Evaluation of PY5 Energy Efficiency Programs Portfolio

Submitted to:

Entergy New Orleans

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Submitted by:

ADM Associates, Inc.
3239 Ramos Circle
Sacramento, CA 95827
916.363.8383

Prepared by:

Adam Thomas
Jeremy Offenstein, Ph.D.
Zephaniah Davis
Daniel Chapman, P.E.
Jordan Christenson
Chris Johnson

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1. Executive Summary

This report is to provide a summary of the evaluation effort of the 2015-2016 ("Program Year 5" or "PY5") Energy Efficiency (EE) portfolio by Energy New Orleans (ENO) and Entergy Louisiana LLC-Algiers (ELL Algiers). This evaluation was led by ADM Associates Inc. (herein known as "ADM", or "the Evaluators"). This report provides verified gross and net savings estimates for the evaluated programs.

1.1 Summary of ENO Energy Efficiency Programs

In PY5, the ENO EE portfolio contained the following programs:

- Home Performance with Energy Star (HPwES);
- Assisted Home Performance with Energy Star (aHPwES);
- Residential Heating & Cooling;
- Energy Smart Lighting and Appliances Program (CP);
- Energy Smart School Kits and Education (SK&E);
- Small Business Solutions (SBS) and
- Large Commercial and Industrial Solutions (Large C&I).

Programs are administered by CLEAResult Consulting Inc. (CLEAResult) with support from Green Light New Orleans and the Energy Wise Alliance.

1.2 Evaluation Objectives

The goals of the PY5 EM&V effort were as follows:

- For prescriptive measures, verify that savings are being calculated according to the appropriate protocols.
- For custom measures, this effort comprises the calculation of savings according to accepted protocols (e.g., IPMVP, etc.). These protocols ensure that custom measures are cost-effective and provide reliable savings.
- Conduct process evaluation of all ENO programs and of the portfolio overall. The process evaluations reviewed program operations, marketing and outreach, quality control procedures, and program successes relative to goals. From this, the Evaluators provided program and portfolio-level recommendations for ENO. Process evaluation activities included interviews of key program actors, surveys of participants and the documentation of program activities, successes, and shortcomings.

1.3 Summary of Data Collection

The data collected as part of this EM&V effort is detailed in Table 1-1. The Evaluators collected on-site data for HPwES, SBS, and the Large C&I Programs. Interviews with program staff were in many instances applicable to multiple programs. The entries included in the table below for "Program Staff Interviews" reflect unique interviews completed.

Table 1-1 Summary of Data Collected

Program	*Site Visits*	*Participant Surveys*	*Trade Ally Interviews*	*Program Staff Interviews*
HPwES	89	55	6	2
aHPwES	0	30	0	0
Green Light New Orleans	0	95	0	1
Consumer Products	0	30	0	1
Residential Heating & Cooling	0	65	6	1
Energy Smart School Kits and Education	0	57	14	1
Small Business Solutions	26	31	3	0
Large C&I	15	12	0	0
Total	130	375	29	6

1.4 Impact Findings

1.4.1 Verified Savings

Table 1-2 and Table 1-3 present verified impacts by program for ENO and ELL-Algiers, respectively. The values in these tables are comparisons of the savings listed by ENO and their program implementation staff ("Expected Savings") and those verified by the Evaluators ("Verified Savings").

Table 1-2 Gross Impact Summary – New Orleans

Program	Annual Energy Savings (kWh)		Realization Rate	Peak kW		Realization Rate
	Expected	Verified		Expected	Verified	
HPwES	3,445,469	4,215,468	122.3%	780.81	934.71	119.7%
aHPwES	517,513	592,562	114.5%	112.15	96.34	85.9%
Green Light New Orleans	1,055,373	1,043,383	98.9%	229.63	322.16	140.3%
Consumer Products	1,297,567	1,706,776	131.5%	301.16	302.74	100.5%
Residential Heating & Cooling	871,859	442,949	50.8%	334.55	146.15	43.7%
Energy Smart School Kits and Education	518,250	453,682	87.5%	70.97	52.07	73.4%
Small Business Solutions	3,833,271	3,272,579	85.4%	546.49	461.08	84.4%
Large C&I	9,626,756	8,867,025	92.1%	1973.63	1436.31	72.8%
Total	21,166,058	20,594,424	97.3%	4,349.39	3,751.56	86.3%

Table 1-3 Gross Impact Summary - Algiers

Program	Annual Energy Savings (kWh)		Realization Rate	Peak kW		Realization Rate
	Expected	Verified		Expected	Verified	
HPwES	393,984	529,374	134.4%	94.85	123.5	130.2%
aHPwES	113,577	128,322	113.0%	24.31	20.86	85.8%
Green Light New Orleans	360,832	291,163	80.7%	112.26	95.14	84.7%
Consumer Products	99,686	136,772	137.2%	22.12	22.66	102.4%
Residential Heating & Cooling	75,030	32,805	43.7%	25.87	9.85	38.1%
Energy Smart School Kits and Education	67,813	59,364	87.5%	8.37	6.81	81.4%
Small Business Solutions	178,159	148,444	83.3%	34.17	28.6	83.7%
Large C&I	181,099	136,864	75.6%	7.6	5.74	75.5%
Total	1,470,180	1,463,108	99.5%	329.55	313.16	95.0%

In addition, the Evaluators estimated program net-to-gross ratios (NTGRs) through evaluation of free-ridership and spillover effects. The contribution to portfolio savings by program is summarized in Table 1-4 through **Error! Reference source not found.**. NTGRs were estimated at the measure-level in aggregate for both ENO and ELL Algiers programs. However, program-level NTGRs may differ due to variances in contribution to program savings by measure rebated through each program.

Table 1-4 Net kWh and kW Impacts – New Orleans

Program	Verified Gross kWh	Verified Gross kW	NTGR	Verified Net kWh	Verified Net kW
HPwES	4,215,468	934.71	89.46%	3,771,339	798.82
aHPwES	1,043,383	96.34	100.00%	1,043,383	83.82
Green Light New Orleans	592,562	322.16	87.00%	515,529	322.16
Consumer Products	1,706,776	302.74	67.33%	1,149,201	199.58
Residential Heating & Cooling	442,949	146.15	80.89%	358,291	117.22
Energy Smart School Kits and Education	453,682	52.07	80.52%	365,288	41.93
Small Business Solutions	3,272,579	461.08	97.48%	3,189,966	461.08
Large C&I	8,867,025	1436.31	97.47%	8,642,831	1,402.92
Total	20,594,424	3,751.56	92.43%	19,035,828	3,427.53

Table 1-5 Summary of Goal Attainment – New Orleans

Program	Verified Net kWh	kWh Goal	% kWh Goal Attained	Verified Net kW	kW Goal	% kW Goal Attained
HPwES	3,771,339	732,674	514.74%	798.82	260	307.24%
aHPwES	515,529	624,202	82.59%	83.82	94	89.17%
Green Light New Orleans	1,043,383	518,876	201.09%	322.16	201	160.28%
Consumer Products	1,149,201	942,765	121.90%	199.58	290	68.82%
Residential Heating & Cooling	358,291	1,458,077	24.57%	117.22	573	20.46%
Energy Smart School Kits	365,288	926,946	39.41%	41.93	119	35.24%
Small Business Solutions	3,189,966	3,692,306	86.39%	461.08	950	48.53%
Large C&I	8,642,831	7,561,766	114.30%	1,402.92	1265	110.90%
Total	19,035,828	16,457,612	115.67%	3,427.53	3,752	91.35%

Table 1-6 Net kWh and kW Impacts – Algiers

Program	Verified Gross kWh	Verified Gross kW	NTGR	Verified Net kWh	Verified Net kW
HPwES	529,374	123.5	87.93%	465,490	105.72
aHPwES	291,163	95.14	100.00%	291,163	112.26
Green Light New Orleans	128,322	20.86	87.00%	111,640	18.15
Consumer Products	136,772	22.66	67.58%	92,433	15.25
Residential Heating & Cooling	32,805	9.85	83.16%	27,280	8.10
Energy Smart School Kits	59,364	6.81	80.01%	47,498	5.49
Small Business Solutions	148,444	28.6	97.48%	144,696	28.6
Large C&I	136,864	5.74	97.47%	133,404	5.61
Total	1,463,108	313.16	89.78%	1,313,604	299.18

Table 1-7 Summary of Goal Attainment – Algiers

Program	Verified Net kWh	kWh Goal	% kWh Goal Attained	Verified Net kW	kW Goal	% kW Goal Attained
HPwES	465,490	59,989	775.96%	105.72	21	503.43%
aHPwES	111,640	n/a	n/a	18.15	n/a	n/a
Green Light New Orleans	291,163	45,946	633.71%	112.26	18	623.67%
Consumer Products	92,433	75,368	122.64%	15.25	23	66.30%
Residential Heating & Cooling	27,280	131,133	20.80%	8.1	52	15.58%
Energy Smart School Kits	47,498	84,150	56.44%	5.49	53	10.36%
Small Business Solutions	144,696	339,555	42.61%	28.6	87	32.87%
Large C&I	133,404	644,830	20.69%	5.61	108	5.19%
Total	1,313,604	1,380,971	95.12%	299.18	362	82.65%

The portfolio overall met 115.67% of the kWh goal for New Orleans and 95.12% of the kWh goal for Algiers. These values represent savings net-of-free-ridership, compared to the filed goals that had presumed gross savings without accounting for free-ridership. Given this, the programs' performance in PY5 exceeded expectations.

The Energy Smart programs did not meet separate savings goals established for Algiers. In particular, the Energy Smart programs for business customers significantly underperformed, while residential programs over-performed compared to filed goals.

1.4.2 Summary of Program Adjustments

The Evaluators made several types of adjustments to program savings. They include:

- **M&V Adjustment:** these adjustments describe instances where the Evaluators revised savings based upon primary data collection of equipment use or analysis of billing data in determining a revised savings estimate. Examples include end-use metering in the Large C&I Program and billing analysis of AC tune-ups in the Residential Heating and Cooling Program.
- **Verification Adjustment:** these adjustments include changes made based upon field data collection findings, but does not include a change to deemed savings. Examples include differences in fixture counts identified during inspection of a commercial lighting retrofit and differences in leakage values measured as part of the Home Performance with ENERGY STAR evaluation.
- **Baseline Correction:** this includes revisions to savings due to correction of the measure baseline. This occurred with residential HVAC systems which had used an early retirement baseline (based upon preexisting equipment) whereas the Evaluators updated this to reflect current minimum code (based upon replacement-on-burnout criteria).
- **Calculation Error Correction:** this category includes miscellaneous calculation errors. The most notable of these was found in ceiling insulation calculations in the Home Performance with ENERGY STAR® Program, where the Evaluators found that program savings were markedly understated.
- **Free-ridership:** the Evaluators adjusted savings for all programs other than Assisted Home Performance with ENERGY STAR based on free-ridership estimates developed through participant surveying.

Figure 1-1 kWh Savings Adjustments – New Orleans

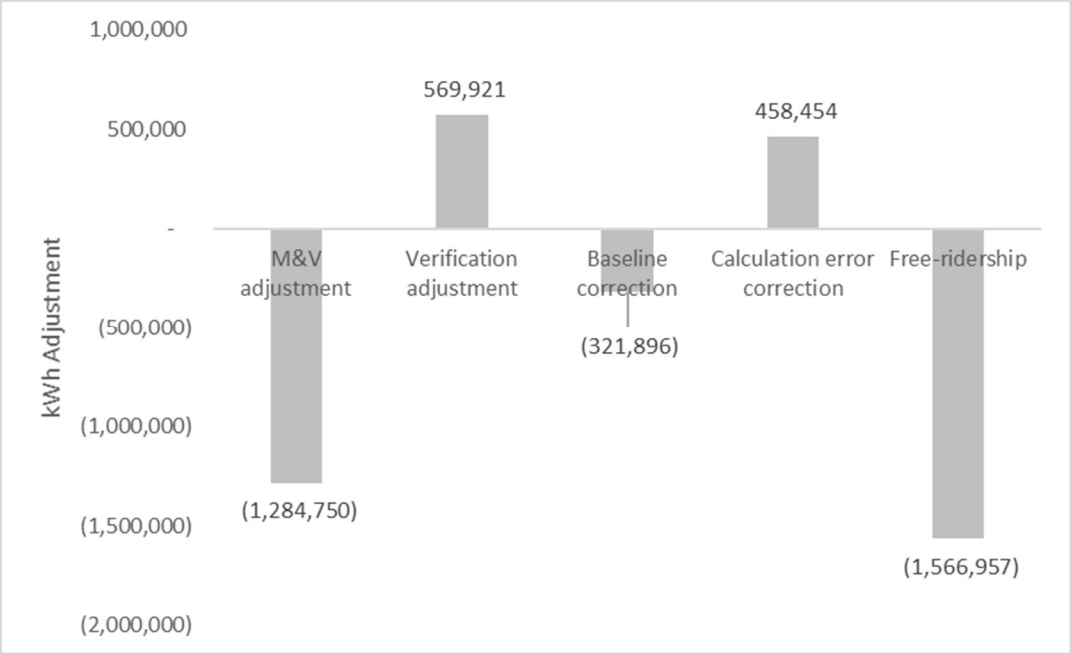
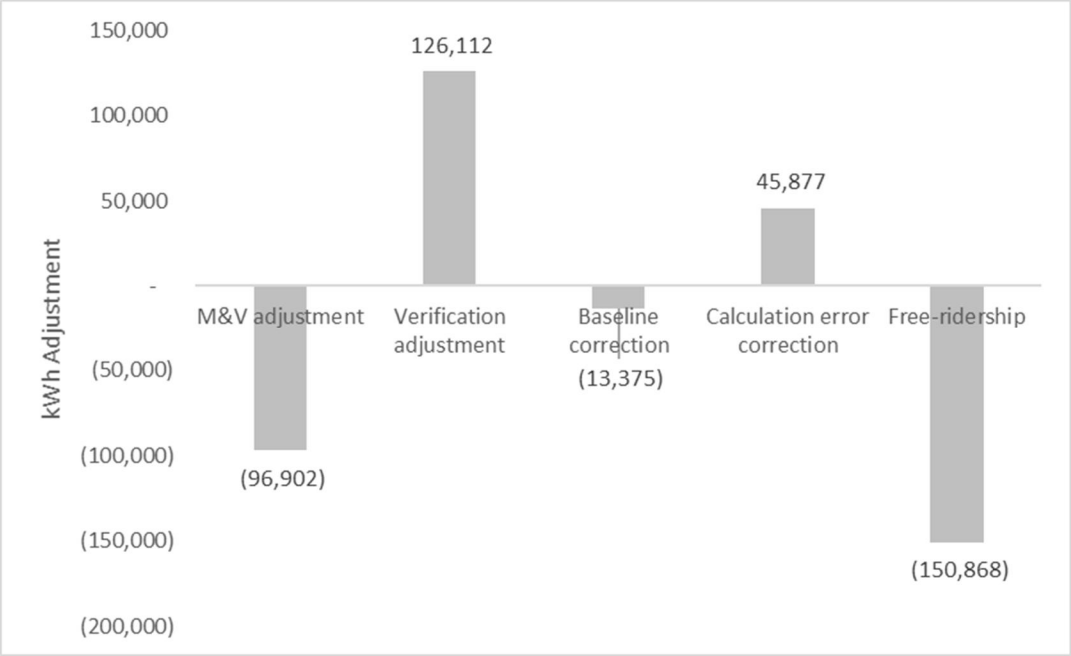


Figure 1-2 kWh Savings Adjustments - Algiers



1.4.3 Cost-Benefit Results

Table 1-8 and

Table 1-9 present cost-benefit summary results. The portfolios overall passed TRC and UCT screening. Most programs passed. The notable exceptions include:

- **ENO/ELL Algiers Energy Smart School Kits:** This program failed cost-effectiveness testing for both ENO and ELL Algiers. The program met participant and savings goals but has exceedingly high acquisition costs. The Evaluators tested to see if the program would pass TRC if the full claimed savings were granted (i.e., no M&V or free-ridership adjustments) and at that savings level the program still failed TRC testing with a score of .76 for ENO.
- **ELL Algiers Large C&I:** This program only had one participant. Based on the performance of the ENO Large C&I Program, the Evaluators find it likely that the ELL Algiers program would pass TRC if program participation goals were met.

Table 1-8 Cost-Effectiveness by Program – New Orleans

Program	*Verified Peak Demand Reduction (kW)*	*Verified Annual Energy Savings (kWh)*	*Total Program Expenditures*	*TRC (b/c ratio)*	*UCT (b/c ratio)*
HPwES	798.82	3,771,339	$511,180	3.18	3.86
aHPwES	83.82	515,529			
Green Light New Orleans	322.16	1,043,383	$421,506	1.62	1.51
Consumer Products	199.58	1,149,201	$684,763	1.53	1.55
Residential Heating & Cooling	117.22	358,291	$451,411	1.57	1.22
Energy Smart School Kits	41.93	365,288	$368,943	0.61	0.37
Small Business Solutions	461.08	3,189,966	$942,064	1.44	1.72
Large C&I	1,402.92	8,642,831	$1,774,136	2.05	2.66
Total	3,427.53	19,035,828	$5,154,003	1.95	2.21

Table 1-9 Cost-Effectiveness by Program - Algiers

Program	Verified Peak Demand Reduction (kW)	Verified Annual Energy Savings (kWh)	Total Program Expenditures	TRC (b/c ratio)	UCT (b/c ratio)
HPwES	105.72	465,490	$43,870	3.56	4.53
aHPwES	112.26	111,640			
Green Light New Orleans	18.15	291,163	$34,912	1.65	1.49
Consumer Products	15.25	92,433	$58,564	1.91	1.57
Residential Heating & Cooling	8.10	27,280	$85,963	1.05	1.17
Energy Smart School Kits	5.49	47,498	$32,751	0.38	0.23
Small Business Solutions	28.6	144,696	$85,461	1.02	1.13
Large C&I	5.61	133,404	$153,103	0.54	0.61
Total	299.18	1,313,604	$494,624	1.59	1.62

1.5 Process Findings

1.5.1 Portfolio Findings

1.5.1.1 Performance Benchmarking

Table 1-10 below summarizes the performance of the Companies' residential and non-residential portfolios in relation to programs operated by four other utilities programs. The results displayed below should be interpreted with caution. It is difficult to make direct comparisons across programs because of differences in markets served, histories of the portfolios, policy environments, and level of funding available. Additionally, these metrics do not comprehensively reflect all dimensions of portfolio performance. For example, the evaluator intended to also provide information on the share of program savings resulting from different measure types and the average savings achieved per participant but was precluded from doing so because of limitations in the available data.

Some key aspects of the comparison programs that may affect differences in the metrics displayed are listed below.

- SWEPCO AR: the metrics displayed are for the 2014 program year which was the seventh year programs were offered.
- Oklahoma Gas & Electric (OG&E): the metrics displayed are for the 2014 program year which was the sixth year programs were offered.
- SWEPCO LA and Entergy LA: the programs offered are highly similar to the Energy Smart programs but do not include the CFL direct install component. The metrics displayed are for the first year programs were offered in these regions.

Table 1-10 Program Performance Comparison

Performance Indicators	***ELL Algiers and ENO***	***SWEPCO AR***	***OG&E***	***SWEPCO LA***	***Entergy LA***
Residential					
Market Penetration					
Energy savings reduction as percent of total sales	0.39%	0.18%	0.54%	0.10%	0.09%
Financial Performance					
% of program expenditures used for incentives and inducements	47%	59%	47%	48%	52%
Incentive and inducement dollars per kWh saved	$0.33	$0.15	$0.40	$0.10	$0.10
Non-Residential					
Market Penetration					
Energy savings reduction as percent of total sales	0.35%	0.05%	0.25%	0.12%	0.04%
Financial Performance					
% of program expenditures used for incentives and inducements	49.7%	59%	47%	48%	52%
Incentive and inducement dollars per kWh saved	$0.24	$0.15	$0.40	$0.10	$0.10
Portfolio TRC	1.95	2.33	1.69	1.98	1.71

Sources:
Oklahoma Gas and Electric Company (2015). 2014 Oklahoma Demand Programs Annual Report.
Southwestern Electric Power Company (2015). Arkansas Energy Efficiency Program Portfolio Annual Report.
ADM Associates (2016). Evaluation of PY1 Energy Efficiency Programs Portfolio. Submitted to Southwestern Electric Power Company.
ADM Associates (2016). Evaluation of PY1 Energy Efficiency Programs Portfolio. Submitted to Entergy Louisiana, LLC.
Energy sales data retrieved from U.S Energy Information Administration website.

1.5.1.2 Program Staffing

The Evaluators found that the programs were well-staffed and the Companies and CLEAResult collaborated effectively in administering the PY5 programs. CLEAResult

uses 12 full time staff to support the programs although these staff also support other programs operating in Louisiana. This staffing includes engineers, field associates, four program coordinators, and marketing and communications support. Oversight is provided by the program senior manager who oversees all of the Companies' programs.

CLEAResult is responsible for the primary program implementation tasks, namely:

- Perform onsite pre and post inspections and other quality control and quality assurance activities;
- Customer and trade ally education and outreach;
- Process qualifying incentives;
- Review and approval of proposed projects; and
- Oversight and training of program trade allies.

The Companies are responsible for authorization and issuing payments to CLEAResult for reimbursement of incentives paid and general oversight of CLEAResult. The Companies also provide quality control related to program communications including review and approval of the program website.

1.5.1.3 Program Communications

CLEAResult holds brief daily meetings with staff supporting all of the residential and non-residential Energy Smart Programs. During these meetings, staff members discuss daily plans and any current issues faced. Additionally, biweekly staff meetings are held during which the program's status is reviewed.

CLEAResult's and the Companies program manager meet twice a month. One of these meetings is focused on the Companies' programs while the other includes these programs as well as programs operated by Entergy in other Louisiana regions. The primary objectives of the meeting are to review program status and to discuss any recommendations CLEAResult may have. During this meeting, a program status report generated by CLEAResult is reviewed.

The Companies and CLEAResult staffs report that communications and coordination between the utility and the implementer have been effective.

1.5.1.1 Program Tracking Data

The Evaluators reviewed the tracking data supplied by CLEAResult for the Energy Smart Programs[1]. Overall, there were not any significant issues identified in terms of

[1] Data for programs administered by implementation subcontractors was provided to the Evaluators via CLEAResult.

missing data or illogical values. However, the process of procuring data and the completeness of the data provided did present challenges to completion of the evaluation effort. The types of issues encountered are summarized below:

- **Multiple data deliveries contained inaccurate records of program activity.** Files included projects completed outside of the program year, or reported total savings that did not match program summaries of program data.
- **Multiple requests were required to get all required fields.** The Evaluators made multiple requests to get all required fields in the included data including project or measure specific information and customer or contractor contact information. The database system used by the program appears to contribute to challenges of providing a data report with all required fields. Staff indicated that that some fields could not be combined into a single report (e.g., customer, contractor, and project specific information for commercial and industrial projects.
- **HPwES measure data included bulk records combining multiple individual measures or project locations.** These fields accounted for approximately one-third of program savings and did not contain measure or location specific information.
- **Missing common identifiers in Large Commercial & Industrial Solutions Program.** The Evaluators received exports of measure and project level information, however these two sets of records did not contain a common identifier to link data provided in the project fields to the measure fields.

The Evaluators recommend the following steps:

- **Develop project tracking protocols so that all measure information is captured for each entry that records kWh or kW impacts.** Staff reported that they are modifying the database to capture this information.
- **Explore internal resources within CLEAResult to develop consistent reports of program evaluation activity to support the program evaluation effort.** Staff may be able to identify resources to set up report exports that are consistent and easily rerun as needed. The development of these tools and procedures should reduce program and evaluation staff time and generally improve the efficiency of the program.

Additionally, the Evaluators recommend that the following fields be added to the report for non-residential programs:

- **Building type:** Identification of building type is important for assessing program success with various submarkets and comparing the representativeness of survey respondents to program tracking data.

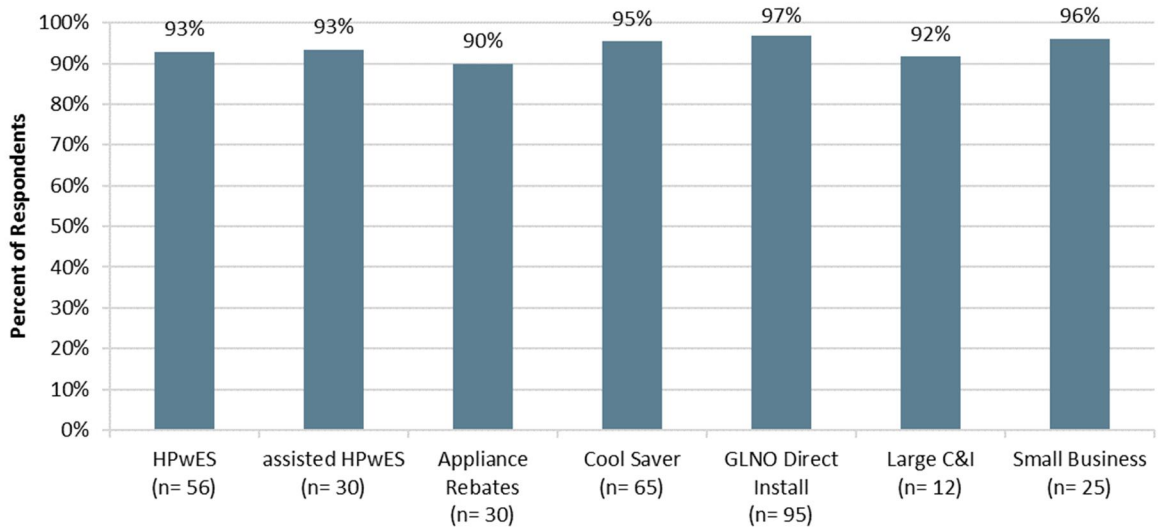
The Evaluators recommend that the following fields be added to the residential program data report:

- **Single or multifamily building:** Adding this field would allow for easier identification of which Cool Saver projects were single or multifamily.

1.5.1.2 Summary of Customer Satisfaction

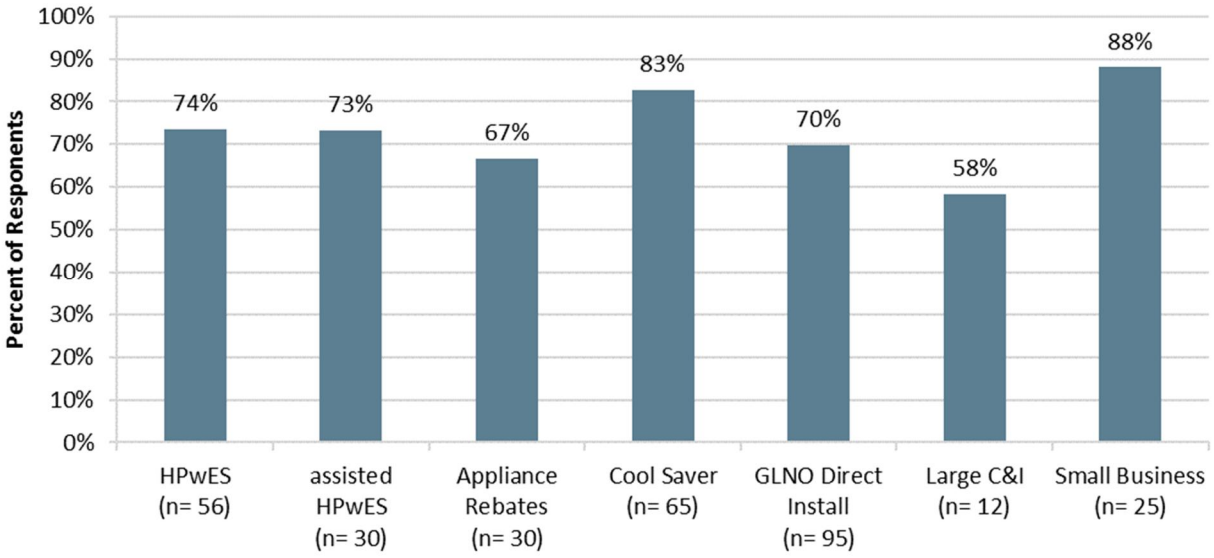
Overall satisfaction with the Energy Smart Programs was quite high. As shown in Figure 1-3, 90% or more of participants were satisfied with their experience with the Energy Smart Programs.

Figure 1-3 Percent of Participants Satisfied with the Program



For each of the Energy Smart programs, a majority of participants reported that their participation increased their satisfaction with the Energy Smart Programs.

Figure 1-4 Percent of Participants for whom Participation Increased their Satisfaction with the Companies



1.5.2 Home Performance with Energy Star

1.5.2.1 Program Design and Participation Process

- The HPwES Program is designed to align with Department of Energy requirements to provide whole home retrofits. The program utilizes contractors with national certifications to provide energy assessments of customer homes to identify energy saving opportunities.
- Incentives amounts are based on aspects of the measures that affect the energy savings (e.g., baseline R-values, CFM 25 reductions). As such there is a fair amount of consistency in the dollars paid per expected kWh saved for the program measures ($0.17 for air sealing, $0.10 for duct sealing, and $0.14 for insulation). This approach to Incentives for duct sealing are sufficient to cover the full cost of the measure.
- Most of the program savings (85% of expected savings) resulted from duct sealing projects. One-half of the projects completed through program were single measure projects. Multi-measure projects were more likely to occur at sites that had energy assessments performed and sites with electric resistance heating.
- There is considerable variation in approaches to how home energy assessments are being performed. Program staff provide spreadsheet calculators for contractors to use to estimate projects savings, but most of the interviewed contractors reported that they use their own paper forms or electronic tools to complete home energy assessments.

- Participant feedback suggests that overall, the process participation process is working effectively.
    - More than 90% of participants reported that it was easy to find a program contractor.
    - Participants provided favorable assessments of their experience with the contractors with 90% or more agreeing that the contractor was courteous and professional, and scheduled and completed the work in a reasonable period of time.
    - No participants were dissatisfied with the participation process.
- Contractors reported that they had experienced delays in receiving rebate payments and that they had difficulty getting information on what was causing the delays. More generally, contractors reported that it was difficult to reach program staff by telephone to get questions answered.

1.5.2.2 Program Marketing and Outreach

- The program is designed to be primarily promoted by contractors. Contractors reported that they are engaged in limited marketing because there is currently more demand for program incentives than budget to fund them.
- Staff has developed several forms of marketing collateral for use by contractors to promote the program, but interviews with contractors indicate that they are generally not aware of the materials or how to get access to them.
- Contractors reported that most customers learn of the program by word-of-mouth and approach them to participate. Participant survey responses also indicate that a plurality of participants (42%) learned of the program from a family member, friend, or colleague. Contractors or home energy consultants were the source of awareness for 25% of participants.

1.5.2.3 Quality Control and Verification

- The program manual does not specifically state what share of project sites receive verification visits, however staff reported that at a minimum, the first five projects completed by a new trade ally firm receive a pre- and post-inspection visit and that 10% of the projects are inspected after that. In practice, staff reported that most sites are receiving verification visits. Project verification visits check for consistency between reported performance testing, site information, and measure information. Additionally, staff reported that they discuss the customer's satisfaction with the trade ally during visits. The reported procedures for verification are sufficient to mitigate evaluation risk.

- Savings estimates for all sites are performed through the CLEAResult database using the measure and site specifications entered by staff. Calculations are typically based on the procedures outlined in the Arkansas Technical Resources Manual V5.0.
- The Evaluators identified some quality control lapses in the program tracking data related to missing information or measure parameters outside of allowable ranges. These issues are detailed in Section 3.6.3.1.

1.5.2.4 Participant and Contractor Satisfaction

- 93% of participants reported that they were satisfied with the program overall. Few participants noted dissatisfaction with the program overall or specific aspects of it. The aspects of the program that the largest share of participants noted dissatisfaction with were the discount amount and the energy saving cost impacts. Six percent of participants were dissatisfied with each of these aspects of the program.
- Five of the six contractors reported that they were satisfied with the program overall and most contractors noted that the program had positive impacts on their business including increased sales, assisting with leveling out work-loads during the year, and improving relationships with their customers. Contractors reported some challenges with communicating with program staff to resolve questions or issues, however, contractors praised the knowledge and responsiveness of field staff.

1.5.1 Assisted Home Performance with Energy Star

1.5.1.1 Program Design and Participation Process

- The aHPwES Program provides similar services and measures to other comparison programs. The program provides a walkthrough home energy assessment and incentives for duct and building envelope air sealing and ceiling / attic insulation. Unlike other programs, the program does not include direct install measures as part of participating in the program. No cost CFLs are available through the CFL Direct Install Program.
- Program incentives are intended to cover the full cost of the project but three survey respondents indicated that they were dissatisfied with the discount amount and one indicated that participation was not free.
- Most projects involved the implementation of two or three program measures. However, 8% of projects involved a single measure, and one-half of these were completed in homes with electric resistance heating which suggests there may be more opportunity for efficiency improvements.

- Participant feedback suggests that, overall, the process participation process is working effectively.
    - None of the participants reported difficulty finding a program contractor.
    - All participants agreed that the contractor was courteous and professional, and scheduled and completed the work in a reasonable period of time.
    - No participants were dissatisfied with the participation process.

1.5.1.2 Program Marketing and Outreach

- The program is designed to be primarily promoted by trade allies. Contractors reported that they market the program through door-to-door canvassing and asking participants for referrals to friends or family who may be interested in it or through working with community organizations.
- Staff has developed several forms of marketing collateral for use by contractors to promote the program. One of the contractors uses these materials and noted that the cobranded materials are useful for enhancing perceptions of credibility.
- Participant survey responses also indicate that a majority of participants (53%) learned of the program from a family member, friend, or colleague. Contractors or home energy consultants were the source of awareness for 7% of participants and 10% learned of the program through a program representative.

1.5.1.3 Quality Control and Verification Processes

- The program manual does not specifically state what share of project sites receive verification visits, however staff reported that Staff reported that at a minimum, the first five projects completed by a new contractor firm receive a pre- and post-inspection visit and that 10% of the projects are inspected after that. In practice, staff reported that most sites are receiving verification visits. Project verification visits check for consistency between reported performance testing, site information, and measure information. Additionally, staff reported that they discuss the customer's satisfaction with the trade ally during visits. The reported procedures for verification are sufficient to mitigate evaluation risk.
- Savings estimates for all sites are performed through the CLEAResult database using the measure and site specifications entered by staff. Calculations are based on the procedures outlined in the Arkansas Technical Reference Manual V5.0.

1.5.1.4 Customer Satisfaction

- Eighty percent of customers were satisfied with the program overall. Participants were most satisfied with the quality of their contractor's work and the energy savings on their bill.
- 93% of participants reported that they were satisfied with the program overall. Few participants noted dissatisfaction with the program overall or specific aspects of it. The aspects of the program that the largest share of participants noted dissatisfaction with were the discount amount and the energy saving cost impacts. Three participants were dissatisfied with both of these aspects of the program.

1.5.2 Green Lights Direct Install

1.5.2.1 Program Design and Participation Process

- The GLDI Program provides direct installation of CFLs in the participant's homes. There is no limit on the number of CFLs that can be replaced at a residence, which distinguishes this direct install program from more typical models that limit the number of replacements that may be made and to lamps installed in areas where they get the most use. The program limits the use of the efficiency funds by receiving financial donations from multiple sources, receiving donations of CFLs, and using volunteers to install the CFLs.
- Staff indicated that they do not think the program competes with the discount CFL program because different types of lightbulbs are available through the programs and the GLDI Program participants tend to be lower income. Survey responses indicate that a significant share of participants are lower income and few respondents indicated that they were aware of the discounted lightbulbs offered prior to deciding to participate in the program.
- The program provides additional social and environmental benefits such as referring customers to the fire department for smoke detector installations and facilitating customers signing up for the recycling program.
- All participants were satisfied with the participation process and 98% were satisfied with the CFL installation process. The CFLs were installed shortly after being requested for most participants – the average duration between request and installation was two weeks.

1.5.2.2 Program Marketing and Outreach

- Staff reported that most participants learn of the program by word-of-mouth. Participant survey responses indicate this as well. Sixty-three percent of participants reported that they learned of the program through friends, family members, or colleagues.

- Program staff also market the program by placing door hangers in selected communities. Earned press coverage and tabling events by Energy Smart partners are other means by which the program is promoted. Visitors to the Energy Smart and Green Light New Orleans websites may also learn of the program there. Eleven percent of participants reported learning of the program through one of these channels.

1.5.2.3 Quality Assurance and Quality Control

- The key quality control and assurance procedures are as follows:
  - Addresses are cross-checked against database records to prevent repeat participation.
  - Periodic satisfaction surveys are also used to assess the participants experience with the program.
  - The program provides training to volunteers on matching CFL and incandescent wattages and uses forms to standardize the recording of information and calculating energy saving impacts.
  - To prevent reuse of the removed lightbulbs, the incandescent lightbulbs are removed from the premise and destroyed.
- Although guidelines intend for only incandescent bulbs to be replaced and staff reported that training is provided to ensure that volunteers only replace incandescent lightbulbs, a sizable share of participants (19%) reported that some of the lightbulbs that were replaced were CFLs or LEDs.

1.5.2.4 Program Satisfaction

97% of participants were satisfied with the program overall and the same share were satisfied with the CFLs installed and 74% reported that it increased their satisfaction with Entergy as their electrical service provider.

1.5.3 Consumer Products

1.5.3.1 Program Design and Incentives

- Overall, program incentive levels appear to be sufficient for the included lighting, appliance, and advanced power strip measures. Incentive levels are within the amounts offered through other programs Additionally, the program met its goal based on expected savings. Discounted lighting accounted for most program savings. Only two advanced power strips were rebated through the program. Program staff noted that promotion of rebates for advanced smart strips in stores is challenging because customers do not understand the benefits of the product that costs considerably more than standard products.
- The program has recruited 8 retailer locations in the Companies' service area to deliver lighting rebates. The discounts for LEDs and standard CFLs are comparable to discounts provided through other regional programs.

- Rebates were provided for ENERGY STAR® qualified pool pumps but incentive levels are the same for multi-speed and variable speed pumps, despite differences in energy savings potential. The rebate levels were changed for PY6.

1.5.3.2 Program Marketing and Outreach

- Lighting discounts are promoted through point-of purchase materials.
- Rebates for window AC units are promoted at retailer locations. Pool pumps are primarily promoted through working with contractors.

1.5.3.3 Quality Control and Verification Processes

- Verification visits are performed with participating lighting retailer to ensure that the terms of the memorandum of understanding (MOU) are complied with. Consistent with common practice, these visits occur on a monthly basis and are unannounced. Additionally, lighting sales data are reviewed for anomalous purchase activity such as large purchases exceeding the program limit. Invoice amounts for the lighting discounts are corroborated with point-of-sale data submitted by the retailer.

Rebated appliance verification procedures are consistent with similar programs. The process consists of reviewing the submitted rebate form for completeness of data, verifying that a sales receipt was submitted, and verifying that the rebate was requested for qualifying equipment.

1.5.4 Residential Heating & Cooling

1.5.4.1 Program Design and Participation Process

- Electronic tools and gauges are used to transmit data on the efficiency of the unit, which is effective for providing a “live snapshot” of the unit’s energy-use performance. The electronic format reduces paperwork burdens on contractors and program staff and reduces errors that could result from incorrect measurements recorded on paper.
- Residential Heating & Cooling is the only Energy Smart Program that multifamily properties with more than four units are eligible. Approximately one-third of tune up projects were completed at multifamily properties.
- Overall, the program participation process appears to be working effectively for customers. Ninety-three percent of participants reported that finding a program contractor was easy. Most tune-up participants (85% or more) agreed that the contractors scheduled and completed the tune-up in a reasonable amount of time and that the contractor was courteous and professional. No participants reported dissatisfaction with the participation process and more than 91% were satisfied with it.

- Contractors also provided positive feedback about the participation process. Most indicated that the clarity of supporting information and required documentation had improved recently and that the process had become more efficient. Two contractors noted that the iManifold software reduces the paperwork burden and considered this an important aspect of the program. However, two other contractors indicated that using the software took additional time that made completion of tune-up projects cost prohibitive. However, on the whole, contractors liked the software and the electronic process.

