



National Grid Rhode Island System Reliability Procurement Pilot: 2012-2013 Focused Energy Efficiency Impact Evaluation

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1. Executive Summary

This report presents the 2012-2013 Focused Energy Efficiency Impact Evaluation for the Rhode Island System Reliability Procurement (SRP) pilot in the towns of Tiverton and Little Compton. The SRP pilot was designed to determine whether demand-side management could be an effective method of reducing peak demand on the Tiverton substation, which serves over 5,000 customers in the pilot communities.¹ Starting in March 2012, National Grid increased marketing and outreach to encourage participation in select statewide energy efficiency programs, enrollment in SRP DemandLink offerings (WiFi programmable controllable thermostats and Smart Plug window AC control), and enrollment in SRP-specific energy efficiency offerings (Window AC Rebates and Recycling).

This report examines the take rate of “Focused Energy Efficiency” efforts, defined as SRP-specific marketing and outreach efforts aimed at increasing participation in existing statewide programs. The take rate represents the proportion of installations in the pilot area that are attributable to SRP pilot and marketing efforts and is a measure of net impacts.² Findings in this report are specific to the Residential EnergyWise program, and cover the period March 1, 2012 through December 31, 2013.

For the 2012-2013 SRP pilot period, we estimate an SRP pilot “take rate” of about 53% for the EnergyWise program. This take rate is based on 1) a survey with EnergyWise participants, from which we estimate SRP marketing attribution of 49% and 2) an incremental participation analysis comparing participation in the pilot communities with nearby towns, from which we estimate an incremental participation rate of 57%.

During the 2012-2013 pilot period, residential customers on the Tiverton substation installed EnergyWise measures with ex ante gross peak summer load savings totaling 35.1 kW. Applying the take rate of 53% to ex ante gross peak load savings, we estimate that the SRP pilot achieved incremental summer peak savings of 18.6 kW from measures installed between March 1, 2012 and December 31, 2013.

¹ Not all customers in the towns of Tiverton and Little Compton are served by the two sub-feeders (33 and 34) that are the focus of demand reduction efforts. Therefore, we make distinctions throughout this report between success metrics for the two towns overall, or specific to customers served by sub-feeders 33-34 (which we refer to as “the Tiverton substation” or “the substation”).

² This analysis did not verify gross savings but applied the take rate to ex ante (i.e., program-reported) gross savings.

2. Overview of Approach

The Focused EE impact evaluation estimates the coincident peak load impacts of measures installed through statewide EE programs that are attributable to pilot marketing efforts (vs. statewide marketing). To assess peak load impacts, the evaluation uses the same peak kW savings per unit that National Grid uses in its cost-effectiveness tool, and estimates a “take rate” to represent the proportion of activity that would not have occurred without incremental SRP marketing efforts.

As stated in the Focused Energy Efficiency Evaluation Plan (dated 12/21/2012), we limit incremental participation analysis to programs that National Grid is directly promoting with SRP funds. For the 2012-2014 impact evaluation we will focus on residential programs only, and the 2012-2013 evaluation will focus on the EnergyWise program. National Grid and the evaluation team discussed the value of estimating incremental peak savings from Small Business program participants. Because historical participation counts in SBS are very low (four SBS participants in all of 2012, and only two in the pilot area), the potential kW reduction does not seem high enough to warrant evaluation activities (at this time). We will evaluate the Window AC Rebate program in 2015, to provide two seasons of participation data (since marketing for the window AC Rebate component began in mid-2013).

The impact evaluation for the EnergyWise program consists of three main efforts, outlined in the 2014 evaluation plan. These efforts are designed to quantify the influence of the pilot on customers’ decisions to participate in the EnergyWise program. We refer to this influence metric as a “take rate” that can be applied to gross ex ante demand savings among EnergyWise participants in the pilot area (during the pilot period).

1. **Estimate the incremental EnergyWise participation rate among Tiverton and Little Compton participants relative to (a) past participants and (b) participants in nearby communities.** We conducted a database analysis of historical and SRP pilot period participation in EnergyWise, to compare participation rates in SRP communities versus comparison communities. The resulting incremental participation rate is one input into determining the overall “take rate” for the EnergyWise program.
2. **Understand SRP pilot influence and estimate SRP attribution from the EnergyWise Participant Survey.** We fielded an online survey among 343 participants in the EnergyWise program in 2012-2013. The survey collected information on participants’ recall of SRP and statewide marketing efforts and the influence of those materials on customer participation. Of the 343 EnergyWise participants, 77 completed the survey.³ Based on survey responses we estimated the level of influence of SRP pilot efforts on participation by estimating the SRP attribution, which will be described in more detail in the report. The estimate of SRP attribution is the second input into the “take rate” for the EnergyWise program.
3. **Estimate load impacts based on ex ante savings and evaluated “take rate”.** During this step we identified, counted, and assigned ex ante gross load impacts (savings) to all measures installed in the pilot area (i.e., among Tiverton substation customers) during the evaluation period (March 1, 2012 – December 31, 2013). We then applied the evaluated “take rate” to these ex ante savings.

³ Note that the SRP attribution analysis presented in this report is based on 73 of the 77 online survey responses. Four respondent had participated in the EnergyWise Program before SRP-specific marketing efforts began and are therefore excluded from this analysis.

The following subsections provide an overview of the methodology for each of these three efforts. We present more details of the approach in Appendix A.

2.1 Incremental Participation Rate

Incremental participation is the increase in EnergyWise participation in the pilot area (Tiverton substation customers) that would not have happened without the pilot. We apply a difference-in-differences approach to determine incremental participation. First, we compared the participation rate in the SRP pilot area during the evaluation period (March 1, 2012 – December 31, 2013) to participation in the pilot area during the baseline period (January 1, 2009 – February 28, 2012). Second, we compared this difference in participation in the pilot area with the difference in savings in a matched comparison region during the same time period. This analysis essentially controls for market trends, i.e., changes in program participation that would have occurred even without the pilot.

The matched comparison towns are: Narragansett, North Kingstown, South Kingstown (excluding URI), Bristol, Barrington and Warren. We describe the methodology for selecting these comparison towns in Appendix A.

Because the pilot and comparison groups are different (a) in terms of numbers of accounts and (b) in terms of their pre-pilot participation rates, the comparisons must be made in terms of a percent increase between the pre-pilot and pilot periods, rather than a change in the number of participants.

