes called, are businesses that have adapted themselves, symbiotically, to support National Grid Rhode Island initiatives that target both small and large commercial/industrial, institutional, and municipal customers. Many of these firms operate in Massachusetts as well as Rhode Island and, over time, some of the largest have extended their business activities regionally and nationally. Such businesses will have variable internal technical resource capabilities, depending on the technologies they are interested in and the markets they pursue. They are primarily sales and project management organizations that rely heavily on independent subcontractors and tradespersons to perform installations. Generally, the more

comprehensive their technology capabilities are, the more attractive they are to National Grid for their ability to provide a more comprehensive service to National Grid customers.

- **Independent installation contractors.** Independent contractors are the "feet-on-the ground" installing energy efficient equipment and approved materials for National Grid customers. They are invariably based in Rhode Island, though some may operate out of "across-the-border" offices in Massachusetts and Connecticut. They include Rhode Island-licensed electricians, plumbers, pipe fitters, and refrigeration experts, as well as other specialists such as weatherization contractors. Many of these installation contractors are active in more than one market sector, sometimes as subcontractors to National Grid-designated program leads or to project expeditors, but also, increasingly, as self-directed installation vendors.

- **Quality assurance inspectors.** National Grid also contracts with inspectors that are independent of service delivery contractors who are responsible for installing equipment. The inspectors check a sample of completed installations or a sample of energy efficient equipment acquired by point-of-sale purchasers to ensure that program standards are being met, equipment is installed properly, that projected savings will likely be realized. Again, because of the low numbers of inspections required in Rhode Island, National Grid will typically award Rhode Island inspections to the same firm providing this service for Massachusetts.

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

Energy Efficiency Program Delivery

Achieving National Grid's energy efficiency goals in 2018 was the result of the aggregate efforts of the many Direct Services Providers who delivered the National Grid Programs. This section describes each electric and gas program offered and who and how many full-time equivalent jobs or "FTEs" were responsible each program's delivery. For all participating persons, regardless of job description, an FTE job is defined as a total of 1760 hours or 220 full eight-hour days worked per year, not including vacation, sick, holiday, or other leave time. Almost every FTE calculated for Rhode Island represents the labor of multiple individuals.

Over the past five years, National Grid's program strategies and designs have remained relatively consistent, although individual programs have been adjusted and tweaked in response to emerging technology, market opportunities, and observed results. Over the years, certain strategies that National Grid had previously piloted, launched, and found to be particularly successful have been expanded to additional markets and technologies. For example, point-of-purchase incentives featured in Commercial Upstream Lighting have been expanded to Commercial HVAC and pumping initiatives. Similarly, the more direct, market-driven participation by installation contractors in the Large Commercial Retrofit program is now a significant element of programs in all sectors.

Peregrine has counted or calculated 804.1 FTEs in 2018 attributable to National Grid's energy efficiency program spending. The increase in FTEs in 2018 over the 726.4 FTEs identified in 2017 maintains the historic trend of job growth associated with energy efficiency since 2013. Variations in total year-to-year job counts reflect increases and decreases in Direct Service Provider jobs counts associated with individual market sectors and with individual programs offered to those market sectors. These changes are driven by adjustments to program budgets, new marketing initiatives, alternative program delivery strategies that have affected customer and trade ally participation, year-to-year shifts in weather and energy prices, and installation opportunities created by emergence of new energy efficient technologies and products.

In 2018, National Grid employed multiple, targeted energy efficiency delivery strategies in Rhode Island. Energy efficiency programs described below were each designed for individual markets and reflect differences in the buying habits, drivers, and technical and financial resources of each market sector (residential, residential income-eligible, commercial and industrial) and their sub-sectors. Program delivery strategies varied with fuel type (i.e. electric vs. natural gas customers), characteristics of different customer rate classes, cost and benefits of different end-use technologies to classes of customers, and whether a program's objective was to affect energy efficiency in current operations or future energy use in new construction.

Residential Programs

In 2018, National Grid's residential programs continued to offer a range of services and incentives to encourage residential electric and natural gas customers, be they owners or tenants, to install energy efficient equipment and materials and to operate their homes with energy efficiency in mind. Programs promoted conversion of residential lighting to LED technology, purchase of more energy efficient appliances, building weatherization, HVAC system replacement, and energy efficient new construction.

Electric programs targeted all customers who used electricity, and also provided weatherization services for customers living in homes heated by electricity-powered equipment or by delivered liquid fuels (propane and fuel oil) or wood. Gas programs provided weatherization and heating system replacement support to customers heating with natural gas. National Grid Programs achieved most energy savings goals for individual programs[7].

Program services included home energy audits with installation of low-cost materials, facilitation of full weatherization (insulation and air sealing), heating system replacement with high efficiency natural gas-fired equipment, cooling system replacement with high efficiency equipment, rebates through National Grid-sponsored market channels to encourage purchase of high efficiency appliances and lighting, and a number of behavioral modification initiatives. Programs sought energy use reductions by all residential customers, regardless of income level, living in single-family dwellings, 2 to 4 unit buildings, and larger multi-family residences of 5 to 20 units and 20 units or greater.

Getting customers' attention and ensuring they follow through on recommended energy saving opportunities are among the greatest challenges National Grid faces in providing programs and services to the diverse residential customers across Rhode Island. To address these challenges, National Grid's residential programs have been designed as a suite of market interventions that use mass-marketing, branding, multiple messaging, and targeted follow-up to deliver services at scale and achieve annual savings goals.

Large energy services companies who specialize in supporting utility energy efficiency initiatives are under contract to manage and deliver individual programs. The energy service company's role is, typically, to engage a wide range of players, including both buyers and sellers of energy efficiency products and services, who are needed to make a residential sector sub-market work. The company then brings these players together, provides education, training, and technical support, and facilitates investments that result in energy use reduction.

[7] National Grid Rhode Island Energy Efficiency Fourth Quarter 2018 report, February 14, 2019.

Delivery information on each program is detailed below.

EnergyWise Single Family (gas and electric)

In 2018, EnergyWise provided residential customers living in single-family homes (defined as 1 to 4-unit buildings) with a comprehensive energy assessment of energy use and building-specific recommendations for actions to take to increase home energy efficiency.

- Participants received technical assistance to identify how and where to improve building insulation and whether to replace appliances, heating systems, and thermostats with high efficiency models.
- As part of the energy assessment, field staff installed LED lighting, low-flow showerheads, faucet aerators and smart power strips.
- They wrote work orders for weatherization services (insulation and air sealing) by insulation contractors and provided recommendations for new high efficiency gas-fired heating and hot water system or high efficiency cooling system installations by plumbing and heating contractors, if warranted.
- National Grid would pay a significant portion of the cost of weatherization and/or a qualifying replacement heating system. New in 2018, the level of incentives provided to customers with delivered fuels (oil and propane) for weatherization services was brought into line with incentives being provided to gas heating customers, increasing the likelihood that these customers would proceed with weatherization.
- 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.

Delivery:

For 2018, National Grid again contracted with RISE Engineering, based in Cranston, Rhode Island, to manage and deliver the EnergyWise Single Family program. Staff had a wide range of program roles: program managers, 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, database management, and accounting and contract oversight personnel. ***The number of RISE FTE employees involved in the program in 2018 totaled 65, up 20% from 2017.***[8]

[8] Source: RISE Engineering

A two-person auditor and installer team conducted the residential energy assessments, also called building audits, providing analysis, education, and instant savings from installations in a single visit. RISE reported that the number of individual energy assessments performed through the EnergyWise Single Family program increased 31% in 2018 to 10,572, up from the 8,041 completed in 2017.[9] ***RISE also sub-contracted with Ocean State Energy Audits for a small number of assessments and related installations in 2018, amounting to 0.35 FTEs.***[10]

Paralleling the increase in audits completed in 2018, completed building weatherization projects (i.e. insulation and air sealing) also increased, from 2,732 in 2017 to 3,588 in 2018. This was equal to one completed weatherization project per three assessments performed, just about the same ratio as in 2017. RISE attributes some of this continued high closing rate of weatherization projects completed to procedural improvements adopted by the company in 2017 and further refined in 2018. These included system software updates and programming improvements that generated "reminders" to staff to re-contact customers about weatherization recommendations and work orders, resulting in higher rates of customer follow-through to move forward with a contractor. Also, increases to incentives available to delivered fuel customers for weatherization in 2018 contributed to these higher levels of participation.

29 independent insulation contractors, 18 of which were based in Rhode Island, installed the insulation and air-sealing materials recommended by RISE. Rhode Island-based contractors were responsible for 73% of the weatherization projects completed. Each insulation crew, generally 2 or 3 persons, was led by a BPI-certified crew chief. RISE coordinated this work and received a percentage mark-up (i.e. cost plus) on insulation work completed by contractors. ***Peregrine calculated that 117.4 FTEs of weatherization contractor time was spent to install insulation and air sealing materials necessary to complete the 3,588 projects completed in 2018.***

CMC Energy Services, Inc. provided 1,061 quality assurance (QA) inspections of a sample of EnergyWise Single Family residential customers served, up from 864 in 2016.[11] QA addressed all phases of service delivery and included review of field auditors' performance, post-audit counts of installed measures, and post-weatherization site visits to confirm proper installation technique and customer satisfaction with results. A unified workforce of 21.5 field inspectors, five of whom resided in Rhode Island, conducted single family and multifamily residential QA visits, as well as commercial program inspections, in Rhode Island and Massachusetts, supported by schedulers and data entry staff. ***Approximately 2.6 FTEs of this team serviced National Grid's residential programs (single family and multifamily) in Rhode Island.***

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[9] Source: Peregrine interview with RISE Engineering, March 26, 2019

[10] Ocean State Energy Audits also provides building assessments for income-eligible customers on a subcontracted basis and provides HERS audits for the Residential New Construction program.

[11] Source: CMC Energy Services, Inc.

Rhode Island Heating and Cooling Program (gas and electric)

The Rhode Island Heating and Cooling program (formerly the High-Efficiency HVAC programs: *Gas Heat* [heating] and *CoolSmart* [cooling]) promotes the installation of high efficiency gas heating and electric cooling systems to replace or displace existing, relatively inefficient equipment. This retrofit program features tiered rebate levels for installation of these 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 also provided in-depth contractor training for design, installation, and testing of high efficiency systems, as well as quality installation verification training to ensure that all equipment is properly sized, installed, sealed, and performing.

In October 2018, National Grid implemented a new initiative called "beneficial electrification of heating" to promote and incentivize installation of cold climate air source heat pumps (ASHP) for residential customers that were currently heating using delivered fuels (oil and propane) in boilers and furnaces or electric resistance heat. This equipment would provide both energy efficient heating and cooling. A pre-requisite for customer participation in this effort would be verification that whole building weatherization had been completed. An initial ASHP training was held for refrigeration mechanics from four HVAC companies serving Rhode Island to introduce the initiative and qualify them to properly install approved systems. National Grid then identified and notified an initial 1,600 eligible ASHP targets among customer homes where weatherization had been completed. The 2018 goal was to install equipment in 45 homes, 25 electrically heated and 20 oil or propane heated. The first installations began late in 2018, with the first inspections completed and incentives paid out in early 2019.

Additional trainings held in the first quarter of 2019 have increased the number of trained technicians to 58 from 33 companies, all but one Rhode Island-based. A goal of 190 installations has been set for this equipment in 2019.

Delivery:

Westborough, Massachusetts-based CLEAResult delivers this program, providing training, technical support, and marketing assistance to trade allies to promote electric mini-splits and higher efficiency water heating systems. Equipment distributors are the market channel used to provide outreach to installation contractors about program objectives, requirements, and opportunities. Independent HVAC contractors installed high efficiency heating and cooling system components. Support services providers Blackhawk and EFI processed product rebate applications and cut checks to installers as part of their larger rebate processing responsibilities. ***2018 FTE counts associated with this program include employees of CLEAResult that manage the program for National Grid in Massachusetts and Rhode Island. The Rhode Island portion of***

their time is equal to 0.8 FTEs, split between electric and gas.[12]

1,456 gas-fired boilers and furnaces, some of which were oil to gas conversions, were installed in 2018, as well as 284 gas-fired water heaters (primarily on-demand). Installations also included 433 high efficiency central air conditioning systems, 1335 mini-split air conditioners, and 45 central heat pumps, as well as thousands of smart thermostats. Installed volumes of all products groups increased in 2018 over prior year levels. Installers were plumbers, pipe fitters, electricians, and refrigeration technicians, primarily Rhode Island-based. Contractor labor hours for this work have been calculated, converted to FTEs, and included in total FTEs for residential electric and gas programs. ***Peregrine calculated that there were 79.3 contractor FTEs attributed to gas equipment installations and 41.8 FTEs attributed to electric equipment installation.***

EnergyWise Multifamily (gas and electric)

In 2018, EnergyWise Multifamily continued to provide 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 available to both market rate and income-eligible multifamily properties. RISE Engineering managed and coordinated the services offered across a portfolio of National Grid programs, including EnergyWise Multifamily, Commercial Multi-family, and Income Eligible Services (i.e. Low Income) for Multi-family Buildings.

Delivery:

RISE employees delivering multifamily programs included the Multi-family Operations Manager, a technical services director, field coordinators, field auditors and installers, warehouse materials handlers, and project intake and coordination staff. In 2018, RISE continued to use multifamily weatherization specialists it employed to do a portion of the weatherization work identified, primarily in 5 – 20 unit multifamily buildings, with the remainder sub-contracted out to installation contractors. ***RISE's EnergyWise Multifamily Program staff working on the non-income eligible Rhode Island multifamily programs in 2018 equaled 10.3 FTEs of a total aggregated 23 FTEs made up of twice as many individual workers.***[13] Many of the same personnel were also engaged in multifamily program delivery in Massachusetts, accounting for the remainder of their work time.

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, hot water systems and

[12] Source: CLEAResult
[13] Source: RISE Engineering

boiler resets, and even replacement refrigerators from retailers for low-income residents). A total of 30 sub-contractors (electrical, plumbing, mechanical, and weatherization) are used by RISE for installations that flow through RISE's books. Work in 5- to 20-unit buildings is assigned to contractors, while work in over 20-unit buildings is competitively bid. ***Peregrine calculated that contractors totaled 18.3 FTEs, largely for weatherization.***

For 2019, RISE also has a goal to install cold climate air source heat pumps in 75 units of multifamily housing as part of the new electric heat initiative, targeting high use electric resistance baseboard heated units. RISE auditors will bring in engineering staff to size the equipment, which will then be installed by sub-contractors.

As noted earlier in the description of the EnergyWise Single Family program, National Grid engaged CMC Energy Services to perform independent quality assurance checks on multifamily services.

Residential New Construction (gas and electric)

The Residential New Construction 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, 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 adopted a performance-based tier structure with corresponding financial incentives and began to capture savings from the Renovation/Rehabilitation and Deep Energy Retrofit offerings. In 2018, the program raised the performance baseline, requiring builders to change their methodologies and further improve performance. Savings that builders could claim against the baseline were harder to achieve, and incentives offered for different levels of performance reflected this baseline adjustment. The program also adopted additional tiers of savings goals, sub-dividing the previous tier system, to create a more stepped performance ladder for builders to maintain their participation in the program.

559 units of housing and homes received Home Energy Rating System (HERS) ratings in 2018.[14] 360 of these units rated in 2018 were multifamily housing units, many of which were in

[14] Source: CLEAResult

affordable housing. The program team continued to bring new builders and developers into the Residential New Construction program in 2018, continuing National Grid's success with market transformation. The availability of better heat pumps continued to drive an increase in the number of electrically heated homes that met program guidelines. In 2016, 90% of new multifamily units being constructed under the program had been gas heated. By 2018, 37% of units being constructed were electrically heated with air source heat pumps.

Delivery:

National Grid continued to contract with CLEAResult to deliver the Residential New Construction program in 2018. CLEAResult had purchased Conservation Services Group (CSG), based in Westborough, Massachusetts, in mid-2015. CSG had delivered this program since 1998. ***Total program staffing for Rhode Island in 2018 totaled 5.5 FTEs, up from 4 FTEs in 2017.***[15]

CLEAResult provided program management, data management, and administrative support to this program out of CLEAResult's Westborough, MA, office. The Program Manager also spent half her time in the program's East Greenwich (Warwick), Rhode Island office. Four additional full-time staff, a senior field manager and three project managers, based in East Greenwich, provided field support and project management services for individual projects. Field personnel provided trainings and reviewed plans submitted by builders and developers. Field staff also modeled proposed buildings and completed inspections that verified and certified that construction practices for participating buildings receiving performance ratings. This same CLEAResult staff also helped National Grid develop a Zero Energy Pilot in 2018 to continue to grow and support zero energy construction in both residential and commercial buildings through increased market awareness, education, and training. Further, in 2018, CLEAResult trained three additional HERS raters who live in Rhode Island and will be contractors to CLEAResult.[16] These raters were officially certified in 2019 and are available to review Rhode Island projects.

With approval from National Grid, Peregrine has only included labor hours associated with program implementation services provided by CLEAResult. No construction labor component is counted for purposes of this study. 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 total 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 likely have been built without the intervention and support of the program, even though they would not achieve the same standards for efficiency in their design and

[15] Source: CLEAResult

[16] Source: CLEAResult

function.

Residential Codes and Standards Initiative (electric and gas)

The Codes and Standards Initiative has been the complement to the New Construction program, providing information, training, and technical support to the construction / design community and to code officials in municipalities to increase code compliance. National Grid's goal has also been to promote advanced and stretch codes like the Rhode Island Green Construction Code so that new construction is mandated to meet higher standards for energy efficiency performance.

The Rhode Island Building Commission had anticipated adopting a new energy code in 2016, but the Office of Regulatory Reform requested that all sections of the building code undergo an economic analysis. This has resulted in a delay in adoption of the new energy code. While the energy code was reviewed first and successfully passed the economic test, review of the remainder of the code remains ongoing, was not completed in 2018, and now is projected for formal adoption in 2019. National Grid had planned trainings concerning the new energy code in 2018, but that effort was put off until the code is fully adopted. However, Rhode Island did implement a voluntary Stretch Code in early 2018 that allowed CLEAResult to integrate anticipated code changes into trainings, alongside addressing areas of the existing code where compliance has been most problematic. 29 trainings on residential code issues and 11 trainings on commercial/industrial code issues were held in 2018, a significant increase over training numbers for 2017.

Delivery:

National Grid contracted with CLEAResult in 2018 to lead this initiative in parallel with the Residential New Construction program it also manages. ***Altogether, staffing, including the program manager, trainer/technical support specialists, and a logistics and administrative coordinator totaled one (1) FTE for Rhode Island.***[17] This time is allocated between the residential electric and gas and commercial electric programs.

As noted above, CLEAResult coordinated and conducted 29 residential trainings in 2018, up from 15 in 2017, lasting from 1.5 to 3 hours and targeting HVAC contractors, architects, builders, and code enforcement officials.[18] In addition, trainers delivered 11 commercial classroom trainings, up from nine in 2017. Two subcontractors assisted with these trainings: Energy Resource Solutions from Andover, Massachusetts, and Steven Turner, Inc. from Providence, Rhode Island.

[17] Source: CLEAResult
[18] Source: CLEAResult

CLEAResult also fielded circuit riders to provide on-site technical assistance to developers and municipalities as needed.

Residential Home Energy Report Program (gas and electric)

National Grid began offering Home Energy Reports (HER) to all residential customers in April 2013 as the first statewide behavioral program in the country and has continued the program through 2018. The Rhode Island HER program uses historical energy usage benchmarking and social comparisons to encourage energy efficient behaviors by residential customers.

The program provides emailed reports to customers 12 times per year and mailed reports six times per year containing customer-personalized energy usage information, recommendations, and links to National Grid's other residential energy efficiency programs and services. The goal of reports has been to generate actual energy savings by providing "tips" for reducing energy use as well as to increase demand for and participation in other residential programs offered by National Grid.

Delivery:

In mid-2016, Oracle Utilities, a division of Oracle America with offices in Arlington, Virginia, purchased OPower, which had originally developed the Rhode Island HER program, using proprietary behavioral analysis and energy audit software. A Northeast team, composed of seven individuals, manages accounts and optimizes delivery services to clients in Rhode Island, Massachusetts, and New York. Oracle's HER service group continues to be staffed with behavioral scientists, marketing experts, engineers, and software product developers, with support staff, operating in cross-functional teams to develop and deliver Home Energy Reports across the U.S.

ENERGY STAR® Lighting (electric)

ENERGY STAR® Lighting is a "point-of-purchase" initiative implemented jointly with other regional utilities. The program's strategy is to facilitate retailer discounts on lighting products that National Grid would like residential customers to purchase, resulting in instant rebates and special promotions at retail stores. A mail-order catalog and online store are also available to customers for lighting purchasing.

Highly efficient and long-lasting LED lighting is at the center of this program. By bringing the cost to customers of LED lamps in line with incandescent lamps at the checkout line, the program has rapidly transformed the residential market. The incentivized price point of LEDs was $1 to $1.50

per bulb in 2018, with savings from new sales achieving 139% of goal.[19] EnergyWise Single Family Program installers have found it increasingly difficult to find locations to install free LEDs during building audits because participants had already purchased and installed them. Meanwhile, discounted LED products continue to be placed at additional smaller retail outlets in 2018, in addition to the major chains and big box stores that were early program participants. Additional retailers brought into the program also included big store pharmacies and other "department" stores.

Delivery:

Lockheed Martin Services (LMS), with an office in Marlborough, Massachusetts, again supported the residential consumer lighting initiative in 2018, providing direct outreach and education to both product retailers and manufacturers. Lockheed works with corporate decision makers to enlist new retailers into the program. They have monthly calls with corporate trade allies and manufacturers to facilitate getting new products to retailers and assist retailers with design and set up of displays and signage in stores.

The LMS staff serves utility programs in both Massachusetts and Rhode Island. ***The Rhode Island contingent is equal to 4.4 FTE staff, with their time split evenly between ENERGY STAR® Lighting and ENERGY STAR® Appliances (described below).***[20] Staffing in 2018 included two full-time Rhode Island-based field representatives and a quarter-time School Funding Coordinator. Field staff worked 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, and helping organize school-based lighting product and power strip purchasing and distribution.

As noted earlier in this report, Massachusetts-based Energy Federation, Inc. (EFI) processed incentive payments to retailers and manufacturers that provided point-of-purchase discounts for lighting. EFI also 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.

With respect to job impacts of the program, while participating Lockheed Martin staff are counted by Peregrine, retail outlet employees are not included in counts since the stocking and

[19] Source: Lockheed Martin

[20] Source: Lockheed Martin

sale of discounted LED products had no discernible incremental effect on store employment.