  Contractors also praised both program field and administrative staff.

1.5.4.2 Program Marketing and Outreach

- The program is primarily marketed by participating contractors. Four of the six interviewed contractors indicated that they actively promote their services, but not the program specifically. Two contractors reported that they do promote the program to their customers. One contractor sends mailings to customers to make it clear that costs are shared between the customer and the contractor and another stated they include a link to the program website in staff email signatures and include program information in customer mailers.
- The program has developed marketing materials for use by contractors including a brochure and truck magnet, but most interviewed contractors are not aware that these materials exist. Contractors that complete tune-ups suggested materials that highlight the technology used in the process, an aspect of the process that is featured in the current material developed.
- Word-of-mouth is driving most tune-up activity. More than three-quarters of participants learned of the program through a friend, family member, or colleague.

1.5.4.3 Quality Control and Verification

- The program employs appropriate project verification practices. Staff reported that the first five projects completed by a contractor are quality checked, followed by 10% of the projects complete after the first five.
- Training on completing tune-ups using the iManifold system was comprehensive and contractors are provided with a manual of how to complete the tune-ups. Contractors thought the training provided was a strength of the program.
- Review of data quality found that participant customer telephone number was missing for a significant number of records (30%). Additionally, no information was included on whether or not the HVAC system installed was part of a new construction project or replaced an existing system. The current application form does not collect this information either.

1.5.4.4 Participant and Trade Ally Satisfaction

- 95% of participants were satisfied with the program overall. Four participants were dissatisfied with the quality of the work performed by the contractor and two were dissatisfied with program staff's response to inquiries.
- Interviewed trade allies reported satisfaction with the program and noted that improvements had been made to the program recently.

1.5.4.5 Savings Calculations

- HVAC Tune Ups produced quantifiable savings that represented a significant reduction in customer bills. The Evaluators found that HVAC tune-ups saved an average of 4.8% off of customer annual usage (10.1% off of annual cooling load). However, realization was low as the baseline energy use of these units was much lower than anticipated in *ex ante* savings calculations.
- The program had significant issues with missing data. 42% of Central AC replacements did not have a valid model number indicated in program tracking.
- Central AC replacements used an erroneous baseline. Realization rates for HVAC system replacement were low. The Evaluators attribute this to erroneous use of an early retirement baseline.

1.5.5 School Kits and Education

1.5.5.1 Program Design and Participation Process

- The efficiency measures offered through the Energy Wise school kit component are similar to other school kit programs.
- Staff initially intended to deliver the program to sixth grade students but expanded to fifth and seventh grades when school participation goals fell below expectations. Teacher survey results indicate that the difficulty of the information presented to students was successfully modified to be appropriate for 5^{th} and 7^{th} grade students.
- While expanding to additional grades assisted the program with meeting its participation target, it may reduce its efficacy in meeting future savings goals if the same households receive kits in multiple years and the installation rates decrease.
- The participation process is largely informal. School participation agreements are verbal rather than written and there is no parental consent process to receive the kit items. Prior to delivering the program, staff discusses expectations with participating teachers. Over the course of the program year, staff has identified standards for classroom management to be a key component of this meeting as these standards vary considerably from school-to-school. Teacher responses indicated some variation in what information was discussed prior to participation.

- Staff offers flexibility in the delivery of the program and may modify the presentation time to reduce it to 45 minutes from the intended 90-minute length. Teacher survey results indicated that about one-half of the presentations were between 30-60 minutes and 14% reported that the presentation was too long.
- Delivery of the program typically involves two visits to the school: one visit to present the material and a return visit to collect parent/guardian surveys. Kits are either directly mailed to the school or are brought from available supplies by program staff during the day of the presentation.

1.5.5.2 Program Marketing and Outreach

- Staff report that direct outreach to individual schools has been the most effective means of recruiting participation. The independent organization of schools in New Orleans precludes recruitment of schools through district channels or other groups of multiple schools, however, staff has identified and worked with a few charter school organizations. Additionally, staff also attempted to recruit through a teacher group but without success. Moreover, email and telephone recruitment has not been effective.
- Word-of-mouth marketing and repeat participation are likely to be key to future program participation. Both repeat participation and word-of-mouth marketing present opportunities to meet participation goals at a lower cost than direct outreach. Feedback from teachers indicates that the program has succeeded at providing a valued service to teachers and that this will likely serve the program well in future years. Teachers indicated that they were satisfied with the program, would likely participate next year, and would recommend it to another teacher.
- School kits contain limited information for parents on the Energy Smart programs. The printed materials contain a reference to the program website.
- Adult outreach provided by the Energy Wise Alliances targets neighborhood groups, senior centers, churches, and cultural organizations and attended school-sponsored events. Outreach efforts consist of informing customers about free or affordable energy-efficiency programs, providing services and customer service in the Energy Service Center, and reaching out to community members through nonprofit retrofits. Program staff have found that messaging related to financial savings and home comfort tend to resonate the best among the Companies' customers.

1.5.5.3 Quality Assurance and Quality Control

- Meeting grade level expectations and classroom relevance are key program quality concerns. Staff discusses the program with teachers to assess the extent to the program is providing a quality educational experience.
- Staff estimates installation rates and prevalence of hot water heating through a take home survey completed by parents or guardians.

- Staff is considering hiring full-time educators to improve the consistency of the delivery of the educational presentation. Although a structured presentation is provided for delivery and staff report that feedback on the instructors has largely been positive, staff noted that different instructors may emphasize different messages or aspects of the presentation.
- Learning objectives are currently not assessed but staff is considering implementing some form of pre- and post-testing to determine if the program learning objectives are being met. However, the assessment of learning objectives through in-class testing could increase the classroom time require and discourage future participation.

1.5.5.4 Teacher Satisfaction and Assessment of Program Effectiveness

- Teachers' responses to the program were very positive. Eighty-six percent of teachers surveyed agreed with the sentiment that the presentation is a valuable educational tool. All surveyed teachers said that they plan to participate in the program again next year and that they would be somewhat or very likely to recommend the program to another educator.
- The presentation is well-matched to teacher's needs and educational standards. All teachers surveyed reported that they felt that the presentation was neither too easy nor too hard for 5th, 6th, and 7th grade students. There was also broad support among surveyed teachers for the sentiments that the Energy Wise program is fully aligned with state standards. Eighty-six percent of teachers confirmed that the program covers topics normally taught in class, and 83% of these teachers said that the program took place at a time of year that corresponded to when they would have taught these concepts.
- Satisfaction with the program is high. Ninety-four percent of respondents indicated high or very high levels of satisfaction with both the items included in the kit and the amount of energy-efficiency education that the kit provides.

1.5.5.5 Kit Items

- Lighting measures were most frequently identified as useful. 50% of respondents reported that the CFLs were the most useful and 19% reported that the LED night lights were the most useful.
- The 91% in-service rate for LED nightlight was the kit component with the highest rate of current use. The in-service rates for the other items were as follows: 84% (faucet aerators), 63% (showerheads), and 66% (CFLs). Approximately one-third or respondents reported that they did not install the faucet aerator or showerhead because it did not fit their faucet or shower. The most commonly given reason for not installing the CFLs, given by 57% of respondents, was that the recipient was waiting until their current lightbulbs burnt out. Three respondents reported installing very few items. Specifically, one respondent

reported that they only installed the LED nightlight and another reported installing one CFL and one faucet aerator, and a third reported that they installed one CFL and one LED nightlight.

1.5.6 Small Business Solutions

1.5.6.1 Program Design and Participation Process

- The Small Business Solutions Program design is consistent with the design of similar programs offered in other jurisdictions. It incorporates key design characteristics to reduce three common barriers to small business.
  - The program provides relatively high incentives for small businesses that typically have less capital for energy efficiency investments. However, while the incentives are high in comparison to typical commercial program incentive rates (which typically range between $0.05 and $0.08 per kWh saved), the $0.12 per kWh incentive is the same as the incentive for non-lighting measures and $0.02 per kWh higher than lighting incentives offered through the Large C&I Program.
  - The program uses high-contact, direct outreach from contractors to reduce typical barriers to program awareness.
  - Incentive payments are paid to contractors who offer services and equipment at a discount to reduce the initial cost to participants.
- Small businesses are defined as businesses that with less than 100 kW maximum demand over a 12-month period. This threshold is typical for qualifying customers for small business programs.
- The program utilizes spreadsheet based calculators and paper forms to guide energy assessments and to record project information for customer proposals and final applications. This paper process differs from the paperless process utilized in other CLEAResult implemented programs in the state, which utilize a software tool. Staff indicated that the choice to not use the software was based on contractor preference.
- Formal training was not completed during the program year. Most of the contractors completing projects through the program have been providing program services for multiple years. Contractors are invited to attend pre- and post- site visits with program staff, which provides staff an opportunity to educate contractors on program requirements and procedures.
- Contractors did not identify any issues with the program participation processes and noted that projects are generally approved quickly. Additionally, program requirements, application materials, and instructions were described as clear.
- Interviewed Contractors stated that the measures offered through the programs met the needs of the small businesses they work with and nearly all participants were satisfied with the equipment offered through the program.

- Few barriers to participation were noted by contractors. Interviewed contractors noted that some customers are skeptical of the program offer and believe it to be "too good to be true." This is also consistent with participant feedback. Approximately one-quarter of program participants had initial concerns about the legitimacy of the program offer. Additionally, one contractor indicated that the 60-day limit for measure implementation may limit project scopes, although all contractors reported that they typically complete measure implementations in in 30 – 45 days.
- Program participants were generally satisfied with the assessment process. Only one participant noted dissatisfaction with any aspect of the assessment, specifically, the proposal received from the trade ally. This respondent did not elaborate on the source of their concern. In open-ended narrative about the assessment, one respondent indicated that they had not realized the expected savings and another indicated that an exterior lamp was not included in the assessment.

1.5.6.2 Program Marketing and Outreach

- Program staff is engaged in limited contractor and participant recruitment. Staff indicated that the network of contractors is well established and that consistent with program design, contractors are primarily responsible for enlisting customers. Survey responses indicate that nearly all participants are learning of the program from a contractor.
- Interviewed contractors indicated that they were performing direct outreach to customers and that most projects were initiated this way.
- The program provides a two-page flyer to help contractors promote the program and staff reported that they have developed case study materials. One interviewed contractor recalled receiving promotional material from program staff and stated that the materials were effective. Approximately one-half of survey respondents reported that they were shown program marketing materials and nearly all of these respondents indicated that the materials were somewhat or very influential on their decision to participate.
- The program does not currently offer co-branded marketing materials for contractor use. These materials are common features of small business programs and help to improve the credibility of the contractor and the offer being made to participants.
- The program website does not currently list participating contractors. Although program model intends for program activity to be driven by contractor outreach efforts, providing information for interested customers on the website would provide an additional channel for assisting customers with participating in the program.

1.5.6.3 Quality Control and Verification Processes

- The program has sufficient verification procedures in place. The procedures outlined in the program manual indicate that the first five projects completed by a new contractor receive pre- and post-verification, followed by 10% of subsequent projects completed by the contractor. However, staff reported that currently most projects are receiving verification visits.
- Inspection procedures include review of documentation, verification of building type (which determines operating hours), photographs of baseline conditions and efficient equipment, and verification that lamps installed are DesignLights Consortium (DLC) or ENERGY STAR ® qualified.
- Despite the apparent sufficiency of the current verification process, 15% of the sampled sites including savings for lamps that had not been installed.

1.5.6.4 Customer and Contractor Satisfaction

- All three interviewed contractors reported that they were very satisfied with the program overall and satisfied with staff's response to questions asked regarding specific projects. However, one contractor indicated that program staff made modifications to the program and did not communicate this to contractors.
- 96% of participants were satisfied with the program overall. Only one participant indicated dissatisfaction with any aspect of the program, specifically the thoroughness of staff's response to a question. This respondent did not elaborate on why the response was dissatisfactory.
- 88% of participants reported that participating in the program increased their satisfaction with the Companies.

1.5.7 Large Commercial & Industrial Program

1.5.7.1 Program Design and Participation Process

- Incentives are based on energy savings. The program appropriately offers higher incentives for non-lighting measures of $0.12 per kWh that typically have longer payback periods. Lighting incentives are $0.10 kWh. The higher incentive for non-lighting measures may contributed to the relatively high share of program savings resulting from lighting measures.
- Four of the five interviewed contractors reported that they complete application materials for customers and supply required documentation. None of the contractors identified any suggestions for improving the program application process.
- All respondents reported that the application process was clear and all indicated that it was clear who they should contact for additional assistance.
- No customers reported dissatisfaction with the steps required to participate in the program or the range of equipment that qualifies for the program. All participants

were satisfied with the project support received from program staff and staff's response to their questions and concerns.

- Five participants received technical assistance from CLEAResult to implement their project and all of these respondents were satisfied with the assistance received.
- Three of the participant survey respondents reported that it took seven weeks or more to receive their incentives, although none were dissatisfied with that amount of time. One interviewed contractor indicated that payment had been slow for a project.
- Most participants (67%) reported that the incentive amount was what they expected, and none indicated that it was considerably more or less than what they were expecting.

1.5.7.2 Program Marketing and Outreach

- The program is engaged in little program marketing and outreach because it is very budget limited. Program staff reported that all incentive funds were reserved shortly after the start of the program year.
- 41% of participants reported that they learned of the program from a contractor or vendor, 17% from a representative of the Companies, and 8% from a CLEAResult staff member.
- Contractors reported limited outreach activities due to the limited program budget.

1.5.7.3 Quality Control and Verification Processes

- The program has documented robust quality control and verification procedures in place including review of submitted materials and on-site pre- and post-verification for all projects completed. Despite these procedures, the failed to realized significantly fewer lamps that reported in project documentation.

  Other issues identified were:
  - Use of a lighting savings calculator that used non EISA compliant baseline wattages. Staff has corrected a more recent version of the calculator.
  - Incorrect entry of efficient lamp wattages.
  - Unspecified heating type lead to incorrect savings estimates because heating

  Additional factors that impacted the realization rate were largely due to differences between deemed values from the Arkansas TRM V5.0 and results based on onsite monitoring. These included:
  - Use of 7,884 lighting hours of operation for parking garages with 8,760 operating hours; and

- Use of 3,055 for guest room operating hours for which monitored data showed less than 2,000 hours of operation.

1.5.7.4 Contractor and Participant Satisfaction

- 92% of respondents were satisfied with the program overall. None reported dissatisfaction with any aspect of the program. Respondents were very satisfied with the thoroughness and timeliness of CLEAResult's response to inquiries.
- 58% of participants indicated that their experience with the program increased their satisfaction with the Companies.
- Four out of five interviewed contractors were satisfied with the program. One contractor was somewhat dissatisfied. The dissatisfied contractor indicated that a miscommunication with program staff had resulted in a customer being dissatisfied and that the limited funding made it difficult to get customers into the program. In general, contractors reported that staff was responsive to questions and that the questions they had were related to project-specific matters and not information that general instruction or training could address.
- Limited program funding was the greatest concern for contractors. Overall, the primary issue noted by the participating contractors was the lack of funding available for the program. This creates difficulties for contractors in promoting the incentives because of the uncertainty of their availability and may prevent the sustained engagement of contractors with the program.

1.6 Report Organization

This report is organized with one chapter providing the full impact and process summary of a specified program. The report is organized as follows:

- Chapter 2 provides general methodologies;
- Chapter 3 Home Performance with Energy Star (HPwES)
- Chapter 4 provides results for the Assisted Home Performance with Energy Star (aHPwES);
- Chapter 5 provides results for the Residential Heating & Cooling Program;
- Chapter 6 provides results for the Lighting and Appliances Program (CP);
- Chapter 7 provides results for the School Kits and Education (SK&E);
- Chapter 8 provides results for the Small Business Solutions Program (SBS)
- Chapter 9 provides results for the Large Commercial and Industrial Solutions Program (C&I);
- Appendix A provides the site-level custom reports for the SBS and C&I Solutions Program.

- Appendix B provides the survey instruments and interview guides used in this evaluation.
- Appendix C presents cost-benefit results.

2. General Methodology

This section details general impact evaluation methodologies by program-type as well as data collection methods applied. This section will present full descriptions of:

- Gross Savings Estimation;
- Sampling Methodologies;
- Process Evaluation Methodologies; and
- Data Collection Procedures.

2.1 Glossary of Terminology

As a first step to detailing the evaluation methodologies, the Evaluators provide a glossary of terms to follow[2]:

- *Ex Ante* – Forecasted savings used for program and portfolio planning purposes (from the Latin for "beforehand")
- *Ex Post* – Savings estimates reported by an evaluator after the energy impact evaluation has been completed (From the Latin for "from something done afterward")
- *Deemed Savings* – An estimate of an energy savings or demand savings outcome (savings) for a single unit of an installed energy efficiency measure. This estimate (a) has been developed from data sources and analytical methods that are widely accepted for the measure and purpose and (b) is applicable to the situation being evaluated (e.g., assuming 112 kWh savings for a residential advanced power strip)
- *Savings* – The change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program
- *Realization Rate* – Ratio of Ex Post Savings / Ex Ante Savings (e.g., if the Evaluators verify 105 kWh per showerhead, Realization Rate = 105/112= 93.8% realization rate

[2] Arkansas TRM V4.0, Volume 1, Pg. 80-86

2.2 Overview of Methodology

The proposed methodology for the evaluation of the PY5 ENO Portfolio is intended to provide:

- Impact results; and
- Program feedback and recommendations via process evaluation

In doing so, this evaluation will provide the verified gross savings results, provide the recommendations for program improvement, and ensure cost-effective use of ratepayer funds. Leveraging experience and lessons learned from impact evaluation can provide greater guidance as to methods by which program and portfolio performance could be improved.

2.2.1 Sampling

Programs are evaluated on one of three bases:

- Census of all participants;
- Simple Random Sample; and
- Stratified Random Sample.

2.2.1.1 Census

A census of participant data was used for select programs where such review is feasible. All program measures were evaluated. Programs that received analysis of a census of participants include:

- Home Performance with ENERGY STAR
- Assisted Home Performance with ENERGY STAR
- Residential Heating & Cooling
- Energy Smart Lighting and Appliances
- Energy Smart School Kits

2.2.1.2 Simple Random Sampling

For programs with relatively homogenous measures (largely in the residential portfolio), the Evaluators conducted a simple random sample of participants. The sample size for verification surveys is calculated to meet 90% confidence and 10% precision (90/10). The sample size to meet 90/10 requirements is calculated based on the coefficient of variation of savings for program participants. Coefficient of Variation (CV) is defined as:

$$CV = \frac{Standard\ Deviation_x}{Mean_x}$$

Where x is the average kWh savings per participant. Without data to use as a basis for a higher value, it is typical to apply a CV of .5 in residential program evaluations. The resulting sample size is estimated at:

$$n_0 = \left(\frac{1.645 * CV}{RP}\right)^2$$

Where,

1.645 = Z Score for 90% confidence interval in a normal distribution

CV = Coefficient of Variation

RP = Required Precision, 10% in this evaluation

2.2.1.3 Stratified Sampling

For the ENO SBS and Large C&I programs, Simple Random Sampling is not an effective sampling methodology as the CV values observed in business programs are typically very high because the distributions of savings are generally positively skewed. Often, a relatively small number of projects account for a high percentage of the estimated savings for the program.

To address this situation, we use a sample design for selecting projects for the M&V sample that takes such skewness into account. With this approach, we select a number of sites with large savings for the sample with certainty and take a random sample of the remaining sites. To further improve the precision, non-certainty sites are selected for the sample through systematic random sampling. That is, a random sample of sites remaining after the certainty sites have been selected is selected by ordering them according to the magnitude of their savings and using systematic random sampling. Sampling systematically from a list that is ordered according to the magnitude of savings ensures that any sample selected will have some units with high savings, some with moderate savings, and some with low savings. Samples cannot result that have concentrations of sites with atypically high savings or atypically low savings. As a result of this methodology, the required sample for the SBS and Large C&I Programs were reduced to the following strata:

Program	*Strata*	*Sites Sampled*	*Overall Precision*
Small Business Solutions	4, plus 1 certainty	26	7.64%
Large Commercial and Industrial	3, plus 1 certainty	15	8.15%

2.2.1 Impact Calculations

The general approach for calculation of verified kWh and kW savings was to start with deemed savings and refine estimates with primary data collection. Further detail can be found in each program chapter.

2.2.2 Process Evaluation

The Evaluator's general approach to process evaluation begins with a review of the tests for timing and appropriateness of process. In this review, the Evaluators determine what aspects of the program warrant a process evaluation. Most Energy Smart programs over-performed or met energy savings goals, and as such most of the PY5 process evaluation activity was focused on current year implementation activities and future directions.

The data collection procedures for process evaluations typically included:

- *Participant Surveying*. The Evaluators surveyed statistically significant samples of participants in each program in order to provide feedback for the program and provide an assessment of participant satisfaction. Surveys cover topics including:
    - Source of program awareness;
    - Their decision to participate and complete an efficiency project;
    - Experience with the participation process; and
    - Satisfaction with various elements of the program and the program overall
- *Program Staff Interviews*. The Evaluators conducted in-depth interviews with high-level program actors, including staff from the Companies, CLEAResult, the Energy Wise Alliance, and Green Light New Orleans. These interviews are semi-structured, in having general topics to be covered, without fully prescribed question and answer frameworks. Topics discussed in program staff interviews include:
    - Program goals and objectives;
    - Marketing and outreach;
    - Communication processes;
    - Program management and staffing; and
    - Quality control and verification processes.
- *Trade Ally Interviews*. The Evaluators completed interviews with program trade allies. These interviews are conducted in a manner similar to program staff interviews. Topics discussed in trade ally interviews include:
    - Promotion of the program and barriers to participation;
    - Program marketing;
    - The program participation process;
    - Training and communication with program staff;
    - Business and market impact; and

- Overall impressions and satisfaction

- *Review of Program Manuals, Marketing Materials, and Other Program Documentation*. The Evaluators reviewed marketing materials for each program, providing feedback as to the appropriateness of the message in reaching its target audience, the breadth of the audience that the effort is attempting to reach, and identifying possible cross-promotional opportunities.

3. Home Performance with ENERGY STAR®

3.1 Program Description

The Home Performance with ENERGY STAR® (HPwES) is designed to promoted energy efficiency by offering home energy walkthrough assessments and/or deeper energy assessments to its residential customers through a participating trade ally. The HPwES provides residential customers with access to qualified vendors and installation trade allies (trade allies) within the Companies' service areas. The participating trade allies are to help the residential customer analyze their energy use and identify energy efficiency improvements. The trade ally inspection includes a visual inspection of the living space, attic, and crawl space/basement, and exterior of the home, as well as discussion of lifestyle and customer behaviors that impact energy use. Following the assessment, the trade ally recommends home improvements to increase energy efficiency. The HPwES Programs provides incentives for installing ceiling insulation, duct sealing, and air infiltration sealing in the form of a discount to the customer.

A total of 1,179[3] households participated in HPwES, Table 3-1 summarizes the total number of homes a measure was installed in and/or performed at, total measures installed/performed and the expected kWh and peak kW savings by measure.

Table 3-1 Summary of Measures and Expected Savings – New Orleans

Measure	***Number of Homes***	***Expected kWh Savings***	***Expected kW Savings***
Duct Sealing	873	2,951,481	583.26
Air Sealing	365	255,432	122.32
Ceiling Insulation	85	221,638	71.39
Floor Insulation	2	2,449	0.51
Wall Insulation	3	14,469	3.33
Total:	1,328	3,445,469	780.81

[3] This total does not equal the sum of the "Number of Homes" column in Table 8-1 and Table 3-2 due to individual residences receiving multiple measures.

Table 3-2 Summary of Measures and Expected Savings – Algiers

Measure	Number of Homes	Expected kWh Savings	Expected kW Savings
Duct Sealing	122	324,637	64.50
Air Sealing	57	38,464	21.16
Ceiling Insulation	10	30,883	9.19
Floor Insulation	0	0	0
Wall Insulation	0	0	0
Total:	189	393,984	94.85

The program goals and achievement of the goals is summarized below.

Table 3-3 Summary of Program Goals

Operating Company	Participation	MWh	MW
ELL Algiers	70	60	0.02
ENO	858	733	0.3

Table 3-4 Summary of kWh Goal Achievement

Operating Company	Verified Net kWh	kWh Goal	% of Goal Attained
ENO	3,771,339	732,674	514.74%
ELL Algiers	465,490	59,989	775.96%

Table 3-5 Summary of kW Demand Reduction Goal Achievement

Operating Company	Verified kW	kW Goal	% of Goal Attained
ENO	798.82	260	307.24%
ELL Algiers	105.72	21	503.43%

The program exceeded goal by a wide margin. Program staff attributed this to the following factors:

- **High prevalence of electric space heating.** Program staff anticipated lower levels of electric space heating. Homes with electric space heating accounted for over 75% of PY5 program savings.
- **Reallocation of budget from Residential Heating & Cooling.** The Residential Heating & Cooling Program underperformed relative to program goals. Program staff reallocated budget mid-year in order to maintain consistent program participation in HPwES.

- **Declining CFL and LED pricing.** The declining costs of CFLs and LEDs allowed program staff to cut incentive levels in the Consumer Products Program and reallocate those funds to HPwES.

3.2 Impact Savings Calculation Methodology

3.2.1 Air Infiltration Reduction Savings Calculations

The deemed savings values for air infiltration reduction were developed through EnergyGauge, a simulation software program. Multiple equipment configurations were simulated in in developing savings values denominated in deemed savings per CFM_{50} of air leakage rate reduction. Table 3-6 summarizes the deemed savings values for New Orleans.

Table 3-6 Deemed Savings Values for Air Infiltration Reduction

Equipment Type	*kWh/CFM Savings*
Electric AC with Gas Heat	.3267
Elec. Resistance w/ AC	.9334
Heat Pump	.6376

For example, consider a residence with electric AC and gas heat located. If the residence had a leakage rate of 7,200 CFM_{50} before air infiltration reduction and a leakage rate of 3,500 CFM_{50} after, then the residence would have an annual savings of:

$$Air\ Infiltration\ Savings = 0.3267 \frac{kWh\ Savings}{CFM_{50}} \cdot (5{,}200\ CFM_{50\ pre} - 3{,}500\ CFM_{50\ post})$$

$$Air\ Infiltration\ Savings = 555.37\ kWh$$

3.2.2 Duct Sealing Savings Calculations

Duct sealing savings was calculated using the following savings algorithms from the TRM.

3.2.2.1 Cooling Savings (Electric):

$$kWh_{savings,C} = \frac{(DL_{pre} - DL_{post})\ x\ EFLH_C\ x\ (h_{out}\rho_{out} - h_{in}\rho_{in})\ x\ 60}{1{,}000\ x\ SEER}$$

Where:

DL_{pre} = Pre-improvement duct leakage at 25 Pa (ft^3/min)
DL_{post} = Post-improvement duct leakage at 25 Pa (ft^3/min)
ΔDSE = Assumed improvement in distribution system efficiency = 5% = 0.05
$EFLH_C$= Equivalent Full Load Hours. See Table 8-6
h_{out}= Outdoor design specific enthalpy (Btu/lb) See Table 8-6
h_{in} = Indoor design specific enthalpy (Btu/lb.) See Table 8-6

Table 3-7 Deemed Savings Values for Duct Sealing Calculations

Parameter	***Value***
$EFLH_C$	1,900
HDD	1,349
h_{out}	40
h_{in}	30
ρ_{in}	.076
P_{out}	.074
SEER	11.5

ρ_{out}= Density of outdoor air at 95°F = 0.0740 (lb/ft^3)[4]
ρ_{in} = Density of conditioned air at 75°F = 0.0756 ($lb./ft^3$)[4]
60 = Constant to convert from minutes to hours
CAP = Cooling capacity (Btu/hr)
1,000 = Constant to convert from W to kW
$SEER$ = Seasonal Energy Efficiency Ratio of existing system (Btu/W·hr)
Default value for SEER = 11.5[5]

As an example, assume the duct leakage before sealing was measured at 360 CFM and the leakage after sealing was 90 CFM. Using the SEER value of 11.5, the annual savings would be:

kWh per year = (360-90) x 2,426 x (37x0.076 – 30x0.074) x 60 / (1000 x 11.5) = 2,023 kWh per year.

3.2.2.2 Heating Savings (Heat Pump):

$$kWh_{savings,H} = \frac{(DL_{pre} - DL_{post}) x\ 60\ x\ HDD\ x\ 24\ x\ 0.018}{1{,}000\ x\ HSPF}$$

Where:

DL_{pre} = Pre-improvement duct leakage at 25 Pa (ft^3/min)
DL_{post} = Post-improvement duct leakage at 25 Pa (ft^3/min)

[4] ASHRAE Fundamentals 2009, Chapter 1: Psychometrics, Equation 11, Equation 41, Table 2

[5] Average of Department of Energy minimum allowed SEER for new air conditioners from 1992-2006 (10 SEER) and after January 23, 2006 (13 SEER)

ΔDSE = Assumed improvement in distribution system efficiency = 5% = 0.05
$EFLH_H$ = Equivalent full load heating hours (see Table 8-6)
60 = Constant to convert from minutes to hours
HDD = Heating degree days (see Table 8-6)
24 = Constant to convert from days to hours
0.018 = Volumetric heat capacity of air (Btu/ft^3°F)
CAP = Heating capacity (Btu/hr)
1,000 = Constant to convert from W to kW
$HSPF$ = Heating Seasonal Performance Factor of existing system (Btu/W·hr)
Default value for HSPF = 7.30.[6]

3.2.2.3 Heating Savings (Electric Resistance):

$$kWh_{savings,H} = \frac{\left(DL_{pre} - DL_{post}\right) x\ 60\ x\ HDD\ x\ 24\ x\ 0.018}{3{,}412}$$

Where:

DL_{pre}= Pre-improvement duct leakage at 25 Pa (ft^3/min)
DL_{post}= Post-improvement duct leakage at 25 Pa (ft^3/min)
ΔDSE = Assumed improvement in distribution system efficiency = 5% = 0.05
60 = Constant to convert from minutes to hours
HDD = Heating degree days (see Table 8-6)
24 = Constant to convert from days to hours
0.018 = Volumetric heat capacity of air (Btu/ft^3°F)
EFLH$_H$ = Equivalent full load heating hours (see Table 8-6)
CAP = Heating capacity (Btu/hr)
3,412 = Constant to convert from Btu to kWh

3.2.2.4 Heating Savings (Gas Furnace):

$$Therms_{savings,H} = \frac{\left(DL_{pre} - DL_{post}\right) x\ 60\ x\ HDD\ x\ 24\ x\ 0.018}{100{,}000\ x\ AFUE}$$

Where:

DL$_{pre}$ = Pre-improvement duct leakage at 25 Pa (ft^3/min)
DL$_{post}$ = Post-improvement duct leakage at 25 Pa (ft^3/min)
ΔDSE = Assumed improvement in distribution system efficiency = 5% = 0.05
60 = Constant to convert from minutes to hours
HDD = Heating degree days (see Table 8-6)
24 = Constant to convert from days to hours
0.018 = Volumetric heat capacity of air (Btu/ft^3°F)
EFLH$_H$ = Equivalent full load heating hours (see Table 8-6)
CAP = Heating capacity (Btuh or Btu/hr)
100,000 = Constant to convert from Btu to therms

[6] Average of Department of Energy minimum allowed HSPF for new heat pumps from 1992-2006 (6.8 HSPF) and after January 23, 2006 (7.7 HSPF)

AFUE = Annual Fuel Utilization Efficiency of existing system
Default value for AFUE = 0.8.

3.2.2.5 Demand Savings (Cooling):

$$kW_{savings,C} = \frac{kWh_{savings,C}}{EFLH_C} \; x \; CF$$

Where:

$kWh_{savings,C}$ = Calculated kWh savings for cooling
$EFLH_C$ = Equivalent full load cooling hours (see Table 8-6)
CF = Coincidence factor = 0.87

3.3 Verified Savings by Measure – HPwES

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided verified savings using deemed values developed for New Orleans combined with in-field testing results.

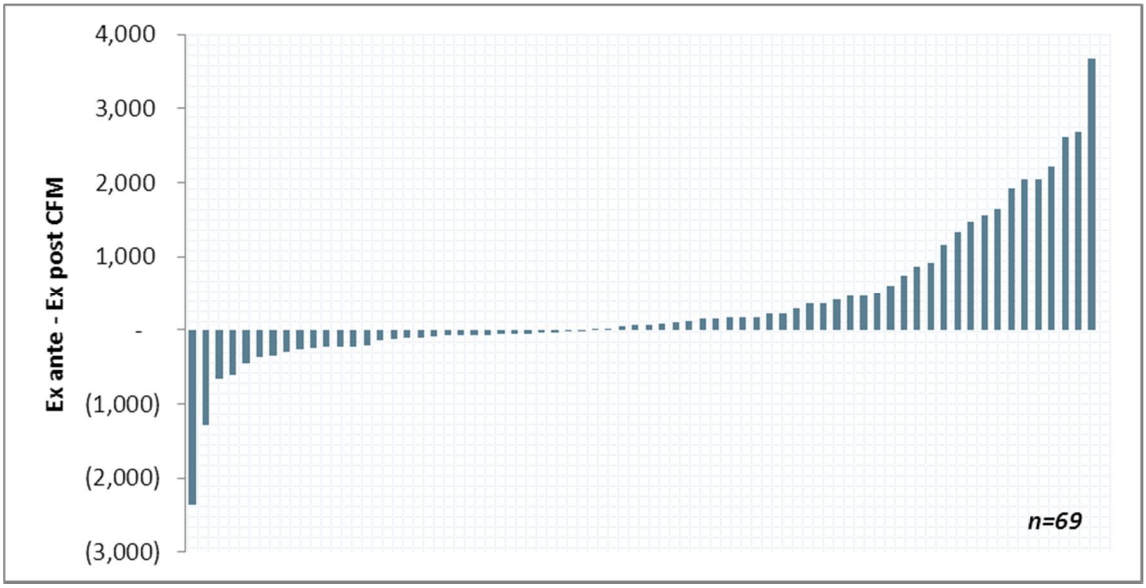
3.3.1 Infiltration/Air Sealing

3.3.1.1 Field Data Collection

The Evaluators conducted on-site testing at a sample of 69 residencies that received air sealing. This sample was comprised of 51 homes in HPwES and 18 homes in Assisted HPwES. During these site visits, the Evaluators' field staff conducted blower door testing in an effort to validate post-retrofit leakage estimates indicated in program tracking data. The Evaluators did not make any changes to pre-retrofit data; the evaluation began with three months remaining in PY5 and as such it was not feasible to conduct baseline testing.

The results of the Evaluators' field testing are summarized in Figure 3-1. In this figure, results are organized such that homes with verified leakage that is lower than shown in tracking data (i.e., homes with realization greater than 100%) are at the left end of the graph and homes with verified leakage higher than shown in tracking data (i.e., homes with realization less than 100%) are on the right. The Evaluators found that 41.2% of tested homes had higher leakage than shown in program tracking, while 58.8% had lower leakage.

Figure 3-1 Air Infiltration Field Testing Results



The Evaluators' field testing found that average post-retrofit leakage was higher than indicated in program tracking data. Summary statistics of the Evaluators' field measurements are as follows:

- Mean: 299 (22.9%)
- Median: 58 (4.4%)

Most homes were within reasonable range of *ex ante* estimates. However, there were some low outlier homes which result in an average *ex post* leakage measurement that is 22.9% higher. These findings reduced savings for this measure accordingly.

3.3.1.2 Deemed Savings Revision

Deemed savings parameters were revised significantly for this measure. The Evaluators found that deemed savings used by program staff were not within reasonable range for this measure.

Table 3-8 Air Infiltration Savings Multipliers

Heating Type	*Ex Ante*	*Ex Post*	*% Reduction*
Natural Gas Furnace	.346	.327	5.5%
Electric Resistance	1.751	.933	46.7%
Air Source Heat Pump	1.064	.638	40.0%

3.3.1.3 Air Sealing Savings Results

The savings resulting from this revision to deemed parameters and application of field results are summarized in Table 3-9 and Table 3-10.

Table 3-9 Expected and Realized Air Sealing Savings – New Orleans

Heating Type	*Expected kWh Savings*	*Realized kWh Savings*	*kWh Realization Rate*	*Expected Peak kW Savings*	*Realized Peak kW Savings*	*Peak kW Realization Rate*
Natural Gas Furnace	53,218	21,757	41%	51.38	18.58	36%
Electric Resistance	194,807	105,111	54%	66.59	31.53	47%
Air Source Heat Pump	7,407	6,516	88%	4.34	2.86	66%
Total	255,432	133,384	52%	122.32	52.97	43%

Table 3-10 Expected and Realized Air Sealing Savings - Algiers

Heating Type	*Expected kWh Savings*	*Realized kWh Savings*	*kWh Realization Rate*	*Expected Peak kW Savings*	*Realized Peak kW Savings*	*Peak kW Realization Rate*
Natural Gas Furnace	13,263	6,846	52%	12.81	5.85	46%
Electric Resistance	25,201	14,455	57%	8.35	4.34	52%
Air Source Heat Pump	0	0		-	-	
Total	38,464	21,302	55%	21.16	10.18	48%

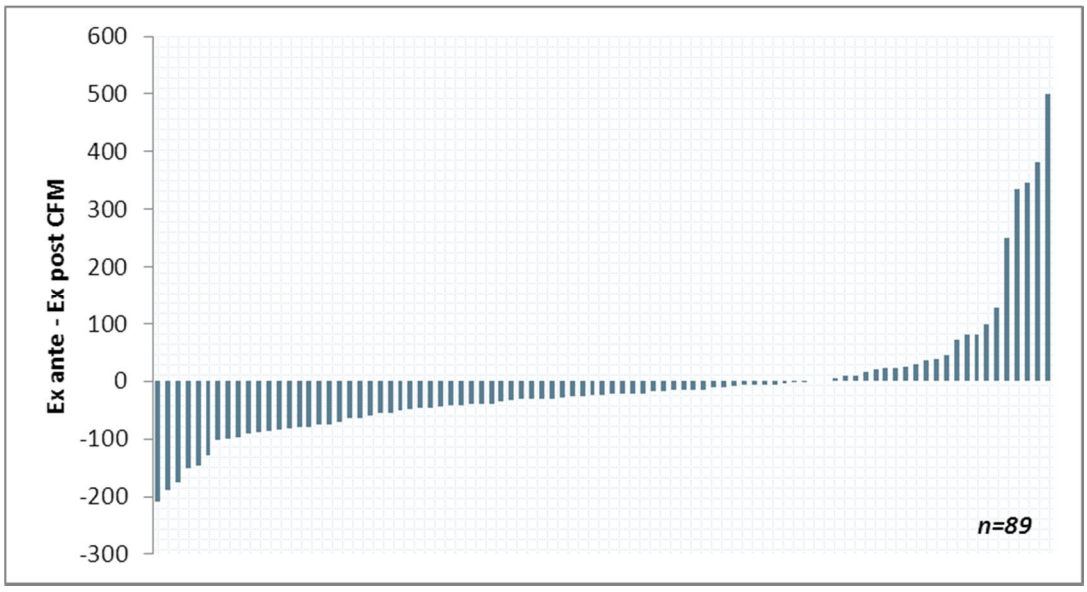
3.3.2 Duct Sealing

3.3.2.1 Field Data Collection

The Evaluators conducted on-site testing at a sample of 89 residencies that received duct sealing. This sample was comprised of 67 HPwES sites and 22 Assisted HPwES sites. During these site visits, the Evaluators' field staff conducted blower door testing in an effort to validate post-retrofit leakage estimates indicated in program tracking data. The Evaluators did not make any changes to pre-retrofit data; the evaluation began with three months remaining in PY5 and as such it was not feasible to conduct baseline testing.