Using actual results from this evaluation period, the calculation is:

| | |
|-------------------------------------|--|
| Pilot group participation (P): | P_{base} = Avg. of 89 participants per year |
| | P_{pilot} = Avg. of 304 participants per year ⁴ |
| | P_{change} = 242% increase |
| Comparison group participation (C): | C_{base} = Avg. of 707 participants per year |
| | C_{pilot} = Avg. of 1,028 participants per year |
| | C_{change} = 45% increase |

The “lift” or incremental change attributable to the pilot is 242% - 45% or a 197% increase. This number can be applied to the pilot area baseline period count (89 participants/year) to show that 175 participants are incremental. Without the pilot, we would have expected to see a 45% increase in participation in the pilot group (or 129 expected audits). Instead we saw 304 audits– of these, 175 can be considered incremental, or attributable to the pilot program. We can calculate the “incremental participation rate” as the percentage of audits that are incremental: $175 / 304 = 57\%$.

⁴ A total of 558 customers in Tiverton and Little Compton participated from March 1, 2012 – December 31, 2013.

2.2 SRP Attribution Based on EnergyWise Participant Survey

Opinion Dynamics estimated the level of influence of SRP marketing efforts on participation based on 1) responses to the EnergyWise participant survey and 2) the Rhode Island Technical Reference Manual (TRM) net-to-gross ratio for audit programs.

The formula used to calculate SRP attribution is:

$$\text{SRP Attribution} = \text{Average SRP Influence} * \text{EnergyWise NTG Ratio}$$

We define the two components of SRP attribution as follows:

- The *Average SRP Influence* factor represents the influence that SRP marketing efforts had on participants' decision to have a home energy assessment conducted. It is based on responses to the online survey. We used a multi-step approach to estimating the *Average SRP Influence* factor:
 - Step 1: Determine respondent recall of SRP and statewide marketing materials
 - Step 2: Determine maximum influence scores for SRP and statewide materials on decision to complete the energy assessment (respondent-level)
 - Step 3: Calculate share of influence attributable to SRP marketing versus statewide marketing
 - Step 4: Calculate respondent-level overall influence of SRP marketing on decision to have assessment
 - Step 5: Calculate program-wide *Average SRP Influence* score as the average of the overall SRP influence scores across all respondents
- The *EnergyWise NTG Ratio* represents the share of audit program participants that would not have installed the direct install measures without the audit. It is based on the RI TRM.

By calculating the SRP attribution as the product of these two components we take into account that free-ridership can occur at both steps: 1) some participants would have had the energy assessment independent of SRP-specific marketing and 2) some participants would have installed the direct install measures independent of the energy assessment.

2.3 Gross Load Impact Estimation

For each measure category, we calculate load impacts as the total quantity of measures installed in the pilot area, multiplied by coincident peak kW savings:

$$\text{Peak kW Savings} = \text{Quantity} * \text{kW Reduction per Unit} * \text{Summer Diversity Factor}$$

We then multiply the sum of savings across all measure categories by the take rate. Here, we discuss the key inputs into this analysis:

- A. **Measure category:** We assigned a measure category to each installation record in the EnergyWise participation data. Peak savings are not assigned in the participation database, and therefore must be assigned based on deemed factors.

- B. **Pilot Quantity:** Measure quantity comes from the program tracking data. We assigned measures installed in Tiverton and Little Compton to the 2012-2013 SRP pilot period based on the paid date, to match how National Grid counts savings in each year. We assigned measures to the Tiverton substation based on lists of account numbers on subfeeders 33-34 provided by National Grid.
- C. **Peak kW Reduction Factors:** National Grid provided a set of deemed load reduction values and diversity factors for each EnergyWise measure category. The factors that National Grid provided are the same load assumptions that National Grid is currently using for cost-effectiveness tests of the EnergyWise Single-Family program in Rhode Island. Since these assumptions are specific to the EnergyWise program, they may differ from assumptions for analogous measures in the 2013 Rhode Island TRM (that other programs offer).
- D. **Take Rate:** The take rate is the percentage of measure installations that can be attributed to the SRP Pilot efforts – i.e., measure installations that would probably not have occurred in the absence of SRP Pilot marketing efforts. We use incremental participation analysis and EnergyWise survey results to estimate a pilot take rate for the EnergyWise program.

The following table shows gross kW reduction assumptions and summer peak diversity factors for EnergyWise measures. Lighting, smart strips, refrigeration and domestic hot water measures are all expected to achieve peak demand savings, with the highest per-unit savings expected from heat pump water heaters and refrigerator rebates. Weatherization measures and thermostats are not expected to reduce load in summer months based on existing demand impact factors (i.e., no cooling savings). Though we know that some EnergyWise participants do have central air conditioning and therefore may achieve some savings from weatherization or thermostats during peak summer periods, the currently-available impact factors do not assign savings to these types of homes.

