National Grid Rhode Island Income Eligible Services Process Evaluation

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Final

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Executive Summary

This report details the 2014 process evaluation of National Grid's Income Eligible Services (IES) Program in Rhode Island, as implemented between 2011 and 2013. The evaluation sought to document program processes and procedures, determine opportunities for improvements, and assess the success of program transitions instituted by National Grid and the new program implementer, CLEAResult.

Program Description

National Grid's IES Program helps income-eligible customers reduce their utility costs, save energy, and increase their knowledge of energy efficiency. IES targets customers eligible for the Low Income Heating Assistance Program (LIHEAP)[1] and living in one- to four-unit residences within National Grid's Rhode Island service territory.

The program offers customers three categories of services:

1. **Weatherization and Heating Upgrades:** National Grid funds home improvements, such as: attic, wall, floor, and pipe insulation; air sealing; and heating system repair or replacements.
2. **Lighting and Appliance Upgrades:** Through National Grid's Appliance Management Program (AMP), customers receive direct-install measures, such as compact fluorescent lamps (CFLs), faucet aerators, and showerheads. In addition, AMP auditors monitor participants' refrigerators and freezers; units with usage over a threshold amount may be replaced with new efficient units.
3. **Energy Education:** AMP auditors work with participating customers to devise plans for adopting energy-conservation behaviors, such as hanging laundry on a clothesline instead of using a dryer or turning off lights and televisions in unoccupied rooms.

Customers qualifying for LIHEAP become eligible for all IES Program services and receive all equipment upgrades at no cost. Customers not qualifying for LIHEAP but eligible for National Grid's residential low-income discount rate (A-60)[2] become eligible to receive AMP services at no cost. Local Community Action Program (CAP) agencies deliver all program services, with installation of weatherization measures completed by agency subcontractors. CAP agencies leverage federal Weatherization Assistance Program (WAP) and LIHEAP funds, in addition to National Grid funding, to deliver higher service levels to customers and to more broadly offer weatherization in their communities.

Process Evaluation Activities

Cadmus based the findings, conclusions, and recommendations presented in this report on analysis of data collected through the following research activities:

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[1] http://www.energy.ri.gov/lowincome/incomeguidelines.php

[2] National Grid customers receiving benefits (such as Supplemental Security Income, LIHEAP, Medicaid, Food Stamps, General Public Assistance, or Family Independence Program Assistance) become eligible for the A-60 rate.

- Research question development
- Materials review
- Stakeholder interviews (n=24)
- Logic model development
- Participant phone surveys (n=120)

This report's Research Approach section presents further explanation of the process evaluation activities and research methodology.

Summary of Key Findings, Conclusions, and Recommendations

This section presents Cadmus' key findings, conclusions, and recommendations, derived from the process evaluation analysis and prioritized by importance. This report's Detailed Findings section presents further explanation regarding findings.

The majority of program stakeholders expressed satisfaction with CLEAResult's role as lead vendor.

National Grid expressed great satisfaction with program implementation following CLEAResult's assumption of the lead vendor role. CLEAResult, National Grid, and the Department of Human Services (the State) expressed high satisfaction levels with the current communications among program stakeholders and agreed benefit resulted from the more collaborative approach taken by program administrators upon hiring CLEAResult as lead vendor in 2013.

The majority of the CAP agencies expressed high satisfaction with the program administration change, indicating program communication and quality levels increased. All CAP agencies agreed the greatest benefit from National Grid hiring CLEAResult arose from substantial improvements in the reimbursement payment cycle.

Participants are satisfied with the program.

Almost all surveyed participants expressed strong satisfaction levels with all aspects of their program experiences (these included CAP agency staff, measures installed, and services provided through the program). Further, a majority of participants reported more affordable energy bills following work performed in their home, and claimed their home became more comfortable due to the work.

An immediate need exists for standard program policies and procedures.

When CLEAResult joined the program as lead vendor, it brought an added level of quality control (QC) to the program by increasing monitoring levels. However, the CLEAResult monitor and the State monitors often expressed differing opinions regarding weatherization best practices, and program policies and procedures, causing frustration among auditors and contractors that received conflicting advice regarding how to best serve a home. Consequently, the CAP agencies and contractors did not always retain a clear understanding of program requirements and installation protocols.

In 2014, CLEAResult and the State began working collaboratively to standardize the program's auditing and installation protocols. Currently, they are developing an IES program manual, detailing the program's policies and procedures.

Recommendations:

- ***Prioritize finalization of the IES program manual.*** The final program manual should include standard procedures for: conducting the AMP and WAP audits, determining which program measures to recommend, and proper measure installation. The program manual should reflect the protocols taught through the program's required Quality Control Inspector (QCI) training. The CAP agencies should receive documented program protocols, accepted by National Grid and the State, no later than the end of the 2014 program year.
- ***Update the IES program manual on an annual basis.*** The program manual should be updated annually to reflect changes in program design, delivery, or implementation (e.g., program processes, measure offering, and installation protocols).

CFL installation protocols may impact program savings.

CLEAResult and the CAP agencies reported the IES Program's CFL installation protocol allowed AMP auditors to install as many CFLs in a house as possible, independent of bulb locations or usage. However, the AMP program manual states light bulbs used most often should receive the highest priority for replacement.

CFL savings largely depend on hours-of-use (HOU). The prevailing evaluation theory holds that HOU decreases as a greater number of bulbs become installed within a home. For example, as CFL saturation in a home increases, HOU decreases as bulb installations occur in less frequently used locations.

CAP agency staff also reported leaving CFLs with residents to install on their own. Some auditors also reported leaving behind the resident's incandescent bulbs, in case the resident did not like the CFLs. Most direct-install energy-efficiency programs provide CFLs to customers, but contractors generally install the CFLs and remove incandescent bulbs from homes. In Cadmus' experience, not physically installing energy-efficient bulbs (i.e., leaving bulbs for the customer to install) and leaving existing (inefficient) bulbs behind can negatively impact CFL savings.

As of this report, National Grid staff indicated they are considering offering a combination of LED and CFL bulbs in participant homes, installing LEDs in high-use locations and CFLs in other locations.

Recommendations:

- ***Revise the CFL installation protocols to maximize the IES Program's potential for savings.*** The following requirements should be considered when revising the protocols:
  - Prioritize installing CFLs in areas with the highest traffic levels (e.g., kitchens, dining rooms, and living rooms) and nighttime use (e.g., exterior fixtures).

- Avoid installing bulbs in locations with below-average HOU (e.g., closets, unfinished basements, attics, and crawlspaces).
- Require agency staff to install CFLs provided to customers and to remove replaced incandescent bulbs from the home.
- Limit the number of CFLs installed per home.

- ***Standardize CFL installation protocols across all program operations materials.*** The AMP program manual and the new IES program manual should reflect the revised CFL protocols, with all conflicting information removed to reduce confusion among program stakeholders.

Appliance metering protocols may be insufficiently comprehensive to accurately estimate savings.

To estimate the savings that result from replacing an existing refrigerator/freezer with a new, energy-efficient model, AMP auditors meter electricity usage of a unit during audits. The CAP agencies reported they typically metered appliances for 75 minutes; Cadmus has found, however, many low-income weatherization programs require auditors to meter existing appliances for at least two hours to gather accurate data for determining replacement eligibility. The U.S. Department of Energy (DOE) determined two-hour metering sufficient to make cost-effective refrigerator and freezer replacement decisions.[3]

Recommendation:

- ***Consider requiring AMP auditors to meter appliances for at least two hours.*** Cadmus' gross impact evaluation of the 2011–2012 IES Program found per-unit refrigerator savings lower than in-program audit metering data suggested. Standardizing the appliance metering protocol to match DOE's program requirement should increase per-unit savings due to better identification of units for replacement.

Not all CAP agencies distribute energy-saving hot water measures to participants.

Although National Grid permits installations of direct-install measures, including energy-saving lighting and hot water measures, only one-half of the CAP agencies reported installing program-eligible faucet aerators, showerheads, and pipe wrap. According to the CAP agencies, the hot water measures exhibited quality issues, the agencies hesitated to install the equipment, fearing customers' dissatisfaction. Only 7% of IES Program participants received faucet aerators and/or showerheads through the program.

Recommendation:

- ***Consider requiring CAP agencies to install all direct-install measures, standardizing the customer experience.*** Measures such as showerheads and faucet aerators provide a low-cost mechanism to achieve deeper per-home savings.

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[3] http://www.waptac.org/data/files/Website_Docs/technical_tools/toolkit07.pdf

- ***Provide high-quality hot water measures.*** Programs commonly offer standard, inexpensive hot-water measures. Hot-water fixtures offered through the program should be tested, with use of high-quality fixtures encouraged as an upgrade for participants (leading to higher measure retention levels).

National Grid employs lower-than-average health and safety fund limits, in comparison with other low-income weatherization programs across the country.

The CAP agencies reported differing protocols regarding health and safety measures. One-half of the CAP agencies said National Grid does not fund health and safety measures, while the other half noted National Grid funded these measures up to $500 per home.

National Grid's funding of $500 per home is lower than similar low-income weatherization programs. With the State's federal funding continuing to decrease each year, all CAP agencies and CLEAResult reporting a desire for National Grid to allocate a greater amount of funding for health and safety.

Recommendation:

- ***Consider increasing the IES Program's health and safety fund limits.*** Any changes made should ensure the IES program manual includes updated health and safety protocols, ensuring all CAP agencies clearly understand National Grid's budget restrictions.

The State's shift to Hancock Software slows IES Program production.

According to the CAP agencies, the switch from CAPTAIN to Hancock Software (Hancock) presented one of the greatest challenges facing the 2014 IES Program. Although the State provided training for the new database, the CAP agencies did not find the training helpful and still continue to experience difficulty in understanding how to use the new system. As a result, data tracking takes much longer than in the past. The agencies reported that data collection with CAPTAIN ranged from 15 to 40 minutes, but data collection in Hancock ranged from one to two hours per project, due to many technical glitches in the software and the learning curve involved with adapting to a new system. Agency staff reported the Hancock challenges have slowed production for the auditors.

Recommendation:

- ***Monitor the CAP agencies' concerns with Hancock to minimize its impact on IES Program production.*** Encourage the State to provide a forum (e.g., Weatherization Technical Committee [WTC] meeting) for the CAP agencies to share their issues with Hancock. State staff could use this time to formally identify all CAP agencies' issues and to submit these directly to the Hancock developers. This will help the auditors feel their concerns are heard and will help organize and prioritize issues for Hancock to address.

Issues with technology can frustrate auditors in the field.

While on site, AMP auditors use laptops and wireless air cards to connect to the Internet and enter audit data into National Grid's proprietary, web-based InDemand software. One-half of the CAP agencies reported experiencing frequent connectivity issues in the field.

Additional technology issues arose when the State rolled out Hancock without access to a handheld device; so the auditors could not use the software in the field. Unlike auditors' use of the National Energy Audit Tool (NEAT), they currently collect data on paper and manually enter it into Hancock upon their return to their offices.

Recommendation:

The CAP agencies' concerns regarding connectivity should continue to be monitored, and the technology used by auditors in the field should be updated as needed. Field analysts in similar programs delivered across the country commonly face issues with technology. As technology barriers can impact an auditors' weekly production, back-up protocols should be in place to streamline the data collection process (e.g., alternative hot spot devices, up-to-date paper copies of audit checklists, and energy education questionnaires).

As of this report, National Grid staff have conducted meetings with CAP agency staff, in part to discuss the agencies' technology issues, and indicate they will continue to monitor agency concerns in this area. In addition, program staff reported offering agencies access to hot spot technology to help address the problems with air cards in the field.

Participants are not aware that National Grid sponsors IES Program services.

Participants expressed below-average awareness of National Grid's program sponsorship, in comparison to levels participants exhibited in other recent low-income weatherization evaluations across the country.

Recommendation:

- ***Increase National Grid sponsorship awareness through leave-behind materials.*** To help increase participant awareness of utility program sponsorship, National Grid-branded materials or products should be developed for the CAP agencies to leave behind with participants. Items other utilities provide include branded LED nightlights and refrigerator magnets offering energy-saving tips.

Introduction

National Grid Rhode Island contracted with Cadmus to perform a process evaluation of the Income Eligible Services (IES) Program for the years 2011, 2012, and 2013. The evaluation sought to: document program processes and procedures; determine opportunities for improvements; and assess the success of program transitions instituted by National Grid and the new program implementer, CLEAResult.

Program History

In 1995, National Grid formed a partnership with Massachusetts' income-eligible weatherization and fuel assistance network of CAP agencies to develop an income-eligible electricity conservation program: the AMP. One of the first income-eligible programs in the United States to move beyond weatherization, AMP addressed lighting, water heating, refrigeration, and other household energy uses. Additionally, AMP incorporated an energy education component to increase participating customers' awareness and knowledge of energy efficiency. In 1998, National Grid launched AMP in Rhode Island.

In 1997, National Grid began supplementing funds for the federal WAP to increase energy-efficiency upgrades for income-eligible natural gas customers. Similarly to the AMP, the CAP agencies delivered WAP to low-income households throughout the state. WAP offered energy audits and installations of insulation, air-sealing measures, and heating system replacements or repairs. Where gas and electric services overlapped, the program is delivered jointly with AMP.

