Jennifer Brooks Hutchinson
Senior Counsel

February 1, 2012

VIA HAND DELIVERY & ELECTRONIC MAIL

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

RE: Docket 4296 – The Narragansett Electric Company, d/b/a National Grid 2012 System Reliability Procurement Plan Report - Supplement

Dear Ms. Massaro:

Enclosed are ten (10) copies of National Grid's[1] proposed System Reliability Procurement Report - Supplement for 2012 (the "Supplemental Report"). This Supplemental Report supersedes the 2012 SRP Report originally filed by the Company on November 1, 2011 (the "Original SRP Report"). As a result of the Company's discussions with members of the Energy Efficiency Resources Management Council and the Division of Public Utilities and Carriers, the Company has made changes to the SRP Plan and the related benefit-cost tables to highlight the cost-effectiveness of the pilot over the multi-year term of the proposed project.

For the Commission's ease of reference, the Company is also providing a redlined version of the Supplemental Report, highlighting the changes from the Original SRP Report.

Thank you for your attention to this filing. If you have any questions, please feel free to contact me at (401) 784-7288.

Very truly yours,

Jennifer Brooks Hutchinson

cc: Jon Hagopian, Esq.
Steve Scialabba, Division

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

National Grid

The Narragansett Electric Company

2012 System Reliability Plan Report - Supplement

February 1, 2012

Submitted to:
Rhode Island Public Utilities Commission

Docket No. 4296

Submitted by:

nationalgrid

2012 SYSTEM RELIABILITY PLAN REPORT SUPPLEMENT

Introduction

The Comprehensive Energy Conservation, Efficiency and Affordability Act of 2006 (the "2006 Act") provides the statutory framework for least cost procurement of system reliability in the State of Rhode Island.[1] The 2006 Act provided a unique opportunity for Rhode Island to identify and procure cost-effective customer-side and distributed resources with a focus on alternative solutions to the traditional supply options. Over time these alternative solutions may deliver savings to customers by deferring or avoiding distribution system investments, and improving overall system reliability. The Least Cost Procurement law, R.I.G.L. §39-1-27.7, requires standards and guidelines for "system reliability" that includes the "procurement of energy supply from diverse sources," including, but not limited to, renewable energy resources, distributed generation, including but not limited to, renewable resources and cost-effective combined heat and power systems, and demand response designed to, among other things, provide local system reliability benefits through load control or using on-site generating capability.[2]

On June 7, 2011, the Commission unanimously approved revised standards for system reliability, finding that the standards were consistent with the policies and provisions of R.I.G.L. 39-1-27.7.1(e)(4), (f) and R.I.G.L. 39-1-27.7.[3] Section 2.1(C) of the revised System Reliability Procurement Standards ("SRP Standards") requires that the Company identify transmission or distribution (T&D) projects that meet certain screening criteria for potential non-wires alternative ("NWA") solutions that reduce, avoid, or defer traditional T&D wires solutions. NWAs are actions by customers that may defer the need for Company investment. NWAs provide demand response either through targeted energy efficiency efforts, controlling load at times of local peak demand, distributed generation used at time of peak demand, and controllers that are programmed to reduce demand at peak demand.

The SRP Standards further require the Company to submit on November 1 of each year an annual system reliability procurement report ("SRP Report") that includes, among other information, a summary of where NWAs were considered, identification of projects where NWAs were selected as a preferred solution, an implementation and funding plan

[1] See P.L. 2006, Ch. 236, S2903 Sub B As Amended; P.L. 2006 Ch. 237, H8025 Sub A As Amended (Enacted June 29, 2006).
[2] R.I.G.L. §39-1-27.7(a)(1)
[3] See Report and Order, In Re: RI Energy Efficiency and Resource Management Council's Proposed Electric and Natural Gas Efficiency Savings Targets, Docket No. 4202 (June 7, 2011).

for selected NWA projects, and recommendations for demonstrating distribution or transmission projects for which the Company will use selected NWA reliability and capacity strategies. The Narragansett Electric Company d/b/a National Grid ("National Grid" or the "Company") seeks approval of this SRP Report in accordance with the guidelines set forth in Section 2 of the SRP Standards. As part of this SRP Report, the Company is proposing to conduct a Load Curtailment Pilot ("Pilot") to test the use of load curtailment by customers, or demand response, as a means to manage local distribution capacity requirements during peak periods. As further explained below, the Company identified the area served by its Tiverton substation as a candidate for a pilot. The Company will leverage experience from its previous effort in targeted energy efficiency (EE) on Aquidneck Island conducted in 2009-2010. That effort was performed as a pilot in the approved Energy Efficiency Program Plan for 2009 using energy efficiency funding.

The Company proposes the use of energy efficiency funds from programs proposed in the 2012 Energy Efficiency Program Plan filing and certain additional funds as proposed below to conduct this Pilot. If this Pilot is approved, the Company estimates that $221,000 will be required in 2012 to provide demand response credits to participating customers, to administer the program and to conduct specific outreach/education to customers in the area of the Pilot, and for evaluation. This is in addition to $337,800 in Focused Energy Efficiency costs that will be leveraged through energy audits and provision of equipment through the energy efficiency programs. The Company forecasts a potential SRP budget in the amount of $1,260,100 over six years to conduct the Pilot. However, the Company recognizes that one goal of the Pilot is the determination of the level of administration, customer outreach and evaluation that will be necessary for this Pilot. Thus, the Company proposes to review this estimate during 2012, and using the knowledge gained from its activities in 2012, will revise this estimate as appropriate in its SRP filing for 2013. Similarly, the Company will review the experience and costs each year, assess the progress toward meeting the demand reduction target, and prepare a status update in the Annual SRP Report each year for the Commission, including a report on the continued viability of the Pilot and, if viable, the updated funding request for the next year. Therefore, as part of this Plan, the Company is requesting approval of $221,000 for funding for the 2012 SRP, as well as a commitment to the six year life of this Pilot.

The requested funds will be used to enhance energy efficiency incentives, provide additional energy efficiency measures that would not otherwise be offered through the statewide programs, increase marketing in the Tiverton/Little Compton area to increase participation in all aspects of the Pilot and conduct a targeted demand reduction program that will reduce customer air conditioning and lighting loads as well as potential appliance loads. The Pilot area serves 5,600 customers and the Company is seeking enough customers to provide 1MW of load reduction over four years to allow deferral of

the new substation feeder for that four (4) year period. If the Pilot is successful in enrolling enough load relief and in providing sustained load relief over a six (6) year period, it will result in the deferred construction of a new substation feeder estimated to cost $2.9 million.

Potential Value for Customers from Use of Non-Wires Alternatives

Although recent economic trends and conservation by customers have limited load growth in the Company's service area, local areas can continue to expand as customers and businesses move to different areas of the service territory and build new facilities. Because load growth throughout the Company's service territory is not uniform, the Company continually assesses the capacity of its distribution system at a local level to ensure that expected localized load growth can be accommodated. Based upon these assessments, the company determines whether existing distribution capacity will be sufficient or whether local capital investment will be required to serve the increased load in certain areas.

Based on its experience, the Company knows that as load grows in areas, the initial need for additional distribution capacity may be limited to a small number of peak periods for a limited number of days during the year. The incremental nature of this normal type of load growth, combined with the rather "lumpy" nature of new capacity additions, however, can result in distribution capacity that may be under-utilized in the early part of its life-cycle. Through the Pilot, the Company aims to determine whether some of these additional, incremental capacity demands that appear early in the load-growth cycle can be temporarily satisfied through more active load management by customers. If they can be, then it may be possible to defer some capital investments in additional distribution capacity until such time as that capacity can be more fully and efficiently utilized. Deferring such capital investments affords the Company added flexibility in scheduling and planning distribution system improvements, can provide a more cost-effective option for meeting customer demand, and provides other benefits to customers and the Company.

First, deferring capital investment in areas where the capacity needs can be temporarily satisfied through other means (such as active load management by customers) allows the Company to better utilize its capital and construction resources. This allows the Company to focus increased attention on areas where there may be a greater need, or where the need cannot effectively be satisfied through other means. Second, deferring a capital investment until such as it will be more fully utilized provides for a more effective use of the distribution system. Finally, it is possible that in some cases, deferring a capital investment may result in the capital investment being avoided altogether if localized load patterns change in significant and unanticipated ways (such as may occur with the departure of a major customers from the area). This is the intent of the guidelines established by Section 2 of the SRP Standards.

Understanding the possibilities from local demand response by customers, National Grid created an internal planning document based on the guidelines in Section 2 of the SRP Standards. This planning document structures the review of transmission and distribution projects with the objective to identify potential NWA demonstration projects consistent with the SRP Standards.

Pilot Proposal

In 2011, several projects[4] were screened using the planning document. One project met the criteria for the use of NWA screening and was selected as an appropriate candidate for a NWA pilot. Load growth in the Tiverton area may cause potential overloads of Company equipment beginning in 2014. These overloads occur in the summertime and are due to increased use of air conditioning. The Company projects the need for an additional feeder from the substation serving Tiverton area, sometime on or before 2014 to remedy the overloads and provide additional capacity for further growth in the area. However, the Company is proposing to use a mix of geographically targeted energy efficiency (as used in the Aquidneck Island pilot), demand response and direct load control mechanisms to defer the Tiverton project a minimum of four years through engagement with residential and commercial customers and provision of incentives for customers to decrease their energy usage during summer peak periods.

Forecasted Load Growth in the Tiverton Area

Load growth assumptions for the Tiverton area were forecast in National Grid's 2010 Power Supply Area Forecast for the Narragansett Electric Company (NECO) released on April 1, 2010. The Company's load forecast is the sum of four Power Supply Area (PSA) forecasts that make up its service area. The four PSAs are Blackstone, Providence, Newport and Western NECO. The Western NECO PSA serves 22 cities and towns in central, western and southern Rhode Island, including Tiverton and Little Compton. A map of the Tiverton/Little Compton pilot area can be found in Appendix 1.

Two feeders serve this area from the Tiverton substation: 33F3 and 33F4. The feeders deliver electricity to 5,614 customers in the towns of Tiverton, Little Compton, Adamsville, Newport and Portsmouth. Residential customers consume about 81% of electricity delivered by these feeders as shown in the Table below for calendar year 2010.

[4]Since February 2011, when the Company adopted the non-wires alternatives screening principles embedded in the SRP Standards, the Company has screened two projects meeting the criteria listed in Section 2.1 (C) of the guidelines. For the Wampanoag substation project, a large customer served from Wampanoag substation is looking to increase its total load to approximately 5,180kW in 2014 and potentially request second feeder service capability. This amounts to reserving an additional 5,180 kW of demand for service to this customer. The Company decided that risks associated with the customer's requests would be greater than the amount of NWA available.

	Accounts	kWh Load	Average kWh Per Account Per Year
Residential	5,144	43,999,415	8,554
Commercial	470	10,292,822	21,900
Total	5,614	54,292,237	

Appendix 2 shows historical and forecast coincident summer peak demands for the Company and its four PSAs. The highest peak demand was recorded in August 2006 at 1,932 MWs as compared to the highest winter demand in January 2004 of 1,369 MWs. The Company's distribution system serves approximately 484,000 customers in 38 cities and towns in Rhode Island. The residential class accounts for about 40% of the Company's total Rhode Island load while the commercial class accounts for 48% and the industrial class 12%.

Appendix 2 illustrates that Western NECO PSA is the Company's largest and fastest growing area. Growth has been fueled by residential and commercial development, especially during the housing boom from 2000-2006.

Tiverton is one of the fastest growing towns in the Western NECO PSA. From 1997 to 2007, total kWh deliveries to Tiverton increased at an average annual rate of 3.4% compared to 2.4% for the Western PSA and 1.7% for the Company as a whole. Little Compton also grew faster than the state average, by 1.9% per year. Residential deliveries account for 70% for Tiverton's deliveries and 87% of Little Compton's deliveries.

For planning purposes, Tiverton/Little Compton study area load is projected to increase at the same rate as the Western NECO non-coincident peak forecast. These forecasted growth rates are shown in Appendix 3. For the 2010 – 2020 ten year forecast period, the Western NECO summer peak is expected to rise at an average annual rate of 2.6% per year on a weather adjusted basis. Residential and commercial load growth is forecast to continue into the forecast period.

Impact on Peak Demand at Tiverton Substation

The forecasted increases in customer load result in the need for new capacity in the future. The Tiverton 33F3 and 33F4 feeders are projected to exceed their summer load rating starting in 2014[5]. The two feeders are designed to work together in serving load in the area. Load can be shifted between the two feeders to balance out the feeder loading

[5] Historical load growth on these two feeders from 2002 – 2011 can be found in Appendix 4.

overall. Forecasts of feeder loadings employ the same cumulative load growth percentage because it is assumed in planning that the whole area grows at the same annual rates.

The 33F4 feeder will be loaded to 101% of its summer normal rating in 2014 and increasing each year thereafter and the 33F3 will be loaded to 101% starting in 2022 as shown in the table below. To ensure continued reliability, a new feeder will be necessary beginning in 2014 and beyond to offload customer demand on the existing feeders and bring load levels on the 33F4 and 33F3 feeders down to manageable levels.

33F4 Feeder	Year									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Maximum Required Load Relief Expected (MW)	**0.15**	**0.39**	**0.63**	**0.86**	**1.08**	**1.27**	**1.49**	**1.71**	**1.92**	**2.12**
Cumulative Load Growth Percentage	**0.0%**	**2.5%**	**4.8%**	**7.2%**	**9.3%**	**11.4%**	**13.5%**	**15.6%**	**17.7%**	**19.8%**

33F3 Feeder	Year									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Maximum Required Load Relief Expected (MW)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.11**	**0.30**
Cumulative Load Growth Percentage	**0.0%**	**2.5%**	**4.8%**	**7.2%**	**9.3%**	**11.4%**	**13.5%**	**15.6%**	**17.7%**	**19.8%**

The proposed solution would be to add a new feeder (33F5) at the Tiverton substation to provide the summer relief to both the 33F3 and 33F4 circuits. Both feeders are limited by their 1000 kcmil aluminum underground getaway cable. Obtaining load relief on one of the feeders can benefit both feeders needing load relief because of their long, radial system configuration.

At the Tiverton substation, the Company's wires proposal would construct a new feeder (the 33F5) and install two 3.6MVAR capacitor banks. This requires installation of 1,200 feet of 1000 Al underground cable in an existing duct line and installation of 15,300 feet of 477 aluminum spacer cable and two load break switches.

The cost for this work in 2014 dollars is as follows:

	Distribution	Substation	Total
Capital	$1,079,314	$1,154,118	$2,233,432
O&M	$160,294	$160,294	$320,588
Removal	$160,294	$160,294	$320,588
Totals	$1,399,902	$1,474,706	$2,874,608

Detailed engineering work for the feeder addition can be found in Appendix 5.

Pilot Implementation

The Company proposes to use focused energy efficiency (EE)[6] as well as to install additional technologies that pass the Total Resource Cost (TRC) test in residential homes and commercial facilities. Measures currently planned for implementation include wi-fi programmable controllable thermostats (PCT) and lighting with enhanced DR ballasts. The Company is also planning to include some direct load control appliance measures in future years of the Pilot's lifetime. Lessons learned from the Aquidneck Island pilot will be used in the implementation of these strategies. The evaluation of the Aquidneck Island pilot[7] determined that, "leveraging existing programs proved to be an effective strategy for delivering incremental savings and program participation." Details of the savings and benefits expected to be achieved can be found in Tables S-4 and S-5 of Appendix 12, respectively.

Since this is a summer loading problem, the Company would look to reduce load on appliances such as central air conditioning in the initial phase and then potentially look to reduce load on dehumidifiers, window air conditioners, pool pumps and hot water heaters in future years. Demand reduction events would be conducted seasonally between June and September for an expected total of twelve (12) days of four hour blocks when demand is highest (3:30 – 7:30 pm according to historical load data at the Tiverton substation level and supported by analysis[8] from the Freeman, Sullivan and Company NWA screening tool).

[6] Focused EE refers to energy efficiency programs or measures offered through the statewide programs that are focused to a specific area, in this case Tiverton/Little Compton.
[7] *Evaluation of National Grid's Community Pilot Program - Energy Action: Aquidneck and Jamestown* Final Report. Prepared by Opinion Dynamics Corporation in October 2011. This document can be found in its entirety in Appendix 6.
[8] Graphical analysis can be found in Appendix 7.

The Company currently expects to hold calls for up to twelve (12) four hour events in each year of the Pilot's lifetime. Each day will include four event hours. For most measures, this will mean four hours of reducing load. However, for the PCTs, the Company plans to cycle the demand reduction by reducing customers in each alternating hour. This way, customers will only have their load reduced for two out of the four hour period. It is likely that event days could be consecutive. For each event, the Company anticipates achieving over 1 MW peak load reduction by 2017 when all devices are implemented. Details of the demand reduction savings and benefits can be found in Table S-6 of Appendix 12.

Appliance Saturation Rates

Appliance saturation data was obtained from the KEMA report, *The Opportunity for Energy Efficiency that is Cheaper than Supply in Rhode Island - Phase II Report*[9]. While the data in the report was not area specific, it was assumed that the statewide saturation data was representative of residential customers in Tiverton and Little Compton. Multifamily dwellings are assumed to be commercial class customers:

Appliance	RI customers with Appliance	Anticipated Customer Saturation in Area
A/C (window)	53%	2,687
A/C (central)	32%	1,622
Pool pump	17%	819
Electric water heater (Single Family)	55%	2,510
Electric water heater (Multi Family)	45%	114
Dehumidifier	37%	1,876

The Company will receive greater clarity on the residential appliance saturation numbers in this specific geographic area once the questionnaire for the Residential Behavior Pilot in the approved Energy Efficiency Program Plan for 2011 is received back from customers.

Residential Incentives

The Company proposes to implement the Pilot with the intention of achieving 805 residential participants in the demand reduction events by 2017. As part of this effort, the Company will contact the 100 customers in the 2011 Behavioral Pilot to determine their interest in participation. The Company plans to use wi-fi PCTs with Demand Response

[9] *The Opportunity for Energy Efficiency that is Cheaper than Supply in Rhode Island – Phase II Report* by KEMA, Inc. delivered to Rhode Island Energy Efficiency and Resource Management Council on August 30, 2010.

cycling capabilities in all years of the Pilot's lifetime. The Company piloted the ecobee PCT in RI in 2010 and it proved to be successful in terms of cost effectiveness and acceptance from customers participating. The Company has estimated customer savings from installation of the ecobee PCT of 0.17 kW. The initial energy efficiency savings of 0.17kW per device are based off the PCT pilot evaluation[10]. In addition, the Company forecasts per-customer load curtailment during a demand response event to be 1.25 kW. This savings will be tested as part of the demand reduction events in this Load Curtailment Pilot. The incremental savings at peak periods during DR events were calculated using 50% cycling.

Participation in load curtailment events by residential customers would include an annual incentive of $40 as a bill credit if the customers participated in 100% of events (including audit or test events) during June through September, with a commitment to the program for two years. This incentive is in addition to customer bill savings that may occur through customer use of the new PCT. Research[11] has shown that by encouraging residential customers to enroll in and stay engaged in a program via a monetary incentive, the program is more successful in retaining participants. If customers chose to opt out of more than one event, they will not receive the $40 credit. The $40 summer credit is comparable to what other utilities in the northeast are offering customers for participating

[10] Preliminary evaluation results are included in a memo from Cadmus and other supporting documentation in Appendix 8.
[11] *Getting Residential Customers on Board with Direct Load Control* by Dulcey Simpkins. published on March 2, 2010.

in a summer load reduction program (see appendix 9). If successful, the Company will review appropriate forms of payment, including valuation, for future NWA proposals.

Commercial Incentives

C&I customers will be recruited for participation in the proposed non-wires demonstration project in an effort to obtain participation of 127 customers. For commercial customers with demand 200kW or below, the Company will use a targeted EE mechanism as part of the Small Business Services Direct Install (SBS/DI) program administered by RISE Engineering. RISE will approach these geographically targeted customers with energy efficiency opportunities in areas such as lighting, HVAC and refrigeration. In the Aquidneck Island pilot, the savings per business customer in this targeted program were as follows:

Program	**Annual kWh Savings**	**Maximum Load Reduction (kW)**	**WinterPeak Energy (%)**	**Winter Off-Peak Energy (%)**	**SummerPeak Energy (%)**	**Summer Off-Peak Energy (%)**	**Summer Coincident (%)**	**Winter Coincident (%)**
SBS/DI	13,838	3.081	52%	15%	26%	7%	100%	53%

An objective of the targeted EE approach will be to install demand response ballasts in small businesses and enroll customers to participate in demand response events. The demand response ballasts will have light levels adjusted to 90% of power as a factory setting; this is commonly referred to as tuning. The lights will be tuned initially for the workspace providing energy efficiency and then further tuned an additional 10% during demand response events. During events, five (5) small C&I customers will be called on to participate, with a larger pool of participants being available as backup resources. The Company expects to achieve five C&I lighting participants per year for a total of thirty participants by 2017 as shown in Table S-6 in Appendix 12. These customers will be offered an incentive of 80% rebate with a 20% customer cost share via on-bill financing (for standard SBS/DI program offerings, there is a 70%/30% split). The details of the lighting energy savings for the initial installation and during a demand response event are as follows:

	Average Reduction Provided by Each Device (kW/ballast)		Approximate Reduction From Typical Small Business Project (kW)		Expected DR Savings (kWh savings)
Device	Initial Tuning (90%)	DR Event (80%)	90%	80%	80%
(2) 28 watt reduced wattage T8 lamps powered by normal ballast (2F28EEE)	**0.016**	**0.022**	**0.160**	**0.220**	**180**
(3) 28 watt reduced wattage T8 lamps powered by normal ballast (3F28EEE)	**0.023**	**0.030**	**0.230**	**0.300**	**210**

If it becomes necessary in future years to garner additional load reduction from these participants, the Company would propose in subsequent annual plans to offer tiered demand response options to this group of customers; one for tuning to 80% during events and one for tuning down to 70%. The participants who opt for the 70% lighting level reduction would receive a 10% greater payment for participation.

The Company plans to install sixty thermostats in C&I customers' facilities by 2017. An annual credit for participation in all load curtailment events between June and September will be given to C&I customers in a lump sum credit on their September bill. The Company estimates that these customers will average a savings of approximately 10 kWh per one four hour event utilizing a PCT by reducing their load by an expected 2.5kW as shown in Table S-6 of Appendix 12.

For example, if an average customer received a PCT and participated in all-events in a given month they would receive a monthly credit of $40 for reducing their load. If successful, the Company will review appropriate forms of payment, including valuation, for future NWA proposals.

Marketing and Retention Plan

Customer interest in active participation in the non-wires pilot will be highly dependent on a robust outreach and education program that will educate customers on the value in participating. *Market Penetration Rates for Residential Load Control Programs* discusses successful demand response programs across the country. The customer penetration rates achieved by the programs overall, "have less to do with the incentive offered than with marketing efforts and a long-term commitment to the program."[12]

[12] *Market Penetration Rates for Residential Load Control Programs* by Scott Dunbar and Dulcey Simpkins.published June 1, 2008 and updated December 22, 2009.

The Company is proposing an outreach strategy that would retain customers for a five year period. Customers in the Aquidneck Island pilot learned more from direct outreach to residential customers via bill stuffers, direct mail, email and through earned media (such as a town official mentioning his/her participation in a National Grid pilot or demonstration project).

In order to maximize customer participation and reach the 5,144 residential customers in the Pilot, the Company will implement a multi-channel outreach campaign similar to the Aquidneck Island pilot. The Company will hire an ad agency to develop a campaign theme to be used in all educational measures. Channels considered for the Pilot are direct mail, e-mail, print advertising, telemarketing, and social media. Funds will also be utilized to develop collateral/leave behind materials, develop campaign micro-site, and for attendance at community events. The Company proposes to expand its outreach through additional media selections. In this manner, the Company will test whether these newer outlets provide appropriate levels of communication and understanding for customers.

In the Aquidneck Island pilot, participation was improved through offering an energy audit to customers and making recommendations for energy efficiency measures. A link with advertising for the EnergyWise program for residential audits and RISE for SBS/DI will integrate this proposed Pilot with a comprehensive energy assessment of a customer's home or facility. The Company's goal is to conduct twice the amount of audits as the number of PCTs targeted to be installed. For 2012, the Company is planning on installing 135 PCTs in the Tiverton area with the goal of conducting 270 audits in the same area.

In-person outreach efforts were the most successful in garnering customer registrations for commercial and industrial customers in the Aquidneck Island pilot. The Company plans on utilizing a similar personal approach for C&I customers in the Tiverton area. The goal of obtaining approximately 100 commercial participants out of the population of 450 will allow for more targeted and aggressive education at a relatively low campaign cost. Customers will be educated on the capabilities of the programmable control thermostats and the additional incentive resulting in lower cost to the customer for these devices through the SBS direct install program. A brochure will outline the benefits and details about this program, targeting eligible customers with 2-3 direct mail letters with the brochure enclosed, email blasts, and telemarketing to follow up with customers. The Company will create a campaign landing page on our efficiency web site, www.powerofaction.com, where customers can go to learn more about this specific program. The landing page for this campaign will track results of our mailings by analyzing web traffic and sign up form submissions on the web.

The Company proposes engaging with other entities, such as Environment Northeast (ENE), as well as other state environmental organizations. The Company believes the support of these organizations will improve outreach, education and recruitment to participants.

Funding Plan

The use of targeted efficiency funds has been shown to be cost effective under the energy efficiency plan requirements as shown in the Aquidneck Island pilot. This Pilot is considered both an experiment and test for effectiveness of the NWA approach. Therefore, the Company is proposing to fund the first year of this SRP Pilot through a combination of existing energy efficiency (EE) funds and the additional funds requested above. The existing EE funds will be leveraged by focusing certain energy efficiency programs and measures in the Tiverton/Little Compton area where they would otherwise be applied statewide.

The additional funds being requested through this SRP Report are needed to provide enhanced incentives, offer incentives for additional measures that would not have been offered by the statewide EE programs, additional marketing in the area and general program administration and evaluation.. Although this SRP Report is requesting a commitment to the Pilot as a whole, the Company is only requesting funding for the 2012 SRP budget as shown in Table S-3 below. Costs for future years are estimates only and are subject to change in future SRP Reports. The Company will submit revised budgets each year as part of its annual SRP filing for the Commission's review and approval.

For reasons of convenience, the Company does not wish to add a separate line item to customers' bills for this SRP funding and is therefore proposing to collect the funds needed for this Pilot by rolling it into the existing energy efficiency program charge on customers' bills. The total, additional SRP funding needed for the Project per kWh is $0.0000342. The proposed Energy Efficiency Program charge in the 2012 EEP Plan is $0.00589. With the addition of the SRP funding, if approved, the total Energy Efficiency Program charge would be $0.00592 per kWh for a 10 month period. Details of this calculation are outlined in Table S-1 in Appendix 12. The Company will reconcile actual costs against collected revenues for 2012 and file for additional recovery as part of the 2013 SRP Report.

<u>SRP Six-Year Budget</u>

The Company proposes the following budget information for the years 2012 through 2017. Depending on customer participation levels, the deferral of the wires upgrade project could extend through the summer of 2017. The table below presents the SRP projected costs over the next six years. These costs are not inclusive of any EE funds that

may be leveraged as part of the overall project costs. For example, the base measure cost for the PCTs is included in the budget for the 2012 EEP Plan. Only the additional incentives (extra rebates, DR credit costs, etc.) are proposed as part of the budget detailed below and in Table S-3 of Appendix 12.

Table S-3
National Grid
System Reliability Procurement - Tiverton/Little Compton
Annual Budgets
$(000)

	Program Planning & Administration	Marketing	Rebates and Other Customer Incentives	Sales, Technical Assistance & Training	Evaluation & Market Research	Total
2012	$60.0	$40.0	$71.0	$25.0	$25.0	$221.0
2013	$50.0	$40.0	$76.0	$30.0	$15.0	$211.0
2014	$30.0	$35.0	$94.8	$30.0	$15.0	$204.8
2015	$30.0	$10.0	$103.4	$30.0	$15.0	$188.4
2016	$30.0	$10.0	$112.0	$30.0	$15.0	$197.0
2017	$30.0	$10.0	$128.9	$30.0	$15.0	$213.9
Total	**$230.0**	**$145.0**	**$586.1**	**$175.0**	**$100.0**	**$1,236.1**

Notes:
(1) The 2012 System Reliability Procurement Report seeks approval only for 2012 funds. Future projections over the life of the Tiverton/Little Compton pilot are estimates subject to change.
(2) The annual totals in this table represent only the forecasted funds necessary to run the Tiverton/Little Compton pilot. They do not include costs associated with focused energy efficiency or with SRP participant costs.
(3) All amounts shown are in $2011.

The proposed project is a test of customer willingness, technology and the effectiveness of various education and outreach efforts. With technology changing at a rapid pace, especially in the home energy sector, the Company proposes continuous evaluation of customer preferences and behaviors and advances in technology. Therefore the Company will update its budget for the Pilot each year to adjust the budget as necessary.

The detailed breakdown of costs by year can be found in Appendix 10.

Monitoring and Evaluation

The non-wires solution must be implemented and ready for deployment in customers' homes and able to be deployed on January 1, 2014 per the distribution planning load growth projections. There are several steps which will take place in order to ensure the company meets that deadline. First, in early 2012, meters will be installed at the Tiverton substation on the feeders 33F3 and 33F4 to monitor loads independently both before and during the demonstration project. This will allow the Company to establish a baseline for tracking load reduction and prepare for implementation of the wires plan when necessary.

Second, to prepare for full deployment in 2014, outreach, enrollment and installation of equipment in customers' premises will begin in the spring of 2012, with on-going efforts to reach the levels of participation needed into the spring of 2013, and undergo testing during the summer of 2013. This testing will ensure that customers are familiar with the technology and that their expectations are met. The testing process will also ensure the effectiveness of internal Company procedures during periods where the NWA solution will be utilized. Appendix 11 contains a project management schedule for all major activities for this proposed demonstration project starting from submittal of this plan through the first year of implementation (2014).