ENERGY STAR® Appliances (electric)

In 2018, 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 and freezer recycling, which helped address a significant barrier to purchasing a more efficient appliance. This appliance disposal program also has helped remove non-efficient units from the market (eliminating additional, older units in customer basements and garages), recycled appliance components, and captured and properly disposed of refrigerants.

Meanwhile, the market transformation to more energy efficient appliances has continued to accelerate, and ENERGY STAR® has increasingly become the standard for new refrigerators. Only a higher level of refrigerator efficiency qualifies for incentives currently offered, and these incentives are low compared to the incremental purchase price of these most efficient models, leaving customers resistant to the higher price.

Additional consumer products like WIFI thermostats, Tier 2 Advanced Power Strips, energy efficient dehumidifiers, and pool pumps have proven to be applicable to this point-of-purchase strategy and are similarly available from retailers.

Delivery:

Lockheed Martin Services (LMS) manages the ENERGY STAR® Appliances in Rhode Island and Massachusetts. As is the case with ENERGY STAR® Lighting, ENERGY STAR® Appliances is 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, Lockheed Martin Services engaged major retail outlets, providing the same support as for ENERGY STAR® Lighting. Lockheed Martin also subcontracted for disposal and recycling of replaced air conditioners and dehumidifiers. ***As described above in the ENERGY STAR® Lighting discussion, LMS employs a total of 4.4 FTEs for Rhode Island program delivery, with their time split evenly between the ENERGY STAR® Appliances and Lighting programs.***[21]

National Grid and the other regional utilities contract with ARCA Recycling Inc. to recycle older refrigerators and freezers as part of the holistic strategy to encourage the purchase of energy

[21] Source: Lockheed Martin

efficient products. ARCA, operating in Franklin, Massachusetts, is responsible for refrigerator collection, dismemberment, and material recycling. In 2018, ARCA collected, transported, disassembled, and processed 3,792 refrigeration units from Rhode Island. The ARCA workforce included a Recycling Center Manager, 16 employees in transportation, and seven warehouse employees who took apart and processed the collected appliances. ***ARCA estimated that 20% of the annual hours of this 24-person workforce were attributable to Rhode Island activity, based on volumes handled, equal to 4.8 FTEs.***[22]

Income Eligible Residential Programs

National Grid offers Income Eligible programs to its electric and gas customers residing in single family (1-4 unit) dwellings and multifamily (5 or more unit) buildings or developments who are eligible for the Low Income Heating Assistance Program (LIHEAP). This target audience was already eligible to receive energy-related assistance through federal and state programs. National Grid's program strategy in this market is to support, complement, and leverage the resources and services provided by these other programs.

Income Eligible Single Family (gas and electric)

National Grid's Income Eligible Single Family program provides low-income customers in 1-4 unit buildings with home energy assessments, installation of energy efficient LED lighting, appliances, heating systems, domestic hot water equipment, and weatherization measures. For many decades, energy services have been, and continue to be, provided to this market sector through local non-profit Community Action Program (CAP) agencies under contract to the Rhode Island Department of Human Services (DHS). These agencies deliver the federally funded Weatherization Assistance Program (WAP) and LIHEAP. These services are fuel-blind and available to income-qualified gas, oil, and electric heat customers as budgets allow. Six CAP agencies provide statewide coverage to Rhode Island residents.

With the participation of National Grid in energy efficiency services delivered by the CAP agencies to this market, WAP budgets have been significantly leveraged and energy efficient installations significantly expanded. ***In 2018, 35 full-time staff in the six CAP agencies provided weatherization-related services across Rhode Island.***[23]

Under the Income Eligible Single Family program, CAP agencies provide three types of building audits: audits focused on lighting and appliances only that install lighting products; audits

[22] Source: ARCA Recycling Inc.

[23] Source: CLEAResult

providing detailed recommendations and work orders for insulation contractors, heating system installers, and fans; and comprehensive audits that do both. BPI-certified auditors complete building assessments and work orders. Special AMP (Appliance Management Program) auditors install lights and refrigerator measures. CAP agencies note that they have been losing auditors in the past year or so to other companies and other professions and are having a difficult time replacing them. Auditors must be BPI-certified. Competition with other would be employers and the general shortage of suitable qualified labor in a better economy makes backfilling particularly difficult.

In 2019, the program will be adding air source heat pumps to the mix of equipment installed, with prior weatherization being a pre-requisite for customer participation. A goal of 30 installations was set for 2019, and initial targets will be electric resistance heated homes in the South County area. At least one auditor at each CAP agency will be trained to target ASHP opportunities.

Delivery:

CLEAResult, working out of offices in Providence, Rhode Island, has been managing the Income Eligible Single Family program since 2013. In 2017, it was awarded a new multi-year contract. CLEAResult serves as the conduit for National Grid payments to the CAP agencies and works closely with the Rhode Island DHS staff to coordinate and optimize delivery of National Grid-funded services and traditional Weatherization Assistance. ***CLEAResult employs three full-time staff to manage this program, a program manager, an installation quality assurance / quality control inspector, and administrative support.***[24]

Under CLEAResults' management, productivity and quality of service delivery to low income residents has continuously improved. CLEAResult has expanded training for current auditors, increased quality control, and improved oversight of National Grid-funded services and installations delivered through CAP agencies.

In 2018, program participants included 231 gas customers and 328 electric (i.e. not-gas) customers. 2,703 AMP installations were provided, up from 2017.[25] CAP agencies delivering the combined National Grid program and WAP achieved weatherization (insulation and air sealing) installations for 481 National Grid gas customers and the installation of 231 high-efficiency, gas-fired heating systems. In addition, 477 homes, electricity-heated and oil- and propane-heated, received weatherization, and 325 received new oil heating systems and 3 received new electric

[24] Source: CLEAResult
[25] Source: CLEAResult

heat systems.[26]

21 independent contractors are active in income-eligible weatherization, installing insulation and completed air sealing for the CAP agencies. Many of these contractors also are active in the EnergyWise Single Family program. Contractors are selected off a state-approved list and offer fixed pricing statewide for installed measures. Each agency had three to five insulation contractors it typically worked with. The CAP auditing staff inspects completed insulation work post-installation to ensure it was properly installed. 21 Heating system repair and replacement contractors are active in this market. Heating system upgrades are put out to bid to contractors, and heating contractors also are used for post-installation inspections. There are also two electrical contractors that are approved to repair and install bathroom fans to address humidity issues and to replace or disable antiquated knob and tube wiring (a code requirement that must be done for safety purposes before insulation can be installed in walls and ceilings). ***Peregrine calculated that contractor installations completed for these income eligible customers equaled 55.7 FTEs.***

ACTION, Inc., based in Massachusetts, oversaw 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. ***This was equal to one (1) FTE in staff time.***[27]

Income Eligible Multifamily (gas and electric)

Since 2013, National Grid has consolidated energy efficiency offerings for income eligible multifamily properties with five or more units into the EnergyWise Multifamily program. This suite of programs addresses both gas and electric opportunities. Comprehensive energy services available to these customers included energy assessments, incentives for heating and domestic hot water systems, cooling equipment, lighting and appliances. Services provided to income-eligible and market rate units and buildings through EnergyWise Multifamily program are tracked separately.

Additionally, and in parallel, the Residential New Construction program works with Rhode Island Housing, local housing authorities, and developers of income-eligible housing to encourage construction of energy efficient properties.

[26] Source: CLEAResult

[27] Source: ACTION, Inc.

Delivery:

In conjunction with its delivery of EnergyWise Multifamily services, RISE Engineering, based in Cranston, Rhode Island, had primary responsibility for delivery and coordination of Income Eligible Multifamily services. RISE staff serve as project managers for retrofit projects, meeting with building facility managers 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. ***Total RISE time attributed to income-eligible multifamily work totaled 12.7 FTEs.***[28] ***Peregrine calculated that contractor time equaled 11.2 FTEs.***

CLEAResult provides support for energy efficient construction of new income-eligible units through the Residential New Construction program.

Commercial and Industrial Programs

In 2018, Commercial and Industrial (C&I) programs, gas and electric, continued to encourage installation contractors, both technology specialists and tradespeople, to take the lead in achieving National Grid's energy efficiency goals for large and small businesses. These C&I programs also target municipal facilities and large non-profit institutions (e.g. colleges and universities and healthcare facilities). At the same time, National Grid increasingly made use of "upstream" or "point-of sale" strategies, particularly for LED lighting, that discounted the purchase price of preferred, more energy efficient equipment to accelerate market transformation and replacement of older technology.

C&I programs differentiate between "prescriptive" and "custom" energy efficiency measures. Prescriptive measures, often lighting, qualify for pre-determined incentives or discounts from National Grid based on cost-effectiveness guidelines (e.g. hours of operation or equipment life). Custom or "comprehensive" measures are evaluated and approved for incentives based on actual total savings these often more complex measures are projected to produce. In particular, the Large Commercial and Industrial Retrofit program encourages customers and their installation contractors to incorporate or "bundle" a mix of shorter payback, more certain, energy savings measures and longer payback, more complex, energy savings measures into projects, providing enhanced incentives for more "comprehensive" or "deeper" efficiency improvement. Nevertheless, in 2018, 71% of all electricity savings in this market sector from

[28] Source: RISE Engineering

prescriptive energy efficiency measures were attributable to LED lighting installations. Savings from lighting from custom installations were likely in the same range.

National Grid Senior Analyst Ben Rivers identified the following trends with respect to commercial and industrial programs targeting electricity use.[29]

- Lighting continues to be the primary source of electrical savings in this market sector in Rhode Island, as a result of the Upstream Lighting program, described below, the Small Business Direct Install program, and the Large Commercial Retrofit program.
- The ready availability of inexpensive, long-lasting LED lighting is anticipated to result in lighting market saturation before long, likely making it more difficult and expensive to achieve electricity savings in this market in the future.
- The next generation of lighting energy savings will likely be from LEDS fixture-mounted lighted controls.
- More industrial process improvements are being identified and installed through targeted industrial services, and grocery stores are continuing to opt for improvements to energy efficiency in refrigeration and controls.
- Increasing the size of customers that can qualify to participate in the Small Business Direct Install program up to 1,000,000 kWh per year may open the door to additional installations.
- While there were fewer combined heat and power projects in 2018 than had been anticipated due to a number of planned projects not moving forward, National Grid is still targeting future projects in housing complexes, hotels, and smaller industrial facilities.
- A number of Strategic Energy Management Plans (SEMPs) for large comprehensive retrofits will be going into a second three-year term and State and Municipal Schools SEMPs are being developed.

C&I programs continue to be increasingly "market-based" and easier for both service sellers and buyers to participate. Programs allow and encourage independent product and service providers to offer services to National Grid customers, and to use National Grid incentives for purchase and installation of qualifying products to drive sales. This strategy enables customers to work within existing contractor relationships to receive program incentives, and likewise allows contractors to work within existing customer relationships to identify opportunities for installing energy efficient equipment that National Grid wants to promote. It also means that multiple vendors can compete for a customer's business, while assuring the customer that they can bring the same National Grid incentives. From both a jobs and a savings perspective, this has resulted in significantly increasing numbers of energy services businesses directly participating

[29] Interview with National Grid

in National Grid programs and has created new and additional opportunities for diverse vendors to promote emerging energy efficient technology to new and existing clients.

Small Business Direct Install (electric and gas)

In 2018, the Small Business Direct Install program continued to provide direct installation of prescriptive 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 in 2018, though this threshold is being increased to up to 1,000,000 kWh in 2019. The program met National Grid electric and gas savings goals for the year, though program budgets for Participant Incentives were lower than in 2017, perhaps reflecting the larger role and lower cost of Upstream Lighting for lighting retrofits. There were 698 customers who participated in the Direct Install program in 2018, down from 830 customers in 2017, the 1,111 customers in 2016 and the 1,340 customers who participated in this program in 2015.[30]

Delivery:

The Direct Install program's lighting 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 provided turnkey installation services to this market, with annual goals. RISE accounted for 76% of applications serviced. The remaining 24% of applications serviced was through the Customer Directed Option or "CDO", described below. CDO projects secured 28% of incentives provided through the Direct Install program, reflecting that these projects were larger on average than those completed by RISE.

RISE employees engaged in the Small Business program were responsible for marketing and lead generation as well as 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. When a customer accepted a RISE proposal, a RISE project manager ensured that sufficient product was available for the installation, issued that product to the installer/electricians, and closed out the work order when the installation was completed.

RISE maintained a supervised warehouse for material distribution and materials handlers. RISE also employed back office and accounting staff to service this program. Active electricians included both RISE employees (5 FTEs) and employees of sub-contractor Superior Electric (4.5

[30] Source: RISE Engineering. These numbers may differ from National Grid's year-end report participation counts due to the fact that the year-end report applies net-to-gross factors and ratios to obtain an estimate of unique participants.

FTEs). Electricians/installers directly employed by RISE and active in the Small Business program were down from 6 FTEs in 2017 and 8 FTEs in 2016. In general, RISE employees supporting this program were salaried or hourly, while subcontractors were paid for installation work on a piece basis.

In 2018, total employment from RISE and its sub-contractor Superior Electric associated with the Small Business program totaled 27.3 FTEs.[31] This was a decrease from 31.5 FTEs in 2017, 38.9 FTEs in 2016 and from 43.5 FTEs in 2015. 24% of customers chose their own preferred electrician through the "Customer Directed Option" of the Small Business program.[32] ***Peregrine calculated that CDOs employed 8 FTEs on these projects.***

As was the case with residential programs, National Grid used CMC Energy Services, Inc. to provide quality assurance inspections of Small Business projects. Field inspectors conducted QA visits in Rhode Island and Massachusetts for the Small Business program as well as for the Large Commercial Retrofit and Upstream Lighting programs (described below), supported by schedulers and data entry staff. ***Approximately 2.6 FTEs of this team were engaged in National Grid's commercial and industrial programs in Rhode Island.***[33]

Large Commercial Retrofit (electric)

The Large Commercial Retrofit program replaces older, but still operating, less efficient energy equipment and systems with both prescriptive and custom configurations of more energy efficient equipment. Energy efficiency improvements installed through the program include, but are not limited to: interior and exterior lighting and lighting controls; drives; heating, ventilation and air conditioning (HVAC) systems; building controls; combined heat and power systems; and street lighting. The goal is achieving persistent, measurable energy savings.

All existing commercial, industrial, and institutional customer facilities are eligible to participate. Customers in the program tend to be larger (i.e. have a monthly demand greater than 200 KW) or are pursuing "custom" electricity saving measures not available through the prescriptive Direct Install program. As was the case for the Small Business program, National Grid pays incentives to assist with defraying a portion of the costs associated with installing equipment; but incentives available through this program are generally less generous than in the Direct Install program, described below, where National Grid pays a larger percentage of the installed

[31] Source: RISE Engineering
[32] Source: RISE Engineering
[33] Source: CMC Energy Services

cost of measures. National Grid also can choose to provide engineering assistance to customers to assist with identification of cost-effective opportunities.

National Grid statistics for the 2018 Large Commercial Retrofit program identify 716 projects as follows: Lighting (479 projects, 67% of the total number); Custom (114 projects, 16%); Drives (65 projects, 9%); HVAC, including controls (52 projects, 7%); Miscellaneous (6 projects, 1%). These projects are associated with 540 individual customer accounts. The percent allocation of the 114 total custom projects, by sub-category is: lighting and streetlights (36%); process, including refrigeration (30%); HVAC and controls (20%); compressed air (7%); drives (3%); miscellaneous (3%); and combined heat and power (1%).

The total value of these electric project installations completed in 2018 was just over $62,653,047. Of the total value of 2018 projects, 44% ($27,569,900) were custom projects, for a net of $35,083,147 total value for non-custom projects. Looking at non-custom projects only, lighting retrofits accounts for $24,613,793 (70% of their total value, HVAC was $8,580,802 (24%), drives were $1,716,774 (5%), and miscellaneous projects were $171,777 (less than 1%) of the non-custom Large Commercial Retrofit project total). A breakdown of the dollar value of custom projects by sub-category was not available.

Delivery:

The Large Commercial Retrofit program is a market-based initiative with no contracted program administrator or designated preferred suppliers. National Grid has established performance standards for qualifying energy efficiency measures and allows customers to choose the suppliers and installation vendors they want to work with. Customers submit applications to National Grid for incentives that are based on projected savings that will be achieved and receive payments from National Grid that help defray costs associated with installed equipment.

Peregrine estimates that the total workforce engaged in the Large Commercial Retrofit (electric) program totals 188.2 FTEs. This number includes installers of equipment and systems, engineers engaged in system sizing and design, sales persons, back office staff, and independent engineers deployed by National Grid to assist customers to identify potential projects.

Installers of record for these projects are identified by National Grid as either “customers,” “installation contractors,” or “project expeditors (PEX)”. For the 716 completed projects totaling $62,653,047 in value, 100 were identified as customer-installed (with a project value of $18,771,146), 425 identified as installation contractor-installed (with a project value of $27,646,408), and 190 identified as PEX-installed (with a project value of $16,235,492).

Of the 13 “project expediters” active in the program, four were responsible for 83% of 190 projects. The most aggressive of the PEXs engaged dedicated sales staff to pursue potential customers, typically sub-contracting the field work to licensed contractors and technology

specialists and serving as the project manager.

On the other hand, the 425 "installation contractor" projects were spread among 104 separate companies who used program incentives to induce customers to upgrade existing systems to improve energy efficiency or to 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.

Finally, it is unclear from National Grid reports who the actual installers were for the 100 "customer-installed" projects. It is likely that independent installation contractors completed many, if not most, of these projects, though no specific information was available to Peregrine to confirm that.

The table below, generated from National Grid project data, shows the distribution of projects for each installer category by energy efficiency measure group category: "custom" or comprehensive projects ("CUSTA"), HVAC projects including controls ("HVAC"), lighting retrofits ("LIGHT"), miscellaneous projects ("MPS"), and variable speed drives ("VSD"). Custom or CUSTA projects often included multiple technologies, received customized incentives from National Grid, and could include any of the other specific installation types.

2018 Large Commercial Industrial Retrofit Program (electric)

Installers of Record with Measure Group Counts

Customer-installed	**100**	
CUSTA	31	31%
HVAC	2	2%
LIGHT	56	56%
MPS	4	4%
VSD	7	7%
Installation Contractor	**425**	
CUSTA	56	13%
HVAC	30	7%
LIGHT	315	74%
MPS	1	0%
VSD	23	5%
Project Expeditor	**190**	
CUSTA	27	14%
HVAC	20	11%
LIGHT	108	57%
VSD	35	18%

Upstream Lighting (electric)

National Grid's Commercial and Industrial Upstream Lighting program encourages customers and electrical contractors to choose higher efficiency lighting products at the point of purchase. The big idea that launched this program was a recognition that commercial customers were going to large lighting distributors to purchase stocks of replacement lighting to have on hand for when lights failed or to undertake large-scale change-outs. At that point in time, fluorescent lighting predominated the commercial market. National Grid reasoned that if a customer again purchased and installed the same "old technology" fluorescent product as was being replaced, this would be a major lost opportunity for efficiency improvement; but if the customer could be induced to purchase and install a more efficient product, both National Grid and the customer would realize the benefits and savings of energy use reduction.

The success of Upstream Lighting in attracting customer participation and generating electricity savings has been driven by three key program design elements:

1. Getting customers to opt for high efficiency by offering incentives to manufacturers to bring the purchase price of new, more energy efficient, National Grid-preferred lighting products in line with older, conventional products;
2. Eliminating the stigma of a mail-in rebate process to offset the incremental cost of the high efficiency product by giving instant rebates to purchasers at the point-of-sale from distributors; and
3. Stipulating that purchased products must not be resold or stored to replace failed lamps in the future, but must be installed immediately to generate savings for National Grid and the customer.

In short order, the rapid advent and availability of even more efficient, longer-lived, and competitively priced LED alternatives to fluorescent and incandescent lighting meant that LED products became the preferred replacement in retrofits, and National Grid no longer wanted customers to install any more fluorescent lamps. And further, to ensure that savings from LED installations persisted, National Grid added an increasing number of new LED fixtures to the products available through the Upstream Lighting program.

From 2012 to 2018, 1,273,643 units of LED lighting (lamps and fixtures) were sold through the Upstream Lighting program in Rhode Island. Three market segments (education, hotel/motel, and public assembly) initially were early adopters and accounted for a major percentage of this volume. But by 2018, large volumes of purchases had been made by the small and large office, retail, industrial, and health care segments.

Total Upstream program sales of fluorescent product reached 713,749 by 2016. Fluorescent Upstream sales peaked in 2014 when 261,820 units were sold but began to decline as more LED product was available and offered. Beginning at the start of 2017, fluorescent lighting was no

longer offered through the Upstream Lighting program, instead replaced by a growing range of LED products that could be installed into existing fixtures. Expanding earlier efforts, National Grid decided to drive more LED fixture sales (e.g. stairway fixtures) that would result in additional savings by replacing the ballasts in older fluorescent fixtures with the lower watt LED drivers in new fixtures. By 2018, a growing variety of LED-only fixtures were available through Upstream, and, if priced right, these products could be installed to economically replace still functional lamps and fixtures.

Interestingly, unit sales of LEDs through Upstream peaked in 2015 at 251,900, and have declined thereafter to 246,153 (in 2016), 179,682 (in 2017), and 153,441 (in 2018), perhaps reflecting some level of market saturation. This is despite National Grid continuing each year to add new LED product types to the mix that would fit in additional customer situations (e.g. high bay and low bay warehouses and garages) to facilitate additional conversions.

Delivery:

National Grid contracted with CLEAResult to administer, support, and promote Upstream Lighting. In early 2018, CLEAResult purchased ECOVA, who managed the program since its inception. The same team manages the Upstream Lighting program in Massachusetts. ***With CLEAResult's guidance, Peregrine has attributed 0.6 FTEs of CLEAResult staff time to Rhode Island activity for 2018, equal to about 15% of the two-state program activity.***

CLEAResult/ECOVA has engaged manufacturers and enlisted lighting distributors throughout Rhode Island, offering incentives from National Grid, if they would reduce list prices of specified energy efficient products to electrical contractors and businesses, all with the goal of transitioning and transforming stocking practices and customer purchasing behavior. ***We assume that 4 FTEs are being employed by lighting distributors across Rhode Island to support demand for products offered through Upstream.*** This is equal to one additional quarter-time person per distributor location.

CLEAResult processed reimbursements to suppliers for discounts provided and managed a quality assurance process to ensure that recorded sales were legitimate. In 2018, new products continued to be added to what had been available through the program to continue to accelerate the market transformation process. CLEAResult has also been more closely managing participating distributors, developing performance plans with them and increasing information sharing. The result has been a significant improvement in the rate at which new product purchases are being installed.