Since their initial implementation, the AMP and WAP programs became increasingly responsive to the energy-savings opportunities and needs of individual customers. Most participants received a detailed appliance assessment, including appliance monitoring and detailed education about energy usage and energy-saving opportunities tailored specifically to their homes. As the Rhode Island Law of Energy Conservation extended to natural gas in 2007, the two programs operated as one.

The programs' management and delivery has undergone many recent events and changes, as this report's Detailed Findings section addresses. The Rhode Island Office of Energy Resources (OER) oversaw the CAP agencies' delivery of the AMP and WAP until 2012. In July 2012, Rhode Island's government officials moved the fuel assistance programs and weatherization staff from OER to the Department of Human Services (DHS) as part of a consolidation of assistance programs. Starting in 2013, the AMP and WAP began operating under one name: IES. Also in 2013, National Grid hired CLEAResult to manage the implementation and delivery of IES Program funds.

Research Approach

To explore issues surrounding program delivery and design, Cadmus evaluated the IES Program process, accounting for issues affecting participant, utility, and other stakeholder perspectives. For the 2014 process evaluation, Cadmus conducted the following:

- Developed research questions to guide the evaluation activities
- Reviewed program materials
- Interviewed key utility and implementation staff (n=24)
- Developed a logic model
- Surveyed program participants (n=120)

Research Questions

In partnership with National Grid, Cadmus developed a list of research questions to guide the evaluation process. This activity structured the adopted approach through developing the data collection tools (e.g., stakeholder interview guides and participant survey) for the evaluation and ensured targeting questions of interest. Table 1 lists the final research questions and investigation areas developed for the 2014 process evaluation.

Table 1. Process Evaluation Research Questions and Indicators

Research Questions	Areas of Investigation/Indicators
Are program targets being met?	• Number of participants in each program year, compared to goals. • Energy and demand savings compared to goals. • Program spending compared to planned budget.
Are customer satisfaction goals being met?	• Overall customer satisfaction.
Are energy education goals being met?	• Effectiveness of energy-saving education and adoption of energy-saving behavior changes.
Is the program design appropriate to meet goals?	• Document changes to program design. • Reasons for and outcomes from changes in program design.
Are administrative processes effective?	• Is the program effectively managed? • Are partners satisfied with the program and administrative support? • Are National Grid's assigned resources sufficient? • Internal and external communication procedures. • Is the data tracking process effective? Do the tracking systems support EM&V, financial, and other informational needs?
Is the marketing process effective?	• Customer awareness of National Grid program sponsorship and first source of program awareness.

Research Questions	Areas of Investigation/Indicators
Is the implementation process effective?	• Effectiveness of program delivery procedures including: audit/assessment workflow, auditor education while on-site with customers, and customer experiences. • What were the protocols in 2011—2012 and were they followed? How have protocols changed with the new lead vendor? • How effective is the new delivery model? How is it working compared to the old delivery model? • Are there any process-related explanations, between 2011 and 2012, for the low CFL savings in the 2013 billing analysis? • If CFL savings result from past practices, have process improvements occurred under the new delivery model that would increase savings? • Do barriers or bottlenecks inhibit optimal delivery? • Are QC procedures in place and effective? • Do lead vendor and delivery staff receive adequate training to deliver the program? What training is provided? How do participants view it? • Could best practices in other jurisdictions improve the current implementation process? • What further process improvements could increase savings further?

Materials Review

As part of the 2014 IES process evaluation, Cadmus reviewed key program materials provided by National Grid and CLEAResult; the review sought to gain a better understanding of the program's delivery protocols and the changes that occurred during the evaluated period (2011–2013). Cadmus reviewed critical program documentation, including program manuals, training and field implementation protocols, and program performance reports. Table 2 lists key program documents Cadmus reviewed for these research activities.

Table 2. IES Program Materials Reviewed by Cadmus

Program Materials
Appliance Management Program Procedures and Training Manual for Energy Managers
Asbestos Policy
Energy Efficiency Program Plan for 2011
Energy Efficiency Program Plan for 2012
Energy Efficiency Program Plan for 2013
Heating System Policy
Knob and Tube Wiring Policy
Minimum Requirements for RI WAP Contractors
Office Data Report
Rhode Island IES Phase 1 (May-August 2013) Report
Rhode Island IES Phase 2 Report
Rhode Island IES January Report

Program Materials
Rhode Island IES February Report
Rhode Island IES March Report
Rhode Island IES Summary of Changes in 2013
Rhode Island State Energy Office WAP Guidelines for the Installation of Energy Conservation Measures
RI WAP Contractor Application
Status Report on Single-Family IES in Rhode Island

Stakeholder Interviews

Cadmus conducted in-person interviews with key program stakeholders, including program staff at National Grid, state-level administrators,[4] and the program's lead vendor (CLEAResult). Additionally, Cadmus interviewed program delivery staff at the seven Rhode Island CAP agencies, including administrative staff and field auditors. These interviews allowed collection of valuable information on a range of issues influencing the design and delivery of the IES program, including the following:

- Program goals and achievements;
- Barriers and bottlenecks inhibiting optimal delivery;
- Program delivery procedures and effectiveness, including audit/assessment workflow, contractor education while on-site with customers, and customer experience;
- Changes in program design between 2011 and 2013,
- Internal and external communication procedures, and
- Quality control procedures.

Table 3 summarizes stakeholder interviews Cadmus conducted for the 2014 process evaluation.

Table 3. Stakeholder Interviews

Program Stakeholders	Number of Interviews	Number of Interviewees
National Grid program staff	2	4*
CLEAResult staff	1	1
Department of Human Services staff	1	2
CAP agency staff	7	17
Total	**11**	**24**

*Cadmus conducted a preliminary interview with National Grid staff during February 2014. Three of the four program staff participating in the preliminary interview, also participated in a follow-up interview in April 2014.

Logic Model

After reviewing program materials and interviewing program staff, Cadmus developed a logic model and key performance indicators (KPIs) for the IES Program. The program theory and logic model provide a

[4] Formerly Rhode Island Office of Energy Resources, now the Department of Human Services.

roadmap to help program planners and managers organize program resources and activities as well as the expected outputs and benefits resulting from various program activities. Understanding the individual program pieces and activities helps planners design the program outcomes (both near- and long-term). The program theory reveals the issues or challenges the program is intended to address, then defines program activities. KPIs allow assessment of program activities' effectiveness towards achieving near- and long-term outcomes.

Participant Phone Surveys

Cadmus conducted 120 phone surveys, with random samples of 2012 and 2013 IES Program participants. These surveys explored a range of program process-related topics, including:

- Awareness of marketing materials and utility sponsorship
- Measure verification and persistence
- Program and measure satisfaction
- Reasons for participating
- Effectiveness of energy-saving education
- Adoption of energy-saving behavior changes

VuPoint Research, a national research firm and subcontractor to Cadmus for this process evaluation, fielded the phone survey during May 2014.

Upon completion of the fielding effort, Cadmus analyzed the survey data and reported the frequencies in the Detailed Findings section of this report. In accordance with Cadmus' best practices, in instances where survey respondents refused to answer, or said they did not recall the answer to any one question, we excluded these respondents from the total reported respondents for that question. Instances where we removed the "don't know" and/or "refused" responses from our analysis is indicated with a figure or table note in the report.

Sampling Approach

Cadmus used program data provided by National Grid to generate random samples of program participants from 2012 and 2013. To achieve a desired confidence level of 90% and precision level of 10% for the overall program, Cadmus sought to complete 120 surveys. Table 4 presents the IES participant survey sample and achieved survey completions for this evaluation activity.

Table 4. Participant Survey Sample Breakdown

Participation Year	Population	Sample	Targeted Survey Completes	Actual Survey Completes
2012	2,513	300	60	60
2013	2,230	300	60	60
Total	**4,743**	**600**	**120**	**120**

Detailed Findings

Program Administration

National Grid Rhode Island's Income Eligible Services (IES) Program experienced many management and delivery changes during the evaluated period (2011–2013), with the most significant changes in the program's administration. Until 2012, the State's Office of Energy Resources (OER) oversaw the Community Action Program (CAP) agencies' delivery of the IES Program, administering both National Grid and the federal funds for the program. In 2013, however, National Grid hired CLEAResult to manage the implementation and delivery of its IES Program funds. According to National Grid and other stakeholders, the State remains a key player in the IES Program delivery, working alongside CLEAResult as a collaborative partner. The seven CAP agencies in Rhode Island, along with their subcontractors, continue to deliver all program services to customers.

National Grid staff reported several factors leading to their decisions to put implementation of the IES program out for bid and ultimately hiring CLEAResult as the program's lead vendor. Overall, National Grid staff wanted to achieve the following:

- Provide enhanced oversight for the program's delivery;
- Ensure CAP agencies met spending and production goals for IES; and
- Improve reporting and communications regarding progress of the IES program over the course of the year

National Grid noted they needed an entity with the availability to: focus solely on IES Program delivery; and to motivate the CAP agencies to spend all of their allocated money and complete their production for each year.

National Grid staff reported that communications among program stakeholders became more transparent after CLEAResult became lead vendor. All CAP agencies agreed that program communication between weatherization entities improved since National Grid hired CLEAResult.

Program Funding

According to CLEAResult, prior to its hire, one of the greatest IES Program challenges facing CAP agencies was their ability to fully spend National Grid's program funding. As shown in Table 5, IES Program funding never became fully exhausted during the evaluated period. However, the CAP agencies' program spending of electric funds increased from 48% in 2011 to 80% in 2013. Program spending of gas funds also increased from 53% to 76% during the same time period.

Table 5. Annual IES Program Funding—Budget and Spending

Program Year	Budget	Actual Spend	Percent of Budget Spent*
Electric			
2011	$5,725,400	$2,725,700	48%
2012	$5,615,400	$3,549,000	63%
2013	$6,242,500	$5,000,600	80%
Natural Gas			
2011	$983,900	$522,400	53%
2012	$1,765,800	$1,090,200	62%
2013	$2,450,100	$1,851,800	76%

*Numbers rounded to the nearest percent.

During 2011 and 2012, the following events impacted the agencies' ability to spend National Grid's program money:

- The American Recovery and Reinvestment Act of 2009 (ARRA) provided an additional $5 billion to weatherize homes of low-income households, $20 million of which was allocated to Rhode Island, with a deadline to exhaust the money by March 2012.[5] The influx of federal funding made it difficult for CAP agencies to spend National Grid's funding. Challenges resulting from the addition of ARRA funds are not unique to this program: similar impacts on utility-sponsored, low-income programs have been observed across the country.
- In 2011, one of Rhode Island's CAP agencies closed due to a scandal that forced it into bankruptcy.[6] In this agency's absence, the State shifted funding to other CAP agencies. Not all of these agencies, however, could ramp up production to cover the additional spending needs.
- In 2012, an auditor at one agency plead guilty to accepting kickbacks of federal weatherization funds.[7] During the federal investigation of this issue, the State pulled all funding (both federal and National Grid) from this agency. Per National Grid, a clear plan did not exist for ways to proceed with their portion of the program in the interim.

Challenges arising from these three events have since been resolved. Currently, all seven Rhode Island CAP agencies participate in IES Program delivery. In addition, CLEAResult has sought to motivate the CAP agencies to meet their annual funding goals by reallocating funds to agencies performing above target.

Program Goals

National Grid said the years of below-target production partly lead to hiring an independent, third-party lead vendor to manage program fund delivery. As shown in Table 6, the program fell short of its net

[5] U.S. Department of Energy Efficiency and Renewable Energy. "Weatherization Assistance Program- The American Recovery and Reinvestment Act of 2009." Accessed June 2014: http://www1.eere.energy.gov/wip/pdfs/wx_recovery_fact_sheet.pdf.

[6] http://blogs.wpri.com/tag/providence-community-action-program/

[7] http://www.justice.gov/usao/ri/news/2012/nov2012/lemoi.html

electric-savings goals during the evaluated period. However, the program achieved 90% of its electric goal in 2013—an increase from 73% in 2011.

Table 6. Annual IES Program Electric Savings—Target and Achieved

Program Year	Electric Savings Goal (MWh)	Electric Net Savings (MWh)	Percent of Electric Goal Achieved*
2011	3,091	2,243	73%
2012	3,960	3,404	86%
2013	4,131	3,735	90%

*Numbers rounded to the nearest percent.

Similarly, the program fell short of its annual net gas-savings goals during 2011 to 2013. Again, the program increased the percent of achieved gas savings from 67% in 2011 to 92% in 2013, as shown in Table 7.

Table 7. Annual IES Program Natural Gas Savings—Target and Achieved

Program Year	Natural Gas Savings Goal (MMBtu)	Natural Gas Net Savings (MMBtu)	Percent of Natural Gas Goal Achieved*
2011	3,848	2,572	67%
2012	7,697	5,516	72%
2013	6,250	5,743	92%

*Numbers rounded to the nearest percent.