The results of the Evaluators' field testing are summarized in Figure 3-2. In this figure, results are organized such that homes with verified leakage that is lower than shown in tracking data (i.e., homes with realization greater than 100%) are at the left end of the graph and homes with verified leakage higher than shown in tracking data (i.e., homes with realization less than 100%) are on the right. The Evaluators found that 28.4% of tested homes had higher leakage than shown in program tracking, while 71.6% had lower leakage.

Figure 3-2 Dust Sealing Field Testing Results



The Evaluators' field testing found that average post-retrofit leakage was lower than indicated in program tracking data. Summary statistics of differences between the Evaluators' field measurements and values listed in tracking data are as follows:

- Mean: -9.6 (4.2%)
- Median: -23.0 (10.1%)

Most homes were within reasonable range of *ex ante* estimates. However, there were some high outlier homes which result in an average *ex post* leakage measurement that is 4.2% lower. These findings increased savings for this measure accordingly.

3.3.2.2 Duct Sealing Savings Results

The savings resulting from this revision to deemed parameters and application of field results are summarized in Table 3-11 and Table 3-12.

Table 3-11 Expected and Realized Duct Sealing Savings – New Orleans

Heating Type	*Expected kWh Savings*	*Realized kWh Savings*	*kWh Realization Rate*	*Expected Peak kW Savings*	*Realized Peak kW Savings*	*Peak kW Realization Rate*
Natural Gas Furnace	584,367	1,277,654	218.6%	278.94	263.22	94.4%
Electric Resistance	2,334,398	2,458,348	105.3%	300.20	504.80	168.2%
Air Source Heat Pump	32,716	35,945	109.9%	6.41	9.69	151.2%
Total	2,951,481	3,771,946	127.8%	585.56	777.71	132.8%

Table 3-12 Expected and Realized Duct Sealing Savings - Algiers

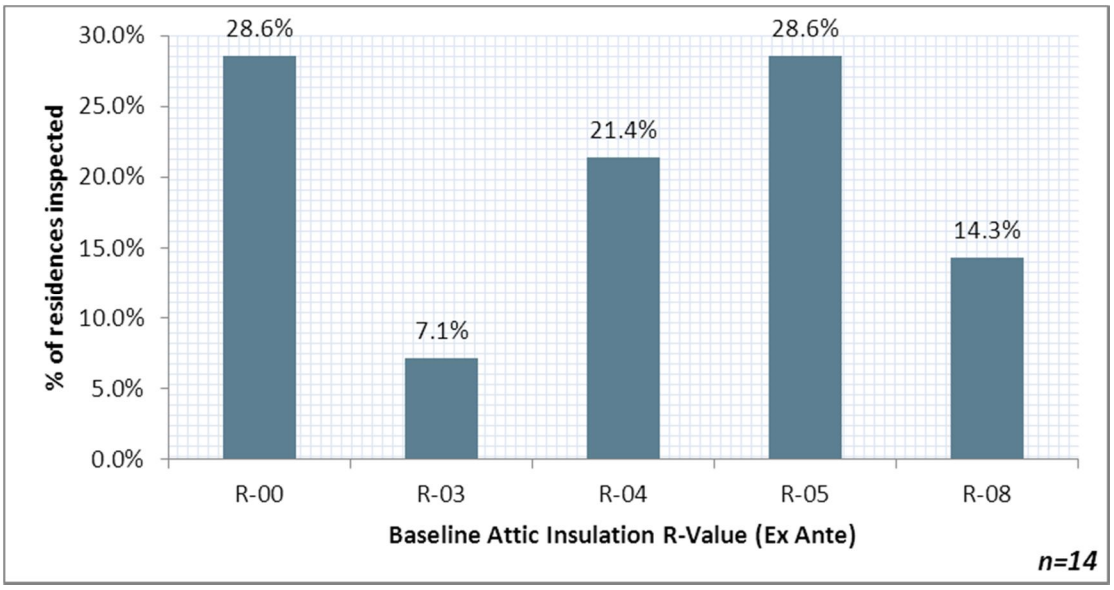
Heating Type	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	Peak kW Realization Rate
Natural Gas Furnace	99,814	228,991	229.4%	35.64	44.84	125.8%
Electric Resistance	224,823	238,334	106.0%	28.86	50.02	173.3%
Air Source Heat Pump	0	0	NA	0.00	0.00	NA
Total	324,637	467,326	144.0%	64.50	94.85	147.1%

3.3.3 Attic Insulation

3.3.3.1 Field Data Collection

The Evaluators conducted on-site inspection at a sample of 14 residencies that received attic insulation. Figure 3-3 summarizes the baseline R-values listed in program tracking for the sampled attic insulation sites.

Figure 3-3 Baseline R-Value for Inspected Attic Insulation Projects



One of the primary goals of on-site inspection was to identify any preexisting insulation. Due to the timing of the evaluation, pre-inspections were not feasible. However, for attic insulation projects it is not uncommon for preexisting insulation to be left in place, with new insulation installed over it. The Evaluators found that two of the four R-0 sites had preexisting installation. This insulation was damaged and in need of repair, but use of R-0 as the baseline insulation level was not appropriate. Based on field data findings for these two homes, the Evaluators estimated that the baseline R-value was R-9 for these two locations.

This effect was mitigated by corrections made by the Evaluators to deemed savings calculations. The Evaluators found that the savings calculations for the HPwES

Program did not correspond with deemed documentation, and the cause of the errors was unknown to program implementation staff. It was the Evaluators' conclusion that this was due to a back-end calculation error in CLEAResult's Catalyst system. This error was not found in the Assisted Home Performance with ENERGY STAR Program calculations. Verified savings for this measure are provided in Table 3-13 and Table 3-14.

Table 3-13 Expected and Realized Duct Sealing Savings – New Orleans

Heating Type	*Expected kWh Savings*	*Realized kWh Savings*	*kWh Realization Rate*	*Expected Peak kW Savings*	*Realized Peak kW Savings*	*Peak kW Realization Rate*
Natural Gas Furnace	49,295	74,416	151%	33.25	65.76	198%
Electric Resistance	165,490	201,936	122%	35.12	70.69	201%
Air Source Heat Pump	6,853	10,232	149%	3.02	5.70	189%
Total	221,638	286,583	129%	71.39	142.15	199%

Table 3-14 Expected and Realized Duct Sealing Savings - Algiers

Heating Type	*Expected kWh Savings*	*Realized kWh Savings*	*kWh Realization Rate*	*Expected Peak kW Savings*	*Realized Peak kW Savings*	*Peak kW Realization Rate*
Natural Gas Furnace	3,421	7,428	217%	3.25	6.77	208%
Electric Resistance	27,461	33,318	121%	5.94	11.70	197%
Air Source Heat Pump	0	0	NA	0	0	NA
Total	3,421	7,428	217%	3.25	6.77	208%

3.4 Verified Gross Savings

Realized savings is presented by program channel in Table 3-15 through Table 3-16.

Table 3-15 Gross Realization Summary – New Orleans

Measure	***Number Homes***	***Expected kWh Savings***	***Expected kW Savings***	***Verified kWh Savings***	***Verified kW Savings***	***Realization***	
						kWh	***kW***
Duct Sealing	873	2,951,481	583.26	3,771,946	777.71	128%	133%
Air Sealing	365	255,432	122.32	133,384	10.18	52%	43%
Ceiling Insulation	85	221,638	71.39	286,583	142.15	132%	201%
Floor Insulation	2	2,449	0.51	2,439	.74	100%	145%
Wall Insulation	3	14,469	3.33	21,116	3.93	146%	118%
	Total:	3,445,469	780.81	4,215,468	934.71	122%	120%

Table 3-16 Gross Realization Summary – Algiers

Measure	Number Homes	Expected kWh Savings	Expected kW Savings	Verified kWh Savings	Verified kW Savings	Realization	
						kWh	kW
Duct Sealing	873	324,637	64.5	467,326	94.85	144%	147%
Air Sealing	365	38,464	21.16	21,302	10.18	55%	48%
Ceiling Insulation	85	30,883	9.19	40,746	18.47	132%	201%
Floor Insulation	0	0	0	0	0	NA	NA
Wall Insulation	0	0	0	0	0	NA	NA
	Total:	393,984	94.85	529,374	123.50	134%	130%

3.5 Estimation of Net Savings

Participant survey responses were used to estimate the net energy impacts of the program. The program net savings are equal to gross savings, less savings associated with free ridership, plus participant spillover savings.

In total, 57 program participants completed the survey. Two responses were removed from the net savings analysis because of errors that occurred during the administration of the survey. Thus, the final number of survey respondents used in the analysis was 55.

3.5.1 Estimation of Free Ridership

The objective of the free ridership analysis is to estimate the share of program activity would have occurred in the absence of the program. To accomplish this, the Evaluators administered a survey to program participants that contained questions regarding the participants' plans to implement the incentivized measures and the likelihood of implementing those measures in the absence of program incentives and informational support. Program participants were asked questions regarding:

- Whether or not they had plans to complete the project and if they could afford to complete it without the program discount;
- The likelihood of completing the project without the discount or the incentivized assessment;
- The timing of the project in the absence of the program.

Participant responses to these questions were used to calculate three scores corresponding to the presence of prior plans, the likelihood of completing the project in the absence of the program, and the timing of that project if it had been completed.

3.5.1.1 Prior Plans Score

Respondents were scored as 1 on the prior plans score if both of the following were true:

- The participant had plans to complete the project prior to learning about the program.
- The participant indicated that they would have been financially able to complete the project had a discount or rebate not been provided.

Respondents that did not have prior plans and could afford the measures were not deemed to be free riders.

3.5.1.2 Likelihood of Project Completion Score

The score reflecting the likelihood of completing the project in the absence of the program was based on the following questions:

- Prior to learning about the program, did you have plans to have an energy assessment of your home performed?
- How likely is it that you would have completed the same < MEASURE> project that you completed through the program if the rebate was not available?
- How likely is it that you would completed the same < MEASURE> project had it not been recommended through the energy assessment of your home?

The first question assesses the existence of prior plans to have the assessment performed while the second and third questions assess the likelihood of the customer implementing the project in the absence of the rebate and energy assessment. A score was assigned to each response for the second and third questions as follows:

- Very likely: 1
- Somewhat likely: .75
- Neither particularly likely or unlikely: .5
- Somewhat unlikely: .25
- Very unlikely: 0

The likelihood score is equal to either:

- If the participant did not have an assessment performed, or had prior plans to have an assessment performed, the score based on the rating for the likelihood of completing the project without the discount.

- If the participant had an assessment and did not have prior plans to have an assessment, the score is based on the minimum of the following two scores:
    - The likelihood of completing the project without the assessment; and
    - The likelihood of completing the project without the discount.

3.5.1.3 Timing Score

To account for the impact the program may have had on project timing, the likelihood score was multiplied by a timing score. The timing score was developed from responses to a question on when the participant might have completed a project in the absence of the program. Specifically, timing was scored as follows:

- Project would have been completed in 0 to 6 months: 1
- Project would have been completed in 6 months to a year: .67
- Project would have been completed in 1 to 2 years: .33
- Project would have been completed in more than 2 years: 0

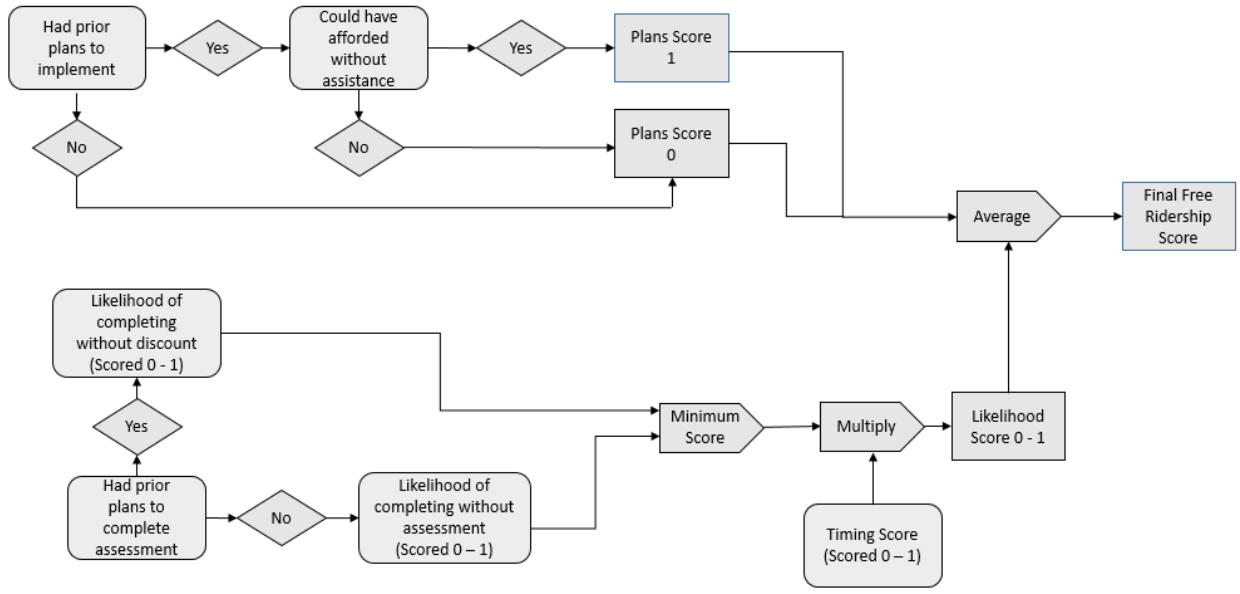
3.5.1.4 Final Free Ridership Score

The final free ridership score is equal to the following:

*Free Ridership = Average (Plans Score + Likelihood Score * Timing Score)*

The procedures used to estimate free ridership are summarized below in **Error! Reference source not found.**.

Figure 3-4 Summary of Free Ridership Scoring Algorithm



3.5.2 Estimation of Participant Spillover

To estimate participant spillover impacts, participant survey respondents were asked if they had purchased any additional items because of their experience with the program without receiving an incentive.

Participants that indicated one or more energy efficiency purchases were asked additional questions about what was purchased and the number of units purchased to estimate the savings impact. Additionally, the following two questions were asked to determine whether the energy savings resulting from measures that were attributable to the program:

- On a scale of 0 to 10, where 0 represents "not at all important" and 10 represents "extremely important", how important was the experience with the program in your decision to purchase the items you just mentioned?
- On a scale of 0 to 10, where 0 represents "not at all likely" and 10 represents "extremely likely," how likely would you have been to purchase those items if you had not participated in the program?

If the average of the first response and 10 – the second response is 7 or greater, the savings associated with the measures were attributed to the program.

Two respondents reported additional measures that met the attribution criteria. The kWh and peak kW estimates are summarized in Table 3-17.

Table 3-17 Participant Reported Spillover Impacts

Measure	*Per Unit kWh Estimate*	*Per Unit Peak kW Estimate*	*Total kWh*	*Total Peak kW*
CFLs[1]	23.06	.0038	230.6	.0375
LEDs[2]	15.38	.0025	153.8	.025
Energy Efficient Clothes Washer and Dryer[3]	284	.0460	284	.046
Total			668	.11

1. Assumed 13 W CFL (900 lumens), 793 annual operating hours, 1.25 demand factor, .97 energy factor, and .10 coincidence factor.
2. Assumed 9 W LED, 793 annual operating hours, 1.25 demand factor, .97 energy factor, and .10 coincidence factor.
3. Based on deemed values from Arkansas Technical Resource Manual, version 3.0. Participant reported electric water heating. Assumed an electric dryer since the respondent had electric water and space heating.

3.5.3 Net Savings Results

Free ridership for the program was estimated by weighting each participant's response by the associated verified gross kWh savings or peak kW reductions for the measure. Program level spillover was estimated by applying a ratio of the survey respondent

reported spillover savings to the total verified gross savings for survey respondents to the program gross savings values.[7] Table 3-18 and Table 3-19 summarize the program net kWh savings and peak kW demand reduction impacts of the HPwES Program.

Table 3-18 Summary of Verified Net Savings

Utility	Expected kWh Savings	Verified Gross kWh Savings	Free Ridership	Spillover	Verified Net kWh Savings	Net to Gross Ratio
ELL Algiers	393,984	529,374	65,374	1,490	465,490	87.9%
ENO	3,445,469	4,215,468	515,922	11,793	3,711,339	88.0%
Total	3,839,453	4,744,842	581,296	13,283	4,176,829	88.0%

Table 3-19 Summary of Verified Net Peak Demand Reductions

Utility	Expected Peak kW Reductions	Verified Gross kW Reductions	Free Ridership	Spillover	Verified Net kW Reductions	Net to Gross Ratio
ELL Algiers	94.85	123.5	17.99	0.21	105.72	85.6%
ENO	780.81	934.71	137.62	1.73	798.82	85.5%
Total	875.66	1058.21	155.61	1.95	904.54	85.5%

3.5.3.1 Measure Level Free Ridership Results

Table 8-14 summarizes the average free ridership scores by measure. The results presented show markedly higher free ridership for insulation as compared to the other two program measures. However, it should be noted that free ridership estimates for this measure are based on a limited number of responses.

Aside from potential sampling error, it is possible that participants were generally more likely to be aware of insulation issues with their home than air or duct sealing because assessment of attic or ceiling insulation levels does not require any diagnostic equipment. As a result of this higher level of awareness, the participants may be more likely to implement insulation improvements compared to air and duct sealing improvements.

[7] Net savings estimates were based on all survey respondents and the same value was applied to ENO and ELL Algiers projects.

Table 3-20 Average Free Ridership by Measure

Measure	Number of Responses	Average Free Ridership
Air sealing	39	11%
Duct sealing	42	10%
Insulation	8	40%

3.6 Process Findings

This chapter presents the results of the process evaluation of the HPwES Program. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

The process chapter begins with an overview of the program. This is followed by a discussion of the methodological approach used in the evaluation. A summary of findings and recommendations for program improvement follow the discussion of the methodology. This discussion is followed by detailed findings of the evaluation activities.

3.6.1 Data Collection Activities

The process of evaluation of the HPwES Program included the following data collection activities:

- *The Companies Program Staff Interviews*. The Evaluators interviewed the Companies' Energy Smart Program manager. This interview was to collect information from program staff on program design, objectives, and operations.
- *CLEAResult Program Staff Interviews*. The Evaluators interviewed staff at CLEAResult, who implements the program. The purpose of the interview was to collect information on implementation activities and clarify questions about program design or processes.
- *Participant Surveying*. The Evaluators surveyed a sample of program participants. These surveys addressed issues including participant satisfaction with the program offerings, demographics, and other contextual issues regarding the participation process.
- *Contractor Interviews*. The Evaluators interviewed a sample of contractors that completed projects through the program. The interviews addressed topics such as contractors' perception and understanding of the program participation process, efforts to market the program, perception of barriers to participation that their customers may face, and satisfaction with the program.

The quantities completed are summarized in Table 3-21.

Table 3-21 HPwES Process Evaluation – Summary of Data Collection

Activity	Sample Size
ENO Staff	1
CLEAResult Staff	1
Participant Survey	55
Contractor Interviews	6

3.6.1.1 Program Staff Interviews

Interviews were completed with one CLEAResult staff member and one staff member at the Companies. The interviews provided information on program operations and covered the following topics:

- Program goals and objectives;
- Marketing and outreach;
- Communication processes;
- Program management and staffing; and
- Quality control and verification processes.

3.6.1.2 Participant Survey

Surveys were administered to samples of participants to gain insight into the participants' experience with the program. Respondents answered questions on the following topics:

- Source of program awareness;
- Their decision to participate and complete an efficiency project;
- Experience with the participation process; and
- Satisfaction with various elements of the program and the program overall.

In total, 57 participants completed the survey.

3.6.1.3 Contractor Interviews

Interviews were completed with program contractors that deliver the energy assessments and implement the program measures. The interviews covered the following topics:

- Promotion of the program;
- Program marketing;
- The program participation process;
- Training and communication with program staff;

- Business and market impact; and
- Overall impressions and satisfaction.

Six interviews were completed with program contractors.

3.6.2 Program Overview

The HPwES Program provides financial incentives for home energy assessments and energy efficiency measures to reduce energy consumption among residential customers. The program is available to any of the Companies' residential customer who lives in an existing single-family home, duplex, triplex, or fourplex with an account in good standing.

The Companies customers are provided $75 discount on the cost of an approved contractor provided home energy assessment. The discount amount is intended to cover the full cost of the walkthrough assessment of the residence. Based on the walkthrough assessment, customers are provided recommendations for improving the efficiency of their home. Customers may also elect to have blower door testing and duct leakage testing performed. These tests are required to qualify for discounts on building envelope and duct sealing, respectively.

Upon completion of the energy assessment, customers have up to six months to receive incentives for energy saving home improvements. Incentives are summarized in Table 3-22.

Table 3-22 HPwES Incentives

Measure	***Incentive Amount***
Duct sealing	Up to $1.50 per CFM 25 reduced
Air sealing	Up to $0.13 per CFM 50 reduced
Ceiling insulation	Up to $.35 / ft.^{2}

3.6.3 Detailed Findings

3.6.3.1 HPwES Participation Data Quality Review

The Evaluators reviewed the final program participant tracking data submitted by CLEAResult. While most of the included fields were free of missing data and contained valid records, a few issues were noted:

- First or last name was missing for 2% of projects.
- Phone number was missing for 18% of projects.
- Two ceiling insulation projects had baseline R-values greater than 8 (outside the scope of program incentive guidelines).

- Four measures for which records indicated an incentive payment but no energy savings.
- 21% of duct sealing projects had total flow exceeding 35% (the maximum value for which the procedures used to estimate expected savings are valid).

3.6.3.2 Analysis of Participation Data

Table 3-23 displays program activity by project type. As shown, most of the expected energy savings (85%) resulted from duct sealing. Based on interviews with program staff and program contractors, duct sealing was frequently implemented because it could typically be completed at no cost to program participants. Despite the incentives covering the full project costs, the expected energy savings achieved through duct sealing came at a relatively low cost ($0.10 per kWh saved, compared to $0.17 and $0.14, for air sealing, and insulation, respectively). However, because the realization rate for insulation was relatively high, the cost of verified insulation savings was lower than the cost of the duct sealing savings.

Table 3-23 Program Activity by Measure Implemented

Measure Type	*Expected Savings (kWh)*	*Share of Program Savings*	*$ per kWh in Expected Savings**	*$ per kWh in Verified Savings**
Air sealing	293,896	8%	$0.17	$0.19
Duct sealing	3,276,117	85%	$0.10	$0.09
Insulation	269,439	7%	$0.14	$0.08

*Excludes savings for measures that were entered in data as a bulk record comprised of multiple projects.

Figure 3-5 through Figure 3-7 displays the relationship between the incentive payments and the verified kWh savings. As shown, incentive payments closely correspond to project savings. As shown in Figure 3-6 the relationship between duct sealing incentives and savings varies for homes that have electric resistance heating or natural gas heating, with more savings being generated per incentive dollar for electric resistance heating.

Figure 3-5 Relationship between Air Sealing Incentives and Verified kWh Savings

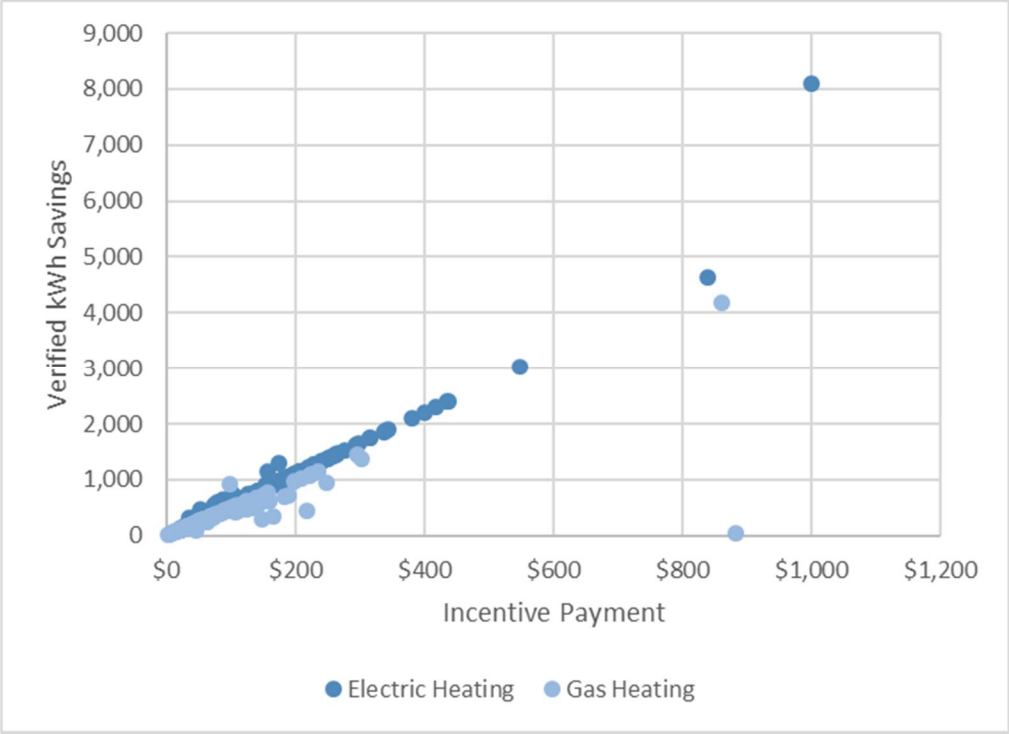


Figure 3-6 Relationship between Duct Sealing Incentives and Verified kWh Savings

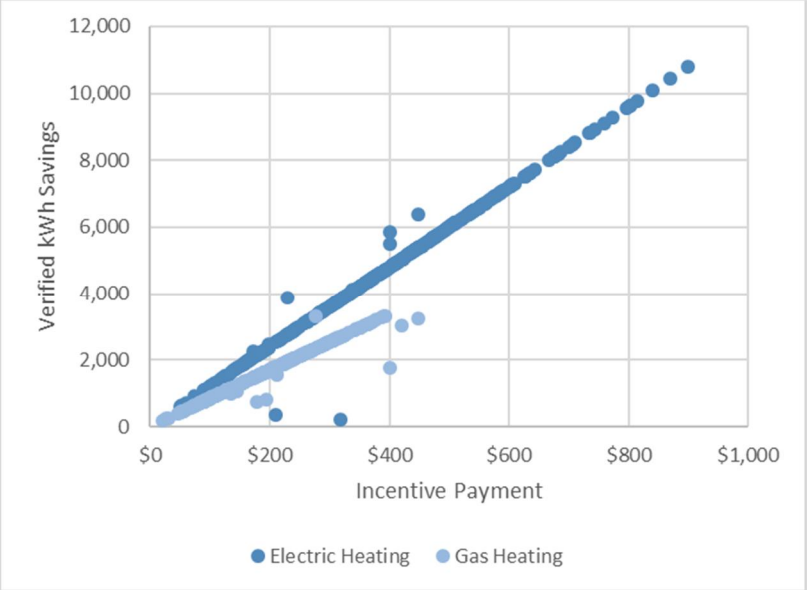


Figure 3-7 Relationship between Insulation Incentives and Verified kWh Savings

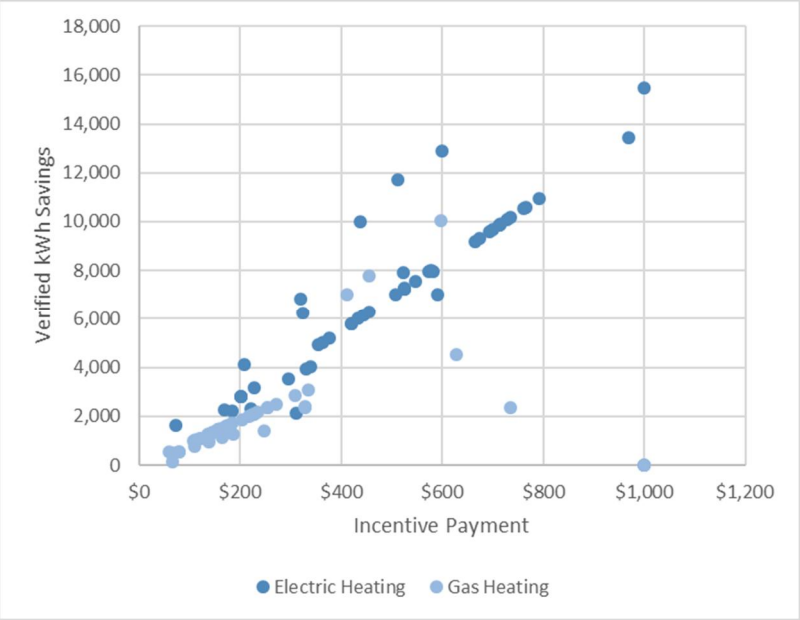


Table 3-24 summarizes program activity by number of measures implemented. As shown, more than one-half of program projects consisted of a single measure. The table also shows the percent of homes that have electric resistance heating. As shown, rates of electric resistance heating were higher in the homes that implemented more than one measure. This suggests that the number of measures implemented may, in part, be a function of the expected savings to be generated. However, it is worth noting that a significant share of sites at which a single measure was implemented also had electric resistance heating. This finding suggests that there may be additional potential for multiple measure projects that is not being realized in some of these homes.

Table 3-24 Average Expected Savings and Prevalence of Electric Resistance Heating by Number of Measures Implemented

Number of Measures Implemented	***Number of Projects***	***Average Expected kWh Savings***	***Percent of Participants with Electric Resistance Heating***
1	56%	2,714	49%
2	43%	4,361	64%
3	1%	6,244	63%

How the customer engaged with the program, that is, whether or not an assessment was performed, was also related to the number of measures implemented and the expected savings. As shown, most homes received an assessment and the number of

measures implemented was slightly higher for these participants. Additionally, the savings was higher for those participants that received an energy assessment.

Table 3-25 Number of Measures and Expected Savings by Engagement Type

Engagement Type	Percent of Projects	Average Number of Measures	Average Expected kWh Savings
Had assessment	85%	1.5	3,511
Did not have assessment	15%	1.4	3,126

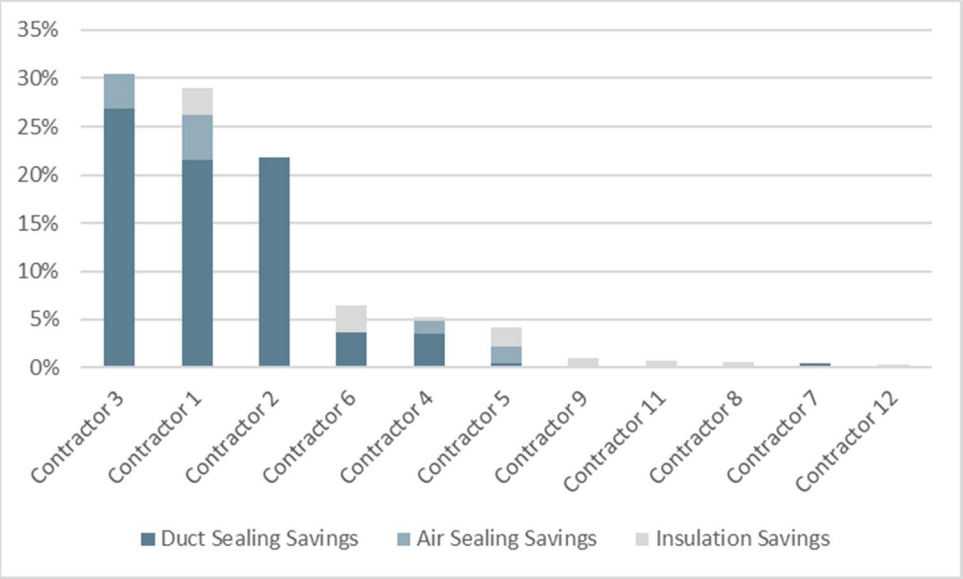
Twelve contractors completed projects through the program during the program year. The Evaluators summarized the number and share of assessment and measure installation projects completed by these firms. The purpose of the analysis was to determine if some contractors were more aggressively completing assessments but not generating energy saving projects. The results are summarized in Table 3-26 and indicate that this was not the case. For most contractors, the share of sites at which assessments were completed is matched or exceeded by the share of sites at which energy saving projects were completed as well.

Table 3-26 Share of Assessment Projects and Measure Projects

Contractor	Number of Assessments	Percent of Assessments	Number of Energy Saving Projects	Percent of Savings Projects
Contractor 1	210	31%	269	35%
Contractor 2	177	26%	159	21%
Contractor 3	134	20%	134	18%
Contractor 4	69	10%	74	10%
Contractor 5	44	6%	50	7%
Contractor 6	36	5%	57	7%
Contractor 7	3	0%	3	0%
Contractor 8	2	0%	4	1%
Contractor 9	2	0%	9	1%
Contractor 10	0	0%	1	<1%
Contractor 11	0	0%	3	<1%
Contractor 12	0	0%	2	<1%

Three program contractors accounted for approximately three-quarters of program savings. As shown below in Figure 3-8, these contractors generated most of their savings through duct sealing projects, including one firm that only completed duct sealing projects

Figure 3-8 Share of Expected kWh Savings by Contractor



3.6.3.3 Comparison with Regional Whole House Programs

The Evaluators reviewed multiple residential, regional whole house programs to assess how the Energy Smart Program compared in terms of audit processes, available measures, eligibility, and incentives.

Table 3-27 provides a summary of the programs reviewed. Each of these programs provides an onsite whole house audit, although they vary in their comprehensiveness. The Energy Smart program provides a discount that generally covers the cost of a walkthrough assessment Three of four programs have a direct install component which includes CFLs and/or water saving devices.

The eligible measures offered by the Energy Smart Program are generally in-line with other program offerings from around the county, which emphasize insulation and sealing, but also include direct install measures, HVAC, and heat pump replacement incentives. The biggest difference for incentives is the amount offered for the audit where the incentives range from $75 to $300. TVA's eScore program offers the same incentive, but the costs are paid for by the customer and rebated rather than discounted by the contractor. SWEPCO Arkansas' program has the highest audit incentive as well as the highest incentive amounts for measures in their program.

Table 3-27 Other Residential Energy Efficiency Programs

Utility	*Audit Component*	*Direct Install*	*Program Measures*	*Incentive Amount*	*Eligibility Criteria*
Energy Smart Home Performance with Energy Star®	Walkthrough assessment of energy saving opportunities performed. Duct and envelope leakage testing required for duct and air sealing measures.	None	Air sealing, duct sealing, ceiling insulation.	Walkthrough energy assessment: $75 Up to $0.13/CFM50 reduction. Duct sealing: Up to $1.50/CFM 25. Ceiling insulation: Up to $0.35/sq.ft. installed area.	Residential customer of utility. Single-family home or a multifamily unit of no more than four units (renters and owners eligible).
SWEPCO Arkansas Residential Home Performance with ENERGY STAR®	Comprehensive energy assessment – diagnostic and combustion safety testing, and energy assessment report.	Faucet aerator, low-flow showerhead, advanced power strip, and CFLs	Attic insulation, central air conditioner, windows, duct sealing, air sealing, and electric water heating.	Comprehensive energy assessment: $300 Duct Sealing: $175-$325 Duct Insulation: $0.50/linear ft. of insulated duct Air Infiltration: $100 Ceiling Insulation: $0.25/sq.ft. Extra incentive: $100 bonus if 2 or more measures installed within six months of assessment.	Any residential dwelling served by SWEPCO – condominiums, apartments, townhomes, multifamily dwellings, manufacture, and mobile homes. Units must be occupied.
Oklahoma Gas & Electric Home Energy Efficiency Program (HEEP)	Cooling inspections and A/C tune-up.	N/A	Duct repair and tightening, duct sealing, and attic insulation.	Assessment: $85 A/C: One pound of A/C system refrigerant and filters. Duct sealing: up to $300. Attic insulation: Up to 30% of costs of additional insulation (max $500).	OG&E customers with central air conditioning.

Utility	*Audit Component*	*Direct Install*	*Program Measures*	*Incentive Amount*	*Eligibility Criteria*
Tennessee Valley Authority eScore Program	eScore evaluation ($75) – customized list of upgrades and rebates available.	CFLs (max 12)	Air sealing, attic insulation, duct sealing, HVAC, water heaters, and windows and doors.	Air sealing: 50% of total installation cost (max $200/home). Attic Insulation: 50% of total installation cost (max $250/home). Duct sealing: 50% of total installation cost (max $200). Heat Pump: $250/unit. Geothermal: $500. Central AC: $150/unit. Dual Fuel Heat Pump: $250/unit. Tune-up: $15/unit. Window Replacement: $25/window (max $500). Exterior Door: $50/door (max $300). Storm Windows: $12.50/window (max $250).	Single-family homeowners.

3.6.4 Program Design, Operations and Activities

The following sections describe operations and activities and were developed from reviews of program documentation and interviews with CLEAResult and the Companies staff.

3.6.4.1 Program Design and Objectives

The HPwES Program is designed to align with Department of Energy requirements to provide whole home retrofits. The program utilizes contractors with national certifications to provide energy assessments of customer homes to identify energy saving opportunities.

The primary program goal is to assist residential customers in achieving electric energy savings and peak demand reductions. Related to this goal is the objective of reaching

as many customers as possible through HPwES and the other Energy Smart programs, and to ensure that energy saving opportunities are available to low-income customers.

The program also has ancillary objectives related to educating customers and contractors about energy efficient technologies and home characteristics, and generally transforming the market for residential equipment and services.

Implementation staff also indicated that they are focused on achieving multi-measure retrofits in participating households to maximize the savings achieved for each participant. New strategies planned by staff to encourage multi-measure projects in PY6 are described in the section on contractor management.

Utility staff also emphasized the importance of customer satisfaction and ensuring that customers have a positive experience with the program.

Overall, both Entergy and CLEAResult staff indicated that the program is well designed to meet its goals and objectives.

The program greatly exceeded its energy saving goals for the program year. Staff attributed the high level of activity to multiple factors. One factor was that the introduction of the statewide incentive programs that has engaged a larger number of contractor firms in energy efficiency. Another factor, is that some firms have developed business models that allow them to develop duct sealing improvements at no cost to customers and as a result, were able to generate a large number of program projects. A third factor that explained the performance of the program is that the share of project sites with electric heating was greater than anticipated.