Table 2-1. EnergyWise Load Impact Factors

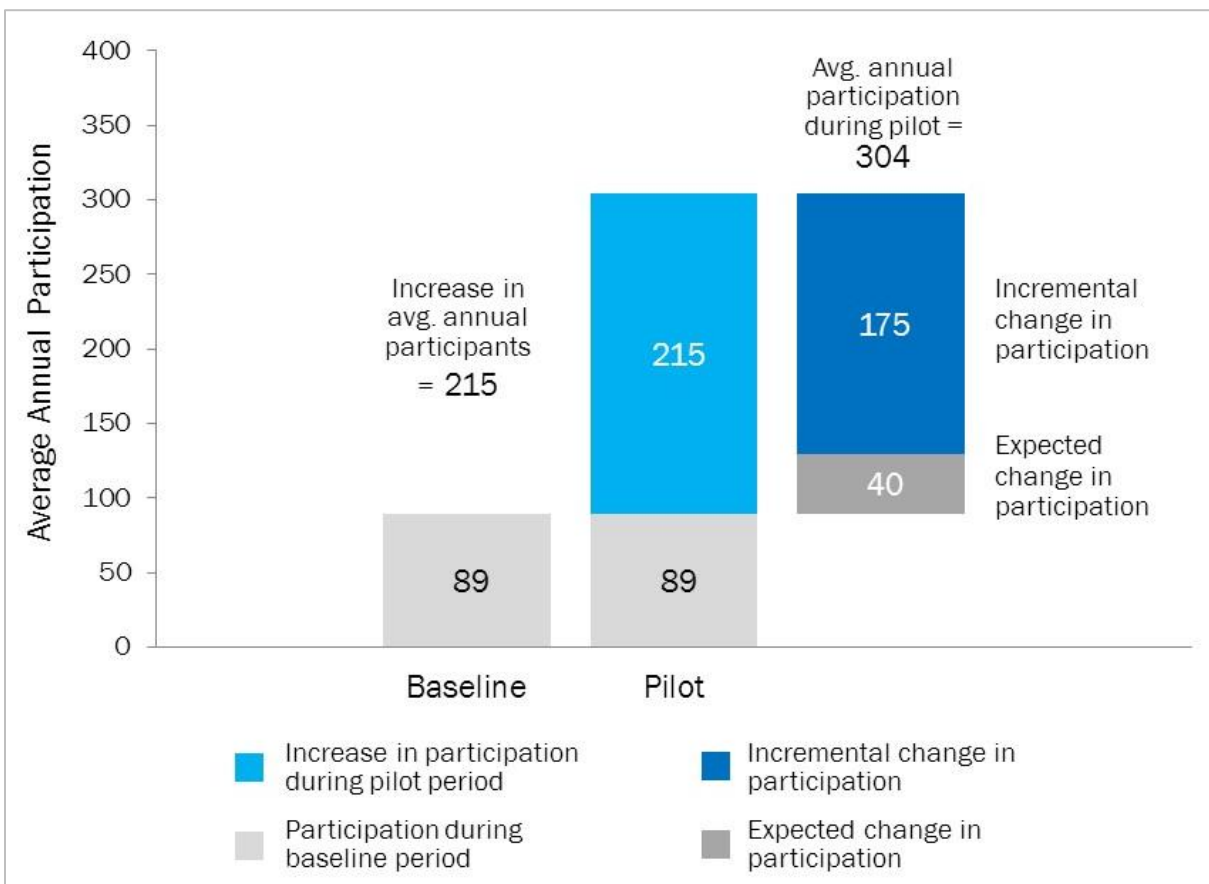
| Measure Category | Gross kW Reduction per unit | Summer Diversity Factor (Peak Diversity Factor) | Average Peak Summer Load Reduction (kW) |
|--------------------------------|-----------------------------|---|---|
| CFL | 0.01 | 0.17 | 0.002 |
| LED Bulbs | 0.01 | 0.17 | 0.002 |
| Indoor Fixtures | 0.02 | 0.17 | 0.003 |
| Outdoor Fixture | 0.05 | 0 | 0.000 |
| DHW | 0.02 | 1 | 0.020 |
| HPWH 50 gallon | 0.37 | 0.47 | 0.174 |
| Refrigerator Brush | 0.007 | 1 | 0.007 |
| Refrigerator rebate | 0.10 | 1 | 0.100 |
| Smart Strip | 0.02 | 0.73 | 0.015 |
| Programmable Thermostat | 0 | 0 | 0.000 |
| Air Sealing | 0 | 0.72 | 0.000 |
| Ventilation – Other | 0 | 0 | 0.000 |
| Weatherization – Electric Heat | 0.832 | 0 | 0.000 |
| Weatherization – Gas Heat | 0.134 | 0 | 0.000 |

3. Results

3.1 Incremental Participation Rate

The incremental participation rate during the 2012-2013 pilot period is 57%. Before the SRP pilot began, there were 89 new EnergyWise participants per year in Tiverton & Little Compton, on average, between January 2009 and February 2012. Between March 2012 and December 2013, there were 558 new EnergyWise participants in the pilot communities, averaging 304 participants per year. Between the baseline period and pilot period, the count of EnergyWise participants per year in the comparison communities increased by 45%. Based on this increase in the comparison communities, we would have expected 40 additional participants in the pilot communities per year. However, the average number of participants per year increased by 215 in the pilot communities, of which 175 participants were incremental. From the annualized incremental participant count (175) and average annual participation during the pilot (304), we calculate an incremental participation rate of 57%.

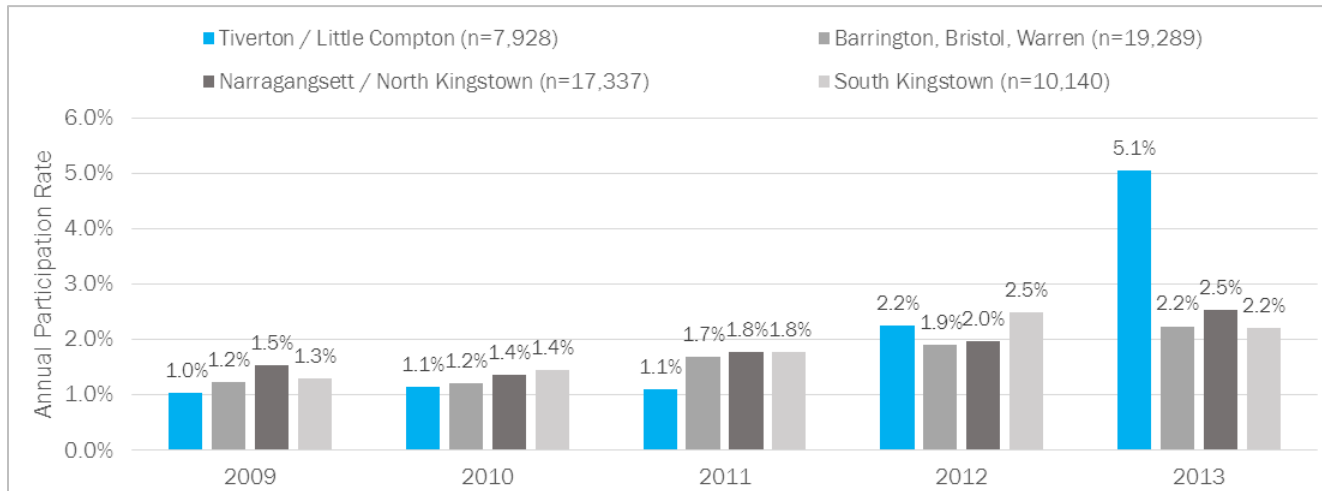
Figure 3-1. Incremental Participation in Pilot Communities (Average Annual Participation, 3/1/2012 – 12/31/2013)



The figure below shows participation rates in the pilot communities and sub-groups of comparison communities for each year of the baseline and pilot period. From this figure we see that none of the

comparison communities experienced as large increases in participation during the pilot as the pilot communities.⁵

Figure 3-2. EnergyWise Participation Rates^a in SRP Pilot and Comparison Towns, 2009-2011



^a Calculated as the number of unique participants in each year divided by the US Census count of occupied housing units. These counts are not perfectly equivalent to residential customer counts.