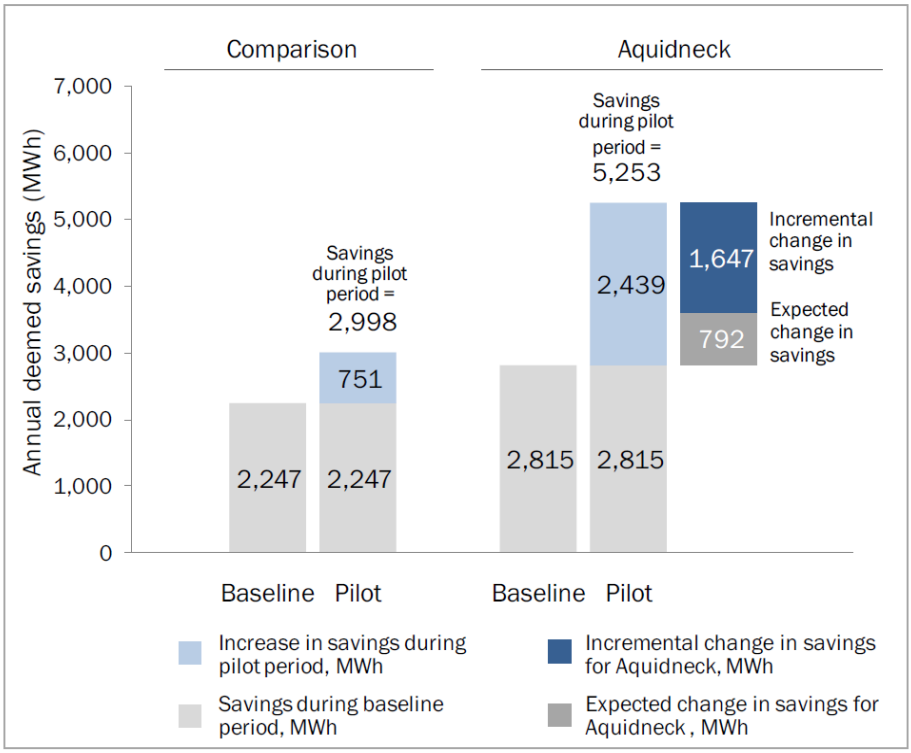
If the proposed rebate strategies are not effective, the Company would look to other options such as other pricing mechanisms to encourage customers to reduce load. The wires solution will undergo coincident planning. If the non-wires alternative is not effective at reducing the necessary load, the Company will proceed with the planned wires solution as soon as possible.

In evaluating whether or not the non-wires solution was effective in deferring a wires project, the following measures will be examined:

- Percentage of load reduction at the substation and on two feeders of concern
- Customer response rate when an individual event occurs
- Customer response rate when multiple events occur
- Customer billing impacts due to deferral of project
- Overall customer satisfaction with demand response programs

Additionally, the Company will revisit the data from the Aquidneck Island Pilot comparison group, which included Tiverton and Little Compton as its control municipalities, to evaluate the energy savings efforts against both the baseline and Aquidneck pilot prior to the NWA. The Pilot proposed in this SRP Report presents an opportunity for Tiverton and Little Compton to reach a similar level of electric incremental savings as experienced in the Aquidneck communities, seen below in Figure 2 from the Aquidneck Island evaluation:

Figure 2. Change in Electric Deemed Savings between Baseline and Pilot Periods, Aquidneck and Comparison Communities



As stated in the Company's Three Year Plan, the Company will provide quarterly updates on the progress and/or performance of this Pilot as well as any future approved NWA projects.

Valuation of Four Year Deferral and Revenue Requirements

National Grid will be able to defer investing $2,874,600 in 2014 through 2017 if enough customers reduce load during peak events during the Pilot. This would allow the Company to prioritize other investment projects without NWA potential. The value from deferral of the proposed wires solution is summarized below. The Company estimated thirty years of revenue requirement from the investment entering service in 2014. The Company proceeded to move the investment one year ahead and calculate the revenue requirement through the next twenty-nine years and continuing for years 2015, 2016 and 2017, respectively, and took the difference between the values from one year to the next. The result of a four- year deferral is the set of net present value benefits as shown in the Table below. The Company converted the $2,874,600 estimate (which is in 2014 dollars)

to 2011 dollars which is represented by $1,959,647 in the "Base Investment" column in the table below[13].

Year		2014	2015	2016	2017
	Base Investment	1 Yr Delay	2 Yr Delay	3 Yr Delay	4 Yr Delay
NPV of Revenue Requirement	$1,959,647	$1,828,888	$1,706,854	$1,592,962	$1,486,670
NPV Annual Value		$130,759	$122,034	$113,891	$106,292
NPV Cumulative savings		$130,759	$252,794	$366,685	$472,977

Benefit/Cost Analysis of NWA Solution

The framework used in this SRP Report for cost-effectiveness is based on the evaluation framework created in the "Evaluation of National Grid's Community Project Program" final report completed by Opinion Dynamics Corporation in October 2011. In this framework, the scope of the benefits and costs used in the Total Resource Cost (TRC) test are inclusive of those associated with the area in question, i.e. occurring in that area as a result of the pilot or project. In the case of this Pilot, the total benefits and costs of both the focused EE efforts combined with the strategies implemented exclusive to the Tiverton/Little Compton area are run through the TRC test to determine cost effectiveness. These costs and benefits are further described later in this section.

The lifetime of this Pilot spans six years from 2012 through 2017. The first two years serve as a ramp-up period for the latter four years, during which the wires project will be deferred. The cost effectiveness of projects like this is most appropriately evaluated over its entire lifetime as opposed to within each year. Therefore, the Company has made an effort to forecast activities for 2013-2017 based on those planned for 2012 in order to develop estimated costs and benefits for the Pilot overall. Because this is a pilot both in terms of objective and, to some extent, technologies employed, it is difficult for the Company to forecast over the entire life of the Pilot. As a conservative approach, it is assumed that measures will be unchanged and participation will remain constant over the life of the pilot, except for a small increase in 2017 participation. This assumption may change in future Annual SRP Reports based on lessons learned from implementation, actual results, or other factors as the Company evaluates the progress of the Pilot. This Pilot is cost effective over its life, with a benefit/cost ratio of 1.82, as well as within each year, as shown in Table S-2 below.

[13] The base investment was converted to $2011 to maintain consistency with all other costs and benefits in the cost-benefit analysis which are also in $2011.

Table S-2
System Reliability Procurement - Tiverton/Little Compton
Summary of Cost Effectiveness ($000)

	2012	2013	2014	2015	2016	2017	Overall
Benefits	**$902.2**	**$932.4**	**$979.7**	**$1,017.7**	**$1,042.8**	**$1,164.3**	**$6,039.1**
Focused Energy Efficiency Benefits[1]	$862.9	$891.9	$786.2	$821.5	$835.1	$940.5	$5,138.0
SRP Energy Efficiency Benefits[2]	$39.3	$40.5	$36.5	$38.2	$49.8	$51.3	$255.6
Demand Reduction Benefits[3]	$0.0	$0.0	$26.3	$36.0	$44.1	$66.2	$172.5
Deferral Benefits[4]	$0.0	$0.0	$130.8	$122.0	$113.9	$106.3	$473.0
Costs	**$562.8**	**$552.8**	**$546.6**	**$530.2**	**$538.8**	**$579.4**	**$3,310.5**
Focused Energy Efficiency Costs[5]	$337.8	$337.8	$337.8	$337.8	$337.8	$361.5	$2,050.4
System Reliability Procurement Costs[6,7]	$225.0	$215.0	$208.8	$192.4	$201.0	$217.9	$1,260.1
Benefit/Cost Ratio	**1.60**	**1.69**	**1.79**	**1.92**	**1.94**	**2.01**	**1.82**

Notes:

(1) Focused EE benefits in each year include the NPV (over the life of those measures) of all TRC benefits associated with EE measures installed in that year that are being focused to the Tiverton/Little Compton area.
(2) SRP EE benefits include all TRC benefits associated with EE measures installed in each year that would not have been installed as part of th
(3) DR benefits represent the energy and capacity benefits associated with the demand reduction events projected to occur in each year.
(4) Deferral benefits are the net present value benefits associated with deferring the wires project (substation upgrade) for a given year in $2011.
(5) EE costs include PP&A, Marketing, STAT, Incentives, Evaluation and Participant Costs associated with statewide levels of EE that have been focused to the Tiverton/Little Compton area. For the purposes of this analysis, they are derived from the planned ¢/Lifetime kWh in Attachment 5, Table E-5 of the 2012 EEPP in the EnergyWise and Small Business Direct Install programs. These are the programs through which measures in this SRP pilot will be offered.
(6) SRP costs represent the 2012 SRPP budget which is separate from the statewide 2012 EEPP budget, as well as SRP participant costs. The SRP budget includes PP&A, Marketing, Incentives, STAT and Evaluation.
(7) All costs and benefits are in $2011.
(8) This SRP report seeks approval only for the 2012 System Reliability Procurement Costs. Future projections over the life of the Tiverton/Little Compton pilot are estimates subject to change.

The Pilot's total costs include both Focused EE costs and SRP costs. Focused EE costs include Program Planning & Administration (PP&A), Marketing, Sales Technical Assistance & Training (STAT), Incentives, Evaluation and Participant Costs associated with statewide EE that has been focused to the Tiverton/Little Compton area. The Focused EE costs associated with this Pilot are approximated by taking the product of the kWh savings expected to be focused through each EE program and the per-kWh cost of each program as presented in the 2012 EEP Plan. This methodology was adopted from the Community Project evaluation report referenced at the beginning of this section. This Pilot plans to focus savings from the statewide Energy*Wise* and Small Business Direct Install programs; therefore, this analysis incorporates the approximated, associated costs from those programs. The expected focused kWh savings for each program are detailed in Table S-4 in Appendix 12.

The SRP costs represent additional funds above those associated with focused EE and are detailed in Table S-3 in Appendix 12. These funds are necessary to provide enhanced incentives, additional measures that would not have been offered by the statewide EE programs, additional marketing in the area and general program administration and

evaluation. Although this SRP Report is requesting commitment to the Pilot as a whole, the Company is only requesting funding for the 2012 SRP costs as shown in Table S-3 in Appendix 12. Costs for future years are estimates only and are subject to change in future Annual SRP Reports. The Company will submit revised budgets each year as part of its annual SRP filing for the Commission's review and approval.

The Pilot's total benefits are categorized into Focused EE benefits, SRP EE benefits, Demand Reduction benefits and Deferral benefits. All of these benefits are detailed in Table S-5 of Appendix 12. The Focused EE benefits in each year represent the NPV (over the life of those measures) of all TRC benefits associated with EE measures installed in that year that are being focused to the Tiverton/Little Compton area. This Pilot plans to focus benefits from the Energy*Wise* and Small Business Direct Install programs.

The SRP EE benefits in each year represent the NPV (over the life of those measures) of all TRC benefits associated with EE measures installed in that year that would not have been installed as part of the statewide EE programs. For now, it is assumed that measures not included in the 2012 EEPP will not be included in the statewide EE plans for 2012-2017. Any changes to this assumption will be reflected in future Annual SRP Reports.

Demand Reduction benefits include energy and capacity benefits associated with the demand reduction events projected to occur in each year. Because demand reduction events are expected to be of short duration, most of these benefits are capacity benefits. Table S-6 in Appendix 12 details these benefits. The "Pilot Implementation" section of this SRP Report provides more information on Demand Reduction events.

The benefit/cost calculation uses an estimate of average Marginal Distribution Costs (MDC) in its calculation of Focused EE benefits and SRP Benefits for the years 2012 and 2013. The MDC estimates the long-term value from reducing the need for additional distribution capacity through the installation and use of energy efficiency measures. In addition, this Pilot proposes deferral of a specific investment through the use of specifically targeted measures to defer a known condition which would result in a Company investment. This is captured in the Deferral benefits. Deferral benefits represent the NPV (over the life of the deferral) of the deferred revenue requirement as a result of delaying the proposed new feeder. The deferral benefit for a given year, e.g. 2014, is entirely claimed if the feeder is not built in that year. Since this decision would have to be made prior to 2014, the benefit can be claimed at the beginning of that year. Once deferral benefits start accruing in 2014, the Company no longer counts the system average MDC.

All costs and benefits in this analysis are in 2011 dollars. The savings associated with this Pilot are categorized in the same way as the benefits. They are shown in Table S-4 of Appendix 12.

As forecasted, this Pilot will create over $6 million in benefits in the Tiverton/Little Compton area over its six year lifetime. For each $1 invested, this Pilot will create $1.82 of economic benefits over the lifetime of the six-year investment. Most importantly, however, it will provide the load relief needed to defer the construction of a new substation through 2017 as shown in Table S-7 below.

Table S-7
System Reliability Procurement - Tiverton/Little Compton
Potential for Wires Project Deferral at Year Begin

	2012	2013	2014	2015	2016	2017
Total Installed kW from Energy Efficiency	**109**	**109**	**109**	**109**	**109**	**116**
Focused Energy Efficiency	105	105	105	105	105	112
SRP Energy Efficiency	3	3	3	3	3	3
Total Forecasted Potential kW from Demand Reduction	**-**	**182**	**363**	**553**	**742**	**932**
Thermostats - Residential	-	156	313	469	625	781
Thermostats - C&I	-	25	50	75	100	125
Appliance Direct Load Control Measures - Residential	-	-	-	8	16	24
Lighting Tuning - C&I	-	0	1	1	1	2
Total kW Reduction	109	290	472	661	851	1,048
Total kW Reduction Needed to Defer Wires Project	-	-	150	390	630	860
kW in Reserve(3)	**n/a**	**n/a**	**322**	**271**	**221**	**188**

Notes:
(1) All kW amounts are Summer kW.
(2) E.g., At the beginning of 2014, there will be 472kW either installed through EE or available through demand reduction to meet the 150kW need.
(3)kW in Reserve acts as insurance against customers overriding the demand reduction themselves, so that the required reduction is still met.

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2. Historical and forecast coincident summer peak demands for the Company
3. 2010 Western NECO PSA forecast
4. 2002 - 2011 Historical loads on the Tiverton 33F3 and 33F4 feeders
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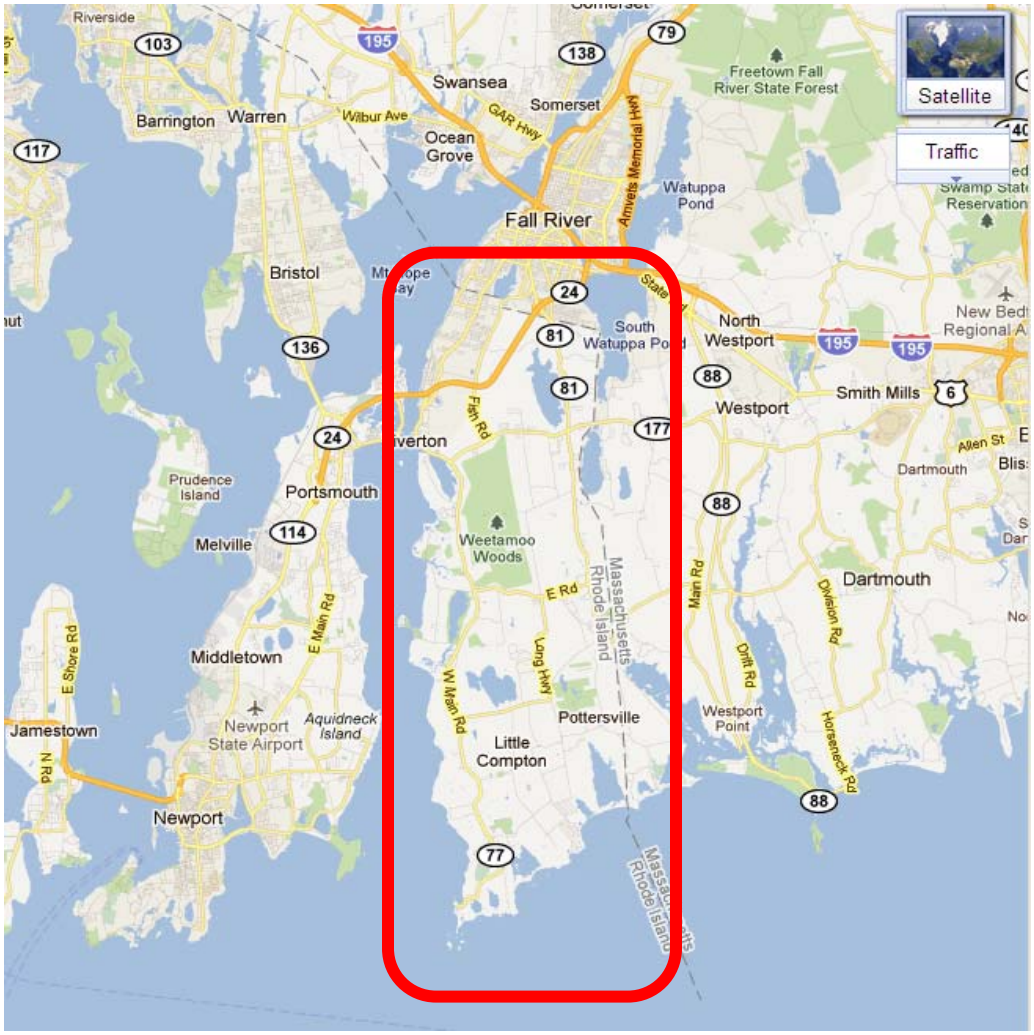
11. Project Management Schedule
12. Benefit-Cost Tables

Appendix 1 – Geographic overview of the area served by Tiverton substation



Appendix 2

PSA FORECAST 2010
NARRAGANSETT ELECTRIC COMPANY
SUMMER PEAK DEMANDS COINCIDENT WITH COMPANY PEAK
ACTUAL HISTORY AND FORECAST WITH EXTREME WEATHER AND DSM (MW)

Year	Mo	Sum of Narragansett PSAs	Growth Rate	Providence PSA	Growth Rate	Western PSA	Growth Rate	Blackstone PSA	Growth Rate	Newport PSA	Growth Rate
1999	7	1,510.600	6.5%	397.000	3.4%	736.000	10.8%	265.700	(1.2%)	111.900	10.2%
2000	8	1,475.400	(2.3%)	393.200	(1.0%)	694.600	(5.6%)	278.800	4.9%	108.800	(2.8%)
2001	8	1,663.324	12.7%	428.366	8.9%	809.650	16.6%	304.708	9.3%	120.600	10.8%
2002	8	1,687.100	1.4%	435.500	1.7%	823.600	1.7%	310.500	1.9%	117.500	(2.6%)
2003	8	1,635.877	(3.0%)	427.664	(1.8%)	810.294	(1.6%)	277.719	(10.6%)	120.200	2.3%
2004	8	1,601.714	(2.1%)	421.297	(1.5%)	773.807	(4.5%)	289.110	4.1%	117.500	(2.2%)
2005	8	1,787.842	11.6%	450.357	6.9%	888.742	14.9%	321.643	11.3%	127.100	8.2%
2006	8	1,931.975	8.1%	496.525	10.3%	957.751	7.8%	334.899	4.1%	142.800	12.4%
2007	8	1,760.051	(8.9%)	453.880	(8.6%)	873.969	(8.7%)	304.101	(9.2%)	128.101	(10.3%)
2008	6	1,781.256	1.2%	469.340	3.4%	871.427	(0.3%)	321.389	5.7%	119.100	(7.0%)
2009	8	1,675.809	(5.9%)	436.014	(7.1%)	825.661	(5.3%)	287.434	(10.6%)	126.700	6.4%
Forecast											
2010	8	1,778.796	6.1%	455.511	4.5%	893.127	8.2%	300.408	4.5%	129.749	2.4%
2011	8	1,803.921	1.4%	456.295	0.2%	916.508	2.6%	300.242	(0.1%)	130.877	0.9%
2012	8	1,846.655	2.4%	460.702	1.0%	950.214	3.7%	301.733	0.5%	134.006	2.4%
2013	8	1,895.332	2.6%	466.511	1.3%	987.110	3.9%	304.060	0.8%	137.651	2.7%
2014	8	1,930.434	1.9%	469.695	0.7%	1,015.758	2.9%	305.344	0.4%	139.638	1.4%
2015	8	1,960.015	1.5%	471.806	0.4%	1,041.059	2.5%	306.197	0.3%	140.953	0.9%
2016	8	1,987.663	1.4%	473.542	0.4%	1,065.188	2.3%	306.899	0.2%	142.034	0.8%
2017	8	2,013.813	1.3%	474.987	0.3%	1,088.410	2.2%	307.484	0.2%	142.932	0.6%
2018	8	2,038.416	1.2%	476.131	0.2%	1,110.694	2.0%	307.949	0.2%	143.642	0.5%
2019	8	2,061.758	1.1%	477.030	0.2%	1,132.214	1.9%	308.315	0.1%	144.199	0.4%
2020	8	2,085.384	1.1%	477.984	0.2%	1,153.908	1.9%	308.702	0.1%	144.790	0.4%
2021	8	2,108.880	1.1%	478.912	0.2%	1,175.523	1.9%	309.079	0.1%	145.365	0.4%
2022	8	2,132.250	1.1%	479.815	0.2%	1,197.063	1.8%	309.446	0.1%	145.925	0.4%
2023	8	2,155.657	1.1%	480.725	0.2%	1,218.626	1.8%	309.816	0.1%	146.490	0.4%
2024	8	2,178.909	1.1%	481.605	0.2%	1,240.096	1.8%	310.173	0.1%	147.035	0.4%

Compound Annual Growth
==========

1999-2009 Ten Year	1.0%	0.9%	1.2%	0.8%	1.2%
2009-2014 Five Year	2.9%	1.5%	4.2%	1.2%	2.0%
2009-2019 Ten Year	2.1%	0.9%	3.2%	0.7%	1.3%
2009-2024 Fifteen Year	1.8%	0.7%	2.7%	0.5%	1.0

Appendix 3

PSA FORECAST 2010
NARRAGANSETT ELECTRIC COMPANY
WESTERN NECO PSA
PSA COINCIDENT SUMMER PEAK DEMAND WITH DSM (MW)

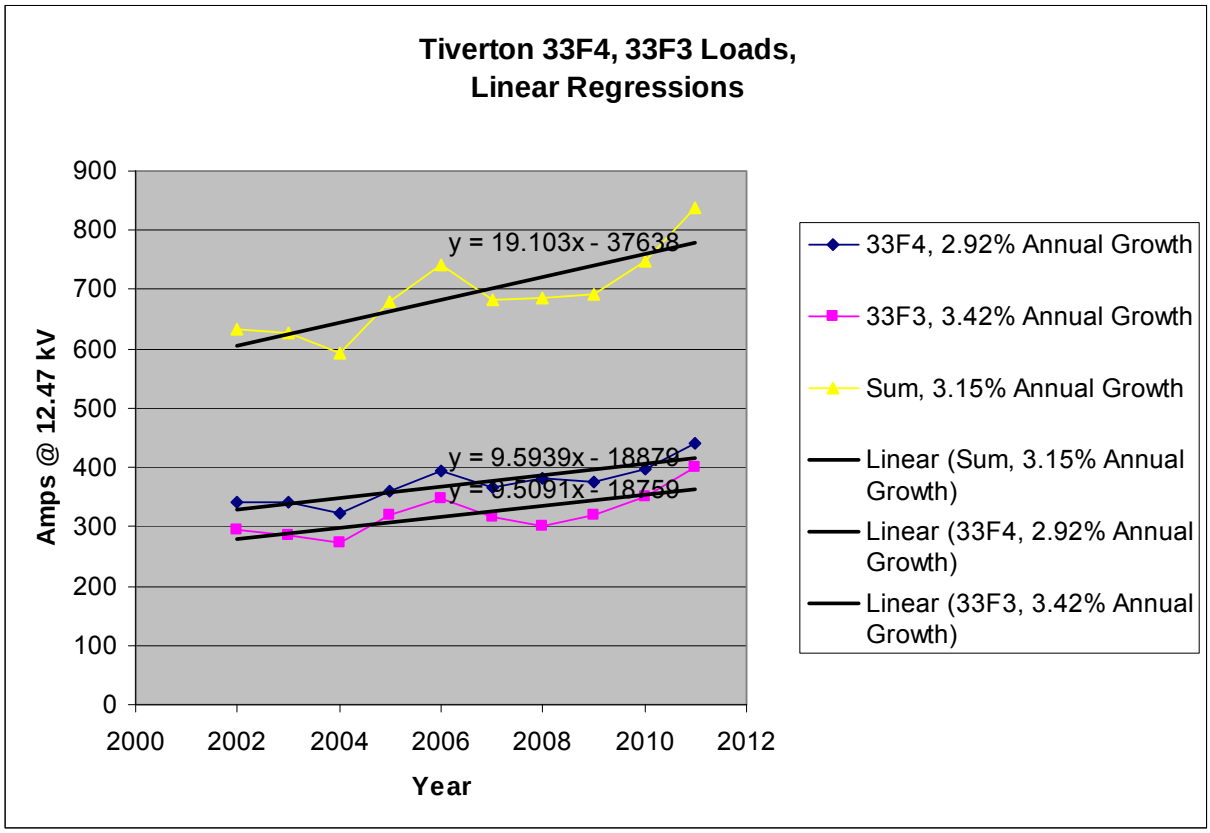
		With Actual History				With Weather Adjusted History					
Year		Extreme Weather Scenario	Growth Rate	Normal Weather Scenario	Growth Rate	Extreme Weather Scenario	Growth Rate	Normal Weather Scenario	Growth Rate	Incremental DSM	% of Load
2004	8	773.807	.	773.807	.	895.533	.	846.842	.	0.000	0.0%
2005	8	888.742	14.9%	888.742	14.9%	888.742	(0.8%)	836.732	(1.2%)	0.000	0.0%
2006	8	957.751	7.8%	957.751	7.8%	948.529	6.7%	893.199	6.7%	0.000	0.0%
2007	8	873.969	(8.7%)	873.969	(8.7%)	932.619	(1.7%)	873.969	(2.2%)	0.000	0.0%
2008	6	871.427	(0.3%)	871.427	(0.3%)	884.328	(5.2%)	822.359	(5.9%)	0.000	0.0%
2009	8	829.540	(4.8%)	829.540	(4.8%)	880.069	(0.5%)	814.779	(0.9%)	0.000	0.0%
Forecast											
2010	8	893.127	7.7%	824.518	(0.6%)	893.127	1.5%	824.518	1.2%	-1.036	(0.1%)
2011	8	916.508	2.6%	844.579	2.4%	916.508	2.6%	844.579	2.4%	2.664	0.3%
2012	8	950.214	3.7%	874.965	3.6%	950.214	3.7%	874.965	3.6%	4.958	0.5%
2013	8	987.110	3.9%	908.541	3.8%	987.110	3.9%	908.541	3.8%	5.106	0.5%
2014	8	1,015.758	2.9%	933.870	2.8%	1,015.758	2.9%	933.870	2.8%	5.159	0.5%
2015	8	1,041.059	2.5%	955.851	2.4%	1,041.059	2.5%	955.851	2.4%	5.207	0.5%
2016	8	1,065.188	2.3%	976.660	2.2%	1,065.188	2.3%	976.660	2.2%	5.254	0.5%
2017	8	1,088.410	2.2%	996.562	2.0%	1,088.410	2.2%	996.562	2.0%	5.299	0.5%
2018	8	1,110.694	2.0%	1,015.527	1.9%	1,110.694	2.0%	1,015.527	1.9%	5.342	0.5%
2019	8	1,132.214	1.9%	1,033.727	1.8%	1,132.214	1.9%	1,033.727	1.8%	5.384	0.5%
2020	8	1,153.908	1.9%	1,052.101	1.8%	1,153.908	1.9%	1,052.101	1.8%	5.425	0.5%
2021	8	1,175.523	1.9%	1,070.396	1.7%	1,175.523	1.9%	1,070.396	1.7%	5.465	0.5%
2022	8	1,197.063	1.8%	1,088.617	1.7%	1,197.063	1.8%	1,088.617	1.7%	5.504	0.5%
2023	8	1,218.626	1.8%	1,106.860	1.7%	1,218.626	1.8%	1,106.860	1.7%	5.542	0.5%
2024	8	1,240.096	1.8%	1,125.010	1.6%	1,240.096	1.8%	1,125.010	1.6%	5.580	0.4%

Compound Annual Growth

2004-2009 Five Year	1.4%	1.4%	(0.3%)	(0.8%)
2009-2014 Five Year	4.1%	2.4%	2.9%	2.8%

2009-2019 Ten Year	3.2%	2.2%	2.6%	2.4%
2009-2024 Fifteen Year	2.7%	2.1%	2.3%	2.2%

Appendix 4 - 2002 - 2011 Historical loads on the Tiverton 33F3 and 33F4 feeders



Appendix 5 – Detailed Engineering Work for the Wires Plan

Major Distribution Work for the 33F5 Feeder

Install 1000 kcmil Al underground cable from the Tiverton Substation to pole 29 ½ Souza Rd in the existing duct bank. Add a second overhead circuit using 477 Al spacer cable from pole 29 ½ Souza to pole 120 Main Rd in Tiverton. Reconductor 1/0 Al overhead wire from pole 144 to pole 170 Main Rd in Tiverton. Also, add a second overhead circuit (477 Al spacer cable) from pole 327 Nanaquaket Rd to pole 116 East Rd (along Main Rd) in Tiverton. Install two loadbreak switches. This new feeder will provide load relief to the Tiverton 33F2, 33F3 and 33F4 feeders.

Appendix 6 – Aquidneck Island Evaluation

EVALUATION OF NATIONAL GRID'S COMMUNITY PILOT PROGRAM

ENERGY ACTION: AQUIDNECK AND JAMESTOWN

Final Report

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1. EXECUTIVE SUMMARY

The Aquidneck Island pilot (Aquidneck pilot) was a community-based energy efficiency pilot program implemented in the towns of Jamestown, Middletown, Newport, and Portsmouth, Rhode Island from July 2009 through December 2010. The purpose of the pilot was to increase energy efficiency savings from National Grid programs in a specific geography, by marketing existing residential and commercial programs through a unique community-based approach. The pilot was also an opportunity to examine whether customer-side solutions such as energy efficiency could address transmission and distribution system planning and reliability issues.