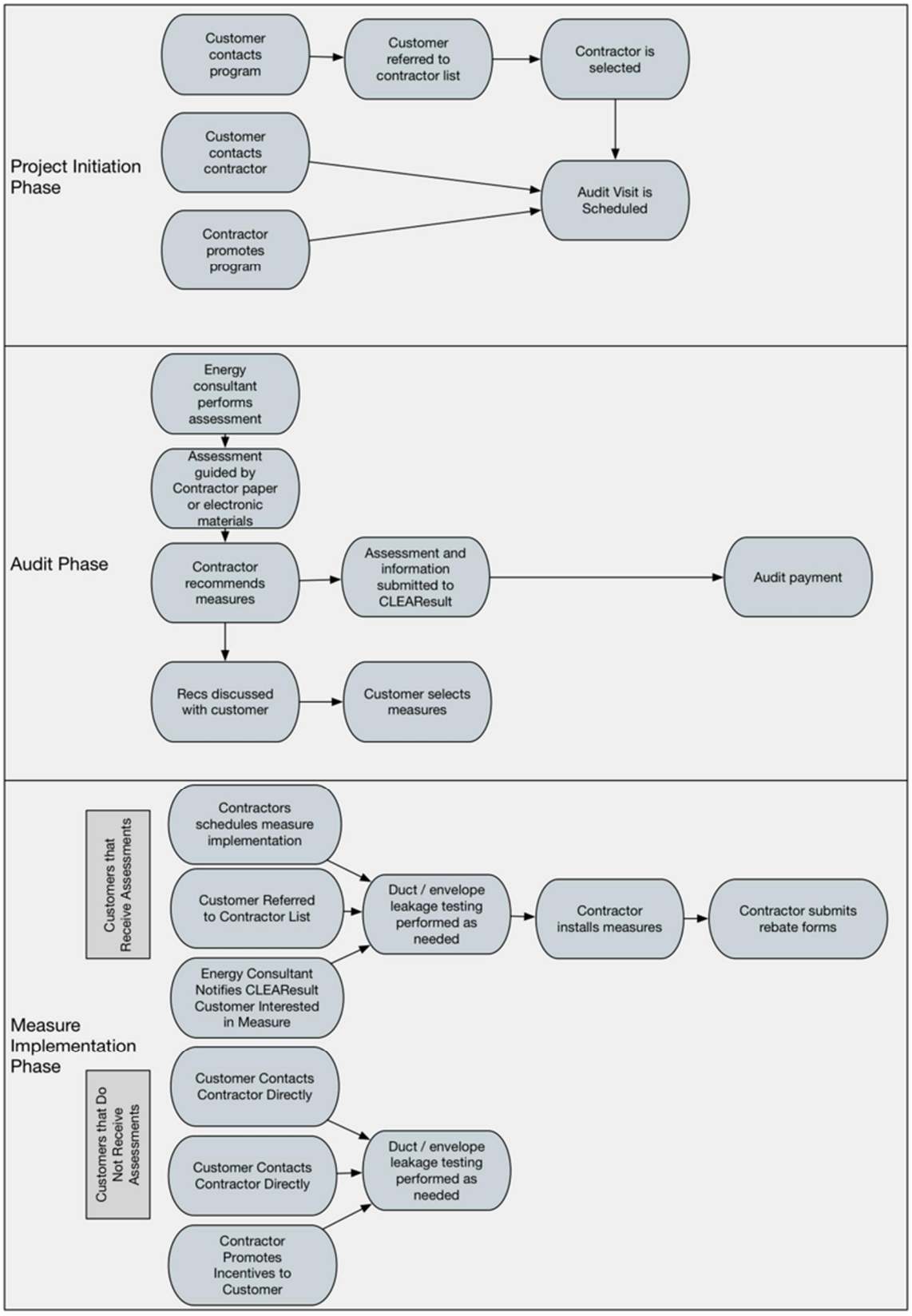
To accommodate the increased program activity, the program was able to divert funding from the Cool Saver program, which did not generate the savings anticipated, as well as from the lighting buy-down program, for which declining bulb prices allowed the program to decrease the amount of the buy down.

3.6.4.2 Program Participation Process

Figure 3-9 provides an overview of the participation process for the HPwES Program. Customers can receive an assessment that includes a walk-through of the residence to identify energy saving opportunities. Customers may also opt for additional performance testing such as testing for envelope or duct leakage. Completing the performance testing qualifies customers for air and duct sealing incentives.

Customers that do not elect to have a home energy assessment performed may also receive incentives for implementing the program measures. Customers receiving incentives for air sealing and duct sealing must complete the necessary performance testing before and after the implementation of the measures.

Figure 3-9 HPwES Program Participation Process



3.6.4.3 Program Marketing and Outreach

The program primarily relies upon contractors to promote the incentives for the energy assessments and measure. To assist contractor marketing efforts, marketing collateral is available in the form of electronic PDF documents that contractors can print and distribute to customers. These materials include a bi-fold brochure promoting the Energy Smart programs and three variations of co-branded advertisements that include space for contractors to provide their business name and contact information. Figure 3-11 and Figure 3-12 display the contents of the brochure and Figure 3-12 displays one of the three co-branded advertisements.

Figure 3-10 Front and Back of Energy Smart Bi-Fold Brochure

Figure 3-11 Interior of Energy Smart Bi-Fold Brochure

Figure 3-12 Example of Cobranded Advertisement Material

These materials contain key elements of effective program marketing. Specifically,

- A call to action, e.g., “It’s time to put your energy into saving money.”
- A summary of incentives available.
- Emphasis on ease of participation and assurance of quality work.
- Clear steps on how to participate.

- Mention of both energy saving benefits and non-energy benefits, namely improved home comfort.
- Contact information to learn more about the program or to initiate participation.

The availability of co-branded materials is also important. These materials help improve customers' perceptions of the credibility of the contractor.

The program is also promoted through the activities of other Energy Smart partners as well. Both the Energy Wise Alliance and Life City promote the Energy Smart program offerings through public events.[8]

Little direct outreach or broad advertisement of the HPwES Program is performed by CLEAResult or the Companies, which is appropriate given the success the program has had in achieving its goals.

Customers may also access the program website to learn about the HPwES Program.

3.6.4.4 Quality Control and Verification Processes

Staff indicated that a minimum of 10% of projects completed through the program receive verification. In practice, staff reported that most projects are verified. This heavy level of verification effort was deemed acceptable by program staff given the addition of some new contractors to the program.

During project verification visits, staff checks for consistency between reported performance testing, site information, and measure information. Additionally, customer satisfaction is assessed through periodic surveys of customers.

Overall, the verification activities described by program staff should effectively mitigate risk of poorly performed work leading to customer relations issues or verification failures.

3.6.4.5 Contractor Recruitment and Management

During PY5, the program had twelve contractor firms that participated in the program. The number of contractors that provided different program services during the program year is summarized in Table 3-28.

[8] See the School Kits Chapter for a summary of outreach performed by the Energy Wise Alliance.

Table 3-28 Services Provided by Contractor Firms

Service	Number of Contractor Firms
Any Service	12
Home Assessment	9
Insulation	8
Duct Sealing	9
Air Sealing	9

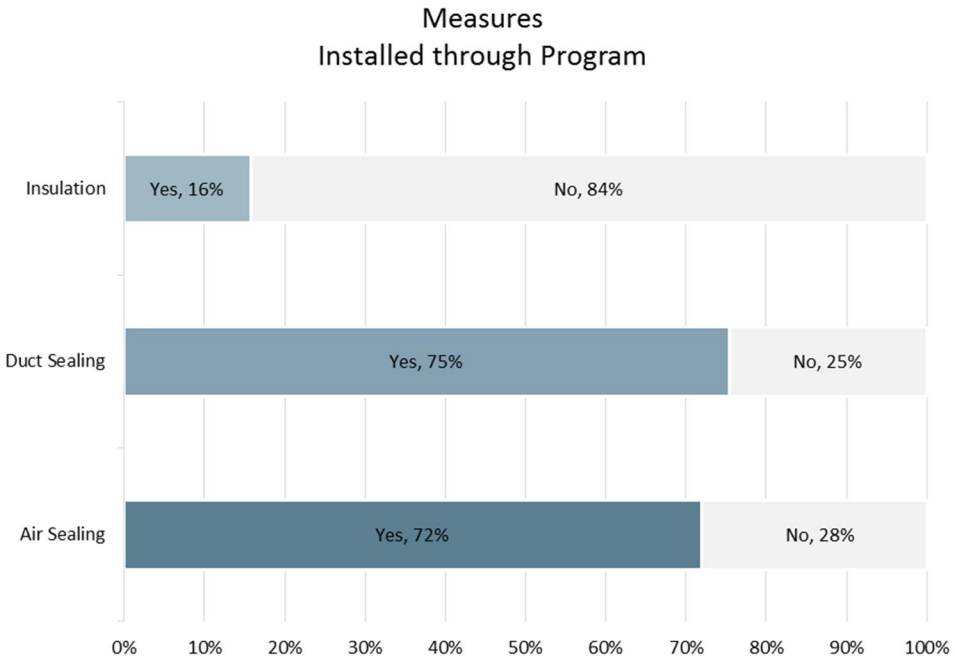
Contractors must provide evidence of competency such as current BPI Certification, RESNET Certification, or verifiable skills and knowledge to participate in the program. CLEAResult coordinates training and overall management of contractors with operations for the Companies' programs operating outside of New Orleans. Staff reported that no contractor training was provided during the program year for the New Orleans program specifically. The program is largely utilizing contractors that have operated in New Orleans in prior years, as well as new contractors that have become involved in the new statewide program and received training through those programs.

To better manage the rate of program activity in PY6, as well as encourage more comprehensive efficiency improvements of customer residences, the program will allocate a set number of homes to each contractor in PY6. By allotting a number of homes rather than a portion of the program incentive budget, this design change is intended to encourage contractors to implement multiple measures at each customer residence. Additionally, after PY6, contractors' allotment will be based on a scoring system that will use the number of measures implemented at each site during PY6, as well as other criteria, such as customer satisfaction and customer complaints.

3.6.5 Participant Survey Results

A total of 57 participants responded to the survey. Figure 3-13 summarizes the measures implemented through the program by the survey respondents. Seventy-two percent of participants received air sealing through the program, 75% revived duct sealing, and 16% received insulation.

Figure 3-13 Measures Implemented by Participants



3.6.6 Participant and Residential Demographics

Overall, program participants tended to own their homes, have relatively few household members, and a significant share reported household annual income of less than $25,000.

Table 3-29 Participant Home Demographics

Demographic Characteristic	***(n = 55)***
Average number of home residents	1.95
Percent with income of:[1]	
Less than $25,000 per year	35%
$25,000 to less than $50,000	16%
$50,000 to less than $75,000	13%
$75,000 or more	9%
Percent own home	89%

1. Total does not equal 100% because some respondents did not know their income or declined to state it.

Table 3-30 participant household characteristics. A majority of participants resided in an older (pre-1990) single family home with electric space heating. About one-half of homes had electric water heating and were larger than 1,500 square feet.

Table 3-30 Average Household size

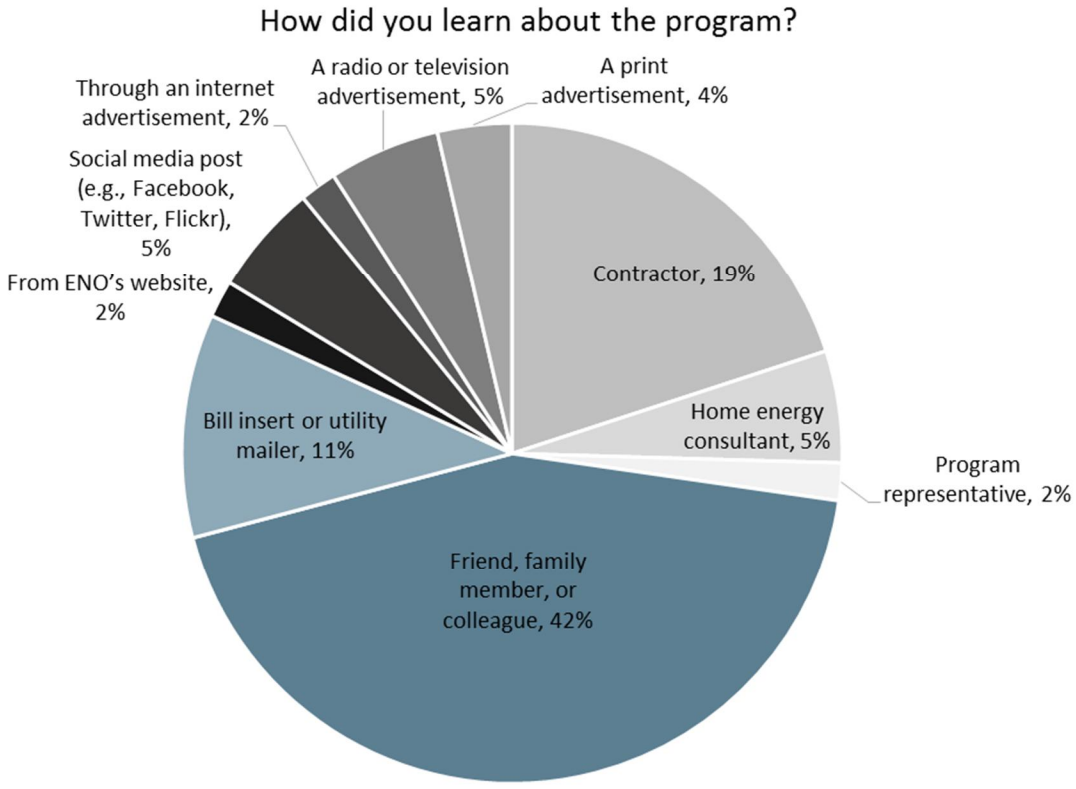
Residence Characteristic	***(n = 55)***
Percent Single Family Home[1]	82%
Percent electric space heating	72%
Percent electric water heating	56%
Percent of households built before 1990	68%
Percent with home size of:[2]	
Less than 1,000 ft.[2]	5%
1,001-1,500 ft.[2]	18%
1,501-2,000 ft.[2]	23%
Greater than 2,000 ft.[2]	23%
1.Consistent with program rules, none of the respondents reported living in a multifamily property of more than 4 units 2. Total does not equal 100% because some respondents did not know the size of their home or declined to state it.	

3.6.7 Program Awareness and Participation

Program participants were asked a series of questions about their awareness and participation in the program. As shown in Figure 3-14, the most common source of awareness of the program was through friends of colleagues (42%). Contractors were reported to be the source of awareness by 19%, and bill inserts or mailers were stated by 11% of program participants. Five percent of participants stated they heard about the program through either a home energy consultant, social media, or a radio/television advertisement. This indicates that word of mouth is the most important source of awareness of the program for participants, but program marketing efforts have also been successful.

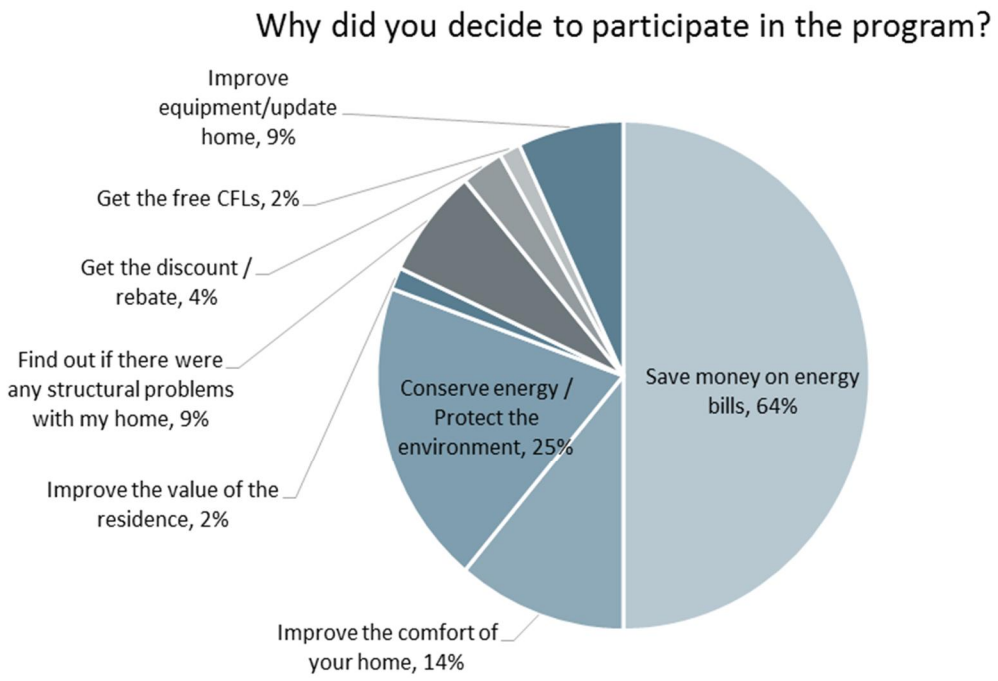
These responses indicate that word-of-mouth is a key factor contributing to awareness of the program and likely related to the maturity of the program and the length of time it has been offered.

Figure 3-14 Source of Program Awareness



Participants gave a range of reasons for participating in the program. As seen in Figure 3-15, the most often stated motivation was to save money or energy on electric bills, with 64% of participants giving this answer. Conserving energy, improving home comfort, and finding out about any structural issues with their homes were also common responses. One respondent reported that they wanted to receive free CFLs, which are not provided through the program. This participant was likely also a participant in the CFL Direct Install Program.

Figure 3-15 Reasons for Participation

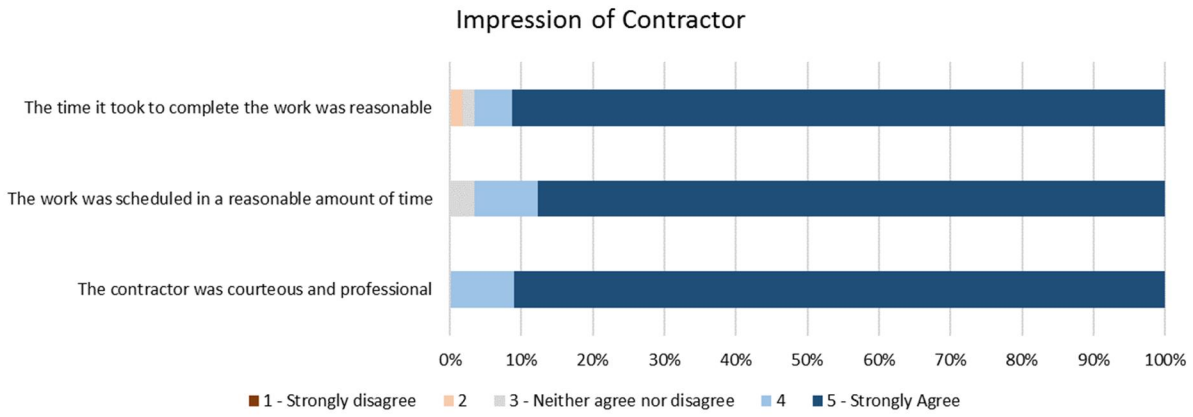


Participants were then asked if they had experienced any other benefits through the program other than energy or cost savings. Participants were allowed to give more than one answer. Of the eight respondents that stated they had experienced other benefits, four stated that their home is more comfortable, two stated their home is less drafty, one stated there was less noise, and one stated there were environmental benefits.

3.6.8 Participation Process

Overall, program participants were very satisfied with the contractors that installed the energy efficiency measures. Most participants thought that the work was scheduled and completed in a reasonable amount of time and that the contractor was courteous and professional.

Figure 3-16 Experience with Program Contractor

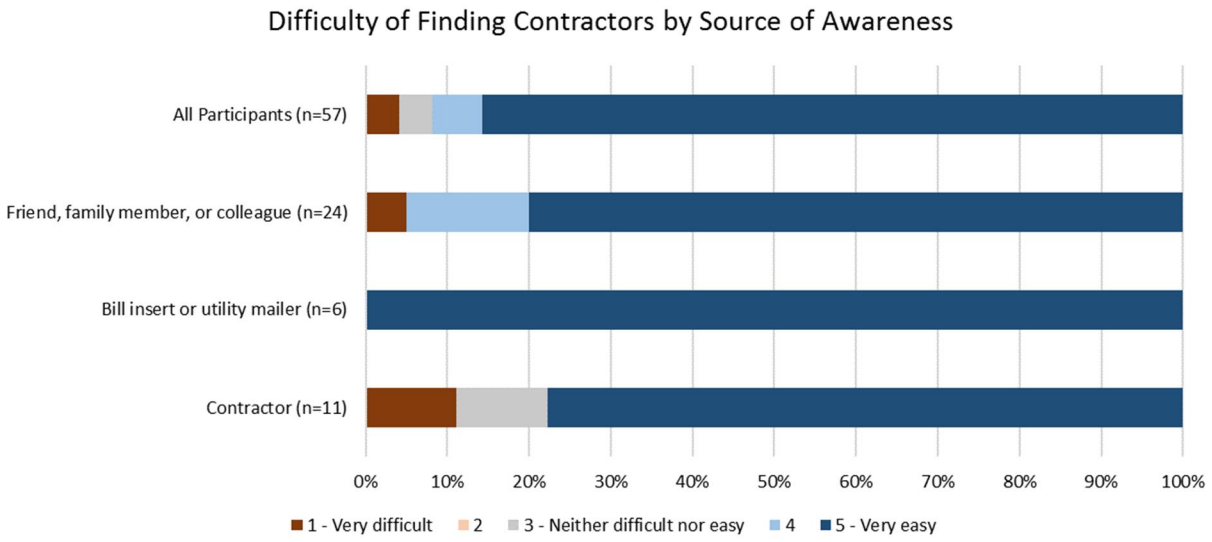


Participants were then asked about the difficulty in finding contractors who participated in the program. Overall, 92% of participants stated that it was easy or very easy to find participating contractors, with 86% stating that it was very easy. Two participants stated that it was neither easy nor difficult to find a contractor, and two participants stated that it was very difficult to find a contractor who participated in the program.

When broken down by the top three sources of initial program awareness, similar patterns are found. The six participants who heard about the program through bill insert of utility mailer stated that it was very easy to find a participating contractor. Most (95%) participants who heard of the program through friends or colleagues stated that it was somewhat or very easy to find a participating contractor, and one participant stated it was very difficult.

One of the participants that learned of the program through a contractor reported that it was difficult to find a program contractor. The difficulty may have occurred because the participant had difficulty finding a contractor to complete work performed on their home, but once found, the contractor informed him or her of the program.

Figure 3-17 Ease of Finding Participating Contractors by Source of Awareness

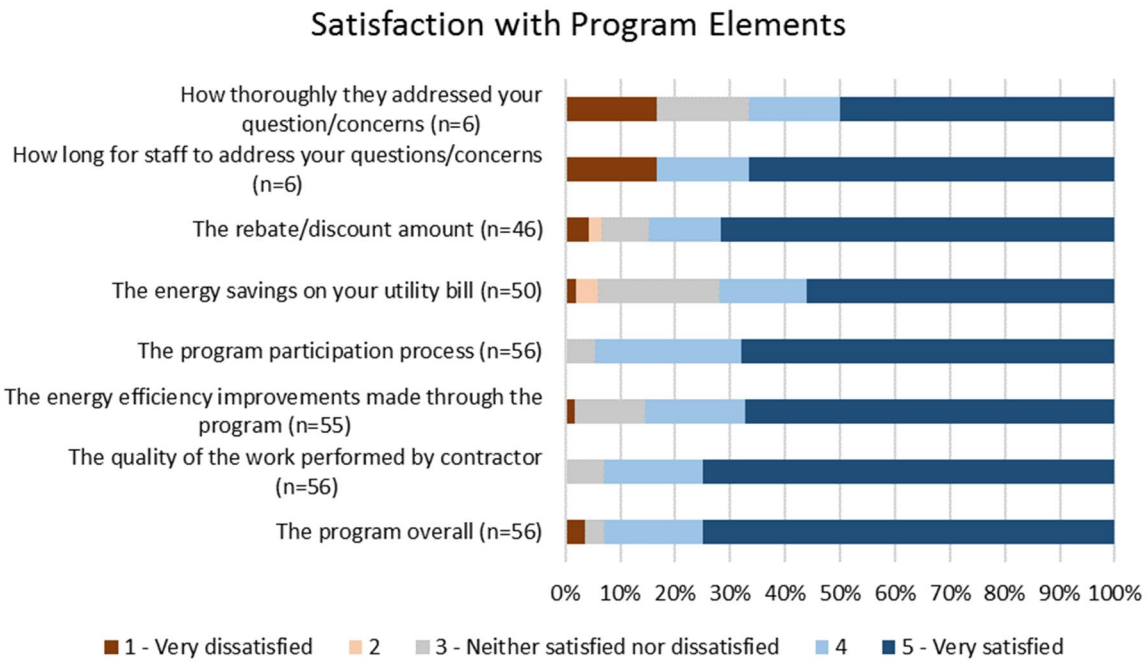


3.6.9 Program Satisfaction and Additional Benefits

Participants were asked a series of questions related to their overall experience with the program. Overall, program participants rated various elements and the program overall highly. The highest rated elements were the quality of work performed by the contractors, the program participation process, and the overall program. As shown in Figure 3-18, 95% of program participants stated that they were either satisfied or very satisfied with the program participation process, and 93% stated that they were satisfied or very satisfied with both the quality of work performed by contractors, and the program overall. Participants were least satisfied with the energy savings on their utility bill, with 72% of participants indicating satisfaction with this aspect. However, only 6% were dissatisfied with the energy savings realized.

The group of participants who contacted program staff over the course of the project were asked two additional questions regarding their experiences with staff. Although participants were generally satisfied with their interactions with staff, one participant was dissatisfied with both how thoroughly staff addressed their questions, and how long it took to address their questions and concerns.

Figure 3-18 Satisfaction with Program Components



Participants that stated some dissatisfaction with one or more aspects of the program were asked to describe why they were dissatisfied. Two participants stated that they had not seen the desired effect on reducing their electricity bill. These comments were as follows:

> *"They worked and I noticed they worked on my home and the numbers lowered a whole lot but when it came to the bill there wasn't a change. It didn't look like a change at all."*
>
> *"Not saving any money."*

Two respondents noted some dissatisfaction with the discount, either the amount or that they were not aware that one was received.

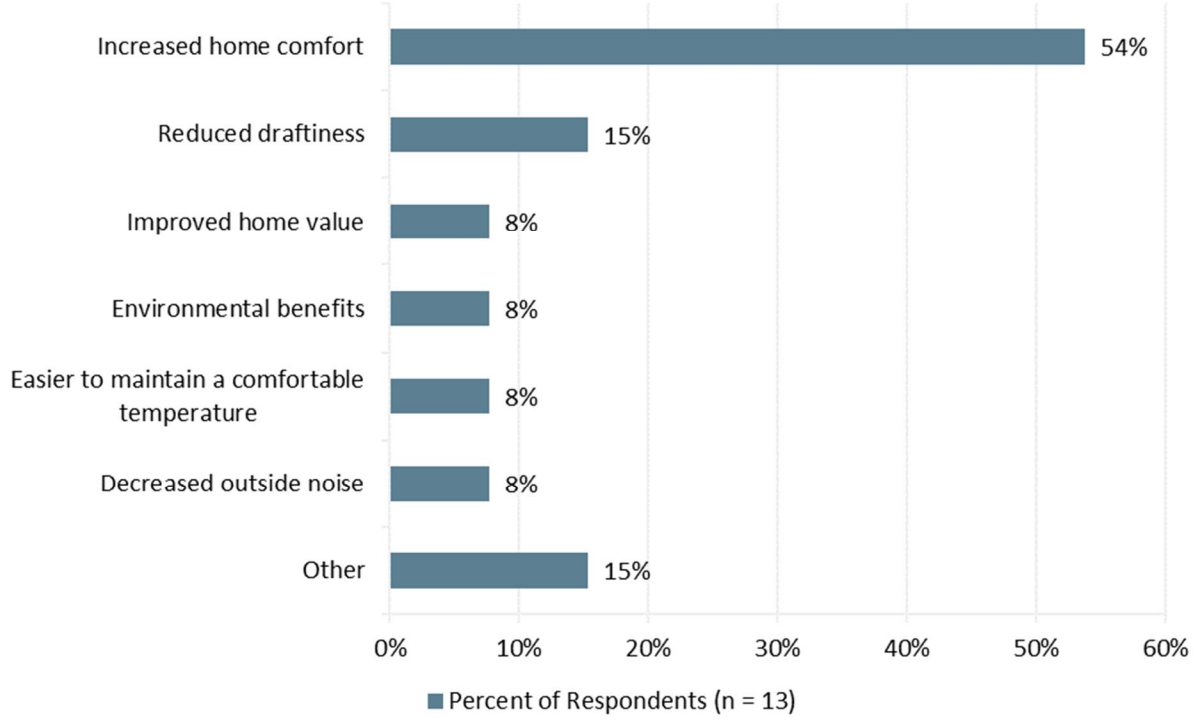
> *"I didn't know anything about the rebate."*
>
> *"Grossly insufficient incentives for low income families. And poorly advertised. No renewable energy incentives. Not nearly ambitious enough in scope or amount."*

One respondent was dissatisfied with the comprehensiveness of the efficiency improvements:

> *"They did say that in my attic, there was no insulation in the back of the room in my house. They asked if I wanted the back room of the attic insulated and I said yes. They got the insulation and put it in the front of the attic but not in the back room."*

Twenty-three percent of respondents reported that they had experience benefits from participating in the program aside from energy and cost savings. The benefits reported are summarized in Figure 3-19. Participants most frequently reported generally improved home comfort. Other benefits reported included reduced draftiness, improved home value, environmental benefits, improved ability to maintain a comfortable home, and decreased outside noise.

Figure 3-19 Non-Energy Benefits Reported by Program Participants



When asked about their overall satisfaction with the Companies as their electrical service provider, nearly three-quarters (72%) of participants stated they were either somewhat or very satisfied with the Companies, with more than half (51%) stating they were ‘very satisfied’. Only four percent indicated dissatisfaction.

Table 3-31: Overall Satisfaction with Entergy

Satisfaction with Entergy	***Percent of Respondents (n=57)***
5 - Very satisfied	51%
4	21%
3 - Neither satisfied nor dissatisfied	21%
2	2%
1 - Very dissatisfied	2%
Don't know	2%
Refused	2%

A majority of participants (61%) stated that their participation in the program somewhat or greatly increased their satisfaction with the Companies. An additional 25% stated that the program did not affect their satisfaction with the Companies. Seven percent of participants stated that participation in the program somewhat decreased their satisfaction with the Companies.

Table 3-32: Effect of Program on Satisfaction with Entergy

Effect of Program on Satisfaction with Entergy	***Percent of Respondents (n = 57)***
Greatly increased your satisfaction with ENO	25%
Somewhat increased your satisfaction with ENO	37%
Did not affect your satisfaction with ENO	25%
Somewhat decreased your satisfaction with ENO	7%
Greatly decreased your satisfaction with ENO	0%
Don't know	4%
Refused	4%

3.6.10 Participating Contractor Interviews

The Evaluators conducted in-depth interviews with six contractors participating in the HPwES and aHPwES Programs. The team's outreach efforts focused on the most active and engaged contractors, which was determined by comparing the number of projects completed and ex ante kWh savings per contractor. Two of the six interviewed contractors had extensive experience with the aHPwES Program and therefore were able to comment on both programs. The interviewer asked contractors to provide (1) background information about their organization, (2) their marketing strategy, (3) their internal energy assessment procedures, (4) their experiences with program staff and trainings, as well as (5) how the program has impacted their businesses. The objective was to better understand the impacts of the HPwES and aHPwES Programs and if implementation strategies and/or program design could be improved to better serve residential customers.

3.6.10.1 Background Information

The majority of respondents, five out of six, indicated their organization specializes in residential home energy performance with a focus on insulation, duct and air sealing. Two of the organizations also have commercial divisions that offer consulting and contracting services, one of which employs several certified Home Energy Rating System (HERS) Raters. One interviewee identified himself as a general contractor who emphasizes energy efficiency only when a homeowner expresses interest in improving their home's energy efficiency through equipment upgrades or weatherization work. The feedback suggests that while some contractors have diverse service offerings, most of the participating contractors specialize in delivering energy efficiency solutions through the installation of weatherization measures.

During interviews the evaluator asked contractors if they perform both the energy assessment and the installation of recommended measures. All contractors interviewed perform the energy assessment and installation of recommended measures. Next the evaluator asked contractors how long they have participated in the program. Half of the contractors have participated since the beginning of the program, while the other half started in the last two or three years.

A noteworthy difference in the business strategies employed by the interviewed contractors was observed during the interviews. By offering duct sealing at no cost to the customer, the most active contractors were able to generate a significant number of projects and program savings. Contractors indicated that the no cost strategy has been successful at getting projects completed; however, by focusing only on duct sealing, there are missed opportunities for generating savings through generating additional savings at each site through improving insulation and envelope air leakage.

3.6.10.2 Organizational Impact

There were three common benefits to their organizations discussed by the contractors.

- *Increased Sales*: Three of the six contractors indicated that program rebates have improved either their gross sales or their ability to close deals more frequently with customers who might not have committed without the financial incentive. Most of the contractors made reference to free duct sealing measures, which not only allows contractors to offer something for free, but also builds trust with the homeowner who may be interested in other efficiency measures.
- *Improved Customer Relations*: Several contractors also mentioned customer satisfaction has improved. When customers are happy they tend to share their experiences with others and are more likely to recommend specific services to a friend or call back the following year. Two contractors specifically mentioned an increase in referrals.

- *Leveled out Workflow*: One contractor discussed his ability to level out his organization's workflow. He discussed the ebb and flow of residential home improvement jobs, stating that work tends to fluctuate with the seasons. When activity slows, field staff can use the program rebates to sell smaller projects that just involve duct sealing at no cost to the homeowner.

3.6.10.3 Marketing

There was a general consensus that contractors were reluctant to actively market the HPwES Program due to uncertainty about how long incentive funds would be available for. Contractors indicate that they were wary of over promising on the availability of funds, which could negatively impact their relationships with their customers.

Two contractors that did promote he program did so through the use of informational flyers to existing and perspective customers. These flyers did not specifically state that incentives were available through the Companies, but generally promoted the contractor's services while noting incentives funds may be available. This strategy may be the best approach to balancing promotional efforts against concerns regarding the limited budget.

One contractor noted that their firm had stopped promoting the program because they were using the program name in their marketing materials without seeking prior approval.

None of the interviewed contractors reported using the program developed marketing materials such as brochures or flyers. In all cases, the contractors indicated that while they were told such materials would be available, none had received them.

3.6.10.4 Level of Program Awareness

The majority of contractors indicated that program participants typically come to them by way of referral, therefore most already know about the program. One contractor indicated that the number of referrals they received in 2015 was less than what they had received in the past. Only one contractor said that none of their customers were previously aware of the program. The feedback suggests that most program participants come to the program through referrals from friends or family, suggesting that there is sufficient awareness of the program for word-of-mouth to be an important driver of program participation.

3.6.10.5 Program Delivery

Contractors discussed the home assessment process and the tools they used to complete the assessment. All contractors indicated that they start the energy assessment with a visual inspection and then perform diagnostic testing, which includes duct blasting and blower door tests. The diagnostic testing was standard practice for all

contractors except one. The contractor who did not routinely perform diagnostic testing, encountered challenges later when rebate checks were delayed.

Most contractors use proprietary, paper forms to complete the energy assessments and that recommendations are written down for the customer to review. One contractor indicated that all their field techs use tablets and email a report to the home owner upon requested.

The evaluator also asked contractors if they had attempted to use the OPEN software tool provided by the program, which is used in other programs operating in Louisiana. Several contractors had tried to use it initially, but indicated there were too many glitches and improved versions of the tool never became available.

Overall there was very little standardization with regards to the energy assessment process or the format in which the performance data was collected and the recommendations presented. Contractors are generally using their own tools to complete assessments and estimate program savings and few are using program provided spreadsheets. Contractor feedback suggests this was a function of limited implementation protocols and program specific tools that would support such standardization.

3.6.10.6 Communication

Contractors provided feedback about their experiences with program staff; some contractors had more positive experiences than others. Below is a summary of the communication successes and challenges.

Communication Successes

- All contractors indicated that staff was polite and helpful. The most active contractor was very satisfied with the support he received from staff, both in the field and in the office.
- Technical training that has been provided in prior program years was beneficial. While some contractors indicated that some if their staff already had BPI certifications, others indicated that they did not previously have BPI certifications and were grateful for the hands on training opportunities and continuing support.
- Technical field staff were considered very responsive and knowledgeable.
- Some contractors received rebates quickly and were very happy with the application process and guidelines.

Communication Challenges

- Two contractors indicated that on multiple occasions they performed work at homes that participated in the program at another time. The contractors indicated it would be beneficial if the program could suggest ways the program could keep

them better informed of customers who have participated in the past and ways to pre-qualify homeowners. However, providing this information may be challenging for program staff because it would require selecting contractors to provide leads to.

- Several contractors said it was difficult to contact program administrative staff by telephone, they indicated that the program's general telephone number often goes to a voice mail system and rarely do they receive a call back. Communication is primarily through email and even then it can take a day or two to receive a response.
- Some contractors experienced delays in receiving reimbursement for program projects. Contractors indicated it was difficult to obtain clarity on what was causing the delay and if documentation was outstanding. One contractor indicated that their organization will not be participating in the future due to issues with payment. When the evaluator asked what accounted for the delays the contractor indicated they had to provide additional documentation including performing blower door test on a number of homes that did not receive this testing initially. In this case, it is likely that the delays were due to the contractor not understanding the program guidelines and participation requirements. However, the situation was exacerbated by limited program staff resources available to ensure each issue was resolved.

Contractors provided suggestions for ways the program could improve communication or better support their efforts in the field. The evaluation team summarized their suggestions below.

- Consider publishing a short promotional video that provides information about the program. According to all of the contractors, program awareness is very low and as a result many homeowners don't believe the program offerings are legitimate. One contractor suggested having short video that explained the program and rebate process would be a quick and easy way for field staff to inform the homeowner and help them understand that the program is sponsored by the utility.
- Consider implementing an online portal for tracking project documentation and communications with program staff.
- Consider increasing program incentives for insulation and air sealing. Many contractors believe the incentives are too low to motivate homeowners to install measures beyond duct sealing.
- Consider an application that includes all the guidelines and authorizations necessary to participate in the program. Right now the homeowner must execute three separate forms. Some contractors indicated that it's burdensome on both

the homeowner and the contractor. For that reason, in addition to rebate processing times, two of the interviewed contractors do not plan to participate in 2016.

3.6.10.7 Contractor satisfaction

All contractors were asked to rate their level of satisfaction with the program overall. One contractor was very satisfied, four of the six contractors were somewhat satisfied, and one was somewhat dissatisfied. Overall, contractors had positive feedback regarding the program offerings and the impact the program has had on their businesses. Sales and customer relations have improved for all contractors interviewed. Additionally, contractors indicated that residential customers are very grateful and excited about the program rebates. The challenges stemmed from communication with staff, a lack of program structure, and the timing of incentive payments.

3.6.10.8 Key Findings

The following key findings summarize the most salient themes that surfaced through conversations with program contractors.

- Some of the more successful contractors are able to complete more projects because they commit to completing projects at no cost to the homeowner. No cost installation is possible if the contractor focuses only on duct sealing. As a result, there are efficiency opportunities that do not get addressed and there is very little diversity in the program measure mix.
- Contractors indicated the HPwES and aHPwES Programs have had positive impacts on their businesses. Since they have started in the program they have increased sales and improved customer relations. Additionally, they have been able to level-out their work flow during slower times of the year through incentive project work.
- There was a general consensus that contractors were reluctant to actively market the HPwES Program due to limited budget. All the contractors indicated that they do encourage customers to complete measure projects once the assessment has been completed performed their initial assessment.
- Contractor feedback suggests that most program participants come to the program through referrals from friends or family.
- Overall there was very little standardization with regards to the energy assessment process or the format in which the performance data is collected and the recommendations presented. Contractor feedback suggests this was a function of limited implementation protocols and program specific tools that would support such standardization.

- The feedback regarding staff communication was mixed. There were highly positive views of field staff and training events that had been completed in prior program years. Rebate processing and administrative support received some positive feedback, however, several contractors expressed frustrations regarding the timing of incentive payments and the responsiveness of staff.
- Contractors were somewhat satisfied with the HPwES and aHPwES Programs. They had positive feedback regarding the program offerings and the impact the programs have had on their businesses. Contractors indicated that residential customers are very grateful and excited about the program rebates. The challenges stemmed from communication with program staff as described above.

3.6.11 Conclusions

The following sections summarize key process evaluation findings and recommendations.

3.6.11.1 Program Design and Participation Process

- The HPwES Program is designed to align with Department of Energy requirements to provide whole home retrofits. The program utilizes contractors with national certifications to provide energy assessments of customer homes to identify energy saving opportunities.
- Incentives amounts are based on aspects of the measures that affect the energy savings (e.g., baseline R-values, CFM 25 reductions). As such there is a fair amount of consistency in the dollars paid per expected kWh saved for the program measures ($0.17 for air sealing, $0.10 for duct sealing, and $0.14 for insulation). This approach to Incentives for duct sealing are sufficient to cover the full cost of the measure.
- Most of the program savings (85% of expected savings) resulted from duct sealing projects. One-half of the projects completed through program were single measure projects. Multi-measure projects were more likely to occur at sites that had energy assessments performed and sites with electric resistance heating.
- There is considerable variation in approaches to how home energy assessments are being performed. Program staff provide spreadsheet calculators for contractors to use to estimate projects savings, but most of the interviewed contractors reported that they use their own paper forms or electronic tools to complete home energy assessments.
- Participant feedback suggests that overall, the process participation process is working effectively.
    - More than 90% of participants reported that it was easy to find a program contractor.