3.2 SRP Attribution Based on EnergyWise Participant Surveys

We estimate SRP attribution for the 2012-2013 pilot period to be 49%. This is based on an average influence rate of SRP marketing (on participants’ decision to have an energy assessment) of 50% and the EnergyWise net-to-gross (NTG) ratio of 0.97.⁶

The SRP influence rate is based on 1) participant recall of SRP-specific and statewide marketing materials, 2) the influence of marketing materials on participants’ decision to have a home energy assessment conducted, and 3) the relative importance of SRP-specific versus statewide marketing materials on participants’ decision to have a home energy assessment conducted. The following subsections provide additional information about these factors.

Recall of SRP-Specific and Statewide Marketing Materials

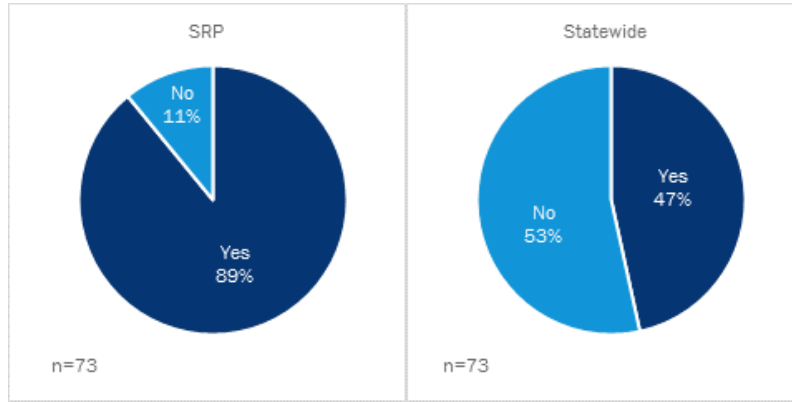
During the 2012-2013 pilot period, customers in the pilot towns were exposed to both SRP-specific and statewide marketing materials. The online survey provided participants with a series of images and descriptions of materials from both marketing campaigns and asked them if they recalled seeing, hearing, or

⁵ Though South Kingstown experienced a slight uptick in participation in 2012, this increase is in line with a trend of increasing participation in South Kingstown in 2009, and the relatively small size of South Kingstown compared to other communities means that its counts are not as influential as other towns.

⁶ Based on the 2013 Rhode Island TRM and discussions with National Grid, the assumed net-to-gross for non-weatherization single-family measures and all multifamily measures is 0.97.

receiving each item. As shown in Figure 3-3, 89% of respondents recall at least one SRP-specific effort while only 47% recall at least one statewide effort.

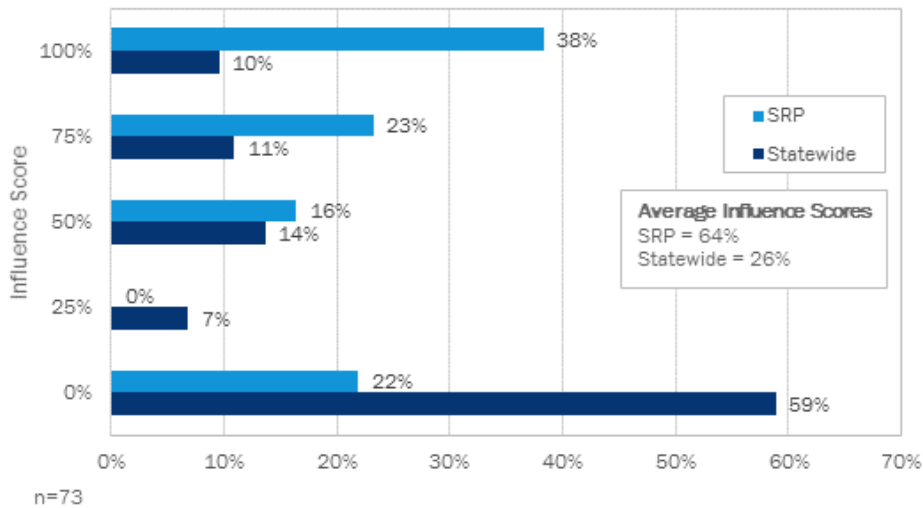
Figure 3-3. Percent of Respondents who Recall at Least One Marketing Effort



Influence of Marketing Materials on Decision to Have a Home Energy Assessment

If respondents could recall a marketing piece, the online survey asked them to rate the level of influence it had on their decision to complete the home energy assessment (using a scale of 1 to 5 where 1 was “Not at all influential” and 5 “Very influential”). We then converted the highest self-reported influence rating for each campaign into an influence score.⁷ The graph below illustrates the distribution of SRP-specific and statewide influence scores among survey respondents. The average influence score for SRP-specific materials among all respondents was 64% while the average influence score for statewide materials was 26%.

Figure 3-4. SRP and Statewide Influence Scores



⁷ Respondents who did not recall any SRP-specific or any statewide materials, received an influence score of 0% for the respective campaigns.

Overall SRP Marketing Influence Based on Relative Importance of SRP-Specific and Statewide Marketing

The *Overall SRP Marketing Influence* score takes into account the influence of SRP-specific marketing relative to the influence of statewide marketing, by applying the SRP share of marketing influence to the *SRP Influence* score. The table below shows the distribution of the *Overall SRP Marketing Influence* scores among the 73 survey respondents. The table shows that the largest share of participants (22%) was either fully influenced by SRP-specific marketing (an *Overall SRP Marketing Influence* score of 100%) or not at all influenced by SRP-specific marketing (an *Overall Marketing SRP Influence* score of 0%).

The program-wide *Overall SRP Influence* score, 50%, is the average of the *Overall SRP Influence* scores across all respondents.

Table 3-1. SRP Influence Score to Overall SRP Influence Conversion

| Influence Score | | SRP Share of Marketing Influence | Overall SRP Influence | Participants | |
|--------------------------------------|-----------|----------------------------------|-----------------------|--------------|------|
| SRP | Statewide | | | n | % |
| 100% | 0% | 100% | 100% | 16 | 22% |
| 100% | 25% | 80% | 80% | 1 | 1% |
| 75% | 0% | 100% | 75% | 5 | 7% |
| 100% | 50% | 67% | 67% | 7 | 10% |
| 75% | 25% | 75% | 56% | 1 | 1% |
| 100% | 100% | 50% | 50% | 4 | 5% |
| 50% | 0% | 100% | 50% | 7 | 10% |
| 75% | 50% | 60% | 45% | 2 | 3% |
| 75% | 75% | 50% | 38% | 6 | 8% |
| Influence Score | | SRP Share of Marketing Influence | Overall SRP Influence | Participants | |
| SRP | Statewide | | | n | % |
| 50% | 25% | 67% | 33% | 2 | 3% |
| 75% | 100% | 43% | 32% | 3 | 4% |
| 50% | 50% | 50% | 25% | 1 | 1% |
| 50% | 75% | 40% | 20% | 2 | 3% |
| 0% | 0% | 0% | 0% | 15 | 21% |
| 0% | 25% | 0% | 0% | 1 | 1% |
| Average Overall SRP Influence Score: | | | 50% | 73 | 100% |