CMC Energy Services conducted quality assurance inspections of 5% of sales in 2018. ECOVA provided monthly lists to CMC of inspection targets to confirm that purchased product had been

installed.[34] Larger distributors also were audited to verify that product sold through the program was, in fact, going to the customers of record.

Peregrine has assumed that licensed electricians are installing a significant portion of the product sold. Reviewing distributor sales records maintained by the program, Peregrine found that an increasing portion of product purchased by customers required an electrician to do the installations, and installation contractors were often the buyers of record. It appeared they were using the program's discounted pricing to convince customers to replace standard-efficiency lighting with high efficiency LED product, further driving the market transition. ***Counting only purchased lighting that an electrician must install under the electrical code and ignoring LED lamp purchases, Peregrine calculated that 19.8 FTE electricians were employed installing these products.*** In calculating these FTEs, Peregrine applied the same product-specific per-unit installed times to Upstream product installed that Peregrine uses to calculate FTEs for lighting installations by electricians under the Direct Install and Large Commercial Retrofit programs. Because these per-unit installation times reflect the high productivity of experienced electricians incentivized to work quickly, the FTEs we calculated for Upstream are a conservative number that does not overstate labor hours.

Technical Support Services (gas and electric)

Engineering support

To further support large commercial customers, National Grid contracted with consulting engineers who could be deployed by an account manager to assist a customer. Engineers would identify potential custom projects, evaluate or model the energy savings that would result, and help the customer complete incentive applications. Some of these consultants brought expertise in specialties like data center energy efficiency improvement or laboratories and clean room technology. In other situations, the customer could propose a scope of work with his own engineer that National Grid could elect to support. Support from contracted consulting engineers was available through National Grid to witness project commissioning, to confirm that the installed measures were operating and performing as anticipated, and to ensure that predicted savings would be achieved.

Energy Smart Grocer

In a similar vein, National Grid contracted with CLEAResult, through its Massachusetts office in Westborough, to offer the Energy Smart Grocer sub-program, which helped large and small supermarket chains identify and implement energy efficiency improvements. Participating

[34] Source: CMC Energy Services

customers were part of local and regional chains and secured through outreach in partnership with the RI Food Dealers Association. Working in 60 kW or larger food markets, CLEAResult focused on refrigeration improvement, controls, and lighting. CLEAResult employed auditors and other technical staff to identify and develop efficiency improvement projects, helped them engage contractors to complete upgrades, provided technical support as needed, and performed quality assurance inspections of installations.

CLEAResult observed that in 2018, it was becoming more difficult to find Rhode Island grocers with significant savings opportunities and that, as a result, services are being offered to "super-pharmacies" that sell fresh food and have refrigeration units. CLEAResult attributes this difficulty to the number and size of grocery stores in Rhode Island (i.e. market limits) and potential market saturation as 2018 was the program's sixth year in this market. Nevertheless, CLEAResult believes that significant savings opportunities remain to be harvested. In 2019, it is taking steps to address this potential, including new measures for regional supermarket chains and reaching additional independent grocers that have not yet installed measures.

Despite these difficulties in 2018, CLEAResult increased both production and savings over 2017. Again, 16 independent contractors were selected and engaged by customers to install energy efficiency improvements. They completed 80 jobs (up from 67 in 2017) at 54 sites (up from 33 sites) for 14 customers (up from 11 in 2017).[35] Savings achieved were 11,420 therms of natural gas and 6,321,450 kWh, nearly doubling the 3,274,891 kWh saved the year before. Gas savings were in HVAC equipment operation, resulting from dehumidification and keeping cold air in refrigerated cases rather than letting it spill into supermarket aisles.

CLEAResult delivers this program in both Massachusetts and Rhode Island. In 2018, Three CLEAResult field staff and account managers visited and worked on-site with Rhode Island retailers to develop projects. ***In total, CLEAResult staff logged 3.1 FTEs providing services in Rhode Island, up from 2017 due to the addition of an Operations Assistant to the two-state staff.***[36] An additional account manager is being added for 2019.

Industrial Energy (gas and electric)

In 2018, National Grid expanded the support provided by Reston, Virginia-based Leidos Engineering, Inc. to help Rhode Island and Massachusetts manufacturers identify and implement energy efficiency improvements in industrial processes. 2018 was the program's most successful to date, exceeding National Grid goals.

Working out of offices in Framingham, Massachusetts, Leidos assisted National Grid customers

[35] Source: CLEAResult
[36] Source: CLEAResult

to develop 81 projects for custom electric measures through the Large Commercial Retrofit Electric program and 19 projects for gas measures through the Large Commercial Retrofit Gas program. Electric savings for 2018 activity totaled over 10,479,445 kWh up from just over 9,000,000 kWh in 2017 and 132% of program goal; gas savings totaled 444,241 therms, 155% of program goal.

Leidos provided targeted engineering support to participating customers, functioning as an owner's representative as customers developed projects with specialty vendors and contractors. A typical engagement included meetings with a customer to review existing operations, major energy uses, and current production issues. Following a guided walk-thru of the facility, Leidos engineers prepare a summary of opportunities and suggested next steps. Depending on the specific interests expressed, Leidos helped identify vendors/contractors and prepared applications for National Grid incentives. The majority of industrial projects were process-related, and, customers often use their own employees for installation and construction.

Despite this success, Leidos reported that market saturation is becoming an issue in Rhode Island due the relatively small size of its industrial base. Customer acquisition is becoming more difficult, and many of the vertical markets (i.e., specific industry groups) have complex problems. In 2019, the focus continues to be on process improvement and new technology opportunities, including storage for daily dispatch and charging stations.

Eleven Leidos staff and four contractors providing engineering and sales support assisted manufacturers in Rhode Island, Massachusetts, Connecticut, and New Hampshire in 2018, up from nine employees in 2016, indicative of the growing success of the program. Rhode Island was about 20% of the total program volume. ***Leidos personnel assisting with Rhode Island customers equaled 2.6 FTEs.***[37] According to Leidos management, 40% of their compensation continues to be performance based, making them "totally engaged" in moving projects forward.

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.

[37] Leidos

Delivery:

The New Construction program was administered and promoted internally by National Grid staff. As noted above, it offered both technical and design assistance to customers to identify opportunities for incremental efficiency improvement in new building designs and to help customers and their architects/engineers to refine their designs to capture these opportunities. Outside consultants were assigned 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 was also offered to ensure that the equipment and systems operate as intended.

For purposes of this study, only the engineering support assigned by National Grid has been counted towards the labor impacts associated with National Grid programs in 2018. As is the case with Residential New Construction, construction jobs associated with commercial new construction were not counted because National Grid's involvement primarily impacts what equipment is installed, and construction labor does not measurably increase in these projects.

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. All commercial, industrial, and institutional customers, large (>40,000 therms) or small (<40,000 therms), were eligible to participate.

The Commercial and Industrial Gas programs 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. A retrofit measure must demonstrate that it will increase energy efficiency above the performance of the still-functional equipment it will replace. For new construction or in the case of failed equipment, "lost opportunity" rules apply. New equipment, to be eligible for incremental incentives, must exceed the efficiency of what codes require.

Delivery:

Unlike previous years when RISE Engineering served as National Grid's Program Manager for gas programs and described its role in the program as "the gears that keep moving applications forward," National Grid internalized the program management responsibility in 2018. As a result of National Grid internalizing the management responsibility role, the RISE program manager and project coordinator positions, which had been responsible for managing the project pipeline, customer "hand-holding," and data management, were eliminated. RISE continued to

be engaged in the program, but their role was restricted to technical support. RISE employees working on the program in 2018 included the Director of Engineering and Gas Program Services and administrative support. RISE technical staff included multiple engineers, field staff performing audits, an installer doing minor installations for the Small Business Direct Install program, and a quality assurance specialist who validated engineering work. Project energy measures included weatherization, controls, process automation, combustion efficiency, heat recovery, combined heat and power, steam traps, and hot water upgrades. RISE performed post-installation inspections of completed projects.

RISE's engineering staff also was involved in program delivery in Massachusetts and New York State. ***A total of 5.45 FTEs from RISE serviced the Rhode Island program.***[38]

[38] Source: RISE Engineering

Analysis of Job Counts for 2018

Comparing 2018 to 2017, 2016, 2015, and 2014 FTEs

The chart below compares five years of job counts for National Grid's Rhode Island Programs. Peregrine tabulates jobs associated with the National Grid electric and gas programs separately, building the numbers at the program level and then aggregating them for both the electric and gas counts into three major categories: Residential Non-Income Eligible, Residential Income Eligible, and Commercial Industrial.

The program counts of Direct Services Provider are the heart of the market sector numbers. Support Services Providers (marketing, program development, rebate processing, and evaluation) counts are allocated to electric and gas program groupings and sub-groupings according to the markets they targeted or consistent with relative program group expenditures by National Grid. Counts also break out Community Action Agency-employed staff who are involved in energy efficiency and National Grid staff engaged in the many aspects of program development and delivery as separate line items.

FTE Job Impacts by Market Sector: 2018, 2017, 2016, 2015, and 2014

	2018 FTEs	2017 FTEs	2016 FTEs	2015 FTEs	2014 FTEs
Electric Programs					
Residential Non-Income Eligible	170.9	98.1	104.0	125.4	109.0
Residential Income Eligible	45.8	46.0	42.3	37.0	38.6
Commercial and Industrial	250.0	263.5	241.1	210.0	199.5
Gas Programs					
Residential Non-Income Eligible	191.6	174.9	159.3	172.1	178.0
Residential Income Eligible	39.4	36.5	41.4	43.8	42.5
Commercial and Industrial	31.9	34.4	36.1	32.0	27.0
Community Action Agency Staff	35.0	35.0	38.0	33.95	32.5
National Grid Staff	39.5	38.2	39.9	41.6	38.9
TOTAL RHODE ISLAND FTE JOBS [4-23-19]	804.1	726.5	702	696	666

Peregrine found that there was a significant increase in total jobs, in FTEs, associated with program delivery in 2018, compared to 2017 and the three prior years. Total jobs counted increased by 77.6 FTEs (10.7%) in 2018 compared to the total 726.5 in 2017.

Looking at market sector job performance:

Electric programs

Residential non-income eligible

2018: 170.9 FTEs; 2017: 98.1 FTEs; 2014 to 2017 average: 109.1 FTEs

- 2017 had been the lowest jobs year in five for electric residential non-income eligible programs at 98.1 FTEs, accentuating the increases that occurred in 2018.
- RISE Engineering, National Grid's prime contractor for the EnergyWise Single Family Program, increase staffing to achieve 2018 goals. Both auditors and installers were added, and the volume of completed audits increased significantly to 10,572 in 2018, compared to the 2017 total of 8,041.
- Further, this increase is highlighted in the electric counts for this market sector due to a coincident shift in allocation of Energy Wise program funding from 55% electric in 2017 to 63% electric in 2018 and the corresponding shift in allocation of staff FTEs.
- Increased audit production and continued staff follow-up on recommendations to customers resulted in significant rise in participation in the weatherization program and more completed weatherization jobs, 3,588 in 2018 compared to 2,732 in 2017. A large part of the weatherization project increase attributed to the electric program was due to a policy change that raised the weatherization incentive available to delivered fuels heating customers (oil and propane) to 75% of project cost, putting it on a par with gas incentives. The result was an increase over 2017 in weatherization contractor FTEs associated with delivered fuel customers that are attributed to the electric program.
- The RI Heating and Cooling program had a major increase in installations of central and mini-split heat pumps as high efficient air conditioning. There were also a large number of smart thermostats installed. All this activity contributed to an increase in HVAC FTEs in 2018
- Multifamily activity remained stable in 2018, with LED fixture installations continuing.

Residential income eligible

2018: 45.8 FTEs; 2017: 46 FTEs; 2014 to 2017 average: 41 FTEs

- Total numbers of FTEs remained largely stable compared to 2017 with continued strong installation of weatherization materials and heating system replacement for oil customers driving weatherization and heating contractor FTEs attributed to the electric program.
- LED installations continue to be a factor in multifamily buildings.

Commercial

2018: 250 FTEs; 2017: 263.5 FTEs; 2014 to 2017 average: 228.5 FTEs

- Installations under the Large Commercial Industrial Retrofit program remained strong with continuing large numbers of LED lighting installations in buildings

- Custom projects include 11 municipal streetlight projects with controls, installed in 2017 and 2018, for which incentives were paid in 2018
- Small Business Direct Install installations declined, continuing the trend of reduced customer participation
- Upstream lighting sales declined on a per unit sold basis, but the mix of products includes an increasing number of fixtures which require more labor to install, therefore keeping associated labor counts strong
- Both the Smart Grocer and Industrial programs added staff and were able to reach more of their targeted customers and develop an increasing number of electric projects that increased Large Commercial Industrial Retrofit custom FTEs.
- Anticipated combined heat and power (CHP) projects did not materialize in 2018, reducing associated FTE counts for project construction and engineering compared to 2017.

Gas programs

Residential non-income eligible

2018: 191.6 FTEs; 2017: 174.9 FTEs; 2014 to 2017 average: 171.1 FTEs

- As was noted for electric EnergyWise Single Family program, RISE added staff, but this increase was offset by the shift in budget allocation to more electric program funding, resulting in a shift in program FTEs away from gas.
- Numbers of gas heating systems, hot water systems, and thermostats installed was up in 2018, resulting in additional installation contractor labor counted through the RI Heating and Cooling program.
- Number of weatherization projects completed for gas customers also increased, from 1,843 in 2017 to 1,980 in 2018, resulting in additional weatherization contractor FTEs.
- Multifamily gas program activity remained largely stable compared to 2017, reflecting ongoing opportunities for weatherization installations in this market.

Residential income eligible

2018: 39.4 FTEs; 2017: 35.5 FTEs; 2014 to 2017 average: 41.5 FTEs

- Total FTEs associated with single-family projects increased slightly, reflecting an adjustment upward to the allocation of expenses to gas programs vs. electric.
- FTEs associated with multifamily projects also were up slightly, reflecting a different mix of efficiency opportunities encountered in the customer buildings served in 2018 and an adjustment upward to the allocation of expenses to gas programs vs. electric

Commercial

2018: 31.9 FTEs; 2017: 34.4 FTEs; 2014 to 2017 average: 32.4 FTEs

- Gas installations associated with the Small Business Direct install program were down slightly, reflecting the ongoing drop in customer participation in this program.
- Custom gas installations through the Large Commercial Retrofit program held steady, but RISE Engineering's staff time supporting the program declined due to National Grid's decision to internalize program management.

Program Budgets and Job Impacts

The table below, "2018 Full Time Equivalents by Program," presents the estimated job impacts from the 2018 Programs by program sector and by individual program, expressed in FTEs, and provides 2018 expenditures for each program.

In the table, associated Direct Service Provider FTEs are specific to each program/sector, but Program Support Services Provider FTEs have been allocated and integrated into individual program FTE counts and program sector FTE counts based on 2018 program expenditures. Support Services FTEs 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 presented separately in the table.

Peregrine has elected to count the workforce involved in delivering energy efficiency in full time equivalents (FTEs). This approach to measuring job impacts supports creation of benchmarks for level of effort expended and, by extension, for meaningful comparisons of counts year-to-year and program-to-program. It is also the most cost effective way to measure and report workforce participation.

A comparison of program spending and program FTE counts in the table shows that the number of FTE jobs attributable to a program is not proportionate to the expenditure by National Grid on a program. Among the reasons why the same number of jobs created associated with programs is not consistently proportionate to energy efficiency dollars spent:

- Some program expenses are less labor intensive than others (e.g. marketing and advertising vs. weatherization services)
- Some program designs are more cost intensive than others (e.g. installing LED products for businesses through the Small Business programs vs. selling discounted LED products through distributors via the Upstream Lighting program)
- Certain energy savings measures are more complicated and laborious than others (e.g. one electrician working alone may install 15 LED ceiling fixtures in a day vs. a team of two may convert 20 streetlights to LED in a day).

2018 Full Time Equivalents by Program

PROGRAMS	2018 SPEND	2018 FTES
ELECTRIC PROGRAMS		
COMMERCIAL & INDUSTRIAL (C&I)		**250**
Large Commercial New Construction	$5,176,973	.4
Large Commercial Retrofit	$22,657,199	214.3
Small Business Direct Install	$5,982,325	35.2
Other	$1,799,240	0.1
LOW-INCOME RESIDENTIAL		**45.8**
Single family Income Eligible Services	$9,871,922	33.9
Income Eligible Multifamily	$2,590,534	11.9
RESIDENTIAL		**170.9**
Energy Wise	$13,406,705	139.1
EnergyStar Appliances	$1,906,524	7.0
EnergyWise Multifamily	$2,195,869	14.3
Home Energy Reports - Residential	$2,568,593	2.6
Residential New Construction	$767,033	3.4
Energy Star HVAC	$1,857,069	0.3
Energy Star Lighting	$10,704,849	2.2
Other	$1,125,325	1.0
NATURAL GAS PROGRAMS		
COMMERCIAL & INDUSTRIAL (C&I)		**31.9**
Large Commercial New Construction	$2,787,537	0.6
Small Business Direct Install - Gas	$142,977	0.7
Large Commercial Retrofit	$4,257,467	26.6
Commercial & Industrial Multifamily	$814,902	4.0
Other	$5,339	
LOW-INCOME		**39.4**
Single family Income Eligible Services	$4,224,638	26.8
Income Eligible Multifamily	$2,420,083	12.6
RESIDENTIAL		**191.6**
Energy Star HVAC	$1,980,485	0.5
Energy Wise	$7,859,946	172.3
EnergyWise Multifamily	$1,035,978	15.7
Home Energy Reports - Residential	$417,081	0.5
Residential New Construction	$640,261	2.5
Other	$83,893	0.1
COMMUNITY ACTION AGENCY STAFF		**35**
NATIONAL GRID STAFF		**39.5**
GRAND TOTAL		**804.1**

Whether the cost of energy efficiency measures installed is more labor driven or equipment/material driven also influences the number of FTEs associated with program expenditures. Two examples of this variability:

- Weatherization materials (e.g., cellulose for installed insulation, and caulking and foam for air sealing) to improve thermal performance and reduce air leakage in residential buildings are simple and inexpensive. Most of the cost associated with weatherization is for labor time during the installation process.
- Other energy efficiency measures such as energy management controls, replacement chillers and boilers, or major HVAC upgrades deploy sophisticated, factory-manufactured equipment making equipment perhaps the greater part of 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 associated with each dollar spent is lower.

A counteracting force in terms of jobs associated with National Grid-supported energy efficiency continues to be the importance of program cost-effectiveness. Regulators, program administrators, and consumer advocates want to increase and maximize the energy saved for each dollar spent, and this could result in adopting program designs that reduce the incremental labor costs associated with a specific energy efficiency improvement. For example, adopting the strategy of point-of-sale discounts through Upstream Lighting has been less expensive than field-oriented strategies to provide LED fixtures to commercial customers. As a result, additional upstream programs have been designed to reach those customers. On the other hand, much of this equipment still requires a tradesperson to install it. Therefore, this strategy may be reducing the program cost for National Grid and to ratepayers who fund the programs, but may be shifting more of the labor cost to customers and may still contribute to the number of FTEs associated with the Programs.

Also, to the extent that contractors are increasingly compensated in part or in total based on goals achieved or installations completed, they will add staff reluctantly and use part-time employees or sub-contractors to keep their cost of labor lower, not only to be more competitive, but also to maximize margins. A vendor delivering a program or performing an installation who is compensated based on results achieved an not on time will naturally look for ways to maximize worker productivity, resulting in less labor required overall to achieve goals and fewer FTEs for Peregrine to count.

Finally, just as evaluations attempt to discern what energy savings associated with the Programs result from replacement on failure or some other naturally occurring consumer process, Peregrine and National Grid agreed that this study should attempt to only count labor as being associated with the Programs if that labor meets a “but for” test, meaning that “but for” National Grid’s intervention in the market, this labor would not occur. Today, unfortunately,

there is limited data collected in Rhode Island about what makes each National Grid customer become a Program participant. Therefore, Peregrine has made assumptions about how significant an impact that a National Grid-sponsored program, service, or benefit (i.e. a rebate or incentive) has on customer behavior and about what labor to count. Some examples:

- The Large Commercial and Industrial Retrofit program convinces customers to install new, more energy efficient equipment to replace still functioning equipment that would otherwise continue to operate in an existing facility for some period of time. It mandates that new equipment installed under the program must meet the program's standards for equipment energy efficiency and does not permit customers to replace old equipment with new equipment of the same efficiency as what is being replaced. Peregrine is currently counting all labor associated with these installations.
- EnergyWise Single Family and Multifamily programs similarly provide incentives to customers to replace operational heating systems with new high efficiency systems because annual energy savings achieved would not alone justify that decision, and, in the absence of the programs most customers would wait for old systems to fail before they replace them at their own cost. Similarly, the programs pay much of the cost of weatherization, an expense with a long return of investment that many customers may be reluctant to take on without the 75% incentive. In this case, Peregrine has counted both program management costs and installation labor costs.
- On the other hand, Commercial New Construction had limited job impacts despite its significant budget. The New Construction program pays a customer's incremental cost of opting for higher efficiency, impacting the customer's choice of materials, equipment, and construction techniques, but not significantly increasing the amount of labor and time needed to construct the building and install equipment and systems. For this program, Peregrine counts costs and services associated with program management and engineering support to customers but does not count the installation jobs associated with building the project or installing high efficiency equipment. The program is affecting not so much when to build, but how to build and those jobs would have been there regardless.
- Finally, for ENERGY STAR® Lighting, Peregrine again only counted the time associated with program management. Big box stores and other retailers are already staffed to sell lighting products. Their decision to stock LED lamps and related products does not increase the number of their sales and floor staff, and, therefore, these staff are not counted. Further, Peregrine is not considering whether or not the LED lamp is replacing an operating lamp. The point-of-purchase rebate is inducing the customer to buy the otherwise more costly LED instead of an incandescent lamp.

Level of Effort of Workforce Associated with Programs

The following table provides a more in-depth breakout of the workforce, providing additional detail in FTEs on the specific role players that are associated with individual markets and programs and the level of effort they contribute. The calculated 804.1 FTEs for 2018 equals 1,415,216 total hours of work at 1,760 hrs./FTE.