- Participants provided favorable assessments of their experience with the contractors with 90% or more agreeing that the contractor was courteous and professional, and scheduled and completed the work in a reasonable period of time.
- No participants were dissatisfied with the participation process.

- Contractors reported that they had experienced delays in receiving rebate payments and that they had difficulty getting information on what was causing the delays. More generally, contractors reported that it was difficult to reach program staff by telephone to get questions answered.

3.6.11.2 Program Marketing and Outreach

- The program is designed to be primarily promoted by contractors. Contractors reported that they are engaged in limited marketing because there is currently more demand for program incentives than budget to fund them.
- Staff has developed several forms of marketing collateral for use by contractors to promote the program, but interviews with contractors indicate that they are generally not aware of the materials or how to get access to them.
- Contractors reported that most customers learn of the program by word-of-mouth and approach them to participate. Participant survey responses also indicate that a plurality of participants (42%) learned of the program from a family member, friend, or colleague. Contractors or home energy consultants were the source of awareness for 25% of participants.

3.6.11.3 Quality Control and Verification

- The program manual does not specifically state what share of project sites receive verification visits, however staff reported that at a minimum, the first five projects completed by a new trade ally firm receive a pre- and post-inspection visit and that 10% of the projects are inspected after that. In practice, staff reported that most sites are receiving verification visits. Project verification visits check for consistency between reported performance testing, site information, and measure information. Additionally, staff reported that they discuss the customer's satisfaction with the trade ally during visits. The reported procedures for verification are sufficient to mitigate evaluation risk.
- Savings estimates for all sites are performed through the CLEAResult database using the measure and site specifications entered by staff. Calculations are based on the procedures outlined in the Arkansas Technical Resources Manual.
- The Evaluators identified some quality control lapses in the program tracking data related to missing information or measure parameters outside of allowable ranges. These issues are detailed in Section 3.6.3.1.

3.6.11.4 Participant and Contractor Satisfaction

- 93% of participants reported that they were satisfied with the program overall. Few participants noted dissatisfaction with the program overall or specific aspects of it. The aspects of the program that the largest share of participants noted dissatisfaction with were the discount amount and the energy saving cost impacts. Six percent of participants were dissatisfied with each of these aspects of the program.
- Five of the six contractors reported that they were satisfied with the program overall and most contractors noted that the program had positive impacts on their business including increased sales, assisting with leveling out work-loads during the year, and improving relationships with their customers. Contractors reported some challenges with communicating with program staff to resolve questions or issues, however, contractors praised the knowledge and responsiveness of field staff.

3.6.12 Recommendations

The Evaluators' recommendations for the HPwES Program are summarized below:

- **Improve communications with contractors about available marketing materials.** The program has developed an array of marketing materials that may be used by contractors to promote the program but use of these materials is low, largely because contractors were not aware of them or had not been able to acquire them.
- **Develop strategies for improving responsiveness to contractor inquiries.** Contractors noted difficulty in receiving responses to inquiries from program staff, particularly in regards to payment issues.
- **Develop strategies for improving data quality.** Data quality issues were identified for a portion of the project tracking records. Staff should seek strategies to minimize data quality issues. In particular, data validation checks and overrides of user inputs should be employed to ensure that project information is complete and within allowable ranges.
- **Enter measure level information for all program projects.** Approximately one-third of expected program savings were processed as bulk incentive projects paid to a contractor. Project information did not include the measure type or site parameters in them. Savings calculations performed for these sites were completed outside of the program database in spreadsheet calculators, introducing the potential for employing varying methodologies and resulting in varying realization rates.

- **Continue with plans to encourage contractors to implement multiple measures.** Program staff currently have new operating procedures in place to encourage contractors to implement multiple measures at each site. Given the current potential for missed savings opportunities at each site, these procedures will hopefully lead to more comprehensive projects at each site. However, staff may want to consider if additional support of contractors is to encourage additional measure installations such as materials or guidance for helping contractors sell broader home improvements, or reviewing incentive levels in light of ex post savings estimates.
- **Add low-flow direct install component for homes with electric water heating.** 56% of program participants reported that their homes have electric water heating, suggesting that there is potential for electricity savings from low flow devices.
- **Consider instituting incentive caps for measures.** Comparison programs typically had upper limits of incentives for duct sealing between $200 and $325. Implementing a cap should free up program budget to fund other measures or additional projects. Based on incentives paid out during PY5, if a $300 cap had been in place for duct sealing, more than $45,000 in additional incentive funds would have been available. A review of incentive caps should be considered in relation to the cost of the service.
- **Consider providing training or additional documentation on program procedures and requirements to contractors.** Some interviewed contractors reported delays in payment due to documentation issues and the assessment procedures used tend to be determined by the individual contractor rather than the program. While several of the active firms are well experienced with the program and likely not in need of additional support, newer firms or staff at those firms, may require additional guidance on program procedures and requirements.

4. Assisted Home Performance with ENERGY STAR

4.1 Program Description

The Assisted Home Performance with Energy Star Program (aHPwES) targets and offers comprehensive weatherization services to qualified low-income, single-family homes and low-rise, multi-family dwellings of four or fewer units. The aHPwES program is intended to be primarily implemented through local participating trade allies who provide energy efficiency upgrades available to income qualifying customers. The Program's objective is to educate customers on how they are using energy, identify opportunities for energy savings specific to their home, and prioritize a wide range of energy conservation measures that will allow them to save energy immediately.

The aHPwES program provides customers with household incomes at or below 60% of the estimated State's median income with home energy upgrades at low or no cost.[9] The Program offers these customers a free home energy assessment through a qualified and participating trade ally.

4.2 Expected Savings and Program Participation

The contractor-installed measures are:

- Air sealing;
- Duct sealing; and
- Ceiling insulation.

A total of 220 households participated in the program. Table 4-1 and Table 4-2 summarizes the total number of homes a measure was installed in/performed at, total measures installed/performed and the expected kWh and peak kW savings by measure.

[9] 60% of the State's median income is the qualification requirement for Louisiana's Low Income Home Energy Assistance Program (LIHEAP).

Table 4-1 aHPwES Summary of Measures and Expected Savings – New Orleans

Measure	Quantity	Total Expected kWh Savings	Total Expected kW Savings
Duct Sealing	202	764,742	131.38
Air Sealing	184	78,600	31.51
Ceiling Insulation	91	212,031	66.74
Total	477	398,666	89.20

Table 4-2 aHPwES Summary of Measures and Expected Savings – Algiers

Measure	Quantity	Total Expected kWh Savings	Total Expected kW Savings
Duct Sealing	22	70,201	14.01
Air Sealing	21	11,005	4.87
Ceiling Insulation	10	18,932	5.19
Total	53	100,138	24.07

The program goals and achievement of the goals is summarized below.

Table 4-3 Summary of kWh Goal Achievement

Operating Company	Verified Net kWh	kWh Goal	% of Goal Attained
ENO	1,043,383	518,876	201.09%
ELL Algiers	291,163	45,946	633.71%

Table 4-4 Summary of kW Demand Reduction Goal Achievement

Operating Company	Verified kW	kW Goal	% of Goal Attained
ENO	322.16	201	160.28%
ELL Algiers	112.26	18	623.67%

4.3 Impact Savings Calculation Methodology

Impact evaluation efforts were focused ceiling insulation, duct sealing, and air sealing. These measures accounted for 97.4% of program savings. Savings estimates for other

program measures were not revised. Impact methodologies for aHPwES are the same as described for HPwES in Section 3.2.

4.4 Verified Savings by Measure – aHPwES

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided verified savings using deemed values developed for New Orleans combined with in-field testing results.

4.4.1 Infiltration/Air Sealing

4.4.1.1 Field Data Collection

The field data collection for air infiltration was an aggregated sample of HPwES and aHPwES homes, as described in Section 3.3.1.

4.4.1.2 Deemed Savings Revision

Deemed savings parameters were revised significantly for this measure. The Evaluators found that deemed savings used by program staff were not within reasonable range for this measure.

Table 4-5 Air Infiltration Savings Multipliers

Heating Type	*Ex Ante*	*Ex Post*	*% Reduction*
Natural Gas Furnace	.346	.327	5.5%
Electric Resistance	1.751	.933	46.7%
Air Source Heat Pump	1.064	.638	40.0%

4.4.1.3 Air Sealing Savings Results

The savings resulting from this revision to deemed parameters and application of field results are summarized in Table 4-6 and Table 4-7.

Table 4-6 Expected and Realized Air Sealing Savings – New Orleans

Heating Type	***Expected kWh Savings***	***Realized kWh Savings***	***kWh Realization Rate***	***Expected Peak kW Savings***	***Realized Peak kW Savings***	***Peak kW Realization Rate***
Natural Gas Furnace	10,704	0	0%	10.17	-	0%
Electric Resistance	66,705	10,600	16%	20.64	3.18	15%
Air Source Heat Pump	1,191	86	7%	0.70	0.04	5%
Total	78,600	10,686	14%	31.51	3.22	10%

Table 4-7 Expected and Realized Air Sealing Savings - Algiers

Heating Type	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	Peak kW Realization Rate
Natural Gas Furnace	2,732	1,257	46%	2.57	1.07	42%
Electric Resistance	8,272	3,588	43%	2.30	1.08	47%
Air Source Heat Pump						
Total	11,005	4,845	44%	4.87	2.15	44%

4.4.2 Duct Sealing

4.4.2.1 Field Data Collection

The field data collection for air infiltration was an aggregated sample of HPwES and aHPwES homes, as described in Section 3.3.2.

4.4.2.2 Duct Sealing Savings Results

The savings resulting from this revision to deemed parameters and application of field results are summarized in Table 4-8 and Table 4-9.

Table 4-8 Expected and Realized Duct Sealing Savings – New Orleans

Heating Type	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	Peak kW Realization Rate
Natural Gas Furnace	125,144	146,757	117%	47.32	88.78	188%
Electric Resistance	635,341	677,347	107%	83.22	164.31	197%
Air Source Heat Pump	4,257	4,842	114%	0.83	1.72	207%
Total	764,742	828,946	108%	131.38	254.81	194%

Table 4-9 Expected and Realized Duct Sealing Savings - Algiers

Heating Type	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	Peak kW Realization Rate
Natural Gas Furnace	21,204	25,337	119%	7.73	15.33	198%
Electric Resistance	48,997	51,391	105%	6.29	12.47	198%
Air Source Heat Pump	-	-		-	-	
Total	70,201	76,728	109%	14.01	27.79	198%

4.4.3 Attic Insulation

4.4.3.1 Field Data Collection

The field data collection for attic insulation was an aggregated sample of HPwES and aHPwES homes, as described in Section 3.3.3.

4.4.3.1 Attic Insulation Savings Results

Verified savings for this measure are provided in Table 4-10 and Table 4-11.

Table 4-10 Expected and Realized Duct Sealing Savings – New Orleans

Heating Type	*Expected kWh Savings*	*Realized kWh Savings*	*kWh Realization Rate*	*Expected Peak kW Savings*	*Realized Peak kW Savings*	*Peak kW Realization Rate*
Natural Gas Furnace	34,277	32,938	96%	28.93	27.80	96%
Electric Resistance	177,755	170,813	96%	37.80	36.33	96%
Air Source Heat Pump	-	-	NA	-	-	NA
Total	212,031	203,751	96%	66.74	64.13	96%

Table 4-11 Expected and Realized Duct Sealing Savings - Algiers

Heating Type	*Expected kWh Savings*	*Realized kWh Savings*	*kWh Realization Rate*	*Expected Peak kW Savings*	*Realized Peak kW Savings*	*Peak kW Realization Rate*
Natural Gas Furnace	3,857	3,706	96%	2.18	2.09	96%
Electric Resistance	15,075	14,486	96%	3.02	2.90	96%
Air Source Heat Pump	-	-	NA	-	-	NA
Total	18,932	18,192	96%	5.19	4.99	96%

4.5 Verified Gross Savings

Realized savings is presented by program channel in Table 4-12 and Table 4-13.

Table 4-12 Gross Realization Summary – New Orleans

Measure	*Expected kWh Savings*	*Expected kW Savings*	*Verified kWh Savings*	*Verified kW Savings*	*Realization*	
					kWh	*kW*
Duct Sealing	764,742	131.38	828,946	254.81	108%	194%
Air Sealing	212,031	66.74	203,751	64.13	96%	96%
Attic Insulation	78,600	31.51	10,686	3.22	14%	10%
Total:	1,055,373	229.63	1,043,383	322.16	99%	140%

Table 4-13 Gross Realization Summary – Algiers

Measure	Expected kWh Savings	Expected kW Savings	Verified kWh Savings	Verified kW Savings	Realization	
					kWh	kW
Duct Sealing	70,201	14.01	76,726	27.79	109%	198%
Air Sealing	11,005	4.87	4,845	2.15	44%	44%
Attic Insulation	18,932	5.19	18,192	4.99	96%	96%
Total:	360,832	112.26	291,163	95.14	81%	85%

4.6 Verified Net Savings

Due to the income qualification requirements to participate in the program, NTGR for the aHPwES is stipulated at 100%.

4.7 Process Evaluation

This chapter presents the results of the process evaluation of the aHPwES Program. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

The process chapter begins with an overview of the program. This is followed by a discussion of the methodological approach used in the evaluation. A summary of findings and recommendations for program improvement follow the discussion of the methodology. This discussion is followed by detailed findings of the evaluation activities.

4.7.1 Data Collection Activities

The process of evaluation of the aHPwES Program included the following data collection activities:

- *Entergy Program Staff Interviews*. The Evaluators interviewed the Energy Smart Program manager. This interview was to collect information from program staff on program design, objectives, and operations.
- *CLEAResult Program Staff Interviews*. The Evaluators interviewed staff at CLEAResult, who implements the program. The purpose of the interview was to collect information on implementation activities and clarify questions about program design or processes.
- *Participant Surveying*. The Evaluators surveyed a sample of program participants. These surveys addressed issues including participant satisfaction with the program offerings, demographics, and other contextual issues regarding the participation process.

- *Contractor Interviews*. The Evaluators interviewed a sample of contractors that completed projects through the aHPwES Program and mass-market HPwES Program.

4.7.2 Program Overview

The aHPwES provides energy efficiency home upgrades at low or no cost to customers with household incomes at or below 60% of Louisiana State's median income. These income limits for 2015 are summarized in Table 4-14.

Table 4-14 Income Limits for Participation in aHPwES

Number in Household	Maximum Annual Income
1	$21,688
2	$28,362
3	$35,035
4	$41,708
5	$48,382
6	$55,055
7	$56,306
8*	$57,558

*For households with more than eight people, add $1,251 per additional person

The program is designed to help qualifying customers save money on their home energy bills by analyzing their energy use and identifying energy efficiency improvement projects. The home energy assessments involve a walkthrough inspection of the customer's home including an inspection of the ceiling walls, doors, windows, and ventilation. Duct leakage testing and blower door testing may be performed if the customer is a good candidate for duct and envelope sealing measures. Following the assessment, the contractor the installation of home improvements to increase its energy efficiency.

Table 4-15 Incentives for Assessments and Measures

Measure/Service	Rebate Amount
Air Sealing	$.14/CFM50 reduction
Duct Sealing	$4.50/CFM25 reduction
Ceiling insulation	Up to $0.60 per ft.^{2} (depending on heating fuel type)
Energy Assessment	$75

The discounts for the assessments and measures are intended to cover the full cost of the measures for income qualified participants.

Measure savings for the program are estimated using the deemed savings values from the Arkansas Technical Reference Manual (TRM).

4.7.3 Methodology

4.7.3.1 Materials Reviewed

The Evaluators reviewed program materials including the program website and the program manual. These materials were reviewed to understand program operations and implementation approach.

4.7.3.2 Program Staff Interviews

Interviews were completed with one implementation contractor staff and one utility staff member. The interviews provided information on program operations and covered the following topics:

- Program goals and objectives;
- Marketing and outreach;
- Communication processes;
- Program management and staffing; and
- Quality control and verification processes.

4.7.3.3 Participant Survey

Surveys were administered to samples of participants to gain insight into the participant's experience with the program. Respondents answered questions on the following topics:

- Source of program awareness;
- Their decision to participate and complete an efficiency project;
- Experience with the participation process; and
- Satisfaction with various elements of the program and the program overall.

Thirty customers completed the survey of program participants.

4.7.3.4 Contractor Interviews

Interviews were completed with program contractors that deliver the energy assessments and implement the program measures. The interviews covered the following topics:

- Promotion of the program and barriers to participation;
- Program marketing;
- The program participation process;
- Training and communication with program staff;

- Business and market impact; and
- Overall impressions and satisfaction.

Interviews were completed with the two contractors that completed projects through the program during PY5.

4.7.4 Detailed Findings

4.7.4.1 Participation Data Quality Review

The Evaluators reviewed the final program participant tracking data submitted by CLEAResult. While most of the included fields were free of missing data and contained valid records, a few issues were noted:

- Phone number was missing for 5% of projects.
- One ceiling insulation projects had baseline R-values greater than 8 (outside the scope of program incentive guidelines).

4.7.4.2 Analysis of Participation Data

Table 4-16 displays program activity by project type. As shown, most of the expected energy savings (72%) resulted from duct sealing.

Table 4-16 Program Activity by Measure Implemented

Measure Type	Expected Savings (kWh)	Share of Program Savings	$ per kWh in Expected Savings*
Air sealing	89,605	8%	$0.22
Duct sealing	834,942	72%	$0.24
Insulation	230,963	20%	$0.35

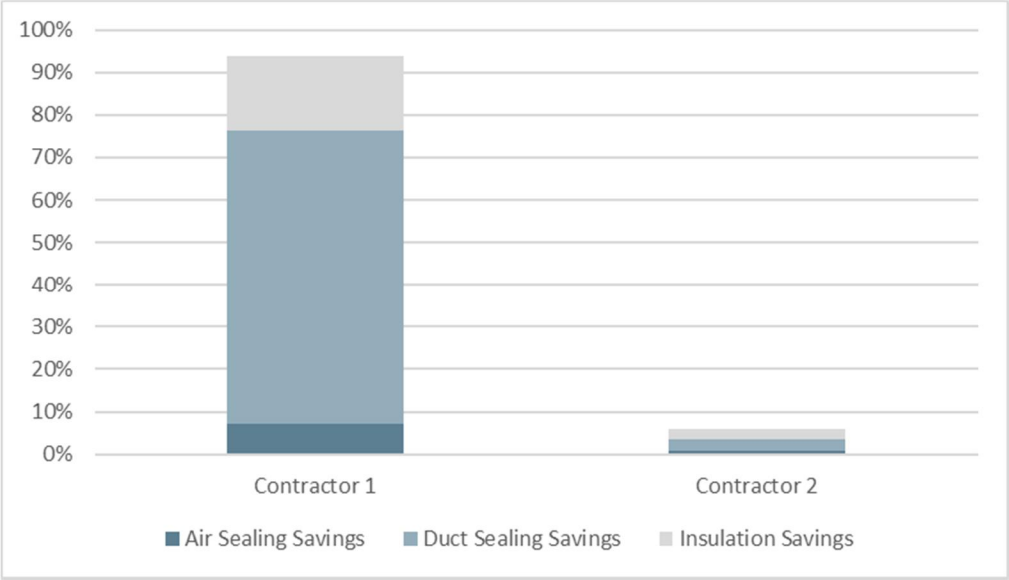
Table 4-17 summarizes program activity by number of measures implemented. As shown, most projects involved multiple measures, with 8% of projects involving a single measure. The table also shows the percent of homes that have electric resistance heating. As shown, rates of electric resistance heating were higher in the homes that implemented more than one measure.

Table 4-17 Average Expected Savings and Prevalence of Electric Resistance Heating by Number of Measures Implemented

Number of Measures Implemented	Percent of Projects	Average Expected kWh Savings	Percent of Participants with Electric Resistance Heating
1	8%	2,571	53%
2	54%	4,578	68%
3	39%	6,725	61%

Only two contractors completed projects through the low income program, and one of the two accounted for nearly all of the program expected kWh savings (94%).

Figure 4-1 Share of Expected kWh Savings by Contractor



4.7.4.3 Program Comparison

The Evaluators reviewed multiple regional home improvement programs targeting lower income customer to assess how the Companies' aHPwES program compared in terms of program measures, eligibility, and advertisements.

Table 4-18 provides a summary of the programs. The eligibility criterion for aHPwES is customers with household incomes at or below 60% of state median income (SMI). Four out of five other programs use 200% of federal poverty level (FPL) as a basis for eligibility, to which the OG&E program is the exception. In Louisiana, the 60% SMI income standard used by the aHPwES Program is more restrictive than the 200% FPL standard, resulting in a smaller share of customers that qualify than would be the case under 200% of FPL standard. The income standard used by aHPwES is the same as the states Low Income Home Energy Assistance Program (LIHEAP).

The aHPwES program offers a more limit range of measures than the other programs listed that does not include the direct install light bulbs and low-flow devices offered by the other programs. However, all of the Companies' customers may receive free CFLs through the CFL Direct Install Program. The program also does not offer appliances or HVAC system replacements, as is offered by other programs. Not including equipment replacements likely enables to aHPwES to generate more kWh savings relative to the costs of the equipment replacement because of the high full-replacement cost of HVAC systems in particular.

Table 4-18 Low Income Weatherization Program Inter-Utility Comparison

	ENO	***OG&E***	***Oncor Texas***	***AEP Texas - Central***	***Louisville Gas & Electric***
Program Name	Residential Solutions Income Qualified	Weatherization Program	Low-Income Weatherization Program	Hard-to-Reach Standard Offer Program	WeCare Program
Program Measures	Walkthrough energy assessment and duct and envelope leakage testing as needed Qualifying measures: air sealing, duct sealing, ceiling insulation.	Attic insulation, sealing air leakage around windows and doors, duct sealing, and CFLs.	Insulation, duct sealing, caulking and weather-stripping, CFLs, and water-saving devices. Other qualifying measures: High-efficiency central air conditioner or room air conditioner, floor insulation, solar screens, ENERGY STAR® appliances, energy-efficient windows.	Insulation, air infiltration, CFLs. High efficiency water heaters, insulation blankets, pipe insulation. Low-flow showerheads, ENERGY STAR home appliances. A/C duct testing and sealing, HE split-system HVAC, HE packaged-unit HVAC, room A/Cs.	Air and duct sealing and insulation, attic and wall insulation, water heater jacket, water devices, heating and central A/C tune-ups, CFLs, programmable thermostats, and energy-efficient refrigerators, window and A/Cs.
Eligibility Requirements	Louisiana residential customer with a valid account number. Customers with household incomes at or below 60% of state median income. Live in a single-family home or a multifamily unit of four units or fewer.	OG&E residential customers who own or lease a single-family, duplex or mobile home and have an income of less than $50,000/year.	Qualified low-income residential consumers have an annual household income at or below 200% above the federal poverty guidelines. Oncor customers who rent their homes can participate provided they have permission from their landlords.	Household incomes at or below 200% of the federal poverty guidelines or that participates in an approved government program.	Lived in their home for one year with 12 months of continuous service. The customer's income must meet the guidelines of the federal government's Low Income Heating Assistance Program (LIHEAP) at 150% poverty.

4.7.5 Program Design, Operations and Activities

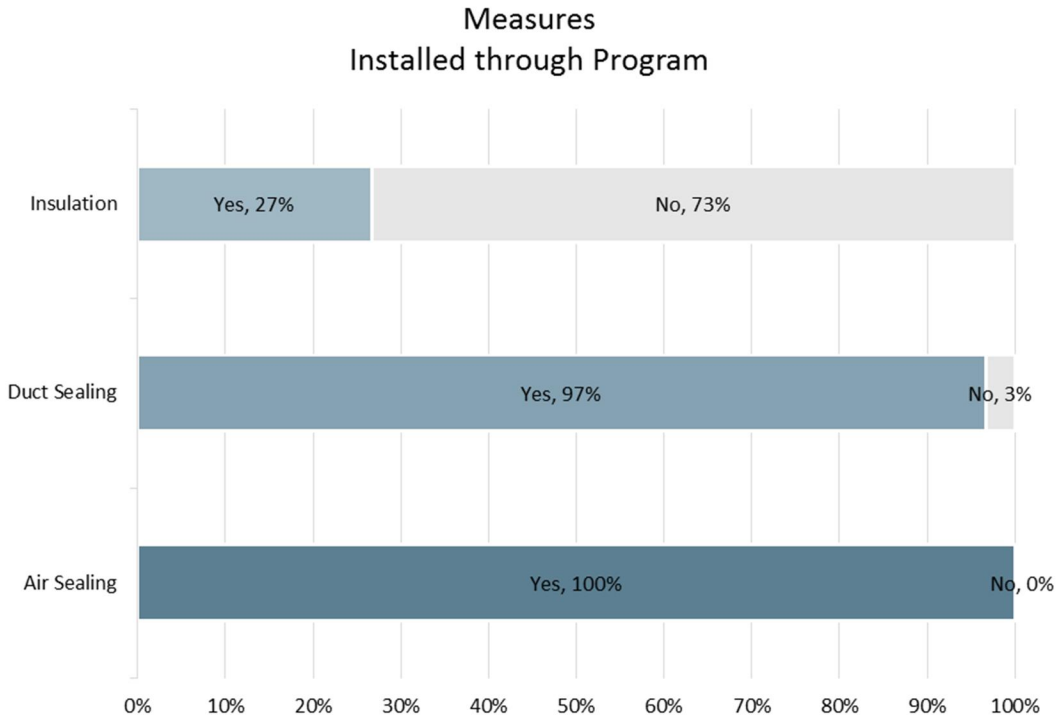
The aHPwES Program design, operations, and activities are essentially the same as for the HPwES Program, which are described in Section 3.6.4 and not repeated here.

However, staff did note one planned program process change that was relevant only to the aHPwES Program, specifically that contractors will be required to provide explanations for why they did not implement one or more of the program measures at a site. This change should help to ensure the comprehensiveness of the projects completed through the program.

4.7.5.1 Participant Survey Results

A total of thirty participants responded to the survey. Figure 4-2 summarizes the program measures implemented by the survey respondents. All participants received air sealing through the program, almost all (97%) revived duct sealing, and slightly more than a quarter (27%) received insulation.

Figure 4-2 Measures Installed through Program



Overall, program participants tended to own their homes, have relatively few household members, and more than one-half of program participants reported household annual income of less than $25,000. The Evaluators cross-tabulated income and occupancy responses and concluded that all surveyed participants were program-eligible.

Table 4-19 Participant Demographics

Demographic Characteristic	***(n=30)***
Average number of home residents	1.53
Percent with income of:[1]	
Less than $25,000 per year	53%
$25,000 to less than $50,000	23%
$50,000 to less than $75,000	3%
$75,000 or more	0%
Percent own home	83%

1. Total does not equal 100% because some respondents did not know their income or declined to state it.

Table 4-20 displays participant household characteristics. A majority of participants resided in an older (pre-1990) single family home with electric space heating. About one-half of homes had electric water heating and most were smaller than 2,000 square feet.

Table 4-20 Household Demographics

Residence Characteristic	***(n=30)***
Percent Single Family Home[1]	93%
Percent electric space heating	83%
Percent electric water heating	63%
Percent of households built before 1990	70%
Percent with home size of:[2]	
Less than 1,000 ft.^{2}	3%
1,001-1,500 ft.^{2}	17%
1,501-2,000 ft.^{2}	20%
Greater than 2,000 ft.^{2}	17%

1.Consistent with program rules, none of the respondents reported living in a multifamily property of more than 4 units

2. Total does not equal 100% because some respondents did not know the size of their home or declined to state it.

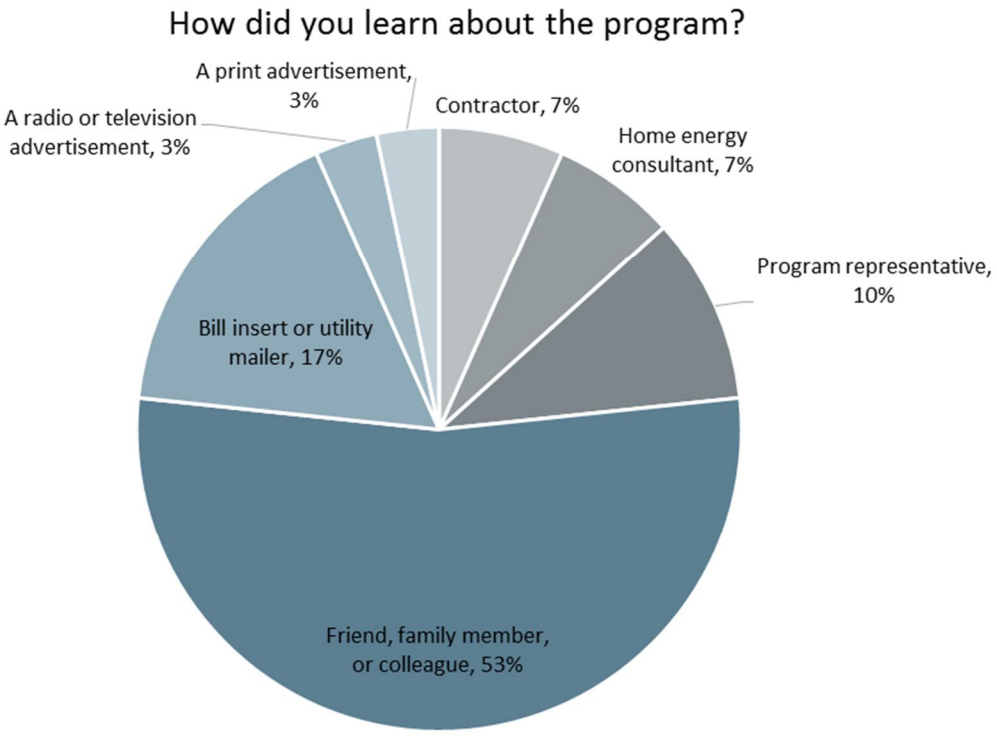
4.7.6 Program Awareness and Participation

As shown in Figure 4-3, the most common source of awareness of the program was through friends, family, or colleagues (53%). Bill inserts or mailers were stated as the source of initial awareness by 17% of program participants, and 10% of respondents indicated that that they learned of the program through a program representative. Home

energy consultants and contractors were stated as the source of awareness for 7% of participants.

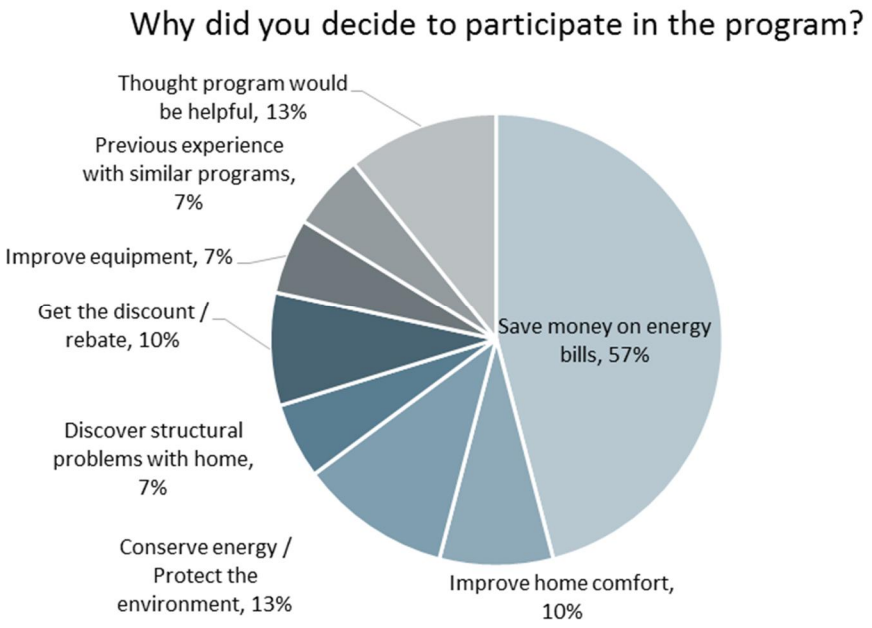
These responses indicate that word-of-mouth is a key factor contributing to awareness of the program and likely related to the maturity of the program and the length of time it has been offered.

Figure 4-3 Source of Program Awareness



Participants gave a range of reasons for participating in the program. As displayed in Figure 4-4 the majority of participants stated that saving money on their energy bills was the main reason that they participated. Conserving energy, the discount on the project, improving home comfort, and the reputation of the program were also common responses.

Figure 4-4 Reasons for Participation



4.7.7 Participation Process

Overall, program participants were very satisfied with the contractors that installed the energy efficiency measures. All respondents agreed that the work was scheduled and completed in a reasonable amount of time and that the contractor was courteous and professional (Figure 4-5).

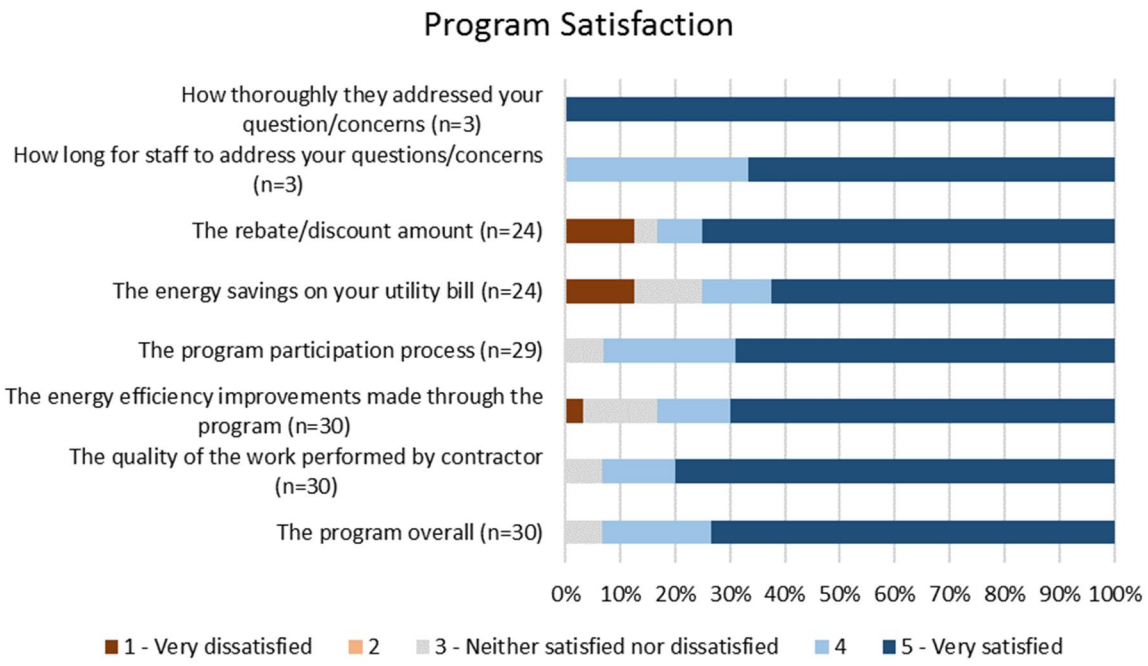
Figure 4-5 Satisfaction with Contractor

Participants were then asked about the difficulty in finding contractors who participated in the program. Overall, 96% of participants stated that it was easy or very easy to find participating contractors, with 81% stating that it was very easy. Furthermore, none of the participants reported difficulty finding a contractor to perform the work, including those that learned of the program from non-program sources such as friends, family or colleagues.

4.7.8 Program Satisfaction

Participants were asked a series of questions related to their overall experience with the program. Overall, program participants rated various elements and the program overall highly. The highest rated elements were the quality of work performed by the contractors, the program participation process, and the overall program. As shown in Figure 4-6, 93% of program participants stated that they were either satisfied or very satisfied with each of these elements. Participants were least satisfied with the energy savings on their utility bill, with 75% of participants rating it satisfied or very satisfied, 13% stating they were neutral, and 13% stating that they were very dissatisfied.

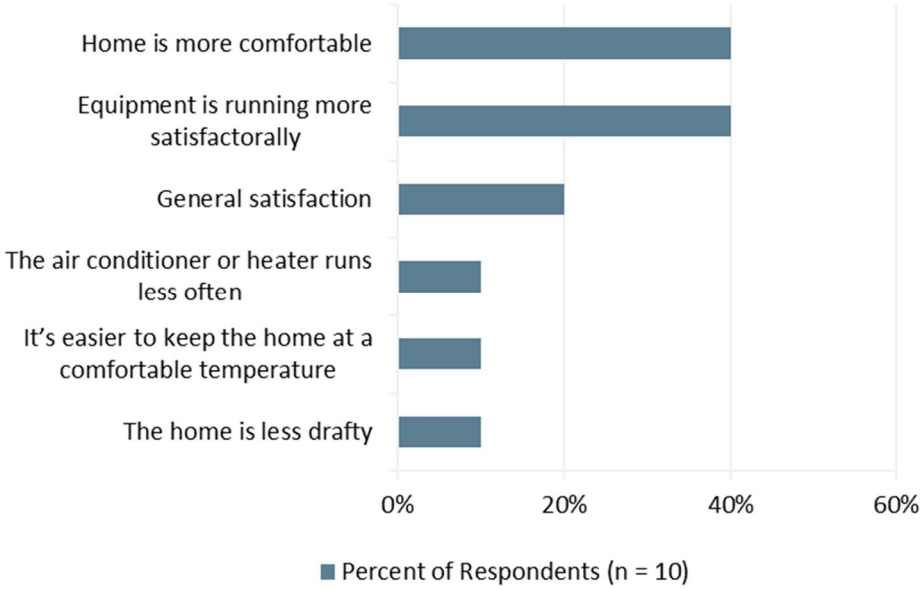
Figure 4-6 Satisfaction with Program Components



Participants that were dissatisfied with one or more aspects of the program were asked to explain in their own words why they were dissatisfied. A total of three respondents indicated dissatisfaction with at least one program element. All of these respondents reported that they were dissatisfied with the savings on their electricity bill and the cost of participation. The dissatisfaction with the cost of participating in the program is surprising because the program incentives are intended to cover the full cost of the efficiency improvements. In their open-ended comments, one of these respondents also indicated that participation "was supposed to be free."

One-third of the program participants indicated that they had also realized benefits from participation in addition to the cost and energy savings. Of the ten respondents that stated they had experienced additional benefits, 40% stated that their heating and cooling equipment was running more efficiently, 30% stated their home is more comfortable, 20% gave general statements of satisfaction, 10% stated that there was less noise, 10% stated their home is less drafty, and 10% stated that it is easier to keep their home at a comfortable temperature.

Table 4-21 Non-Energy Benefits of the Program



Participants were also asked about their overall satisfaction with the Companies as their electrical service provider. Three-quarters (76%) of participants stated they were either somewhat or very satisfied with the Companies, with more than half (53%) stating they were 'very satisfied'. Three percent of participants stated that they were somewhat dissatisfied with the Companies.

Table 4-22 Overall Satisfaction with Entergy

Satisfaction with Entergy	***Percent of Respondents (n=30)***
5 - Very satisfied	53%
4	23%
3 - Neither satisfied nor dissatisfied	20%
2	3%
1 - Very dissatisfied	0%

When asked how their participation in the program affected their satisfaction with Entergy as their electrical service provider, most participants (74%) stated that their participation in the program somewhat or greatly increased their satisfaction with the Companies (Table 4-23). An additional 17% stated that the program did not affect their satisfaction with the Companies. Ten percent of participants stated that participation in the program either somewhat or greatly decreased their satisfaction with the Companies. However, none of these respondents indicated any dissatisfaction with the program, which suggests they may have misunderstood the question.

Table 4-23 Effect of Program on Satisfaction with Entergy

Effect of Program on Satisfaction with Entergy	***Percent of Respondents (n=30)***
Greatly increased your satisfaction with ENO	37%
Somewhat increased your satisfaction with ENO	37%
Did not affect your satisfaction with ENO	17%
Somewhat decreased your satisfaction with ENO	3%
Greatly decreased your satisfaction with ENO	7%

Overall, participants are generally satisfied with the program and ENO as their electrical service provider.