National Grid designed *Energy Action: Aquidneck & Jamestown* to package and market existing National Grid residential, municipal, and commercial efficiency programs to customers through community outreach channels.[1] The Program Administrator (PA) designed a community-based marketing campaign that focused on creating and maintaining community partnerships to help market efficiency programs. Two primary community groups received direct funding from National Grid to organize, promote, and implement community events and outreach: the Aquidneck Island Planning Commission (AIPC) and Neighborhood Energy Challenge (NEC). The PA also worked with the local Chamber of Commerce to design events that might attract local business leaders.

By creating partnerships with community organizations, the PA aimed to market the program through new and creative tactics such as sponsorships or contests, as well as traditional advertising. For example, AIPC conducted direct outreach and hosted energy-related events throughout the pilot period, including an Energy Breakfast for town officials and local business leaders. The NEC created a community-based energy-saving contest to encourage residents to track their energy use and find ways to reduce electricity, home heating fuel, and transportation fuel consumption. Community partners also coordinated press releases and editorials in local papers that highlighted upcoming *Energy Action* events and energy efficiency opportunities (e.g., an energy audit of the Mayor of Newport's home).

Additionally, the PA worked with the energy efficiency marketing team to brand the pilot program through a community-focused marketing campaign and website. The PA developed a unique brand for the Aquidneck pilot – *Energy Action: Aquidneck & Jamestown* – and used it on the website and in program marketing materials, such as newspaper advertisements, bill inserts, door hangers, and community event displays.[2] The PA sponsored the website and local advertising that promoted community events (e.g., a *Power to Save* night at local schools, and a contest for Newport Gulls baseball tickets). PA program staff also launched a "Main Streets" approach to small business outreach, going door-to-door with program materials to talk to small business owners about energy efficiency opportunities.

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[1] Electric and gas energy efficiency programs offered during the pilot were based on standard National Grid programs and incentives in Rhode Island, and relied on the same implementation staff that was responsible for implementing these programs elsewhere in Rhode Island.

[2] Community partners could use their own branding as well as *Energy Action* to promote energy efficiency opportunities.

Evaluation Objectives

This evaluation addresses two key questions: First, whether the community-based energy efficiency approach used in the Aquidneck pilot is a cost-effective method for increasing energy savings, and second, whether the Aquidneck pilot program approach is replicable as a geographically focused energy efficiency program strategy for increasing participation.

To address the first question, we use a quasi-experimental design approach to calculate net incremental impacts attributable to the pilot. These net incremental impacts become inputs to a Total Resource Cost test (TRC) that is based on the 2010 Rhode Island Benefit-Cost analysis tool.

To assess the second question, we consider two dimensions of replicability – first, whether the pilot program design is worth replicating as an energy efficiency strategy (for increasing participation and savings), and second, what pilot implementation tactics proved effective in driving pilot results. We then draw conclusions regarding what implementation tactics PAs could or should consider for other community-based programs.

Please note that this evaluation does not cover the pilot's effectiveness as a transmission and distribution (T&D) deferral strategy, though it does explore peak load changes at a high level, and discusses measurement and evaluation considerations for future assessment of T&D deferral benefits. Although the program was initially planned as a T&D deferral project in 2008, T&D planning efforts were not fully developed in 2008 when the Aquidneck pilot was planned. Therefore, the program continued as an energy efficiency project without setting T&D goals or establishing a measurement framework for tracking T&D deferral benefits during the program. Consequently, we were unable to definitively answer whether this type of program approach works as a deferral of T&D costs.

Pilot Cost-Effectiveness

The targeted, community-based marketing and outreach efforts were effective in driving incremental participation in both residential and commercial energy efficiency programs.[3] As Figure 1 shows, the pilot delivered incremental electric savings from energy efficiency programs, surpassing both the baseline savings level in Aquidneck and the increase that was expected based on a matched comparison groups' savings in the pilot period.[4,5] The pilot was cost-effective in delivering electric energy savings, with an overall Benefit-Cost ratio of 2.26.[6] The pilot did not have an impact on gas energy savings.[7]

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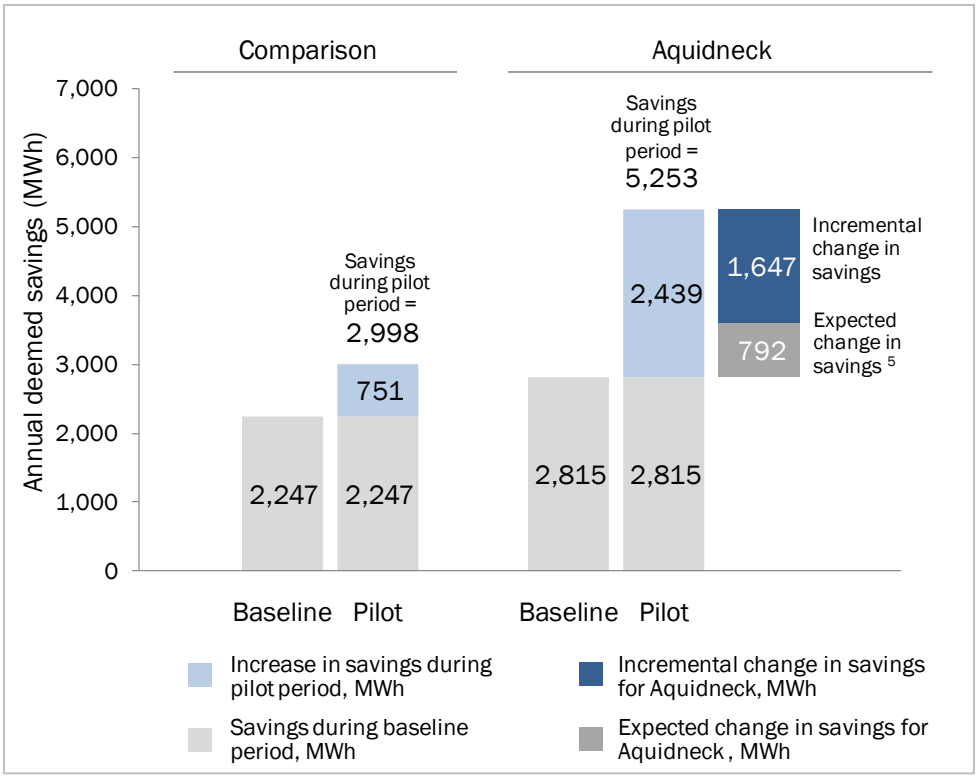
[3] The pilot targeted Small, Medium, and Municipal Commercial & Industrial customers. The pilot did not include marketing and outreach to C&I managed accounts, or Large C&I.

[4] Energy efficiency savings achieved from the same National Grid efficiency programs in comparison towns of Barrington, Warren, Bristol, Tiverton, and Little Compton served as a reference for estimating energy efficiency program savings we would expect in the Aquidneck region in the absence of the pilot.

[5] Expected change in savings for Aquidneck is equal to the increase in average savings per account in comparison towns in the pilot period versus the baseline period, multiplied by the number of customer accounts in Aquidneck. Section 2 of the final report describes methodology in more detail.

[6] The numerator of the Benefit-Cost ratio is total resource benefits from incremental program savings, i.e., avoided costs of capacity, energy, and non-electric benefits. The denominator is incremental program costs, which include standard program costs as well as pilot-specific implementation costs. For this calculation, pilot implementation costs exclude evaluation costs; with evaluation costs included, the Benefit-Cost ratio is 2.12.

Figure 1. Electric Impact from Pilot Program



The pilot's ability to deliver incremental electric energy savings from existing programs, with a relatively low implementation cost, drove its cost-effectiveness. Key achievements of the pilot that contributed to cost-effectiveness include:

- Commercial electric programs achieved 53.0% incremental savings during the pilot – in other words, 53.0% of the Aquidneck savings achieved from PA energy efficiency programs are above the savings level we would expect in the absence of the pilot.[8]
- Residential electric programs achieved incremental savings of 12.8% in Aquidneck during the pilot period, and residential gas programs achieved 15.2% incremental savings.
- *Energy Action* messages and information likely influenced between 20-25% of residential households that participated in a PA energy efficiency program during the Aquidneck pilot, to participate in a program.

Based on the Aquidneck pilot's success in delivering cost-effective incremental electric savings among both residential and commercial customers and feedback from program participants, we conclude that the variety of marketing and outreach activities implemented by National Grid and community-based partners a) succeeded in reaching potential

[7] While overall gas savings in Aquidneck during the pilot increased slightly above baseline savings, gas savings in the comparison group increased by a larger amount.

[8] Incremental savings are based on a difference-in-difference analysis of energy efficiency savings achieved during a baseline period and in a matched group of comparison towns.

participants, and b) influenced customers' decision to participate in energy efficiency programs. For these reasons, National Grid should consider similar program design elements for future energy efficiency programs.

Pilot Implementation Effectiveness

Key findings regarding the effectiveness of pilot implementation can help answer the question of how the pilot could be replicated. Here we summarize key findings from the process component of the Aquidneck pilot evaluation:

- Varying and repeating energy efficiency messages through different sources, channels, and brands was an effective method for reaching customers throughout the community.
- Mass media – including newspaper (stories, press releases, ads) and radio – provided the most effective outreach for generating awareness of *Energy Action* activities.
- The door-to-door "Main Streets" approach seemed to be effective for generating participation among small businesses, as Small C&I electric program activity increased substantially when door-to-door promotion ramped up.
- Early engagement of partner organizations and business leaders was useful in garnering support for the pilot and building program processes.
- Sharing feedback with stakeholders – including partner organizations – helped increase pilot effectiveness by enabling stakeholders to adapt approaches in response to success metrics.
- Building community partnerships and facilitating outreach through community organizations required more PA resources than anticipated – particularly staff time and in-person visits.
- Leveraging existing programs proved to be an effective strategy for delivering incremental savings and program participation, with incremental savings results described above.

In combination, the cost-effectiveness of the pilot, its success in generating incremental program savings, and our qualitative findings on the effectiveness of implementation methods indicate that the Aquidneck pilot model could be replicated in other communities.

Implications for Replicability

The Aquidneck pilot demonstrated that the community-based program strategy is worth replicating (due to its cost-effectiveness) and replicable (as a process), though the specific tactics may be difficult to replicate per se. Here we discuss a few considerations for PAs planning to replicate the Aquidneck pilot as a geographically focused energy efficiency program strategy for increasing participation.

Building community partnerships and facilitating outreach through community organizations requires staff resources as well as monetary investment. To optimize the use of PA resources for community-based efforts, PA staff should define the type of relationship they wish to have with community partners, and refine community partner selection and partnership agreements accordingly.

When designing a program with multiple stakeholders who share marketing responsibilities, we recommend maintaining a program strategy that allows for change based on input from community partners and ongoing feedback on successes and failures. This pilot demonstrated that it is important to hold program strategy and kickoff meetings early in the process with key community partners (and stakeholders) to begin building program processes, and empower stakeholders as early as possible.

In future community-based efforts, we recommend creating metrics to capture marketing effectiveness that can be shared with stakeholders and implementers, and developing processes to share these metrics in real time with partners and implementers. During the Aquidneck pilot, National Grid and community partners were able to modify tactics quickly in response to program participation feedback as well as marketing and outreach opportunities.

Finally, repeating similar messages that vary by source, channel, and brand is an effective method of reaching customers (based on customer recall and stakeholder feedback). For example, newspaper articles and press releases – such as a story about a community leader's home audit – proved effective in generating interest in energy efficiency programs. This pilot showed that it is not necessary to maintain tight control over brand and marketing tactics to generate incremental participation in energy efficiency programs.

2. OVERVIEW OF EVALUATION

National Grid engaged Opinion Dynamics Corporation to assess the cost-effectiveness and replicability of an innovative community-based pilot program. We calculated the cost-effectiveness of the pilot using a standard total resource cost test approved for use in Rhode Island. We examined the effectiveness of the pilot implementation in terms of driving incremental participation in existing energy efficiency programs. We also assessed program processes such as the engagement of community groups and marketing tactics. Given that future replication was an overarching goal of National Grid in implementing the pilot, we designed the evaluation approaches to share information about the effectiveness of the pilot that can help with future community-based program design.

We first discuss the program itself followed by our evaluation objectives and the methods used to answer research questions. Section 3 presents integrated findings.

2.1 Program Under Assessment

Energy Action: Aquidneck & Jamestown is a community-based pilot program designed to package and market existing residential, municipal, and commercial efficiency programs to customers through community outreach channels. The pilot began in July 2009. The purpose of the pilot was to increase participation in energy efficiency programs in a concentrated geographical area to investigate whether community-based initiatives increase energy efficiency program uptake (participation) and whether there are any transmission and distribution deferral benefits. The program fully integrated gas and electric, and commercial and residential programs under a community umbrella.

The pilot targeted residents, businesses, and municipalities in the towns of Jamestown, Middletown, Newport, or Portsmouth, Rhode Island. We chose the communities in 2008 based on their geographically constrained transmission and distribution networks and community interest. The customer base (in 2010) was 35,356 electric customers (30,162 residential and 5,194 non-residential) and 11,423 gas customers (10,033 residential and 1,390 non-residential).

Energy efficiency program offerings during the pilot are based on standard National Grid programs and incentives in Rhode Island, and rely on the same implementation staff that is responsible for implementing these programs elsewhere in Rhode Island.[9]

2.1.1 Pilot Program Design

The program focused on creating and maintaining community partnerships to help market the regular efficiency programs and on designing a community-based marketing campaign. The goal of program design was to increase uptake in the energy efficiency programs currently active in Rhode Island. Additionally, National Grid wanted to determine whether

[9] One exception to standard incentives: For municipal Whole Building Assessment customers, National Grid offered to waive fee of the business analysis study from what is usually a cost-sharing arrangement.

transmission and distribution deferral savings were possible from additional customer-side energy efficiency actions.

The Energy Action PA worked with other National Grid energy efficiency program administrators to achieve savings in the four pilot towns through additional marketing of existing efficiency programs to the communities. By creating partnerships with community organizations, the PA was hoping to identify new and creative ways to market the program through sponsorships and contests, as well as traditional advertising. Additionally, the PA worked with the energy efficiency marketing team to brand the pilot program through a community-focused marketing campaign and website.

Energy Action set savings goals relative to savings achieved through electric and gas programs in Aquidneck and Jamestown in 2008. The pilot's goals were to (1) triple 2008 electric savings among residential and commercial customers by the end of 2010, (2) triple residential gas savings by the end of 2010, and (3) maintain C&I gas savings at 2008 levels.[10] To track the program's savings goals, the PA monitored participation in most National Grid programs[11] in the four Aquidneck pilot towns and used Rhode Island approved savings assumptions for each measure within a program to estimate the total savings.

Table 1. 2008 Baseline Consumption and Pilot Goals

Fuel and Sector	2008 Baseline		Pilot Goals	
Electric	MWh Savings	% Savings	MWh Savings	% Savings
Residential	709.1	0.35%	2,088.5	1.03%
C&I	821.5	0.25%	3,681.7	1.10%
All Electric	1,530.6	0.29%	5,770.2	1.08%
Gas	MMBtu Savings	% Savings	Therm Savings	% Savings
Residential	152.3	0.01%	432.6	0.03%
C&I	6,104.6	0.29%	8,000.0	0.38%
All Gas	6,256.9	0.30%	8,432.6	0.41%

In 2009, the program leveraged the marketing budgets from Rhode Island energy efficiency programs. In 2010, the program received its own budget. Including marketing expenses, and community partner costs, the incremental cost of implementing the pilot was $165,798 over the duration of the pilot.[12]

[10] Because many larger gas C&I accounts participated in gas energy efficiency programs in 2008, the pilot set goals to levelize C&I savings rather than increase savings.

[11] Participation and savings were tracked in all RI programs except ENERGY STAR Homes, and large managed C&I accounts.

[12] Note that these incremental costs exclude evaluation costs, to illustrate what costs might be if the pilot were replicated.

2.2 Evaluation Objectives

The primary objective of this evaluation is to determine whether the community pilot program was a cost-effective strategy for increasing energy savings through participation in existing National Grid energy efficiency programs. National Grid is interested in whether energy efficiency programs marketed through the community continue to be cost effective under the Rhode Island TRC for both gas and electric programs after considering the additional marketing costs of the community outreach activities.

The secondary objective of this evaluation is to determine whether the Aquidneck pilot program approach is replicable as a geographically focused energy efficiency program strategy for increasing participation.

This evaluation also discusses evaluation considerations for future assessment of community-based programs that may have T&D deferral or substitution goals. Although the program was initially planned as a T&D deferral project in 2008, T&D planning efforts were not fully developed in 2008 when the Aquidneck pilot was planned. Therefore, the program continued as an energy efficiency project without setting T&D goals or establishing a measurement framework for tracking T&D deferral benefits during the program. Consequently, we were unable to draw conclusions on whether this type of program approach works as a deferral of T&D costs. Instead, we explore peak load changes at a high level, and discuss measurement and evaluation considerations for future assessment of T&D deferral or substitution benefits.

2.3 Study Method

2.3.1 Energy Impact and Cost-Effectiveness

Impact Analysis Approach

To determine the energy impact of the pilot, we used a quasi-experimental design approach. This approach compares two groups – the Aquidneck towns and a set of matched comparison towns – across two periods – the Pilot period and a Baseline period occurring before pilot implementation. This quasi-experimental design enables the calculation of net incremental impacts attributable to the pilot. These net incremental impacts are the basis of the Benefit-Cost analysis that we use to determine the cost-effectiveness of the pilot.

To assure equal footing with other energy efficiency program cost-effectiveness analyses, National Grid provided the evaluation team with a TRC analysis tool for 2010 Rhode Island Benefit-Cost calculations. We input incremental impacts into the model based on our comparative analysis, and National Grid provided pilot costs to enable the total resource cost test.

We define “incremental impact” as an increase in energy savings attributable to the pilot efforts, beyond the energy savings we would have expected in Aquidneck without the pilot. We applied a difference in differences approach to determine incremental impacts. First we compared gross energy savings from energy efficiency program participation in the

Aquidneck pilot region during the 18 months of the pilot efforts (pilot period)[13] with energy savings in the Aquidneck region during the 18 months before the pilot began (baseline period).[14] Second, we compared this difference in savings in Aquidneck between the pilot and baseline periods with the difference in savings in a matched comparison region between the same pilot and baseline periods. The incremental savings analysis compares combined program activity (savings across multiple programs) for the towns targeted by the pilot effort to savings from the same programs in the comparison region. This analysis essentially controls for natural trends, i.e., changes in program participation and savings that would have occurred even without the pilot. This is important because overall statewide goals for energy efficiency programs in Rhode Island increased in 2009 and again in 2010.

A key part of this analysis is the matched comparison group. The comparison group consists of Rhode Island towns that are similar to the Aquidneck region in demographic, housing, and customer characteristics, and had been exposed to the same energy efficiency programs but were not exposed to the additional National Grid energy efficiency marketing and outreach offered through the pilot.

We included the towns of Barrington, Warren, Bristol, Tiverton, and Little Compton in the comparison group. We selected these based on similarities with the pilot towns with respect to:

- Total population
- Geography (they are all island or peninsular towns, like the four pilot towns)
- Demographics (the comparison group has similar household income levels, but slightly lower education levels)
- Housing (the comparison group has a higher owner-occupancy rate and share of single-family homes).[15]

We also considered the availability of National Grid gas service in these towns, and included Little Compton to balance Jamestown, neither of which have National Grid gas service. The table below provides key characteristics for the pilot towns and the comparison group. While income, education, and single-family home occupancy are fairly similar between the groups, owner occupancy is lower in the Aquidneck region due to the inclusion of Newport, which has a lower owner occupancy rate than most Rhode Island towns. We note that this difference in owner occupancy may affect the ability of residents to take advantage of rebate and installation-based energy efficiency programs.

[13] 7/1/2009 to 12/31/2010

[14] 1/1/2008 to 6/30/2009

[15] Demographic and housing comparability of Aquidneck and comparison group towns was based on US Census data from the 2000 Decennial Census, as updated data at a town level was not available when we made our initial selections. Here, we show the more recent data – from the 2005-2009 American Community survey – to demonstrate the current comparability of the two groups. Data from the 2000 Census is shown in the Appendix.

Table 2. Demographic and Customer Characteristics of Aquidneck and Comparison Groups, 2005-2009

Characteristics	Aquidneck Pilot Towns	Comparison Group
Community Characteristics[a]		
Total population	63,061	68,654
Total households	26,470	26,510
Median household income (wgtd. average)	$ 65,711	$ 68,878
% Adults 25+ with Bachelor's Degree or higher	46%	38%
% Owner-Occupied Housing Units	60%	75%
% Single-Family Housing Units	63%	75%
Customer Characteristics[b]		
Residential Electric Customer Accounts	30,162	30,146
Residential Gas Customer Accounts[c]	10,033	12,318
Commercial Electric Customer Accounts	5,194	3,386
Commercial Gas Customer Accounts[c]	1,390	1,077

[a]Source: US Census American Community Survey 2005-2009 5-year estimates, [b]Source: National Grid Customer Account System (2010 Customer Accounts), [c] Number of gas customer accounts in 2010.

Programs Under Evaluation

To estimate electric and gas savings from each region – Aquidneck and comparison – in each period – Pilot and Baseline, we compiled all energy efficiency program participant data from residential and commercial programs that were promoted in the Aquidneck region during the pilot.[16] We classified each participation record in each energy efficiency program as occurring in the baseline vs. pilot period based on the same date fields that National Grid uses to classify participation in a certain year (e.g., invoice date).

Table 3. summarizes the program participation data we included in the cost-effectiveness analysis. All programs were available in the comparison communities and Aquidneck communities during the evaluation period. All but one measure (the refrigerator recycling measure in the ENERGY STAR® program) were available for the duration of the evaluation period.[17]

[16] Upstream lighting measures are excluded from analysis as program tracking does not enable attribution of rebates to the pilot vs. comparison region. Very Large C&I (over 750 kW) and managed accounts are also excluded from analysis, as they were not part of the pilot effort.

[17] Refrigerator recycling became available during the pilot period. We keep the refrigerator recycling measure in analysis because it was a focus of incremental marketing and outreach activities, and it was available in the comparison communities during the same time period.

Table 3. National Grid Energy Efficiency Program Included in Cost-Effectiveness Analysis

Program	Sector[a]	Aquidneck		Comparison	
		Baseline Period	Pilot Period	Baseline Period	Pilot Period
National Grid Electric Programs					
Design 2000plus	C	X	X	X	X
Energy Initiative	C	X	X	X	X
Small and Medium Business Applications	C	X	X	X	X
EnergyWise (Single-Family and Multi-Family)	R	X	X	X	X
ENERGY STAR® Lighting (Coupon and Ordered)	R	X	X	X	X
ENERGY STAR® Appliances	R	X	X	X	X
Appliance Recycling	R		X		X
ENERGY STAR® Air Conditioning	R	X	X	X	X
National Grid Gas Programs					
Commercial Energy Efficiency Program (Custom)	C	X	X	X	X
Commercial High Efficiency Heating (Prescriptive)	C	X	X	X	X
High-Efficiency Heating Equipment (HEHE)	R	X	X	X	X
EnergyWise (Single-Family and Multi-Family)	R	X	X	X	X

[a] C=Commercial, R=Residential

Incremental Savings Calculation

We performed a comparison of the kWh and therm savings between the pilot and comparison groups to determine the incremental savings associated with the pilot. Because the pilot and comparison groups are different in terms of numbers of accounts, the comparisons must be normalized by the number of accounts; therefore, we used average savings per account as the unit of comparison. For example:

Assume the Aquidneck group (A) includes 35,000 accounts.
Assume the comparison group (C) includes 33,000 accounts.

Assume Aquidneck kWh savings (A) to be:

$$\text{Baseline}_A = 2{,}250{,}000/35{,}000 = 64.3 \text{ kWh/acct}$$
$$\text{Pilot}_A = 3{,}000{,}000/35{,}000 = 85.7 \text{ kWh/acct}$$

Assume comparison group kWh savings (C) to be:

$$\text{Baseline}_C = 2{,}150{,}000/33{,}000 = 65.2 \text{ kWh/acct}$$
$$\text{Pilot}_C = 2{,}600{,}000/33{,}000 = 78.8 \text{ kWh/acct}$$

The change in savings for each is:

$$\Delta \text{ Savings}_A = 85.7 - 64.3 = 21.4 \text{ kWh/acct}$$
$$\Delta \text{ Savings}_C = 78.8 - 65.2 = 13.6 \text{ kWh/acct}$$

In this example, the incremental savings attributable to the pilot are 21.4 – 13.6 or 7.8 kWh/acct. Without the pilot, we would have expected to see an increase in energy savings of 13.6 kWh/account in the pilot group (or 477,273 kWh of savings [13.6*35,000]). Instead, we saw a 750,000 kWh increase in savings, of which 272,727 kWh is due to the program. In this example, we take 272,727 kWh as incremental savings and 9.1% as the percentage of savings that are incremental [272,727 kWh due to program / 3,000,000 kWh gross savings].

We then apply the incremental percentage savings (e.g., 9.1%) for the pilot as a whole to gross savings from each energy efficiency program measure in Aquidneck in the pilot period to estimate incremental savings from each program measure, so that we can use these incremental savings values to calculate the total resource benefit attributable to pilot efforts.[18,19] We must apply incremental percentage savings to each program measure because the Total Resource Benefit-Cost Test model (described below) requires inputs at a measure level.

While the comparison group is not the entire population of Rhode Island, we are working with population data within the two groups. As such, there is no precision or sampling error involved in our calculations. Our analysis produces a point estimate with no error bound.

Cost-Effectiveness Test

Cost-effectiveness analysis replicates the Rhode Island Total Resource Benefit-Cost Test (B/C Test) used to evaluate the program year cost-effectiveness of National Grid's portfolio of electric and gas programs in Rhode Island. Total Benefits are the avoided costs of capacity, energy, and non-electric benefits. The standard B/C test is calculated as:

$$B/C\ Ratio = \frac{Total\ Benefits}{Implementation\ Expenses + Customer\ Contribution + Evaluation\ Cost + Shareholder\ Incentive}$$

To calculate an incremental B/C ratio, we modified this calculation to reflect the total benefits of incremental savings and the total cost of generating those incremental energy savings. The incremental B/C test is:

$$Incremental\ B/C = \frac{Benefits\ from\ Incremental\ Program\ Savings}{(Standard\ Program\ Cost\ per\ kWh * Incremental\ kWh) + (Aquidneck\ Pilot\ Implementation\ Cost)}$$

The table below describes the components of this formula, with more information available in Appendix A. All benefits and costs are normalized to 2010 dollars.

[18] Determination of the incremental change in savings by specific measures or programs is not practical given the false precision it implies (especially for smaller programs), since we expect some natural variation in measure mix between regions and time periods (that may not be related to pilot influence). As such, we distribute the incremental savings rate estimate across all measures and programs evenly to reflect overall pilot influence.

[19] For example, if our analysis estimates a 5% incremental increase in total savings, 5% of the total lighting savings for the pilot towns will be used within the cost-effectiveness screening model, as will 5% of the total HVAC savings, etc.

Table 4. Inputs to Cost-Effectiveness Calculation

Components	Description
Incremental Benefit (2010 Dollars)	
Total Resource Benefit from incremental savings	Calculated 2010 Rhode Island Electric and Gas Screening Models, with incremental kWh and therms as inputs.
Electric Benefits	
Gas Benefits	
Incremental Cost (2010 Dollars)	
Standard cost to generate incremental savings	Based on average per kWh or MMBtu costs of implementation, customer contribution, shareholder incentive, and evaluation for each program, weighted by the proportion of energy savings from each program in the Aquidneck pilot. Applied to incremental kWh and MMBtu only.
2009 Electric Costs	
2010 Electric Costs	
2009 Gas Costs	
2010 Gas Costs	
+ Incremental cost of implementing pilot	Marketing, community and partnership and expenses specific to pilot
Pilot-specific implementation Costs	

Incremental benefits are the total resource benefit of incremental energy savings achieved by the Aquidneck pilot, based on savings approved in the 2010 Rhode Island Energy Efficiency Program Plan. The electric and gas screening models use assumptions about each measure to determine avoided capacity, along with monetary value associated with avoided capacity and resource costs. Incremental costs include the costs of generating each incremental unit of energy savings under standard programs, as well as pilot-specific implementation costs such as marketing expenses and community partnerships.[20]

The analysis combines 2009 and 2010 into a single pilot period to obtain a single cost-effectiveness value for the pilot. Performing the analysis on a year-by-year basis could lead to misleading results as some installations associated with first-year marketing efforts might not happen until the second year; therefore, incremental savings must pool savings from the 18 months of each period (baseline and pilot). We the calculate savings per customer account using a weighted average number of customers in each region and period.[21] To generate pooled incremental costs, we weight standard program costs (average costs per kWh or MMBtu) from 2009 and 2010 by the proportion of pilot savings in Aquidneck occurring in each year. This allows us to account for slight differences in program implementation costs from year to year.

[20] For the purpose of the B/C ratio calculation, we exclude evaluation costs from Incremental Costs to enable comparison of the B/C ratio to other programs that may not have separate evaluation budgets.

[21] Given slight differences in the number of gas customer accounts per year, we calculate a weighted average number of customers for the baseline period and the pilot period – for example, the 2009 customer count was weighted by 1/3 and the 2010 customer count by 2/3 to estimate the weighted average number of customer accounts in the pilot period (6 months in 2009 and 12 months in 2010).

2.3.2 Process Evaluation

We conducted a limited process evaluation to assess whether the pilot is replicable and scalable, two of National Grid's goals when implementing this pilot. We explored which activities worked well from the perspective of program stakeholders and participants, which activities did not work as well, and potential barriers to replicability and scalability. In addition to examining customers' perspectives on and satisfaction with the pilot effort, we explored which pilot-specific outreach activities participants recalled and if these outreach activities motivated participants to take energy-saving actions.

To inform qualitative analysis and prepare for discussion with stakeholders and participants, we reviewed pilot program materials, such as program planning documents, program goals, marketing and outreach collateral (e.g., press releases, ads, website screenshots, event materials, and photos), and preliminary lead tracking reports.