Level of Effort in FTEs of Workforce Associated with National Grid Energy Efficiency Programs

MARKETS AND PROGRAMS	Market/Program Totals with Support Services allocations	DIRECT SERVICES PROVIDERS			SUPPORT SERVICES PROVIDERS			
		Third Party Program Admin. & Mgmt.	Auditor/Installers, Technical support, QA Inspections	Installations by vendors & trades	Rebate processing	Marketing	EERMC Consultants	Evaluation
Residential programs	**362.5**							
Energywise Single Family	188.9	19.1	49.2	117.4				
RI Heating and Cooling	123.5	0.8		122.7				
Energywise Multifamily	30	4.5	6.6	18.3				
Res New Construction	5.9	1.5	4.0					
Res Codes and Standards	1.1	0.7						
Res Home Energy Report	3.1	3.0						
Energy Star Lighting/Appliances/HVAC	10.0	9.7						
Income-Eligible programs	**85.2**							
Res Income Eligible	60.7	3.0		55.7				
Res Income Eligible Multifamily	24.5	4.5	8.5	11.1	3.4	3.7	2.35	3.9
Commercial programs	**281.9**							
C&I Small Business	36.1	14.2	6.8	15				
C&I Large Commercial Retrofit Electric	182.5		2.6	179.3				
C&I Upstream Lighting/HVAC	25	7.9		16.5				
C&I Tech Support	1.0			1.0				
Industrial Energy & Energy Smart Grocer	5.7	2.9		2.8				
C&I Multifamily	4.0	0.4		1.3				
C&I New Const.	1.0	0.3	0.7					
C&I Large Commercial Retrofit Gas	26.6	0.4	4.3	21.1				
Natonal Grid staff	**39.5**							
Community Action Agency staff	**35**							
TOTAL LEVEL OF EFFORT	**804.1**	**72.9**	**82.7**	**562.2**	**3.4**	**3.7**	**2.35**	**3.9**

NOTE: All numbers are in FTEs, each equal to 1,760 hrs/year. Rounding of contributing data may affect some totals and sub-totals.

Employee Head Counts and Full Time Equivalent Jobs

Peregrine has used a consistent calculation of FTE employees in this study to provide a definable and comparable measure of job impacts. That said, based on interviews with employers associated with the programs, Peregrine can say with confidence that the number of individual employees associated with National Grid Programs in Rhode Island well exceeds total FTEs reported. This was confirmed by interviews with companies who provide support services or manage programs for National Grid and by our analysis of field installation of individual program measures. Employers told Peregrine that individuals who perform this work may be full-time or part-time employees, may work solely in Rhode Island or divide their time between Rhode Island utility programs and utility programs in other states, or may be engaged both in energy efficiency activity and other work for which their trade licenses qualify them. FTE counts are determined based on: reports from employers of actual Rhode Island hours tracked; from allocations of total labor hours to Rhode Island using relative numbers of Rhode Island customers served by a team vs. customers in other states, primarily Massachusetts; or using unit counts of installed materials (e.g., a particular lighting fixture) or number of projects completed (e.g., a residential home weatherization) installed to calculate total labor hours.

For non-installation roles, many companies interviewed told Peregrine that they employed multiple individuals with specialized skills or in discrete roles that were necessary and important to delivering a comprehensive, high quality product or service. However, only a portion of each employee's total annual hours might be attributable to Rhode Island energy activity.

For unit installed-based calculations, totals for individual items installed are converted into hours or days by applying the average per unit installation labor time and then converted total hours into FTEs by dividing by 1,760 hours or 220 days per FTE year. Similarly, specific types of work completed, such a weatherization job or heating system installation, are assigned an average labor time for an installation crew, and counts are multiplied by the time for each to generate total days or hours and an FTE number.

Some examples:

- Engineers providing technical support to customers. National Grid's Large Commercial and Industrial customer base in Rhode Island is relatively small, the call for engineering support is very intermittent, the engineering expertise that different customers need varies. Rather than retaining engineers with a variety of skills to be available to assist Rhode Island customers, National Grid has entered into master services agreements with multiple consulting engineering firms from whom expert engineering can be purchased as needed. However, since business economics necessitate that these consulting engineering firms' keep their staff utilized and billable most of the time, the majority of preferred engineering firms do other work. Some, like RISE Engineering, provide similar energy engineering

services to multiple utility programs, in multiple states, to utility and non-utility clients, or to a combination of these.

- Firms that manage programs targeting specific customer sub-sectors and offer market-specialized technical services in multiple utility jurisdictions. The Energy Smart Grocer program delivered by CLEAResult and the Industrial program delivered by Leidos, Inc. exemplify this dynamic in the commercial market. Both companies are headquartered outside of New England, but they have local offices in Westborough and Framingham, Massachusetts, respectively. Both have field staff that spent a portion of their time helping National Grid customers in Rhode Island, but supported many more such projects for utility customers in Massachusetts. The firms dispatch staff, as required, to advance individual projects in Rhode Island, but they could not cost effectively deliver this program to Rhode Island alone, given the size of the target market in the state. For both programs, the customers select the contractors they prefer to do the installations.
- Programs targeting regional retailers. The contractors delivering the residential Energy Star Lighting and Appliance programs (Lockheed Martin Services) or the commercial Upstream Lighting program (CLEAResult) and Upstream HVAC program (Energy Solutions) work with and mobilize regional distributors and retailers to stock and promote energy efficient products preferred by utilities. National Grid and other utilities, covering both Rhode Island and Massachusetts, have recognized that using a single contractor to manage this effort across multiple territories creates programmatic benefits and economies of scale. Time spent supporting Rhode Island programs is allocated out of the total staff deployed, which may include individuals dedicated wholly or in part to Rhode Island.
- National Grid's Rhode Island team. National Grid itself reported 79,566 employee hours billed against Rhode Island energy efficiency program-related accounts, equal to 39.5FTE employees. Those hours and that FTE count represent not only the aggregate contributions of Rhode Island-dedicated employees, but also employees with system-wide or similar other-state responsibilities who contributed fractionally to the Rhode Island FTE total.
- RISE Engineering, based in Cranston, Rhode Island. RISE has been a partner to National Grid in Rhode Island since the inception of energy efficiency programs over 30 years ago. Today, RISE is the lead vendor for or a major participant in many of the largest programs offered in Rhode Island by National Grid, including EnergyWise Single Family, EnergyWise Multifamily, Small Business Direct Install, Large Commercial and Industrial Retrofit, and the Commercial and Industrial Gas programs. For the complex, labor intensive, high volume, EnergyWise Single Family program, RISE's total FTE counts and the number of individual personnel contributing to the program are nearly equal. The large customer volume of EnergyWise Single Family enables RISE to employ full-time staff to serve in specific program roles, such as auditors, installers, and inspectors. This creates stability and consistency that benefits customers, National Grid as well. Further, similarities between staffing needs across multiple programs, e.g. for engineering, materials handling, or accounting, have allowed RISE to pool staff to provide higher levels of utilization and improved staffing economies. Additionally,

similarities in technical needs between programs, e.g. for electricians, allowed RISE to employ a baseline number of full-time technical specialists, but then supplement them on an as needed basis with sub-contracted assistance. Having this capacity has, in turn, enabled RISE to be a major player as a Project Expediter supporting National Grid's Large Commercial Retrofit program, generating business opportunities, managing more complex installations, securing equipment and materials, and providing or contracting for installation labor. And, at the same time, as new business opportunities have emerged and been secured in neighboring states, RISE has been able to grow further, shifting specialized staff back and forth between states as demand for services dictates, while maintaining or increasing the efficiency of staff utilization and improving labor economics.

The Road Ahead: The Future Energy Efficiency Workforce

The purpose of this chapter is to begin to describe the workforce that will be needed in future years to delivery energy efficiency programs and to identify issues and barriers that should be addressed to ensure that a workforce is available that is aligned with future National Grid Program goals.

Peregrine's analysis confirmed that, in 2018, in addition to significant energy and financial savings that Programs achieved for National Grid's Rhode Island customers, the employment associated with the Programs was again an important benefit that investments in energy efficiency contribute to the Rhode Island economy. As described in the earlier chapters of this study, the current energy efficiency workforce, both employers and employees, is diverse in terms of skill sets it brings and the roles it has taken on to deliver National Grid Programs. It functions as an extension of National Grid, providing program and service marketers, managers, trainers and educators, sales persons, project developers, equipment distributors and suppliers, and materials installers.

In the course of research to complete this workforce report for 2018, Peregrine conducted conversations and interviews with employers and employees that were involved in providing services for National Grid Programs. Peregrine also spoke with other organizations and individuals who might have information that would provide context or additional perspectives on Programs. Supplemental informants included National Grid staff and the Oil Heat Institute.

Interviews with 2018 program service providers covered such topics as: interviewees history with the program; their roles and responsibilities in service delivery; differences between 2018 and prior years' programs in terms of program strategies, goals, and performance; their perspectives on what accounted for these differences; titles and numbers of workers employed in providing program services; and any changes in 2019 program delivery.

Also, at National Grid's request, to help inform National Grid's ongoing future program development and design efforts, Peregrine asked interviewees to provide their perspectives on the future of National Grid's Programs and how they might be affected. Topics covered included: ease and cost of future customer acquisition; barriers to future service delivery; whether they believed their energy efficiency activity would increase or decrease; if there were other non-efficiency businesses opportunities that they might pursue; and how easy or difficult they anticipated future acquisition of qualified employees would be. Their responses are referenced in this this chapter and elsewhere in the report.

A Brief Review of the Current Workforce

Another way to categorize the current workforce is to differentiate between companies that were created specifically in response to the business opportunities that utility energy efficiency created and pre-existing companies that adapted and applied their technical capabilities and workforce capacity to participate in utility efficiency programs.

Based on interviews conducted by Peregrine, it can be determined that some businesses that support National Grid in Rhode Island had been established or grown specifically to address the energy efficiency program delivery needs of utilities companies. Their business model is to develop and maintain symbiotic relationships with utilities and to realize the profits that these relationships create. "We are built to serve utilities," observed one such company, Lockheed Martin Services, National Grid's Energy Star Lighting and Appliance programs manager.[39] These businesses include national companies, like Lockheed Martin Services, CLEAResult, Energy Solutions, and Leidos Inc., that specialize in utility program management, have opened offices in New England to do what they do, and been selected by National Grid through competitive solicitations to support the Programs. This same group of specialized services providers also includes homegrown companies, like, for example, RISE Engineering, Energy Federation Inc., and Energy Source, that provide a range of field-based or support services and have been able to grow regionally and even nationally to provide similar services in other utility service territories.

Many other energy efficiency workforce employers existed prior to the advent of utility-sponsored energy efficiency initiatives. They have adjusted their business plans and prospered, adapting what they do to the business opportunities that the specific National Grid programs created. These include, but are not limited to: engineering firms; equipment distributers; big box retailers; marketing firms, and the trades (electricians, plumbers, pipefitters, air conditioning technicians, BPI-certified weatherization contractors). Some of these pre-existing businesses, like, for example, KSV, the National Grid marketing services provider Peregrine spoke with, have diversified or adjusted their offerings to align themselves with National Grid. Many of these businesses, like weatherization companies, electricians, and heating and cooling contractors, provide core services directly to customers and will continue do so with or without future National Grid Programs.

The Rhode Island Department of Labor and Training (RI DLT) website[40] provides counts of the numbers of current (2016) licensed or certified Rhode Island trades employees. It also provides projections for numbers of employees that will be in these same trades in 2026. These include

[39] Interview with Lockheed Martin

[40] http://www.dlt.ri.gov/lmi/proj.htm

the trades that participate in National Grid Programs. According to the RI DLT website, the workforce size of these trades that participate in the Programs is not projected to significantly change over the ten-year period described. An important question for National Grid is whether the projected workforce will be sufficient to deliver the programs that National Grid is designing for the future.

The following table summarizes this data.

Rhode Island Department of Labor and Training Employment Statistics

TRADE GROUP	Primary National Grid Program	2016 Employees (total actual)	2026 Employees (total projected)
Electricians	Large Commercial & Industrial	2,323	2,646
Plumbers, pipefitters, steamfitters	RI Heating and Cooling	2,006	2,443
Heating, air conditioning, and refrigeration mechanics	RI Heating and Cooling	750	825

Future National Grid Programs

It is difficult to discuss the future energy efficiency workforce, without considering how programs and energy efficiency measures providing energy savings today might change and what new programs could be offered in the future. One year ago, when Peregrine reported on the 2017 workforce, we projected that the total number of FTE jobs associated with National Grid's expenditures for energy efficiency would stay in the same range in 2018 so long as qualifying customers could be found and motivated to participate in National Grid programs and that new opportunities for installing efficiency measures could be identified and realized. In fact, 2018 jobs exceeded Peregrine's expectations, and total FTE jobs increased over 2017 levels. For 2019, programs are consistent with 2018 offerings, and it is reasonable to assume that savings and employment will remain in line with past performance.

Rhode Island regulators approve an Annual Plan for National Grid's energy efficiency programs each year. National Grid also has three-year plans with aspirational annual targets, with the current cycle being from 2018-2020. Three-year plans provide a baseline to target in the annual planning process, but National Grid is only formally bound to the targets in an Annual Plan approved by regulators. This is different than Massachusetts where utilities propose and receive final approval for integrated three-year energy efficiency program plans. However, because Massachusetts' markets, customer base, and historic energy programming is very similar to Rhode Island's, Peregrine has looked at the recently approved Massachusetts three-year plan for 2019 – 2021 to anticipate where Rhode Island programs might be headed.

The Massachusetts Energy Efficiency 2019 – 2021 Plan's Overview states that the Plan "sets an ambitious agenda to continue to drive energy saving benefits … while proposing new approaches to meet the challenges of the rapidly changing energy landscape."[41] It lauds the savings that have been achieved through LED lighting, while saying that future LED-driven savings opportunities are diminishing. It notes significant deterioration in claimable savings for HVAC technologies due to past successes in program outreach that have made high efficiency equipment the standard practices or the default consumer choice, raising the net baseline from which savings are determined. It describes market saturation of specific technologies. It calls for future programs that go "deeper and broader to secure the next unit of efficiency." It recommends more investment in training and education, and, specifically, with respect to employers and employees, it calls for facilitating workforce retention, recruitment, and development.

As National Grid has been planning future Rhode Island energy efficiency program offerings beyond 2019, it has been considering the following questions:

- What savings have been achieved to date with the technologies promoted and supported?
- How much additional savings can these technologies deliver?
- Which customers have and have not participated in current programs and why?
- To what degree have markets adopted particular technologies and been transformed?
- What new technologies can generate additional significant energy efficiency savings?
- Which technologies should be piloted and evaluated?
- How can new energy efficiency opportunities be best delivered and what will it cost?
- What market infrastructure needs to be development to ensure future success?

In the course of Peregrine's research on 2018 employment, service providers also shared their perspectives on market trends and needs. Two technologies, LED lighting and air source heat pumps, were identified as having the most near-term impact on current markets and future energy efficiency programs as described below.

LED lighting

Transformation of the lighting market to LED technology has been a primary focus of National Grid's electric programs for many years. Last year, Peregrine observed that both employment and savings that have grown on the back of the LED revolution could begin to decline as market saturation by this technology inevitably occurs. However, no significant decline in lighting program activity occurred in 2018.

[41] Massachusetts Three-Year Plan 2019-2021, October 31,2018, p.27

Looking ahead, many LED products could soon become the baseline lighting technology. For the residential sector, changes to efficiency standards for general purposed light under the federal Energy Independence and Security Act (EISA) could end the availability of incandescent and halogen lamps as soon as January 1, 2020, though DOE has announced plans to roll back this deadline. The change to EISA standards would make screw-in LEDs the primary lighting technology available for existing fixtures and their installation would become standard practice (i.e. the residential baseline)[42]. In the commercial sector, National Grid has indicated that, by as soon as 2022, it expects the combination of federal standards, market saturation, and industry standard practice will make the installation of certain LED equipment the baseline and result in the phase out these LED applications from programs.

Commercial Markets

For commercial electric programs, the sale and installation of LED lamps and fixtures accounted for 70% of electric savings achieved, except for the custom measures category of Large Commercial and Industrial Retrofit where the lighting fraction was smaller.

- As noted earlier, the Upstream Lighting program limited itself to LED products beginning in 2017. In 2018, 150,302 LED lamps and fixtures were sold, resulting in Peregrine-estimated 23.8 FTE installations by electrical contractors.
- For the Small Business Direct Install program, which targeted Rhode Island electric customers of 200 KW or smaller, LED lighting was over 99% of measures installed in 2018, requiring a total of 35.3 FTEs of labor.
- The Large Commercial and Industrial Retrofit Program was also a heavy installer of LED lighting. LED projects accounted for 67% of total non-custom projects and 70% of non-custom project total costs. 83% of the installer time associated with non-custom projects, (43.9 of 51.1 FTEs) was for LED lighting installations.
- Custom projects installation time for lighting was 30.3 FTEs of a total 55.9 FTEs (54%).

National Grid is continuing to add new LED fixtures to Upstream Lighting in 2019 and mandate the installation of LED fixtures that have integral lighting controls for occupancy and daylighting to create additional savings. The first such LED fixtures with integral controls were introduced in Rhode Island in 2018 with more being added this year. In the future, controlled fixtures will likely exceed LED baseline standards and allow continued LED installations.

Meanwhile, there has been a tension between achieving near-term electricity savings and the long-term goal of maximizing benefits. The result in 2018 was significant savings achieved

[42] Rhode Island Energy Efficiency. Fourth Quarter Report by National Grid, February 2019

through lighting retrofits, though potentially some control savings were lost. Maximizing benefits will require additional workforce training on how to get full value from the new integrally controlled fixtures. There are many independent electrical contractors that install LED fixtures through the commercial programs. While knowledgeable in the electrical code requirements for installations, they are not controls experts and could lack the necessary knowledge to program the control features. Compounding this problem is that different fixture manufacturers currently do not use standard controls protocols, creating the need for manufacturer-specific electrician trainings.[43]

Residential Markets

For residential programs, according to National Grid, 67% of the total electric savings achieved in 2018 was from LED lighting, either installed by field staff associated with specific programs or purchased and installed by customers themselves. The quick success of National Grid LED lighting programs in transforming the Rhode Island lighting market means that LED lighting may soon reach market saturation in the residential sector. Customers were the installers of LED lamps purchased directly from retailers; field staff for non-income eligible and income eligible residential programs installed large quantities as well.

- Through the Residential Lighting program, there was a combined total of 2,192,966 LED fixtures and lamps sold and distributed to residential customers. The lamps, which according to program manager Lockheed Martin were generally priced at $1.00 to $1.50 a piece at retailers with National Grid point-of-sale rebates, have a 20-year life.
- Receiving LED lights is considered a major incentive that brings customers into both the non-income eligible and income eligible single Family programs. Income-eligible customers in 1-4 unit residences received 37,588 installed LED lamps, and 206,038 LED lamps were installed during EnergyWise Single-Family energy assessments in 2018. RISE Engineering, the EnergyWise program manager, observed that energy auditors are increasingly finding that many customers homes they visit already have many LED lamps. National Grid shared the similar observations LED lighting in the income-eligible market.
- Further, for the EnergyWise Multifamily program, RISE reported having an increasingly difficult time finding new opportunities to install LED fixtures in significant numbers in individual apartments as well as common and general use areas. “The big whales are gone,” noted the Multifamily Operations Manager. “We had only a couple of large Rhode Island facilities to work with in 2018, compared to six or seven in past years.”

[43] Interview with National Grid

In 2018, 63% of the cost of the EnergyWise Single-Family program was included in the electric programs budget, with the remaining 37% included in the gas program budget. Should screw-in LED lamps become the baseline, perhaps as soon as 2020, installing them during audits to generate electricity savings could become problematic, adversely affecting the cost effectiveness of the EnergyWise Single-Family program. To reduce future program costs, there is discussion of employing an online customer "self-audit" to pre-screen residential customers to ensure that on-site visits by auditors are primarily to customers who show an interest in and are likely to proceed with weatherization and heating system upgrades. As with any potential, new program design, National Grid will need to test this approach to assess its impacts on customer participation and overall savings.

Cold Climate Air Source Heat Pumps

In the fall of 2018, National Grid began offering residential cold climate air source heat pumps (ccASHP) to customers heating with electric baseboard and delivered fuels (i.e. fuel oil and propane) as part of the electric High-Efficiency Heating, Cooling and Hot Water (HVAC) program. The HVAC program already promoted the installation of ASHP for cooling.

The goal of the ccASHP electric heating initiative is installation of both cold-climate ductless mini-split heat pumps and ducted central heat pumps as the primary system for space heating. The program targets and offers installation incentives to high-use electric resistance baseboard heating customers and customers that heat with fuel oil and propane. Today, approximately one third of the heating market in Rhode Island uses fuel oil or propane, equal to 149,302 National Grid customers, according to National Grid. In addition, National Grid told Peregrine that 36,850 residential households have electric resistance heat. Therefore, the size of the potential target market for the ccASHP program could be as many as 185,000 National Grid electric customers, less any customer systems that may fail and convert to gas heating. A detailed market assessment would be needed to confirm the total market potential.

According to National Grid, the program's objective is to "displace" but not replace the current heat source of these customers. The concept is that the heat pumps will be the primary heating source in all but the coldest weather, when the former heating system, still connected, will pick up the additional heating load, managed by new integrated building controls that will also be installed. Cooling capacity will be an additional customer benefit during warm weather. A pre-requisite for participation in the ASHP program is that all participating homes must be fully insulated and air sealed to ensure efficient operation of the heat pumps. This will likely drive additional demand for weatherization services.

Part of what makes this this new electric heat initiative attractive in the eyes of proponents is that it backs out inefficient electric resistance heating and the worst GHG-producing carbon-based fuels. Further, the hope is that much of the electricity that will power this new electrical heating and cooling load would come from renewable wind and solar generation. Converting

natural gas heating customers to this technology is not cost-effective due to the lower cost and cleaner burning of natural gas and the potential for high efficiencies with replacement condensing gas heating systems.

For the initiative start-up in the fall of 2018, National Grid set as initial goal of a total of 45 homes converted to ccASHP for heating, of which 25 were electric and 20 used oil or propane. An initial 1,600 National Grid customers whose homes were fully weatherized were identified as program targets.

Installation of an air source heat pump requires an HVAC contractor and an electrician. To be qualified to participate in the ccASHP initiative, an HVAC contractor must be listed on the program website and employees must attend a National Grid-sponsored training. In addition, all HVAC contractor employees and sub-contractors who enter a customer's home on behalf of National Grid energy efficiency programs must pass a background check.

The HVAC contractor needs to properly size and locate new equipment to ensure that the customer continues to receive the same expected level of comfort heating. The contractor also must properly handle and manage refrigerants. Finally, the contractor must ensure that the new system is properly integrated with the operation of the heating system it is displacing, with the appropriate building system controls installed and set up. The electrician must ensure that the electrical service panel is capable of accepting the new equipment and additional electrical load, upgrade the service and panel as needed, and run wire and make the necessary connections.

In 2018, National Grid worked with an initial group of four HVAC contractors to launch the electric heat initiative. The four contractors completed the air conditioning (AC) and mini split check (MS check) training offered through the program. Training covered proper airflow and charge protocols to ensure that installed equipment operates according to manufacturers specifications. 17 installations occurred in late 2018 though the first final inspections and incentive payments occurred in 2019. In early 2019, the AC/MS Check trainings were open to all contractors and as of March 2019, the total number of program-qualified technicians was 58, representing 32 Rhode Island firms and one (1) out-of-state firm.