The program proved more successful in achieving its participation goals. In 2012 and 2013, the program distributed and installed electric-saving measures to over 2,600 clients, achieving 106% of its 2,501-account participation goal: an increase from 83% in 2011. Further, the program achieved 100% of its gas participation goal in 2013, an increase from 88% in 2011, as shown in Table 8.

Table 8. Annual IES Program Participation—Target and Achieved

Program Year	Participation Goal (Number of Accounts)	Actual Participation (Number of Accounts)	Percent of Participation Goal Achieved*
Electric			
2011	1,813	1,499	83%
2012	2,501	2,654	106%
2013	2,501	2,646	106%
Natural Gas			
2011	215	190	88%
2012	430	388	90%
2013	400	398	100%

*Numbers rounded to the nearest percent.

While the program has spent closer to its goals since 2013, its production and savings have not substantially increased in that time period. Spending for the IES Program's electric portion between

2012 and 2013 increased by $1.45 million; however, participation decreased by eight households and savings increased by only 331 MWh. Similarly, spending on the program's gas portion increased by $761,600, while participation increased by 10 participants and savings increased by 227 MMBtu. National Grid staff noted the increased program costs in 2013 likely resulted from the following:

- Hiring CLEAResult as the program's lead vendor,
- The per-unit cost of program measures increasing due to market inflation, and
- Adding LED light bulbs to the program measure offerings.

Figure 1 shows the cost per MWh saved and electric account served by program year. Cost per MWh saved increased from 2011 to 2013. Electric spending per participant also increased from 2011 to 2013.

Figure 1. Electric Cost per Unit Saved and Participant Served by Program Year

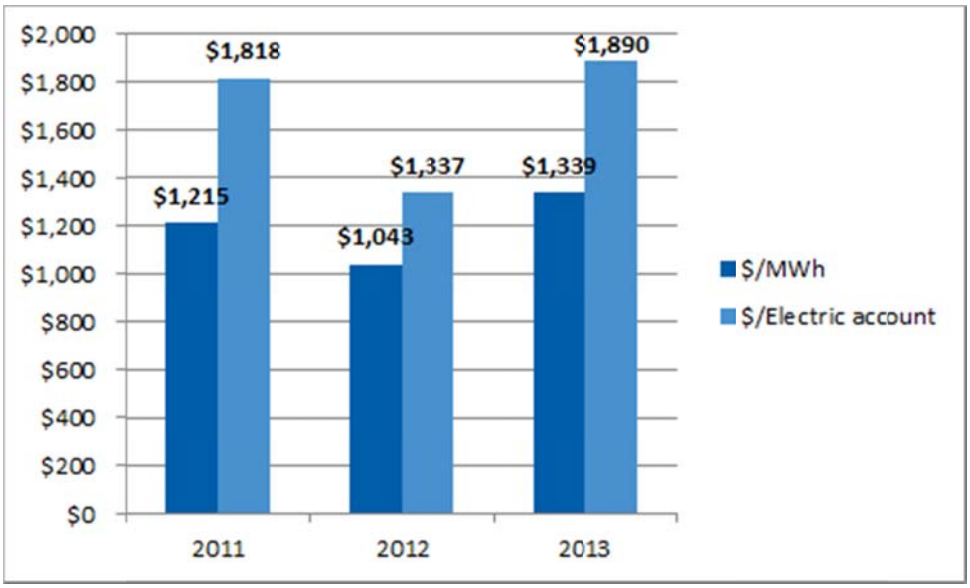
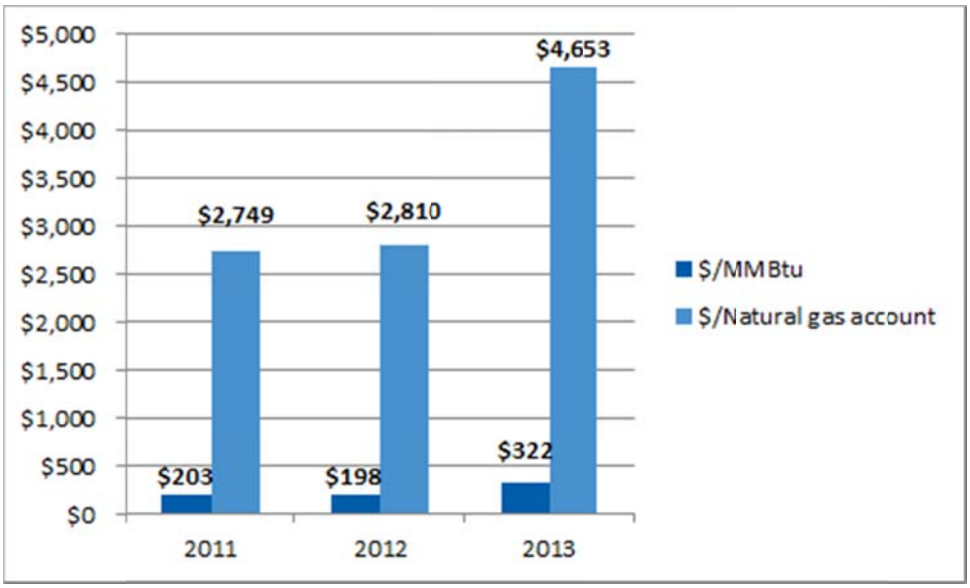


Figure 2 shows the cost per MMBtu saved and natural gas account served by program year. Similarly to the program's electric side, the cost per MMBtu saved increased from 2011 to 2013. In addition, the cost per natural gas participant served increased by nearly 170% from 2011 to 2013.

Figure 2. Natural Gas Cost per Unit Saved and Participant Served by Program Year



Process Goals

In addition to National Grid's objective of effectively utilizing available IES funding annually, program stakeholders reported process-related goals for the IES Program, including quality improvements and standardization.

Quality Improvements

National Grid and CLEAResult reported increased quality as a primary IES Program improvement goal. Specifically, CLEAResult said the program needed increased quality control (QC) monitoring levels. CLEAResult integrated another monitor into the program in 2013 to work in conjunction with the State's monitors. National Grid required that CLEAResult's monitor inspect at least 10% of all program projects, but CLEAResult reported its monitor inspected closer to 40% of projects during 2013. State monitors continue to inspect a minimum of 5% of jobs, per the U.S. Department of Energy's (DOE) Weatherization Assistance Program (WAP) requirements, but indicated they usually exceeded that minimum.

CLEAResult staff hoped steps taken to improve quality also would help the program run more efficiently. If monitors find a quality issue during inspections, auditors and subcontractors must return to the projects, increasing the cost and number of hours spent on the job. CLEAResult staff found that, if auditors and contractors had an additional monitor to reach out to during a job (for inspections or questions), fewer "go backs" occurred after post-installation inspections.

CLEAResult provides field training to CAP agency auditors and installation subcontractors. CLEAResult said many auditors and contractors called their monitors to ask questions about auditing and measure installation protocols. Most CAP agencies found CLEAResult's monitor very knowledgeable and a valuable asset to the program.

CAP agencies also reported that, in 2014, DOE required all auditors and monitors (from the State and CLEAResult) to pass Quality Control Inspector (QCI) training. QCI training is a three-day course that ensures all weatherization workers: understand how to complete WAP projects to DOE's specifications and standards; perform safety and diagnostic testing; record and report data; and implement corrective actions based on building audit results. State staff said all monitors and auditors in the state would be trained for the test. CLEAResult reported all auditors and monitors would have two chances to pass the QCI test, adding they would provide extra training and study support to those experiencing trouble with the test during the first round.

In addition, the State and CLEAResult now jointly host a working group meeting with auditors from around the state: the Weatherization Technical Committee (WTC) meets at least quarterly and sometimes more frequently to review weatherization procedures, discuss quality installation, and share information between the organizations.

Standardization

National Grid reported standardization as a current strategic focus for the program. All CAP agencies agreed an immediate need existed for program stakeholders to standardize program processes and installation requirements.

As noted, when CLEAResult joined the program as lead vendor, it brought an added QC level to the program. The CAP agencies reported the CLEAResult monitor and State monitors often experienced differences of opinions regarding the correct way to conduct audits, measures to recommend, and methods for installing measures. The CAP agencies said this caused frustration as their auditors and contractors were accustomed to serving homes in one manner and, when CLEAResult monitored a home, agencies and contractors would be told to make changes. CAP agencies reported receiving conflicting advice from different monitors about how to best serve a home. These inconsistencies lead to many "go backs" for adjusting projects based on monitors' inspections. In addition, one agency reported installation contractors became frustrated when an agency required measure installations using one method and another agency required it a different way.

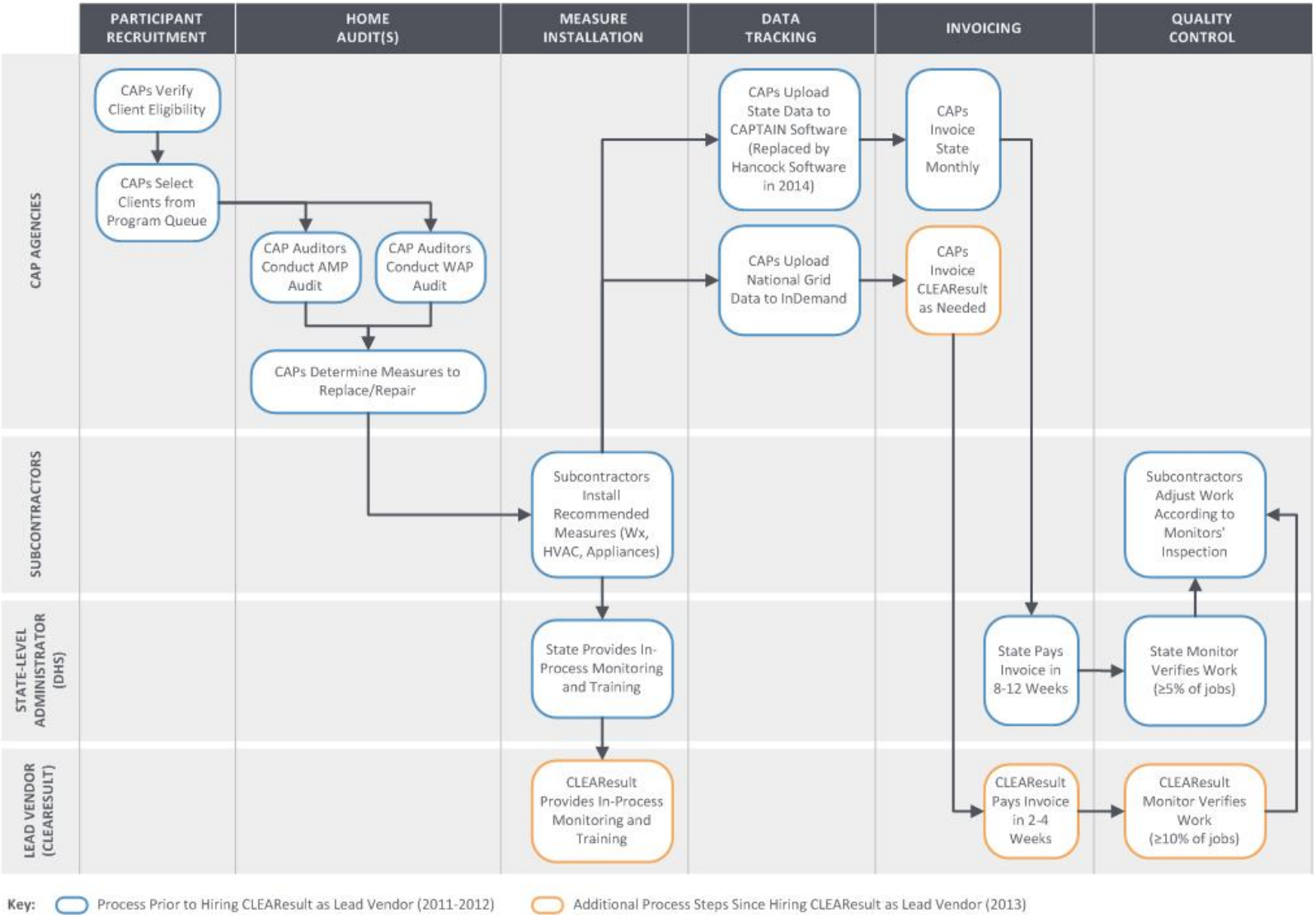
CAP agencies also expressed confusion regarding whether National Grid would pay for window and/or room air conditioner replacements. Some CAP agencies noted they could install these measures, whereas others reported they could not.

In 2014, CLEAResult and the State began working collaboratively to standardize the program's auditing and installation protocols. Together, they are developing an IES program manual that describes the program's policies and procedures in detail.

Program Delivery

Figure 3 shows the IES Program, as described to Cadmus through interviews with program stakeholders.