Program Stakeholder In-Depth Interviews

We conducted in-depth interviews with five program and implementation staff and two key community group leaders in December 2010. These interviews addressed what stakeholders saw as the objectives of the pilot: stakeholder perceptions of pilot replicability, barriers to replicability, most and least successful marketing and outreach activities, key challenges in implementation, and recommendations for future efforts. Interviews also explored how effective the engagement of community groups was during the pilot, and what lessons could be applied to future initiatives that might engage community partners.

Residential Participant Survey

To understand the reach and influence of the pilot on energy efficiency actions in the pilot area, we conducted a telephone survey of residential customers who lived in the pilot towns and participated in National Grid energy efficiency programs during the pilot period. We administered this telephone survey in January 2011. We completed 71 surveys of residential participants in National Grid energy efficiency programs who lived in the pilot communities and participated in a program between January and October 2010. The survey asked customers how they heard about the energy efficiency program they participated in; their general opinion of and satisfaction with National Grid; what they recalled about Energy Action messages; and how Energy Action messages influenced their knowledge of energy efficiency opportunities, motivations to take action, and opinions of National Grid. We recruited the telephone survey sample in proportion to participation records from Aquidneck in the same period. Nearly 40% of survey respondents received a home energy audit during this period. Table 5. shows the distribution of program participation in the survey sample.

Table 5. Energy Efficiency Residential Program Participation of Survey Respondents

Program	Percentage of Participant Records	Percentage of Survey Respondents	Survey Respondent n
EnergyWise (Single-Family and Multi-Family)	33%	38%	27
ENERGY STAR® Appliances	25%	25%	18
Appliance Recycling	17%	17%	12
ENERGY STAR® Lighting (Coupon and Ordered)	20%	14%	10
ENERGY STAR® Air Conditioning	3%	3%	2
High-Efficiency Heating Equipment (HEHE)	2%	3%	2
Total	100%	100%	71

2.3.3 Energy Efficiency as T&D Deferral Strategy

In the absence of baseline and pilot period demand data, we used qualitative analysis to evaluate the potential effectiveness of energy efficiency community-based programs as a T&D deferral strategy. We conducted interviews with National Grid staff familiar with the capital planning process. We also collected usage data for the relevant substations and circuits to develop a high-level assessment of peak load reductions after the implementation of the pilot.

3. KEY FINDINGS

The key questions for this pilot evaluation are whether the pilot is a cost-effective way to increase participation and the degree to, and circumstances under which the pilot is replicable. Three dimensions of a pilot determine whether it is replicable:

1) Is the pilot worthwhile to replicate as an energy efficiency strategy? In other words, do the incremental costs and benefits justify the effort?
2) What elements of the pilot could or should be replicated? In other words, what worked and what didn't work?
3) Is the pilot worthwhile to replicate as a T&D deferral strategy?

We divide our findings into three sections in line with these three questions. The first section – Impact and Cost-Effectiveness – summarizes the incremental impact of the pilot in terms of energy savings, and the cost-effectiveness of the pilot. The second section – Process Findings – summarizes program stakeholders' feedback on program design, marketing and outreach, and the influence of pilot activities on program participants' decision to participate in a National Grid energy efficiency program. The third section – Energy Efficiency as T&D Deferral Strategy – discusses measurement and evaluation considerations for other community-based program PAs that may wish to prove the effectiveness of community-based programs as either T&D deferral or substitution strategies (e.g., Non-Wires Alternatives).[22] Because the Aquidneck pilot developed as an energy efficiency project without establishing a framework for measuring T&D benefits during the program, this evaluation cannot draw conclusions about its effectiveness as a T&D deferral strategy.

3.1 *Impact and Cost-Effectiveness*

3.1.1 Incremental Energy Savings

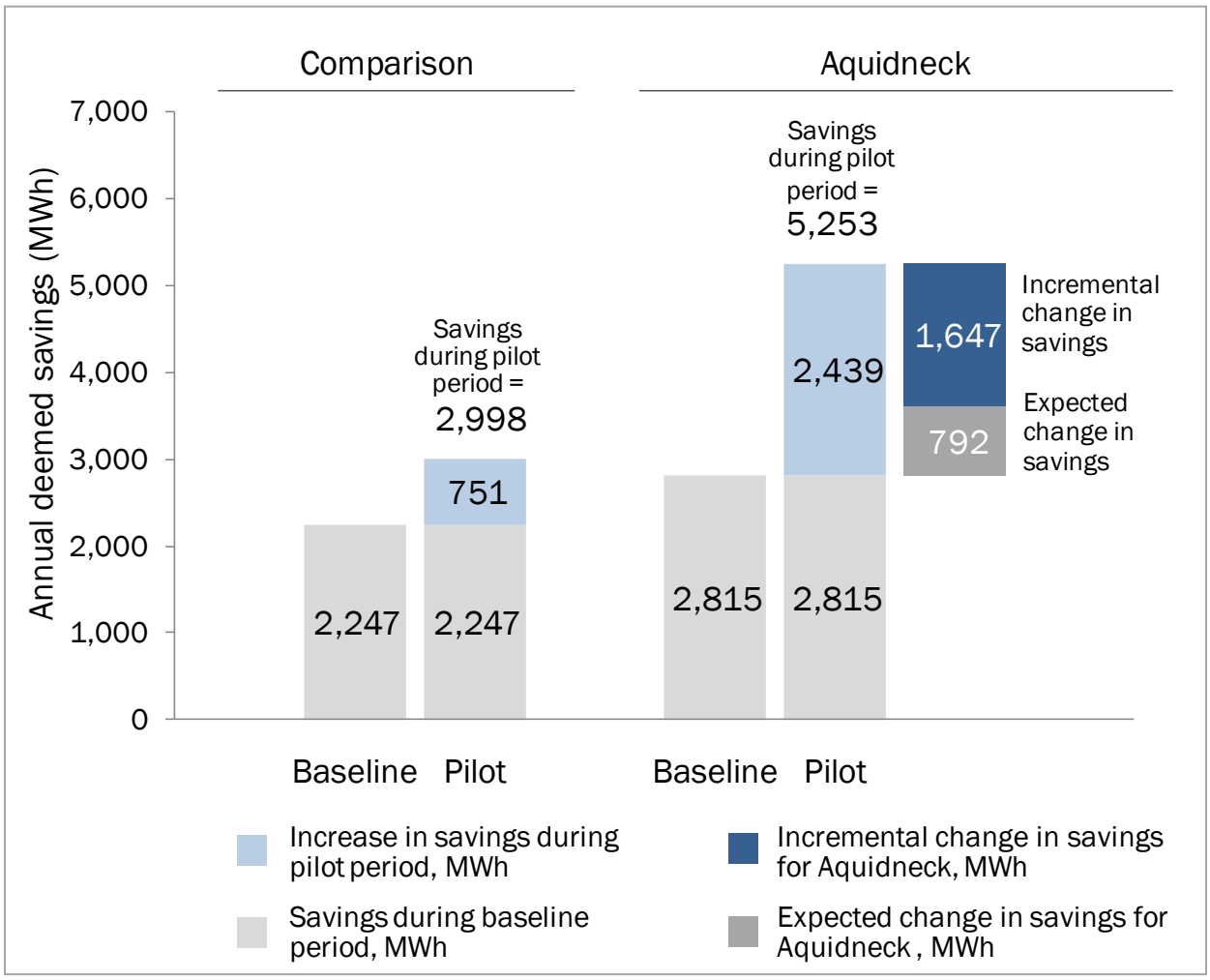
To calculate incremental savings, we first normalized total deemed savings in each time period (baseline and pilot) for each group of communities (comparison and Aquidneck) to the number of customer accounts in each group of communities. We calculated normalized deemed savings values separately for electric and gas programs. For gas programs, the number of customer accounts increased between 2008 and 2010 in both the comparison group and Aquidneck, so normalized deemed savings values in each period account for the number of customer accounts present in each time period. We then calculated the change in deemed savings (again, normalized by number of customer accounts) between the pilot period and baseline period. The change in savings achieved in the comparison communities is the change we would have expected Aquidneck communities to achieve in the absence of the pilot effort. Any additional increases in deemed savings in Aquidneck beyond what the comparison communities achieve can be considered incremental savings, and attributed to

[22] Non-Wires Alternatives (NWAs) can be thought of as any combination of energy efficiency, demand response, distributed generation, demand management, or other peak demand-targeting strategies that defer or substitute for the need for capital improvements to the transmission and distribution infrastructure.

the pilot. Finally, we calculated total incremental savings attributable to the pilot as the incremental savings per customer account multiplied by the number of customer accounts in Aquidneck during the pilot period.

The Aquidneck pilot achieved 1,647 MWh of incremental savings from electric energy efficiency programs. Figure 2 shows that energy savings increased by 2,439 MWh in Aquidneck during the pilot, compared with the baseline period. Of this increase in savings, 1,647 MWh is attributable to pilot efforts, as an increase of 792 MWh was expected given the increase seen in the comparison communities. Incremental savings for the Aquidneck pilot represent 31.4% of total savings (5,253 MWh) generated by electric energy efficiency programs in Aquidneck during the pilot period.

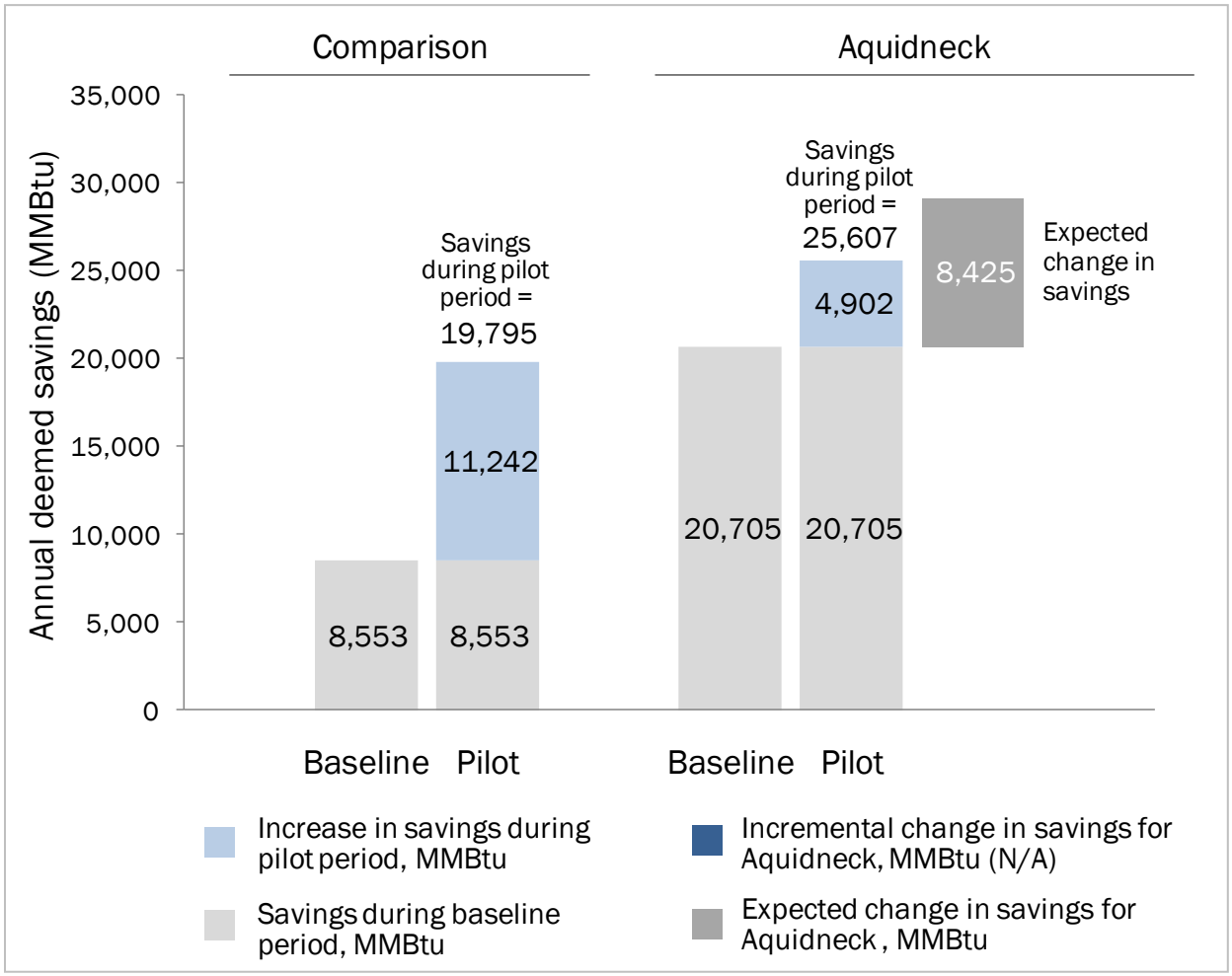
Figure 2. Change in Electric Deemed Savings between Baseline and Pilot Periods, Aquidneck and Comparison Communities



The Aquidneck pilot did not achieve incremental savings from gas energy efficiency programs. Figure 3 shows that energy savings increased by 4,902 MMBtu in Aquidneck during the pilot, compared with baseline period savings of 20,705 MMBtu. However, we would have expected an increase in savings of 8,425 MMBtu during the pilot period, based

on the average savings per account achieved in the comparison communities and the number of gas accounts in Aquidneck.

Figure 3. Change in Gas Deemed Savings between Baseline and Pilot Periods, Aquidneck and Comparison Communities



The smaller increase in Aquidneck C&I gas savings between periods – relative to the comparison group - is likely related to an uptick in broad C&I gas program activity in Aquidneck prior to the pilot period. Trended analysis of gas savings by sector – provided in Section 4 – shows a substantially higher baseline level of C&I savings for Aquidneck relative to the comparison group. According to program stakeholders, some larger C&I accounts participated in gas energy efficiency programs in 2008 and early 2009, leaving more limited potential for savings among remaining gas customers. For this reason, the PA established lower pilot savings goals for gas C&I compared with other sectors (Table 1.). The pilot succeeded in reaching its gas C&I savings goal of 8,000 MMBtu, with 12,253 MMBtu of annual savings from gas C&I programs during the pilot. Because overall gas savings in the Aquidneck region during the pilot did not exceed the level of savings we expected, we cannot calculate incremental gas benefits from the Aquidneck pilot.

3.1.2 Cost-Effectiveness of Pilot

The Aquidneck pilot was cost effective, with an overall Benefit/Cost ratio of 2.26. The cost of generating incremental energy savings in Aquidneck through the pilot was $1,216,894, while the total resource benefit from the incremental impact of the pilot is $2,748,999.

Table 6. Cost-Effectiveness Calculation and Benefit/Cost Ratio

Component	Value (2010 Dollars)
Incremental Benefit	
Total Resource Benefit from incremental savings	
Electric Benefits	$ 2,748,999
Gas Benefits	$ -
Total Incremental	*$ 2,748,999*
Incremental Cost	
Standard cost to generate incremental savings	
2009 Electric Costs	$ 305,894
2010 Electric Costs	$ 745,201
2009 Gas Costs	$ -
2010 Gas Costs	$ -
+ Incremental cost of implementing pilot[23]	
Implementation Costs	$ 165,798
Total Incremental Cost	*$ 1,216,894*
Benefit-Cost Ratio	**2.26**

In the absence of incremental gas savings, the overall Benefit-Cost test for the pilot as a whole is based only on the benefits associated with incremental savings from electric programs, compared with the costs associated with delivering those incremental savings (a standard program cost per kWh), and the cost of implementing the pilot as a whole.

3.1.3 Cost-Effectiveness Implications

Based on this analysis, the pilot was cost effective, and therefore worthy of replication in other areas. One area that National Grid could continue to monitor is the sustainability of savings following the program intervention, to determine whether program participation after the pilot remains at pilot levels. This may help determine the depth and duration of enhanced community-based efforts that are required to deliver measurable incremental savings.

[23] Incremental costs exclude evaluation costs. With evaluation costs included, the B/C ratio would be 2.12.

3.2 *Process Findings*

3.2.1 Effectiveness of Program Design

Community Group Engagement

National Grid energy efficiency and marketing staff worked with multiple community groups to encourage participation in National Grid energy efficiency programs in the pilot region. National Grid provided direct funding to two primary community groups to organize, promote, and implement energy-related community events and outreach throughout the pilot period. National Grid also worked with the local Chamber of Commerce to design events that might attract local business leaders. The two primary groups were effective in connecting with other local groups to promote National Grid energy efficiency programs in local media at multiple community events.

The main community partner, the Aquidneck Island Planning Commission (AIPC), was an established organization – a municipal planning commission – before the Aquidneck pilot. The AIPC was contracted to create and coordinate energy efficiency events for municipal leaders and residential customers. For example, they reached out to town officials to have their homes audited, met with school leaders to discuss National Grid's "Power to Save" educational campaign, and set up tables at numerous community evens to promote Energy Action. They were also responsible for media and press coverage of events they set up.

A second community partner organization was the Neighborhood Energy Challenge (NEC), a grassroots citizens group that formed around the time that the pilot launched to encourage and help residents to save energy. The NEC created a community-based energy-saving contest – also called the Neighborhood Energy Challenge – to encourage residents to track their energy use and find ways to reduce electricity, home heating fuel, and transportation fuel consumption. The NEC conducted in-person outreach and coordinated public relations (PR) to raise awareness of energy issues on Aquidneck Island and promote the contest.

There were benefits and challenges to working with both organizations, suggesting that future community-based programs should consider multiple types of organizations for potential partnerships. Based on this pilot, we do not believe that community partner organizations must necessarily be well established before forming an alliance. Other criteria to consider when choosing partner organizations include the organizations' motivation and ability to leverage community connections, existing member or customer lists, ability to leverage outside funding sources, staff time and commitment to the partnership, and their ability to balance National Grid program objectives with the organization's existing mission or agenda.

Community Group Communication

The utility and community group partnership represents a new kind of partnership that requires some capacity building, as partners work to identify community leaders, form working groups, establish responsibilities, etc. National Grid program staff felt that all community partners required more interaction and contact with National Grid than anticipated during program planning. The program ended up being more top-down than the

program manager expected. Community partners appreciated this frequent contact, planning sessions with National Grid, and joint decision-making, and seemed to want even more communication with National Grid.

Program design – both in National Grid's interaction with community partners, and in marketing activities – changed and evolved throughout the 18-month duration of the pilot. Activities changed in response to successes and failures, new opportunities (such as community events), and community partner suggestions. Future community-based programs should anticipate that program design changes will arise while working with community groups, and program design should allow enough flexibility to respond to opportunities and results.

During the Aquidneck pilot, program implementers received useful, real-time feedback on audit requests for residential and Small C&I energy audits. This real-time feedback allowed implementation staff to link marketing activities – such as radio ads, press releases, or contests – to upticks in audit requests, and modify marketing tactics based on the relative success of different tactics. Program implementers and stakeholders also received periodic feedback on progress against National Grid energy savings goals.

However, staff received more limited feedback on participation in other programs – particularly lighting and appliance rebates as well as refrigerator recycling – which were highlighted at local events and in local media. Additionally, not all program stakeholders received feedback on other rebate-type program participation at the same time. Improved feedback on participation in multiple types of programs may have led to different or earlier course changes in marketing tactics.

Future community-based efforts may want to consider other mechanisms for providing regular feedback on energy efficiency rebate participation to community-based stakeholders so they can modify tactics based on real-time results. Regular updates on program participation and progress against savings goals can help re-focus community partners on the right sectors and customer groups for outreach.

In the Aquidneck pilot, partner organizations were expected to coordinate and implement a certain number of community events, but given that the Aquidneck effort was a pilot in working with community-based organizations, partner organizations were not responsible for meeting specific, quantifiable participation goals. Future community-based programs may want to consider what type of accountability partner organizations should have for reaching specified goals and how to track those metrics.

3.2.2 Effectiveness of Program Marketing

Our findings on program marketing effectiveness are based on the results of a residential participant survey, stakeholder interviews, and review of program data. Please see section 4.3 for more detailed findings from the residential participant survey.

Branding and Messaging

National Grid developed a unique brand for the Aquidneck pilot – Energy Action – that associated National Grid energy efficiency programs with the community. National Grid used

the Energy Action brand on program marketing materials, specifically direct outreach, newspaper advertisements, bill inserts, and at community events.

While the PA encouraged community partners to use the Energy Action brand and logo, not all of the marketing efforts conducted by community partners focused on the National Grid or Energy Action brand. Community partners used their own branding and logos of their partner organizations to promote energy efficiency opportunities.

From the program stakeholders' perspective, the use of multiple brands and voices for energy efficiency messages was an effective strategy for increasing awareness of energy efficiency and knowledge of energy-saving opportunities. Having the same message coming from multiple brands – including trusted local organizations – may have helped the Energy Action message to reach more households and businesses than if program messages had originated solely from National Grid materials.

The multiple organizations and brands involved in promoting the pilot resulted in more varied messages. For example, while program messages focused on saving energy and money on utility bills, some messages from community groups took a broad approach to energy and environmental issues highlighting CO_2 emissions, rising sea levels, and transportation energy costs as reasons to save energy. Other messages gave people specific actions to take (like refrigerator recycling or purchasing a power strip). Program stakeholders felt that this varied repetition of messages worked well, given residents' many motivations to save energy. Still, some stakeholders felt that messaging more focused on saving money could have generated even greater interest.

Based on our evaluation of the Aquidneck pilot through the end of the pilot period (December 2010), it is unclear whether there will be a long-term effect of intensive, varied energy efficiency messages in the pilot communities. However, community partners plan to continue their energy efficiency efforts beyond the pilot, by seeking other funding sources.

Awareness and Influence of Energy Action Messages

Program participants surveyed for this evaluation had moderate awareness and recall of Aquidneck pilot marketing and outreach efforts. Energy Action messages likely influenced up to one-quarter of residential program participants to participate in National Grid energy efficiency programs. This influence rate is in line with residential incremental savings – about 13% of all residential electric savings and 15% of all residential gas savings in Aquidneck during the pilot period can be considered incremental (**Error! Reference source not found.**). Participant survey findings suggest that incremental energy savings may have been due to Energy Action marketing efforts.[24]

Key findings from participants were:

- Over one-third of residential energy efficiency program participants were aware of the Energy Action initiative.

[24] Though participant survey findings (regarding the influence of the pilot on participation decisions) and the presence of incremental savings from residential findings align (i.e., incremental program savings are coincident with incremental marketing), we cannot infer causality.

- Energy Action messages and information likely influenced up to one-quarter of participants to participate in a National Grid energy efficiency program.
  - Energy Action information influenced the participation decision of nearly one-quarter (23%) of the respondents.
  - About 20% of participants recalled hearing about their program through a marketing channel specific to Energy Action. Considering that some marketing channels were used to promote Energy Action as well as standard programs (e.g., bill inserts, direct mail), more than 20% of participants may have heard about their program through Energy Action marketing tactics.
- People who recalled Energy Action messages may have been more attuned to energy efficiency messages and opportunities prior to the pilot.
  - Nearly all (92%) of the EnergyWise home audit participants who had Energy Action awareness said they knew about National Grid energy efficiency programs prior to 2010.
  - One community partner stakeholder felt that the NEC contest seemed to attract people who had taken energy-saving actions in the past.
- Satisfaction with National Grid (at the time of the participant survey) was the same for participants with and without awareness of Energy Action.
  - Still, almost one-quarter of program participants with awareness of Energy Action reported an increase in opinion of National Grid since learning about Energy Action (23%).[25]

Effective Marketing and Outreach Tactics

- Early engagement of local officials and business leaders was thought to be useful in garnering support for the pilot.
  - Early in the pilot, program staff and the Aquidneck Island Planning Commission organized an Energy Breakfast for town officials, local business leaders, National Grid program staff, and National Grid account executives. Program stakeholders feel that this particular event was effective in sharing information about the pilot – specifically what National Grid was doing to help save energy in the community, and how local groups could help. Future community-based programs may want to consider organizing similar events with community leaders from the public and private sectors early in program implementation.
- Mass media provided the most effective outreach for residential customers
  - Newspaper stories, articles, and press releases had the broadest reach among participants in the pilot area - more than two-thirds (69%) of program participants

[25] Changes in opinion of National Grid since learning about Energy Action cannot be solely attributed to Energy Action, because more than one-quarter of all program participants reported an increase in opinion of National Grid as a result of participating in an efficiency program (29%), and changes in opinion could be due to the joint effect of efficiency program participation and Energy Action messages. Changes in opinion due to program participation were the same for participants with and without awareness of Energy Action.

with Energy Action awareness recalled seeing or hearing about Energy Action in a newspaper or magazine.

- Program staff and community partners also felt that media for the pilot – particularly press releases and ads in local media outlets – was effective in driving awareness of the pilot. Program staff saw a notable increase in home audit leads after a press release highlighting a home energy audit at the Mayor of Newport's home.
- Program staff saw an increase in leads during the Newport Gulls contest, which was promoted via radio, newspaper, direct mail, and bill stuffers. The contest required customers to schedule a home energy audit to be eligible for free baseball tickets.

➢ While commonly used, community and business oriented events were not as frequently recalled among participants and may not have been as effective in terms of driving participation.

- While the Energy Action message was promoted at numerous community events (such as Power to Save Night, an Energy Breakfast, or farmer's market), few program participants recalled or attended events.
- However, these events may still have had an indirect influence on participation, by raising general awareness of energy efficiency in the community through marketing activities used to promote events – i.e., newspaper ads or press releases.
- Similarly, the NEC contest was marketed through community events, PR, and partner organizations. Though over one-third (35%) of participants with Energy Action awareness had heard of the Neighborhood Energy Challenge, few participated in the contest.[26]

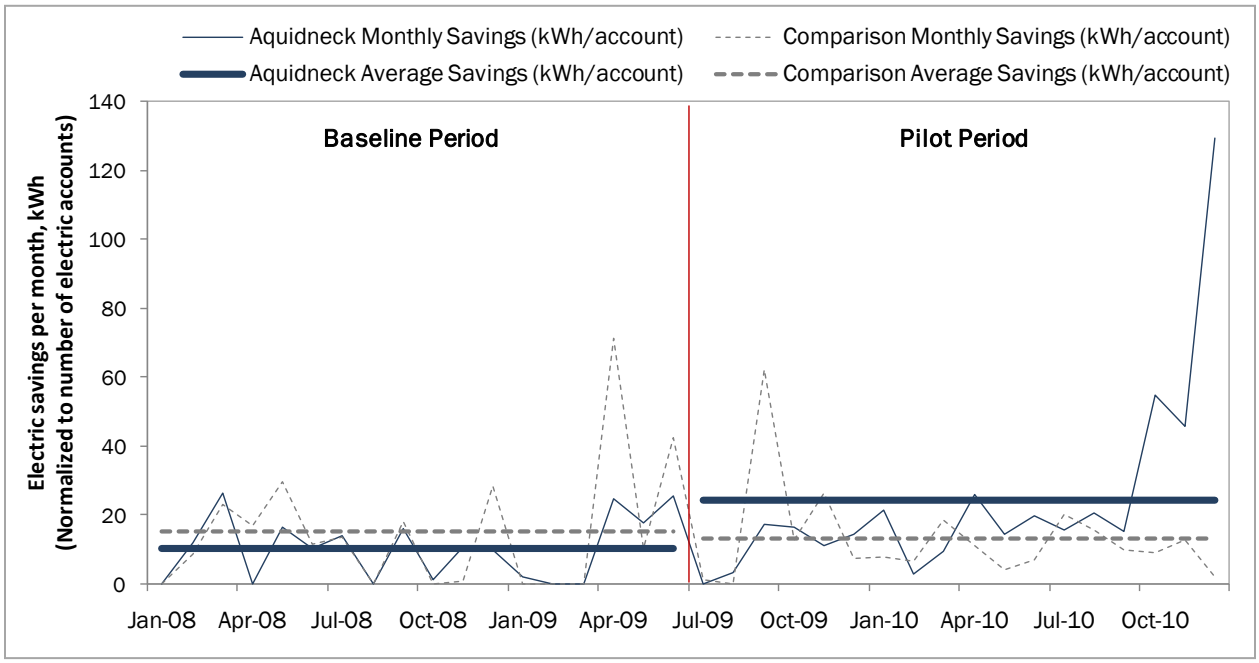
➢ The door-to-door approach seems to be effective for small business.

- Small C&I program staff conducted direct outreach early in the pilot, by phone and in person, as well as hosting business-oriented events. Program stakeholders felt that business-oriented events such as an event at the Chamber of Commerce and school events – did not generate as much interest from Small C&I customers as expected.
- Pilot stakeholders changed the strategy midway through the pilot when it appeared that C&I energy savings goals were not within reach. Eventually, program staff launched a "Main Streets" approach to small business outreach, going door-to-door with program materials to talk to small business owners.
- Looking at electric energy savings from Small Business applications (Figure 4), we see a substantial increase in Small C&I electric program activity toward the end of the pilot period, suggesting that pilot efforts were effective in driving participation

[26] Over the course of the pilot, the Neighborhood Energy Challenge enrolled fewer customers in the contest than expected – about 125 – despite significant grassroots marketing and PR.

in Small C&I electric programs overall, and that the change in strategies to a door-to-door approach was likely effective.

Figure 4. Small Business Electric Savings Trend, Aquidneck and Comparison Regions



3.2.3 Implications for Replicability

The Aquidneck pilot demonstrated that the community-based program strategy is worth replicating (due to its cost-effectiveness) and replicable (as a process), though the specific tactics may be difficult to replicate per se. Here we summarize our findings on the two dimensions of replicability outlined in the Evaluation Objectives:

- **Replicability as an energy efficiency strategy:** The Aquidneck pilot demonstrated that the pilot strategy – of investing in community-based partnerships, incremental marketing, and staff time – could deliver cost-effective incremental energy savings.
- **Replicability of pilot implementation tactics:** The Aquidneck pilot demonstrated that it takes time and commitment to work with stakeholders from the outset to develop a community-based outreach approach that fits the strengths and needs of a particular region, and build support for the approach. Many successful marketing tactics were the result of stakeholder collaboration, and may have been difficult to plan at the outset of the program. Specific tactics used in the Aquidneck pilot would likely need to be tailored for different communities.