3.3 Estimation of the Take Rate

We compared the SRP attribution rate from the EnergyWise survey (48.8%) and the incremental participation rate (57.5%) to develop an overall take rate for the 2012-2013 pilot. Given the benefits and uncertainties of each method, we recommend using the midpoint of these two rates – 53.1% – to estimate net pilot savings. Specifically, we considered the following tradeoffs between the two methods:

- **Incremental participation analysis:** This method accounts for all participants in the pilot area and comparison communities, making it a comprehensive “population” analysis. However, this method does not control for all non-program factors that may have occurred outside of statewide marketing (e.g., independent, community-based energy efficiency efforts) that may have influenced participation rates in comparison communities. Additionally, the comparison communities, even as a group, are not perfectly identical to the SRP communities in terms of demographics and pre-pilot participation rates (see Appendix A), and therefore we might expect slightly different rates of participation growth for each set of communities. By including numerous comparison communities in slightly different geographic areas, yet as close to the pilot area as possible, we attempted to mitigate these affects to the extent possible.
- **EnergyWise participant surveys:** This method represents a direct measurement of the variable of interest: recall of SRP-specific marketing and its influence on participants’ decision to have a home energy assessment. However, the method is based on a sample of participants and is therefore subject to potential response bias. In addition, this method uses self-reported information, which can be unreliable. Finally, this method incorporates a net-to-gross ratio based on the RI TRM, which we did not independently verify within the scope of this evaluation.

The EnergyWise take rate can be updated in future years, using EnergyWise program tracking data and ongoing EnergyWise survey results.

3.4 Measure Installations during Pilot

The table below shows the quantities and peak kW load impacts (*quantity * kW reduction * summer diversity factor*) for all installations in the substation area (subfeeders 33-34) during the pilot period. The majority of peak demand savings in the pilot area are expected to come from CFLs, followed by smart strips and refrigerator brushes. As mentioned in the methodology section above, weatherization measures and thermostats are not expected to reduce load in summer months based on existing demand impact factors. However, we know that some EnergyWise participants do have central air conditioning and therefore may achieve some savings from weatherization or thermostats during peak summer periods that may not be counted in these impact results.

Based on program tracking data and peak load factors provided by National Grid, ex ante gross peak load reductions in the 2012-2013 pilot period were 35.1 kW.⁸

⁸ It should be noted that National Grid established Focused Energy Efficiency goals for the pilot that apply to *all* measure installations in the pilot area, not just incremental savings achieved by the pilot.⁸ The Focused Energy Efficiency goal for 2012 and 2013 was 66 kW of summer load reduction (net). Applying a program-level net-to-gross ratio of 0.97 to the ex ante gross load savings of 35.1 kW, net peak kW savings within the SRP area are 34.0 kW. These savings represent about 52% of Focused Energy Efficiency goal.

Table 3-2. Installed Measures and Ex Ante Gross Peak Load Reduction in SRP Pilot Area, 3/1/2012 - 12/31/2013
(before applying SRP Pilot take rate)

| Measure Category | 3/1/2012 - 12/31/2012 | | 1/1/2013 - 12/31/2013 | | 3/1/2012 - 12/31/2013 | |
|--|-------------------------------------|--------------------------------|------------------------|--------------------------------|------------------------|--------------------------------|
| | Total Measure Quantity ^a | Total Peak Load Reduction (kW) | Total Measure Quantity | Total Peak Load Reduction (kW) | Total Measure Quantity | Total Peak Load Reduction (kW) |
| CFL | 2,382 | 4.0 | 8,670 | 14.7 | 11,052 | 18.8 |
| LED Bulbs | 87 | 0.1 | 998 | 1.7 | 1,085 | 1.8 |
| Indoor Fixtures | 28 | 0.1 | 96 | 0.3 | 124 | 0.4 |
| Outdoor Fixture | 1 | 0.0 | 11 | 0.0 | 12 | 0.0 |
| DHW | 0 | 0.0 | 71 | 1.4 | 71 | 1.4 |
| HPWH 50 Gallon | 0 | 0.0 | 1 | 0.2 | 1 | 0.2 |
| Refrigerator Rebate | 3 | 0.3 | 6 | 0.6 | 9 | 0.9 |
| Refrigerator Brush | 103 | 0.7 | 297 | 2.1 | 400 | 2.8 |
| Smart Strip | 60 | 0.9 | 539 | 7.9 | 599 | 8.7 |
| Programmable Thermostat | 5 | 0.0 | 41 | 0.0 | 46 | 0.0 |
| Air Sealing ^a | 0 | 0.0 | 27 | 0.0 | 27 | 0.0 |
| Ventilation - Other ^a | 0 | 0.0 | 60 | 0.0 | 60 | 0.0 |
| Weatherization (multiple fuels) ^a | 0 | 0.0 | 141 | 0.0 | 141 | 0.0 |
| TOTAL | 2,669 | 6.2 | 10,958 | 28.9 | 13,623 | 35.1 |

^a Quantities of Air Sealing, Ventilation and Weatherization are the accounts of unique participants. All other quantities are measure counts (e.g., count of installed bulbs). In 2012, no participants in the pilot area installed weatherization measures (though participants in other areas of Tiverton & Little Compton installed these measures).

3.5 Summary of Incremental SRP Load Impacts

The estimated take rate for this evaluation period is 53.1%. We compared the SRP attribution based on the EnergyWise surveys (48.8%) and the incremental participation rate (57.5%). Given the pros and cons of each method described above, we recommend using the midpoint of these two rates – 53.1%. Applying the two rates to the measure-level results, we estimate that the pilot achieved summer peak load savings totaling 18.6 kW, in a range of 17.1 – 20.2 kW. Table 3-3 below contains the ranges for each measure category.