4.7.8.1 Participating Contractor Interviews

The Evaluators completed interviews with the two participating contractors who provided services through the aHPwES program. Both contractors provide services through the mass market HPwES Program and the results of the interviews are presented in Section 3.6.1.3. Many of the findings presented there are relevant for the HPwES Program as well. The findings presented below are specific to the aHPwES Program and describe the outreach strategies used by aHPwES Program contractors.

One of the two contractors indicated that his organization actively recruits participants through door-to-door selling. Additionally, when they have completed an assessment of a customer's home, the firm asks the resident if they know anyone else who could benefit from the program. Typically, the resident will provide the contractor with the names and phone numbers of friends and family that might be interested, or they will call them during the contractors visit. This contractor emphasized that word of mouth is the best way to reach the low-income community. This contractor also indicated that residents who fall into the lower median income brackets tend to be most interested in saving money, as well as sharing the means of doing so with others in their community.

The same contractor that indicated they primarily work through referrals also indicated that he received program developed marketing materials in the form of program informational brochures. He referred to these materials as "leave-behinds." The contractor indicated that these informational brochures help them gain credibility because the materials show that the contractor is affiliated with the program. The contractor indicated that program staff told him that program badges were also available for pick up, although he had not picked them up yet.

The second contractor that participated in the aHPwES Program also provided feedback about the degree to which her organization actively encourages program participation within low income communities. Their firm's strategy was very different and primarily focused on collaborating with community centers to promote the program. Administrative staff at the community centers indicated a willingness to collaborate with

a program representative or contractor who could help organize the outreach message and overall effort.

4.7.9 Conclusions

The following sections summarize key process evaluation.

4.7.9.1 Program Design and Participation Process

- The aHPwES Program provides similar services and measures to other comparison programs. The program provides a walkthrough home energy assessment and incentives for duct and building envelope air sealing and ceiling / attic insulation. Unlike other programs, the program does not include direct install measures as part of participating in the program. No cost CFLs are available through the CFL Direct Install Program.
- Program incentives are intended to cover the full cost of the project but three survey respondents indicated that they were dissatisfied with the discount amount and one indicated that participation was not free.
- Most projects involved the implementation of two or three program measures. However, 8% of projects involved a single measure, and one-half of these were completed in homes with electric resistance heating which suggests there may be more opportunity for efficiency improvements.
- Participant feedback suggests that, overall, the process participation process is working effectively.
    - None of the participants reported difficulty finding a program contractor.
    - All participants agreed that the contractor was courteous and professional, and scheduled and completed the work in a reasonable period of time.
    - No participants were dissatisfied with the participation process.

4.7.9.2 Program Marketing and Outreach

- The program is designed to be primarily promoted by contractors. Contractors reported that they market the program through door-to-door canvassing and asking participants for referrals to friends or family who may be interested in it or through working with community organizations.
- Staff has developed several forms of marketing collateral for use by contractors to promote the program. One of the contractors uses these materials and noted that the cobranded materials are useful for enhancing perceptions of credibility.
- Participant survey responses also indicate that a majority of participants (53%) learned of the program from a family member, friend, or colleague. Contractors

or home energy consultants were the source of awareness for 7% of participants and 10% learned of the program through a program representative.

4.7.9.3 Quality Control and Verification Processes

- The program manual does not specifically state what share of project sites receive verification visits, however staff reported that Staff reported that at a minimum, the first five projects completed by a new contractor firm receive a pre- and post-inspection visit and that 10% of the projects are inspected after that. In practice, staff reported that most sites are receiving verification visits. Project verification visits check for consistency between reported performance testing, site information, and measure information. Additionally, staff reported that they discuss the customer's satisfaction with the trade ally during visits. The reported procedures for verification are sufficient to mitigate evaluation risk.
- Savings estimates for all sites are performed through the CLEAResult database using the measure and site specifications entered by staff. Calculations are based on the procedures outlined in the Arkansas Technical Resources Manual.

4.7.9.4 Customer Satisfaction

- Eighty percent of customers were satisfied with the program overall. Participants were most satisfied with the quality of their contractor's work and the energy savings on their bill.
- 93% of participants reported that they were satisfied with the program overall. Few participants noted dissatisfaction with the program overall or specific aspects of it. The aspects of the program that the largest share of participants noted dissatisfaction with were the discount amount and the energy saving cost impacts. Three participants were dissatisfied with both of these aspects of the program.

4.7.10 Recommendations

The Evaluators' recommendations for the aHPwES Program are as follows:

- **Review incentive levels and procedures to ensure that all qualifying participants receive improvements at no cost.** Three survey respondents reported dissatisfaction with the discount amount and one participant indicated that participation was not free. Staff should review incentive design and payment procedures to ensure that costs are not passed onto low-income participants.
- **Add low-flow direct install component for homes with electric water heating.** 63% of program participants reported that their homes have electric water heating, suggesting that there is potential for electricity savings from low flow devices.
- **Continue with plans to require that participant contractors justify not implementing all three program measures.** Requiring contractors to explain

why they are not implementing one or more of the program measures at a residence should ensure the comprehensive of program projects.

5. Green Light New Orleans

5.1 Program Description

The Green Light CFL Direct Install (GLDI) Program provides direct installation of compact fluorescent lamps (CFLs) in participating residences. The GLDI Program is intended to reduce residential energy use through the one-for-one replacement of incandescent lamps with energy efficient CFLs.

Residential customers in New Orleans Parish are eligible for the program. There is not limit on the number of CFLs that can be installed in a residence so long as they replace incandescent lamps.

5.2 Expected Savings and Program Participation

A total of 1,367 households participated in the program. The tables below summarize the total measures installed and the expected kWh and kW savings.

Table 5-1 Summary of Measures and Expected Savings – New Orleans

Measure	***Total Quantity of Measures***	***Total Expected kWh Savings***	***Total Expected kW Savings***
9W CFL	5,729	67,029	14.32
13W CFL	20,673	381,830	77.52
14W CFL	1,516	28,001	5.50
20W CFL	890	19,180	3.67
23W CFL	742	21,473	4.54
Total	29,550	517,513	105.56

Table 5-2 Summary of Measures and Expected Savings - Algiers

Measure	***Total Quantity of Measures***	***Total Expected kWh Savings***	***Total Expected kW Savings***
9W CFL	1,052	12,308	2.67
13W CFL	4,661	86,089	18.64
14W CFL	205	3,786	0.82
20W CFL	249	5,366	1.17
23W CFL	160	6,028	1.01
Total	6,327	113,577	24.31

5.3 Gross Impact Savings Calculation Methodology

For equipment and retrofits rebated through the PY5 GLDI Program, calculation methodologies were performed using existing literature pertaining to the usage of residential CFLs.

5.3.1 Savings Calculations

The energy savings calculations used to analyze the program are described in this section.

5.3.1.1 Energy Savings Calculation

Per unit energy savings for lighting is calculated as follows:

$$kWh_{savings} = ((W_{base} - W_{post})/1000) \times Hours \times ISR \times IEF_E \times (1 - Baseline\ Penalty)$$

Where,

- Wbase = Baseline watts (Based on EISA standard, see Table 5-3)
- Wpost = Installed watts
- Hours = Annual hours of use, 792.6[10]
- IEF_E = Energy Interactive Factor (See Table 5-4),
- ISR = In Service Rate, .98 [11]
- 1000 = W/kW conversion
- Baseline Penalty: 8.73%. This value is derived from survey responses where participants indicated some lighting that was replaced were existing CFLs.

Per unit peak demand is calculated as follows:

$$kW_{savings} = ((W_{base} - W_{post})/1000) \times CF \times ISR \times IEF_D$$

Where,

- Wbase = Baseline watts (Based on EISA standard see Table 5-3) **Error! Bookmark not defined.**
- Wpost = Installed watts

[10] Arkansas TRM V5.0

[11] ISR calculated based on participant survey data of actually installed equipment.

- 1000 = W/kW conversion
- CF = Summer Peak Coincidence Factor, 10% for indoor, 0% for outdoor
- ISR = In Service Rate, .98 [11]
- IEF_D = Interactive Effects Factor (See Table 5-5)

Table 5-3: EISA Baseline Assumptions

Minimum Lumens	***Maximum Lumens***	***Incandescent Equivalent EISA 2007 – 2019 (W_{base})***
310	749	29
750	1,049	43
1,050	1,489	53
1,490	2,600	72

Table 5-4: IEF_E Assumptions

Heating/Cooling Type	***IEF***E
Gas heat with AC	1.10
Gas heat without AC	1.00
Electric heal with AC	0.83
Electric heat without AC	0.73
Heat pump	0.96
Unknown	0.97

Table 5-5: IEF_D Assumptions

Heating/Cooling Type	***IEF***D
Gas heat with AC	1.29
Gas heat without AC	1.00
Electric heal with AC	1.29
Electric heat without AC	1.00
Heat pump	1.29
Unknown	1.25

5.4 Verified Savings

Realized savings are presented by utility and measure type in tables Table 5-6 and Table 5-7.

Table 5-6 Verified Gross Savings – New Orleans

Measure	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante kW Savings	Ex Post kW Savings	Peak kW Realization Rate
9W CFL	67,029	80,401	119.95%	14.54	13.07	89.89%
13W CFL	381,830	435,190	113.97%	82.69	70.76	85.57%
14W CFL	28,001	30,850	110.17%	6.06	5.02	82.84%
20W CFL	19,180	20,609	107.45%	4.18	3.35	80.14%
23W CFL	21,473	25,513	118.81%	4.67	4.15	88.87%
Total	517,513	592,562	114.50%	112.15	96.34	85.90%

Table 5-7 Verified Gross Savings – Algiers

Measure	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante kW Savings	Ex Post kW Saving	Peak kW Realization Rate
9W CFL	12,308	14,764	119.95%	2.67	2.4	89.89%
13W CFL	86,089	98,119	113.97%	18.64	15.95	85.57%
14W CFL	3,786	4,172	110.20%	0.82	0.68	82.93%
20W CFL	5,366	5,766	107.45%	1.17	0.94	80.34%
23W CFL	6,028	5,501	91.26%	1.01	0.89	88.12%
Total	113,577	128,322	112.98%	24.31	20.86	85.81%

5.5 Estimation of Net Savings

The objective of free ridership analysis is to estimate the portion of program activity would have occurred in the absence of the program. To estimate free ridership for the GLDI Program, the Evaluators administered a survey to program participants that contained questions regarding the participant's plans to replace the CFLs in the absence of the program. Program participants were asked questions regarding:

- Whether or not they had plans to replace the CFLs prior to requesting them;
- The number of CFLs they were planning to replace; and
- The timing of those planned purchases.

Respondents that indicated that they did not have plans to install CFLs were deemed to not be free riders. For those respondents that did have plans to install the CFLs, quantity and timing adjustments were applied to account for partial and deferred free ridership. Specifically, the quantity free ridership adjustment was calculated as:

> Quantity Adjustment = Quantity of Planned CFLs Installations / Total Number of CFLs Installed

A timing adjustment was calculated based on the when the participants planned on purchasing those CFLs. The scoring adjustment applied is as follows.

Table 5-8 Timing Adjustment Score

Timing	Timing Adjustment Score
Within 6 months of when you received them	1
Between 6 and 12 months	0.5
In more than a year	0

5.5.1 Net Savings Results

Table 5-9 and Table 5-10 summarize the ex post net kWh and kW achieved through the GLDI Program.

Table 5-9 Summary of Ex Post Net kWh Savings

Utility	Expected kWh Savings	Realized Gross kWh Savings	Free Ridership	Realized Net kWh Savings	Net to Gross Ratio
ENO	517,513	592,562	77,033	515,529	87%
ELL Algiers	113,577	128,322	16,682	111,640	87%
Total	631,090	720,884	93,715	627,169	87%

Table 5-10 Summary of Ex Post Net Peak kW Reductions

Utility	Expected kW Reductions	Realized Gross kW Reductions	Free Ridership	Realized Net kW Reductions	Net to Gross Ratio
ENO	112.15	96.34	12.52	83.82	87%
ELL Algiers	24.31	20.86	2.71	18.15	87%
Total	136.46	117.20	15.24	101.97	87%

The savings goals for the program was 624,202kWh, and 94kW. Total verified savings for the program are:

- 627,169 kWh – 100.4% of the kWh goal,
- 101.97 kW – 108.5%% of the peak kW goal

The program met savings goals for PY5.

5.6 Process Evaluation

This chapter presents the results of the process evaluation of the GLDI Program. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

The process chapter begins with an overview of the program. This is followed by a discussion of the methodological approach used in the evaluation. A summary of

findings and recommendations for program improvement follow the discussion of the methodology. This discussion is followed by detailed findings of the evaluation activities.

5.6.1 Data Collection Activities

The process of evaluation of the Income Qualified Program included the following data collection activities:

- *Green Light New Orleans Staff*. The Evaluators interviewed the Executive Director of Green Light New Orleans. During the interview, staff discussed the program's history, goals and objectives, operational processes, and outreach efforts.
- *CLEAResult Program Staff Interviews*. The Evaluators interviewed the Senior Program Manager at CLEAResult, who implements the program. The purpose of the interview was to collect information on implementation activities and clarify questions about program design or processes.
- *The Companies' Program Staff Interview*. The Evaluators interviewed staff the Companies program manager who administers the Energy Smart Programs. The interview focused on higher-level issues related to the administration of the portfolio of programs and included discussion of the process of setting energy saving goals, communications processes, implementation contractor management, the utilities role in marketing the programs, and quality control processes.
- *Participant Surveying*. The Evaluators surveyed a sample of program participants. These surveys addressed issues including participant satisfaction with the program offerings, demographics, and other contextual issues regarding the participation process.

5.6.2 Program Overview

The CFL Direct Install (DI) Program provides direct installation of compact fluorescent lamps (CFLs) in participating residences. The GLDI Program is intended to reduce residential energy use through the replacement of incandescent lamps with energy efficient CFLs.

Through the program, participants may request to have some or all of the incandescent light bulbs in their home replaced with CFLs.

5.6.3 Methodology

5.6.3.1 Materials Reviewed

The Evaluators reviewed program materials including the program website and program tracking data provided.

5.6.3.2 Program Staff Interviews

Interviews were completed with staff at Green Light New Orleans, who implements the program, and CLEAResult, who provides oversite of the implementation. The Companies program manager was also interviewed. The interviews provided information on program operations and covered the following topics:

- Program goals and objectives;
- Marketing and outreach;
- Communication processes;
- Program management and staffing; and
- Quality control and verification processes.

5.6.3.3 Participant Survey

Surveys were administered to a sample of participants to gain insight into the participant's experience with the program. Respondents answered questions on the following topics:

- Source of program awareness;
- Their decision to participate and complete an efficiency project;
- Experience with the participation process; and
- Satisfaction with various elements of the program and the program overall.

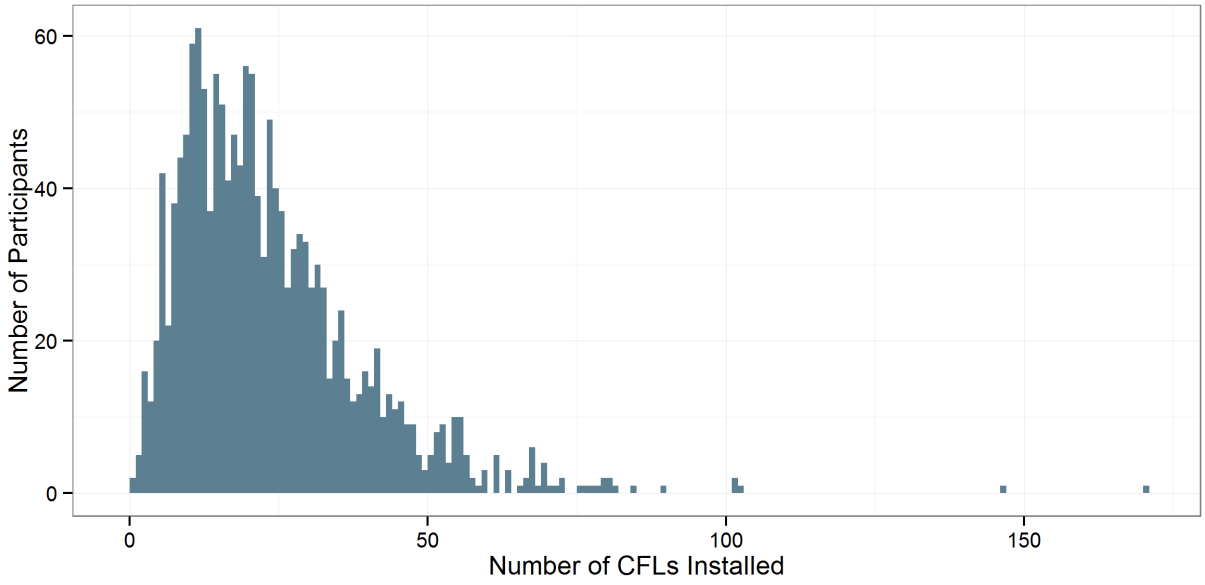
Ninety-five participants completed the survey of program participants.

5.6.4 Detailed Findings

5.6.4.1 Analysis of Participation Data

Figure 5-1 displays the number of CFLs distributed in participant residences. As shown, most participants received fewer than 30 CFLs, though a few received more than 100.

Figure 5-1 Distribution of Number of CFLs Installed in Participant Residences



5.6.4.2 Program Design, Operations and Activities

The following sections describe operations and activities and were developed from reviews of program documentation and interviews with CLEAResult, Green Light New Orleans, and the Companies staff.

5.6.4.2.1 Program Design and Objectives

Green Light New Orleans is a non-profit organization that provides direct installation of CFLs to residential customers in New Orleans. Green Light's direct install program predates Energy Smart Program funding.

The program will replace any incandescent lamp with a CFL and does not limit the number of installations per residence. The program also provides informational material on the energy saving impacts and CO2 reduction benefits of efficient light bulbs. The broader goal of the program is to increase awareness of energy use and efficiency and to change the way the residents of New Orleans understand and respond to their impact on the environment. Because of the high contact design (i.e., program representatives enter a resident's home), staff indicated that the program is positioned to create a bigger impact than the energy saving impact of the CFLs. These additional impacts include:

- Signing up residents for recycling service if they do not currently have it;
- Identifying homes without smoke detectors and referring them to the fire department to have one installed if the home does not have working detectors; and
- Providing energy saving tips.

To reduce costs to the Energy Smart Program, the program leverages outside funding, donated CLFs, and volunteers. The program website states that the first 20 CFLs are funded by the Energy Smart program, but staff indicated that the Energy Smart funds may be used to purchase CFLs or fund the operations of the program and that program funds are not used to fund the installations in specific homes or a specific number of bulbs per home. Thus, all CFLs installed and associated claimed savings are reported even though the bulbs may be donated by another entity and funding may come from multiple sources.

The program has considered additional direct install measures and there are currently plans to try direct installation of low-flow shower heads. Staff noted that are challenges to incorporating low-flow devices in the program, including limited number of households with electric water heating and the additional training requirements.

CFLs will only be installed at a location on a single occasion to prevent replacement of CFLs.

5.6.4.2.2 Program Participation Process

Figure 5-2 provides an overview of the program participation process. Customers can request CFLs online using a web form, email or by telephone. CLEAResult staff estimated that approximately 60% of the requests are made by telephone. Requests are entered into a database.

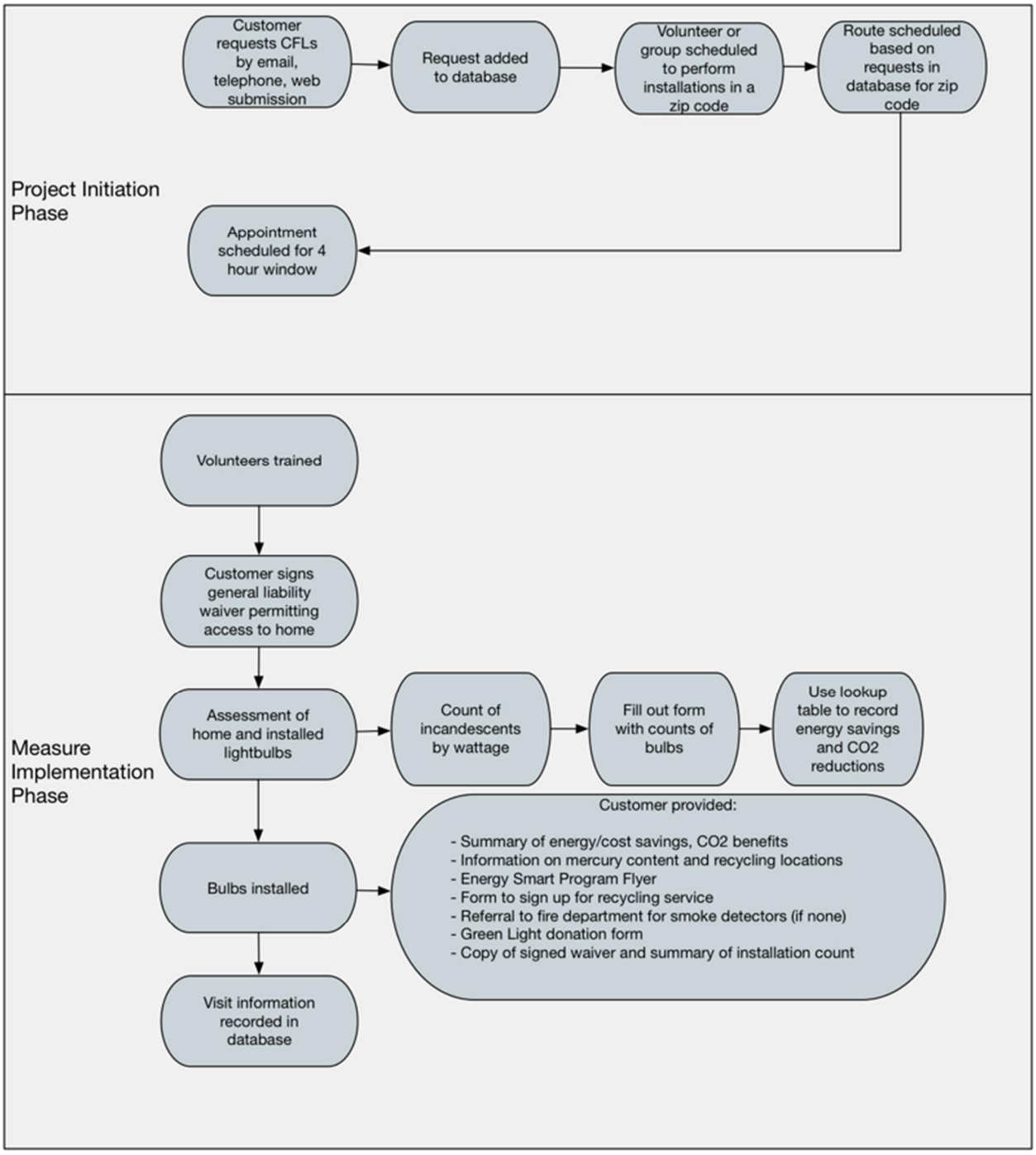
The program makes arrangements with individual or groups of volunteers to install the bulbs. When volunteers are available, staff reviews unfulfilled requests for a zip code and arranges an installation route that consists of 6 – 8 homes. Customers are provided a four hour window for the installation. Any special notes about the visit (e.g., if there is a dog on the premise) are entered into the database. Volunteers receive training on safety issues and how to identify lamp wattage.

Customers are required to sign a general liability form to permit the installers into the residence. Installers are responsible for counting the number incandescent light bulbs by wattage and replacing them with a CFL of matching wattage. The replaced incandescent bulbs are removed from the home and destroyed.

Upon completion of the visit, information collected on the number and types of bulbs installed are entered into the program database.

CLEAResult receives monthly reports of program activity from Green Light that are developed from database exports. These reports include customer name, address, and contact information, counts of CFLs installed by bulb type, date of installation, and group or individual that performed the installation.

Figure 5-2 Green Light Direct Install Process Summary



5.6.4.2.3 Program Marketing and Outreach

Staff noted that word-of-mouth is a key means by which customers learn of the program. However, staff indicated that ongoing outreach is required to sustain program activities. These activities include placing door hangers in selected communities,

providing information on the Companies' and the Green Light websites, press coverage, and through tabling events done by Energy Smart program partners.

Although Green Light has provided direct installation of CFLs in 26,000 homes over the years of its operations, staff reported that currently there is no indication that the market is becoming saturated.

5.6.4.3 Quality Control and Verification Processes

To enforce compliance with the program requirement that CFLs will only be installed on one occasion, submitted requests are cross-checked against the addresses of past participants. If CFLs were previously installed at the address, they will not be installed a second time, even if the participant is newly occupying a residence that participated when occupied by another person.

Additionally, periodic satisfaction surveys are also used as part of the quality control process.

Quality assurance procedures include program training on matching CFL and incandescent wattages, use of standard forms for recording information and calculating energy saving impacts, and ongoing tracking of all program activity in the database.

5.6.5 Participant Survey Results

A total of 95 participants completed the participant survey. This survey asked participants questions about how they learned of the program, their level of satisfaction with it, as well as demographic information and other contextual information about the program participation process.

5.6.5.1 Participant Demographics and Residence Characteristics

Approximately one-half of respondents owned their own home and a significant share of participants (34%) have an income of less than $25,000 a year. Based on reported income and household size, it was estimated that approximately 63% of participants had income of less than 200% of the federal poverty limit. This finding is consistent with staff's statement that that program participants are disproportionately low-income customers.[12]

[12] 48% of households in Orleans Parish are below 200% of the Federal Poverty Level. Source: American Community Survey 2014 5-year estimate. Data retrieved May 10, 2016.

Table 5-11 Participant Demographics

Demographic Characteristic	***(n = 95)***
Average number of home residents	2.8
Percent with income of:[1]	
Less than $25,000 per year	34%
$25,000 to less than $50,000	13%
$50,000 to less than $75,000	15%
$75,000 or more	9%
Percent own home	58%

1. Total does not equal 100% because some respondents did not know their income or declined to state it.

Approximately two-thirds of participants occupied single family homes. Forty-five percent had electric space heating and 34% had electric water heating.

Table 5-12 Participant Residence Characteristics

Residence Characteristic	***(n = 95)***
Percent single family home	68%
Percent electric space heating	45%
Percent electric water heating	34%
Percent of households built before 1990	60%
Percent with home size of:[1]	
Less than 1,000 ft.^{2}	4%
1,001-1,500 ft.^{2}	16%
1,501-2,000 ft.^{2}	21%
Greater than 2,000 ft.^{2}	6%

1. Total does not equal 100% because some respondents did not know the size of their home or declined to state it.

5.6.5.2 Sources of Program Awareness

Most respondents (63%) reported that they heard of about the program through friends, family members, or colleagues. Other sources of program awareness included bill inserts or utility mailers (5%), and print advertisements (5%). Survey responses are summarized in the table below.

Table 5-13 Sources of Program Awareness

Education Level	*Percent of Respondents (n=95)*
Friend, family member, or colleague	63%
Bill insert or utility mailer	5%
A print advertisement	5%
Other environmental or energy program	4%
Program representative	3%
Social media post	3%
A radio or television advertisement	3%
Contractor	2%
From the utility's website	2%
Through a retailer	1%
The news	1%
Other	4%
Don't know	2%

5.6.5.3 Motivations for Participation

When asked why they chose to participate in the program, the most common response involved the desire to save money on energy bills (reported by 49% of respondents). Other frequently mentioned motivations included the desire to save energy and protect the environment (reported by 38% of respondents) and to get the free CFLs (reported by 37%) of respondents. Responses are summarized below. Since respondents were able to provide more than one response, the total percentage of responses exceeds 100%.

Table 5-14 Motivations for Participation

Education Level	*Percent of Respondents (n=95)*
Save money on energy bills	49%
Conserve energy / protect the environment	38%
Get the free CFLs	37%
Liked the idea of the program	8%
Wanted to try out CFLs	5%
Improve the comfort of home	2%
Improve the value of residence	1%
Become as energy efficient as friends and neighbors	1%
Get the discount / rebate	1%
Home needed improvements	1%
Other	4%

5.6.5.4 Participation Process

Respondents were asked about the time that elapsed between their request for CFLs and the installation in their home. On average, respondents had to wait two weeks for their CFLs to be installed. The smallest reported wait time was one week and the longest was sixteen weeks. These responses indicate that the typical wait time for the CFL installation is fairly brief.

No participants reported dissatisfaction with the participation process or the process of having the CFLs installed.

5.6.5.5 Cross-Program Awareness

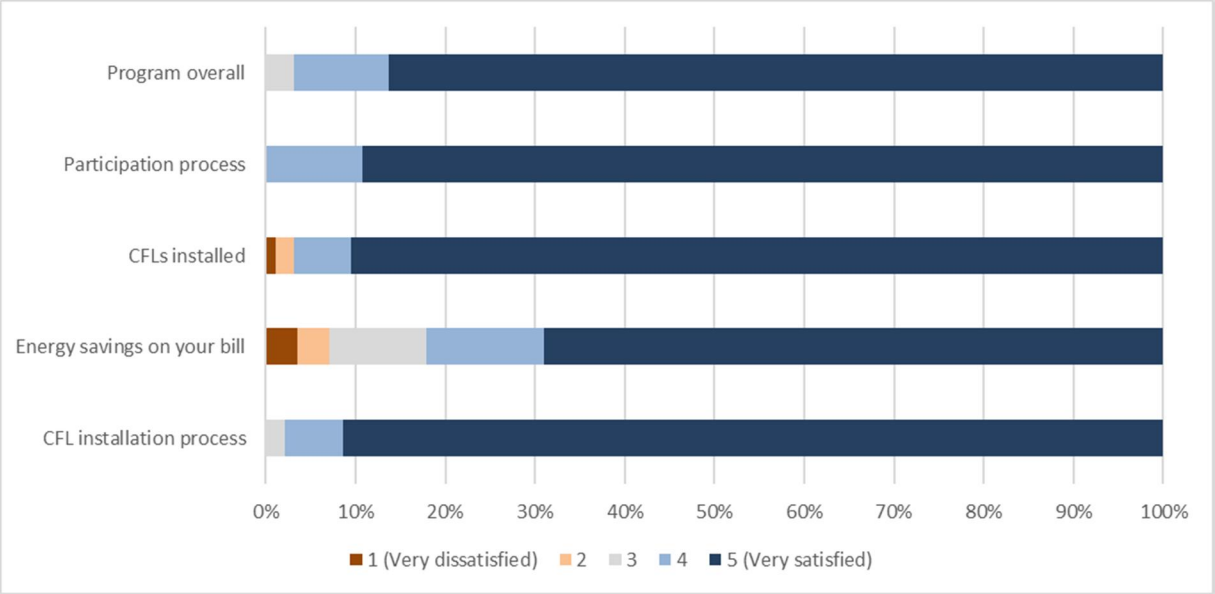
Survey respondents were asked if they had any prior awareness of the Companies' discounts on energy efficient CFLs and LED bulbs purchased at retail locations. Nine percent of respondents were aware of these discounts. Of those respondents who indicated awareness of the discount program, one respondent knew about these discounts before requesting the installation of the free CFLs. The responses indicate that few participants are opting to receive free CFLs over purchasing them at a discount. This finding provides some evidence that the program is not competing with the discount program.

Thirteen percent of respondents reported being aware of Entergy's programs providing rebates and discounts for energy efficient home improvements and appliances.

5.6.6 Program Satisfaction

Respondents were asked about their satisfaction with various features of the program, rating them on a scale of 1 to 5, where 1 represents "very dissatisfied" and 5 represents "very satisfied." Results are summarized in Figure 5-3 below.

Figure 5-3 Participant Satisfaction



Overall, satisfaction with all program elements is quite high. Participants were most satisfied with the CFL installation process, the participation process, and the program overall. The only aspects of the program for which any participants reported dissatisfaction were the CFLs installed and the savings on their energy bill.

There were few reported instances of dissatisfaction (a satisfaction score of two or below). No respondents reported being dissatisfied with the installation process, the program participation process, or the program overall. Seven percent of respondents reported being dissatisfied with the savings on their energy bill, three percent reported being dissatisfied with the CFLs they received, and one percent reported that they were dissatisfied with the program overall.

Participants who were dissatisfied with one or more aspects of the program were asked to elaborate on the negative aspects of their program experience – none provided additional explanation for why they were dissatisfied with the program.

Respondents were also asked about their satisfaction with the Companies as their electrical service provider. Seventy-four percent reported that they were satisfied or very satisfied with the Companies. Responses are summarized in the table below.

Table 5-15 Satisfaction with Entergy as an Electrical Service Provider

Satisfaction Score	*Percent of Respondents (n=95)*
5 (Very satisfied)	55%
4	19%
3	14%
2	4%
1 (Very dissatisfied)	8%

Some of the participants that indicated dissatisfaction with the Companies provided additional explanation for why they are dissatisfied. Six respondents made comments concerning high energy prices and four disliked not having a choice of electricity service provider. Two respondents reported disappointing experiences with Entergy's customer service.

Participants were also asked how their participation in the program had influenced their satisfaction with the Companies. Most respondents (67%) reported that their program experience had at least somewhat increased their satisfaction with Entergy. Responses are summarized in the table below.

Table 5-16 Change in Satisfaction with Entergy as a Result of Program Participation

Impact on Satisfaction	*Percent of Respondents (n=95)*
Greatly increased satisfaction with Entergy	35%
Somewhat increased satisfaction with Entergy	32%
Did not affect satisfaction with Entergy	27%
Somewhat decreased satisfaction with Entergy	3%
Greatly decreased satisfaction with Entergy	1%
Don't know	2%

5.6.7 Conclusions

The following sections summarize key process evaluation findings.

5.6.7.1 Program Design and Participation Process

- The GLDI Program provides direct installation of CFLs in the participant's homes. There is no limit on the number of CFLs that can be replaced at a residence, which distinguishes this direct install program from more typical models that limit the number of replacements that may be made and to lamps installed in areas where they get the most use. The program limits the use of the efficiency funds by receiving financial donations from multiple sources, receiving donations of CFLs, and using volunteers to install the CFLs.

- Staff indicated that they do not think the program competes with the discount CFL program because different types of lightbulbs are available through the programs and the GLDI Program participants tend to be lower income. Survey responses indicate that a significant share of participants are lower income and few respondents indicated that they were aware of the discounted lightbulbs offered prior to deciding to participate in the program.
- The program provides additional social and environmental benefits such as referring customers to the fire department for smoke detector installations and facilitating customers signing up for the recycling program.
- All participants were satisfied with the participation process and 98% were satisfied with the CFL installation process. The CFLs were installed shortly after being requested for most participants – the average duration between request and installation was two weeks.

5.6.7.2 Program Marketing and Outreach

- Staff reported that most participants learn of the program by word-of-mouth. Participant survey responses indicate this as well. Sixty-three percent of participants reported that they learned of the program through friends, family members, or colleagues.
- Program staff also market the program by placing door hangers in selected communities. Earned press coverage and tabling events by Energy Smart partners are other means by which the program is promoted. Visitors to the Energy Smart and Green Light New Orleans websites may also learn of the program there. Eleven percent of participants reported learning of the program through one of these channels.

5.6.7.3 Quality Assurance and Quality Control

- The key quality control and assurance procedures are as follows:
    - Addresses are cross-checked against database records to prevent repeat participation.
    - Periodic satisfaction surveys are also used to assess the participants experience with the program.
    - The program provides training to volunteers on matching CFL and incandescent wattages and uses forms to standardize the recording of information and calculating energy saving impacts.
    - To prevent reuse of the removed lightbulbs, the incandescent lightbulbs are removed from the premise and destroyed.
- Although guidelines intend for only incandescent bulbs to be replaced and staff reported that training is provided to ensure that volunteers only replace incandescent lightbulbs, a sizable share of participants (19%) reported that some of the lightbulbs that were replaced were CFLs or LEDs.

5.6.7.4 Program Satisfaction

- 97% of participants were satisfied with the program overall and the same share were satisfied with the CFLs installed and 74% reported that it increased their satisfaction with Entergy as their electrical service provider.

5.6.8 Recommendations

The Evaluators' recommendation for the GLDI Program are as follows:

- **Review procedures to reduce replacements of non-incandescent lighting.** Although the program currently provides training to enforce the requirement that only incandescent light bulbs are replaced, staff may be able to further enhance this training through reinforcing the importance of the requirement and assisting volunteers with strategies for communicating to residents that efficient light bulbs will not be replaced.
- **Use the program as opportunity to promote air conditioner tune-ups.** Participants in the direct install program may be a good fit to have AC tune-ups completed through the Residential Heating & Cooling Program. The incentives provided often allow these tune-ups to be completed at no cost to the customer.
- **Consider addition of exterior lighting.** The mix of lighting in the program does not adequately serve residential exterior lighting needs. Possibilities to fill this include:
    - 42W Spiral CFLs: these use a 150W baseline and are not currently affected by EISA.
    - PAR 30/38 flood lights: these have a baseline wattage ranging from 35W to 70W.

6. Consumer Products

6.1 Program Description

The Consumer Products (CP) Program provides Point of purchase discounts are provided for compact fluorescent lamps (CFLs) and light emitting diodes (LEDs) through participating retailers, as well as mail-in rebates (downstream rebates) for Room ACs, Pool Pumps, and Advanced Power Strips. A complete list of eligible items is listed below:

- 13W – 14W compact fluorescent light bulbs (CFLs);
- 6.2W - 11W light emitting diodes (LEDs);
- Advanced Power Strips;
- Pool Pumps; and
- Room ACs.

The tables below summarize the total number of measures distributed through the program and expected savings.

Table 6-1 Summary of Measures and Expected Savings - Total

Measure	***Total Quantity of Measures***	***Total Expected kWh Savings***	***Total Expected kW Savings***
Lighting	75,865	1,331,277	289.10
Power Strips	2	224	0.02
Pool Pumps	13	27,703	4.25
Room ACs	217	36,459	40.25
Total	366	1,395,663	333.63

Table 6-2 Summary of Measures and Expected Savings – New Orleans

Measure	***Total Quantity of Measures***	***Total Expected kWh Savings***	***Total Expected kW Savings***
Lighting	69,749	1,236,032	268.09
Power Strips	2	224	0.02
Pool Pumps	12	25,572	3.92
Room ACs	212	35,739	39.46
Total	69,975	1,297,567	311.49

Table 6-3 Summary of Measures and Expected Savings - Algiers

Measure	Total Quantity of Measures	Total Expected kWh Savings	Total Expected kW Savings
Lighting	6,116	96,835	21.00
Power Strips	0	0	0
Pool Pumps	1	2,131	.33
Room ACs	5	720	.79
Total	6,122	99,686	22.12

Total verified savings and percentage of goals for the CP Program are detailed in Table 6-4.

Table 6-4 Savings Goals by Utility

Utility	kWh goal	Net Realized kWh	Percentage of kWh goal realized	kW goal	Net Realized kW	Percentage of kW goal realized
ENO	942,765	1,149,201	121.90%	290	199.58	68.82%
ELL Algiers	75,368	92,433	122.64%%	23	15.25	66.30%

6.2 M&V Methodology

Evaluation of the CP Program included the following:

- Updating pool pump calculations to reflect ENERGY STAR parameters by drive type and horsepower;
- Review of program tracking and recreation of deemed savings calculations;
- Interviews with program staff; and
- Review of program Memoranda of Understanding (MOU).

For equipment and retrofits rebated through the PY5 CP Program, calculation methodologies were performed as described in the Arkansas TRM (AR TRM). Measure inputs came from the AR TRM, EISA lumen table and groundwater data specific to the New Orleans area.

Table 8-3 identifies the source of the inputs used for the verification of measure-level savings under the CP Program.

Table 6-5 Data Sources by Measure

Measure	Input	Source
Lighting	Baseline wattages	EISA lumen equivalence table
Lighting	Operating hours, energy factor, demand factor, CF	AR TRM Section 2.5.1
Room ACs	CA, RAF, $EHLF_C$, CF	Simulation modeling
Pool Pumps	See Section 6.2.4 below	ENERGY STAR Pool Pump Calculator[13]

Three measures accounted for the majority of the gross savings for the CP Program: lighting, room ACs and pool pumps. The calculation methodologies for these measures are detailed in the following sections.