Figure 3. IES Program Process Flow



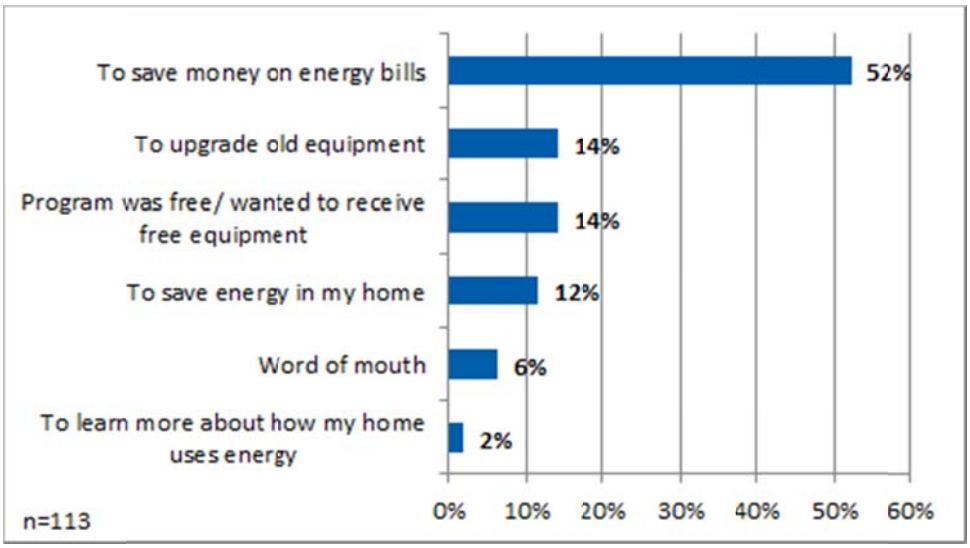
Participant Recruitment

All customers on National Grid's A-60 (low income) rate become eligible for the AMP; however, WAP eligibility runs through the Low Income Heating Assistance Program (LIHEAP). To qualify for National Grid's A-60 rate, a customer must meet one of the following criteria:

- A current recipient of Supplemental Security Income from the Social Security Administration; or
- Eligible for LIHEAP, Medicaid, Food Stamps, General Public Assistance or Family Independence Program Assistance.

LIHEAP provides services to residents at or below 60% of Rhode Island's median income; customers becoming eligible for LIHEAP qualify to receive services through AMP and WAP. When customers sign up for LIHEAP, the application includes a box that customers can check if interested in receiving weatherization services. Figure 4 shows the reasons surveyed customers chose to check the weatherization services box. Just over one-half (52%) of respondents reported they signed up for program services to save money on their utility bills.

Figure 4. Participation Motivations*



*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

All customers checking the weatherization box on the LIHEAP application go into a program queue (for AMP and WAP program services), prioritized according to the DOE's points system. The following criteria set the priority:

- Elderly (defined as an individual 60 years of age or older)
- Persons with disabilities
- Children
- Households with high energy consumption

CAP agencies select customers from the program queue based on this priority. According to CAP agency staff, however, it often becomes difficult to reestablish contact with customers signed up for program services through LIHEAP (similarly, it proved difficult to cold-call customers on National Grid's A-60 rate).

Many CAP agencies reported having to call customers in the queue several times before actually making contact and scheduling an audit. Most CAP agencies said they did not have sufficient staff to support this effort. One CAP agency reported mailing a letter to all customers in their program queue, requesting they call the CAP agency to schedule an audit; this agency reported the direct-mail effort as successful.

Home Audit

The IES Program includes two types of audits: the AMP audit and the WAP audit. Some CAP agencies conduct the audits at different times, while other agencies schedule the audits concurrently.

AMP Audit

The AMP audit, funded solely by National Grid, focuses on increasing the efficiency of a home's appliances and other electric base load measures. During audits, AMP auditors determine if customers' refrigerators or freezers qualify for replacement and encourage customers to dispose of or replace other appliances that may contribute to their household energy burdens (e.g., heated waterbeds, water coolers, secondary refrigerator/freezers).

The AMP audit includes a comprehensive energy education component, where the AMP auditor reviews a customer's electric bills and energy use and provides tips for how to save energy and money in the home.

Auditors collect all AMP audit data through National Grid's proprietary, web-based InDemand system. AMP auditors have laptops and wireless air cards to connect to the Internet and enter data while on site. Three of seven CAP agencies reported frequent connectivity issues in the field; reporting auditors typically asked to connect via the customer's in-home wireless Internet, if available. As of this report, National Grid staff reported they are offering agencies access to hot spot technology to help address the problems with air cards in the field.

Appliance Replacement

During the AMP audit, auditors assess the efficiency of customer's refrigerators and/or freezers to determine if appliances qualify eligible for replacement. Refrigerators and freezers must be plugged in and in working condition to be replaced.

To estimate annual consumption and to determine eligibility for replacing an existing refrigerator/freezer, the AMP auditor meters electricity usage of the unit during the audit. Nearly all CAP agencies reported typically metering appliances for 75 minutes. Table 9 lists appliance metering protocols for low-income weatherization programs across the country. Most benchmarked programs require auditors to meter existing appliances for at least two hours to gather accurate data to determine replacement eligibility.

Table 9. Comparison of Low-Income Weatherization Program Metering Protocols

Program Sponsor(s)	Appliance Metering Protocol
National Grid	1.25 hours
Ameren Missouri	2 hours
Northeast program administrators*	2 hours
Midwest utility*	2 hours
DOE	2 hours
Efficiency Maine	2 hours
Electric and Gas Program Administrators of Massachusetts	1-2 hours
Rocky Mountain Power	72 hours

*As data derived from proprietary program materials, Cadmus did not name program sponsors for this benchmarking activity.

The duration of refrigerator and freezer metering determines the accuracy of the annual electricity use estimate. Longer metering times result in more accurate estimates. Refrigerator metering studies indicate a one-hour metering duration results in estimates within ±10% of actual usage only 18 out of 100 times. Three-hour metering results in estimates within ±10% of actual usage 90 out of 100 times, though many auditors typically do not spend this long at a house. Consequently, DOE found a two-hour metering duration sufficient to make cost-effective refrigerator and freezer replacement decisions.[8]

Direct-Install Measures

During the AMP audit, auditors install energy-efficient lighting and hot water devices to achieve immediate savings for IES Program participants. According to *The Appliance Management Program Procedures and Training Manual for Energy Managers*, the AMP audit's direct-install component includes:

- High-efficiency faucet aerators,
- High-efficiency showerheads
- Pipe wrap
- Water heater set point adjustment
- CFLs (standard and specialty bulbs)
- A TLC kit (two LED night lights, refrigerator brush, refrigerator thermometer, and shower timer)

All CAP agency staff reported they regularly installed CFLs and distributed TLC kits to IES participants, but only one-half of CAP agencies said they installed pipe wrap and hot water measures. Program tracking data confirmed that only four CAP agencies install hot water measures. Some CAP agency staff reported that showerheads and faucet aerators available through the program were not high-quality, and they hesitated to install hot water measures, thinking customers would dislike them. One CAP

[8] Moore, Alex. *Incorporating Refrigerator Replacement into the Weatherization Assistance Program*. Prepared for U.S. Department of Energy. November 19, 2001. Available online: http://www.waptac.org/data/files/Website_Docs/technical_tools/toolkit07.pdf

agency noted that if the showerheads, in particular, were of higher quality, customers would more willingly accept auditors installing the measure.

According to IES Program tracking data, only 7% of program participants received faucet aerators and/or showerheads during the evaluated program years (2011-2013).[9] Two of three survey respondents who received faucet aerators reported satisfaction with the measures. The one respondent who was dissatisfied with the program aerators installed in their home reported the fixtures leak. All three of the survey respondents who received faucet aerators through the program reported they remained installed in their homes. All three survey respondents who received a program showerhead reported satisfaction with the new fixtures. Reasons for these respondents' satisfaction included the associated energy savings, appreciating the measure's multiple stream settings, and favoring the fixture's water pressure. None of the survey respondents who received a program showerhead reported removing the measure.

Compact Fluorescent Lamp (CFL) Installation

The AMP program manual presents conflicting CFL installation protocols. One section of the manual states: "there is no limit to the amount of CFLs that may be installed in a home"; then a latter section of the manual states that light bulbs used most often should receive the highest replacement priority. This manual section states criterion for installing CFLs include the following:

- CFLs shall be installed only where the fluorescent replaces an incandescent of higher wattage and the fixture is on for two hours or longer on the average day.
- Auditors are advised to ask customers which lights they use most and then ask how many hours per day they are used to avoid installing lights in rooms where people don't spend much time during evening hours.
- Up to eight CFLs may be installed in separate fixtures in a house. Fifteen total may be installed when multiple CFLs are in eight or less fixtures.

During the stakeholder interviews, CLEAResult and the CAP agencies reported the IES Program's CFL installation protocol allowed AMP auditors to install as many CFLs in a house as possible, independent of bulb location or usage. Nearly one-half of surveyed customers (47%) estimated they received 11 to 25 CFLs. CLEAResult reported that one AMP auditor installed 120 CFLs in one participant's home. According to program tracking data, AMP auditors installed an average of 20 CFLs per home during the evaluated program years (2011-2013).

CFL savings largely depend on the number of hours a bulb is used (hours-of-use [HOU]). Prevailing theory holds that average HOU decrease as a greater number of CFLs become installed within a home (for example, as CFL saturation in the home increases, bulbs become installed in less frequently used locations and average HOU declines). As described in Volume I of Cadmus' initial gross impact evaluation

[9] Due the small number of participants that received hot water measures through the program, respondent commentary on these measures is primarily anecdotal.

findings for the 2011–2012 IES Program, this applies to the IES Program.[10] As shown in Table 10, results from the 2011–2012 IES Program billing analysis indicated CFL savings decreased dramatically upon greater CFL installations.[11]

Table 10. Energy Savings Based on Number of CFLs Installed (IES Program Impact Evaluation, Volume I)

CFLs Received	Percent Analysis Dataset	Average Number of CFLs Installed	Billing Analysis kWh Saved/CFL
1–5	3%	3.6	59
6–15	29%	11.2	26
16–50	65%	25.9	19
Over 50	3%	66.0	13
Overall	**100%**	**22.2**	**17**

*With 22.2 CFLs installed per home in the 2011–2012 billing analysis sample and 20.5 per home in the 2011–2012 population.

Cadmus and Navigant recently conducted a metering study of 261 homes to determine lighting HOU in Massachusetts low-income households.[12] Study findings suggested room types with the highest traffic levels (such as kitchens, dining rooms, and living rooms) experienced the highest average annual HOUs, as shown in Table 11. Exterior fixtures also indicated higher lighting usage on average, a finding consistent with anticipated nighttime use of these fixtures. Bedrooms and bathrooms showed lower average annual lighting usage relative to the aforementioned room types.

[10] Cadmus. *Impact Evaluation: Rhode Island Income Eligible Services, Volume I*. January 15, 2014.

[11] The trend showing HOU decreasing with installations of more energy-efficient bulbs appears to contradict the *Northeast Regional Hours of Use Study*. That study found: higher HOU for energy-efficient vs. inefficient bulbs; and this relationship did not change with socket saturation (i.e., the percentage of sockets filled with energy-efficient bulbs). However, the 2011–2012 IES Program impact evaluation and the regional HOU study cannot be directly compared. The regional HOU study primarily focused on bulbs obtained from retail stores, with home occupants deciding where to install bulbs, with even the homes with the highest energy-efficient socket saturations having many (sometimes 50% or more) of their sockets filled with inefficient bulbs. NMR Group, Inc. and DNV GL. 2014. *Northeast Regional Hours of Use Study.* Final delivered on May 5, 2014. Available online at: https://app.box.com/s/o1f3bhbunib2av2wiblu

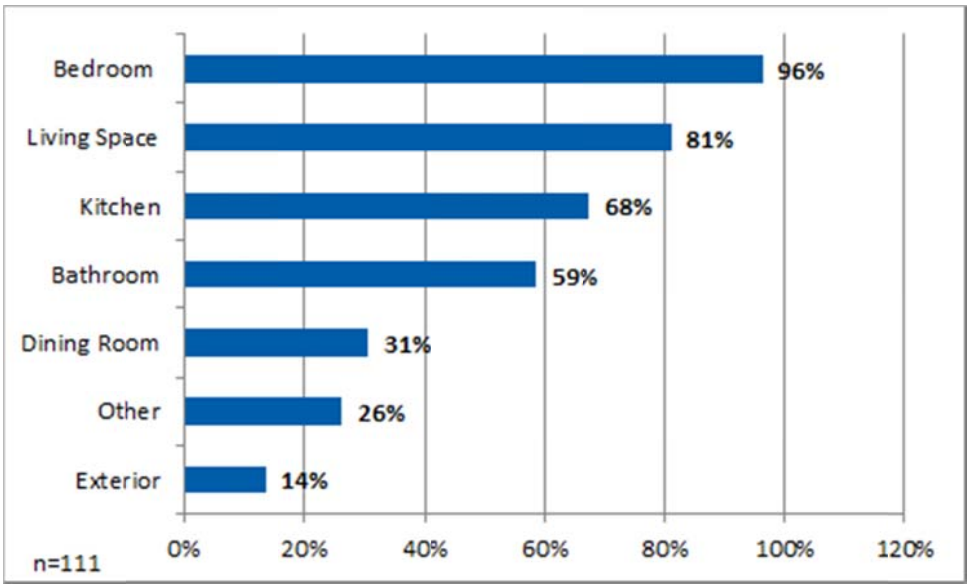
[12] Cadmus and Navigant. *Massachusetts Low Income Metering Study.* Prepared for the Electric and Gas Program Administrators of Massachusetts. May 2014.