Table 3-3. 2012-2013 SRP Pilot Load Impacts by Measure Category

| Measure Category | 3/1/2012 - 12/31/2013 | |
|---------------------------------|--------------------------------------|---------------|
| | Incremental Peak Load Reduction (kW) | Range (kW) |
| CFL | 10.0 | (9.2 - 10.8) |
| LED Bulbs | 1.0 | (0.9 - 1.1) |
| Indoor Fixtures | 0.2 | (0.2 - 0.2) |
| Outdoor Fixture | 0.0 | (0 - 0) |
| DHW | 0.8 | (0.7 - 0.8) |
| HPWH 50 Gallon | 0.1 | (0.1 - 0.1) |
| Refrigerator Rebate | 0.5 | (0.4 - 0.5) |
| Refrigerator Brush | 1.5 | (1.4 - 1.6) |
| Smart Strip | 4.6 | (4.3 - 5) |
| Programmable Thermostat | 0.0 | (0 - 0) |
| Air Sealing | 0.0 | (0 - 0) |
| Ventilation - Other | 0.0 | (0 - 0) |
| Weatherization (multiple fuels) | 0.0 | (0 - 0) |
| TOTAL | 18.6 | (17.1 - 20.2) |

Appendix B contains a table with incremental quantities and peak kW results per measure category for each program period (2012 and 2013).

Appendix A: Detailed Methodology

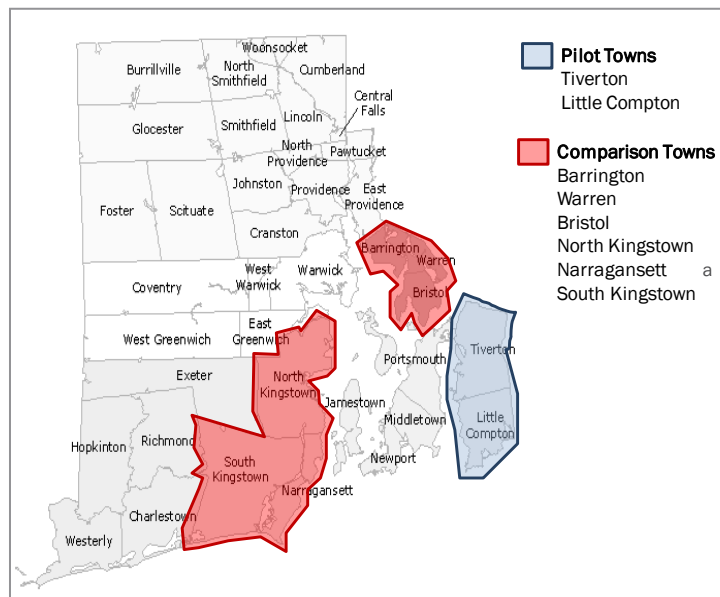
Comparison Community Selection

Our community comparison selection process focused on similarities in the residential customer base. Specifically, we aimed to identify Rhode Island communities for which:

- EnergyWise participation trends over past few years are similar (i.e., similar rates of increase from year to year)
- Residents may have similar incentive and ability to retrofit homes (assessed by owner occupancy, single-family homes, housing values, and seasonal usage patterns)
 - Because seasonal usage patterns are difficult to measure, the Evaluation Team decided to include comparison towns that were most geographically similar (i.e. eligible towns and towns on the southwestern edge of Narragansett Bay)
- Residents may have similar housing stock, related to opportunity and incentive to retrofit (assessed primarily by geographic proximity, year home is built, heating fuel)
- Towns did not participate in the Aquidneck Energy Action pilot

Based on the criteria above, we included the following towns in the comparison group: Barrington, Bristol, Warren, Narragansett, North Kingstown, and South Kingstown (excluding the ZIP code associated with the University of Rhode Island). We recommend including this larger group of towns to buffer against future localized participation trends that may be due to community efforts or media that is not affiliated with statewide programs.

Figure A-1. SRP Pilot and Comparison Communities



^a Excludes ZIP code that includes University of Rhode Island (02881).

Map Source: Rhode Island Department of Labor and Training

Table A-1 shows that the SRP pilot towns have slightly higher owner occupancy and single-family home rates of the potential comparison community groups.⁹ Home values and income are slightly lower in the SRP communities; slightly lower average income in SRP communities may be related to slightly more heads-of-household over age 65). One of the largest differences is in the proportion of homes heated by electric or gas. The majority of homes in the pilot area use oil heat, and few use gas, whereas potential comparison communities have a fairly even mix of oil and gas.

Table A-1. Housing and Income Characteristics of SRP Pilot and Comparison towns

| Subject | SRP Pilot | All Comparison Communities | Barrington, Bristol, Warren | Narragansett, N. Kingstown | South Kingstown ^a |
|--------------------------------------|-----------|----------------------------|-----------------------------|----------------------------|------------------------------|
| Residential Households ¹⁰ | 7,928 | 46,766 | 19,289 | 17,337 | 10,140 |
| Demographics | | | | | |
| Pct Owner Occupied | 79.6% | 74.4% | 72.3% | 75.4% | 77.5% |
| Median Household Income | \$69,543 | \$73,478 | \$72,073 | \$73,855 | \$74,803 |
| Head-of-Household Age 65+ | 30.4% | 24.6% | 25.9% | 23.0% | 25.8% |
| Housing | | | | | |
| Pct Single-Family | 79.3% | 73.7% | 68.1% | 75.5% | 80.7% |
| Home built 1990 or later | 25.1% | 19.6% | 10.8% | 20.9% | 31.5% |
| Pct Utility Gas Heat | 7.5% | 9.6% | 7.7% | 10.6% | 10.7% |
| Pct Electric Heat | 8.1% | 39.2% | 46.4% | 41.5% | 22.6% |
| Median Home Value | \$345,711 | \$367,417 | \$361,714 | \$374,617 | \$365,951 |

Source: US Census American Community Survey 2007-2011 (5-year estimates). Towns are defined by ZIP Code Tabulation Area (ZCTA)

^a Excludes ZIP code that includes University of Rhode Island (02881).

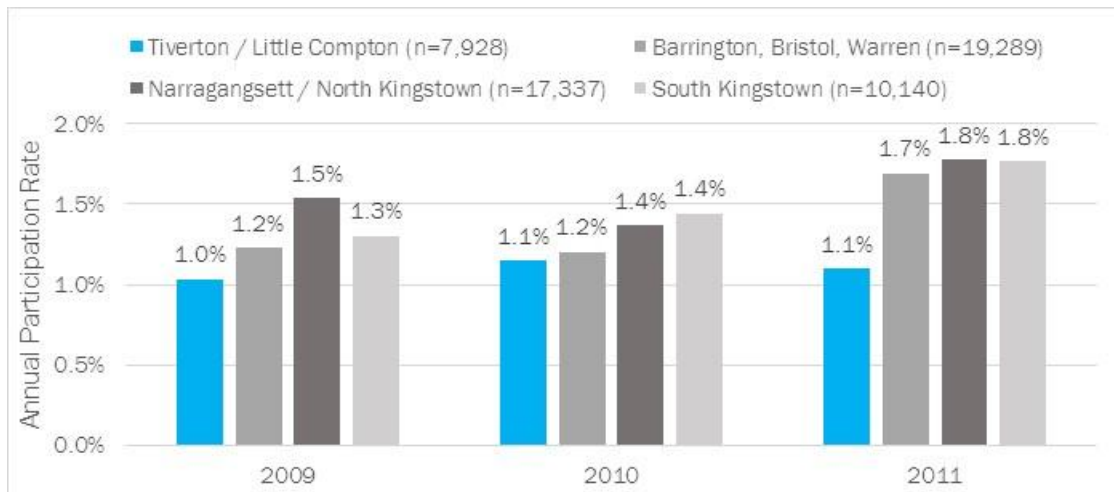
Next, we looked at trends in audit participation over a multi-year period within each community. Figure A-2 shows participation rates in each year¹¹ as a percentage of all Census-defined households in the area. Participation is relatively stable in the pilot communities from 2009-2011, while the comparison communities show a slightly higher increase in the participation rate from 2009-2011.