The following discussion describes a few considerations for PAs planning to replicate the process of Aquidneck pilot as a geographically focused energy efficiency program strategy for increasing participation.

Building community partnerships and facilitating outreach through community organizations requires staff resources as well as monetary investment. To optimize the use of PA resources for community-based efforts, PA staff should define the type of relationship they

wish to have with community partners, and refine community partner selection and partnership agreements accordingly.

Based on this pilot, multiple types of community-based organizations could be considered as partners for future programs. However, program designers should realize that community-based partners may not have the internal capacity to meet all the needs of the program, and either the PA or the partner organization may require additional staff resources, during both program planning and implementation. To minimize implementation challenges, partnership arrangements should consider the unique motivations and capacities of potential partners, and attempt to engage with partners early in the process to set expectations and responsibilities, and address unique needs.

To maximize program design effectiveness, programs should empower community partners to leverage the resources, connections, and brand reputation they have to promote National Grid energy efficiency programs. As this pilot demonstrated, community-based efforts can increase effectiveness by using multiple channels and brands – particularly among residential customers. Co-branding through multiple organizations (retaining the National Grid brand on partner materials) can also be effective.

Program administrators should continue to examine drivers and barriers of program participation among small C&I customers to confirm that door-to-door efforts are more effective in driving program participation, and more cost-effective, than alternative small C&I strategies.[27]

Program administrators should also examine how in-person community events influence program participation. For the Aquidneck pilot, it appears that marketing and promotion of activities (e.g., PR and direct mail about contests and events) may have informed more customers about National Grid programs than the events themselves. Our analysis suggests that there may be an indirect effect of events and activities on program participation, especially if events or contests are well promoted. However, it is unclear how community events influenced participation beyond the impact of incremental program marketing.

Sharing performance data like program participation – to the extent possible – can also maximize program effectiveness by enabling community partners to modify their marketing and implementation approach based on results. During the Aquidneck pilot, National Grid and community partners were able to modify tactics quickly in response to program participation feedback as well as marketing and outreach opportunities. In future community-based efforts, we recommend creating metrics to capture marketing effectiveness that can be shared with stakeholders and implementers, and developing processes to share these metrics in real time with partners and implementers.

[27] In some cases (according to the PA), direct outreach has the same close rate as other types of outreach, but a higher volume of initial participants. In the case of the pilot, program stakeholders felt that direct outreach was needed to increase participation. Future community-based efforts could examine cost-effectiveness in more detail.

3.3 *Energy Efficiency as T&D Deferral Strategy*

3.3.1 T&D deferral planning for the Aquidneck pilot

In initial filings, National Grid planned that the Aquidneck pilot would be a T&D deferral strategy, to address interest in avoiding construction of a substation in the Aquidneck area by implementing direct load control. However, T&D planning efforts were not fully developed in 2008 when the Aquidneck pilot was planned. The lack of planning for T&D deferral strategies at the time made it difficult to establish performance measurement and tracking to gauge the effectiveness of the Aquidneck pilot as a deferral project. Therefore, the Aquidneck pilot continued as an energy efficiency project without setting goals or tracking T&D benefits.

National Grid is now planning T&D deferral demonstration pilots similar to the Energy Action pilot to explore how to package energy efficiency and T&D alternatives under System Reliability Procurement provisions of Rhode Island law. The company is now looking at Non-Wires Alternatives (NWAs) in the T&D planning process and evaluating trade-offs; there are many challenges involved.

Additionally, according to National Grid staff, from 2009 through 2010, the regulatory framework in Rhode Island's System Reliability Planning (SRP) did not support consideration of T&D deferral strategies such as NWA projects like the Aquidneck pilot and distributed resources. At this point, National Grid is engaged with external stakeholders in evolving SRP. The company is also in the early stages of including energy efficiency programs as non-wires alternatives. The internal processes and communication are well underway. For example, Distributed Resources and Energy Efficiency staff is working with T&D planning staff to develop a screening process that will consider a suite of non-wires alternatives, including targeted energy efficiency, during the T&D process.

3.3.2 Measuring T&D Deferral Potential of Pilot

Though establishing a measurement framework to assess the pilot's effectiveness as a T&D deferral strategy was not a focus of program planning, it is still possible to look at changes in demand at a high level.[28] In this section, we discuss changes in peak demand, as well as three confounding factors that make it difficult to parse out the effect of the pilot on peak demand. These are factors that PAs and evaluators should consider when planning measurement and evaluation of future community-based programs that need to determine their cost-effectiveness as T&D deferral or substitution projects.

[28] For example, measuring changes in demand on overloaded circuits was not part of the program plan. The age of the distribution system on Aquidneck – and associated "low-tech" metering – compounds the challenge of measuring peak demand reduction on the most overloaded circuits.

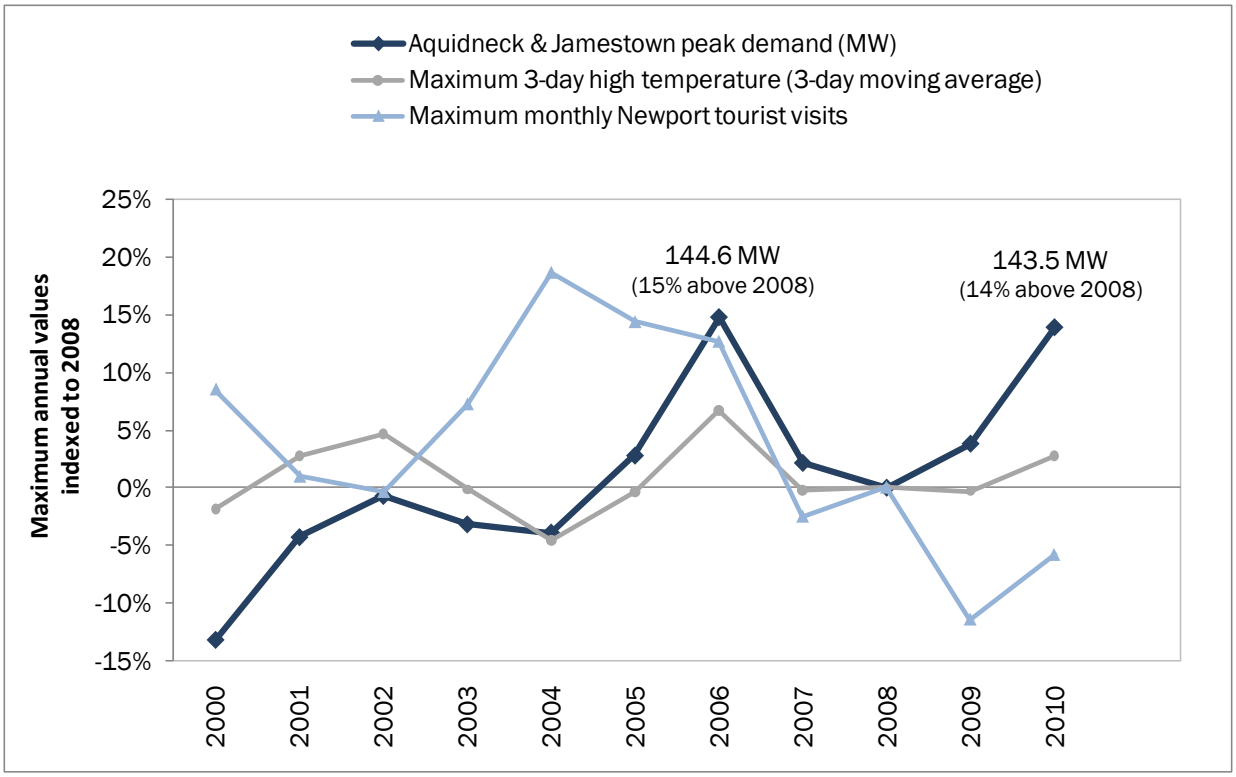
Peak Load Trends in Aquidneck

Based on transmission data from National Grid, peak demand in the pilot area increased by 6% from 2008 to 2009 and 10% from 2009 to 2010. However, demand was slightly lower than 2006 levels (Figure 5). It is difficult to determine how demand may have changed in the absence of the pilot, as numerous factors may have influenced demand in each program year as well as the baseline. Here we discuss a few confounding factors.

- Confounding Factor 1 - Transmission activity
  - **Load shifting**: It is possible that load shifts occurred during the baseline or pilot periods. It is unclear how moving customers to different lines might skew load numbers.
  - **Large customer participation in voluntary price response programs**: It is unclear whether the Navy is or was participating in this forward capacity market or a voluntary price response program.
- Confounding Factor 2 - Weather
  - **Weather patterns**: The summers of 2007-2009 did not have the heat waves of 2010 (or 2006). The duration of high-temperature, high-humidity days matters more to peak demand than the temperature itself, as there is more diversity in the load in the first few days of persistent high temperature. Humidity and wind also affect peak demand.
  - **Duration of a heat wave**: The peak often occurs when there are consecutive high-temperature days – for example, after a couple of days of persistent high temperature and high-humidity days, if air conditioners have been turned on and left on. The peak might not fall on the day of the highest temperature.
- Confounding Factor 3 - Energy use and load profiles
  - **C&I energy use profiles**: Energy use profiles of largest C&I customers, such as the Navy, could impact peak demand if the high-use period shifts from off-peak to on-peak periods. For example, aircraft carriers might come to the Navy dock and plug in, drawing about 1.5 MW at such a time. The number of employees living and working at the Naval Station may have changed in the past few years as a result of 2005 Base Realignment and Closure (BRAC) changes.
  - **Tourism**: Tourism in Newport and Aquidneck Island is heaviest on weekends in July and August. Peak demand also occurs on summer weekends, with circuits in the Aquidneck area showing the highest load on summer afternoons, likely Saturdays between 4 pm and 6 pm. This pattern coincides with tourism activity such as restaurants, hotels, and vacation homes operating air conditioners. Tourism in this area has fluctuated in recent years in concert with economic cycles. Coincidence of a heat wave with increased tourist activity could influence demand on the circuits.
  - **Aquidneck commercial development**: The real estate market on Aquidneck could also influence demand. From the perspective of one National Grid staff member, major commercial development (e.g., new big box retail) could eradicate all apparent savings from energy efficiency.

As Figure 5 shows, some of these factors have moved in parallel with peak demand in the last ten years, making it difficult to distinguish changes in demand due to energy efficiency programs from other confounding factors. Future evaluations need to be aware of, and account for, these factors while establishing measurement protocols at the outset of community-based program efforts.

Figure 5. Changes in Peak Demand, Temperature, and Tourist Visits Compared with Baseline Year (2008)



Note: 2008 serves as the baseline year, with all other data points indexed to 2008 values.
Peak demand source: National Grid transmission data
Temperature source: NOAA National Climatic Data Center, Global Summary of the Day for Newport Weather Station. Maximum 3-day moving average in July and August.
Tourist visit source: Newport & Bristol County Convention & Visitors Bureau, Newport Gateway Visitor Center counts. Maximum monthly visits per year (either July or August in each year).

3.3.3 Considerations for Future T&D Deferral or Substitution Evaluation

This is one of the first community-based pilots to attempt to fit into the dual modes of energy efficiency and T&D deferral. Assessment of this and future pilots (or programs) will help to build a set of values that can be used for forecasting and in benefit-cost analyses that may encompass several wires and non-wires alternatives. National Grid is developing a model that may be able to incorporate T&D deferral or substitution impacts of energy efficiency programs in non-wires alternatives planning. Based on our interviews, the model may need more performance data from targeted, community-based energy efficiency initiatives – both within and outside of National Grid's territory. Here, we provide process recommendations to

help collect this performance data from future community-based programs. Our general process recommendations to help assure appropriate evaluation include:

- Engagement of the National Grid community-based PA at all stages of the non-wires alternative assessment for the target area– including goal setting.
- Collaboration between PAs of community-based programs and National Grid staff with intimate knowledge of the circuits in the area targeted by a program (e.g., how the electricity on those circuits is managed).
- Incorporation of market knowledge of economic factors such as tourism and large business changes in the targeted area into the evaluation plan – e.g., to ensure that the baseline reflects true counterfactual conditions, and that measurement approach can "parse out" effects of targeted energy efficiency with expected fluctuations due to other factors.
- Continuation of work with T&D planners to understand the screening process, including what information and metrics might be needed for energy efficiency projects to be considered during the process, and under what conditions (e.g., geographic constraint) energy efficiency programs might be considered.
- Building measurement and evaluation procedures into each community-based pilot to deliver the data required to meet capital planning screening criteria, and build a knowledge database around T&D impacts of energy efficiency programs in general.

Next are a few measurement approaches that could help the Energy Products group evaluate the impact of an energy efficiency program on demand.

- Market Characterization Assessment. This type of evaluation could build on information from the supply side planners to more fully understand whether energy efficiency programs could potentially be an effective alternative to a wires option. For example, this type of assessment could trace historical trends and patterns in the customer base that feeds a particular constrained circuit to provide insight into how users are changing (e.g., what types of businesses or residential shifts are driving changes – more small businesses, or large commercial users). Such analysis could help identify characteristics that determine whether an area is a good candidate for targeted energy efficiency efforts (i.e., if demand increases are driven by customers who could decrease demand by taking program-based energy efficiency actions). This type of research could help inform decision making when considering NWAs.
- Demand Impact Assessment. Determine demand (kW) reduction associated with targeted energy efficiency program investments and installations. This is already done across several programs and includes:
    - Approaches such as engineering estimates of installations, verification and metering, or a more rigorous evaluation approach (such as the level of evaluation required to bid capacity into the forward market), but still assessing from the customer side of the meter.
    - Moving to a comparison approach from the supply side through monitoring of utility-level data at different areas along the distribution system.

- **Knowledge Base and Benchmarks**. Create benchmarks to forecast energy efficiency effectiveness. Multiple studies that quantify reduction in peak demand attributable to energy efficiency initiatives are needed to facilitate consideration of energy efficiency programs in non-wires alternatives. Specifically, knowledge is required of the cost-effectiveness of energy efficiency initiatives in delivering a quantifiable reduction in peak load for a given investment in community-based energy efficiency. Levelized costs – calculated as dollars of energy efficiency program costs per kW reduction – are one way to look at the cost-benefit relationship of energy efficiency investment and demand reduction. There are data already available on the levelized cost of energy efficiency programs generating demand reduction – e.g., the levelized cost of energy efficiency investment per kW. This is not specific to what could be obtained from this type of pilot program, but is available to give an idea of the range of costs required to obtain capacity reductions.

4. SUPPLEMENTAL FINDINGS

4.1 Cost-Effectiveness Analysis Results

4.1.1 Energy Savings Trends

The figures below show monthly trends in energy savings (normalized to the number of electric or gas customer accounts) in Aquidneck and the comparison towns, for the baseline and pilot periods. Each chart shows monthly savings from energy efficiency programs in Aquidneck and the comparison towns – the thin lines – as well as average savings per account in each period – the thick lines. In each chart, Aquidneck savings are designated with solid lines while comparison group savings are designated with dotted lines.

For all customer sectors, Figure 6 shows that electric savings (from participation in electric energy efficiency programs) in Aquidneck and the comparison towns were trending in a similar direction in the baseline period. However, in the pilot period, Aquidneck savings increased toward the end of the pilot period, while savings in the comparison communities remained steady. Overall, average savings per account increased more in Aquidneck than the comparison group, resulting in positive incremental savings.

Figure 6. Electric Savings Trend, Aquidneck and Comparison Regions

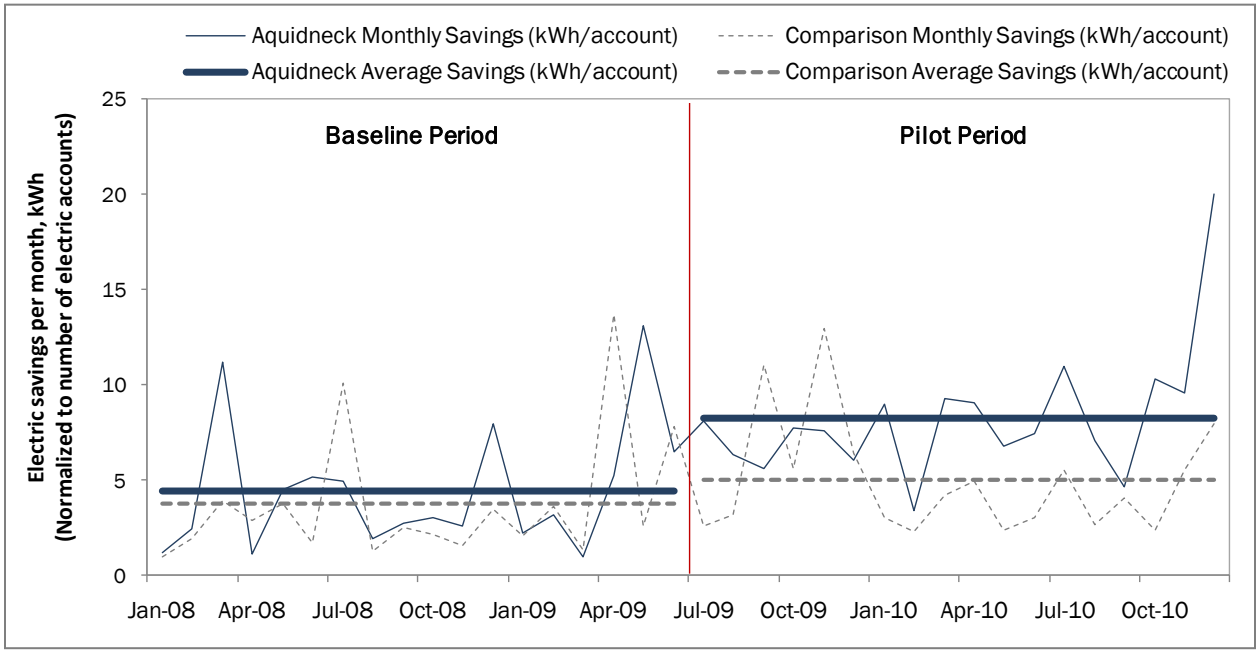
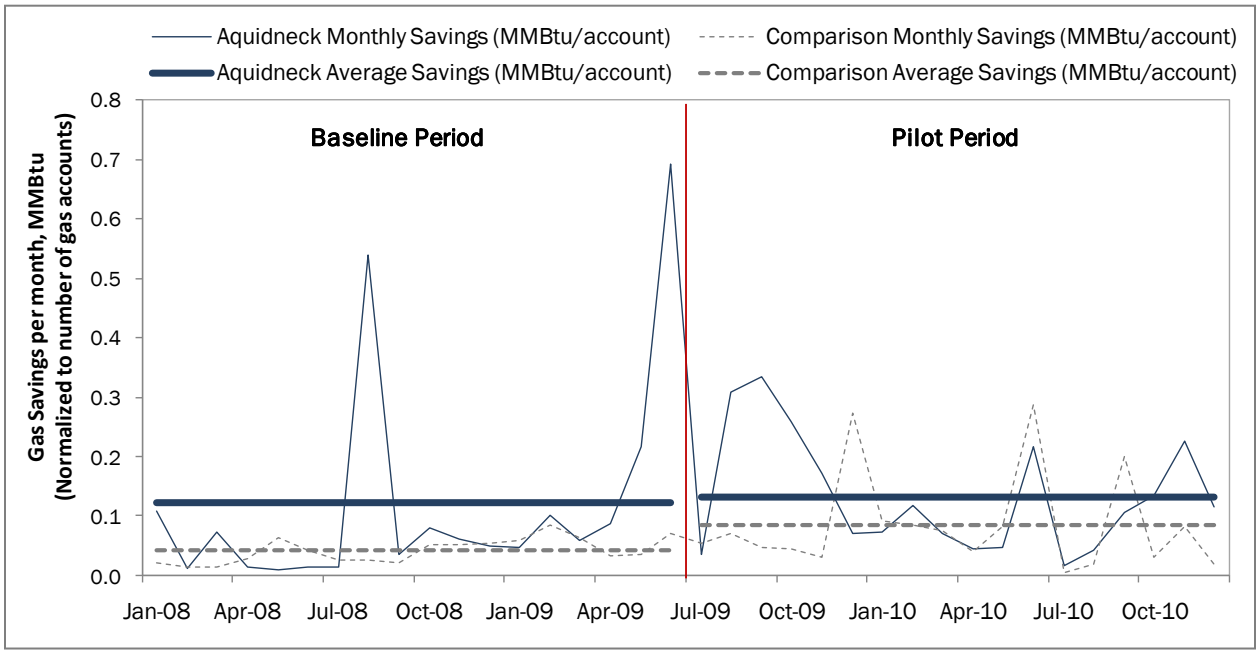


Figure 7 shows gas savings for all customer sectors (from participation in electric energy efficiency programs) in Aquidneck and the comparison towns. Average gas savings per account increased by a wider margin in the comparison group than in the Aquidneck area between the baseline and pilot periods. There were a few upticks in gas program activity in Aquidneck before the pilot started, particularly in the summers of 2008 and 2009. According to the PA, some of the larger gas C&I accounts were targeted in the baseline

period, which brought up the baseline average. Overall, Aquidneck gas savings increased from 2.29 MMBtu per gas customer during the baseline period to 2.34 MMBtu per gas customer during the pilot period, while gas savings in the comparison communities increased from 0.77 MMBtu per gas customer during the baseline period to 1.54 MMBtu per gas customer during the pilot period.

Figure 7. Gas Savings Trend, Aquidneck and Comparison Regions



4.2 Incremental Savings by Sector

While it is not possible to estimate cost-effectiveness analysis by sector (residential and C&I), incremental savings analysis by sector provides additional insight into program performance during the pilot. Residential electric and gas efforts and C&I electric efforts generated incremental savings in Aquidneck during the pilot (Table 7). Gas C&I efforts in Aquidneck did not generate incremental gas savings, though there was still an increase in C&I gas savings relative to the baseline period.

Table 7. Aquidneck Pilot Savings by Sector

Total Electric Savings (MWh)		Total Gas Savings (MMBtu)	
Residential		Residential	
Baseline Period Savings	909	Baseline Period Savings	10,017
Pilot Period Savings	2,288	Pilot Period Savings	13,354
Change in Savings	1,379	Change in Savings	3,338
Expected Change in Savings	1,085	Expected Change in Savings	1,304
Incremental Savings [29]	**294**	**Incremental Savings**	**2,034**
Incremental Savings Percent [30]	**12.8%**	**Incremental Savings Percent**	**15.2%**
Commercial		Commercial	
Baseline Savings	1,906	Baseline Savings	10,689
Pilot Savings	2,965	Pilot Savings	12,253
Change in Savings	1,059	Change in Savings	1,564
Expected Change in Savings	(512)	Expected Change in Savings	10,797
Incremental Savings	**1,571**	**Incremental Savings**	**0**
Incremental Savings Percent	**53.0%**	**Incremental Savings Percent**	**N/A**
Overall		Overall	
Baseline Savings	2,815	Baseline Savings	20,705
Pilot Savings	5,253	Pilot Savings	25,607
Change in Savings	2,439	Change in Savings	4,902
Expected Change in Savings	792	Expected Change in Savings	8,425
Incremental Savings	**1,647**	**Incremental Savings**	**0**
Incremental Savings Percent	**31.4%**	**Incremental Savings Percent**	**N/A**

The charts below show savings trends by sector. Electric savings from residential programs increased substantially in both the Aquidneck region and the comparison region between periods, though savings in Aquidneck increased by a larger margin (Figure 8). Electric savings from C&I programs increased in Aquidneck between periods, particularly toward the end of the pilot period, while savings decreased in the comparison region between the baseline and pilot periods (Figure 9).

[29] Incremental savings are the difference between the actual change in energy savings in Aquidneck (between the pilot and baseline periods) and the expected change in savings (calculated as the actual change in energy savings per account in the comparison group, multiplied by the number of Aquidneck accounts).

[30] The incremental savings percent represents the proportion of Aquidneck pilot savings that were incremental.

Figure 8. Residential Electric Savings Trend, Aquidneck and Comparison Regions

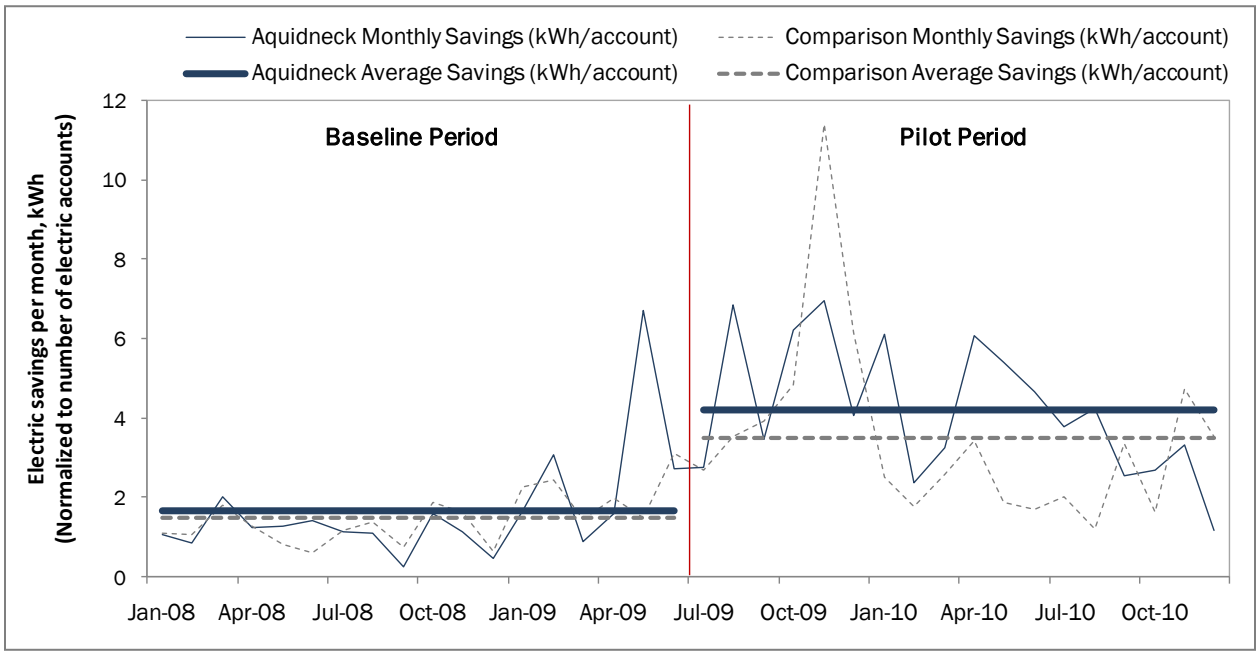
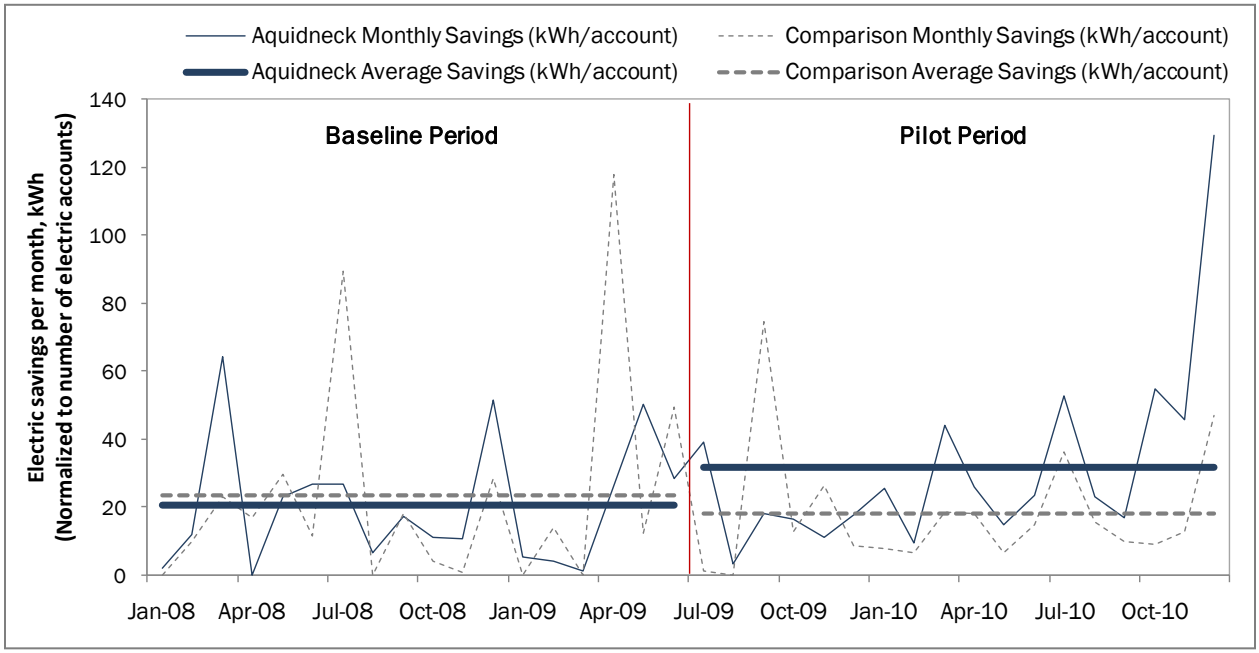
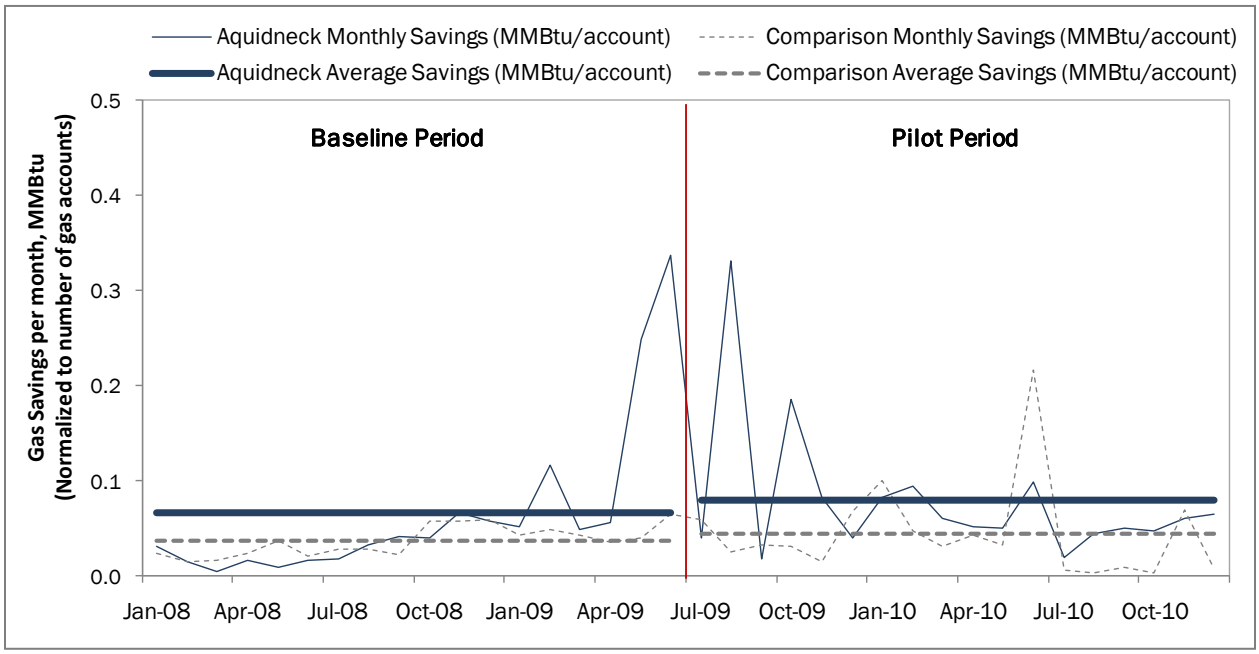