Table 11. Massachusetts Low-Income Metering Study HOU by Room Type

Room Type	HOU	Relative Precision at 90% Confidence (±)	90% Confidence Interval
Exterior	4.5	25%	3.4–5.7
Kitchen	3.8	15%	3.3–4.4
Living Space	3.6	14%	3.1–4.1
Dining Room	3.1	22%	2.4–3.7
Bedroom	2.3	12%	2.0–2.6
Bathroom	1.7	15%	1.5–2.0
Other	1.6	17%	1.4–1.9

Figure 5 shows rooms in which auditors installed IES Program CFLs, according to participant survey respondents. Nearly all surveyed customers (96%) reported at least one CFL installed in a bedroom. However, only 14% of customers reported having a program CFL installed in an exterior fixture, even though exterior fixtures had the highest average annual HOU, per the Massachusetts study.

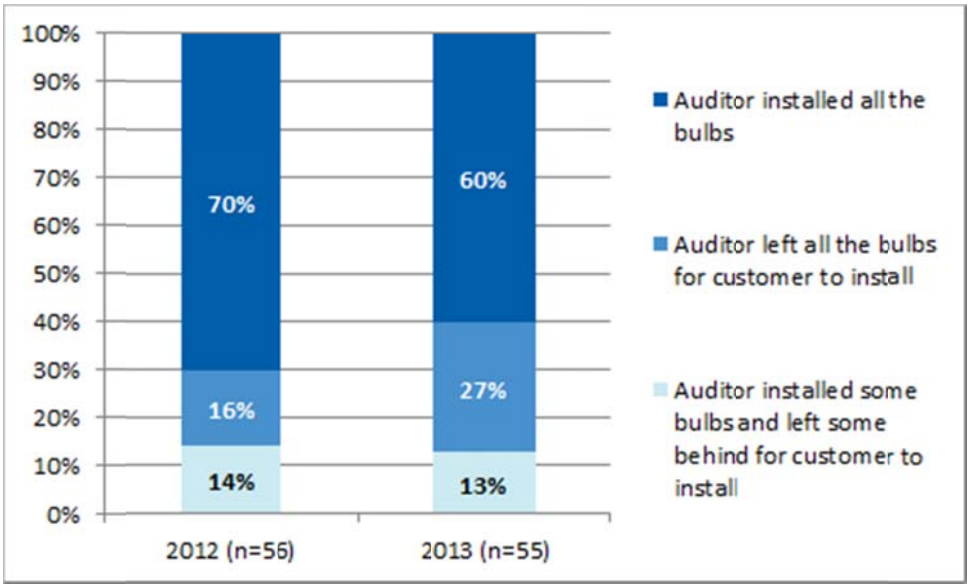
Figure 5. CFL Installation by Room Type



In addition to the preferred protocols regarding quantity and location, CFL installation processes varied. The majority of surveyed customers (65%) reported that AMP auditors installed the CFLs for them, with 22% indicating they installed all bulbs themselves. As shown in Figure 6, however, the percentage of surveyed customers saying the auditor left all bulbs for them to install themselves increased from 16% in 2012 to 27% in 2013.[13] All CAP agencies reported their auditors left behind existing incandescent bulbs after replacing them with CFLs.

[13] P-value=0.08; this difference is statistically significant (α=0.1).

Figure 6. CFL Installation Practices by Year*



*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

National Grid staff reported investigating several program design changes for future program years. As of this report, IES program staff are considering offering a combination of LED and CFL bulbs in participant homes, installing LEDs in high-use locations and CFLs in other locations.

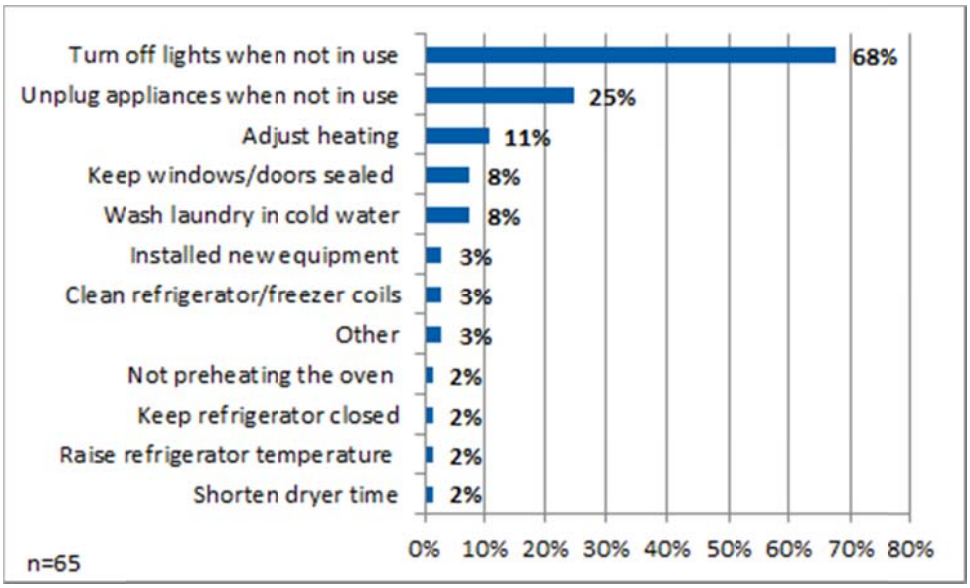
Energy Education

During the AMP audit, agency auditors provide participants with energy-saving education. This includes: completing a questionnaire about current energy habits; reviewing energy-saving tips to help reduce energy costs; and developing a plan of action to save energy and lower participants' electric bills. At the end of the AMP audit's energy education component, National Grid requires IES participants to sign a report promising to reduce energy usage in their home by taking four energy-saving actions of their choosing.

All but two surveyed respondents recalled discussing energy-saving tips with their AMP auditors. Nearly all IES participants (94%) rated the quality of the energy-saving information as excellent (57%) or good (37%). In addition, 60% of respondents said their knowledge of saving energy increased due to receiving this information from their auditor.

The majority (59%) of respondents recalling the energy education reported changing some of their habits to help save more energy. Figure 7 shows the energy-saving habits respondents reported changing, with the following actions most commonly cited: turning off lights when not in use (68%); unplugging unused appliances and electronics (25%); and adjusting thermostat settings (11%). In addition, 8% of participants avoided heat loss through windows and doors, and 8% washed their laundry in cold water, contributing to overall household savings.

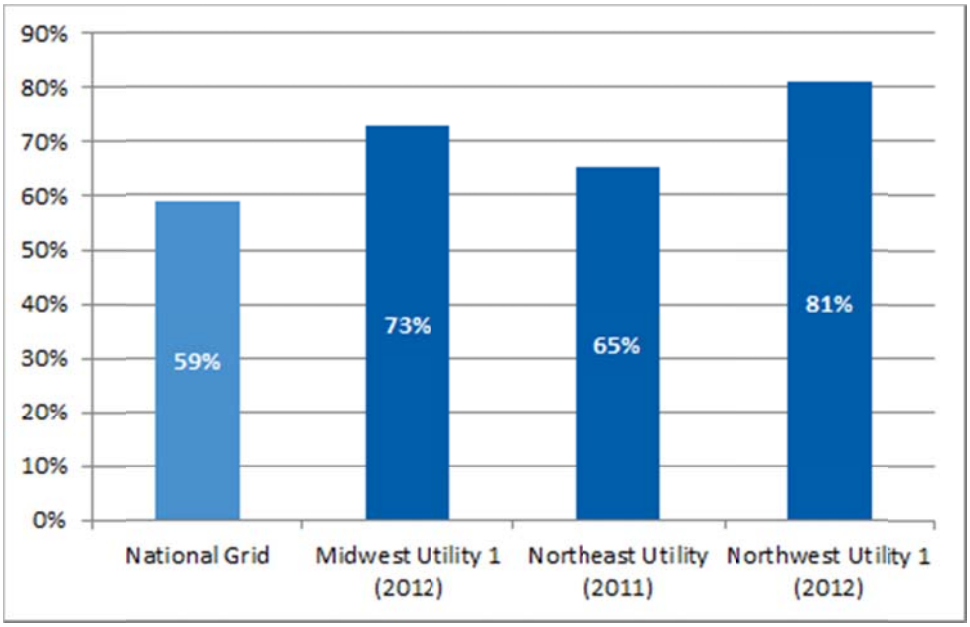
Figure 7. Participant Energy-Saving Behavior Changes



*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

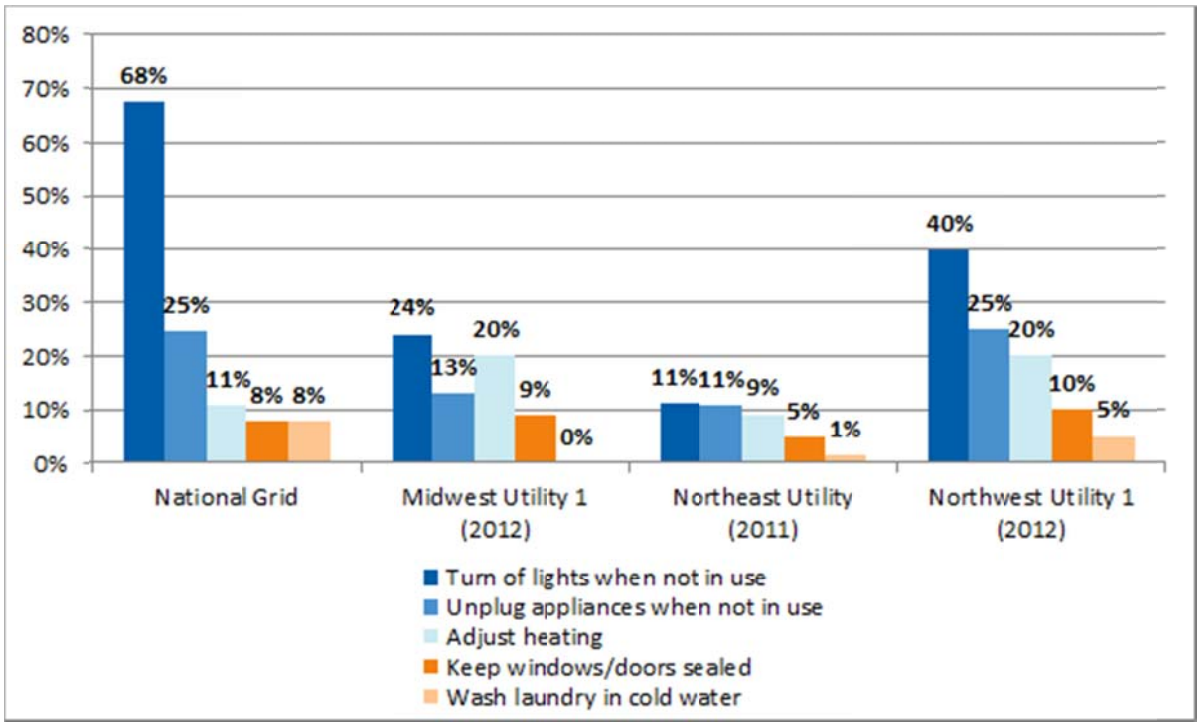
Figure 8 compares the percentage of participants across the country who reported implementing energy-saving behavior changes due to receiving energy education through low-income weatherization programs. By comparison, IES participants reported taking energy-saving actions less frequently than participants in other low-income weatherization programs.

Figure 8. Comparison of Energy Education Tip Implementation



Drawn from the same studies, Figure 9 compares energy-saving behaviors adopted by participants who recalled receiving energy-savings tips.

Figure 9. Comparison of Adopted Energy-Saving Behavior Changes



WAP Audit

During the WAP audit, the auditor conducts a whole-house inspection. While on-site, auditors collect information on existing home conditions or equipment, and determine weatherization or health and safety measures to install. They also often perform combustion and safety diagnostics and blower-door tests. CAP agencies reported all weatherization auditors as Building Performance Institute (BPI) certified.

During the evaluated period, CAP agencies used the National Energy Audit Tool (NEAT) to gather home data and calculate the savings-to-investment (SIR) ratio of energy-efficiency measures recommended for a project. All projects had to achieve an SIR ratio of 1.0 to allow installation of measures. CAP agencies reported, in most cases, they could install most measures desired through leveraging National Grid IES funds with the State's federal weatherization funds.

In 2014, the State switched audit and database tools, requiring the CAP agencies to use Hancock Software (Hancock) to gather audit data. According to the CAP agencies, the State rolled out Hancock without access to a handheld device; so auditors could not use the software in the field (as they could when using NEAT). This meant auditors had to collect data on paper and manually enter it into Hancock upon returning to the office. The State cites Hancock as compatible with handheld tablets and hopes to

start introducing that technology to the program. Hancock uses the Home Energy Audit Tool to determine estimated measure savings and SIR for the WAP audit.