⁹ We group the communities based on geography to illuminate slight differences.

¹⁰ The US Census defines households as occupied housing units; these counts are not perfectly equivalent to residential customer counts.

¹¹ Calculated as the number of unique participants in each year divided by the US Census count of occupied housing units. These counts are not perfectly equivalent to residential customer counts.

Figure A-2. EnergyWise Participation Rates in SRP Pilot and Comparison Towns, 2009-2011



Our analysis will define January 1, 2009 to February 28, 2012 as the baseline. This ensures that we have sufficient data in the baseline period to estimate participation across a variety of marketing activities (which, though statewide, may have stimulated program activity in different areas, at different times).

The table below lists ZIP codes in EnergyWise participation analysis and corresponding Census ZIP Code Tabulation Areas.

| Communities | US Census ZIP Code Tabulation Areas (ZCTA) | ZIP codes included in EnergyWise participation analysis |
|---|--|---|
| Tiverton, Little Compton | 02837, 02878 | 02837, 02878 |
| Barrington, Bristol, Warren | 02806, 02809, 02885 | 02806, 02809, 02885 |
| Narragansett, North Kingstown | 02852, 02874, 02882 | 02852, 02854, 02874, 02882 |
| South Kingstown (excl. URI) ¹² | 02879, 02892 | 02879, 02883, 02892 |

Prepare program tracking data for Incremental Participation Analysis

To assign participation data to the time-periods of interest and count records, we used the following rules:

Counting participation: In each area, a unique Facility ID that the program implementer assigns defines participants. This facility ID can apply to a single-family or multi-family facility, and remains the same for a facility that participates on different dates. In multifamily facilities, the EnergyWise program may affect multiple accounts at the facility through common area or in-unit energy efficiency improvements. However, we count the number of unique participants by the number of unique facility IDs for two reasons: (1) to reflect the number of decision-makers who made a choice to participate, and (2) to minimize the fluctuations in counts that could occur in either the SRP or comparison communities if a very large multifamily facility were to participate in a given time period.

¹² Excludes ZIP 02881 (URI and surrounding area)

For the purpose of incremental participation analysis, we counted all customers in Tiverton and Little Compton in each year – not just the count of the substation customers – in the SRP pilot area count. Though the pilot targeted most marketing efforts to Tiverton and Little Compton customers in the pilot period, some efforts were community-wide, and we might expect an increase in participation across the community due to the pilot efforts. Additionally, customers are associated with the two sub-feeders on the substation based on an account list provided by National Grid. The earliest list available was pulled in February 2012, and reflected the subfeeders of current customers. Since counting baseline period participation among substation customers would require identifying substation and non-substation customers going back to 2009, and a list of subfeeder customers in each of years 2009-2011 was not available, we do not believe that assignments based on a 2012 list accurately capture the count of EnergyWise participants on the substation in each of years 2009-2011 (without identifiers, the substation count would be understated). Therefore, we did not attempt to separate incremental participation counts for substation customers only.

Assigning participants to the program period or pre-period: We assigned each participant to a year based on the first status date that appeared in the program tracking database. This ensured that we did not count participants multiple times if they receive follow-up visits to install additional measures. For status dates that occurred three or more years apart, we counted the later status date as a new participation event, since customers can receive an audit every three years.

SRP Attribution Based on EnergyWise Participant Survey

The formula used to calculate SRP attribution as:

$$SRP\ Attribution = Average\ SRP\ Influence * EnergyWise\ NTG\ Ratio$$

We define the two components of SRP attribution as follows:

- The *Average SRP Influence* factor represents the influence that SRP marketing efforts had on participants' decision to have a home energy assessment conducted. We based this factor on responses to the online survey. We used a multi-step approach to estimating the *Average SRP Influence* factor:
 - Step 1: Determine respondent recall of SRP and statewide marketing materials
 - Step 2: Determine maximum influence scores for SRP and statewide materials on decision to complete the energy assessment (respondent-level)
 - Step 3: Calculate share of influence attributable to SRP marketing versus statewide marketing
 - Step 4: Calculate respondent-level overall influence of SRP marketing on decision to have assessment
 - Step 5: Calculate program-wide *Average SRP Influence* score as the average of the overall SRP influence scores across all respondents
- The *EnergyWise NTG Ratio* represents the share of audit program participants that would not have installed the direct install measures without the audit. It is based on the RI TRM.

By calculating the SRP attribution as the product of these two components we take into account that free-ridership can occur at both steps: 1) some participants would have had the energy assessment independent

of SRP-specific marketing and 2) some participants would have installed the direct install measures independent of the energy assessment.

Below, we present additional detail on each of these four steps as well as a few examples of participant responses and the resulting influence scores.

Step 1: Determine recall of SRP-specific and statewide marketing materials

During the 2012-2013 pilot period, customers in the pilot towns were exposed to both SRP-specific and statewide marketing materials. The online survey provided participants with a series of images and descriptions of marketing materials from both the SRP-specific and statewide marketing campaigns and asked them if they recalled seeing, hearing, or receiving each item. The table below summarizes the marketing materials included in the survey.

Table A-2. Marketing Materials Included in Survey

| Description of Marketing Material | Campaign | |
|-----------------------------------|----------|-----------|
| | SRP | Statewide |
| Direct Mail | ✓ | ✓ |
| Postcard | ✓ | |
| Email | ✓ | ✓ |
| Phone | ✓ | |
| Newspaper Article | ✓ | |
| Facebook Ad | ✓ | |
| Paid Search | ✓ | |
| Facebook Posts | ✓ | |
| Twitter Posts | ✓ | |
| Community Event | ✓ | |
| Radio | | ✓ |
| Newspaper Ad | | ✓ |
| Online Banner Ads | | ✓ |
| Cinema | | ✓ |

Step 2: Determine maximum influence scores for SRP-specific and statewide materials on decision to complete the energy assessment

If respondents could recall a marketing piece, the online survey asked them to rate the level of influence it had on their decision to complete the home energy assessment (using a scale of 1 to 5 where 1 was “Not at all influential” and 5 “Very influential”).