Figure 9. Commercial & Industrial Electric Savings Trend, Aquidneck and Comparison Regions



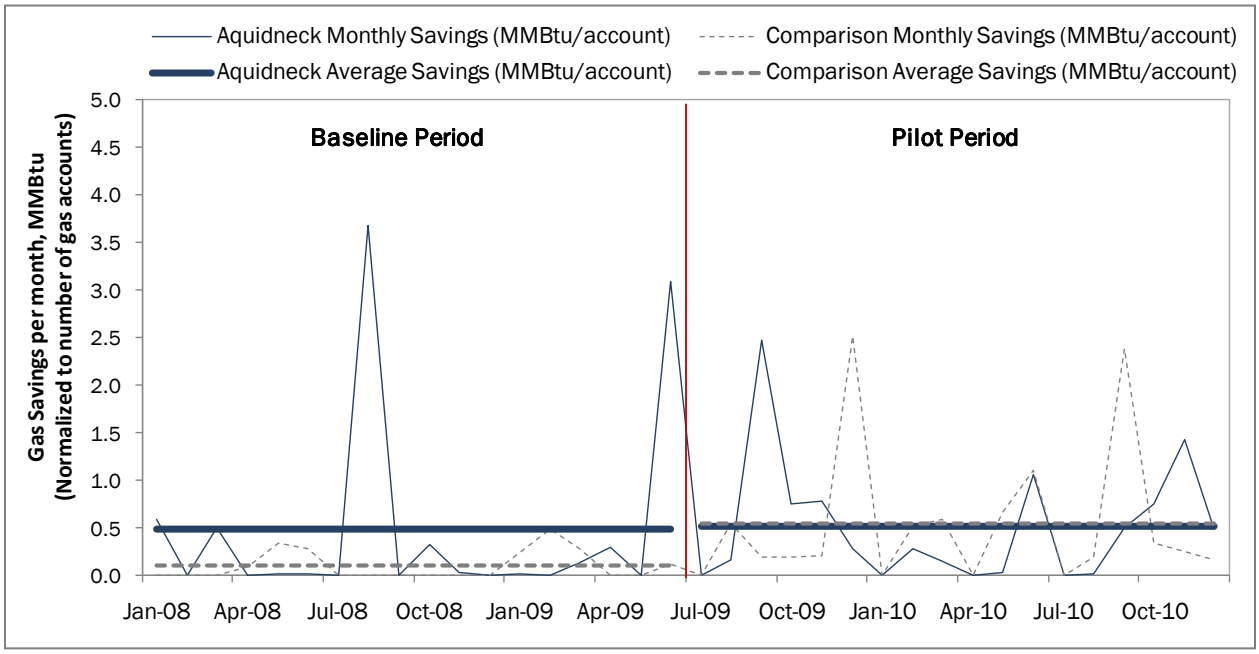
For residential gas programs, both the Aquidneck and the comparison communities increased between periods. In Aquidneck, the greatest savings occurred right after the launch of the pilot, following a period of high activity in May and June before the pilot launched (Figure 10).

Figure 10. Residential Gas Savings Trend, Aquidneck and Comparison Regions



Savings from C&I gas programs in Aquidneck were relatively constant between periods (on average), while C&I gas savings increased substantially in the comparison communities during the pilot period (Figure 11). A couple of relatively high-activity periods occurred for C&I gas programs before the pilot launched, effectively creating a higher baseline for Aquidneck than comparison communities. While commercial gas programs did not reach the incremental increase expected based on the comparison group, commercial gas savings still achieved program goals (see Table 1.).

Figure 11. Commercial Gas Savings Trend, Aquidneck and Comparison Regions



4.3 Participant Survey Findings

This section describes results of a telephone survey of residential National Grid energy efficiency program participants who live in the pilot towns. We conducted the survey after the pilot ended, in January 2011. These residential customers participated in National Grid energy efficiency programs during the pilot period.

4.3.1 Demographic and Housing Characteristics

The majority of survey respondents were homeowners living in single-family homes (83%). Only 20% of participants' homes have central air conditioning. Nearly all (96%) participants live in their homes year-round. The educational level of participants is higher than average within the pilot towns – 77% have at least a bachelor's degree, and 42% a graduate or professional degree.

4.3.2 Energy Action Awareness

Over one-third (37%) of participants were aware of the Energy Action initiative. Eighteen percent of the sample recalled Energy Action on an unaided basis (by name), and 18% on an aided basis (after hearing a description of the pilot).

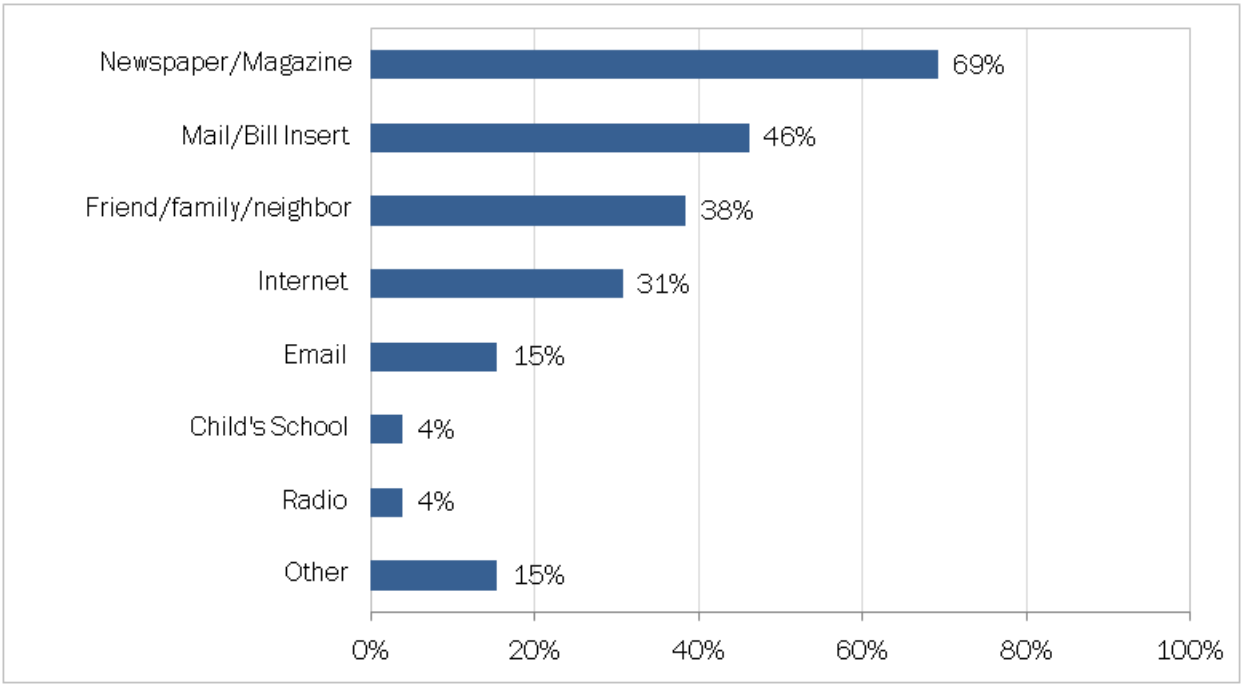
4.3.3 Referral to National Grid Energy Efficiency Program

Participants were more likely to have heard about National Grid energy efficiency programs through standard program outreach approaches – such as bill inserts or at the point of purchase or installation – than through pilot-specific approaches. Nearly one-quarter of participants (24%) learned about National Grid energy efficiency programs through a National Grid bill insert, though no participants mentioned Energy Action in association with this bill insert. Newspaper articles – exclusive to pilot efforts – were the fourth-most-common source of information about energy efficiency programs, mentioned by 14% of participants as the way they learned about their energy efficiency program. In total, about 20% of participants recalled hearing about their program through a marketing channel specific to Energy Action, such as a newspaper article, community event, or TV/radio advertising.

4.3.4 Recall of Energy Action Messages

The majority of participants with Energy Action awareness recalled hearing Energy Action messages through a newspaper or magazine (69%). The majority of newspaper/magazine messages came from news stories or articles, rather than advertising. The second-most-recalled source of Energy Action messages was the mail (46%). Participants' relatively high recall of Energy Action newspaper articles and the proportion of participants that learned of their energy efficiency program through the newspaper (14%) suggests that local newspaper and PR efforts may have had a greater influence on program awareness and participation than other messaging tactics (at least among residential customers).

Figure 12. Recall of Energy Action Messages
Among People Who Have Seen or Heard about Energy Action (n=26)



Percentages total more than 100% because respondents could select multiple responses.

Participants who received Energy Action information through the mail attributed this information to National Grid, Rise Engineering, the Newport Chamber of Commerce, the Neighborhood Energy Challenge, and AIPC (listed in order of recall frequency). Among participants who recalled Energy Action messages online, participants were more likely to recall information from nationalgrid.com rather than powerofaction.com or the NEC website.

About one-third (35%) of participants with Energy Action awareness had heard of the Neighborhood Energy Challenge, a community contest to save energy. This puts the NEC on par with friends/family and the Internet as channels through which people may have heard of Energy Action. Three respondents participated in the Neighborhood Energy Challenge. Two of these respondents participated in their energy efficiency program after signing up for the Neighborhood Energy Challenge.

Only three participants recalled attending an Energy Action event. Events mentioned include Earth Day, Energy Independence Day, the Energy Breakfast, Farmer's Market, and the Rotary Club. No one recalled a Go Green Night or Power to Save night. Only one of the participants we spoke with had entered the Newport Gulls contest.

4.3.5 Influence of Energy Action

Nearly two-thirds (62%) of people with Energy Action awareness said that information about Energy Action influenced their decision to participate in an energy efficiency program. This means that Energy Action information influenced the participation decision of nearly one-quarter (23%) of the sample (considering people with and without awareness of Energy Action).

Over half (57%) of people with Energy Action awareness said that Energy Action messages provided them with new information on saving energy in their homes. The marketing messages alone increased the motivation of 43% of people with Energy Action awareness to make their homes more energy efficient.

Participants who learned new information from Energy Action messages frequently mentioned specific products they should use, such as lighting / light bulbs, appliances and insulation. Only two participants interpreted the messages in a broader sense – for example, that National Grid is offering programs to help save energy. Two participants may have misattributed Energy Action messages – one associated Energy Action with the EnergyWise audit, and another thought Energy Action provided new information about wind energy.

4.3.6 Influence of Energy Action among EnergyWise Home Audit Participants

Encouraging residential customers to sign up for an EnergyWise home energy audit was a focus of pilot marketing and outreach. More than four in ten (43%) of EnergyWise participants who participated in EnergyWise during the pilot were aware of Energy Action messages, indicating that the pilot may have had some influence on their program participation. However, awareness of Energy Action had no influence in terms of their satisfaction with the audit, likelihood to take follow-up recommendations, and the influence of audit information on the decision to take follow-up measures.

Among EnergyWise participants who were aware of Energy Action, nearly all (92%) said they knew about National Grid energy efficiency programs prior to 2010. Conversely, about half (56%) of EnergyWise participants without Energy Action awareness knew about National Grid energy efficiency programs prior to 2010. This suggests that people who recalled Energy Action messages may have been more attuned to energy efficiency messages and opportunities prior to the pilot – in other words, messages reached people with a prior inclination to listen to energy efficiency information.

4.3.7 Program Participant Opinion of National Grid

About 73% of energy efficiency program participants (who had participated in a National Grid program during the pilot) considered themselves very or somewhat satisfied with National Grid (top two boxes of 5-point rating scale). About 29% of program participants reported that their opinion of National Grid increased as a result of installing energy efficiency program measures. There was no significant difference in satisfaction between participants with and without awareness of Energy Action (70% and 76% very or somewhat satisfied, respectively). Similarly, there was no difference in the proportion of each group whose opinion of National Grid increased as a result of participating in a National Grid energy efficiency program (23% of participants with Energy Action awareness vs. 31% without).

Most participants with Energy Action awareness said that their opinion of National Grid had not changed since learning about Energy Action (73%), while 23% reported an increase in

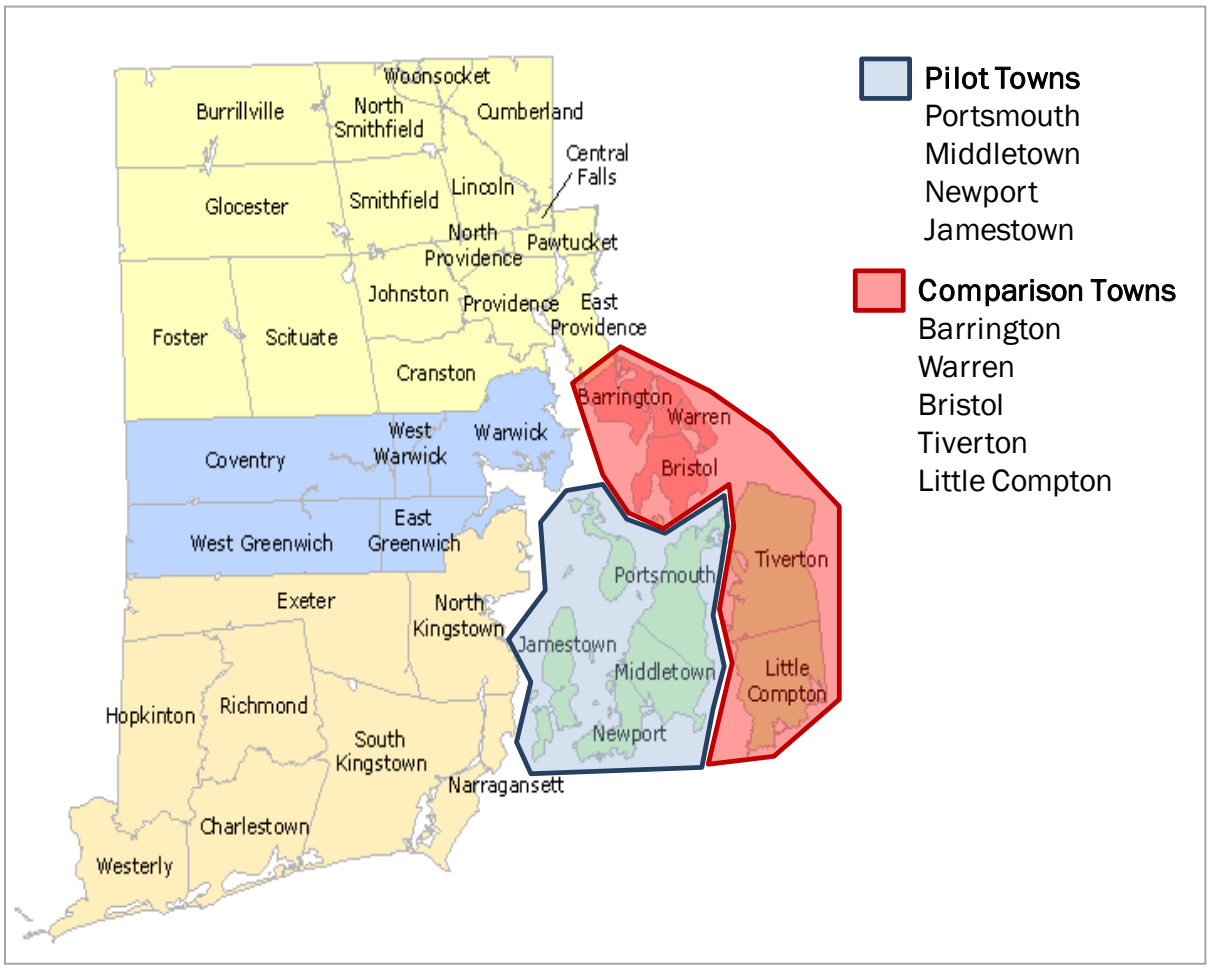
opinion since learning about Energy Action. These findings indicate that Energy Action may have increased some customers' opinion of National Grid, though the incremental effect is in line with the increase that would be expected from participating in an energy efficiency program (here, about 23%).

APPENDIX A. DETAILED METHODS

Community Selection

We based the selection of matched community characteristics on geographic, demographic, housing, and customer similarities. Figure 13 shows the geographic location of the pilot and comparison towns. We used data at a town level from the 2000 US Decennial Census to evaluate demographic and housing comparability, shown in Table 2.

Figure 13. Location of Pilot and Comparison Towns



Source: Rhode Island Department of Labor and Training

Cost-Effectiveness Analysis Approach

We calculate total benefits from incremental savings by using the 2010 Rhode Island Electric Screening Model and 2010 Rhode Island Gas Screening Model, and entering measure- or program-level incremental kWh and therms (as appropriate). Capacity assumptions (kW) are then based on the measure- or program-level ratio of kWh to kWh used in the standard screening model.

We calculate incremental program costs as the cost of saving each incremental kWh or therm that the program achieved. We assume that the cost of incremental savings is equal to the standard cost of those savings (what it would cost in the absence of the pilot, equal to average costs elsewhere in Rhode Island), plus the cost of generating those savings in Aquidneck during the pilot (since these savings are above and beyond standard program efforts). For example, for electric energy efficiency programs in 2010, we add average costs per kWh for all programs in Rhode Island in 2010 (from the Rhode Island (RI) Year End Cost Summary) to cost per incremental kWh for implementing the pilot program in Aquidneck.

The cost estimate also accounts for different average costs for each National Grid program in Rhode Island by weighting average program cost estimates by the proportion of gross deemed savings from each program during each year of the Aquidneck pilot. To estimate a weighted average cost per kWh, we first calculate the standard program cost per kWh as RI standard cost per annual kWh (based on National Grid 2009 and 2010 year-end estimates), then weight these average costs by proportion of the deemed savings for each program during the respective years of the pilot. We then multiply this weighted average cost per kWh by incremental kWh savings attributable to the pilot during each year (based on the proportion of gross energy savings occurring in each year of the pilot, and the overall incremental savings percent – here, 31.4%). We add this estimate of what incremental costs would be in the absence of the program to pilot implementation costs.

APPENDIX B. RESIDENTIAL PARTICIPANT SURVEY

PROGRAM PARTICIPATION AND READ-INS
[IF PROGRAM PARTICIPANT, flag=1]

EW. Energy Wise Home Energy Audit
S1 READ-IN: Your household received an Energy Wise home energy audit
PROGRAM READ-IN: Receive an Energy Wise Home Energy Audit

LR. Energy Star Retail Lighting
S1 READ-IN: Someone in your household purchased energy efficient lighting using an in-store coupon
PROGRAM READ-IN: Purchase energy efficient lighting using an in-store rebate or coupon

LO. Energy Star Lighting Order
S1 READ-IN: Someone in your household ordered energy efficient lighting from National Grid
PROGRAM READ-IN: Order energy efficient lighting from National Grid

ESP. Energy Star Products / Appliances
S1 READ-IN: Your household received a rebate for purchasing Energy Star Products
PROGRAM READ-IN: Purchase an Energy Star product using a rebate from National Grid

CS. Cool Smart
S1 READ-IN: Your household received a rebate for purchasing a high-efficiency central air conditioning system
PROGRAM READ-IN: Purchase a high-efficiency central air conditioning system using a rebate from National Grid

HEHW. High-Efficiency Heating & Hot Water Heating
S1 READ-IN: Your household received a rebate for a new heating system, water heater or thermostat.
PROGRAM READ-IN: Receive a rebate for a new heating system, water heater or thermostat

RB. Refrigerator Bounty / Recycling
S1 READ-IN: Your household had a refrigerator or freezer recycled by National Grid
PROGRAM READ-IN: Recycle a refrigerator or freezer

INTRO. Hello may I please speak to [NAME]? My name is _____ and I'm with Opinion Dynamics, a research firm hired by National Grid to conduct a brief survey about residential energy efficiency programs in Rhode Island. Your responses will help National Grid improve its programs and will be kept confidential.

S1. According to our records [READ IN LIST] in the past year.
a. [READ IF EW=1] Your household received an Energy Wise home energy audit

b. [READ IF LR=1] Someone in your household purchased energy efficient lighting using an in-store coupon
c. [READ IF LO=1] Someone in your household ordered energy efficient lighting from National Grid
d. [READ IF ESP=1] Your household received a rebate for purchasing Energy Star Products (You may have received a rebate for an Energy Star certified appliance)
e. [READ IF CS=1] Your household received a rebate for purchasing a high-efficiency central air conditioning unit
f. [READ IF HEHW=1] Your household received a rebate for a new heating system, water heater or thermostat.
g. [READ IF RB=1] Your household had a refrigerator or freezer removed by National Grid

S2. Are you the person in your household who is most familiar with [READ IN LIST]? [1=Yes, 2=No, 98=Don't Know, 99=Refused]

[READ IF EW=1] The energy audit
[READ IF LR=1] or [READ IF LO=1] or [READ IF ESP=1] or [READ IF HEHW=1] This purchase
[READ IF CS=1] The installation of this cooling system
[READ IF RB=1] The refrigerator or freezer you recycled
[IF RB & ESP] the appliances you purchased and refrigerator or freezer you recycled
[IF EW & ESP] the energy audit and rebate you received
[IF EW & LR] the energy audit and rebate you received
[IF RB & LR] the refrigerator or freezer you recycled and lighting rebate
[IF EW & RB] the energy audit and refrigerator or freezer you recycled
[IF LR & ESP] the appliance and lighting rebates you received
[IF RB & LR & ESP] the appliance you recycled and rebates you received
[IF EW & HEHW] the energy audit and rebate you received
[IF HEHW & ESP] these rebates and purchases
[IF LO & ESP] the appliance or lighting you received a rebate for
[IF EW & LO] the energy audit and lighting you ordered
[IF RB & CS] the installation of this cooling system and appliance you recycled
[IF RB & HEHW & ESP] the rebates you received and refrigerator or freezer you recycled
[IF EW & LR & ESP] the energy audit, and lighting or appliances you received rebates for

1. (Yes) [Continue with the person in the household who is most familiar]
2. (No) [Ask to speak with the person in the household who is most familiar]
98. (Nobody in household recalls participation) [Thank and Terminate]

S4. Can you confirm that [READ IN S1 LIST] in the past year? [1=Yes, 2=No, 98=Don't Know, 99=Refused]

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

S3. Please confirm that <street_addr> in <city> is your primary residence.
1. (Yes)
2. (No) (Specify what address this represents)
99. Refuse

Awareness of Energy Action

EA1. Have you heard of the Aquidneck and Jamestown Energy Action initiative?
1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF EA1=1]
EA2. Before this call, did you know that National Grid sponsored the Aquidneck and Jamestown Energy Action initiative?
1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF EA1=2,98]
EA3. Energy Action is the name of an energy efficiency initiative sponsored by National Grid and other organizations on Aquidneck Island and in Jamestown. The Energy Action initiative distributed information on ways to save energy in your home or business. There were also events in your area about energy efficiency and ways to save energy in your home that were sponsored by National Grid, the Aquidneck Island Planning Commission and the Neighborhood Energy Challenge. After hearing this description, do you recall hearing about the Aquidneck and Jamestown Energy Action initiative?
1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

Participation questions

P1. In addition to receiving a [READ IN LIST], did your household participate in any other energy efficiency programs or receive rebates through National Grid in 2010?
[IF S1A=1, EW S1 READ-IN]
[IF S1B=1, LR S1 READ-IN]
[IF S1C=1, LO S1 READ-IN]
[IF S1D=1, ESP S1 READ-IN]
[IF S1E=1, CS S1 READ-IN]
[IF S1F=1, HEHW S1 READ-IN]
[IF S1G=1, RB S1 READ-IN]
1. (Yes)
2. (No)
98. (Don't Know)

99. (Refused)

[ASK IF P1=1]
P2. Please tell me what other National Grid energy efficiency programs your household participated in, or energy efficiency rebates you received, in 2010. [OPEN RESPONSE with some programs pre-coded]

1. (Home energy audit / Energy Wise) [EW]
2. (Rebate / coupon for light bulb o light fixture purchased in a store) [LR]
3. (Ordered energy efficient lighting through a catalog or internet) [LO]
4. (Rebate for Energy Star refrigerator, freezer, TV or computer monitor) [ESP]
5. (Rebate for Central Air conditioning / HVAC) [CS]
6. (Rebate for Thermostat, hot water heater, heating system) [HEHW]
7. (Had old refrigerator or freezer removed by National Grid) [RB]
00. Other (specify)
98. (Don't Know)
99. (Refused)

P4. How did you learn about National Grid's energy efficiency programs? [OPEN RESPONSE]

P5. Prior to [PROGRAM READ-IN, adding –ing to verb], did you have a positive, negative or neutral opinion of National Grid?

1. Positive opinion
2. Negative opinion
3. Neutral or no opinion
98. (Don't know)
99. (Refused)

Marketing and Outreach Exposure

[ASK SECTION IF EA1=1 OR EA3=1]

M1. You mentioned that you've heard of the Aquidneck and Jamestown Energy Action initiative. I'm interested in the ways you may have received information about the Energy Action initiative.
Do you recall… [ROTATE; 1=YES, 2=NO, 98=Don't Know, 99=Refused]

a. Receiving information about Energy Action in the mail
b. Receiving information about Energy Action in an email
c. Reading about Energy Action in a newspaper or magazine
d. Seeing Energy Action on the internet
e. Hearing about Energy Action on the radio
f. Receiving information about Energy Action from your child's school
g. Hearing about Energy Action from a friend, neighbor or family member?
h. Having information about Energy Action left on your door?

[ASK IF M1A=1]
M2. You mentioned that you received information about Energy Action through the mail. Which of the following organizations sent you information about Energy Action through the mail? [ROTATE] [multiple response; check all that apply]

1. National Grid
2. Aquidneck Island Planning Commission [Note to interviewer: also called Aquidneck Island Energy Alliance]
3. Neighborhood Energy Challenge
4. The City of Newport [Note to interviewer: also includes Newport Energy & Environment Commission]
5. Greater Newport Chamber of Commerce
6. RISE Engineering
00. (Other, Specify)
98. (Don't Remember)
99. (Refused)

[ASK IF M1B=1]
M3. You mentioned that you received information about Energy Action through email. Which of the following organizations sent you information about Energy Action through email? [multiple response; rotate; check all that apply]

1. National Grid
2. Aquidneck Island Planning Commission [Note to interviewer: also called Aquidneck Island Energy Alliance)]
3. Neighborhood Energy Challenge
4. The City of Newport [Note to interviewer: also includes Newport Energy & Environment Commission]
5. Greater Newport Chamber of Commerce
6. RISE Engineering
00. (Other, Specify)
98. (Don't Remember)
99. (Refused)

[ASK IF M1C=1]
M4. You mentioned that you saw or read about Energy Action in a newspaper or magazine. Did you see Energy Action mentioned in an advertisement, or in a news story?

1. Advertisement
2. News story/article
3. (Both)
00. Other (specify)
98. Don't Know
99. Refused

[ASK IF M1D=1]
M5. You mentioned that you saw information about Energy Action on the internet. On which of these websites did you see information about Energy Action? [ROTATE; MULTIPLE RESPONSE]

1. National Grid website (nationalgrid.com)

2. Neighborhood Energy Challenge (neighborhoodenergychallenge.org)
3. Energy Action website (powerofaction.com)
00. Other (Specify)
98. Don't know
99. Refused

[ASK IF ANY M1A-H=1]
M6. Did the Energy Action messages we just discussed provide you with new information about saving energy in your home?
1. (Yes)
2. (No)
3. (Never heard of it)
98. (Don't Know)
99. (Refused)

[ASK IF M6=1]
M6A. What new information did you learn from Energy Action messages? [OPEN RESPONSE]

[ASK IF ANY M1A-H=1]
M7. As a result of the Energy Action messages we just discussed, did your motivation to make your home more energy efficient change?
1. (Yes)
2. (No)
3. (Never heard of it)
98. (Don't Know)
99. (Refused)

[ASK IF M7=1]
M8. Did your motivation to make your home more energy efficient increase substantially, increase somewhat, decrease somewhat or decrease substantially as a result of Energy Action messages?
1. Increased substantially
2. Increased somewhat
3. Decreased somewhat
4. Decreased substantially
98. (Don't know)
99. (Refused)

Energy Action Events

[ASK SECTION IF EA1=1 OR EA3=1]

EV1. The Energy Action initiative also held energy efficiency events at schools, businesses, stores or as part of community festivals. Did you attend any Energy Action events on Aquidneck Island or in Jamestown?
1. (Yes)
2. (No)
98. (Don't Know)

99. (Refused)

[ASK IF EV1=1]
EV2. Did you attend any of the following events where there was energy efficiency information? [Rotate; multiple response]

1. Go Green Night held at your local school
2. Power to Save event held at your local school
3. An Earth Day event
4. Energy Independence Day
5. Energy Breakfast hosted by the Aquidneck Island Planning Commission
6. Historic Homes workshop
7. Farmer's market
8. A hardware store event
00. [ANCHOR] (Other – specify)
98. (Don't Know)
99. (Refused)

[ASK IF EV1=1 & EV2≠00 (no other events specified)]
EV4. Do you recall attending any other Energy Action Events [OPEN END]?