Rhode Island electric heat initiative goals for 2019 total 190 ccASHP conversions: 85 single-family homes of which 40 are electric resistance heat and 45 are oil/propane heated; 30 income-eligible single-family homes split evenly between delivered fuel heating customers and electric resistance heating customers; and 75 income eligible multifamily units of which 15 will be delivered fuel heating customers and 60 electric resistance heating customers.

Meanwhile, the Massachusetts three-year energy efficiency plan calls for more than 20,000 cold climate air source heat pumps to be installed for electric heating from 2019 – 2021. This number includes 6,381 system installations in 2019, 7,003 in 2020, and 7,215 in 2021.

Workforce Issues and Barriers to Future Success

Beyond the likely reduction of LED lighting installation and the advent of electric air source heat pumps for heating, it is likely that National Grid's Rhode Island energy efficiency programs will evolve with the availability of new energy efficient technologies, emerging market opportunities, and customer preferences. Massachusetts' vision of changes in energy efficient programming may be an indicator of future Rhode Island programs.

New energy efficiency initiatives will, as did previous and current programs, require a trained, qualified, and motivated workforce. This workforce will need to have the necessary skills and capacity to manage programs, engage customers, install new measures that achieve new program goals, and meet customer expectations.

Based on our interviews, discussion, and communications with National Grid, EERMC advisors, third-party program managers, and other businesses whose employees are part of the energy efficiency workforce, Peregrine has identified an initial set of workforce issues and barriers, presented below, that program planners and designers should address as they craft future programs. This is not presented as an exhaustive list, but hopefully it can help jumpstart an increased focus on workforce needs and can lead to near-term action and future research.

1. **Trade allies want to have increased communication with and from National Grid.** In interviews with Peregrine, many trade allies said they lack timely information on proposed new programs and changes to existing programs. Further, they believe program design would benefit from trade allies' perspectives. They say better information sharing would not only improve their ability to prepare to participate in programs, but also give National Grid additional intelligence on customers and markets.

   Discussion

   Current National Grid energy efficiency trade allies need more information from National Grid as soon as possible about proposed program adjustments like so they can anticipate these changes and make strategic decisions about resources they will need to be prepared to participate. Even incomplete information is better than no information at all. Trade allies also would welcome the opportunity to bring their knowledge of markets into the program design process to help create programs that reflect their experience working with customers.

   In conversations with current program managers and service providers, many have expressed concerns that they do not know where National Grid is taking future programs. Faced with what they perceive as growing market saturation in smaller Rhode Island markets or by specific technologies (e.g. LED lighting), and a lack of information about future

programs, some are growing pessimistic about the long-term potential for energy efficiency work and looking for new directions to take their employees.

Energy Source, a project expediter and major participant in the Large Commercial and Industrial Electric Retrofit program, would like more opportunity to bring the voice of the market place to program designers. They told Peregrine, "More advance notice of program changes is critical to our ability to support utility programs." He also said that stable and consistent program funding is critical to maintaining a qualified workforce. RISE Engineering, National Grid's Program Manager for EnergyWise Single Family and Multifamily residential programs and the Small Business commercial program and a major participant in Large Commercial and Industrial programs as project expediter and engineer, likewise told Peregrine that, "as programs evolve, market participants like RISE need as much information and lead time as possible to properly staff and better position ourselves so the required workforce is available."

Recommendation: National Grid should convene regular meetings with critical trade allies to share its interests and intentions as early as possible in the program design process. The goal of such meetings should be two-way communications between the parties to gather market intelligence from vendors and to give these companies sufficient time to respond, react, rebuild, and be ready to serve.

2. **Trade allies are concerned that changes to residential program design might adversely affect their current skilled workforce.** Peregrine has been told by National Grid that near-saturation of LED lighting in the residential market and changes to federal standards could end LED installations during EnergyWise and income-eligible residential audits. Because LED installations account for most electricity savings in these markets, program designers are considering a redesign of these programs to improve cost-effectiveness. Peregrine has heard concern that such a redesign could put at risk the experienced, highly skilled staff that both programs have taken years to develop.

Discussion

RISE Engineering, which has managed the EnergyWise Single Family program since its inception, told Peregrine that there is presently no shortage of single-family residences in Rhode Island that need or could benefit from added insulation, air sealing, and upgraded heating systems. RISE is still finding prospects that they have never seen before. RISE also believes that there is the potential for RISE's workload and contribution to energy efficiency to expand dramatically under the new electric heat initiative. This will likely also be the case for the income-eligible program if or when the electric heat initiative reaches full-scale. Auditors want and need additional training in new technologies like ASHP and integrated controls systems. Community Action Agency auditors delivering the income-eligible program are already receiving this training. Further, with respect to the electric heat initiative's

requirement that participating homes be weatherized to qualify for ASHP incentives and installations, these field-based programs should be at the forefront of getting this weatherization work done and ensuring that it has been done properly.

Recommendation: Any design changes to field-based residential programs should consider potential workforce impacts on field staff and make every effort to conserve this expert, long-time workforce to address future program objectives and goals. The EnergyWise Single-Family and Income Eligible Single-Family programs could be key contributors to identifying and qualifying candidates for heat pump installation under the electric heat initiative.

3. **The cost of customer acquisition continues to increase in commercial markets, acting as a potential disincentive to aggressive trade ally participation in installation programs**. Trade allies have expressed concern for the past few years in interviews with Peregrine that cost of sales is rising in mature programs. Not only are prospective customers getting harder to find, but putting together an attractive package of energy efficiency improvements is more difficult as the market penetration of LED lighting grows. National Grid believes that there is significant additional opportunity for electrical energy savings in commercial and industrial markets, even as there is growing adoption and increased market saturation of certain technologies. Finding and capturing this opportunity will require the continued engagement and involvement of field-based trade allies. Trade allies are wondering how long current programs can last and what they and their employees will be doing next.

   Discussion

   The Small Business program, a very successful predominantly lighting-oriented installation effort, has been serving fewer customers in recent years as many of the larger eligible customers have already participated or been siphoned off by Upstream Lighting, and new customers are harder to readily identify. National Grid has increased the size of eligible customers in 2019 from 200 kW to up to 1,000,000 kWh a year is an effort to increase the eligible customer pool.

   Large Commercial and Industrial Retrofit program project expediters anticipate reduced opportunity in the future to install lighting measures that had driven sales in the past. If that proves true, project expediters will need additional help targeting prospective projects with good savings opportunities and a high likelihood of closing. National Grid seems to be limiting the provision of independent engineering support to larger electric customers, according to Peregrine's analysis of technical assistance dispatched by National Grid, even though it is increasingly important to National Grid to secure electric savings from new sources in this market. Both RISE and Energy Source told Peregrine that they are strengthening their own mechanical system and controls capabilities to be better able to serve more complex future projects. But National Grid may want to increase the engineering

support it offers these customers as an alternative to leaving it to project expeditors and equipment vendors to make the case that what they are selling is needed and appropriate.

The Energy Smart Grocer program and Industrial Initiative prove the value of National Grid providing unbiased technical assistance and analysis to customers. Both the Energy Smart Grocer program and the Industrial Initiative provide expert technical support to identify project opportunities and position customers to confidently engage vendors. Both programs have had good luck with progressive selling, i.e., returning to past customers who have been satisfied participants and identifying and completing new projects involving new technologies.

For Energy Smart Grocer, given the limited size of the market it is pursuing, the key to future growth may be having new cost-effective measures to promote. For the Industrial Initiative, future opportunities will require additional referrals from National Grid account managers and likely focus increasingly on process and solutions sales.

Recommendation: National Grid should pursue additional strategies to increase the pool of available customers and identify customers for future targeting who have not recently or previously participated. The goals would be to help reduce the cost of sales, keep Commercial programs productive, and preserve the workforce infrastructure it has built. Strategies could include: increasing the size of Small Business customers from 200 to 300 kW as has been done in Massachusetts; identifying specific customers that have not as yet participated in programs through cross-checks of customer databases and program databases to create target lists for future direct sales; and more aggressive outreach to large customers and referrals to programs by National Grid account managers. Further, more Grid-sponsored, targeted technical assistance, including engineering studies, could help identify projects and convince additional customers to proceed with them.

4. **Sufficiency of workforce capacity to support new program initiatives.** As National Grid continues to plan and roll out new programs, like the electric heating initiative, it should keep close eye of the elasticity of the workforce to take on additional work, while maintaining service quality and customer satisfaction.

Discussion

The Electric Heat Initiative is a big commitment by National Grid to promote a new technology. At the suggestion of CLEAResult, National Grid's Rhode Island Heating and Cooling Program manager, Peregrine reached out to CARJON Air Conditioning and Heating Inc., a leading Rhode Island HVAC contractor based in Smithfield, to better understand the new heat pump market and how potential trade allies perceive it. Specifically, Peregrine was interested in both the workforce capacity and desire of the existing HVAC contractors to increase production in line with National Grid expectations for both the new electric heating

initiative and the existing Rhode Island Cooling program. CARJON had been tapped as one of the first companies to be trained to deliver the air source heat pump program, and both National Grid and CLEAResult recommended them as a reliable information source.

CARJON, founded in 1989, has grown to 40 employees including 10 installers, 9 service technicians, and 21 support staff providing supervision, warehouse management, duct fabrication, and business administration. Customers are 90% residential and 10% light commercial. CARJON has averaged 600 jobs a year over the past few years and has expressed comfort with this business volume. In 2018, 35% of jobs were heat pumps, both central and ductless mini-splits, for air conditioning. The remainder of jobs was installing and repairing boilers and furnaces. Two- and three-person crews do this work.

In 2019, CARJON expects to do 625 to 650 jobs, of which 40-45% will be heat pump installations for both cooling and electric heating. Some ASHP jobs will be new cooling installations, some will replace traditional air conditioning upgrades, and others will come from National Grid's new electric heating initiative. CARJON observed that they have had three record months of new leads in January, February, and March this year due to National Grid's ccASHP electric heating promotions. CARJON suspects that other HVAC companies are having similar experiences. CARJON also expressed uncertainty about how much increased demand for services the company can support with current staffing and what the seasonal workflow will be like for crews.

CARJON suggested that the new increase in business opportunity could draw new contractors into the heat pump business that, though they have the basic technical qualifications required, lack the in-depth understanding of the potential and limits of the technology to ensure that customers are happy with results. CARJON expressed concern that in a competitive environment, some contractors may be tempted to focus on price over quality to win work, cutting corners and using workers with limited experience to scope and install complex projects. CARJON recounted how they lost one of the earlier jobs they bid in this new electric heating market to another firm on price and how their subsequent follow-up determined that the winning company had proposed a lower cost "solution" to the customer that CARJON suspected might not, in the end, provide the customer with satisfactory comfort performance.

Peregrine also spoke with the Oil Heating Institute, to learn whether, with the potential displacement of oil and propane by ccASHP installations through the electric heat initiative, full-service oil dealers that install and maintain boilers and furnaces might be interested in offering this technology to existing customers and moving into this niche. Many full service oil companies are also HVAC companies, though they might use contract labor for jobs requiring refrigerant handling. While there might be some potential for these companies to

grow into this new ccASHP service arena, the Oil Heat Institute noted that these firms would need to meet licensing requirements and secure the needed talent to do the work.

National Grid has told Peregrine that its approved 2019 Energy Efficiency Plan includes a Heat Pump Market Assessment to evaluate the current status of the heat pump market and assess potential for future growth of cold climate heat pumps in Rhode Island for displacing electric resistance heating and delivered oil and propane for space heating. The Heat Pump Market Assessment will collect data from heat pump owners, contractors, manufacturers and distributors and review existing research in the small commercial and residential markets to understand the current status of both supply-side and demand-side markets, trends, and perceptions.

Recommendations: National Grid's planned Heat Pump Market Assessment should include in-depth interviews with as many Rhode Island HVAC contractors and would-be contractors as possible to confirm their current installer and service personnel capacities, how much additional installation work they can safely take on without compromising quality, and whether they are interested in growing their workforce and business volume to take on more heat pump installation work.

Further, during this initial full year of the electric heating initiative, National Grid should conduct in-depth quality assurance inspections and evaluations of all completed jobs to identify quality and customer satisfaction shortfalls that warrant workforce training.

5. **Current labor shortages**. The current strong economy makes it increasingly difficult for energy services employers to find and recruit good employees.

Discussion

Almost all employers that Peregrine interviewed for this study said that the Rhode Island labor market is extremely tight and that it is very difficult to find the quality of workers they seek. Shortages included specialized engineers, field auditors, and technicians, but the problem is not only one of technical capability. New employees also must conform to the culture of the companies they join, and employers Peregrine spoke with noted that at a time of near full employment it can be challenging to find employees that can fully integrate into a company's culture and work schedule. In recruiting prospective mechanical system technicians, CARJON looks for recent graduates who can focus on service and trouble-shooting. Prime candidates are familiar with tools and how to use them, and it helps if they are mechanically inclined. But the ability to work in a team environment and provide good service to customers is especially valuable.

Installation contractors in the trades have a particular problem when it comes to adding staff because their employees not only must be specially trained, but also often require long

apprenticeships before they are licensed. RI Department of Labor and Training statistics indicate that growth in the total roll of trade persons in Rhode Island will be limited at least until 2026. CARJON told Peregrine that the labor shortage for HVAC is getting worse each year, and they do not expect it to improve until there is a new generation of young workers with an appreciation for trades work. This could be a cultural problem if students are being told that college is the road to success when, in fact, trade school graduates earn good livings; or perhaps there are perceived uncertainties about trade school education and the apprenticeship process that are a deterrent to new entries to the trades. Regardless, CARJON says that there is the lack of new talent, and CARJON finds it equally hard to find experienced licensed staff because anyone who is qualified and employable is likely already working.

National Grid has already been trying to address this "new talent" issue through its relationship with the RI Home Show. In that context, National Grid has encouraged Rhode Island career and technical schools to educate students about the energy trades, in the hope that these students eventually join a business that supports the energy efficiency market.

Recommendation: Peregrine has no magic bullets to recommend that will solve the current labor shortage. However, if National Grid's Heat Pump Market Assessment confirms there are limits to the existing capacity of HVAC contractors to meet projected goals for the Rhode Island Heating and Cooling Program, it could be prudent to stage increases in installations of ASHP to allow HVAC contractors to gradually build up their workforce.

6. **New or supplemental training needs and the shortage of instructors.** As electrical, heating, and cooling technologies become increasingly driven by electronics and controls, the existing workforce requires continuing education to remain productive. For new workers trying to enter this workforce, training and apprenticeship requirements are specific and considerable. Would-be technicians must invest time and money in school against the hope they can land with an HVAC contractor to which they can apprentice. Employers need to feel that apprentices they hire will someday be productive if they are going to invest valuable staff time in training them to become journeymen. In addition, as trainee demand increases, technical schools need qualified instructors to teach these programs.

   Discussion

   While there is no immediate shortage of plumbers, pipefitters, and electricians needed to physically install program measures, existing technicians and tradespeople will likely require continuing education and training to have the skills needed to install and service increasingly sophisticated equipment. This training, if it is readily available, will be a cost for employers and take current employees away from productive work. Employers may be reluctant to take their firms in that direction without confirmation that this investment will result in long-term returns.

- In interviews with Peregrine, plumbers and pipefitters who install gas boilers and furnaces said they are already being challenged by the increased prominence and complexity of electronics in condensing systems in a field that historically was more pipes and wrenches than sensors. These changes have already resulted in supplemental training for technicians to troubleshoot and resolve equipment problems. In the future, increased emphasis on controls could require companies to provide more technical training if their crews are to install sophisticated controls that integrate multiple building systems including ASHP.
- Rhode Island's Office of Energy Resources believes that there is a pressing need now for qualified people to install, program, and commission lighting controls and networked systems. They believe that this work is likely to be done by people already in the lighting industry[44]. However, as noted earlier, while electricians have for many years been installing occupancy sensors as part of lighting jobs, setting up the controls that are integral to the new LED fixtures is beyond their experience and training and perhaps even beyond their aptitudes and interests. They will require training in the unique controls protocols associated with different manufacturers' equipment.

Peregrine has already noted that the numbers of qualified HVAC technicians in Rhode Island is limited due to the relatively limited historic demand for air conditioning, the relatively recent advent of heat pump air conditioning, and the new emergence of cold climate air source heat pumps for heating. This limited number of qualified HVAC technicians is a source of concern for HVAC contractors in light of National Grid programs to scale up the use of air source heat pumps for cooling and for ccASHPs to displace resistance heat, oil, and propane.

Becoming a HVAC Refrigeration Journeyman and being qualified to be a member of an ASHP installation crew (but not lead the crew), requires a prospective refrigeration technician to have 288 documented hours of classroom training, as well as to serve a 2 – 3 year apprenticeship totaling 4,000 hours with an experienced technician, according to the Oil Heat Institute. It can be a stretch for a recent high school graduate or a current full-time worker looking to enter the field to find the initiative, energy, time and resources to attend a private technical school and complete such a program. The Oil Heat Institute noted in speaking with Peregrine that the HVAC technician training problem is further complicated by a lack of qualified instructors. Experienced practitioners can earn more money doing rather than teaching and may not have the skills and aptitude to be successful teachers.

[44] Communications with RI Office of Energy Resources, 4-25-2019

After successfully graduating from a tech course, the prospective journeyman must find an apprenticeship with an HVAC contractor. A would-be journeyperson may find herself schooled, but without a spot to apprentice. According to CARJON, the state presently limits an HVAC contractor to no more than four (4) apprentice-level employees on the books at a time. The number of apprentices can be increased if a contractor becomes an affirmative action company, but that is another decision that each contractor needs to make about its long-term business needs and strategy. An installation crew might include an experienced installer and one or two apprentice "helpers" who are working off their 4,000-hour requirement for journeyperson status, but HVAC companies may limit such apprenticeships for reasons of cost, productivity, and quality control. CARJON told Peregrine that actively and closely supervising in-experienced helpers increases costs, makes jobs take longer because of limits to the work apprentices can do safely and effectively, and can adversely affect the quality of work performed.

Recommendations: Peregrine recommends that National Grid, possibly in cooperation with the RI Department of Labor and Training, commission a study that addresses current and future training needs of the energy efficiency workforce. This study should consider both the need for continuing education to improve the capabilities of existing members of this workforce and the training needs of new workforce entrants that National Grid feels will be needed to support future programs.

Further if National Grid's planned 2019 Heat Pump Market Assessment finds that there is a significant market opportunity for this technology, but additional trained workers will be needed to capture it, Peregrine recommends that National Grid take a leadership role in addressing relevant workforce development issues. We suggest that National Grid, again possibly in partnership with the RI Department of Labor and Training, convene a stakeholder task force that includes HVAC contractors, private technical schools, equipment distributors, public educators, union representatives, and other stakeholders to discuss near term and long term training needs and develop strategies to address those needs.

Key Recommendations to National Grid for Near-Term Workforce Development

Again, as future program goals are developed, these workforce issues and barriers (and others as yet undefined) should receive further study and analysis and mitigation strategies should be identified. This will help to ensure that trade ally workforce capacity, capabilities, and needs are reflected in final program plans and will enable this workforce to contribute optimally to the programs' success.

Key recommendations from this study:

- Improve two-way communications with trade allies to provide them with timely information of potential changes to programs and to ensure that their knowledge of markets is incorporated in program design decisions.
- Consider the potential impacts of market saturation and program design changes on existing skilled energy efficiency workers and take steps to conserve this workforce to support future planned and proposed energy efficiency initiatives.
- Proceed with the approved 2019 Heat Pump Market Assessment to better understand market needs and opportunities, including future workforce development.
- With respect to future Rhode Island workforce development, commission a comprehensive study of the workforce labor and training needs for all future energy efficiency programs, including issues and barriers and strategies to mitigate them.
- With respect to ccASHP and other HVAC technologies, convene a stakeholder task force to develop a common understanding of and address future workforce opportunities and challenges, including specific training needs.

Attachment A: Methodologies used for Assessing Employment

Peregrine has made a conscious effort to use consistent methodologies to count jobs year-to-year as it has undertaken studies for National Grid of the workforce associated with energy efficiency programs. Our goal has been to maximize the potential for apples to apples comparisons of total jobs and program specific workforce jobs. Further, we believe the methodologies we have used are conservative in their counting and generally understate the employment impacts of National Grid programs.

Program Support Service Providers

National Grid

National Grid provided to Peregrine a summary of billed hours for employees involved with individual energy efficiency programs in Rhode Island in 2018. Responsibilities of 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 counts and hours for employees supporting National Grid in Rhode Island. The FTEs Peregrine is reporting often represent the aggregation of small numbers of hours worked by many employees. Often, this was because the contractor's role required contributions from many members of a multi-disciplinary team. Depending on the nature of the services provided and whether the support role could be associated with specific programs, time of these contractors 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

Employee numbers reported by Direct Service Providers was a primary input to FTE counts. Peregrine Interviewed the major contractors directly engaged by National Grid to support or deliver Rhode Island programs to get information about type, number, and responsibilities of personnel employed. Some of these contractors provided the same services in 2018 to National Grid customers in multiple states and in some cases to multiple utilities, often using the same team of employees. Peregrine relied on their informal calculations of allocations of time to Rhode Island when formally reported hours from time cards were not available.

Where employer-sourced information on employment was not available, Peregrine relied on program records and statistics for 2018 installations to calculate person-hours, person-days, and ultimately annual full time equivalent field staff. Peregrine used totals for individual energy efficiency measures installed or, in some cases, total dollar value of categories of projects completed in 2018 to calculate FTEs. Depending on the information available, Peregrine would multiply 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. These unit-based installation times were secured from representative installation companies that performed this work or from organizations that supervised installation activity. In other cases where the only information available was total project cost, Peregrine would estimate the labor cost component of projects and determine total hours required for installations using average hourly billing rates, again converting those total hours into annual FTEs. Finally, in cases where major employers could provide actual installer hours of work to Peregrine, those actual hours or days of work were used instead of calculated FTEs.

Again, central to these calculation methodologies is an effort to use the same approach year-on-year for individual programs.

Residential Programs

EnergyWise 1 – 4 Unit Residential Program

For the EnergyWise Residential program, RISE Engineering's program manager provided to Peregrine an overview of how the program functions and any changes from 2016, as well as updated FTE counts of RISE employees in various roles based on payroll tracking. Peregrine then allocated this total number of FTEs to gas and electric programs, using the relative size of National Grid electric and gas budgets as the basis for these allocations.