We used the highest influence rating a respondent gave to any of the SRP-specific materials to generate the SRP influence rating. Similarly, we used the highest influence rating a respondent gave to any of the statewide materials to generate the statewide influence rating. For example, if a respondent recalled seeing three SRP-specific marketing materials and rated the influence they had on their decision to complete the home energy assessment a two, a three, and a five, respectively, on the five-point scale we assigned the maximum SRP influence of five.

We then converted the highest self-reported influence rating for each campaign into an *SRP Influence Score* using the table below.

Table A-3 Conversion of Influence Rating to % Influence Score

| Self-Reported Influence Rating ^a | % Influence Score |
|---|-------------------|
| 1- Not at all Influential | 0% |
| 2 | 25% |
| 3 | 50% |
| 4 | 75% |
| 5- Very Influential | 100% |

^a Respondents who did not recall any SRP-specific or any statewide materials, respectively, received an influence score of 0%.

The result of this step is an SRP-specific influence score and a statewide influence score for each survey respondent.

Step 3: Calculate share of marketing influence attributable to SRP-specific efforts

Because both statewide and SRP-specific materials could have influenced a participant to have the energy assessment done, we then determined the share of overall marketing influence attributable to the SRP-specific marketing materials.

$$\text{Share Attributable to SRP} = \frac{\text{SRP Influence Score}}{\text{SRP Influence Score} + \text{Statewide Influence Score}}$$

Step 4: Calculate overall influence of SRP marketing on decision to have energy assessment

In this step, we apply each respondent’s SRP share of marketing influence attributable to SRP (developed in Step 3) to the *SRP Influence Score* (developed in Step 2) to calculate the *Overall SRP Marketing Influence* score. This score represents the influence of SRP materials, net of the influence of statewide materials, on the respondent’s decision to have an energy assessment conducted.

$$\text{Overall SRP Marketing Influence} = \text{Share of Influence attributable to SRP} * \text{SRP Influence Score}$$

Step 5: Calculate program-wide Average SRP Influence score

We then average the *Overall SRP Marketing Influence* scores developed in Step 4 across all respondents to derive the program-wide *Average SRP Influence* score.

Examples

Below we provide a few scenarios that illustrate the calculation of respondent-level influence scores.

Table A-4. Respondent-Level Influence Score Scenarios

| Scenario | Step 2: Influence Score | | Step 3: SRP Share of influence | Step 4: Overall SRP Marketing Influence |
|--|-------------------------|-----------|--------------------------------|---|
| | SRP | Statewide | | |
| Recalls SRP marketing materials only, or says statewide materials had little or no influence on decision to participate. The entire marketing influence is attributable to SRP-specific efforts. The overall SRP influence is equal to the SRP influence score. | 100% | 0% | 100% | 100% |
| | 75% | 0% | 100% | 75% |
| | 50% | 0% | 100% | 50% |
| Recalls both SRP and statewide materials and rates influence of both campaigns equally. SRP and statewide materials are equally responsible for marketing influence, and SRP share of marketing influence is 50%. The overall SRP influence is equal to half of the SRP influence score. | 100% | 100% | 50% | 50% |
| | 75% | 75% | 50% | 38% |
| | 50% | 50% | 50% | 25% |
| Recalls both SRP and statewide materials and rates SRP materials as more influential in decision. A greater share of influence is attributable to SRP than statewide materials. | 100% | 50% | 67% | 67% |
| | 75% | 50% | 60% | 45% |
| Doesn't recall SRP marketing materials or says they had little or no influence on decision to participate. No overall SRP influence, independent of influence of statewide materials. | 0% | 0% | 0% | 0% |
| | 0% | 25% | 0% | 0% |

Appendix B: Detailed Findings

The table below shows incremental quantities and peak kW results per measure category for each program period (2012 and 2013).

Table B-1. 2012-2013 SRP Pilot Load Impacts by Measure Category and Time Period

| Measure Category | 2012 Pilot Period (3/1/2012 - 12/31/2012) | | 2013 Pilot Period (1/1/2013 - 12/31/2013) | | 2012-2013 Pilot Period (3/1/2012 - 12/31/2013) | |
|---|--|---|--|---|---|---|
| | Incremental Quantity ^a | Incremental Peak Load Reduction (kW) | Incremental Measure Quantity | Incremental Peak Load Reduction (kW) | Incremental Measure Quantity | Incremental Peak Load Reduction (kW) |
| CFL Bulbs | 1,265 | 2.2 | 4,606 | 7.8 | 5,871 | 10.0 |
| LED Bulbs | 46 | 0.1 | 530 | 0.9 | 576 | 1.0 |
| Indoor Fixtures | 15 | 0.1 | 51 | 0.2 | 66 | 0.2 |
| Outdoor Fixtures | 1 | 0.0 | 6 | 0.0 | 6 | 0.0 |
| DHW | 0 | 0.0 | 38 | 0.8 | 38 | 0.8 |
| HPWH 50 Gallon | 0 | 0.0 | 1 | 0.1 | 1 | 0.1 |
| Refrigerator Rebate | 2 | 0.2 | 3 | 0.3 | 5 | 0.5 |
| Refrigerator Brush | 55 | 0.4 | 158 | 1.1 | 212 | 1.5 |
| Smart Strip | 32 | 0.5 | 286 | 4.2 | 318 | 4.6 |
| Programmable Thermostat | 3 | 0.0 | 22 | 0.0 | 24 | 0.0 |
| Air Sealing ^a | 0 | 0.0 | 14 | 0.0 | 14 | 0.0 |
| Ventilation – Other ^a | 0 | 0.0 | 32 | 0.0 | 32 | 0.0 |
| Weatherization (multiple fuels) ^a | 0 | 0.0 | 75 | 0.0 | 75 | 0.0 |
| TOTAL | 1,418 | 3.3 | 5,821 | 15.4 | 7,239 | 18.6 |

^a Quantities of Air Sealing, Ventilation and Weatherization are the accounts of unique participants. All other quantities are measure counts (e.g., count of installed bulbs). In 2012, no participants in the pilot area installed weatherization measures (though participants in other areas of Tiverton & Little Compton installed these measures).

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