6.2.1 Lighting Savings Calculations

6.2.1.1 Energy Savings Calculations

Upstream rebates were provided in-store for 14W CFLs and 9W LEDs.

Per unit energy savings for lighting is calculated as follows:

$$kWh\ Savings = Hours \times (W_{Base} - W_{Post}) \times IEF \times ISR/1000$$

Where,

- Hours = Annual hours of use
- W_{base} = Baseline watts
- W_{post} = Installed watts
- IEF_E = Energy Interactive Factor, .97
- ISR = In Service Rate, .98
- 1000 = W/kW conversion

Table 6-6 Deemed Savings Values for Lighting Calculations

Parameter	Deemed Value
Hours	792.6
EF	.97
DF	1.25
ISR	98[14]%

[13] The ENERGY STAR® Pool Pump Savings Calculator, updated February 2013, can be found on the ENERGY STAR® website at: https://www.energystar.gov/products/certified-products/detail/pool-pumps.

[14] Over a three-year period.

Table 6-7 Baseline Wattages by Lamp Type

Lamp Type	Wattage	Baseline
CFL	13W Spiral	43W
	14W Spiral	43W
	15W BR30	65W
LED	6W A-lamp	29W
	8.5W A-lamp	29W
	9W A-lamp	29W-43W[15]
	9W BR30	65W
	11W A-lamp	43W

6.2.2 Room Air Conditioner Calculations

6.2.3.1 Energy Savings Calculations

The CP Program energy savings room air conditioners were calculated as follows.

$$kWh_{Savings} = CAP \times \frac{1kW}{1000W} \times RAF \times EFLH_C \times \left(\frac{1}{\eta_{base}} - \frac{1}{\eta_{post}}\right)$$

Where,

- CAP = Rated equipment cooling capacity of the new unit (Btu/hr)
- RAF = Room AC adjustment factor
- $EFLH_C$ = Equivalent full-load cooling hours
- η_{base} = Energy efficiency rating (EER) of the baseline cooling equipment (Table 6-8)
- η_{post}= Energy efficiency rating (EER) of the installed cooling equipment (at least equal to value from Table 6-8)

[15]Lumen output on 9W LEDs varied significantly; some fell into the 29W bin while others qualified for a 43W baseline.

Table 6-8. Window AC Replacement – Baseline and Efficiency Standards[16]

Reverse Cycle (Yes/No)	Louvered Sides (Yes/No)		Capacity (Btu/hr)	Capacity (Btu/hr)	Baseline Efficiency (EER)	Efficiency Standard (EER)
No	Yes	NY	< 8,000	0	9.7	10.7
			≥ 8,000 and < 14,000	8000	9.7	10.7
			≥ 14,000 and < 20,000	14000	9.7	10.7
			≥ 20,000	20000	8.5	9.4
No	No	NN	< 8,000	0	9	9.9
			≥ 8,000	8000	8.5	9.4
Yes	Yes	YY	< 20,000	0	9	9.9
			≥ 20,000	20000	8.5	9.4
Yes	No	YN	< 14,000	0	8.5	9.4
			≥ 14,000	14000	8	8.8

Table 6-9 Deemed Savings Values for Room Air Conditioner Calculations

Parameter	Deemed Value
RAF	792.6
$EFLH_C$	1,900

6.2.4 ENERGY STAR® Pool Pump Calculations

6.2.4.1 Energy Savings Calculations

The CP Program energy savings for ENERGY STAR Pool Pumps were derived using as follows.

$$kWh_{Savings} = kWh_{conv} - kWh_{ES}$$

Where,

- kWh_{conv} = Conventional single-speed pool pump energy
- kWh_{ES} = ENERGY STAR® variable speed pool pump energy

[16] 10 CFR 430.32(b). www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/41.

Algorithms to calculate the above parameters are defined as:

$$kWh_{conv} = PFR_{conv} \times 60 \times hours_{conv} \times daysEF_{conv} \times 1000$$

$$hours_{conv} = V_{pool} \times PTPFR_{conv} \times 60$$

$$kWh_{ES} = kWh_{HS} + kWh_{LS}$$

$$kWh_{HS} = PFR_{HS} \times 60 \times hours_{HS} \times daysEF_{HS} \times 1000$$

$$kWh_{LS} = PFR_{LS} \times 60 \times hours_{LS} \times daysEF_{LS} \times 1000$$

$$PFR_{LS} = V_{pool}t_{turnover} \times 60$$

Table 6-10 Parameters for kWh usage of conventional and ENERGY STAR® Pool Pump

$kWhHS$	ENERGY STAR® variable speed pool pump energy at high speed
$kWhLS$	ENERGY STAR® variable speed pool pump energy at low speed
$hoursconv$	Conventional single-speed pump daily operating hours
$hoursHS,VS$	ENERGY STAR® variable speed pump high speed daily operating hours = 2 hours
$hoursLS,VS$	ENERGY STAR® variable speed pump low speed daily operating hours = 10 hours
$hoursHS,MS$	ENERGY STAR® multi-speed pump high speed daily operating hours = 2 hours
$hoursLS,VS$	ENERGY STAR® multi-speed pump low speed daily operating hours
$days$	Operating days per year = 212.8 days
$PFRconv$	Conventional single-speed pump flow rate (gal/min)
$PFRHS,VS$	ENERGY STAR® variable speed pump high speed flow rate = 50 gal/min
$PFRLS,VS$	ENERGY STAR® variable speed pump low speed flow rate (gal/min) = 30.6
$PFRHS,MS$	ENERGY STAR® multi-speed pump high speed flow rate (gal/min)
$PFRLS,MS$	ENERGY STAR® multi-speed pump low speed flow rate (gal/min)
$EFconv$	Conventional single-speed pump energy factor (gal/W·hr)
$EFHS,VS$	ENERGY STAR® variable speed pump high speed energy factor = 3.75 gal/W·hr
$EFLS,VS$	ENERGY STAR® variable speed pump low speed energy factor = 7.26 gal/W·hr
$EFHS,MS$	= ENERGY STAR® multi-speed pump high speed energy factor (gal/W·hr)
$EFLS,MS$	ENERGY STAR® multi-speed pump low speed energy factor (gal/W·hr)
$Vpool$	Pool volume = 22,000 gal
PT	Pool turnovers per day = 1.5
$tturnover,VS$	Variable speed pump time to complete 1 turnover = 12 hours
$tturnover,MS$	Multi-speed pump time to complete 1 turnover

Table 6-11 Conventional Pool Pumps Assumptions

Pump HP	$hours_{conv}$	PFR_{conv} (gal/min)	EF_{conv} (gal/W·h)
0.5	11.0	50.0	2.71
0.75	10.4	53.0	2.57
1	9.2	60.1	2.40
1.5	8.6	64.4	2.09
2	8.5	65.4	1.95
2.5	8.1	68.4	1.88

3	7.5	73.1	1.65

Table 6-12 ENERGY STAR® Multi-Speed Pool Pumps Assumptions

Pump HP	$t_{turnover,MS}$	$hours_{MS,LS}$	$PFR_{HS,MS}$ (gal/min)	$EF_{HS,MS}$ (gal/W·h)	$PFR_{LS,MS}$ (gal/min)	$EF_{LS,MS}$ (gal/W·h)
1	11.8	9.8	56.0	2.40	31.0	5.41
1.5	11.5	9.5	61.0	2.27	31.9	5.43
2	11.0	9.0	66.4	1.95	33.3	5.22
2.5	10.8	8.8	66.0	2.02	34.0	4.80
3	9.9	7.9	74.0	1.62	37.0	4.76

Demand savings calculations are as follows:

$$kW_{Savings} = \left[\frac{kWh_{conv}}{hours_{conv}} - \left(\frac{kWh_{HS} + kWh_{LS}}{hours_{HS} + hours_{LS}}\right)\right] \times \frac{CF}{days}$$

CF = Coincidence Factor = .31

Deemed kWh and kW savings are summarized in Table 6-13 and Table 6-14.

Table 6-13 ENERGY STAR® Variable Speed Pool Pumps – Deemed Savings Values

Pump HP	kW Savings	kWh Savings
0.5	0.24	1,713
0.75	0.28	1,860
1	0.36	2,063
1.5	0.47	2,465
2	0.52	2,718
2.5	0.57	2,838
3	0.72	3,364

Table 6-14 ENERGY STAR® Multi-Speed Pool Pumps – Deemed Savings Values

Pump HP	kW Savings	kWh Savings
1	0.30	1,629
1.5	0.40	1,945
2	0.41	1,994
2.5	0.46	2,086
3	0.54	2,292

6.3 Verified Savings by Measure

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided verified gross savings according to TRM protocols. Savings figures provided by CLEAResult for the following measures were verified:

- CFL and LED lighting;
- Advanced Power Strips;
- Pool Pumps; and

- Room ACs.

6.3.1 Lighting

Table 6-15 Expected and Realized Lighting Savings – New Orleans

Measure	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
14W CFL	842,763	1,165,925	138.30%	181.82	189.57	104.26%
6W LED	30,595	38,222	124.90%	6.64	6.21	93.52%
9W LED	14,779	18,408	124.60%	3.21	2.99	93.15%
10W LED	20,425	25,516	124.90%	4.43	4.15	93.68%
11W LED	149,743	187,071	124.90%	32.48	30.42	93.66%
BR30 LED	177,727	207,841	116.90%	38.55	33.79	87.65%
Total	**1,236,032**	**1,642,983**	**132.90%**	**268.11**	**267.13**	**99.63%**

Table 6-16 Expected and Realized Lighting Savings - Algiers

Measure	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
14W CFL	96,835	133,634	138.0%	21.00	21.73	103.4%
Total	96,835	133,634	138.0%	21.00	21.73	103.4%

6.3.2 Advanced Power Strips

Table 6-17 Expected and Realized Power Strip Savings – New Orleans

Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
224	224	100.0%	.02	.028	140.0%

Table 6-18 Expected and Realized Power Strip Savings – Algiers

Measure	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized kW Savings	kW Realization Rate
Total	0	0	NA	0	0	NA

6.3.3 Room Air Conditioners

Table 6-19 Expected and Realized Room AC Savings – New Orleans

Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
35,739	31,162	87.20%	39.46	29.12	73.80%

Table 6-20 Expected and Realized Room AC Savings - Algiers

Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
720	493	68.5%	.79	.46	58.0%

6.3.4 ENEGRY STAR® Pool Pumps

Table 6-21 Expected and Realized Pool Pump Savings – New Orleans

Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
25,572	32,407	126.7%	3.92	6.46	164.6%

Table 6-22 Expected and Realized Pool Pump Savings - Algiers

Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
2,131	2,645	115.7%	.33	.47	143.7%

Table 6-23 and Table 6-24 summarize the savings from the CP Program.

Table 6-23 kWh and Peak kW Realization Summary – New Orleans

Measure	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
Lighting	1,236,032	1,642,983	132.92%	268.1	267.13	99.64%
Power Strips	224	224	100.00%	0.02	0.028	140.00%
Room ACs	35,739	31,162	87.19%	39.46	29.12	73.80%
Pool Pumps	25,572	32,407	126.73%	3.92	6.46	164.80%
Total	1,297,567	1,706,776	131.54%	301.16	302.74	100.52%

Table 6-24 kWh and Peak kW Realization Summary - Algiers

Measure	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected Peak kW Savings	Realized Peak kW Savings	kW Realization Rate
Lighting	96,835	133,634	138.00%	21	21.73	103.4%
Power Strips	0	0	NA	0	0	NA
Room ACs	720	493	68.50%	0.79	0.46	58.0%
Pool Pumps	2,131	2,645	115.70%	0.33	0.47	143.7%
Total	99,686	136,772	137.20%	22.12	22.66	102.4%

6.4 Estimation of Net Savings

The following sections describe the approach used to estimate net savings for the lighting and appliance components of the CP Program.

6.4.1 Lighting Component

Free ridership for the lighting component was estimated using the Revenue Neutral Sales Model (RNSM).[17] The logic of the RNSM is that retailers will not participate unless they feel they can do so without reducing revenue. The model relies on this assumption to calculate the number of bulbs sold under normal retail pricing required to meet the same level of revenues the retailers have implicitly agreed to by participating in the program. As such, the estimate of free ridership represents a maximum free ridership value. It relies on the idea that retailers are concerned with top-line sales for each discounted lamp, and that they are able to accurately forecast sales under program and

[17] Opinion Dynamics Corporation (2013). The Revenue Neutral Sales Model: A new approach to estimating lighting program free ridership. International Energy Program Evaluation Conference, Chicago IL.

non-program conditions. The sales required to meet the same level of revenues as are expected through program sales sets the baseline sales condition for what would have been sold in the absence of the program.

Under this model free ridership is equal to:

$$FR = \frac{Quantity\ without\ Program}{Quantity\ with\ Program} \leq \frac{Price\ with\ Program}{Price\ without\ Program}$$

The quantity without the program is estimated by divided the total revenue for the program discounted product by the sales price without the program discount.

6.4.2 Appliance Component

Participant survey responses were used to estimate the net energy impacts of appliance component of the CP Program. The program net savings are equal to gross savings, less savings associated with free ridership, plus participant spillover savings.

In total, 30 program participants completed the survey.

6.4.2.1 Estimation of Free Ridership

The objective of the free ridership analysis is to estimate the share of program activity would have occurred in the absence of the program. To accomplish this, the Evaluators administered a survey to program participants that contained questions regarding the participants' plans to implement the incentivized measures and the likelihood of implementing those measures in the absence of program incentives and informational support. Program participants were asked questions regarding:

- Whether or not they had plans to complete the project and if they could afford to complete it without the program discount;
- The likelihood of completing the project without the discount or the incentivized assessment;
- The timing of the project in the absence of the program.

Participant responses to these questions were used to calculate three scores corresponding to the presence of prior plans, the likelihood of completing the project in the absence of the program, and the timing of that project if it had been completed.

6.4.2.1.1 Prior Plans Score

Respondents were scored as 1 on the prior plans score if all of the following were true:

- The participant had plans to complete the project prior to learning about the program.
- The participant confirms that they were planning to install an efficient unit as opposed to a standard efficiency unit.

- The participant indicated that they would have been financially able to complete the project had a discount or rebate not been provided.

Respondents that did not have prior plans and could afford the measures were not deemed to be free riders.

6.4.2.1.2 Likelihood of Project Completion Score

The score reflecting the likelihood of completing the project in the absence of the program was based on the following questions:

- Prior to learning about the program, did you have plans to have an energy assessment of your home performed?
- How likely is it that you would have completed the same < MEASURE> project that you completed through the program if the rebate was not available?

A likelihood score was assigned to each response for this question as follows:

- Very likely: 1
- Somewhat likely: .75
- Neither particularly likely or unlikely: .5
- Somewhat unlikely: .25
- Very unlikely: 0

6.4.2.1.3 Timing Score

To account for the impact the program may have had on project timing, the likelihood score was multiplied by a timing score. The timing score was developed from responses to a question on when the participant might have completed a project in the absence of the program. Specifically, timing was scored as follows:

- Project would have been completed in 0 to 6 months: 1
- Project would have been completed in 6 months to a year: .67
- Project would have been completed in 1 to 2 years: .33
- Project would have been completed in more than 2 years: 0

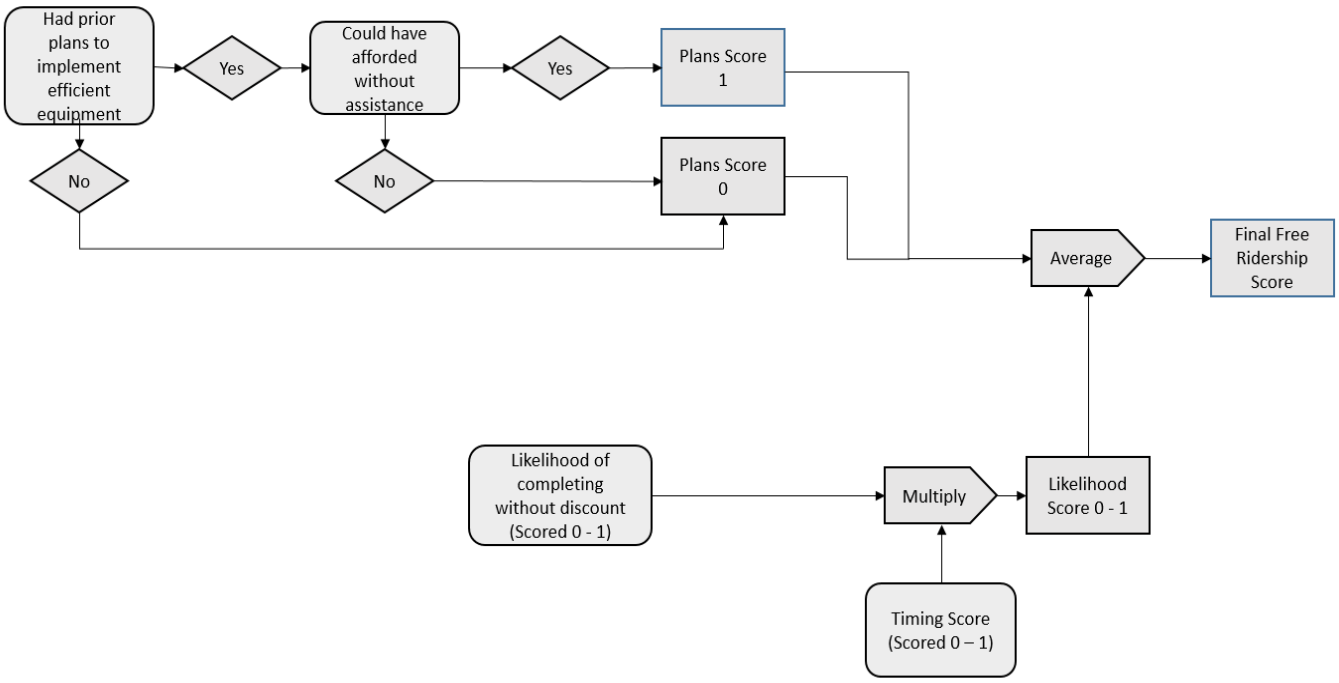
6.4.2.1.4 Final Free Ridership Score

The final free ridership score is equal to the following:

*Free Ridership = Average (Plans Score + Likelihood Score * Timing Score)*

The procedures used to estimate free ridership are summarized below in Figure 6-1.

Figure 6-1 Summary of Free Ridership Scoring Algorithm



6.4.2.2 Estimation of Participant Spillover

To estimate participant spillover impacts, participant survey respondents were asked if they had purchased any additional items because of their experience with the program without receiving an incentive.

Participants that indicated one or more energy efficiency purchases were asked additional questions about what was purchased and the number of units purchased to estimate the savings impact. Additionally, the following two questions were asked to determine whether the energy savings resulting from measures that were attributable to the program:

- On a scale of 0 to 10, where 0 represents “not at all important” and 10 represents “extremely important”, how important was the experience with the program in your decision to purchase the items you just mentioned?
- On a scale of 0 to 10, where 0 represents “not at all likely” and 10 represents “extremely likely,” how likely would you have been to purchase those items if you had not participated in the program?

If the average of the first response and 10 – the second response is 7 or greater, the savings associated with the measures were attributed to the program.

None of the respondents reported implementing any additional projects that met the spillover criterial.

6.4.3 Net Savings Results

6.4.3.1 Lighting Component

The free ridership rates are presented below in Table 6-25 by bulb type. The rate of free ridership was similar for LEDs and CFLs.

Table 6-25 Net to Gross Ratios for CFLs and LEDs

Bulb type	Free Ridership
CFL	32%
LED	33%

The verified net kWh savings of the lighting component are displayed in Table 6-26 followed by verified net peak kW reductions in Table 6-27. The net-to-gross ratio is equal to 68% for both kWh savings and peak kW reductions.

Table 6-26 Summary of Verified Net Savings – Lighting Component

Utility	Expected kWh Savings	Verified Gross kWh Savings	Free Ridership	Verified Net kWh Savings	Net to Gross Ratio
ELL Algiers	96,835	133,634	42,763	90,871	68%
ENO	1,236,032	1,642,983	525,755	1,117,228	68%
Total	1,332,867	1,776,617	568,517	1,208,100	68%

Table 6-27 Summary of Verified Net Peak Demand Reductions – Lighting Component

Utility	Expected Peak kW Reductions	Verified Gross Peak kW Reductions	Free Ridership	Verified Net Peak kW Reductions	Net to Gross Ratio
ELL Algiers	21.00	21.73	6.95	14.78	68%
ENO	268.10	267.13	85.48	181.65	68%
Total	289.10	288.86	92.44	196.42	68%

6.4.3.2 Appliance Component

Free ridership for the appliance component of the program was estimated by applying the measure level net to gross ratios to the measure savings. Program level spillover was estimated by applying a ratio of the survey respondent reported spillover savings to the total verified gross savings for survey respondents to the program gross savings.

values.[18] Table 6-28 and Table 6-29 summarize the program net kWh savings and peak kW demand reduction impacts of the CP Program.

Table 6-28 Summary of Verified Net Savings – Appliance Component

Utility	Expected kWh Savings	Verified Gross kWh Savings	Free Ridership	Spillover	Verified Net kWh Savings	Net to Gross Ratio
ELL Algiers	2,851	2,883	1,321	0	1,562	54%
ENO	61,535	59,008	27,035	0	31,973	54%
Total	64,386	61,890	28,355	0	33,535	54%

Table 6-29 Summary of Verified Net Peak Demand Reductions – Appliance Component

Utility	Expected Peak kW Reductions	Verified Gross Peak kW Reductions	Free Ridership	Spillover	Verified Net Peak kW Reductions	Net to Gross Ratio
ELL Algiers	1.12	0.93	0.46	0.00	0.47	50%
ENO	43.40	35.61	17.68	0.00	17.93	50%
Total	44.52	36.54	18.14	0.00	18.40	50%

6.4.3.3 Measure Level Free Ridership Results

Table 6-30 summarizes the average free ridership scores by measure. The results presented show higher levels of free ridership for room air conditioners than for pool pumps.

Table 6-30 Average Free Ridership by Measure

Measure	Number of Responses	Average Free Ridership
Room air conditioners	26	52%
Pool pumps	3	42%
Power strips	1	0%

[18] Net savings estimates were based on all survey respondents and the same value was applied to ENO and ELL Algiers projects.

6.4.3.4 Final Net Savings

Table 6-31 Verified Net Savings – New Orleans

Measure Category	Expected Gross kWh	Verified Gross kWh	Verified Net kWh	Expected Gross kW	Verified Gross kW	Verified Net kW
Lighting	1,236,032	1,642,983	1,117,228	268.1	267.13	181.65
Appliances	61,535	59,008	31,973	43.4	35.61	17.93
Total	1,297,567	1,701,991	1,149,201	311.5	302.74	199.58

Table 6-32 Verified Net Savings - Algiers

Measure Category	Expected Gross kWh	Verified Gross kWh	Verified Net kWh	Expected Gross kW	Verified Gross kW	Verified Net kW
Lighting	96,835	133,634	90,871	21	21.73	14.78
Appliances	2,851	2,883	1,562	1.12	0.93	0.47
Total	99,686	136,517	92,433	22.12	22.66	15.25

6.5 Process Evaluation

This chapter presents the results of the process evaluation of the CP Program. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

The process chapter begins with an overview of the program. This is followed by a discussion of the methodological approach used in the evaluation. A summary of findings and recommendations for program improvement follow the discussion of the methodology. This discussion is followed by detailed findings of the evaluation activities.

6.5.1 Program Overview

The CP Program provides mail-in rebates (downstream rebates) for window ACs, Pool Pumps, and Advanced Power Strips. Point of purchase discounts are provided for compact fluorescent lamps (CFLs) and light emitting diodes (LEDs) through participating retailers.

6.5.1.1 Lighting Component

Entergy provides point-of-sale discounts on standard CFLs and LEDs three retail chains. CFLs receive a discount of $1 per bulb and LEDs receive a discount of $3 - $6 per bulb. Table 6-33 summarizes the number of retail locations offering discounted bulbs in the Entergy Louisiana service area. All locations offered both CFLs and LEDs.

Table 6-33 Number of Participating Retailers

Retailer	Number of Participating Locations
Home Improvement #1	2
Home Improvement #2	2
Big Box #1	4
Total	8

6.5.1.2 Appliance Component

Mail-in rebates are offered for Window AC ENERGY STAR ®, ENERGY STAR® Pool Pumps installed in an in-ground pool, and Advanced Power Strips. The rebates available for these products are summarized in Table 6-34

Table 6-34 Appliance Rebates

Appliance	Rebate Amount
Window AC units	$40
Pool Pumps	$200
Advanced Power Strips	$15

6.5.2 Detailed Findings

6.5.2.1 Review of Program Tracking Data

The Evaluator reviewed the program tracking data for completeness and other issues. The following issues were noted:

- Lighting program activity is tracked in two systems. One system tracks detailed product sales data and is used to calculate savings for the lighting measures. The second system (Catalyst) is use to track program and portfolio progress towards savings goals. Data is batched from the detailed system and entered into the second system. The Evaluators initially received exports from both systems that had discrepant savings due to the inclusion of PY4 sales in the Catalyst system. Staff rectified the discrepancy.
- There was a small amount of missing data in the appliance records provided.
    - o Missing phone numbers for 4% of records.
    - o Model number information was not recorded for one room AC unit
    - o Expected savings were missing for 4% of records

6.5.2.2 Analysis of Program Tracking Data

Table 6-35 provides a summary of CP Program activity during PY5. As shown, lighting accounted for 95% of the program expected energy savings. Room ACs accounted for the largest share of appliance savings followed by pool pumps.

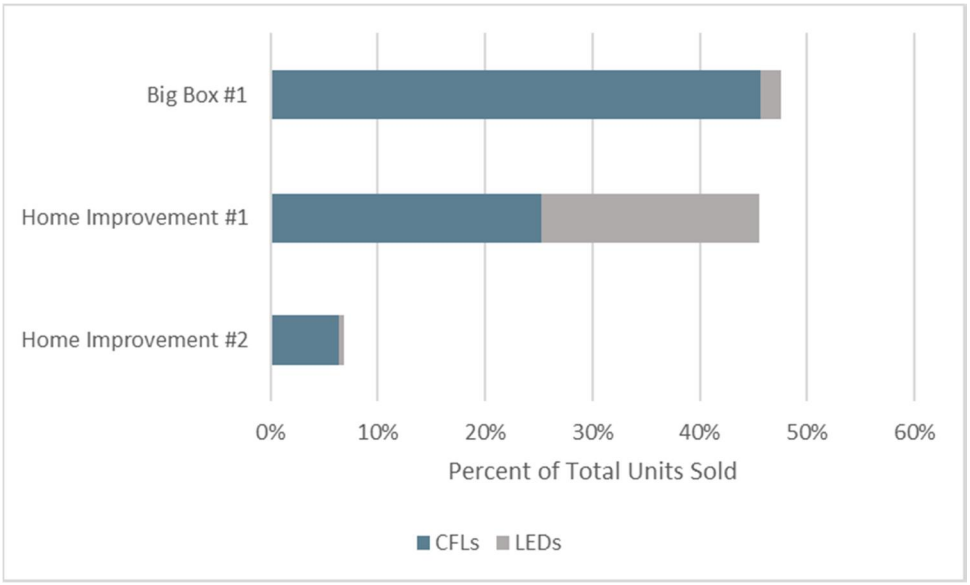
Table 6-35 Summary of CP Program Activity

Measure Type	Per Unit Incentive Amount	Number of Units Purchased	Expected Savings (kWh)	Share of Program Savings	$ per kWh in Expected Savings
CFL	$1.00	58,650	939,598	67%	$0.06
LED	$3.00 - $8.00	17,215	393,269	28%	$0.26
Power strip	$15.00	2	224	<1%	$0.13
Pool pump	$200.00	13	27,703	2%	$0.09
Room AC	$40.00	217	36,459	3%	$0.24

.

The participating big box retailer accounted for the largest share of program sales which were largely comprised of CFL sales. Home Improvement #1 accounted for a similar share of program sales, of which slightly less than one-half were LED sales.

Figure 6-2 Lighting Sales



Monthly and cumulative expected savings are shown in Figure 6-3 and Figure 6-4, respectively. Lighting sales did not begin until August because the first seven MOUs with the manufacturer and retailers were signed in late July (the final MOU was signed in November).

Appliance sales began earlier, with the first rebate submissions in June. August was the most active rebate month, during which 73 room ac units and three pool pumps were rebated. The increased activity was likely due to customers seeking new AC units during the warmest months of the year.

Figure 6-3 Monthly and Cumulative Accrual of Lighting kWh Savings

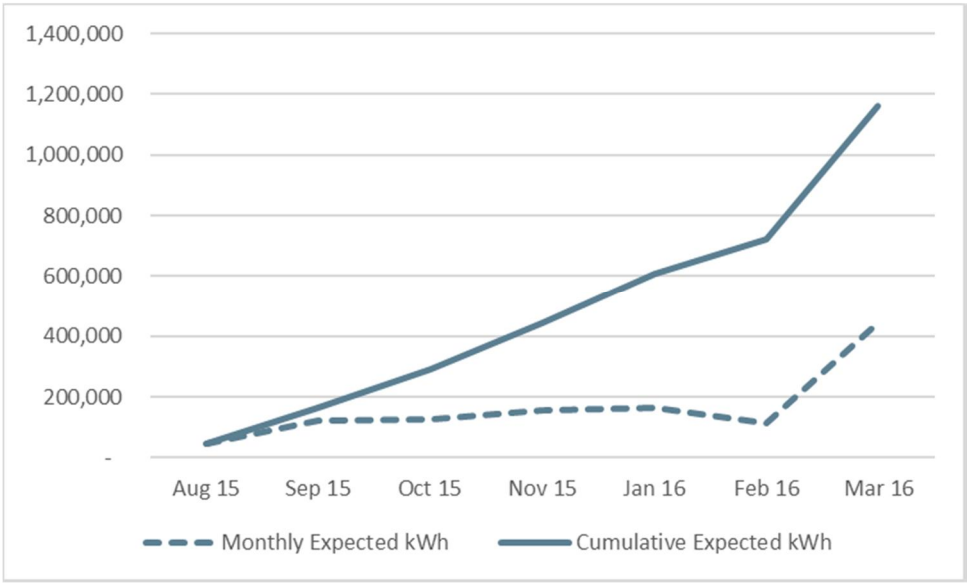
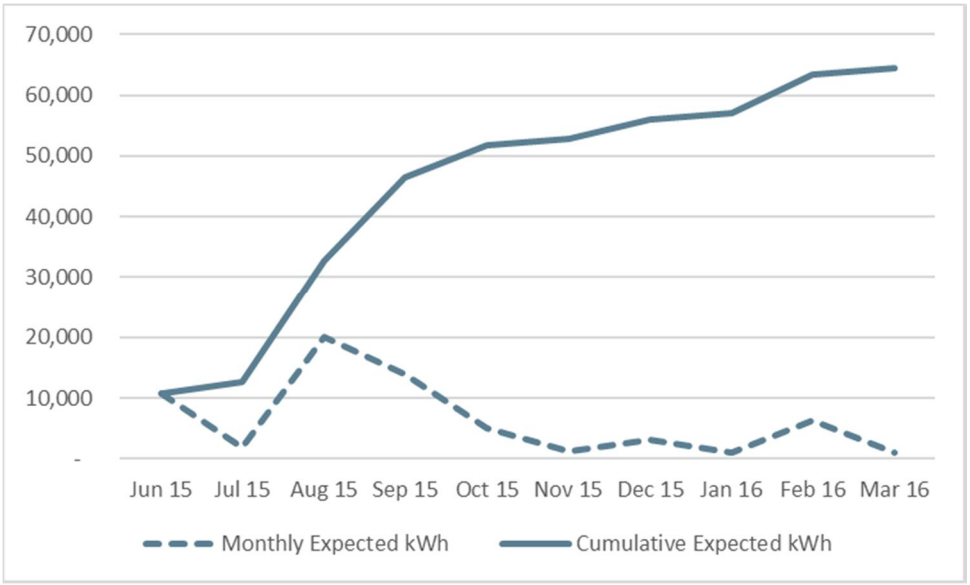


Figure 6-4 Monthly and Cumulative Accrual of Appliance kWh Savings



6.5.2.3 Program Design, Operations and Activities

The following sections describe program design, operations, and activities and were developed from reviews of program documentation and interviews with program staff.

6.5.2.3.1 Program Objectives

The primary program objective is to assist residential customers in achieving electric energy savings and peak demand reductions through the installation of efficient lighting and select appliances.

Ancillary program objectives include improving access to the qualified products and providing consumers information about the quality of efficient CP Program.

The program met energy and demand goals in New Orleans and Algiers.

6.5.2.3.2 Program Participation Process

A key component of the program participation process is the establishment of Memoranda of Understanding (MOU) with the participating manufacturers and retailers. CLEAResult staff work with lighting product manufacturer retailer representatives to establish an agreement between CLEAResult, the lighting product manufacture, and the retailer. The terms of the agreement are set forth in the MOU signed by the parties. Under the terms of the MOU, retailers agree to the following:

- Provide discounts on the qualified products;
- Display point of purchase materials and advertising with the utility's logo;
- Submit point-of-sale data to corroborate information provided in invoices; and
- Limit purchases to 12 bulbs per customer.

Manufacturers agree to the following:

- Notify the program of any proposed changes to the approved product mix; and
- Submit invoices for the discounted products purchased.

Once the program is in place, customers participate by receiving an instant discount on the incentivized products.

The following are the key steps in the participation process for customers to receive the rebates on the appliances:

- Customer purchases a qualifying product;
- Customer completes the rebate form and submits it and a sales receipt by mail, email, or fax;
- CLEAResult staff review the rebate submission for completeness;
- CLEAResult staff request complete information from customer if needed; and

- CLEAResult staff approves the rebate and mails payment to the customer.

6.5.2.3.3 Roles and Responsibilities

CLEAResult is responsible for the primary program implementation tasks, namely:

- Recruiting and establishing agreements with retailers to offer the discounted lighting products;
- Ensuring that participating retailers comply with the terms of the MOU;
- Providing training to retailer staff;
- Reviewing sales reports and invoicing submitted for lighting discounts;
- Reviewing rebate materials submitted by customers; and
- Process and distribute incentive payments to retailers and customers.

CLEAResult staffs the program with an associate program manager and a field representative who split time between the Companies' programs in operating in and outside of New Orleans as well as, Entergy Gulf States, and Cleco programs. The Companies' programs are overseen by a senior program manager.

6.5.2.3.4 Program Marketing and Outreach

The lighting discounts are primarily promoted through point of service materials. CLEAResult staff supplies participating retailers with materials for display in participating stores. These materials include shelf stickers that display the program name and utility next to every item, as well as, larger signs. These marketing materials are presented in English and Spanish and include a statement about the 12 bulb purchase limit. An example of the material is displayed below in Figure 6-5.

Figure 6-5 Example of Lighting Display

Program staff reported that no in-store promotion days were held during the program year. However, the program's field representative speaks with customers and retailer staff about the discounts during monthly store visits. Additionally, staff is considering offering these events during the coming program year.

Similarly, the rebates for Window AC units are promoted at retailer locations. Some of the largest retailers are located outside of Orleans Parish but are targeted by the program because customers of Orleans Parish shop there. Retailers are not signed up for the program but staff provides them application tear pads and tags to hang retail store aisles that state the rebate amount, the Orleans Parish customer requirement, and the Energy Smart and Entergy logos (see Figure 6-6 and Figure 6-7). The application tear pad contains messaging related to saving money improving home comfort through purchasing an efficient air conditioner.

Figure 6-6 Room AC Tear Pad Messaging

Figure 6-7 Room AC Hang Tag

Staff reported that in-store promotion of advanced power strips is challenging because they compete against sales of standard power strips. The standard power strips cost lest and the benefits of the advanced power strips are often not clear to customers. Additionally, not all retailers carry the advanced power strips. The advanced power strips are primarily promoted through the program website where customers can download the rebate form.

To promote the availability of the rebates for ENERGY STAR ® qualified pool pumps, program staff held three open house events at two locations of a wholesale distributor of pool pumps. Contractors are the primary focus for promoting the program because it is generally anticipated that few residential customers will self-install the pool pumps. However, in PY5 23% of the 13 rebated pool pumps were self-installed. Additionally, contractors are an important component in realizing savings for pool pumps because of the importance of properly programming them.

Customers may also learn of all rebates through the program website and download application form there.

6.5.2.3.5 Quality Control and Verification Processes

CLEAResult performs two types of quality control activities: monitoring participating retailer compliance with the MOU and verification and review of lighting sales and submitted rebates.

Activities related to monitoring compliance with the terms of the MOUs include:

- Verifying that the products provided at a discount are ENERGY STAR® qualified;
- Completing monthly visits to retail locations to verify that signage is displayed, product pricing is displayed, and that the pricing is accurate; and
- Educating retail staff to ensure that they are aware of the program discounts and the purchase limit. The program held 11 training events during the program year during which a total of 40 retail associates received training.

A review of lighting sales data is performed to ensure that invoiced sales data match point of purchase sales data and to identify anomalies such as large sales for items that suggest the purchase limit was not adhered to.

Quality control procedures for rebated appliances consist of reviewing the submitted rebate form for completeness of data, verifying that a sales receipt was submitted, and verifying that the rebate was requested for qualifying equipment.

Staff reported that few quality issues have occurred during the program year.

6.5.2.3.6 Review of Program Incentives

The Evaluators reviewed discounts and rebates offered on lighting products and appliances for utilities operating in the southern region to benchmark the Companies' discounts of $1 per standard CFL and $3 per LED. As shown in Table 6-36 the Companies' discounts are similar to those offered by other utilities. The Companies' rebates for pool pumps are near the midpoint of the discounts provided in other jurisdictions.

Table 6-36 Appliance and Discounts Offered by Regional Utilities

State	Utility / Administrator	Measure	Rebate / Discount Amount
FL	Gulf Power	Pool Pump	$100
MO	Ameren	Pool Pump	$350
TX	CPS Energy	Pool Pump	$200
AR	SWEPCO	ENERGY STAR® Window AC	Up to $35
FL	Gulf Power	ENERGY STAR® Window AC	$75
MO	Ameren	ENERGY STAR® Window AC	$20
MO	Kansas City Power & Light	ENERGY STAR® Window AC	$25
AR	Entergy	Advanced Power Strips	$15
MO	Kansas City Power & Light	Advanced Power Strips	$10
MO	Ameren	Advanced Power Strips	7 outlet strip for $4.95 (approx. $20 discount)
MO	Ameren	LED Light Bulbs	Up to $24
MO	Kansas City Power & Light	LED Light Bulbs	$2.00 - $5.00
AR	AEP Southwestern Electric Power Company	LED Light Bulbs	$3.00
AR	Entergy Arkansas	LED Light Bulbs	$3.00 - $10.00
MO	Ameren	Standard CFLs	$5.00 - $8.00
MO	Kansas City Power & Light	Standard CFLs	$1.35
AR	AEP Southwestern Electric Power Company	Standard CFLs	$1.00
AR	Entergy Arkansas	Standard CFLs	$0.50 - $1.00

Sources: ENERGY STAR® Summary of Lighting Programs: September 2015 Update. https://www.energystar.gov/ia/partners/downloads/FINAL_2015_ENERGY_STAR_Summary_of_Lighting_Programs.pdf

Data retrieved from http://www.dsireusa.org/ and utility program websites.

For a broader comparison, Table 6-37 summarizes rebates and discounts offered on room AC units, pool pumps, and LED and CFL light bulbs by members of the Consortium for Energy Efficiency (CEE). As shown, the Companies Room AC rebates are towards the higher end, while rebates for pool pumps are towards the lower end. Additionally, lighting incentives tend to be toward the lower end of what is offered by CEE members.