In 2014, RISE had shared general rules of thumb with Peregrine concerning how weatherization contractor crews and heating contractors perform site work. These typical installation scenarios were borne out by direct interviews with installation companies, as well as by interviews with Community Action Program supervisors with similar responsibilities for low-income residential services. Peregrine has continued to use these rules of thumb for 2018 to estimate numbers of FTE insulation and heating system contractor personnel that installed major energy efficiency measures.

Peregrine assumes it takes a weatherization crew made up of three insulation specialists an average of two days to complete an insulation and air sealing job. National Grid provided counts of numbers of weatherization jobs completed in 2018. Peregrine then used the total numbers of insulation jobs and the average number of man-days required for each installation to calculate a total number of FTEs (again, assuming work 220 days per person per year) providing insulation

services in 1-4 unit buildings. FTEs were marked up by 20% to account for a contractor's support and management staff.

For heating system installations, we assume that it takes a two-person team four days on average to remove and replace a hydronic heating system. Peregrine secured counts of high efficiency heating systems and related equipment installed in 2018 from Hawk Incentives, which processes the incentives paid out for these installations. Since Peregrine had received 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 any replacement residential oil or propane heating equipment or electric heat pump installations were treated as an expense of the electric program. We multiplied average total hours required for an installation 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 Residential Program

As with the EnergyWise 1-4 Unit 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. Peregrine relied on installation counts from National Grid to determine numbers of individual measures that had been installed by independent weatherization contractors and heating contractors in these buildings. As was the case for contractors installing measures 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.

Rhode Island Heating and Cooling Program

The Heating and Cooling Program serves as the umbrella for high efficiency heating, cooling, and water heating. In some respects, it is a distributor and contractor installation program that encourages these market channel participants to promote high efficiency heating and cooling equipment (e.g. condensing gas boilers and furnaces, ductless and ducted heat pumps for air conditioning, high efficiency central air conditioners, smart thermostats) to their respective customers, and passes on National Grid rebates to customers for installation of approved equipment. Installation contractors submitted rebate applications on behalf of their customers to rebate processers Blackhawk and Energy Federation who processed reimbursement checks.

FTE counts for program management were developed from staff counts and allocations provided by the program manager to Peregrine. Total FTEs were then allocated to gas or electric based on the ratio of spending gas and electric programs.

Counts of installation FTEs were generated using installed equipment counts provided by National Grid based on rebates provided. These counts were then used to calculate total hours or days of installation time required and converted to FTEs.

Residential New Construction
Residential Codes and Standards
Residential Home Energy Report Program

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 it did which product was installed. Peregrine generated FTE counts through interviews with contractors that facilitated these programs and provided support services (e.g. marketing assistance, informational mailings, technical assistance, trade ally training, quality assurance inspections). These businesses provided staffing counts 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 contractors engaged by National Grid to supply services in support of the programs. These businesses provided staffing counts for 2018 from their accounting records. Total FTEs were then allocated to the residential electric spend.

Low Income Residential Programs

Income Eligible 1-4 Unit Residential

FTE counts for this program for 2018 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 FTE counts came from direct interviews with CLEAResult's program manager. We determined CAP agency energy staffing for each of the six agencies operating in Rhode Island with the assistance of CLEAResult and then aggregated them to establish the statewide Community Action Agency staff count. CLEAResult also provided

counts of weatherization and heating system installations completed in 2018. Peregrine used CAP agencies guidance on contractor crew sizes and installation practices to calculate the numbers of FTE installers who performed this work.

Income Eligible Multifamily Residential

Peregrine used the same approach to calculating FTEs for the Income Eligible Multifamily program as for the EnergyWise Multifamily Residential 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 the work of RISE and its subcontractors, as all workers were accounted for without a piecework analysis. Peregrine also calculated additional FTEs associated with the "customer-directed option" (or "CDO") that allowed customers to use an electrician they had an existing relationship with to install program measures and receive the same incentives as were available through RISE. These numbers were based on information from RISE about numbers of electrical contractors that were active through CDO and the numbers of customers they work with and then cross-tabulated installation time that would be required for actual items installed.

Large Commercial Retrofit Program (electric)

Installations

As described in the section on energy program delivery, the Large Commercial Retrofit program was the most market-based of all electric programs offered. Customers initiated projects, as did businesses that had products or services they were trying to sell. Installations included prescriptive lighting, motors and drives, compressors, and HVAC control measures. FTEs for installation work was calculated in a number of ways, depending on which information and how much information was available to Peregrine in the data sets supplied by National Grid. For prescriptive Large Commercial Retrofit installations that were part of a specific technology group (e.g. lighting, drives), Peregrine used installed item counts to generate total installation times or total project cost to generate labor cost estimates and converted this information to FTEs. For larger, more complex custom projects, National Grid helped disaggregate total project costs into costs for sub-categories by technology. Installation labor ratios of FTEs associated with non-custom installations of specific equipment and total project costs were applied to total

costs of custom measure sub-categories. Once the total dollar value of the project was determined, we could apply assumptions about the ratios of labor cost to material cost for different technologies, calculate the type and number of labor hours this represented, aggregate the total hours, and convert them to FTEs.

Sales and project management

As in past years, Peregrine interviewed the larger Project Expeditors to get counts of sales and project management staff they were employing in 2018 to secure and oversee projects. Similarly, Peregrine estimated the number of sales and project management personnel that were employed by other installation contractors active in Large Commercial Retrofits. We extrapolated the sales and project management staffing identified for Project Expediters to calculate numbers of like staff employed by other installation contractors. This extrapolation used the total dollar value of Large Commercial retrofit projects installed by PEX and by other contractors under to estimate the additional sales and project management staff employed by these other installation contractors.

Engineering support

For engineering support services provided to commercial customers, Peregrine used the recorded payouts for technical assistance services provided in 2018 to calculate workforce FTEs. National Grid provided engineering services to customers through retained contractors, in particular where 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. Finally, for the Smart Grocer and Industrial initiatives, Peregrine interviewed and secured staff counts from CLEAResult and Leidos Engineering.

Upstream Lighting
Upstream HVAC

As in other programs where National Grid and other utilities had engaged a shared contractor to promote and manage like programs in multiple states, Peregrine secured counts of contractor staff from program managers, calculated FTEs, and allocated a portion of them to Rhode Island.

Upstream Lighting-related sales counts were rolled into the Large Commercial Retrofit counts. Peregrine calculated the FTEs required for installation of equipment that required an electrical contractor to wire it by code, taking counts of product, applying per unit labor times, and then calculating the total FTEs for installations. Peregrine did not include any stand-alone lamps sold by Upstream lighting in its FTE calculations because Peregrine could not determine with

certainty if they had been installed by the customer or an installation contractor. Upstream HVAC sales counts were reviewed and considered but ultimately not included in total counts. Numbers were relatively small and were in many cases attributed to equipment failures where no incremental labor was needed.

Commercial and Industrial Gas Programs

For Commercial and Industrial Gas programs Peregrine interviewed RISE to secure counts of RISE employees and FTEs. RISE management time attributed to the program was reduced for 2018 because National Grid internalized much of this role leaving RISE to do engineering and Small Business gas installations.

A variety of contractors installed energy efficiency measures under the Large Custom Retrofit program. Due to a lack of specific details about the cost of these projects, Peregrine relied on statistics about incentives levels paid to develop order of magnitude estimates of total project costs for labor and equipment and then conservatively calculated hours of installation labor and total FTEs assuming an average labor rate of $100/hour.

Attachment B: Interview Guide

National Grid 2018 Rhode Island Labor Study
Organization Interview Guide

Interview date: _____, 2019

National Grid Program: _____ [Electric or Gas?]
[Program overview/Targets/How delivered/Goals in 2018/Program volumes in 2018]

Business/organization name: _____

Interviewee/position: _____/_____

- Phone/email: _____/_____
- Primary company address: _____
- Rhode Island company address: _____
- How would you classify your business/organization? _____
- Company role in program (i.e. services provided): _____
- How long has company been involved in the Program? ____ yrs
- Location(s) of office(s) providing RI services and activities: _____
- Any RI based staff? [Y/N] RI head count? _____
- % of total company FTE staff that works on NG RI EE program: _____. Where do rest work?

Program-related changes from 2017:

- Employees? [More/Less/Same] _____
- Payroll hours? [More/Less/Same] _____
- Customers served? [More/Less/Same] _____
- Revenue? [More/Less/Same] _____
- Other? _____

Additional comments:

National Grid 2018 RI Labor Study

Personnel involved in program delivery and support:

[Title/Role/(Name)	Count/FTEs	Comp (salary, hrly, piece, commission)]
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Sub-contractors?

[Name/Address	Roles	comp type	Add'l contact info]
1			
2			
3			
4			

Do you use installation contractors for service delivery to Nat Grid customers?

[Name/Address	Roles	comp type	Add'l contact info]
1			
2			
3			
4			

Looking forward…

1. How does participating in National Grid's Rhode Island Energy Efficiency Programs affect your business?

   Further prompts if needed:

   How does participating affect the health of your business?

   What about your profitability?

   Is your business better off, worse off, or neither for participating in these programs?

   To what extent does your business rely on these programs?

   Can you please elaborate?

   Response coding:

Overall impact:	Very positive	Positive	Neutral	Negative	Very negative
Reliance:	Very important	Somewhat important		Not at all important	
Impact of program participation:		Better off	Neutral	Worse off	

2. Describe how you find energy efficiency customers. How has that changed over the past few years?

   Further prompts if needed:

   Roughly what proportion is customer acquisition of total cost of sales?

   Is that more, less, or the same as previous years?

   [If interviewee notes change] Could you please elaborate on what has changed? Why do you think that is? How has your company adapted? Did that increase, decrease, or have no affect on your cost of sales?

   Response coding:

Customer acquisition trend:	More difficult	About the same	Easier
Customer acquisition cost:	More costly	About the same	Less costly

3. Do you think it would be impossible, difficult, or easy to adapt your company's EE service offerings to other non-EE markets?

   Further prompts if needed:

   Why do you think that?

   Response coding:

Adaptation:	Impossible	Difficult	Easy

4. To what extent do you anticipate your market changing over the next 1-5 years?

   Further prompts if needed:

   Why do you think that?

   Do you anticipate the market expanding, contracting, or staying the same as now?

   Do you anticipate changes to consumer demand for your services/products?

Response coding:

Market changes:	Expansion	About the same	Contraction
Consumer demand:	More	About the same	Less

5. Massachusetts recently passed a new 3-year energy efficiency plan for 2019-2021. This plan includes an increased focus on electric heating systems like heat pumps made for cold climates and reductions in the amount of LED lighting that's being incentivized. Lighting currently represents about 60 - 70% of the Massachusetts energy efficiency program portfolio, but most lighting measures may be phased out of the program in the next few years since customers are already choosing to install LED lighting on their own. About 60-70% of Rhode Island's energy efficiency program portfolio is also lighting – in terms of total annual MWh savings, not $'s spent. Assuming similar shifts occur in Rhode Island energy efficiency programs, how do you think these changes will affect your work volume?

Further prompts if needed:

Do you think your work volume will increase, decrease, or stay about the same?

Do you think your EE business will expand, contract, or stay about the same?

If you think your EE business will expand (contract), where do you see that expansion (contracting) happening? (RI locations, technologies, markets)

If you think your EE business will expand (contract), how will that affect your hiring?

If you think your EE business will expand, do you think it will be easy or difficult (or neither) to find qualified workers?

Response coding:

Work volume:	Increases	Stays about the same	Decreases
EE business:	Expands	Stays about the same	Contracts
Hiring:	Hire more	Stays about the same	Hire less
Qualified workers:	Easy to find	Neutral	Difficult to find

Attachment C: Participating Companies

The following list includes contractors and subcontractors performing work directly for National Grid Energy Efficiency programs in 2018 that were counted in the FTE analysis and additional companies who assisted customers to secure equipment rebates, for example through the New Construction, High Efficiency HVAC programs, and upstream lighting. 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.

The list is organized by state, with companies then listed alphabetically. Rhode Island firms are listed first. Of the 1,109 companies, agencies, contractors and sub-contractors listed here, 73% are either headquartered in Rhode Island or have a physical presence in Rhode Island. 19% are Massachusetts-based companies with no physical presence in Rhode Island. 2% of companies are Connecticut firms. The remaining firms have offices in the other New England states or outside of New England.

Vendor	Town	State
2 Sons Electric LLC	East Providence	RI
A & L Plumbing Mechanical and Consulting	Westerly	RI
A E Costa Electrical Contractor LLC	Warwick	RI
A Perry Plumbing, Heating, & Construction	Coventry	RI
A&J Electric	Cranston	RI
A.T. Electric Co.	Pawtucket	RI
A-1 Electric Co.	North Smithfield	RI
AAA Plumbing, Heating, And Contracting	Johnston	RI
Abernathy Lighting Design	Providence	RI
Able Electric Inc	Warwick	RI
Accu Electric	Providence	RI
Accurate Trades LLC	Providence	RI
Ace Electric	Providence	RI
Acorn Maintenance	Warwick	RI
ACR Construction and Management Corporation	Johnston	RI
Action Plumbing	Pawtucket	RI
Addessi Plumbing	Providence	RI
Adi Energy	Smithfield	RI
Advance Electrical Corporation	Providence	RI
Advanced Comfort Systems Inc.	North Smithfield	RI
Advanced Heating and Cooling	Greenville	RI
Aero Mechanical Inc.	Johnston	RI
Affordable Building and Weatherization, Inc.	Cumberland	RI
After Hours Plumbing	Providence	RI
Air Conditioning Services of New England Inc.	Cranston	RI
Air Flow Inc	Coventry	RI

Air Metalworks Ltd	North Providence	RI
Air Quality LLC	Warwick	RI
Air Synergy Cooling and Heating Systems Specialists	Providence	RI
Airhart Electric Inc.	Coventry	RI
Air-Tech Heating & Air Conditioning	Rumford	RI
AJ's Plumbing and Heating	North Providence	RI
AJS Plumbing and Heating	North Providence	RI
Ak Mechanical	Coventry	RI
Ala & Sons Construction Inc.	Warwick	RI
Aladdin Electric Co. Inc.	Johnston	RI
Alan Menard Plumbing LLC	Pawtucket	RI
Alan Paul Electric	Warwick	RI
All Electrical Solutions	Providence	RI
ALL IN ONE Plumbing and Heating	Coventry	RI
All Phase Heating & Cooling	Coventry	RI
All Seasons Heating and Air Inc.	Johnston	RI
All Star Insulation	Providence	RI
Allen Plumbing & Heating	North Providence	RI
Allen's Electric	Woonsocket	RI
ALLIANCE Plumbing and Heating Inc.	CUMBERLAND	RI
Almeida Plumbing, Heating & Air	Greenville	RI
Alpha Electrical Contractors Inc.	Riverside	RI
Al's Electric	North Providence	RI
Amazon	Barrington	RI
American Green Energy Inc	Harrisville	RI
American Heating, Plumbing & Sprinkler Inc.	North Providence	RI
American Home Heating and Air Conditioning Inc.	Cranston	RI
American Pride Plumbing and Heating LLC	Warwick	RI
Amity Electric	Wyoming	RI
Anchor Insulation Inc.	Pawtucket	RI
Andrews Heating	West Greenwich	RI
Andy's Overhead Electric LLC	Exeter	RI
Anibal J Cante	Central Falls	RI
Anthony Divello Construction	Saunderstown	RI
Anthony J Santurri Jr	East Greenwich	RI
Anthony Macari	Warwick	RI
Anthony’s Plumbing and Heating Hvac	Riverside	RI
Anthony’s Quick Plumbing and Heating	Johnston	RI
Anytime Plumbing Services	Harrisville	RI
APB Plumbing and Heating	Cumberland	RI
Apple Valley Alarms	North Scituate	RI
Apuzzo Plumbing and Heating	North Scituate	RI
Aquidneck Services LLC	Portsmouth	RI

AR Heating and Cooling Inc.	Cranston	RI
Arden Building Companies LLC	Pawtucket	RI
Arema Hvac	Greenville	RI
Aris Plumbing Inc	Middletown	RI
Arthur Lettieri	Providence	RI
Arthur W Adler	Bristol	RI
Aten Energy	Pawtucket	RI
Atlantic Control Systems, Inc.	North Kingstown	RI
Atlantic Plumbing and Heating Supply Co.	Coventry	RI
Atlantis Comfort Systems Corp	West Warwick	RI
Atlas Copco Compressors Inc	Johnston	RI
Atms Electrical	East Providence	RI
Auburn Electric Company	Cranston	RI
Audet, E.W. And Sons Inc	Providence	RI
Aussant Electric	Cumberland	RI
Autiello Plumbing and Heating LLC	Cranston	RI
Automatic Heating Equipment Inc	Providence	RI
Automatic Temperature Controls	Cranston	RI
Az Corporation	Hopkinton	RI
Azverde Electric Company	Cumberland	RI
B & B Consumers Natural Gas Service	Woonsocket	RI
B & K Electric, LLC	Warwick	RI
B and M Plumbing And Heating	Warwick	RI
B&D Boiler Removal Inc.	Pawtucket	RI
B&W Building Maintenance Electrical Contractors	North Providence	RI
Baptista Electric	Cumberland	RI
Bard Plumbing and Heating	Warwick	RI
Barlow Heating LLC	Warwick	RI
Barrett Plumbing and Heating Inc	West Greenwich	RI
Barrington Plumbing and Heating	Barrington	RI
Bashaw Electric	East Greenwich	RI
Baum Energy	Warren	RI
Baynes Electric Supply Company	Westerly	RI
Bayside Electric Company	Warwick	RI
Beach Mechanical	Warwick	RI
Behan Bros. General Contractor	Middletown	RI
Belcher Electric LLC	Woonsocket	RI
Beneficial Energy Products	Pawtucket	RI
Bermudez Plumbing and Heating	Pawtucket	RI
Bertrand Plumbing Inc.	Pascoag	RI
Best Buy	Warwick	RI
Biello Electric Co	Fall River	RI
Bileau Hvac Inc	Woonsocket	RI

Bill Gornostai Electric	Warwick	RI
Bills Heating Service Inc.	Warwick	RI
Blackstone Valley Community Action	Pawtucket	RI
Bmb Services LLC	Cranston	RI
Bob Larisas Plumbing and Heating Inc.	Barrington	RI
Bob Martel Plumbing and Heating	Central Falls	RI
Bob Sequeira Plumbing and Heating	West Warwick	RI
Bob's Mechanical	Warwick	RI
Boss Heating & Cooling	Westerly	RI
Boss Heating and Cooling Inc	Charlestown	RI
Boucher Hvac Inc.	Wakefield	RI
Boulevard Plumbing and Heating	Middletown	RI
Brandon Greist	Cranston	RI
Brano & Son Construction	Pawtucket	RI
Brendan Prest Plumbing	Wakefield	RI
Brian's Fire Alarm System Solutions, LLC	North Smithfield	RI
Brien Godin	Cumberland	RI
Brittain Electric Inc.	Jamestown	RI
Broway Electric, LLC	Cranston	RI
Bruno & Son Electric Inc.	Providence	RI
Bryant's Lemme	Coventry	RI
BSH Heating and Appliance	Barrington	RI
Buckley Heating and Cooling	Wakefield	RI
Butler and Sons Plumbing And Heating, Inc.	Providence	RI
Bz Electric, Inc.	West Warwick	RI
C & K Electric Company Inc.	Providence	RI
C & L Energy Corp	Cranston	RI
C Carr Electric LLC	Cumberland	RI
C. Mancuso Construction, LLC	Cranston	RI
C.W. Cummings Plumbing Co Inc.	Coventry	RI
Cadorette Plumbing & Heating	North Smithfield	RI
Calyx Retrofit	Lincoln	RI
Campco Electrical Services LLC	Wyoming	RI
Capital Good Fund	Providence	RI
Capitol Plumbing and Heating Services Inc	Cumberland	RI
Capo Plumbing and Heating	Foster	RI
Carbone Plumbing Heating and Air	Johnston	RI
Cardillo Plumbing & Heating, Inc.	Hope	RI
Carello Plumbing	East Providence	RI
Carjon Air Conditioning and Heating Inc.	Smithfield	RI
Carl Gross	Providence	RI
Carlino Electric Inc.	Coventry	RI
Carnevale Electric	Johnston	RI

Carter Brothers Inc	Glendale	RI
Cassana HVAC LLC	Johnston	RI
CBRE	Providence	RI
Cd Heating Inc.	Cranston	RI
Century Electric	Westerly	RI
Century Heating	Smithfield	RI
Century Sheet Metal	Riverside	RI
Chad Megrew Plumbing and Heating	Charlestown	RI
Charland Enterprises Inc.	Pawtucket	RI
Charles Burton	Lincoln	RI
Charles Doherty	Warwick	RI
Charlie's Heating Service LLC	East Greenwich	RI
Chevalier Electric	Johnston	RI
Chris Cardillo Electrician	Providence	RI
Chris Electric, Ltd	Newport	RI
Christopher Coppolino	Warwick	RI
Ciamparelli Plumbing and Heating	West Kingston	RI
Cipriano Plumbing and Heating	Wakefield	RI
CJ's Plumbing and Heating Specialists LLC	Smithfield	RI
Clearesult	Providence	RI
Clermont Mechanical Plumbing & Heating Services	Glendale	RI
Climate Controlled Systems Inc.	Cranston	RI
Climate Masters	Providence	RI
CMAGS Heating and Air Conditioning	Warwick	RI
Coastal Electric Inc.	Newport	RI
Cobra Electric and Compaction Services, Inc.	Providence	RI
Cola Plumbing and Heating Inc.	North Kingstown	RI
Comfort Systems & Solutions Inc.	West Kingston	RI
Commercial Electric	East Providence	RI
Community Action Partnership of Providence	Providence	RI
Competitive Chimney Sweep Inc.	Woonsocket	RI
Comprehensive Community Action	Cranston	RI
Computer Sciences Corporation	Warwick	RI
Construction and Rehabilitation	Johnston	RI
Consumers Propane - Bousquet Oil	Woonsocket	RI
Contemporary Builders	East Greenwich	RI
Continental Engineering and Service Co Inc	Johnston	RI
Corona Plumbing and Heating Supply	Providence	RI
Cox Electric LLC	Narragansett	RI
Craig R Committo Electrician	Tiverton	RI
Cross Insulation	Cumberland	RI
Crystal Plumbing and Heating Inc.	Providence	RI
Csv Mechanical Inc	Wakefield	RI