Health and Safety

The CAP agencies reported differing protocols regarding health and safety measures. One-half of the CAP agencies said National Grid did not fund health and safety measures, while the other half noted National Grid funded these measures up to $500 per home. CAP agencies reported they typically assigned as many health and safety project costs to be paid for by federal dollars, noting the State's federal funding continued to decrease annually. All CAP agencies (and CLEAResult) reported wanting National Grid to allocate a greater amount of funding to health and safety.

Table 12 lists health and safety budget limitations set by other low-income weatherization programs across the country.

Table 12. Comparison of Health and Safety Budget Restrictions

Program Sponsor(s)	Health and Safety Fund Limits
National Grid (RI)	Up to $500 per home.
Pacific Power (WA)	50% of the installed repair costs necessary to make installation of energy-efficient measures possible.
Electric and Gas Program Administrators of Massachusetts (MA)	Up to $2,500 for health and safety on an individual home, with an average of $500 per home for the entire budget.
Ameren Missouri (MO)	Repairs limited to $600 in material or to the point where NEAT computes a cumulative SIR of 1.0, whichever comes first.
Nebraska Energy Office (NE)	15%–20% of annual budget set aside for health and safety-related expenditures.
Dayton Power & Light (OH)	15% of overall project costs for a specific location can be spent on health and safety measures.
Puget Sound Energy (WA)	30% of each agency's total budget can be spent on health, safety, and repairs.

Beginning in 2014, DOE required all delivering agencies to follow ASHRAE 62.2-2013 standards. According to Rhode Island CAP agencies, the standards require them to tighten participating homes as much as possible (using air sealing and insulation). After completing a post-installation blower door test, for a home indicating a low air exchange, they must install a whole-house fan in the home to ensure healthy air quality. Interviewed CAP agencies reported concerns about tightening up homes so tight that they required fans, noting that, if the fan stops working or a new tenant disconnects it due to a lack of education regarding the equipment's purpose, air quality may suffer. CAP agencies reported a representative from ASHRAE would train them on the new requirements during the 2014 program year.

All CAP agencies reported ASHRAE fan requirements presented an additional health and safety funding concern. Though considered a health and safety measure, ASHRAE fans are required by DOE. In addition, CAP agencies reported that National Grid and CLEAResult supported installation of this measure, but National Grid's health and safety funding did not cover installation costs. CAP agencies expressed

concerns regarding: the lack of funding provided by the State for the federal DOE program and the limited health and safety dollars appropriated by National Grid not covering the costs of adhering to the ASHRAE standards (in addition to the funds required to make the repairs necessary to install energy-saving measures).

Measure Installation

CAP agencies distribute work orders to contractors from the State-approved contractor list. As CAP agencies often leverage National Grid and federal dollars (allocated by the State) within the same home, only contractors on the State-approved list can install measures for the IES Program. The minimum requirements for Rhode Island WAP contractors include the following:

- Required insurance (e.g., workman's compensation, liability);
- Valid registration with the Rhode Island Building Contractors Registration Board;
- Rhode Island Lead-Safe Renovator/Remodeler license;
- BPI certification;
- Supplying all tools and equipment necessary to perform the work (e.g., blower door, high-efficiency particulate air [HEPA] vacuum);
- The ability to work with low-income and minority households in a professional manner; and
- Material standards complying with DOE 10 CFR 440.

On average, surveyed participants reported the installation process, from the first visit from the CAP agency staff to performance of work by the contractor, took just over three weeks. Both the State and CLEAResult reported their monitors could provide on-site training to subcontractors and share best practice installation protocols, as needed.

Data Tracking

During the evaluated program years, the CAP agencies tracked National Grid and DOE data using two different databases: InDemand and CAPTAIN. CAP agencies collected and submitted all National Grid-required program data through InDemand, while the State required all CAP agencies to collect and submit all federally required program data through CAPTAIN, a database with the capability to run all data reports required by DOE. CAPTAIN worked in conjunction with NEAT.

Although the CAP agencies continue to enter National Grid program data into InDemand, the State replaced CAPTAIN with Hancock in 2014. The State found Hancock much better for data reporting than CAPTAIN, leading to the decision to switch data tracking systems.

All CAP agencies reported the switch to Hancock presented one of the greatest challenges facing the 2014 IES Program. Although the State provided training for the new database, the CAP agencies did not consider the training helpful and continued to experience difficulties in understanding use of the new system. CAP agency staff, including administrative staff and auditors, reported data tracking times greatly increased, with: CAPTAIN and NEAT data collection times ranging from 15 to 40 minutes; and

Hancock collection times requiring one to two hours per project. Extended tracking times with Hancock resulted from multiple technical problems with the software and from the learning curve involved with adapting to a new system. Consequently, agency staff reported challenges with Hancock slowed production for auditors. As of this report, National Grid staff conducted meetings with CAP agency staff, in part to discuss the agencies' issues with Hancock, and indicate they will continue to monitor agency concerns in this area.

Invoicing

In addition to IES Program data, the CAP agencies submit invoices for National Grid-funded program measures through InDemand. When the State administered National Grid's funds, it permitted the CAP agencies to invoice it on a monthly basis. The CAP agencies reported a very slow payment cycle through the State, often taking eight to 12 weeks to receive reimbursement (and sometimes much longer). This caused a great deal of frustration with CAP agency staff and subcontractors. CLEAResult reported the slow payment cycle discouraged subcontractors from working with the program and affected production.

All CAP agencies agreed a quicker payment cycle provided the greatest benefit from National Grid's hiring of CLEAResult as the lead vendor. CLEAResult reported they allowed CAP agencies to invoice it as regularly as they chose. Most CAP agencies, however, reported they invoiced CLEAResult biweekly. CLEAResult also reported it typically could pay CAP agencies within 12 to 14 days after receipt of an invoice, specifying no agency had to wait more than 30 days for payment. This, in turn, allowed CAP agencies to pay their installation contractors within 30 days. All CAP agencies found the subcontractors highly satisfied with the change and much more willing to take on additional program work when reimbursed more quickly.

Quality Control

All CAP agencies must provide their weekly audit and installation schedules to the State and CLEAResult. This allows monitors to know the schedule and location of program work; so they can conduct in-progress QC inspections. CLEAResult, however, reported some agencies did not always provide this information, causing breakdowns in the QC process.

Though DOE requires the State to inspect at least 5% of all program projects, the State reported it typically inspected a higher percentage than the minimum, conducting QC on 10% of projects while in progress and another 5% after completion of installation. In addition, starting in 2013, National Grid required CLEAResult to inspect at least 10% of IES Program projects. Again, CLEAResult reported inspecting a higher percentage of projects than required (inspecting 30% to 40% of projects). CLEAResult noted its inspections varied between in-progress and post-installation jobs.

In addition to the State and CLEAResult, all CAP agencies reported their auditors conducted QC for all program projects. CAP agencies with sufficient staff reported they did not permit auditors to QC their own projects. A few agencies, however, had insufficient auditors on staff to rotate project QC.

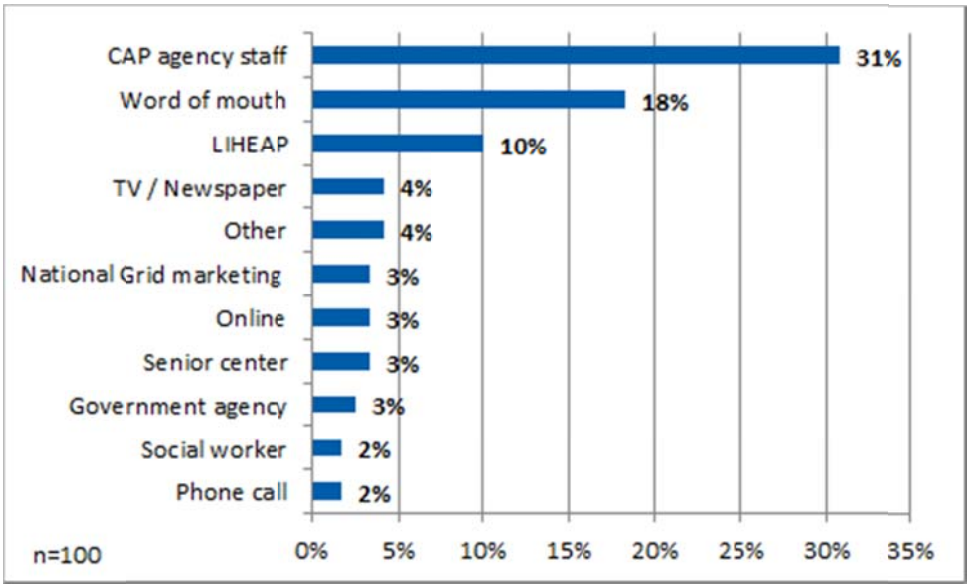
As cited in this report's Program Goals section, the added QC level resulted from CLEAResult assuming the role of lead vendor and caused some confusion among CAP agency staff and contractors due to differences in preferred auditing and installation protocols among State and CLEAResult monitors. Nonetheless, only nine of the 120 surveyed customers reported challenges during the installation process, ranging from incorrect insulation installations to discrepancies regarding measures the auditor recommended, compared to measures the monitor allowed to be installed. Seven of the nine respondents reporting challenges expressed strong satisfaction with the way CAP agency staff resolved these challenges. The two survey respondents remaining dissatisfied attributed their frustration to not receiving the measures they were told would be installed.

Marketing

LIHEAP serves as the primary marketing channel for the IES Program. In addition, the CAP agencies discuss the IES Program along with their other low-income program offerings with customers when at the CAP agency's office. Each agency develops its own marketing tactics to promote AMP and WAP services, including radio, television, program websites, direct mail, and brochures.

Figure 10 shows participant-reported sources of program awareness. Nearly one-third (31%) reported learning of the program through their local CAP agencies. Surveyed customers also commonly cited word of mouth as a source of program awareness (18%).

Figure 10. Sources of IES Program Awareness*

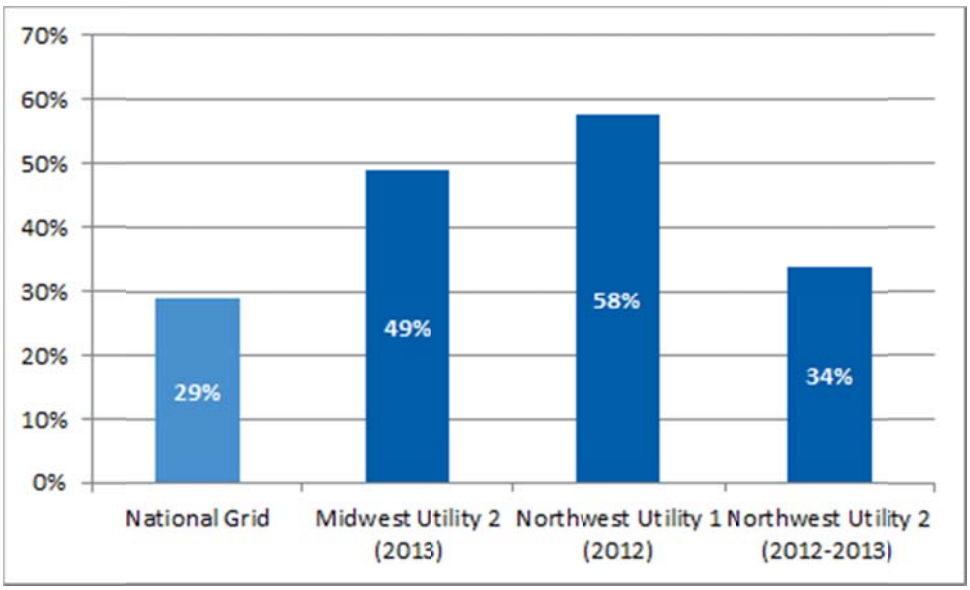


*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

Although the CAP agencies' marketing effectively attracted participants to the IES Program, surveyed customers did not display a great awareness of National Grid's involvement in the program. Only 29% of

survey respondents knew National Grid helped pay for services they received. Figure 11 compares participant awareness of utility involvement for various low-income weatherization programs. IES Program participants expressed below-average awareness of National Grid's program sponsorship compared to other, recent, low-income weatherization evaluations across the country.