00. (Yes – Specify)
2. (No)
98. (Don't Know)
99. (Refused)

EV3. Did you participate in an Energy Action contest for Newport Gulls tickets? (if needed: To win a Newport Gulls ticket, you had to sign up for a Home energy audit)

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF EV1=1]
EV5. Did the Energy Action events you attended provide you with any new information about saving energy in your home?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF EV5=1]
EV5A. What new information did you learn from Energy Action events? [OPEN RESPONSE]

[ASK IF EV1=1]
EV6. As a result of attending Energy Action events, did your motivation to make your home more energy efficient change?

1. (Yes)

2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF EV6=1]
EV7. Did your motivation to make your home more energy efficient increase substantially, increase somewhat, decrease somewhat or decrease substantially as a result of attending Energy Action events?

5. Increased substantially
6. Increased somewhat
7. Decreased somewhat
8. Decreased substantially
98. (Don't know)
99. (Refused)

Neighborhood Energy Challenge
[ASK SECTION IF EA1=1 OR EA3=1]

NE1. Have you heard of the Neighborhood Energy Challenge, a contest to earn points by saving energy?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF NE1=1]
NE2. Did you participate in the Neighborhood Energy Challenge?

1. (Yes)
2. (No)
3. (Never heard of it)
98. (Don't Know)
99. (Refused)

[ASK IF NE2=1]
NE3. Did the Neighborhood Energy Challenge provide you with any new information about saving energy in your home?

1. (Yes)
2. (No)
3. (Never heard of it)
98. (Don't Know)
99. (Refused)

[ASK IF NE2=1]
NE4. As a result of your participation in the Neighborhood Energy Challenge, did your motivation to make your home more energy efficient change?

1. (Yes)
2. (No)

98. (Don't Know)
99. (Refused)

[ASK IF NE4=1]
NE5. Did your motivation to make your home more energy efficient increase substantially, increase somewhat, decrease somewhat or decrease substantially as a result of participating in the Neighborhood Energy Challenge?

1. Increased substantially
2. Increased somewhat
3. Decreased somewhat
4. Decreased substantially
98. (Don't know)
99. (Refused)

[ASK IF NE2=1]
NE6. Did you [PROGRAM READ-IN] before or after you signed up for the Neighborhood Energy Challenge?

1. (before)
2. (after)
3. (during)
98. (Don't Know)
99. (Refused)

Influence of Messaging

[ASK SECTION IF EA1=1 OR EA3=1]

IM1. Are there any other ways you saw or heard about Energy Action, besides the ways we just discussed?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF IM1=1]
IM2. How else did you see or hear about Energy Action? [OPEN RESPONSE]

IM3. Did the information that you saw or heard about Energy Action influence your decision to [PROGRAM READ-IN])?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

IM4. As a result of everything you saw or heard about Energy Action, has your knowledge of energy efficiency actions you could take in your home changed?

1. (Yes)
2. (No)

98. (Don't Know)
99. (Refused)

[ASK IF IM4=1]
IM5. Has your knowledge of energy efficiency actions you could take in your home increased substantially, increased somewhat, decreased somewhat or decreased substantially as a result of the information you saw or heard about Energy Action?

1. Increased substantially
2. Increased somewhat
3. Decreased somewhat
4. Decreased substantially
98. (Don't know)
99. (Refused)

EnergyWise Battery
[ASK SECTION IF EW=1 OR P2=1]

EW1. My next set of questions is about the home energy audit you received in the past year. Did the home energy audit provide you with any new information about saving energy in your home?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

EW2. Please rate your overall satisfaction with the home energy audit, using a scale from 1 to 5, where 1 is very dissatisfied and 5 is very satisfied. [NUMERIC OPEN END]

[ASK IF EW2<4]
EW3. Why did you rate it this way? [OPEN END]

EW4. What recommendations for saving energy did you receive from your home audit? [OPEN RESPONSE]

1. (Install compact fluorescent light bulbs)
2. (Install energy efficient light fixtures)
3. (Install programmable thermostat)
4. (Install Air sealing or weather stripping)
5. (Duct sealing)
6. (Install additional insulation)
7. (Ventilation work)
8. (Replace refrigerator)
9. (Replace water heater)
10. (Upgrade windows)
11. (Upgrade heating or air conditioning system)
12. (Install or replace home appliance)
00. (Other – specify)
98. (Don't Know)

99. (Refused)

EW5. Have you taken any of the recommended steps for saving energy since your home audit?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF EW5=1]
EW6. Using scale that ranges from 1 to 5 where 1 is no influence and 5 is a great deal of influence, how much influence did the information that you received during the audit have on your decision to take the recommended steps for saving energy in your home? [NUMERIC OPEN END]

[ASK IF EW5=1]
EW7. What other factors influenced your decision to take the recommended steps for saving energy in your home? [OPEN RESPONSE]

[ASK IF EW5=2]
EW8. Why didn't you take the recommended steps for saving energy in your home?

Customer Satisfaction

P3. Prior to 2010, did you know that National Grid offered programs that help its customers save energy?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

SAT1. Please rate your overall satisfaction with National Grid, using a scale that ranges from 1 to 5, where 1 is very dissatisfied, and 5 is very satisfied. [NUMERIC OPEN END]

[ASK IF SAT1<4]
SAT2. Why did you rate it this way? [OPEN END]

SAT3. Did your opinion of National Grid change as a result of [PROGRAM READ-IN, adding –ing to verb]?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF SAT3=1]
SAT4. Did your opinion of National Grid increase substantially, increase somewhat, decrease somewhat or decrease substantially as a result of [PROGRAM READ-IN, adding –ing to verb]?

1. Increased substantially
2. Increased somewhat
3. Decreased somewhat
4. Decreased substantially
98. (Don't know)
99. (Refused)

[ASK IF EA1=1 OR EA3=1]
SAT5. Has your opinion of National Grid changed since learning about the Energy Action initiative?

1. (Yes)
2. (No)
98. (Don't Know)
99. (Refused)

[ASK IF SAT5=1]
SAT6. Has your opinion of National Grid increased substantially, increased somewhat, decreased somewhat or decreased substantially since learning about the Energy Action initiative?

1. Increased substantially
2. Increased somewhat
3. Decreased somewhat
4. Decreased substantially
98. (Don't know)
99. (Refused)

Demographics and Housing Characteristics

We're almost done with the survey. I just have some questions about your household and home.

D1. What type of residence is your home in <CITY>? Is it a..

1. A single-family detached residence
2. A single-family attached residence (for example, a townhouse)
3. An apartment or condominium in a building with 2-4 units
4. An apartment or condominium in a building with 5 or more units, or a
6. A mobile home
7. Other [SPECIFY]
98. (Don't know)
99. (Refused)

D2. Do you own or rent this home?

1. Own

2. Rent
98. (Don't know)
99. (Refused)

D3. Does this home have Central Air Conditioning?
1. (Yes)
2. (No)
8. (Don't Know)
9. (Refused)

D4. Is this home occupied year-round?
1. (Yes)
2. (No)
8. (Don't Know)
9. (Refused)

[ASK IF D4=1]
D5. Including yourself, how many people live in your household on a full time basis?
1. [NUMERIC OPEN END]

[ASK IF D4=2]
D6. During what months is this home occupied? [MULTIPLE RESPONSE; SELECT ALL THAT APPLY][INTERVIEWER: LIVING IN HOME ONLY ON WEEKENDS COUNTS AS A MONTH. PLEASE MARK]
1. (January)
2. (February)
3. (March)
4. (April)
5. (May)
6. (June)
7. (July)
8. (August)
9. (September)
10. (October)
11. (November)
12. (December)
98. (Don't Know)
99. (Refused)

[ASK IF D4=2]
D7. Including yourself, how many people live in your household during these months?
1. [NUMERIC OPEN END]

D8. What is your age?
1. (24 yrs or younger)
2. (25 to 34 yrs)
3. (35 to 44 yrs)

4. (45 to 54 yrs)
5. (55 to 64 yrs)
6. (65 years and over)
98. (Don't Know)
99. (Refused)

D9. What is the highest level of education you have completed?
1. (Less than high school)
2. (High school graduate or equivalent)
3. (Some college, no degree)
4. (Associate's degree)
5. (Bachelor's degree)
6. (Graduate or professional degree)
98. (Don't know)
99. (Refused)

D10. Please stop me when I get to the range of your household's total annual income before taxes:
1. Less than $25,000
2. $25,000 - $34,999
3. $35,000 - $49,999
4. $50,000 - $74,999
5. $75,000 - $99,999
6. $100,000 - $149,000
7. $150,000 - $199,999
8. $200,000 or more
98. (Don't know)
99. (Refused)

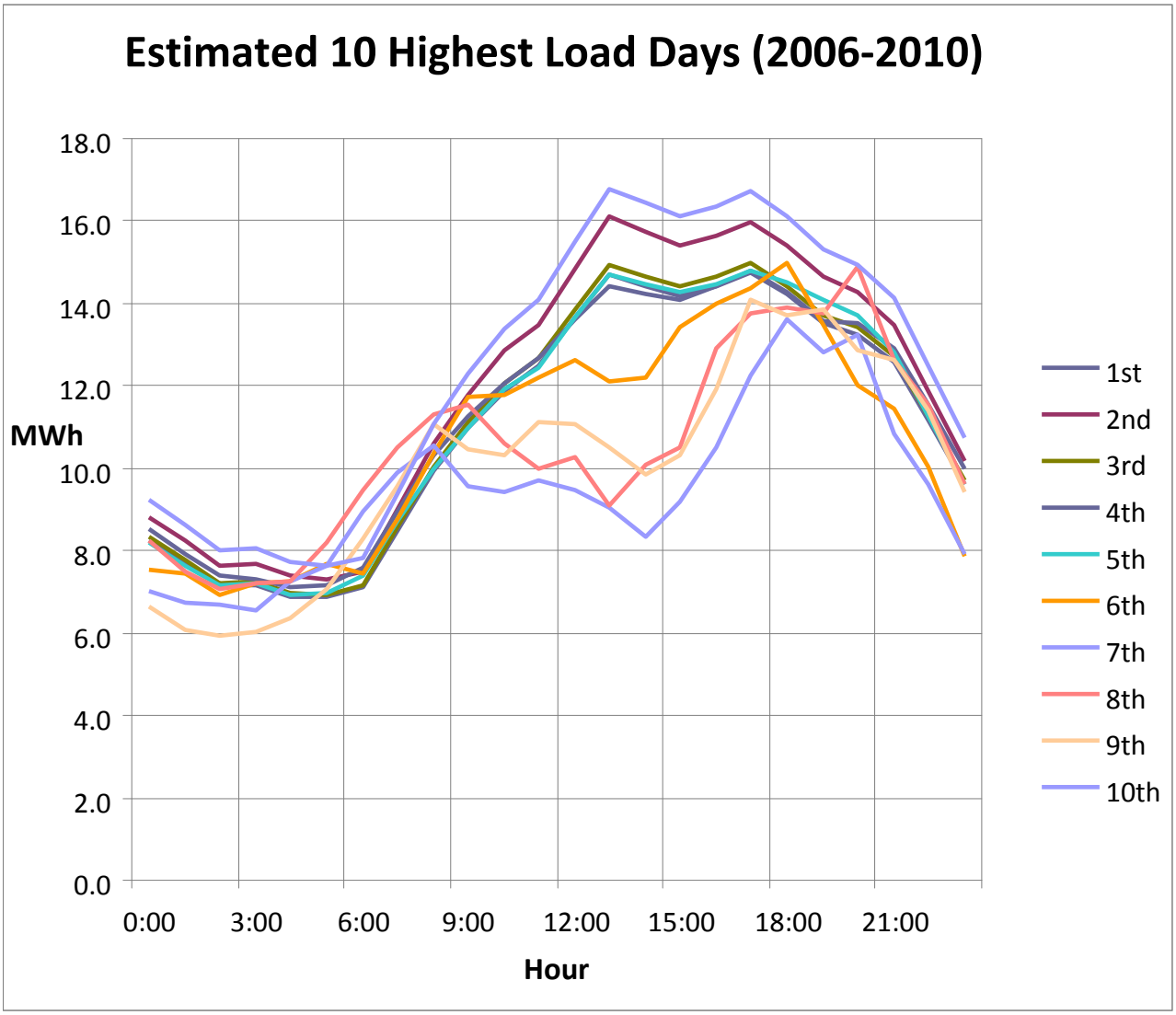
D11. (OBSERVATION) Sex:
1. Female
2. Male

That completes the Energy Action survey! Thank you for your participation. National Grid greatly values your opinion. Your responses have been recorded and all of your responses will be kept confidential.

Appendix 7 (a) – FSC NWA Analyses

Estimated 10 Highest Load Days on the Tiverton Sub Feeders 33F3 and 33F4

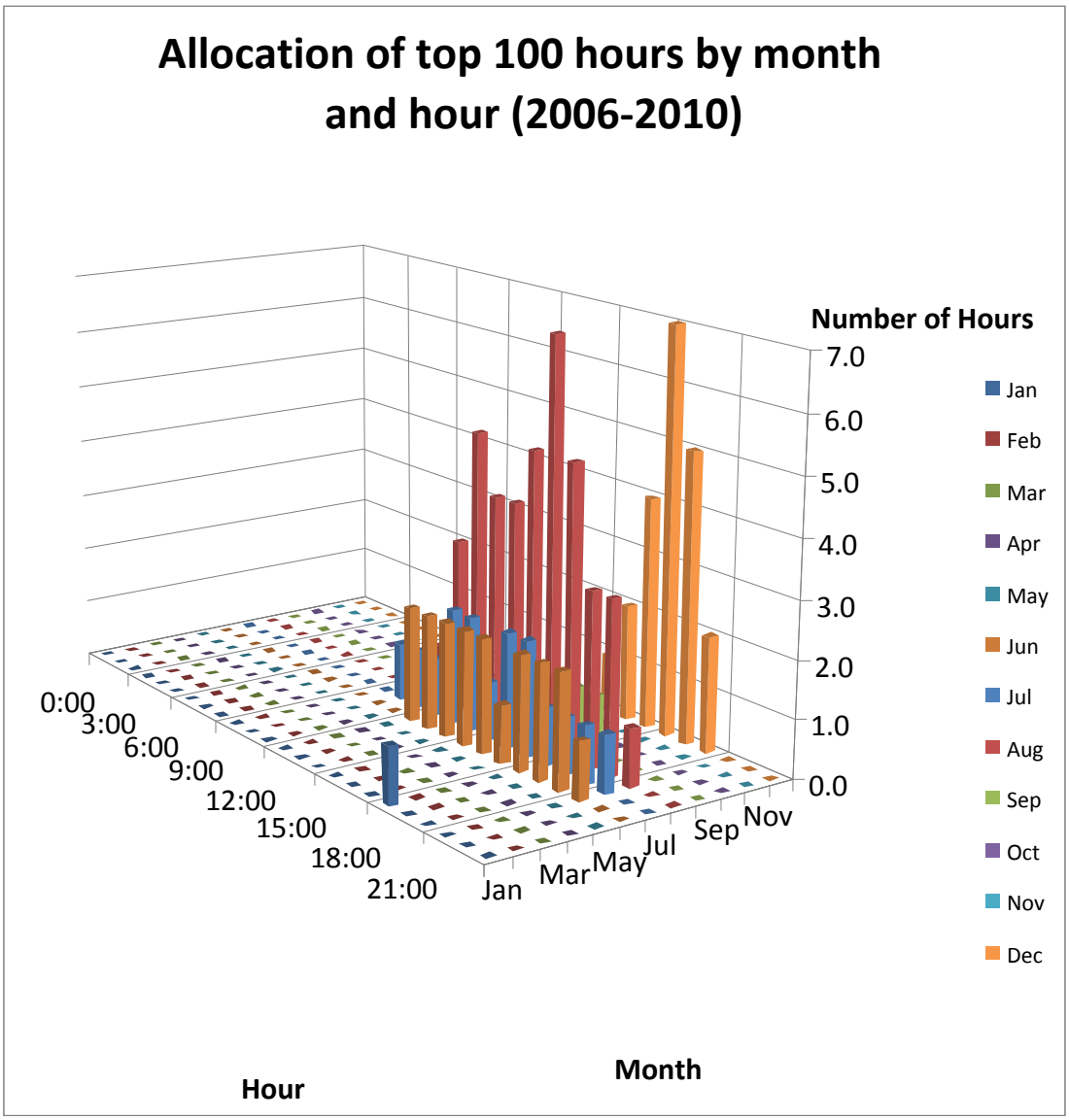
1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
8/1/06	8/2/06	8/3/06	6/27/07	6/9/08	12/20/09	12/21/09	12/23/09	12/29/09	7/6/10



Appendix 7 (b)

Top 100 Load Hours by Month and Hour on the Tiverton Sub Feeders 33F3 and 33F4

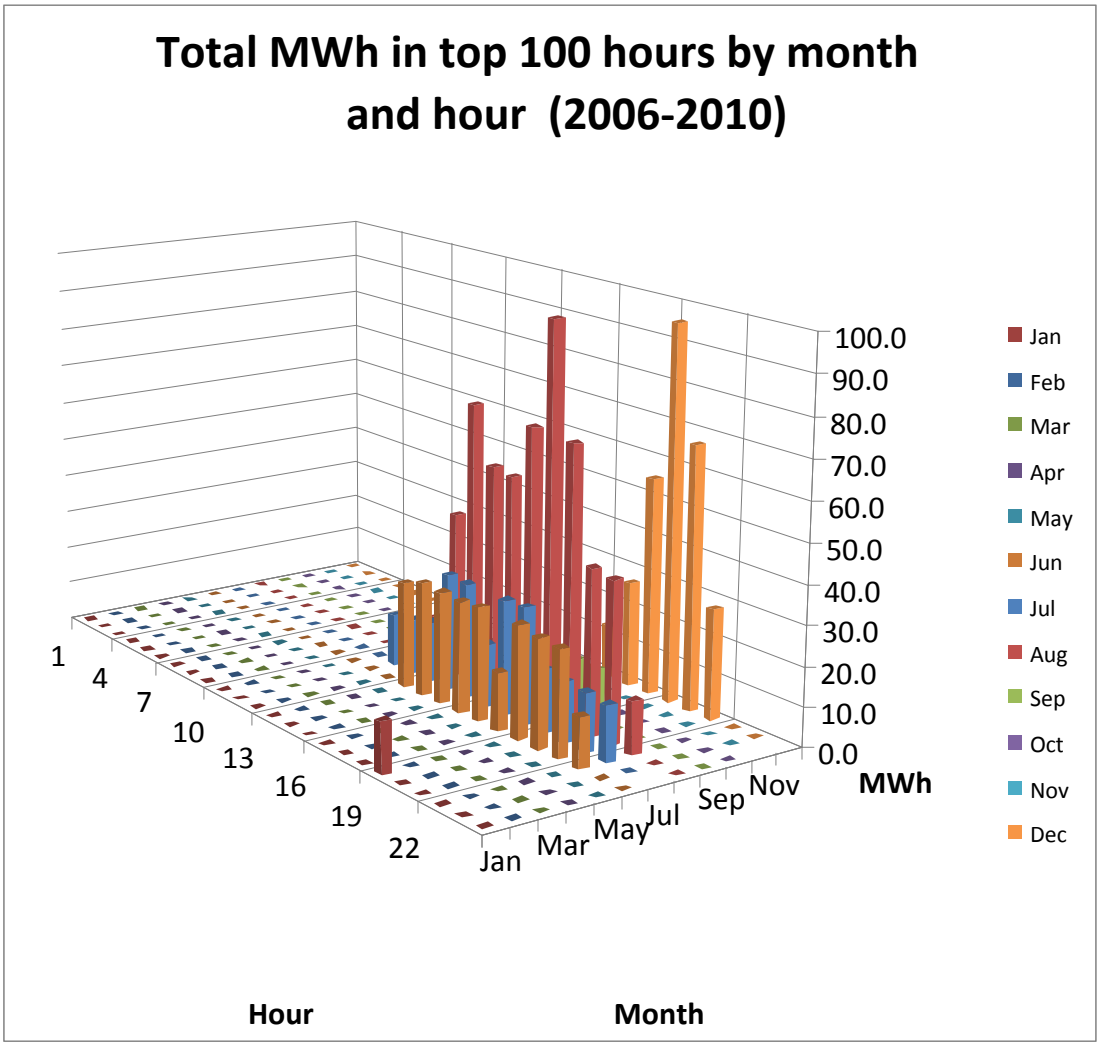
Hour Starting	Jun	Jul	Aug	Sep
0:00				
1:00				
2:00				
3:00				
4:00				
5:00				
6:00				
7:00				
8:00				
9:00				
10:00		1		
11:00		1	1	
12:00	2	1	3	
13:00	2	2	5	
14:00	2	2	4	
15:00	2	1	4	
16:00	2	2	5	1
17:00	1	2	7	1
18:00	2	1	5	1
19:00	2	1	3	
20:00	2	1	3	
21:00	1	1	1	
22:00				
23:00				
TOTAL	**18**	**16**	**41**	**3**


Allocation of top 100 hours by month and hour (2006-2010)
Number of Hours
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0:00
3:00
6:00
9:00
12:00
15:00
18:00
21:00
Jan
Mar
May
Jul
Sep
Nov
Hour
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Appendix 7 (c)

Total MWh in Top 100 Hours on the Tiverton Sub Feeders 33F3 and 33F4

Hour Starting	Jun	Jul	Aug	Sep
0:00				
1:00				
2:00				
3:00				
4:00				
5:00				
6:00				
7:00				
8:00				
9:00				
10:00		13.4		
11:00		14.1	13.5	
12:00	27.3	15.5	42.4	
13:00	29.1	30.0	72.0	
14:00	28.7	29.4	58.0	
15:00	28.4	16.1	57.2	
16:00	28.9	29.3	71.1	13.0
17:00	14.8	29.7	98.7	13.3
18:00	28.8	16.1	70.3	13.1
19:00	27.7	15.3	41.9	
20:00	27.3	14.9	41.0	
21:00	12.9	14.1	13.5	
22:00				
23:00				
TOTAL	253.8	238.0	579.4	39.4


Total MWh in top 100 hours by month and hour (2006-2010)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
MWh
1
4
7
10
13
16
19
22
Hour
Jan
Mar
May
Jul
Sep
Nov
Month
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Appendix 8 – Ecobee PCT preliminary evaluation results

Date: **August 12, 2011**

To: **Keith Miller and Whitney Domigan, National Grid**

From: **Jessica Aiona, Kathy Hile, and Matei Perussi, The Cadmus Group, Inc.**

Re: **Wi-Fi Programmable Thermostat Billing Analysis**

Introduction

National Grid ran a pilot program to install Ecobee Wi-Fi thermostats in residential homes. From December 2010 through April 2011, Cadmus installed 98 of these thermostats for 69 participants in Massachusetts and installed 25 thermostats for 17 participants in Rhode Island, for a total of 123 thermostats. All thermostats control a furnace, at minimum; some also control air conditioners. This memorandum outlines our preliminary billing analysis examining gas heating savings from the thermostats;[14] we will deliver a more extensive analysis with a full year of post-installation billing data and a summer cooling analysis in May 2012.

Table 1 summarizes the characteristics of the Ecobee Wi-Fi thermostat installation pilot participant homes. The characteristics of the entire population of pilot participants are very similar to the group of 64 participants we used in the billing analysis.

Table 1. General Characteristics of Wi-Fi Thermostat Pilot Participants

Group	Number of Participant Homes	Number of Thermostats Installed	Average Home Area (sf)	Average Furnace Capacity (BTU per Home)	Average Furnace Age (Years)	Average Number of Thermostats Installed per Home
Population	86	123	2,267	104,210	10	1.43
Billing Analysis Group	64	91	2,319	106,422	10	1.42

[14] The current preliminary analysis is limited by less than six months of post-installation billing data being available. In May 2012, our more robust complete billing analysis will include 12 months of post-installation billing data.

Methodology

National Grid provided Cadmus with monthly gas billing data for Massachusetts and Rhode Island participants from January 2009 through June 2011. In order to achieve the most accurate results, a billing analysis should include pre-installation data for the 12 months immediately before the thermostat was installed, and post-installation data for the 12 months immediately following thermostat installation. However, since the pilot thermostats were installed from December 2010 through April 2011, post data were only available from January 2011 through June 2011.

Because of that limitation, we paired pre- and post-installation months for this billing analysis. By using the same calendar months in both the pre- and post-installation periods, we ensured having a reasonable comparison in both periods that prevents bias which could occur if we had used mismatched months. For example, for a participant who had the Wi-Fi thermostat installed in January 2011, we included post data in our analysis from the period of February 2011 through June 2011, and used the corresponding February 2010 through June 2010 data for our baseline analysis.

The next step in our analysis was to obtain daily temperature weather data from the National Climatic Data Center for the three weather stations corresponding to the Wi-Fi pilot participants' zip codes. From the daily weather data, we calculated the base 65 reference temperature heating degree days (HDDs).[15] We then matched the participant billing data to the nearest weather station by zip code, and matched each monthly billing period to the associated base 65 HDDs.

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

Next, we applied the data screening and criteria shown in Table 2. If a participant failed any of these screens, we excluded that site's data from our billing analysis. We also excluded homes from our analysis that consumed less than an average of 1 therm per day in either the pre or post period, as this indicates insufficient heating usage or that the participant home was vacant.

Table 2. Participant Screening for Analysis

Site-Level Screening Criterion	Number of Participants Dropped
Fewer than three paired months in the pre or post period	20
Heating energy usage changed by more than 70 percent after implementation	1

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

Heating energy averaged less than 1 therm per day either in pre or post period	1
Total Participants Screened Out	22
Total Participants Used in Analysis	64

Using these criteria, we screened out 22 of 86 participants, or approximately 25 percent. Sixty-four participants had sufficient billing data for our analysis, and these are the sites we used in our preliminary regression modeling.

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

$$ADC_{it} = \alpha_i + \beta_1 AVGHDD_{it} + \beta_2 POST * AVGHDD_{it} + \varepsilon_{it}$$

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

ADC_{it} = average daily gas consumption during the pre- and post-installation periods.

α_i = average daily non-weather-sensitive base load for each participant that is part of that fixed-effects specification.

β_1 = average daily gas usage per HDD in the pre-installation period.

$AVGHDD_{it}$ = average daily base 65 HDDs based on home location.

β_2 = gas heating savings per HDD as a result of thermostat installation(s).

$POST_t$ = a dummy variable that is 0 in the pre-period and 1 in the post-period.

$POST_t * AVGHDD_{it}$ = an interaction of $POST_t$ and $AVGHDD_{it}$.

ε_{it} = the modeling estimation error.

The model directly estimates the thermostat savings (β_2). The inclusion of the interaction of the HDDs and the post-variable allows for the possibility of obtaining weather-normalized savings by specifically isolating only the heating therm savings. For this billing analysis, Cadmus used the most recent 15 years of Typical Meteorological Year

(TMY3) data (1991-2005) to calculate normalized HDDs and weather-normalized savings estimates.[16]

Wi-Fi Thermostat Preliminary Savings Summary Results

Table 3 summarizes the Wi-Fi thermostat gas savings, which averaged 93 therms per home. However, since our billing analysis sample (n=64) averaged 1.42 Ecobee thermostats installed per home, the savings per thermostat is 66 therms. Calculating a 90 percent confidence interval around the overall savings yields an estimate of 48 to 83 therms per thermostat. Each thermostat achieved 7 percent savings over the average annual pre-installation gas usage of 890 therms per home. Each participant home achieved 10 percent savings over the average (93/890). Table 4 presents the regression output of the Wi-Fi preliminary thermostat model.

Table 3. Wi-Fi Thermostat Preliminary Billing Analysis Savings Summary

Number of Thermostats Installed (Population)	Number of Participants (Population)	Number of Participants (Billing Analysis)	Savings (Therms per HDD)	Normal HDD_TMY3	Savings Per Participant (Therms)	Savings Per Thermostat (Therms)	90% Precision	Savings Lower 90% CI	Savings Upper 90% CI
123	86	64	0.01511	6,165	93	66	27%	48	83

[16] This TMY3 series is the latest available normal weather series. The 30-year TMY2 (1971-2000) series shows higher normal HDDs (6,497), but we deemed the TMY3 series to be more appropriate as it reflects the warming trend evident in more recent years.

Table 4. Wi-Fi Thermostat Preliminary Billing Analysis Regression Model Output

	Analysis of Variance				
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	66	8015.10814	121.44103	227.68	<.0001
Error	620	330.70171	0.53339		
Corrected Total	686	8345.80985			
Root MSE	0.73034		R-Square	0.9604	
Dependent Mean	2.74637		Adj R-Square	0.9562	
Coeff Variable	26.59274				
	Parameter Estimates				
Source	DF	Parameter Estimates	Standard Error	t value	Prob. T
Average Intercept*	64	0.017513	0.22746	0.08	0.92
AvgHDD	1	0.14844	0.00265	55.93	<.0001
PostHDD	1	-0.01511	0.00249	-6.06	<.0001

* Since we ran the model with a fixed-effects specification, each participant has a unique intercept. Due to the large amount of output produced when showing the model coefficients for each of the 64 intercepts, the model output in this table presents the average of the separate intercepts.

Conclusions

The Wi-Fi thermostats show a preliminary savings of 7 percent per thermostat, and 10 percent per home; however, the confidence intervals around those savings are high because they are based on small sample sizes and a limited number of winter months of billing data. Our next report will be more precise, as it may include additional sites and will include additional billing data for analysis.

Recommendations

We recommend that National Grid have us re-run the analysis when 12 months of pre- and post-installation billing data are available, and if possible with more participants, to achieve more precise savings estimates.