Custom Comfort	Woonsocket	RI
Cutler H Besser & Sons	Scituate	RI
Cv Construction	Cumberland	RI
D & D Electric Company	East Greenwich	RI
D & E Electric, Inc.	Warwick	RI
D & J Electric Corporation	Warwick	RI
D & J Plumbing and Heating Inc.	Carolina	RI
D & S Construction Company	Lincoln	RI
D F S Plumbing Services	Cranston	RI
D Gomes Electric LLC	Pawtucket	RI
D&D Metal Works	Cranston	RI
D&V Mechanical Inc.	Westerly	RI
D. Heywood Construction Inc.	Johnston	RI
Dan S Electric	Exeter	RI
Dante Gonzales Heating	Providence	RI
David Development Group LLC	Newport	RI
David Fisher	Lincoln	RI
David Parrillo Plumbing Heating and Son LLC	Hope	RI
David Seddon Electrician	Rumford	RI
David R Gince Electrician	Woonsocket	RI
Dayco Electric	Warwick	RI
Delmonico Enterprises -Plumbing and Heating	Cranston	RI
Delta Mechanical Contractors, LLC	Warwick	RI
Desarro Electric LLC	Hope Valley	RI
Desimone Electric	Cranston	RI
Desmarais Plumbing and Heating Inc.	Johnston	RI
Dessaint Electric Co.	Warwick	RI
Devivo Plumbing and Heating	North Smithfield	RI
Dg Electric	Woonsocket	RI
Dimery Electrical	Barrington	RI
Dion Signs	Central Falls	RI
Dionne's Plumbing System	Woonsocket	RI
Dirocco Plumbing and Heating Services LLC	Johnston	RI
Divona Plumbing	Cranston	RI
DJL Electric	Warren	RI
Dmr Builders	Warwick	RI
Don Jesting & Sons LLC	Middletown	RI
Donald E. Lemay Electrician	Bristol	RI
Donovan And Sons Inc.	Middletown	RI
Doug Brownlow Associate General Contractor	Barrington	RI
DPR Sheet Metal	Newport	RI
Drivers Plumbing and Mechanical Inc.	Providence	RI
Ds Plumbing	Coventry	RI

DSA Mechanical	Barrington	RI
DSC Heating and Air Conditioning	North Kingstown	RI
Dudek Oil Co.	Warren	RI
Dupuis Energy	Pawtucket	RI
Durante Electric	Lincoln	RI
DWI Group Ltd	Johnston	RI
Dynamic Air Systems Inc.	East Providence	RI
E. A. Marcoux & Son Inc	Woonsocket	RI
E.W. Audet & Sons Inc.	Providence	RI
EA Marcoux And Son, Inc.	Woonsocket	RI
East Coast Building and Remodeling Inc	Hope	RI
East Coast Masonry & Restoration	Johnston	RI
Eastbay Community Action	Riverside	RI
Eastern Electric Construction Co. Inc	Cranston	RI
Eastern Plumbing Co Inc.	North Kingstown	RI
Eastland Electric	Lincoln	RI
EB Wood Construction	West Greenwich	RI
Ecologic Spray Foam Insulation Inc.	Tiverton	RI
Econ Electric Contractors	Bristol	RI
Economy Air Inc	Exeter	RI
Ed Beaudoin Plumbing and Heating	Cranston	RI
Eddy's Weatherization	Providence	RI
Edward Martino Plumbing and Heating	Johnston	RI
Edward Silvia Heating Plumbing Inc	Middletown	RI
Electrical Wholesaler Inc.	Cranston	RI
Electro-Tec Systems Inc	Lincoln	RI
Elite Heating and Cooling LLC	Pawtucket	RI
Emergency Response Plumbing Heating and Air Conditioning	Warwick	RI
Emmett Electric	East Providence	RI
Emre Construction LLC	Saunderstown	RI
Energy Conservation Inc.	South Kingstown	RI
Energy Efficient Exteriors, Inc.	Pawtucket	RI
Energy Electric Co, Inc.	Woonsocket	RI
Energy Geeks	North Smithfield	RI
Energy Monster	Lincoln	RI
Energy One Southern Mechanical	West Warwick	RI
Energy Source LLC	Providence	RI
Ep Electric	East Providence	RI
Eric R Krause Electrician	Cranston	RI
Esmond Electric Cod Acct	Smithfield	RI
Eurotech Climate systems LLC	Pawtucket	RI
Eveready Electric	Barrington	RI

Evergreen Plumbing and Heating Co., Inc.	Warwick	RI
EW Audet & Sons	Providence	RI
F & S Electric Inc.	Bristol	RI
Falcone Electric	Hope Valley	RI
Feula Plumbing and Heating LLC	Johnston	RI
Figliozzi Plumbing and Heating	Peace Dale	RI
Five Star Mechanical	West Kingston	RI
Five Star Plumbing and Heating	Johnston	RI
Fleet Plumbing and Heating Inc.	North Scituate	RI
Fletcher Heating Burner Repairs	Ashaway	RI
Flou Heating and Air Conditioning	Charlestown	RI
Fossati Plumbing and Construction	Greenville	RI
Foster Electric, Inc.	Tiverton	RI
Francis Heating and Hydronics	East Providence	RI
Frank Alessio Building Contractor	Westerly	RI
Frank Dimaio Heating LLC	Cranston	RI
Frank Lombardo & Sons	Providence	RI
Fred Manuppelli Plumbing and Heating	Johnston	RI
Fressilli Plumbing	Riverside	RI
Frontier Mechanical LLC	Providence	RI
Furtado Lighting & Design LLC	Bristol	RI
G & B Electric	Exeter	RI
G & L Electric Inc.	Woonsocket	RI
G Asselin Improvements Property Maintenance	Coventry	RI
G Gagnon Sons Limited	Cumberland	RI
G M Perron & Son Inc.	North Smithfield	RI
Gamache Enterprises	North Smithfield	RI
Gambit Electric Inc.	Johnston	RI
Gary Fernandes Electrician	Woonsocket	RI
Gary Ficca Electrician	North Smithfield	RI
Gary Fortin Hvac	Smithfield	RI
Gas Doctor	Providence	RI
Gatta Electric LLC	Cranston	RI
Gem Plumbing and Heating Services Inc.	Lincoln	RI
Ginos Plumbing and Heating	Warwick	RI
Giorno Plumbing and Heating	Cranston	RI
GKT Refrigeration Inc.	Pawtucket	RI
Global Pro Maintenance Corporation	Warwick	RI
Gm Control Systems	North Smithfield	RI
Granite City Electric	Pawtucket	RI
Gravel Electric Inc.	Harrisville	RI
Greenwich Insulation	West Greenwich	RI
Greenwood Plumbing and Heating	Warwick	RI

Greg R Brown	Smithfield	RI
Griff Electric LLC	Portsmouth	RI
Gs Roy Electrical Service Inc	Westerly	RI
Gt World	Chepachet	RI
Guarino Power Systems LLC	Smithfield	RI
GYR Makina Construction and Plumbing	Central Falls	RI
H and H Heating	Lincoln	RI
H V Holland Inc.	Jamestown	RI
Hawkes Plumbing and Heating Co Inc.	Chepachet	RI
HB LLC	Providence	RI
Heating Unlimited South County Energy	Westerly	RI
Heffernan Mechanical Services	Warwick	RI
Henderson Electric	Warwick	RI
High Tech Plumbing and Mechanical LLC	Ashaway	RI
Hill & Harbor Design Build	East Greenwich	RI
Hill Electrical Services	Pascoag	RI
HK Heating Inc.	Coventry	RI
HM LEI AND Associates LLC	Woonsocket	RI
Holgate Plumbing and Heating	Cumberland	RI
Holland Electric	Peace Dale	RI
Homeserve USA	Riverside	RI
Houle Plumbing and Heating	Greene	RI
Howard C Saucier	Pawtucket	RI
Howard's Heating Service	North Kingstown	RI
HP Electric Co.	Cranston	RI
Hutchins Electric	Greenwich	RI
Hvac Inc	Cumberland	RI
Hynson Electrical Construction Inc.	Bristol	RI
Iasimone Plumbing-Heating & Drain Cleaning Inc.	North Providence	RI
Innovative Plumbing and Heating Inc.	North Providence	RI
Ironman Heating and Cooling	Riverside	RI
Iroquoian Plumbing and Heating Supplies	Providence	RI
It's Shocking Electric Corp.	Cranston	RI
Izzo & Sons Electric	Providence	RI
J & A Electric	Providence	RI
J & J Electric	Warwick	RI
J Berard Heating and Plumbing	Warwick	RI
J H Lynch & Sons	Rumford	RI
J Joyce Plumbing and Heating Inc.	Warwick	RI
J Truppi Plumbing	North Providence	RI
J&E Mechanical Contractors Inc.	Johnston	RI
J&K Supplemental Plumbing Inc.	East Greenwich	RI
J&O Plumbing LLC	Warwick	RI

J. Marchetti Construction and Snow Removal LLC	Warwick	RI
Jack's Electric	Jamestown	RI
Jacob Messier	Warwick	RI
Jacobson Energy Research	Providence	RI
Jake Lavoie Plumbing and Heating LLC	Pawtucket	RI
James Amaral Mechanical	Riverside	RI
Janton Electric Contractors	West Warwick	RI
Jaquez General Contractor	Providence	RI
Jason M Malafronte	Bristol	RI
Jatwire Electric LLC	Tiverton	RI
Jbe Industries LLC	Warwick	RI
Jc Electric Inc.	Wakefield	RI
Jc Refrigeration	West Warwick	RI
Jd Mechanical Inc.	Greenville	RI
JD Mello Jr. Plumbing and Heating Inc.	Newport	RI
Jdv Electric	Cranston	RI
Jed Electric Inc.	Greene	RI
Jeffrey Reynolds	Westport	RI
Jenkins Enterprises LLC	Middletown	RI
Jenkins Heating	Smithfield	RI
Jesse Bernardin Hvac R	Chepachet	RI
JJ Mcnamara Electric	Providence	RI
Jkl Engineering Company Inc.	Providence	RI
Jl Electric	Middletown	RI
JMAC Plumbing and Heating Inc.	Warwick	RI
Jmb Mechanical Inc	Johnston	RI
Jmc Construction	Johnston	RI
Jo Da Plumma	Providence	RI
Joaquin Refrigeration	Portsmouth	RI
Joe Britto	Providence	RI
Joe Chaves Heating and Plumbing	Middletown	RI
Joe Vigneault Electrician	Riverside	RI
John Fraser Dba Gastech	Cranston	RI
John Jackson	Cumberland	RI
John Nicholson Mechanical Contractor	North Scituate	RI
John St George	Foster	RI
Johnny Home Solutions LLC	Central Falls	RI
Johnny Mack Electric	Narragansett	RI
Johnny's Oil and Heating Inc.	Providence	RI
Johnson & Johnson Plumbing and Heating Inc	Narragansett	RI
Johnston Electric Inc.	North Scituate	RI
Johnstone Supply	Providence	RI
Joseph A Gelinas Plumbing LLC	Warwick	RI

Joseph Diorio	Pawtucket	RI
Joseph Stroscio - Morra Electric	Johnston	RI
Jouberts Heating and Air Conditioning	Warwick	RI
Jp Island General Services	Middletown	RI
Jr Vinagro Corporation	Johnston	RI
JS Plumbing and Heating	North Providence	RI
Julio Ortiz	Johnston	RI
Just Heat	Portsmouth	RI
Justin Boiani - Boiani Electric	Middletown	RI
Kafin Oil Company Inc.	Woonsocket	RI
Kelco Electric Inc.	Johnston	RI
Kelly Electric LLC	Cumberland	RI
Kens Heating	Providence	RI
Kevin Messier Electrical	Cumberland	RI
Kirk Rerick	Hope	RI
Kmj Electric & Construction	North Providence	RI
Koolco Inc.	Wakefield	RI
Kwik Plumbing and Heating, Inc.	Johnston	RI
Kyle Quinn Hvac Service	Warwick	RI
L J Giorgi Plumbing and Heating Inc.	North Providence	RI
L&B Remodeling	North Providence	RI
L&F Plumbing Inc	Cranston	RI
Lad Electric LLC	Providence	RI
Lama & Sons	Warwick	RI
Lamar And Sons	Greenville	RI
Lamplighter, Inc.	Little Compton	RI
Landry And Martin Oil Co Inc.	Pawtucket	RI
Landscape Lighting Concepts	Cranston	RI
Leidos Engineering	Newport	RI
Leveille Electric	Smithfield	RI
Lifespan Corporation	Providence	RI
LIGHTHOUSE CONSULTING Group Inc.	Warren	RI
Lincoln Energy Mechanical Services Inc	West Warwick	RI
Lombardo Electric Company	Warren	RI
Louie Electric & Son	Providence	RI
Lp And Son LLC	Cranston	RI
Lubera Plumbing LLC	Coventry	RI
Lucas-Milhaupt LLC	Warwick	RI
Luke Beaudreault Plumbing and Heating	North Smithfield	RI
Luso Plumbing and Heating Inc.	Cumberland	RI
M & M Electric Inc.	Providence	RI
M and J Plumbing, Inc.	West Greenwich	RI
M D'andrea Electric LLC	Portsmouth	RI

Madden Electric	Little Compton	RI
Magnetic Electric Inc.	Warwick	RI
Main Street Plumbing LLC	Pawtucket	RI
Malone Plumbing and Heating Inc.	Cranston	RI
Mandarini Plumbing and Heating	Cranston	RI
Manning Plumbing Company	Warwick	RI
Map Electric	Woonsocket	RI
Marcel Multi Services	Pawtucket	RI
Marciano Electrical Contractors	West Warwick	RI
Marinelli & Sons Electric	West Kingston	RI
Marisa Desautel	Providence	RI
Martel Plumbing and Heating	Lincoln	RI
Massed Electric	Warren	RI
Mastro Electric Supply Co Inc.	Providence	RI
Mastrocinque & Sons Plumbing	Portsmouth	RI
Matthew A Truppi	North Providence	RI
Matthew Cedarfield	Warwick	RI
Matthew Fitts Electrical	Greeneville	RI
Matts Mechanical	Smithfield	RI
Matt's Plumbing LLC	West Warwick	RI
Mccormick Electrical	North Kingstown	RI
Mcdonough Electric LLC	West Warwick	RI
Mckee Brothers Energy Solutions	Cumberland	RI
Mcs Electric Inc.	Portsmouth	RI
Mcshane Home Improvements Inc	Pawtucket	RI
MD Heating and Air Conditioning LLC	North Providence	RI
Mechanical Engineering	Central Falls	RI
Mechanical Hvac Systems Inc.	Wakefield	RI
Megawatt Energy Solutions LLC	Pawtucket	RI
Melco Plumbing and Heating Inc	Lincoln	RI
Menard Electric	Manville	RI
Meticulous Construction	Warwick	RI
Metro Electric	Woonsocket	RI
Mh Electric	Cranston	RI
Michael Chace Electrician	Johnston	RI
Michael Freitas Plumbing and Mechanical	Pascoag	RI
Michael Principe	Cumberland	RI
Michael Zincone Heating and Air Condition	Warwick	RI
Michael R Lafleur	Smithfield	RI
Micheletti Oil Services Inc.	Johnston	RI
Midstate Heating and Cooling	Hope Valley	RI
Mike Chace	Johnston	RI
Mike Manfredo Electrician	North Providence	RI

Miller Electric Corp	West Warwick	RI
Miller Mechanical Inc.	Rumford	RI
MJ Electric and Refrigeration	Central Falls	RI
Mj Heating and Air Conditioning	Tiverton	RI
MJF Plumbing and Heating	Bristol	RI
Modern Mechanical LLC	Woonsocket	RI
Moonworks	Woonsocket	RI
Morel Plumbing & Heating LLC	North Providence	RI
Morra Electric Inc.	Johnston	RI
Morrair Heating and Air Conditioning LLC	Warren	RI
Mp Remodel General Contractor	Warwick	RI
Mpg Mechanical LLC	Charlestown	RI
Mr. Plumber LLC	East Providence	RI
Mr. Rooter Plumbing	Warwick	RI
Msc Mechanical	Warwick	RI
Multi State Electric Co.	North Providence	RI
Mutual Engineering Service Company	Warwick	RI
National Efficiency Supply (Nes)	Providence	RI
National Refrigeration Inc.	Warwick	RI
Neil Smith Plumbing & Heating Contracting	East Providence	RI
New England Boiler Works	Coventry	RI
New England Energy Concepts Inc.	North Dighton	RI
New England Plumbing Heating and Air LLC	FOSTER	RI
New England Sheet Metal Inc	Cranston	RI
New Freedom Group	Coventry	RI
Newbury Insulation	Woonsocket	RI
Newport Electric	Portsmouth	RI
Nexgen Mechanical	Warwick	RI
Nexus Electric	North Providence	RI
Ngb Electric	Smithfield	RI
Nicholas Donnelly LLC	Cumberland	RI
Nightingale Heating	Providence	RI
Nite Oil	Tiverton	RI
Nivaldo Rocha	Central Falls	RI
Nolin Electric	North Scituate	RI
Nolin Electric Incorporated	Providence	RI
North Atlantic Heating Inc.	Coventry	RI
Northeast Efficiency Supply (Nes)	Pawtucket	RI
Northeast Electrical Distributors	Cumberland	RI
Northeast Temperature Control Inc.	Westerly	RI
Northern Energy Services Inc.	Providence	RI
Northern Power Electrical Services	North Scituate	RI
Nrg Electrical Inc	Harrisville	RI

Oak Service Co	Central Falls	RI
Ocean State Air Solutions	Portsmouth	RI
Ocean State Mechanical Inc	Coventry	RI
Ocean State Service Group LLC	Cranston	RI
Oceanline Combustion	Pawtucket	RI
Ocwen Loan Servicing LLC	Pawtucket	RI
O'hearne Home Development	North Smithfield	RI
Omni Electric	Wakefield	RI
On the Side Hvac	Providence	RI
O'neil Electric Company	Warwick	RI
O'rourke James J Inc	Warwick	RI
Ost Services, LLC	Providence	RI
Owen Blanco	Warwick	RI
P & S Electric Inc.	East Greenwich	RI
P E Plumbing Inc	Tiverton	RI
Pagnozzi & Sons Plumbing	Smithfield	RI
Pajan Services Inc.	North Providence	RI
Papa's Plumbing Corporation	Johnston	RI
Parrella Electric	Providence	RI
Patt Matt	Warwick	RI
Paul Holgate Plumbing	Warwick	RI
Paul Manfredo Electric	Warwick	RI
Paul Scotto Electrical	Portsmouth	RI
Paul Scotto Electrical Contracting	Portsmouth	RI
Pav Electric	Wakefield	RI
Pawtucket Power Association	Pawtucket	RI
Peak Plumbing and Heating LLC	Cumberland	RI
Pecchia Plumbing and Heating	Warwick	RI
Pellegrino Plumbing and Heating	Westerly	RI
Pelletier & Son Plumbing & Heating	North Kingstown	RI
Percivalle Electric Inc.	Warwick	RI
Perez LLC Plumbing Heating and Air Conditioning	Cranston	RI
Perfect Touch Electrical Cont Corp	Cranston	RI
Peter Bibby	Providence	RI
Peter Chilabato Sure Power Electrical	Portsmouth	RI
Peter Marino Electrician	Providence	RI
Petro Home Services	Warwick	RI
Petro West Bay Electric Inc.	Warwick	RI
Petronelli Plumbing and Heating	Johnston	RI
Pezzullo & Sons Electric Inc.	East Providence	RI
Pgl Contractors	Cumberland	RI
Philip Michael Child	Bristol	RI
Philip P Sands	Warwick	RI

Phillip J Bolster Plumbing and Heating	Wakefield	RI
Phillip J Forcier Electric	Cumberland	RI
Phillips Plumbing and Mechanical Inc.	Cranston	RI
Phil's Heating and Air Conditioning	Westerly	RI
Pierce Plumbing and Heating LLC	Ashaway	RI
Pinnacle Plumbing and Heating	Greenville	RI
Plumb Perfection	Johnston	RI
Plumbers Company Inc	Warren	RI
Plumbing and Heating Solutions LLC	East Greenwich	RI
Polar Air	Wakefield	RI
Polaris Plumbing & Heating Inc	Johnston	RI
Potvin Enterprises Inc.	Warwick	RI
Power by Design Electrical Contracting LLC	Richmond	RI
Powertrak Efficiency Systems, LLC	Bristol	RI
Pratt Plumbing and Heating LLC	Harrisville	RI
Precision Mechanical	Cumberland	RI
Premair Hvac	Warwick	RI
Premier Home Restoration	Cranston	RI
Presto Plumber LLC	Westerly	RI
Price Right Construction	Providence	RI
Priority Plumbing and Heating Inc.	Warwick	RI
Prout Construction Company	Coventry	RI
Prout Mechanical	Warwick	RI
Providence Mechanical Services LLC	Smithfield	RI
PSE Agency	Providence	RI
Quinn Plumbing and Heating	Providence	RI
R & M Electric Inc.	Coventry	RI
R and G General Contracting	Central Falls	RI
R E L Services Inc	Johnston	RI
R.E. Coogan Heating Inc.	Warwick	RI
Ralph A Devivo	Lincoln	RI
Rama Electric	Wakefield	RI
Rambone And Sprague Oil Services Inc.	North Scituate	RI
Rapid Electric	Cranston	RI
Raymond Degnan	North Providence	RI
Raymond J Reinsant Plumbing	Lincoln	RI
Raz Heating & Plumbing Services	Foster	RI
Rb Queern Co.	Portsmouth	RI
Red White And Blue Mechanical LLC	Pawtucket	RI
Reddy Piping Concepts Inc.	Cranston	RI
Regan Heating & Air Conditioning Inc.	Providence	RI
Regent Electric Co Inc.	Coventry	RI
Regent Electric Company	Coventry	RI

Reilly Electrical Contractor Inc.	Providence	RI
Reliable Electric Corp.	Coventry	RI
Reliant Electric	Cranston	RI
Resendes Heating Service LLC	Coventry	RI
Restivos Heating and Air Conditioning	Johnston	RI
Rexel Energy Solutions (Munro Distributing)	Cranston	RI
Rexel/CLS	Warwick	RI
Rhode Island Heating Oil Company	Bradford	RI
Rhode Island Sheet Metal	East Providence	RI
Rhode Island's Affordable Heating and Air Conditioning Services	North Providence	RI
Rhodes Technologies Inc.	Coventry	RI
Ri Insulation	Hope	RI
Ri Pipe Guys	Warwick	RI
Ricci Electric	Cranston	RI
Richard Brochu	Manville	RI
Richard Distefano Heating and Cooling LLC	Warwick	RI
Richburns Plumbing	Newport	RI
Rightway Electric, Inc.	Providence	RI
Rise Engineering	Cranston	RI
Ritacco Electric LLC	Westerly	RI
Rmd Plumbing	Newport	RI
Robert Colaluca Plumbing Heating Cooling	Greenville	RI
Robert Dionne	Smithfield	RI
Robert Hagen Electrician	Warwick	RI
Robert Hopkins Electrician	Exeter	RI
Roberto Rodriguez Service LLC	Providence	RI
Roberts Electric	Pawtucket	RI
Ronald Vento Electrician	Johnston	RI
Rooter Man Plumbing	Johnston	RI
Ross Landy Electrician	Portsmouth	RI
Rossi Electric Company	Cranston	RI
Rpm Electrical Services	Providence	RI
Rsm Electric	North Providence	RI
Rst Mechanical	North Kingstown	RI
Russ Lembo Electrician	Johnston	RI
Rwl General Contractors	Pawtucket	RI
Ryan Electric Construction	Warwick	RI
Rycor Services	Cranston	RI
S & K Electric Inc.	Charlestown	RI
S & S Electric	Chepachet	RI
Sakonnet Electric	Bristol	RI
Sal Manzi And Son Plumbing and Heating Inc.	Cranston	RI