Figure 11. Comparison of Utility Sponsorship Awareness



Satisfaction

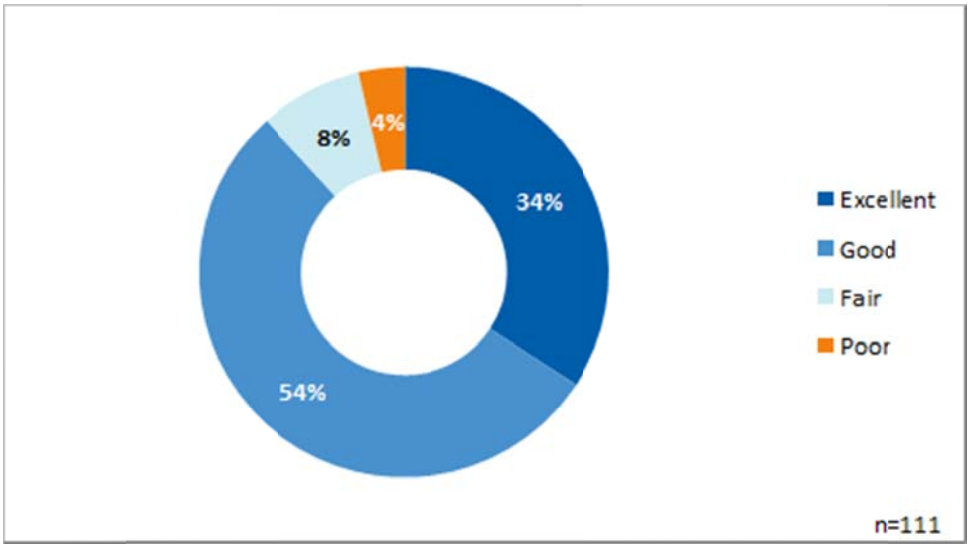
Measure Satisfaction

For each IES Program measure installed in their homes, surveyed participants rated their satisfaction on four-point scale (excellent, good, fair, or poor). The study deemed: respondents rating any measure as excellent or good as satisfied with that particular equipment; and survey respondents rating any measure as fair or poor as dissatisfied.

CFLs

As shown in Figure 12, participants reported high satisfaction levels (88%) with CFLs provided during the AMP audit.

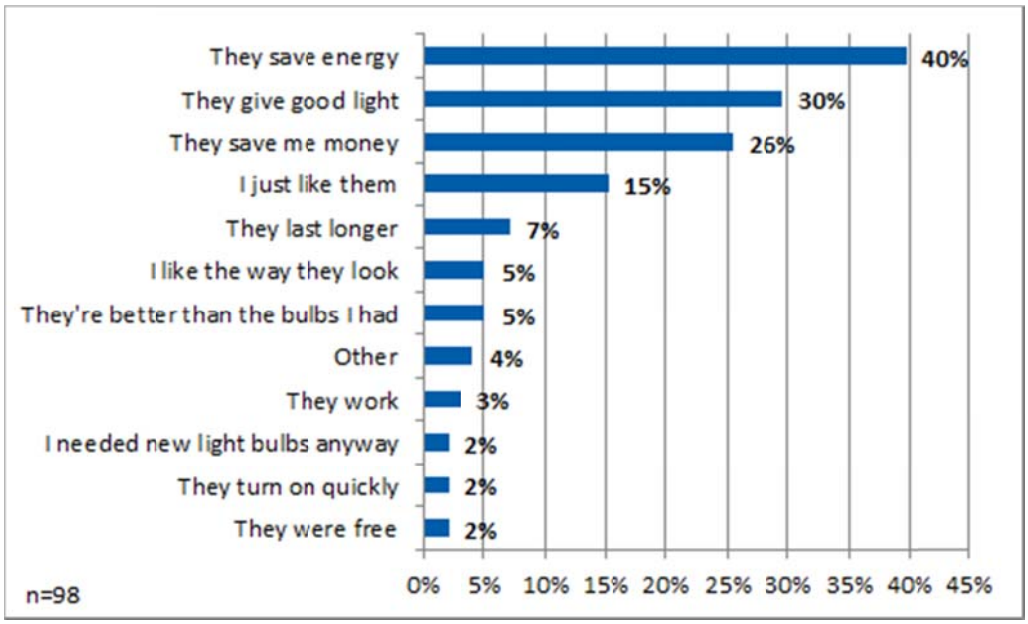
Figure 12. Participant Satisfaction with CFLs*



*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

Figure 13 shows surveyed participants' reasons for high satisfaction with CFLs. Surveyed customers most commonly (40%) reported satisfaction with the new bulbs as they saved energy.

Figure 13. Reasons for Participant Satisfaction with CFLs*



*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

Only 13 customers rated CFLs as fair or poor; just over one-half of these customers (54%) reported giving the CFLs a negative rating due to dissatisfaction with the light quality of the new bulbs. Table 13 lists the remaining reasons participants provided for rating the CFLs as fair or poor.

Table 13. Reasons for Participant Dissatisfaction with CFLs

Reason for CFL Dissatisfaction	Number of Participant Responses (n=13)*
The light is too dim/bright	7
They burn out quickly	5
They take too long to light up/ they flicker	4
I just don't like them	2
They have not saved me money on my utility bill	1
I don't like the way the bulbs look (spiral shape)	1

*Multiple responses allowed.

CFL Persistence

Overall, only 14% of surveyed customers receiving CFLs through the IES Program removed some bulbs after installation. Overall, respondents reported removing 48 IES Program CFLs, 42% of which they replaced with similar energy-saving CFL bulbs. Survey respondents reported the following reasons for removing CFLs:[14]

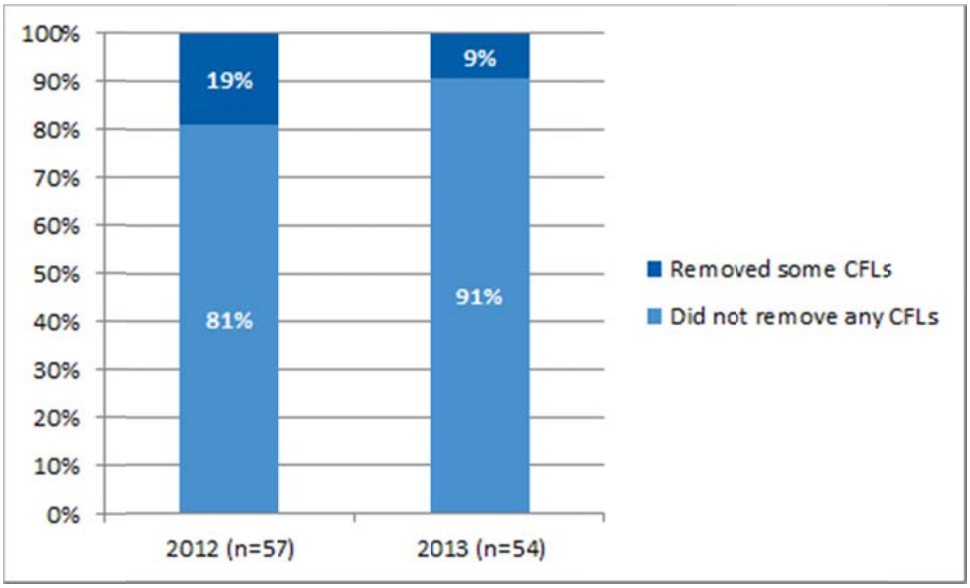
- The bulbs burned out (81%).
- The bulbs broke or stopped working (13%).
- The bulbs were too bright (6%).
- The bulb was not needed in the fixture in which it was initially installed (6%).

In addition, CFL persistence improved during the evaluated period: the percent of customers who reported removing the CFLs in 2012 (compared to 2013) decreased from 19% to 9%, respectively.[15]

[14] Multiple responses allowed.

[15] P-value=0.07; this difference is statistically significant (α=0.1).

Figure 14. CFL Persistence by Year*



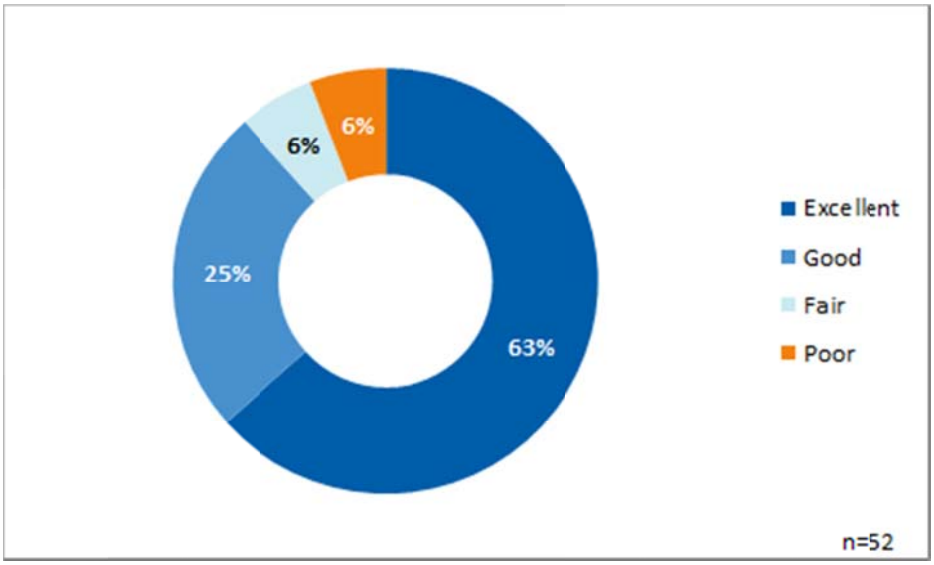
*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

More than one-half (54%) of survey respondents receiving CFLs reported the AMP auditor left them with extra CFLs in case they needed replacements. Only one customer reported giving the extra bulbs away; the remainder stored them in their home (82%) or installed them in available light fixtures (15%).

Refrigerators

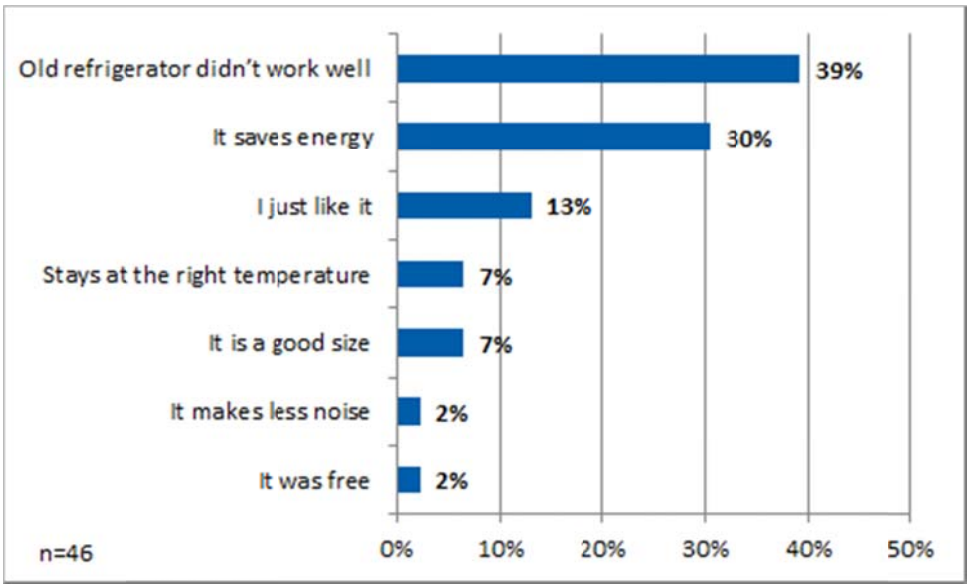
The great majority of customers (88%) receiving a refrigerator replacement through the IES Program expressed satisfaction with the new equipment, as shown in Figure 15.

Figure 15. Participant Satisfaction with Refrigerator Replacement



Participants most frequently cited the following reasons for awarding the new refrigerator a positive rating: their old refrigerator did not work well (39%); and the new refrigerator saved energy (30%). Figure 16 lists all reasons for customers' satisfaction with the refrigerator replacement.

Figure 16. Reasons for Participant Satisfaction with Refrigerator Replacement



Only six surveyed participants reported their new refrigerator as fair or poor. They reported the following reasons for dissatisfaction with the measure:

- Three respondents found the new refrigerator very noisy.
- One respondent reported the new refrigerator was not as big as the older model.
- One respondent said the new refrigerator did not keep their food at the preferred temperature.
- One respondent stated the new refrigerator stopped working.

Heating Systems

Ten surveyed customers reported receiving a heating system repair or replacement through the IES Program; two of these customers reported not having a working heating system for up to four years. Nine of the 10 surveyed HVAC system recipients rated the new system as excellent or good. Table 14 lists surveyed participants' reasons for their satisfaction with the new heating system.

Table 14. Reasons for Participant Satisfaction with Heating System Repair or Replacement

Reason for Heating System Satisfaction	Number of Participant Responses (n=9)*
It saves energy	4
I just like it	4
It lowers the utility bill	3
It keeps the house at a more comfortable temperature	2
I needed a new heating system anyway	1

*Multiple responses allowed.

The one participant rating the new system as poor did not report a noticeable change in their comfort or energy bills.

Insulation and Air Sealing

All but one of 19 customers receiving insulation through the IES Program rated it as excellent or good. As shown in Table 15, most customers who rated the insulation positively attributed their satisfaction to an increase in their home's comfort. In addition, 13 of the 19 customers receiving air sealing reported their home feels less drafty since completion of the upgrade.

Table 15. Reasons for Participant Satisfaction with Insulation

Reason for Insulation Satisfaction	Number of Participant Responses (n=16)*
The house is more comfortable (i.e., warmer/cooler)	13
It saves energy	1
It lowers the utility bill	1
The contractor did a nice job	1

*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

The one respondent rating the insulation as poor said the contractor who installed the insulation left a mess in their home.