Saving for 2.5 Ton AC System with Wi-Fi Thermostat

Hours	W	total Wh	Savings/Yr	kwh Savings/Yr	Lifetime Savings/Yr	Value Yr	Value Lifetime	Cost of kWh	Savings Assumption
360	2484.18	894304.8	62601.336	62.601336	626.01336	$11.27	$112.68	0.18	7.00%

kW savings 0.1738926

Gas Actuals

Therms Saved	Cost	Life/Yrs	Savings/Yr	Savings/Life	Therm Life
67	1.69	10	$113.23	$1,132.30	-670

$ Total Savings

	Dollars	Year	Life	
Gas Savings	$770.50	67	670	**Therms**
Electric Savings	$81.64	626.0134	6260.1336	**kWh**
Total	$852.14			

Assumptions for AC

You can assume a 1/3 HP outside blower and a 1/2 HP inside blower.

Compressor 2.5 HO

2.5+ 1/3 + 1/2 =3.33 HP

2484.18 Watts

Running watts would be about 746*3.33 + 25 that 2486.8 W

Call it 2.5KW; there are 746 W/HP

Pilot Costs

Unit Cost	**$200.00**
Labor	**$300.00**

Appendix 9 – Sampling of summer load curtailment programs offered by utilities in the northeast

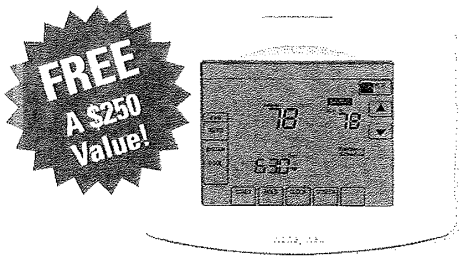
Receive a Credit of up to $50 on Your Electric Bill!

Dear valued PSE&G customer:

If you have central air conditioning, you may be eligible to participate in PSE&G's Cool Customer Program and receive **a credit of up to $50** on your electric bill!

Once you enroll, you'll also receive a new, state-of-the-art digital touch-screen programmable thermostat that can save you money year-round by allowing you to customize cost-efficient temperature settings during the coldest and hottest months of the year.*

More than 100,000 PSE&G customers already enjoy the savings, and have learned how to better manage their home energy use all year by participating in this easy, voluntary program. It "pays" for you to join them!



Save Energy and Money When You Enroll in PSE&G's Cool Customer Program

Call today to enroll, and you'll get a one-time $50 credit on your electric bill!** We'll also send an experienced PSE&G technician to your home to install your **FREE programmable thermostat** ($250 value) at no charge to you.

How the Cool Customer Program works:

If summer energy demand in our service area is extremely high, your central air conditioning compressor may be cycled on and off at 15 minute intervals. This helps to minimize the impact of high energy demand on the electric system, which maintains the reliability of the electric system and reduces the likelihood of blackouts due to high energy usage. During cycling, your indoor fan will continue to circulate air throughout your home.

Please refer to the enclosed brochure for additional information on PSE&G's Cool Customer Program. Then call 1-888-504-4028 to schedule your appointment and start saving!

Appointments are filling up fast so don't wait – hurry and call today!

** You must be a PSE&G electric customer and participate in the program for a minimum of two years.*

*** Instead of a new thermostat and $50 bill credit, you can choose to have a cycling switch installed on your central air conditioner compressor outside your home. If you choose this option, you will earn a $4 credit on your electric bill for each summer month you participate, June-September, plus $1 per cycling event.*

PSE&G

power
PPL ELECTRIC UTILITIES

Program Overview

Frequently Asked Questions

Need Help?

Enroll Today

Interested?
Contact us today:
1-866-748-2333
(8 a.m. - 6 p.m.
Monday - Friday)

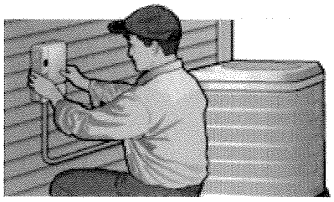
E-power Peak Saver
Program Overview: Residential

E-power Peak Saver is a FREE program that helps reduce times of peak electricity demand in our area.

When you enroll in E-power Peak Saver, we'll connect a Digital Cycling Unit (DCU) on or near your central A/C unit/heat pump. On the hottest summer weekdays, June 1 through September 30, we'll automatically coordinate participating units to help balance the demand for electricity. There is no charge for signing up and installation is free.

During the summer, when energy demand approaches a critical point, the DCU receives a signal that puts your compressor into a "conservation mode". This means your compressor will operate half the time it did during the hour prior to the conservation event. However, during the entire conservation event, your unit's fan will run uninterrupted, circulating cool air throughout your home to maintain comfort.

E-power Peak Saver typically operates on the hottest weekdays for a block of time between 12 p.m. and 7 p.m., June 1 through September 30. The program will not be activated on holidays or weekends unless there is an unexpected critical need.



See how E-power Peak Saver works.

Click Here to Watch the Video

How You Benefit

- For every full cooling season that you participate, you'll receive up to **$32* per central A/C unit or heat pump**.
- **It's FREE.** There's no charge for the installation and service of the E-power Peak Saver Digital Cycling Unit (DCU). If you're not satisfied, you can ask to be removed from the program at no cost to you.
- Installation is easy. If our technician has safe and unobstructed access to your central A/C unit(s) or heat pump(s), you don't need to be at home when the device (s) is installed.

For more details, read our Frequently Asked Questions
Ready to enroll? Click here.

* Participation earnings for each device installed are prorated at $8/month for four months and paid as a check following the end of the program season.
However, should you leave during the program season, you would then forgo the full participation incentive.

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Smart Energy Savers Program®
What is PeakRewards℠?
PeakRewards℠ A/C Program
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Customer Testimonials
Enrollments by County
PeakRewards℠ Electric Water Heater Program
PeakRewards℠ Online Access
PeakRewards℠ ReferralRewards
Trade Ally Program
Multifamily Program
Enroll Now
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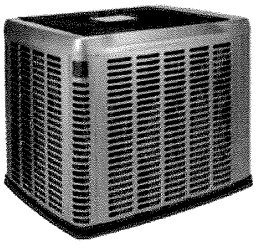
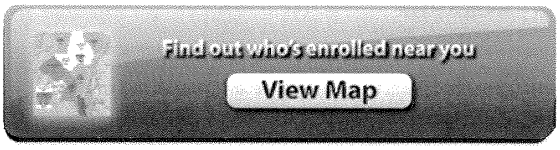


PeakRewards℠ A/C Program

Share

What is it?

The PeakRewards℠ A/C program is designed by BGE to help ease the "peak" demand for electricity in the Mid-Atlantic region. It's part of the BGE Smart Energy Savers Program®, which helps you conserve energy, save money and protect the environment.



FAQs

How does it work?

BGE residential customers with central air conditioning or an electric heat pump in good working order can choose either a Honeywell programmable thermostat or a switch professionally installed. When you enroll, you agree to help ease high electricity demand by allowing BGE to "cycle" your air conditioning on and off from time to time, typically during the summer months when electricity demand is at its peak. PeakRewards℠ is available to BGE residential electric customers regardless of their choice of electricity supplier. For more information on energy choice, click here.

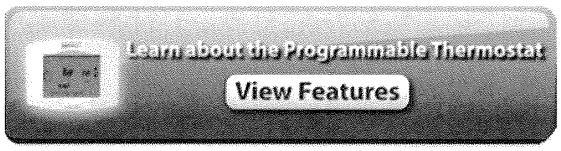
What do I get?

Upon enrollment, you'll receive a new programmable thermostat or the Smart Switch professionally installed at your home. If you choose the programmable thermostat, you can save up to $1,790 over the next five years.

	50% cycling	75% cycling	100% cycling
Year 1 total bill credits & bonus	$100	$150	$200
Year 2 total bill credits	$50	$75	$100
Year 3 total bill credits	$50	$75	$100
Year 4 total bill credits	$50	$75	$100
Year 5 total bill credits	$50	$75	$100
Sub Total	$300	$450	$600
Thermostat & Install No out-of-pocket expense	$290	$290	$290
Thermostat Energy Savings*	$900	$900	$900
Total Savings	$1490	$1640	$1790

*Bill credits are paid June-July-August-September. The value of the thermostat and installation varies according to market pricing. *Savings vary and $900 is based on an average of $180 per year over five years.*

- **Equipment Choices.**Choose a new Honeywell programmable thermostat, which can save you up to 15%* on your heating and cooling costs year-round, or an outdoor air conditioner switch professionally installed at your home.



- **Cycling Choices.** Choose 50%, 75% or 100% cycling. The higher the cycling level, the higher the billing credits on your BGE bills - $50, $75 or $100 each summer you participate.
- **More Savings.** In addition, you will get a matching bonus, which *doubles* your credits during the first year of participation. If you choose a thermostat, you can save up to 15%* year-round on your heating and cooling costs.
- **Online Access.** This new feature will allow you to manage your PeakRewards℠ thermostat settings and override up to two non-emergency cycling events from anywhere you have access to a web browser.

**Savings vary and 15% is based on an average of $180 savings per year.*

How does it help?

Participation in PeakRewards℠ is one way we can work together to help protect our environment and reduce our carbon footprint by:

- **Reducing** the need for additional power generation plants.
- **Reducing** the emissions from current and future power plants.
- **Reducing** the need for additional electric delivery infrastructure such as electric transmission and distribution lines.
- **Easing** the burden on Maryland's electricity delivery system as our state's electricity demands continue to grow.
- **Aligning** with the state's *EmPOWER Maryland* goals.
- A/C Switch and Thermostat Recycling

PeakRewards℠ is available to BGE residential electric customers regardless of their choice of electricity supplier.
For more information on energy choice, click here.
1-888-309-PEAK (7325)

Legal

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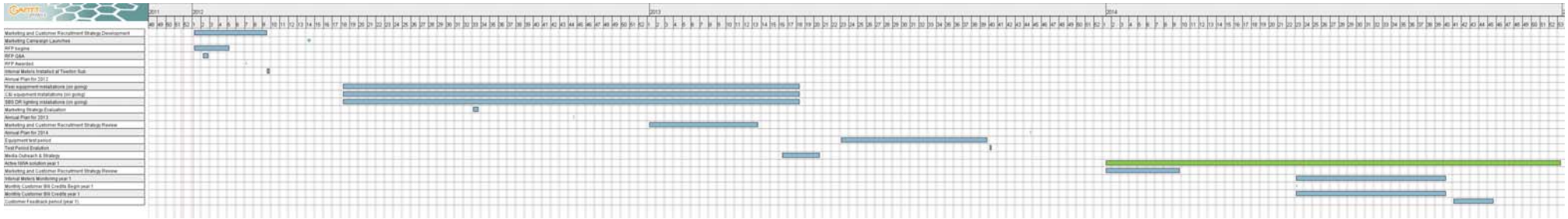
Appendix 10 – Detailed Incremental Cost Information for Budget

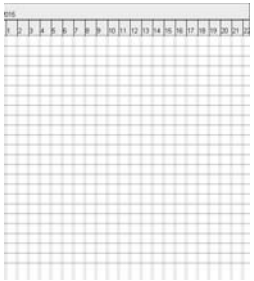
Budget	2012	2013	2014	2015	2016	2017	Total
PP&A	$60,000	$50,000	$30,000	$30,000	$30,000	$30,000	$230,000
Marketing	$40,000	$40,000	$35,000	$10,000	$10,000	$10,000	$145,000
Rebates - Resi	$50,000	$50,000	$50,000	$50,000	$50,000	$60,000	$310,000
Rebates - DLC	$0	$0	$7,000	$7,000	$7,000	$4,900	$25,900
Rebates - C&I	$16,000	$16,000	$16,000	$16,000	$16,000	$16,000	$96,000
$40 Resi Customer Incentive	$5,000	$10,000	$15,000	$20,000	$25,000	$31,000	$106,000
$160 C&I PCT DR Credit			$4,800	$6,400	$8,000	$9,600	$28,800
DLC DR Credit (50% C&I)			$2,000	$4,000	$6,000	$7,400	$19,400
STAT (wi-fi site)	$25,000	$30,000	$30,000	$30,000	$30,000	$30,000	$175,000
Evaluation	$25,000	$15,000	$15,000	$15,000	$15,000	$15,000	$100,000
Total	$221,000	$211,000	$204,800	$188,400	$197,000	$213,900	$1,236,100

Administrative costs represent the internal costs for 0.5 full time employees to work on the project over the first three years. In the initial years, this cost will be larger so that operational processes can be fully established and put into place. Equipment and installation costs are built off the costs from the 2011 behavioral project. As mentioned previously, this industry is changing rapidly and equipment is becoming more easily accessible so costs could decrease over time and when purchased in bulk quantities. Approximately seventy percent of this cost is for equipment and thirty percent is for a vendor to do the installations.

Marketing costs are higher in earlier years with the goal of obtaining and retaining the majority of participants. If customers leave the program, the equipment in their homes and facilities would still provide energy efficiency value for the customers.

Appendix 11 – Project Management Schedule


2011
2012
2013
2014
Marketing and Customer Recruitment Strategy Development
Marketing Campaign Launches
RFP begins
RFP Q&A
RFP Awarded
Internal Meters Installed at Tiverton Sub
Annual Plan for 2012
Rate equipment installations (on going)
C&I equipment installations (on going)
SBS DR lighting installations (on going)
Marketing Strategy Evaluation
Annual Plan for 2013
Marketing and Customer Recruitment Strategy Review
Annual Plan for 2014
Equipment test period
Test Period Evaluation
Media Outreach & Strategy
Active SMA solution year 1
Marketing and Customer Recruitment Strategy Review
Internal Meters Monitoring year 1
Monthly Customer Bill Credits Begin year 1
Monthly Customer Bill Credits year 1
Customer Feedback period (year 1)



Appendix 12 – Benefit – Cost Tables

Table S-1
National Grid
System Reliability Procurement - Tiverton/Little Compton
Funding Sources
$(000)

	2012	2013	2014	2015	2016	2017	Total
(1) **Projected Budget:**	**$221.0**	**$211.0**	**$204.8**	**$188.4**	**$197.0**	**$213.9**	**$1,236.1**
(2) **Customer Funding Required:**	**$221.0**	**$211.0**	**$204.8**	**$188.4**	**$197.0**	**$213.9**	**$1,236.1**
(3) **Forecasted kWh Sales:**	**7,795,659,066**	**7,966,166,286**	**8,134,402,716**	**8,282,471,092**	**8,282,471,092**	**8,282,471,092**	**48,743,641,344**
(4) **Additional SRP Funding Needed per kWh:**	**$0.0000283**	**$0.0000265**	**$0.0000252**	**$0.0000227**	**$0.0000238**	**$0.0000258**	**$0.0000254**
(5) **Proposed Energy Efficiency Program charge in 2012 EEPP**	**$0.0058900**						
(6) **Proposed Total Energy Efficiency Program charge**	**$0.0059183**						

Notes
(1)Projected Budget includes only additional funds for SRP. It does not include costs associated with focused energy efficiency.
(2) Proposed Total Energy Efficiency Program charge is the sum of the "Additional SRP Funding Needed per kWh" and "Proposed Energy Efficiency Program charge in 2012 EEPP" lines.
(3) The 2012 System Reliability Procurement Report seeks approval only for 2012 funds. Future projections over the life of the Tiverton/Little Compton pilot are estimates subject to change.
(4) All dollar amounts shown are in $2011.

Table S-2
System Reliability Procurement - Tiverton/Little Compton
Summary of Cost Effectiveness ($000)

	2012	2013	2014	2015	2016	2017	Overall
Benefits	**$902.2**	**$932.4**	**$979.7**	**$1,017.7**	**$1,042.8**	**$1,164.3**	**$6,039.1**
Focused Energy Efficiency Benefits[1]	$862.9	$891.9	$786.2	$821.5	$835.1	$940.5	$5,138.0
SRP Energy Efficiency Benefits[2]	$39.3	$40.5	$36.5	$38.2	$49.8	$51.3	$255.6
Demand Reduction Benefits[3]	$0.0	$0.0	$26.3	$36.0	$44.1	$66.2	$172.5
Deferral Benefits[4]	$0.0	$0.0	$130.8	$122.0	$113.9	$106.3	$473.0
Costs	**$562.8**	**$552.8**	**$546.6**	**$530.2**	**$538.8**	**$579.4**	**$3,310.5**
Focused Energy Efficiency Costs[5]	$337.8	$337.8	$337.8	$337.8	$337.8	$361.5	$2,050.4
System Reliability Procurement Costs[6,7]	$225.0	$215.0	$208.8	$192.4	$201.0	$217.9	$1,260.1
Benefit/Cost Ratio	**1.60**	**1.69**	**1.79**	**1.92**	**1.94**	**2.01**	**1.82**

Notes:

(1) Focused EE benefits in each year include the NPV (over the life of those measures) of all TRC benefits associated with EE measures installed in that year that are being focused to the Tiverton/Little Compton area.
(2) SRP EE benefits include all TRC benefits associated with EE measures installed in each year that would not have been installed as part of the statewide EE programs.
(3) DR benefits represent the energy and capacity benefits associated with the demand reduction events projected to occur in each year.
(4) Deferral benefits are the net present value benefits associated with deferring the wires project (substation upgrade) for a given year in $2011.
(5) EE costs include PP&A, Marketing, STAT, Incentives, Evaluation and Participant Costs associated with statewide levels of EE that have been focused to the Tiverton/Little Compton area. For the purposes of this analysis, they are derived from the planned ¢/Lifetime kWh in Attachment 5, Table E-5 of the 2012 EEPP in the EnergyWise and Small Business Direct Install programs. These are the programs through which measures in this SRP pilot will be offered.
(6) SRP costs represent the 2012 SRPP budget which is separate from the statewide 2012 EEPP budget, as well as SRP participant costs. The SRP budget includes PP&A, Marketing, Incentives, STAT and Evaluation.
(7) All costs and benefits are in $2011.
(8) This SRP report seeks approval only for the 2012 System Reliability Procurement Costs. Future projections over the life of the Tiverton/Little Compton pilot are estimates subject to change.

Table S-3
National Grid
System Reliability Procurement - Tiverton/Little Compton
Annual Budgets
$(000)

	Program Planning & Administration	Marketing	Rebates and Other Customer Incentives	Sales, Technical Assistance & Training	Evaluation & Market Research	Total
2012	$60.0	$40.0	$71.0	$25.0	$25.0	$221.0
2013	$50.0	$40.0	$76.0	$30.0	$15.0	$211.0
2014	$30.0	$35.0	$94.8	$30.0	$15.0	$204.8
2015	$30.0	$10.0	$103.4	$30.0	$15.0	$188.4
2016	$30.0	$10.0	$112.0	$30.0	$15.0	$197.0
2017	$30.0	$10.0	$128.9	$30.0	$15.0	$213.9
Total	**$230.0**	**$145.0**	**$586.1**	**$175.0**	**$100.0**	**$1,236.1**

Notes:
(1) The 2012 System Reliability Procurement Report seeks approval only for 2012 funds. Future projections over the life of the Tiverton/Little Compton pilot are estimates subject to change.
(2) The annual totals in this table represent only the forecasted funds necessary to run the Tiverton/Little Compton pilot. They do not include costs associated with focused energy efficiency or with SRP participant costs.
(3) All amounts shown are in $2011.

Table S-4
System Reliability Procurement - Tiverton/Little Compton
Summary of kW, and kWh

			Capacity (kW)			Energy (MWh)	
			Summer	Winter	Lifetime	Maximum Annual	Lifetime
2012	EE	Energy Wise	37	40	456	163	1,423
		Small Business	68	38	819	310	3,724
		SRP	3	0	52	1	19
	Non-EE	Demand Response	0	0	0	0	0
	Total		109	77	1,327	475	5,166
2013	EE	Energy Wise	37	40	456	163	1,423
		Small Business	68	38	819	310	3,724
		SRP	3	0	52	1	19
	Non-EE	Demand Response	0	0	0	0	0
	Total		109	77	1,327	475	5,166
2014	EE	Energy Wise	37	40	456	163	1,423
		Small Business	68	38	819	310	3,724
		SRP	3	0	52	1	19
	Non-EE	Demand Response	553	0	553	13	13
	Total		661	77	1,880	488	5,179
2015	EE	Energy Wise	37	40	456	163	1,423
		Small Business	68	38	819	310	3,724
		SRP	3	0	52	1	19
	Non-EE	Demand Response	742	0	742	18	18
	Total		851	77	2,070	493	5,184
2016	EE	Energy Wise	37	40	456	163	1,423
		Small Business	68	38	819	310	3,724
		SRP	3	0	52	1	19
	Non-EE	Demand Response	932	0	932	23	23
	Total		1,041	77	2,259	498	5,189
2017	EE	Energy Wise	44	47	544	195	1,688
		Small Business	68	38	819	310	3,724
		SRP	3	0	52	1	19
	Non-EE	Demand Response	1,150	0	1,150	28	28
	Total		1,266	85	2,566	535	5,459
Grand Total			4,037	471	11,429	2,963	31,342

Notes:
(1) The "EE" savings include both Focused Energy Efficiency savings and SRP Energy Efficiency Savings.
(2) Measures unique to SRP are listed as a separate line item under the EE heading. Measures part of the focused EE are listed in the EnergyWise and Small Business program lines.
(3) This table shows the kW that will have been installed by the end of each year

Table S-5
System Reliability Procurement - Tiverton/Little Compton
Summary of Benefits By Year

				Capacity ($)						Energy ($)					Non-Electric ($)	
			Total Benefits	Summer Generation	Winter Generation	Transmission	MDC/ Deferral(3)	DRIPE	Winter Peak	Winter Off-Peak	Summer Peak	Summer Off-Peak	DRIPE	Resource	Non - Resource
2012	EE	Energy Wise	412,738	21,417	0	10,010	42,059	4,297	22,110	28,844	20,808	15,905	10,691	206,664	29,935
		Small Business	450,157	33,502	0	18,120	76,136	9,125	124,742	30,242	74,599	14,865	26,911	-8,143	50,059
		SRP	39,274	2,837	0	1,135	4,770	527	0	0	1,006	300	109	28,590	0
	Non-EE	Demand Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
		Deferral	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	**902,169**	**57,755**	**0**	**29,265**	**122,965**	**13,949**	**146,852**	**59,086**	**96,413**	**31,070**	**37,710**	**227,110**	**79,994**
2013	EE	Energy Wise	424,539	24,597	0	10,170	42,731	4,488	22,885	29,751	21,449	16,449	10,868	211,216	29,935
		Small Business	467,361	40,383	0	18,410	77,354	10,101	129,258	31,167	76,824	15,377	26,861	-8,433	50,059
		SRP	40,516	3,232	0	1,153	4,847	541	0	0	1,037	310	110	29,286	0
	Non-EE	Demand Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0
		Deferral	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	**932,417**	**68,212**	**0**	**29,733**	**124,932**	**15,130**	**152,143**	**60,918**	**99,311**	**32,136**	**37,839**	**232,068**	**79,994**
2014	EE	Energy Wise	389,863	27,956	0	10,333	0	1,746	23,614	30,542	22,054	16,952	10,410	216,323	29,935
		Small Business	396,295	47,868	0	18,705	0	3,227	133,585	31,949	78,883	15,860	24,881	-8,721	50,059
		SRP	36,519	3,647	0	1,172	0	164	0	0	1,068	320	103	30,045	0
	Non-EE	Demand Reduction	26,285	11,780	0	13,427	0	0	0	0	1,077	0	0	0	0
		Deferral	130,759	0	0	0	130,759	0	0	0	0	0	0	0	0
		Total	**979,722**	**91,251**	**0**	**43,637**	**130,759**	**5,137**	**157,199**	**62,491**	**103,082**	**33,132**	**35,393**	**237,647**	**79,994**
2015	EE	Energy Wise	404,805	31,866	0	10,498	0	5,480	24,317	31,239	22,573	17,436	9,531	221,931	29,935
		Small Business	416,647	55,841	0	19,004	0	11,217	137,718	32,651	80,853	16,314	21,983	-8,993	50,059
		SRP	38,225	4,079	0	1,191	0	572	0	0	1,099	330	91	30,862	0
	Non-EE	Demand Reduction	35,984	16,074	0	18,321	0	0	0	0	1,589	0	0	0	0
		Deferral	122,034	0	0	0	122,034	0	0	0	0	0	0	0	0
		Total	**1,017,695**	**107,861**	**0**	**49,014**	**122,034**	**17,269**	**162,035**	**63,890**	**106,114**	**34,080**	**31,605**	**243,800**	**79,994**
2016	EE	Energy Wise	416,749	36,196	0	10,666	0	5,967	24,875	31,717	23,013	17,818	8,644	227,918	29,935
		Small Business	428,533	64,217	0	19,308	0	11,528	141,092	33,165	82,559	16,684	19,162	-9,242	50,059
		SRP	39,596	4,530	0	1,210	0	588	0	0	1,127	339	81	31,722	0
	Non-EE	Demand Reduction	44,054	18,464	0	23,368	0	0	0	0	2,222	0	0	0	0
		Deferral	113,891	0	0	0	113,891	0	0	0	0	0	0	0	0
		Total	**1,042,823**	**123,408**	**0**	**54,552**	**113,891**	**18,083**	**165,967**	**64,881**	**108,921**	**34,842**	**27,886**	**250,399**	**79,994**
2017	EE	Energy Wise	511,290	48,842	0	12,940	0	6,778	30,185	38,149	27,703	21,603	9,139	284,260	31,690
		Small Business	439,544	73,135	0	19,617	0	10,689	144,740	33,740	83,825	17,072	16,172	-9,506	50,059
		SRP	40,983	5,007	0	1,229	0	545	0	0	1,151	348	68	32,634	0
	Non-EE	Demand Reduction	66,183	34,095	0	29,307	0	0	0	0	2,780	0	0	0	0
		Deferral	106,292	0	0	0	106,292	0	0	0	0	0	0	0	0
		Total	**1,164,292**	**161,080**	**0**	**63,093**	**106,292**	**18,012**	**174,925**	**71,889**	**115,460**	**39,024**	**25,380**	**307,389**	**81,749**
Grand Total			**6,039,118**	**609,567**	**0**	**269,294**	**720,874**	**87,579**	**959,120**	**383,155**	**629,300**	**204,283**	**195,815**	**1,498,413**	**481,718**

Notes:
(1) The "EE" benefits include both Focused Energy Efficiency benefits and SRP Energy Efficiency benefits.
(2) Measures unique to SRP are listed as a separate line item under the EE heading. Measures part of the focused EE are listed in the EnergyWise and Small Business program lines.
(3) The MDC/Deferral column represents: 2012-2013: the system-average distribution benefit and 2014-2017: the calculated deferral benefit as defined in the notes section of Table S-2
(4) All benefits are in $2011.

Table S-6
System Reliability Procurement - Tiverton/Little Compton
Demand Reduction

	Tstats	DLC	Lighting
Per- Event Capacity Savings per Residential Participant (kW)	**1.25**	**0.4**	**n/a**
Per- Event Capacity Savings per C&I Participant (kW)	**2.5**	**n/a**	**0.065**

	2012	2013	2014	2015	2016	2017
Number of Forecasted Event Hours	**0**	**0**	**48**	**48**	**48**	**48**
Participants	**140**	**280**	**440**	**600**	**760**	**939**
Thermostats - Residential	125	250	375	500	625	775
Thermostats - C&I	10	20	30	40	50	60
Appliance Direct Load Control Measures - Residential	0	0	20	40	60	74
Lighting Tuning - C&I	5	10	15	20	25	30
Total Annual Savings Expected from Demand Reduction Events at Year End						
Forecasted Annual Capacity Savings (kW)	**0**	**0**	**553**	**742**	**932**	**1,150**
Thermostats - Residential	0	0	469	625	781	969
Thermostats - C&I	0	0	75	100	125	150
Appliance Direct Load Control Measures - Residential	0	0	8	16	24	30
Lighting Tuning - C&I	0	0	1	1	2	2
Forecasted Annual Energy Savings (kWh)	**0**	**0**	**13,481**	**18,230**	**22,980**	**28,364**
Thermostats - Residential	0	0	11,250	15,000	18,750	23,250
Thermostats - C&I	0	0	1,800	2,400	3,000	3,600
Appliance Direct Load Control Measures - Residential	0	0	384	768	1,152	1,421
Lighting Tuning - C&I	0	0	47	62	78	94
Total Annual Demand Reduction Benefits ($)	**-**	**-**	**26,285**	**35,984**	**44,054**	**66,183**
Annual Energy Benefits ($)	-	-	1,077	1,589	2,222	2,780
Annual Capacity Benefits ($)	-	-	25,208	34,395	41,832	63,403

Notes:

(1) Forecasted event hours are based on an assumed three days of four-hour events, four times per year. In each event, it is assumed that the demand reduction will be cycled on and off so that full reduction will occur for two of the four hours.
(2) The 2012 System Reliability Procurement Report seeks approval only for 2012 funds. Future projections over the life of the Tiverton/Little Compton pilot are estimates subject to change.
(3) All dollar amounts are in $2011.

Table S-7
System Reliability Procurement - Tiverton/Little Compton
Potential for Wires Project Deferral at Year Begin

	2012	2013	2014	2015	2016	2017
Total Installed kW from Energy Efficiency	**-**	**109**	**109**	**109**	**109**	**109**
Focused Energy Efficiency	-	105	105	105	105	105
SRP Energy Efficiency	-	3	3	3	3	3
Total Forecasted Potential kW from Demand Reduction	**-**	**182**	**363**	**553**	**742**	**932**
Thermostats - Residential	-	156	313	469	625	781
Thermostats - C&I	-	25	50	75	100	125
Appliance Direct Load Control Measures - Residential	-	-	-	8	16	24
Lighting Tuning - C&I	-	0	1	1	1	2
Total kW Reduction	-	290	472	661	851	1,041
Total kW Reduction Needed to Defer Wires Project	-	-	150	390	630	860
kW in Reserve(3)	**-**	**n/a**	**322**	**271**	**221**	**181**

Notes:
(1) All kW amounts are Summer kW.
(2) This table shows the number of kW have been either installed through EE or have become available to reduce through demand reduction by the end of the previous year to therefore contribute to the deferral of the wires investment in the current year.
(3)kW in Reserve acts as insurance against customers overriding the demand reduction themselves, so that the required reduction is still met.