Sam Ponte Heating and Air Conditioning LLC	Foster	RI
Santoro Oil Company Inc.	Providence	RI
Santurri Electric	East Greenwich	RI
Sasa Energy LLC	Johnston	RI
Sasa Mechanical Contractors Inc.	Johnston	RI
Sauvageau, Roy	South Kingstown	RI
Sb Carbone Plumbing and Heating Co Inc	Cranston	RI
SCG Construction	Charlestown	RI
Scott Gatta Electric	Johnston	RI
Scotto Electric	Portsmouth	RI
Seaview Plumbing and Heating	Narragansett	RI
Sensible Heating and Air Conditioning LLC	Hope Valley	RI
Shamrock Electric	Middletown	RI
Shawn Woods Electric	Burrillville	RI
Shearman Oil	Portsmouth	RI
Shepherd Services	Cumberland	RI
Sheridan Electric Inc.	Warwick	RI
Simons Supply Co Inc	Pawtucket	RI
Sine Plumbing and Heating Co Inc	East Providence	RI
Site Specific LLC	Providence	RI
Sizemore Plumbing and Heating	Warwick	RI
Smalls Plumbing Inc.	Woonsocket	RI
Smc Mechanical	East Providence	RI
Smithco Oil Service	Wakefield	RI
Sms Oil Burner Service Inc.	Jamestown	RI
Sosa & Son Heating Air Conditioning & Refrigeration	Woonsocket	RI
South County Community Action	North Kingstown	RI
South County Energy	Westerly	RI
Spencer's Plumbing LLC	East Greenwich	RI
Spl Electrical Corporation	North Smithfield	RI
Stable Hvac	Pawtucket	RI
Staffall Electronic Hardware	Cranston	RI
Stafford Electric	North Scituate	RI
Stan Bailey Construction	Wakefield	RI
Standish Brothers Hvac LLC	Coventry	RI
Stan's Plumbing and Heating	Cumberland	RI
Stanton Electric, Inc.	Cumberland	RI
Statewide Insulation	North Smithfield	RI
Statewide Plumbing and Heating Co Inc	Cranston	RI
Stay Cool	Cranston	RI
Stedman And Company	Charlestown	RI
Stem Electrical	Warwick	RI
Stephen Andrea Fire & Electric, LLC	Coventry	RI

Stephen Haun Inc.	Providence	RI
Stephen Larochelle	Cumberland	RI
Stephen Turner Inc	Providence	RI
Sterling Mechanical Services	Greene	RI
Steven Cacicia Electrician	Providence	RI
Sullivan & Mclaughlin	Greenville	RI
Summit Electrical Contractors Inc.	Lincoln	RI
Sunshine Fuels and Energy Services, Inc.	Bristol	RI
Superior Comfort Inc.	Bristol	RI
Superior Electric	Providence	RI
Superior Fire & Electrical Services	North Providence	RI
Superior Insulation	Narragansett	RI
Superior Led Lighting LLC	Warwick	RI
Superior Security Systems LLC	Cranston	RI
Supply New England	Pawtucket	RI
Supreme Duct Systems	Lincoln	RI
Sw & Sons Plumbing & Heating	Johnston	RI
Swajian And Son	Cranston	RI
Sylvester Sheet Metal Inc.	West Warwick	RI
Symmes Maini & Mckee Asso	Providence	RI
T Gomes Heating and Cooling	Warwick	RI
T Miozzi Inc	North Kingstown	RI
T. Cabral Rooter and Plumbing Repair	Cranston	RI
T. H. Malloy & Sons Inc.	Cumberland	RI
T.A. Gardiner Plumbing & Heating Inc.	Bristol	RI
Td Construction	Hope	RI
Tebano Electric	Bristol	RI
Tebo Electric Inc.	Woonsocket	RI
Technic Inc.	Cranston	RI
Teknicote Inc	Rumford	RI
Temptec Mechanical	Providence	RI
The Home Depot	Johnston	RI
The Plumber Company Lp	Cranston	RI
Thermal Energy Inc.	Cranston	RI
Therrien Mechanical Systems	Lincoln	RI
Thibault Plumbing and Heating Co	Cranston	RI
Thielsch Engineering Inc.	Cranston	RI
Thomas Calci Plumbing	Coventry	RI
Thomas McGee Plumbing and Heating	Forestdale	RI
Todd Campopiano Electrician	North Providence	RI
Tom Peters Plumbing & Heating Inc	Portsmouth	RI
Tom Whitaker Pm	Newport	RI
Tomark	Saunderstown	RI

Toms Plumbing LLC	Manville	RI
Toner Electric Company	Middletown	RI
Tops Lighting (Electric Supply Company)	Providence	RI
Total Comfort Heating and Cooling Inc.	Lincoln	RI
Total Construction Services Inc	Providence	RI
Total Control Hvac LLC	Cranston	RI
Towerhill Electric	Cumberland	RI
Towner Design Build	Pawtucket	RI
Tpf Electrical Services	Pawtucket	RI
Tri-Town Community Action	North Providence	RI
Tuma Insulations	Warwick	RI
Ug Nasons Inc.	Middletown	RI
Ultimate Plumbing Corporation	Warwick	RI
United Mechanical Inc.	Cranston	RI
Universal HVAC LLC	North Providence	RI
V Letizia Plumbing, Heating, Fire Protection	Providence	RI
Valco Electric	Warwick	RI
Valcourt Heating Inc.	Tiverton	RI
Valley Heating and Cooling Inc.	Wyoming	RI
Valley Plumbing and Heating	Cumberland	RI
Van's Electric Inc.	Bristol	RI
Vaughn Oil Company Inc.	Smithfield	RI
Vicmir & Sons Heating and Air Conditioning Controls	Riverside	RI
Victor Aillienello	Providence	RI
Viking Mechanical	Warwick	RI
Viking Supply Company	Westerly	RI
Villanueva Services	Cumberland	RI
Vinas Construction	Providence	RI
Vintage Plumbing	Riverside	RI
Vivona Plumbing And Heating Inc.	Portsmouth	RI
W.W. Grainger, Inc.	Warwick	RI
Wakefield Heating Service	Wakefield	RI
Waldo Plumbing And Heating LLC	Lincoln	RI
Watermark Plumbing LLC	Cranston	RI
Wayne Electric, Inc.	Bristol	RI
Wesco Oil	Smithfield	RI
West Bay Electric	Providence	RI
West End Plumbing and Heating	Cranston	RI
Westbay Community Action	Warwick	RI
Wickford Appliance and Lighting Inc.	Pawtucket	RI
Wilkinson Plumbing and Heating	West Kingston	RI
Willam Rocchio	Coventry	RI
William Bernardino Electrician	Cumberland	RI

William Francis	Bristol	RI
William Gornostai	Warwick	RI
William J Riley Plumbing and Heating	Warwick	RI
William R Vallee Jr. Plumbing and Heating	Block Island	RI
William Soares Electric	Bristol	RI
Wood's Heating Service	Providence	RI
Wordell Heating & Cooling LLC	Little Compton	RI
Wyman & Sons Electric Co	Johnston	RI
Zawadzki Plumbing and Heating Inc.	Warwick	RI
Zinc Heating and Air Conditioning	Warwick	RI
Zompa Plumbing and Heating	Warren	RI
Calson Corporation	Johnston	RI
Association of Energy Services Professionals	Phoenix	AZ
Autogrid Systems Inc	Redwood City	CA
Axiom Energy Solutions LLC	Brea	CA
Cohen Ventures	Oakland	CA
CRM Orbit	San Francisco	CA
Nest	Palo Alto	CA
Regency Lighting	Chatsworth	CA
Whisker Labs Inc.	Oakland	CA
E Source Companies LLC	Boulder	CO
A&B Cooling & Heating Corp	South Windsor	CT
Duarte Costa	Jewett City	CT
Duncklee Cooling and Heating Inc.	Stonington	CT
Dynamic Building & Energy (Formerly Uplands Construction Group)	N. Stonington	CT
Hdl LLC	Jewett City	CT
J&M Plumbing and Construction LLC	Norwich	CT
Jkmuir LLC	Rocky Hill	CT
Kenair	Niantic	CT
L&M Electric LLC	North Branford	CT
Lupo Electric	Waterbury	CT
Mcneil Heating and Cooling	Pawcatuck	CT
Milla's Heating & Cooling LLC	Mystic	CT
Mystic Plumbing & Heating	Mystic	CT
Praxis Research Partners	Westport	CT
Simmons Hvac	Pawcatuck	CT
Smart Thermal Solutions LLC	Pawcatuck	CT
South Shore Heating and Cooling Inc	Pawcatuck	CT
Techniart Inc.	Collinsville	CT
Terranova Plumbing	Pawcatuck	CT
Thermaxx LLC	West Haven	CT
Tom Buehler Plumbing & Heating	North Stonington	CT

Wattsaver Lighting Products Inc.	East Hartford	CT
Williams & Associates Mechanical Contracting Inc.	North Stonington	CT
Wjr Plumbing and Heating LLC	Voluntown	CT
Cadeo Group LLC	Washington	DC
Energy Solutions Center	Washington	DC
Express Lighting, Corp.	Melbourne	FL
Parker Davis Hvac International Inc	Miami	FL
Sears Home Improvement Products Inc	Longwood	FL
Apogee Interactive Inc	Tucker	GA
Frontier Energy Inc	Chicago	IL
Innerworkings Inc.	Chicago	IL
3 D Lighting	Franklin	MA
A & M Electrical Mechanical, Inc.	Fall River	MA
A&M Electrical	Fall River	MA
Action Inc.	Fall River	MA
Adams Refrigerator and Air Conditioning	Seekonk	MA
Advanced Energy Services	Hopedale	MA
Aegis Energy Services Inc	Holyoke	MA
Ags Hvac Services LLC	Westport	MA
Ahaesy Electric	Fall River	MA
Air Masters Hvac Services of Ne Inc	Fall River	MA
Air Tight Insulators	Webster	MA
Ak Electric Inc	Palmer	MA
Aks Electric	Rehoboth	MA
All American Electric	Lynn	MA
All State Plumbing & Heating Co Inc.	North Attleboro	MA
All-Pro Electric, LLC	Bradford	MA
Alternative Weatherization, Inc.	Fall River	MA
Ameresco Inc	Framingham	MA
American Plant Maintenance	Woburn	MA
Andelman And Lelek Engineering Inc.	Norwood	MA
Andy Ramos Electric	Holyoke	MA
Anthony Vieira Heating and Air Conditioning	Attleboro	MA
Apollo Lighting & Supply	Holbrook	MA
Arca Recycling Inc	Franklin	MA
Atlantic Power Services	Seekonk	MA
Attention to Detail Plumbing & Heating LLC	Somerset	MA
B&L Ductless LLC	Swansea	MA
B2q Associates Inc.	Andover	MA
Baraby Electric	Fall River	MA
Barry L KUTZ, ELECTRIC	Waltham	MA
Baystate Energy Reduction	Sutton	MA
Beaupre Electric	Assonet	MA

Boivin Electric LLC	North Attleborough	MA
Boston Air Corp.	Stoughton	MA
Botelho Electric	Rehoboth	MA
Brh Electrical Services	Seekonk	MA
Briggs Mechanical Inc	North Attleboro	MA
Bristow Electric Company, Inc.	Attleboro	MA
Bruin Corp	North Attleboro	MA
Brunelli, Philip M Jr	Franklin	MA
Bulbs.Com	Worcester	MA
Camara's Heating & Air Conditioning Services	Westport	MA
Carlos A Magina Electrical Inc.	Seekonk	MA
Cavallaro Plumbing	East Freetown	MA
CENTER FOR ECOLOGICAL Technology	Pittsfield	MA
Certified Safe Electric	Marshfield	MA
Cma Heating & Air	North Dartmouth	MA
Coastline Plumbing and Mechanical LLC	Westport	MA
Coghlin Electrical Contractors	Worcester	MA
Commonwealth Electrical Technologies	Worcester	MA
Complete Recycling Solutions LLC	Fall River	MA
Concord Electric Supply	Fall River	MA
Consolidated Marketing Services	Burlington	MA
Consortium for Energy Efficiency	Boston	MA
Corbiel Associates Inc.	South Weymouth	MA
Costa Plumbing and Heating Inc	Seekonk	MA
Craig R Casavant Inc.	Blackstone	MA
Crown Supply Company Inc	Milford	MA
Cullen Energy	Shrewsbury	MA
D Cabral Plumbing	Swansea	MA
Dan Mckay Heating and Cooling	Sagamore Beach	MA
Daniel Cabral	Fall River	MA
Datasense Solutions Inc	Waltham	MA
David J Dionne Electric	Blackstone	MA
DMI	Wellesley	MA
Dons Plumbing and Heating LLC	Fall River	MA
Dougs Installation and Service	Fall River	MA
Dp Electric Inc.	Blackstone	MA
Dube's Plumbing	Blackstone	MA
E.M. Corbeil Inc	Millville	MA
Eagle Energy Systems	Raynham	MA
Eagle Mechanical Solutions	Framingham	MA
Ecast Video LLC	Boston	MA
Ecova Inc.	Boston	MA

Efficiency Forward Inc. (Dlc)	Medford	MA
Efficient Buildings LLC	Bridgewater	MA
Efr Electric Inc	Bellingham	MA
Electric Supply Center	Mansfield	MA
Electrical Technologies	Medford	MA
Elite Construction Corp	Rehoboth	MA
Ellsworth Supply Co Inc	Boston	MA
Ene Systems Inc.	Canton	MA
Energy & Resource Solutions Inc.	North Andover	MA
ENERGY EFFICIENCY Advisers Inc	Mendon	MA
Energy Federation Inc.	Westborough	MA
ENERGY MANAGEMENT Associates Inc	Franklin	MA
Energysavvy Inc.	Cambridge	MA
Etech, Inc.	Millbury	MA
F.L. Machado Plumbing and Heating LLC	Seekonk	MA
Florence Electric LLC	Canton	MA
Focal Point Data Risk LLC	Newton	MA
Generators by F.S.G.	Dover	MA
Germain Plumbing and Heating	Attleboro	MA
Gh Electrical Service	Attleboro	MA
Glynn Electric Inc	Plymouth	MA
Gm Refrigeration Co	Fall River	MA
Graybar Electric Co.	Boston	MA
Green Elements LLC	Newton	MA
Hannon Electric	South Easton	MA
Horizon Solutions LLC	Taunton	MA
Hughes Electrical Services	Marshfield	MA
Hull Electric	Marblehead	MA
Hvac360	North Dighton	MA
IBM Corp.	Cambridge	MA
Illuminating Engineering Society	Boxford	MA
Independent Electric Supply	Somerville	MA
Insulate 2 Save	Fall River	MA
Insulation R Us Inc.	Fall River	MA
Interstate Electrical Services Co.	North Billerica	MA
Ion Lighting Distribution Inc.	Chicopee	MA
J Derenzo Company	Brockton	MA
J Senecal Construction	Seekonk	MA
J&L Heating and Air Conditioning	Plainville	MA
Jason Cabral Electric	Fall River	MA
JAY SHELDON's HEATING and Cooling	Seekonk	MA
Jf Electrical	Quincy	MA
John A. Moniz Electrical	Swansea	MA

John Mcdonough Electrician	Boston	MA
Jones Lang Lasalle Construction	Boston	MA
Jr's Hvac Design	Westport	MA
K & K Contractors LLC	Wareham	MA
KELLEY, JAMES - Middleton Electric Light Dept.	Middleton	MA
Kema	Burlington	MA
Kevin R Curt Electrical LLC	Fall River	MA
L.S. Heating and Air Conditioning	Seekonk	MA
Lafleur Plumbing and Heating	Swansea	MA
Lawrence Air Systems Inc.	Seekonk	MA
Ledoux Electric	Seekonk	MA
Lefevre	Taunton	MA
Leiser Corporation	Weston	MA
Litemor	Norwood	MA
Lockheed Martin	Burlington	MA
Lussier Plumbing and Heating	Seekonk	MA
Lussier Electric Services	Worcester	MA
Machado Plumbing & Heating LLC	Dighton	MA
MALONE Brothers Inc.	Swansea	MA
Marc's Sheet Metal	Fall River	MA
Mass Electric Construction	Waltham	MA
Mcnamara Electric	North Attleboro	MA
Mello Electric Co Inc	Fall River	MA
Michael Devine Electric	Plymouth	MA
Mike Bell Electrician	Seekonk	MA
Mike's Heating and Ac Inc	Fall River	MA
Mog Heating and Cooling	Taunton	MA
Mr Electric	Framingham	MA
Mts Mechanical	Swansea	MA
National Led Distributors	Boston	MA
Nesco (Needham Electric Supply)	Canton	MA
New England Combustion Products, Inc.	Rockland	MA
New England Energy Concepts Inc	North Dighton	MA
Nmr Group Inc.	Somerville	MA
Northeast Electrical Service	Bellingham	MA
Northeast Energy Efficiency Partnerships (Neep)	Lexington	MA
O H Burg Corp	Stoughton	MA
O'brien & Neville Inc.	Holliston	MA
Oracle America	Cambridge	MA
Pacheco-Cooke Electrical	Plainville	MA
Pbz Construction - Robert Ayers	Stoughton	MA
Peregrine Energy Group	Boston	MA
Phd Plumbing and Heating	Seekonk	MA

Piquette & Howard Electric Service	Somerville	MA
Potter Electric Inc	Fairhaven	MA
Prism Energy Services	Quincy	MA
Quality Climate Control Inc.	Fall River	MA
Quality Energies	Rehoboth	MA
R & F Construction	Dedham	MA
R E M Electric	Attleboro	MA
R R Services Inc	Swansea	MA
Ralco Electric Inc.	Westport	MA
Raymond D. Melanson Electric	Swansea	MA
Rethinking Power Management	Boston	MA
Retrofit Insulation	Fall River	MA
RF Plumbing and Heating	Mansfield	MA
Rickard And Sons Plumbing	Seekonk	MA
Robert J Malloy	Rockland	MA
Rock Electric Inc	New Bedford	MA
Roi Energy Investments LLC	East Walpole	MA
Jason Roia	Fall River	MA
Rooney Electric	North Reading	MA
Sacks Exhibits	Wilmington	MA
Sarnie Electrical Contracting	Walpole	MA
Sense Labs Inc	Cambridge	MA
Sikora Electric	Fall River	MA
South Coast Alternative Power Solutions	Acushnet	MA
South Coast Greenlight Energy	Swansea	MA
Standard Electric	Wilmington	MA
State Electric Corporation	Bedford	MA
Stateline Fuel & Burner Service Inc.	Seekonk	MA
Steam Trap Systems	Amesbury	MA
Steven Lascola Electrician	Seekonk	MA
SUBURBAN HEATING AND COOLING Services	Somerset	MA
Superior Energy Solutions	Swansea	MA
SYLVANIA LIGHTING Solutions	Wilmington	MA
Synapse Energy Economics Inc.	Cambridge	MA
Teeg LLC	Sharon	MA
The Brattle Group	Boston	MA
The Cadmus Group LLC	Boston	MA
Theroux Mechanical	Attleboro	MA
Tj's Plumbing and Heating	Attleboro	MA
Tnz Energy Consulting Inc.	Stoughton	MA
Towne Heating Co Inc	Swansea	MA
Trc Environmental Corp.	Boston	MA
Triple B Plumbing Inc	Seekonk	MA

Trust Energy Solutions	Marlborough	MA
Utility Energy Inc	Fall River	MA
Uts Energy Engineering Llc	Quincy	MA
Veolia North America	Boston	MA
Victory Heating, Air Conditioning, Plumbing	Bellingham	MA
Walls, Jeff Electrician	Franklin	MA
Wayne D Faria	North Dartmouth	MA
Wayne Electric & Alarms	Fairhaven	MA
Wellington Plumbing and Heating	Roxbury	MA
Wipro Ltd.	Quincy	MA
Worcester Electric Assoc	Worcester	MA
World Energy Efficiency Services LLC	Worcester	MA
Antares Group Inc.	Lanham	MD
Lynne Kaplan & Associates	Kensington	MD
Utilityboost LLC	Rochester	MI
The Maintenance Team	Minneapolis	MN
Apex Analytics	Greensboro	NC
Costal Lighting LLC	Wilmington	NC
Daniels Equipment	Auburn	NH
KT&T Distributors	Nashua	NH
National Energy & Light Inc.	Nashua	NH
Sprague Operating Resources	Portsmouth	NH
Clear Energy LLC	Bloomfield	NJ
Cmc Energy Services Inc.	Cranbury	NJ
Ideas Agency Inc.	Blairstown	NJ
Shi International Corp.	Somerset	NJ
T-Systems North America Inc	Red Bank	NJ
Cdh Energy Corp.	Cazenovia	NY
Fdm Group Inc.	New York	NY
L&S Energy Services Inc.	Clifton Park	NY
Radiator Labs Inc	Brooklyn	NY
Ram Marketing	Saint James	NY
Rensselar Research	Troy	NY
Smartwatt Energy Inc.	Albany	NY
Loeb Electric	Columbus	OH
Questline Inc.	Columbus	OH
Research into Action Inc	Portland	OR
A R Building Company Inc	Seven Fields	PA
Emergent Energy Solutions	Trappe	PA
M. J. Brunner Inc.	Pittsburgh	PA
Aiqueous	Austin	TX
Blackhawk Engagement Solutions	Lewisville	TX
Don Jordan Construction	Lewisville	TX

Ed Tudino	Lewisville	TX
Facility Solutions Group (Fsg)	Austin	TX
Compressed Air Challenge	Alexandria	VA
Securicon LLC	Alexandria	VA
Kelliher Samets Volk	Burlington	VT
Optimal Energy Inc	Hinesburg	VT
Avalara Inc	Seattle	WA
New Buildings Institute Inc.	White Salmon	WA
Northwest Energy Efficiency Council	Seattle	WA
Illume Advising LLC	Madison	WI
Market Probe Inc.	Milwaukee	WI
Seventhwave Inc	Madison	WI