Program Satisfaction

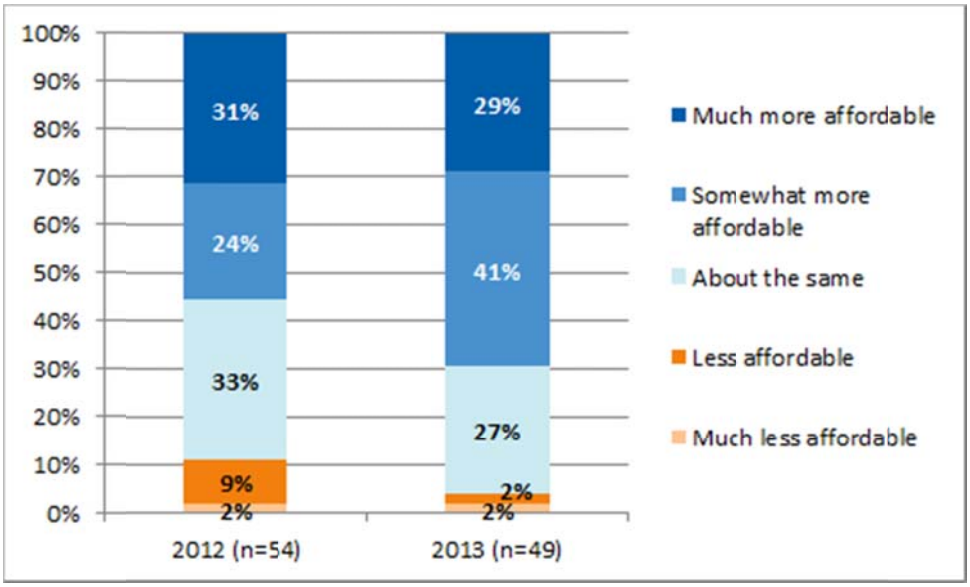
National Grid expressed high satisfaction levels with the program implementation since CLEAResult assumed the role of lead vendor. CLEAResult, National Grid, and the State all expressed high satisfaction levels with current communications among program stakeholders and agreed that benefit resulted from the collaborative program implementation that began in 2013.

The majority (five of seven) of the CAP agencies expressed high satisfaction levels with the program administration change. In 2013, CLEAResult and the State launched WTC meetings for the CAP agencies. CLEAResult, the State, and one auditor from each CAP agency attend the meetings. The meetings serve to allow participants to share technical best practices, discuss program changes and challenges, and offer an additional communication line among all involved parties. CAP agencies reported satisfaction with the current level of program communication among stakeholders.

Nearly all surveyed participants (96%) characterized the CAP agency staff coming to their homes as courteous and respectful, and a majority (61%) said their home has been more comfortable since completion of program work.

More than one-half of surveyed customers (62%) reported their utility bills have been more affordable since they received program services. As shown in Figure 17, the percent of survey respondents who reported their utility bills less affordable since work completion decreased from 9% in 2012 to 2% in 2013.[16] In contrast, the percent of customers reporting their utility bills as somewhat more affordable increased from 24% to 41%.[17]

Figure 17. Utility Bill Affordability as a Result of the Program by Year*



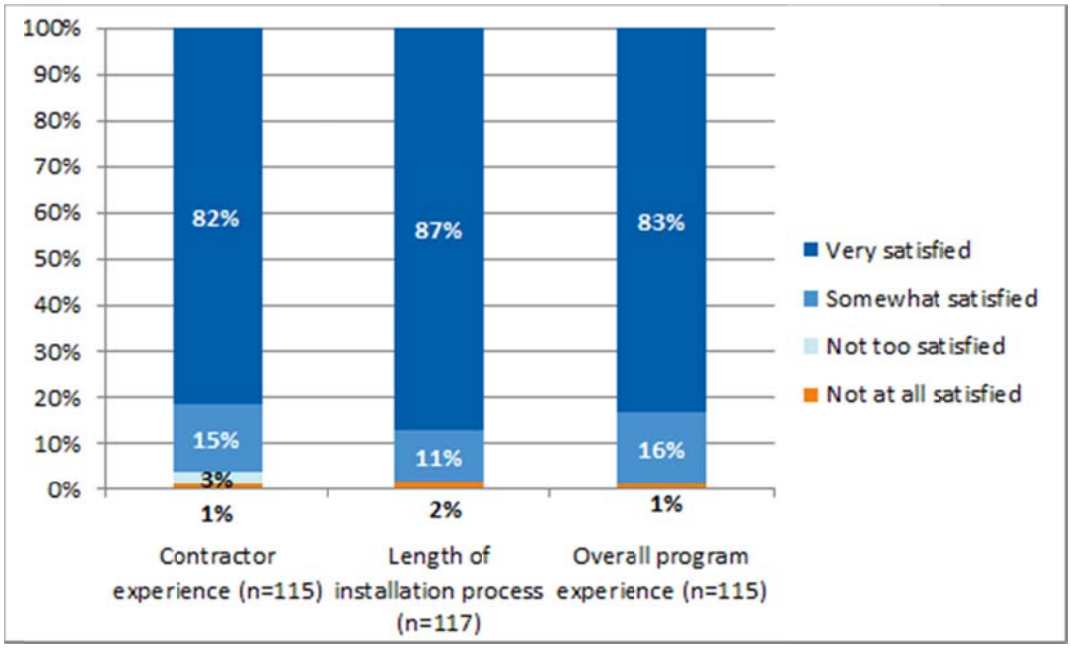
*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

Figure 18 illustrates surveyed participants' satisfaction with: contractors performing work in their homes; the time required to complete the installation process; and their overall program experience. More than 95% of participants reported satisfaction in all three categories. The one participant who reported being not at all satisfied with their overall program experience said they did not receive all of the services they were told they would receive.

[16] P-value=0.08; this difference is statistically significant (α=0.1).

[17] P-value=0.04; this difference is statistically significant (α=0.1).

Figure 18. Participant Satisfaction with IES Program Components*

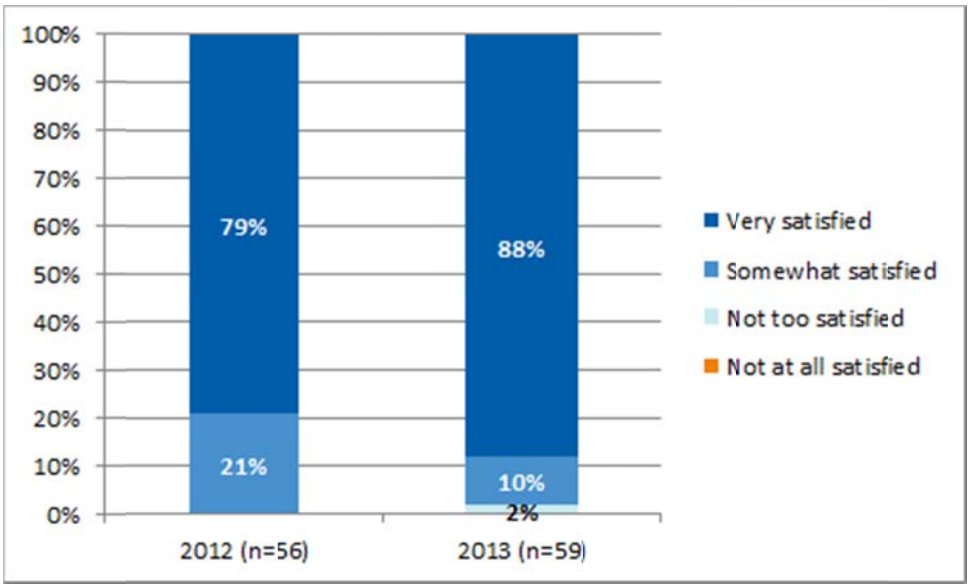


*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

Overall, the percentage of surveyed customers reporting great satisfaction with their overall program experience increased from 79% in 2012 to 88% in 2013, as shown in Figure 19.[18]

[18] P-value=0.08; this difference is statistically significant (α=0.1).

Figure 19. Overall Program Satisfaction by Year*



*Those respondents that refused to answer, or said they did not recall the answer, are excluded from the total reported respondents.

Suggested Program Improvements

Nearly one-quarter of survey respondents (24%) provided suggestions for how the IES Program could be improved. As shown in Table 16, most customers suggested the program expand the number of measures installed within each home. Specifically, these comments suggested that program restrictions kept certain measures from being replaced in their homes (e.g., windows, doors, water heaters, boilers).

Table 16. Participant Suggested Program Improvements

Suggested Program Improvement	Number of Participant Responses (n=29)
Expand the measure offering within each home	13
Increase quality of subcontractors	5
Decrease wait time for services (i.e., program queue)	4
Increase quality of replacement equipment	3
Increase IES Program awareness among customers	3
Better explain project recommendations to customer	1

Program Theory

Cadmus developed a logic model that specifies the current IES program theory (with CLEAResult acting as the program's lead vendor), based on information gathered through the stakeholder interviews and the materials review. The logic model presented in Figure 20 illustrates linkages between program inputs, activities, results, and outcomes. The logic model can serve as useful tool for program managers, stakeholders, and others to understand the relationships between program elements and the intended near-term and long-term outcomes.

Figure 20. IES Program Logic Model

Situation: Significant energy savings potential within income eligible population in Rhode Island. Limited income customers unlikely to participate in traditional energy efficiency programs due to cost barriers, lack of energy-efficiency knowledge, and split incentives. Limited federal funding to leverage weatherization services.

Strategy: Provide no-cost energy-efficiency programs and services to income eligible, residential customers living in single-family homes (1-4 units).

Inputs: Policy, planning, design, energy savings goals, utility and federal funding, experienced program staff, local CAP agencies, subcontractors, market knowledge, technology, participants

Stakeholders	National Grid	Lead Vendor (CLEAResult)	State-level Administrator (DHS)	CAP Agencies	
Activities	**Program Sponsor** • Contribute funds to AMP and WAP programs	**Program Administrator** • Administer utility funds • Oversee program delivery • Training support • Data tracking and reporting • QA/QC • Payment to agencies	**Program Administrator** • Administer federal funds • Training • QA/QC • Payment to agencies	**Customer Intake** • Marketing and outreach • Verify customer eligibility	**AMP Program Delivery** • AMP audit • Direct install small measures • Energy education • Appliance replacement • Data tracking and reporting • Payment to subcontractors **WAP Program Delivery** • WAP audit • Health and safety checks • Measure installation (subcontracted) • Data tracking and reporting • Payment to subcontractors
Results	Increase in number and scope of measures	• Standard, comprehensive installation, measurement, and reporting protocols • Decreased payment cycle (CLEAResult)		Customers enroll in program	Energy saving and health and safety opportunities identified
Near-Term Outcomes (1 yr.)	• Increase in customers served • Increased measure installations • Deeper energy savings per household served	• High quality program delivery • Increased CAP agency satisfaction • Program sustainability		Increased program awareness in target market	• Increased energy-efficiency awareness • Energy-efficiency behavior change • Intermediate energy savings • High customer satisfaction
Long-Term Outcomes (2-5 yrs.)	• Persistent energy savings • Help income eligible customers manage their energy bills (i.e., arrearage reduction)	• Annual energy savings and spending goals met • Greater cost-effectiveness • Long-term program sustainability		• Increased program penetration • Increased efficiency of income eligible homes	• Non-energy benefits (i.e., reduced greenhouse gas emissions) • Health and safety • Economic stability • Long-term high customer satisfaction

Acronym Key: CAP= Community Action Program; DHS= Department of Human Services; AMP= Appliance Management Program; WAP= Weatherization Assistance Program; QA/QC= quality assurance and quality control

Cadmus also developed KPIs to measure outcomes presented in the logic model above, and measured 2013 IES Program performance against the KPIs listed in Table 17.

Table 17. IES Program KPIs and 2013 Program Performance

Key Performance Indicator	2013 Performance	
Number of participating homes (by account)	Electric: 2,646	Natural gas: 398
Measure persistence	CFLs: 86% Faucet aerators: 100% Showerheads: 100%	
Payment cycle time	CLEAResult: 2–4 weeks State: 8–12 weeks	
Number of projects with QA/QC issues (i.e., go-backs)	Track for future program years.	
Number of annual training opportunities	Track for future program years.	
Number of customers signing up for program services	Track for future program years.	
Percent of customers adopting energy-saving behaviors	59%	
Customer reported non-energy benefits	61% of customers reported their home has been more comfortable since the work was completed. 62% of customers said their utility bills have been more affordable since they received program services.	
Customer measure satisfaction	CFLs: 88% Faucet aerators: 67% (2 of 3) Showerheads: 100% (3 of 3) Refrigerators: 88% Heating Systems: 90% Insulation: 95%	
Customer program satisfaction	99% of customers satisfied with overall program experience	
CAP agency satisfaction	Five of seven CAP agencies are satisfied with the program administration change. All seven CAP agencies are satisfied with the improved payment turnaround time.	
Achievement of program spending goals	Electric: 80%	Natural gas: 76%
Achievement of program participation goals	Electric: 106%	Natural gas: 100%
Achievement of program savings goals	Electric: 90%	Natural gas: 92%
Program cost-effectiveness (total-resource cost test results)	Electric: 1.63	Natural Gas: 1.04