Table 6-37 Rebate and Discount Amounts for Consortium for Energy Efficiency Members

Measure	Efficiency Criteria	Number of Programs	Rebate / Discount Amount			Distribution
			Average	Minimum	Maximum	
Efficient Room Acs	Includes ES, CEE Tier 1, CEE Tier 2, Other	12	$31.25	$20.00	$50.00	
Pool Pumps	Variable and two speed pumps	32	$320.31	$100.00	$1,000.00	
LEDs	-	48	$9.38	$3.00	$20.00	na
CFLs	-	51	$1.76	$0.50	$3.00	na

Sources: Consortium for Energy Efficiency, 2015. Overview of Residential Appliance Programs in the United States and Canada.
Consortium for Energy Efficiency, 2015. Overview of Residential Lighting Programs in the United States and Canada.
Consortium for Energy Efficiency, 2015. Overview of Residential Swimming Pool Programs in the United States and Canada.

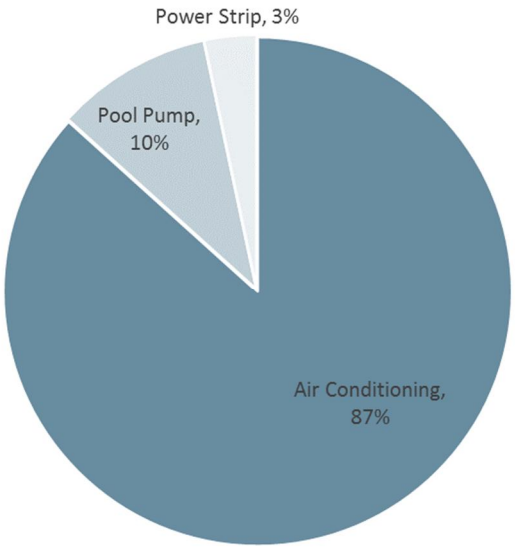
A $200 incentive is provided for all ENERGY STAR® qualified pull pumps, which includes multi-speed and variable-speed pumps. Given the differences in potential energy savings between these two pumps, staff should consider offering different incentive amounts for these types of pumps.[19] Savings for variable speed pumps range between approximately 20% - 30% higher than multispeed pumps, depending on horsepower.

6.5.2.4 Participant Survey Results

A total of 30 participants responded to the survey. Figure 6-8 summarizes the measures implemented by survey respondents. Eighty-seven percent of participants received air conditioning units through the program, 10% received pool pumps, and 3% received power strips.

[19] Consortium for Energy Efficiency (2012). CEE[SM] High Efficiency Residential Swimming Pool Initiative.

Figure 6-8 Measures Implemented by Survey Respondents



6.5.2.4.1 Participant Demographics and Residence Characteristics

Most program participants owned their homes, had, on average, 2.9 household members, and 50% reported household of income of at least $50,000.

Table 6-38 Participant Demographics

Demographic Characteristic	***(n=30)***
Average number of home residents	2.9
Percent with income of:[1]	
Less than $25,000 per year	13%
$25,000 to less than $50,000	23%
$50,000 to less than $75,000	17%
$75,000 or more	33%
Percent own home	53%

1. Total does not equal 100% because some respondents did not know their income or declined to state it.

Table 6-39 summarizes the participant household characteristics. Most participants resided in an older (pre-1990) single family homes with gas space and water heating. Nearly one-half lived in a home that was at least 2,000 square feet.

Table 6-39 Residence Characteristics

Residence Characteristic	***(n=30)***
Percent Single Family Home[1]	57%
Percent electric space heating	37%
Percent electric water heating	23%
Percent of households built before 1990	97%
Percent with home size of:[2]	
Less than 1,000 ft.[2]	20%
1,001-1,500 ft.[2]	20%
1,501-2,000 ft.[2]	10%
Greater than 2,000 ft.[2]	47%

1.Consistent with program rules, none of the respondents reported living in a multifamily property of more than 4 units

2. Total does not equal 100% because some respondents did not know the size of their home or declined to state it.

6.5.2.4.2 Program Awareness and Participation

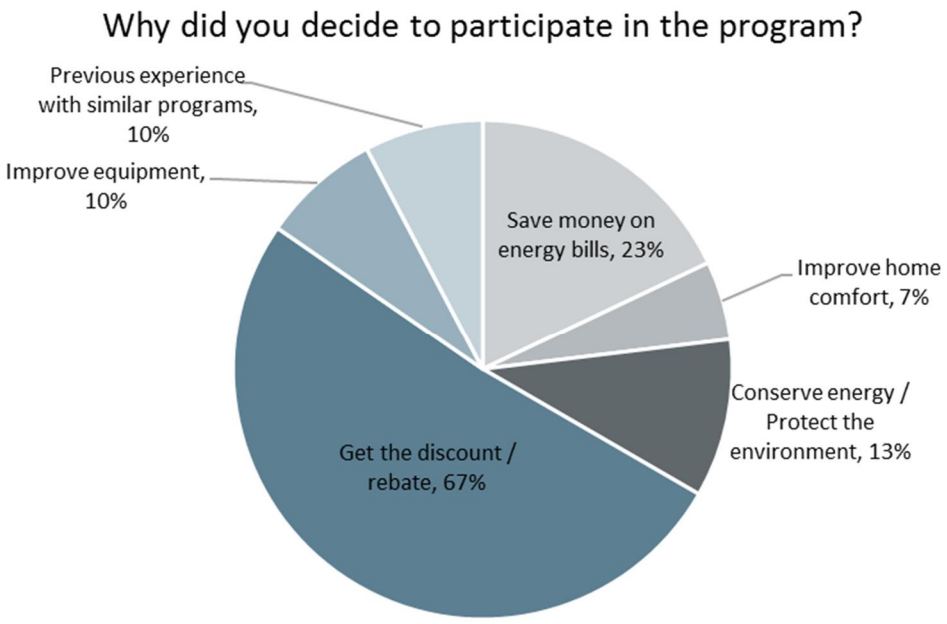
As shown in Figure 6-9, participants most frequently learned of the program through a retailer. Contractors were reported to be the source of awareness by 10% of the respondents, both of whom installed room air conditioners. Seven percent of program participants stated they had heard about the program by either radio or television advertisements and bill inserts or mailers.

None of the three respondents that installed pool pumps reported learning of the program from a contractor. These participants learned of the program from a pool pump company website, a friend, family member, or colleague, and a bill insert or mailer.

Figure 6-9 Source of Program Awareness

Participants gave a range of reasons for participating in the program. As seen in Figure 6-10, most (67%) participants stated they participated in the program in order to receive the program discount or rebate. Saving money on their electric bills was stated by slightly less than a quarter or respondents. Conserving energy or protecting the environment, previous experience with similar programs, improving equipment, and improving home comfort were also mentioned.

Figure 6-10 Reasons for Participation



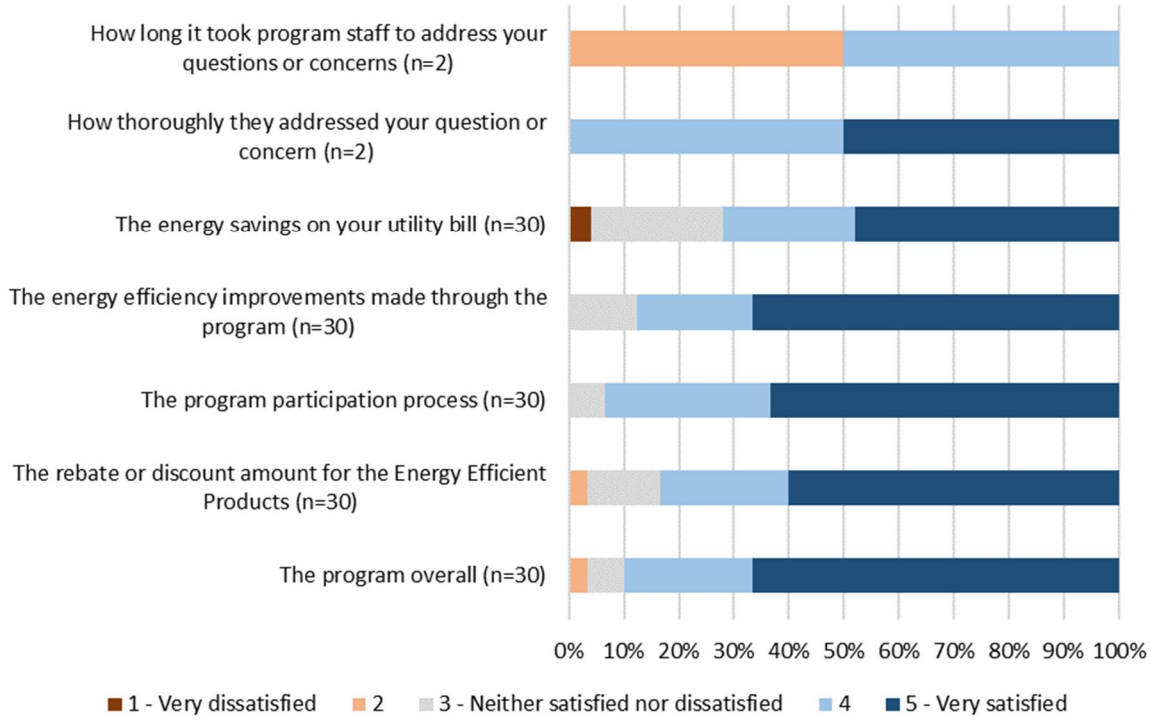
6.5.2.4.3 Program Satisfaction

Overall, program participants rated various elements and the program highly. The highest rated elements were the program participation process, and the overall program. As shown in Figure 6-11, 93% of program participants stated that they were either satisfied or very satisfied with the program participation process and none reported dissatisfaction with it. Most participants (90%) stated that they were satisfied or very satisfied with the program overall. Seven percent stated that they were neither satisfied nor dissatisfied, and three percent stated that they were somewhat dissatisfied.

The aspect of the program that the fewest participants indicated satisfaction with was the savings on their bill – 74% of participants were satisfied with this aspect of the program.

The group of participants who contacted program staff over the course of the project were asked two additional questions regarding their experiences with staff. The two participants that had interactions with the staff were satisfied with how thoroughly staff addressed their questions or concerns. One of these participants was dissatisfied with how long it took staff to respond to their question.

Figure 6-11 Satisfaction with Program Components



Two participants provided open-ended comments about their reason for dissatisfaction. One stated that they were dissatisfied with the rebate amount because it only covered 25% of the measure cost. This respondent also stated the Companies should "be more pro-active with their programs for low-income." Another respondent was dissatisfied with the program's running out of funds:

> *They tell you there's a program and when you go to apply they've run out of money. Underfunded. Hard to get ahold of them.*

Participants were then asked if they had experienced any other benefits through the program other than energy or cost savings. Participants were allowed to give more than one answer. The benefits noted and the number of respondents that mentioned them is summarized below:

- Home is more comfortable (n = 3);
- Environmental benefits (n= 2);
- Less outside noise (n = 1);
- Air conditioner runs less often (n = 1).

Sixty-seven percent of respondents were satisfied with the Companies as their service provider.

Table 6-40 Overall Satisfaction with Entergy

Satisfaction with Entergy	*Percent of Respondents (n=30)*
5 - Very satisfied	37%
4	30%
3 - Neither satisfied nor dissatisfied	17%
2	13%
1 - Very dissatisfied	3%

A sizable share of participants, 67%, reported that their experience with the program increased their satisfaction with the Companies.

Table 6-41 Effect of Program on Satisfaction with Entergy

Effect of Program on Satisfaction with Entergy	*Percent of Respondents (n=30)*
Greatly increased your satisfaction with ENO	10%
Somewhat increased your satisfaction with ENO	57%
Did not affect your satisfaction with ENO	33%
Somewhat decreased your satisfaction with ENO	0%
Greatly decreased your satisfaction with ENO	0%

6.5.3 Conclusions

6.5.3.1 Program Design and Incentives

- Overall, program incentive levels appear to be sufficient for the included lighting, appliance, and advanced power strip measures. Incentive levels are within the amounts offered through other programs Additionally, the program met its goal based on expected savings. Discounted lighting accounted for most program savings. Only two advanced power strips were rebated through the program. Program staff noted that promotion of rebates for advanced smart strips in stores is challenging because customers do not understand the benefits of the product that costs considerably more than standard products.
- The program has recruited 8 retailer locations in the Companies' service area to deliver lighting rebates. The discounts for LEDs and standard CFLs are comparable to discounts provided through other regional programs.
- Rebates were provided for ENERGY STAR® qualified pool pumps but incentive levels are the same for multi-speed and variable speed pumps, despite differences in energy savings potential. The rebate levels were changed for PY6.

6.5.3.2 Program Marketing and Outreach

- Lighting discounts are promoted through point-of purchase materials.

- Rebates for window AC units are promoted at retailer locations. Pool pumps are primarily promoted through working with contractors.

6.5.3.3 Quality Control and Verification Processes

- Verification visits are performed with participating lighting retailer to ensure that the terms of the MOU are complied with. Consistent with common practice, these visits occur on a monthly basis and are unannounced. Additionally, lighting sales data are reviewed for anomalous purchase activity such as large purchases exceeding the program limit. Invoice amounts for the lighting discounts are corroborated with point-of-sale data submitted by the retailer.
- Rebated appliance verification procedures are consistent with similar programs. The process consists of reviewing the submitted rebate form for completeness of data, verifying that a sales receipt was submitted, and verifying that the rebate was requested for qualifying equipment.

6.5.4 Recommendations

The Evaluators' recommendations for the Consumer Products Program are as follows:

- **Correct pool pump savings calculation.** All pool pumps are currently given the same savings value regardless of horsepower or type.
- **Cross check lighting data entered into database used to track portfolio savings.** Lighting savings are calculated outside of the primary database used to track program activity. Bulk records are then entered into the primary database. During this process a data entry error was made that resulted in different savings totals between the two databases.
- **Promote a broader range of markdown lighting.** The program does not include any lighting for 75W/100W lamp types. This is a missed opportunity for savings. All programs included in the benchmark comparison provided incentives for general service lamps providing 75W and 100W equivalence. Other possibilities include globe and decorative lamps.
- **Offer tiered incentives for multi/variable speed pool pumps.** The program currently incents single-speed and multi/variable-speed pool pumps at $200. Program staff should consider lowering the incentive for single-speed and increasing the incentive for multi/variable-speed pool pumps.
- **Consider expansion of marketing and education on pool pumps to include direct-to-consumer marketing.** Marketing activities in the program were focused towards installers, under the presumption that customers are unlikely to self-install a pool pump. However, in PY5 23% of pool pumps were self-installed by homeowners.

- **Remove advanced power strips from the downstream rebate channel.** This measure has had low participation (only two units rebated in PY5). This equipment is difficult to differentiate from standard power strips by consumers and is error-prone when installed by an end-user that does not understand the technology[20]. This measure is more successfully implemented in direct install programs, where trained program staff properly set up the equipment for the end-user. Within this, the Evaluators recommend:
    - **Home Performance/Assisted Home Performance with ENERGY STAR®:** use the same model(s) currently qualified in the Consumer Products Program, and have it added to the HPwES direct install package.
    - **Green Lights New Orleans:** use a model that has a locking screw mechanism, keeping the unit in place when a tenant moves out[21].

[20] 2015 EM&V of Public Service Company of New Mexico Whole-House Program findings that less than one-third of "leave-behind" power strips were correctly installed by end-users.

[21] For further detail, see SWEPCO Arkansas Residential Energy Improvement Program Multifamily Pathway: http://www.swepcogridsmart.com/arkansas/multifamily-pathway.html

7. Residential Heating & Cooling

7.1 Program Description

The Residential Heating & Cooling Program provides financial incentives to encourage residential customers to improve the efficiency of their HVAC systems. Incentives are provided for a tune-up of the system and for HVAC system replacements.

Tune-ups are provided by a qualified technician and involve testing the performance of the unit before and after measures are implemented. Typical measures implemented as part of the tune-up procedure include air flow correction; cleaning of the indoor blower, evaporator coils, condenser coils; and correction of refrigerant charge.

Incentives are provided for replacement of air conditioning systems and heat pump systems. Incentives for air conditioner replacements range from $75 to $550, depending on the size and SEER of the new unit. Incentives for ducted heat pumps range from $100 to $650, depending on size and SEER of the new unit. Ductless heat pumps may receive incentives ranging from $225 to $700 depending on the size of the unit.

A total of 835 customers participated in the Residential Heating & Cooling Program; 760 tune-ups and 75 replacements. Below, Table 7-1 summarizes the total number of measures conducted and distributed through the program and overall expected savings:

Table 7-1 Summary of Measures and Expected Savings

Measure	***Total Quantity of Measures***	***Total Expected kWh Savings***	***Total Expected peak kW Savings***
Tune-ups	760	810,032	306.53
Replacements	75	182,383	53.89
Total	835	992,415	360.42

Total verified savings and percentage of goals for the Residential Heating & Cooling Program are summarized in Table 7-2.

Table 7-2 Savings Goals & Attainment by Utility

Utility	***kWh goal***	***Net Realized kWh***	***Percentage of kWh goal realized***	***kW goal***	***Net Realized kW***	***Percentage of kW goal realized***
ENO	1,458,077	358,291	24.57%	573	117.22	20.46%
Algiers	131,133	27,280	20.80%	52	8.1	15.58%

7.2 M&V Methodology

Evaluation of the Residential Heating & Cooling Program included the following:

- Surveys with tune-up participants;
- Interviews with program trade allies; and
- Collection and analysis of participant billing data.

The Evaluators examined the Excel workbook distributed to trade allies to assess savings by measure. The workbook includes a section on heat pump replacement which utilizes deemed savings algorithms with trade ally inputs to calculate savings based on the input parameters. The Evaluators examined the calculator and factor tables, however were unable to recreate savings figures found in tracking data. Savings from AC and heat pump replacements used stipulated equivalent full-load hours along with unit-specific capacity and efficiency inputs. Finally, to evaluate savings from the tune-up portion of the program the Evaluators used regression modeling with participant billing data.

7.2.1 Central Air Conditioner Tune-Up Savings Calculations

A fixed-effects regression model using billing data was used to estimate annual savings for an individual tune-up. This model adjusts for variation unique to each customer over time, while considering the effect of dependent variables (i.e. CDD) on energy use (kWh) as fixed. Annual savings were predicted using TMY data and model output. The dependent variable (kWh) was created from billing data spanning January 2014 through April 2016. Monthly reads of kWh were converted into average daily kWh by dividing by the billing duration. In addition, billing data was divided into pre and post periods, with the pre-period beginning prior to the tune-up date and the post period beginning after the tune-up date, for each individual customer. Billing intervals overlapping the tune-up date were discarded. The regression model to predict daily kWh is specified as follows:

$$kWh_{ij} = ParticipantD_j + PostD_{ij} + Relative\ Humidity_{ij} + CDD_{ij} + HDD_{ij} + (PostD_{ij} * CDD_{ij}) + (PostD_{ij} * HDD_{ij}) + (PostD_{ij} * Relative\ Humidity_{ij}) + \varepsilon$$

Where,

- i = the nth observation
- j = the nth participant
- CDD_{ij} = Average daily cooling degree days for the billing interval
- HDD_{ij} = Average daily heating degree days for the billing interval
- kWh_{ij} = Average daily kWh for the billing interval
- $ParticipantD_j$ = Dummy variable for each participant in the analysis (where 1 = the jth participant, 0 = not)

- $PostD_{ij}$ = Dummy variable for the post period (where 0 = pre and 1 = post tune-up)
- $RelativeHumidity_{ij}$ = Average daily relative humidity for the billing interval
- $PostD_{ij} * CDD_{ij}$ = Interaction of post period dummy variable with CDD (both defined above)
- $PostD_{ij} * HDD_{ij}$ = Interaction of post period dummy variable with HDD (both defined above)
- $PostD_{ij} * RelativeHumidity_{ij}$ = Interaction of post period dummy variable with RelativeHumidity (both defined above)
- ε = Error term

Model coefficients, standard errors, and p-values are presented in the Table 7-3. The model coefficients are used to predict average daily kWh for each customer over each billing interval under a typical meteorological year (TMY). The results show that CDD, HDD, Relative Humidity, Post Dummy*CDD, and Post Dummy*Relative Humidity are significant predictors (p-value < 0.05). Of particular interest for savings, the coefficient for the interaction of Post Dummy and CDD is negative, which indicates customers in the post period used less energy for cooling than in the pre period.

Table 7-3 Regression Model Results

Variable	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	35.707	2.354	15.169	0.000
Post	-1.285	1.457	-0.882	0.378
Relative Humidity	-0.952	0.211	-4.515	0.000
CDD	1.068	0.043	25.090	0.000
HDD	1.280	0.056	22.873	0.000
Post*CDD	-0.202	0.074	-2.713	0.007
Post*HDD	-0.113	0.113	-0.996	0.319
Post*Relative Humidity	1.188	0.419	2.833	0.005

Table 7-4 below displays model fit. The model had an adjusted R-squared of 0.68. Each customer had on average 25.7 billing intervals (or roughly two years of data).

Table 7-4 Regression Model Fit

Number of Observations	Number of Customers	R-squared	Adjusted R-squared
6,848	267	0.693	0.680

Table 7-5 below shows the predicted per customer use and expected savings in the pre and post periods under a typical meteorological year (TMY for Station ID KMSY). Average annual savings per-unit for the M&V sample was 481 kWh.

The Evaluators compared this savings value to a weather-normalized estimate of participant cooling load. This cooling load estimate was developed by examining customer bills and normalizing them to TMY weather data for New Orleans.

The Evaluators weather-normalized the participants'' billed usage, and found normalized average annual pre-use of 10,093 kWh. With this, the tune up savings reflect a 4.8% reduction off of total annual bills. When compared to Louisiana deemed EFLH parameters, this savings value reflects a reduction of roughly 10.1% off of forecasted cooling use. This is a very effective tune-up, yielding high savings relative to energy use. However, realization for this measure is low as the ex-ante savings estimates were not calibrated to the lower usage associated with this group of customers. According to data provided by the Companies (and validated through a secondary review of information available by the Energy Information Administration website), the average residential account served by the Companies used 13,063 kWh in 2015. In PY5, the Residential Heating & Cooling Program reached lower-use customers, and savings calculations were not adjusted to reflect this.

Table 7-5 Predicted kWh Use and Savings

Average Daily Use Pre (kWh)	Average Daily Use Post (kWh)	Average Daily Savings (kWh)	Average Annual Use Pre (kWh)	Average Annual Use Post (kWh)	Average Annual Savings (kWh)	Savings as % of Annual Load
27.6523	26.336	1.317	10,093.08	9,612.51	480.57	4.8%

7.2.2 Central AC/Heat Pump Replacement

The PY5 Residential Heating & Cooling Program rebated 62 central air conditioners and 13 heat pumps. The Evaluators calculated savings for all replacements were as Replacement-on-Burnout ("ROB"), using current minimum code as baseline.

7.2.2.1 Central AC

$$kWh_{Savings} = CAP \times \frac{1kW}{1000W} \times EFLH_C \times \left(\frac{1}{\eta_{base}} - \frac{1}{\eta_{post}}\right)$$

Where,

- CAP = Rated equipment cooling capacity of the new unit (Btu/hr.)
- $EFLH_C$ = Equivalent full-load cooling hours
- η_{base} = Energy efficiency rating of the baseline cooling equipment (14)
- η_{post}= Energy efficiency rating (SEER) of the installed cooling equipment

7.2.2.2 Heat Pump

$$kWh_{SavingsCooling} = CAP \times \frac{1kW}{1000W} \times EFLH_C \times \left(\frac{1}{\eta_{base}} - \frac{1}{\eta_{post}}\right)$$

$$kWh_{SavingsHeating} = CAP \times \frac{1kW}{1000W} \times EFLH_H \times \left(\frac{1}{\eta_{base}} - \frac{1}{\eta_{post}}\right)$$

Where,

- CAP = Rated equipment cooling capacity of the new unit (Btu/hr)
- $EFLH_H$ = Equivalent full-load heating hours
- η_{base} = Energy efficiency rating of the baseline cooling equipment
  - 13/14 SEER for cooling, depending on timing of installation
  - 7.7 HSPF / 8.2 HSPF (split) and 8.0 (packaged) for heating, depending on timing of installation
- η_{post}= Energy efficiency rating (SEER) of the installed cooling equipment

New codes took effect on January 1, 2015 for residential HVAC systems. The effects of this code change are as follows:

- Minimum required Seasonal Energy Efficiency Ratio (SEER) increased from 13 to 14;
- Minimum required Heating Season Performance Factor (HSPF) increased from 7.7 to 8.0 (for packaged systems) and 8.2 (for split systems)[22].

This code change barred the manufacturing of equipment at older efficiency levels, but did not bar the sale of equipment already on the market. The Evaluators allowed for a six-month sell-through period for back-stock of old equipment when calculating savings for HVAC systems rebated trough the Residential Heating & Cooling Program. As a result, 13 SEER/7.7 HSPF baselines were applied to all systems rebated before July 1, 2015, with the new code being applied to units rebated on or after that date. For the Southern Region as-defined in this code change, EER was not affected by this update. 18 central AC units and one heat pump rebated in PY5 qualified for a lower SEER or HSPF due to the 6-month sell-through period.

Table 7-6 Savings Algorithm Inputs

Input	Value
$SEER_{base}$	14.0
$HSPF_{base}$	8.2
$EFLH_C$	2,426
$EFLH_H$	1,107

7.2.2.3 Results

The Evaluators had difficulty in creating unit-specific calculations for a significant number of participants. There were erroneous entries for model numbers for a large

[22] https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=48&action=viewlive

Accessed June 6, 2016.

share of units. In such occurrences, the model number field was instead populated by a statement of “CAC_” along with the premise address. This issue as present in:

- 15.4% of heat pumps; and
- 41.9% of central air conditioners.

For units with model numbers present, the evaluator did not find any issues in terms of unit eligibility (i.e., all units shown had eligible SEER and HSPF ratings). As a result, the Evaluators did not disqualify these units. However, they were credited at a conservative savings level. For such units, the Evaluators assumed:

- 16 SEER; and
- 9 HSPF (heat pumps only).

Resulting gross savings are summarized in Table 7-7 and Table 7-8.

Table 7-7 CAC/HP Savings Summary – New Orleans

Measure	Expected kWh	Realized kWh	kWh Realization Rate	Expected kW	Realized kW	Peak kW Realization Rate
Central AC	127,642	67,175	52.6%	38.16	15.60	40.9%
Heat Pump	29,974	27,841	92.9%	8.24	4.42	53.6%
Total	157,616	95,016	60.3%	46.40	20.02	43.1%

Table 7-8 CAC/HP Savings Summary - Algiers

Measure	Expected kWh	Realized kWh	kWh Realization Rate	Expected kW	Realized kW	Peak kW Realization Rate
Central AC	24,767	15,504	62.6%	7.49	3.58	47.8%
Heat Pump	0	0	NA	0	0	NA
Total	24,767	15,504	62.6%	7.49	3.58	47.8%

Overall realization for HVAC replacements was 60.6%. The Evaluators sought to identify key drivers of shortfalls in realization. To that end, each input was tested to address how sensitive savings estimates are to changes in the input. As a result of this testing, it is the Evaluators’’ conclusion that the findings are most sensitive to changes in baseline SEER. The Evaluators discussed this finding with staff from CLEAResult and it was found that they had used an “Early Retirement” baseline as defined in the Arkansas TRM. This baseline presumes replacement of a functioning unit, and uses the efficiency of the old equipment rather than current codes. The Evaluators concluded that there was no basis to assume that these units were functioning and changed the baseline to reflect the codes as defined in Section 7.2.2.

7.3 Savings Results

Verified savings are summarized in Table 7-9 and Table 7-10.

Table 7-9 kWh Realization Summary – New Orleans

Measure	Expected kWh	Realized kWh	kWh Realization Rate	Expected kW	Realized kW	Peak kW Realization Rate
Tune-ups	714,243	347,933	48.70%	288.15	126.13	43.80%
Replacements	157,616	95,016	60.30%	46.4	20.02	43.10%
Total	871,859	442,949	50.81%	334.55	146.15	43.69%

Table 7-10 kWh Realization Summary - Algiers

Measure	Expected kWh	Realized kWh	kWh Realization Rate	Expected kW	Realized kW	Peak kW Realization Rate
Tune-ups	50,263	17,301	34.40%	18.38	6.27	34.10%
Replacements	24,767	15,504	62.60%	7.49	3.58	47.80%
Total	75,030	32,805	43.72%	25.87	9.85	38.07%

7.4 Estimation of Net Savings

Participant survey responses were used to estimate the net energy impacts of appliance component of the Residential Heating & Cooling Program. The program net savings are equal to gross savings, less savings associated with free ridership, plus participant spillover savings.

In total, 65 program participants that completed tune-ups completed the survey. One respondent was removed from the analysis because responses to key questions used to estimate free ridership were not provided.

7.4.1.1 Estimation of Free Ridership

The objective of the free ridership analysis is to estimate the share of program activity would have occurred in the absence of the program. To accomplish this, the Evaluators administered a survey to program participants that contained questions regarding the participants' plans to implement the incentivized measures and the likelihood of implementing those measures in the absence of program incentives and informational support. Program participants were asked questions regarding:

- Whether or not they had plans to complete the project and if they could afford to complete it without the program discount;
- The likelihood of completing the project without the discount or the incentivized assessment;
- The timing of the project in the absence of the program.

Participant responses to these questions were used to calculate three scores corresponding to the presence of prior plans, the likelihood of completing the project in the absence of the program, and the timing of that project if it had been completed.

7.4.1.1.1 Prior Plans Score

Respondents were scored as 1 on the prior plans score if all of the following were true:

- The participant had plans to complete the project prior to learning about the program.
- The participant indicated that they would have been financially able to complete the project had a discount or rebate not been provided.

Respondents that did not have prior plans and could afford the measures were not deemed to be free riders.

7.4.1.1.2 Likelihood of Project Completion Score

The score reflecting the likelihood of completing the project in the absence of the program was based on the following questions:

- Prior to learning about the program, did you have plans to have an energy assessment of your home performed?
- How likely is it that you would have completed the same < MEASURE> project that you completed through the program if the rebate was not available?

A likelihood score was assigned to each response for this question as follows:

- Very likely: 1
- Somewhat likely: .75
- Neither particularly likely or unlikely: .5
- Somewhat unlikely: .25
- Very unlikely: 0

7.4.1.1.3 Timing Score

To account for the impact the program may have had on project timing, the likelihood score was multiplied by a timing score. The timing score was developed from responses to a question on when the participant might have completed a project in the absence of the program. Specifically, timing was scored as follows:

- Project would have been completed in 0 to 6 months: 1
- Project would have been completed in 6 months to a year: .67
- Project would have been completed in 1 to 2 years: .33
- Project would have been completed in more than 2 years: 0

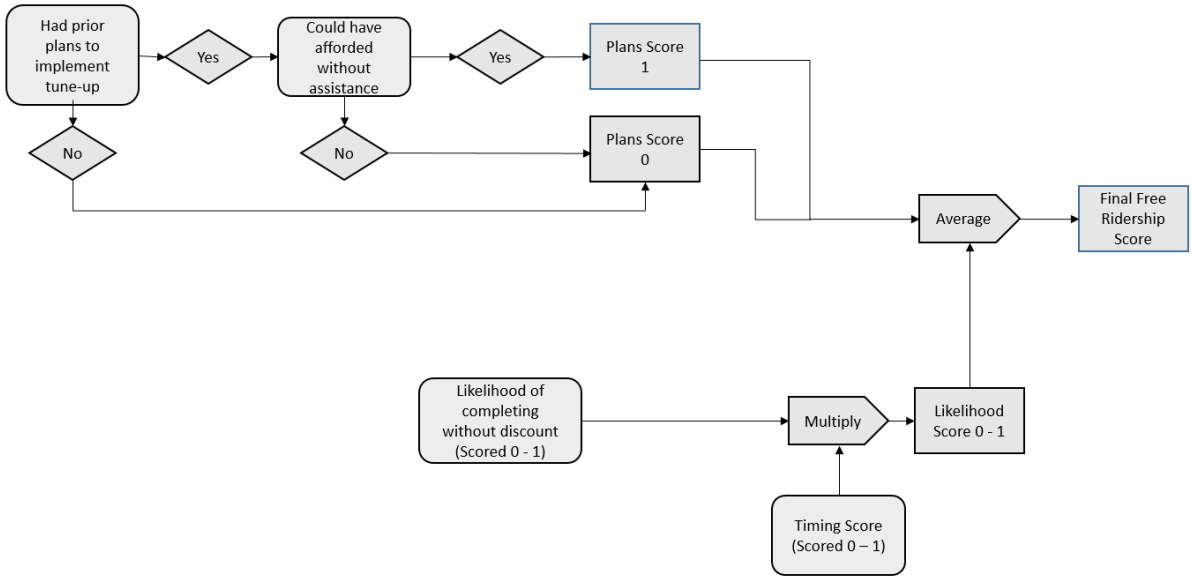
7.4.1.1.4 Final Free Ridership Score

The final free ridership score is equal to the following:

*Free Ridership = Average (Plans Score + Likelihood Score * Timing Score)*

The procedures used to estimate free ridership are summarized below in Figure 7-1.

Figure 7-1 Summary of Free Ridership Scoring Algorithm



7.4.1.2 Free-Ridership Modification – AC Tune-Up

The Evaluators found that the tune-up service provided through Residential Heating & Cooling included additional benefits compared to prior tune-up practices performed in the Companies' service areas. Program plan savings for AC tune-ups were listed at 615 kWh prior to the introduction of the iManifold system. This was increased to 1,060 kWh per unit subsequent to this program improvement. Survey responses for AC tune-ups found a free-ridership rate of 21%. The Evaluators are adjusting this to reflect the added savings from the iManifold tune-up as follows:

$$Adjusted\ FR = 21\% \times \frac{615}{1{,}060} = 12.2\%$$

7.4.1.3 Estimation of Participant Spillover

To estimate participant spillover impacts, participant survey respondents were asked if they had purchased any additional items because of their experience with the program without receiving an incentive.

Participants that indicated one or more energy efficiency purchases were asked additional questions about what was purchased and the number of units purchased to estimate the savings impact. Additionally, the following two questions were asked to

determine whether the energy savings resulting from measures that were attributable to the program:

- On a scale of 0 to 10, where 0 represents “not at all important” and 10 represents “extremely important”, how important was the experience with the program in your decision to purchase the items you just mentioned?
- On a scale of 0 to 10, where 0 represents “not at all likely” and 10 represents “extremely likely,” how likely would you have been to purchase those items if you had not participated in the program?

If the average of the first response and 10 – the second response is 7 or greater, the savings associated with the measures were attributed to the program.

None of the respondents reported implementing any additional projects that met the spillover criterial.

7.4.2 Net Savings Results

The results of the net savings analysis are presented below in Table 7-11 and Table 7-12. As shown the net-to-gross ratios for kWh savings and peak kW reductions are both equal to 79%.

Table 7-11 Summary of Verified Net Savings

Utility	Expected kWh Savings	Verified Gross kWh Savings	Free Ridership	Verified Net kWh Savings	Net to Gross Ratio
ENO	871,859	442,949	84,658	358,291	80.9%
ELL Algiers	75,030	32,805	5,525	27,280	83.2%
Total	946,889	475,754	90,183	385,571	81.0%

Table 7-12 Summary of Verified Net Peak Demand Reductions

Utility	Expected Peak kW Reductions	Verified Gross Peak kW Reductions	Free Ridership	Verified Net Peak kW Reductions	Net to Gross Ratio
ENO	334.55	146.15	28.93	117.22	80.2%
ELL Algiers	25.87	9.85	1.75	8.10	82.2%
Total	360.42	156.00	30.68	125.32	80.3%

7.5 Process Evaluation

This chapter presents the results of the process evaluation of the Residential Heating & Cooling Program. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

The process chapter begins with an overview of the program. This is followed by a discussion of the methodological approach used in the evaluation. A summary of findings and recommendations for program improvement follow the discussion of the methodology. This discussion is followed by detailed findings of the evaluation activities.

7.5.1 Data Collection Activities

The process evaluation of the Residential Heating & Cooling Program included the following data collection activities:

Table 7-13 Residential Heating & Cooling Process Evaluation – Summary of Data Collection

Activity	*Sample Size*
The Companies Staff	1
CLEAResult Staff	1
Participant Survey – AC Tune-up	65
Trade Ally Interviews	6

7.5.2 Program Overview

The Residential Heating & Cooling Program provides financial incentives to encourage residential customers to improve the efficiency of their HVAC systems or replace their systems with more efficient units.

7.5.3 Detailed Findings

7.5.3.1 Data Quality Review

The Evaluators reviewed tracking data submitted at the end of August and identified the following issues with the AC tune-up data:

- Customer phone numbers were missing for 2% of tune-up projects and 30% of replacement projects
- Several tune up project records listed a property name and general phone number rather than the customer contact information. The customer contact information was provided to the Evaluator upon request.
- HVAC replacement data did not indicate if the efficient equipment replaced existing equipment or was a new construction project. Similarly, the rebate form does not capture this information.

7.5.3.2 Review of Participation Data

Table 7-14 displays the number of projects and the expected kWh savings by measure type. As shown, AC tune-ups accounted for nearly three-quarters of the program expected kWh savings. Duct sealing also accounted for a large share of energy savings.

Table 7-14 Program Activity by Measure Implemented

Measure Type	Expected Savings (kWh)	Share of Program Savings	Number of Projects	Percent of total of Projects	$ per kWh in Expected Savings
Tune Up	810,032	82%	760	91%	$0.11
AC Replacement	152,409	15%	62	7%	$0.15
Heat Pump Replacement	29,974	3%	13	2%	$0.20

The Evaluator classified all tune-up projects into single and multi-family residence types based on the address information. Table 7-15 summarizes the program savings by multi and single family participation. As shown, approximately one-third of projects were completed in multi-family properties. Review of the replacement data indicated that none of the projects were completed at multi-family properties.

Table 7-15 Program Activity by Residence Type

Type of Residence*	Percent of Projects (n= 760)	Average expected kWh Savings
Single Family	62%	1,402
Multi-family	38%	537

*Estimated based on contact name and/or address

Figure 7-2 Figure 7-3 display monthly and cumulative expected kWh savings for the tune-up and replacement components, respectively. Both programs saw higher levels of activity during the warmer months when customers are more likely to discover issues with their AC units and to be more motivated to fix or replace them.

Figure 7-2 Monthly and Cumulative AC Tune Up Expected kWh Savings

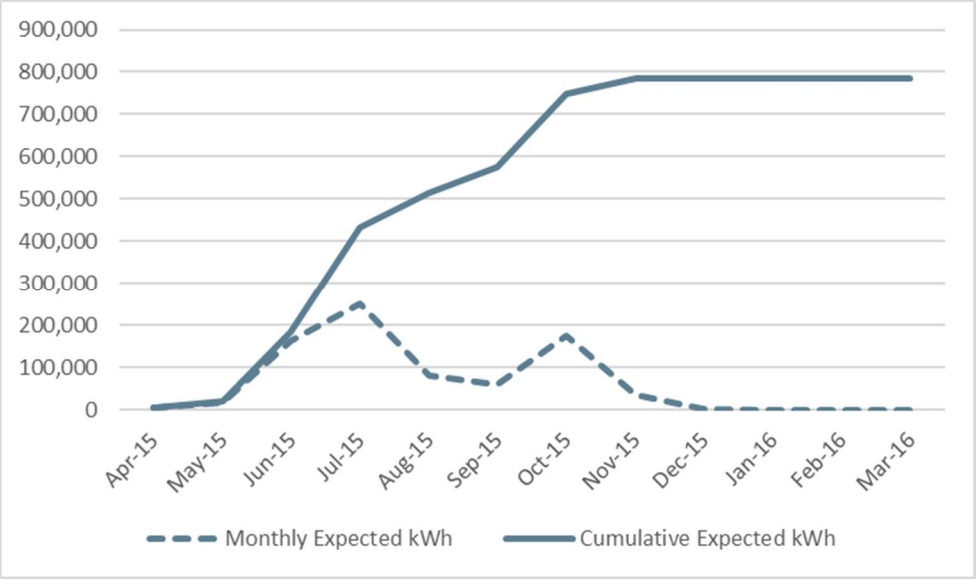


Figure 7-3 Monthly and Cumulative Replacement Expected Savings

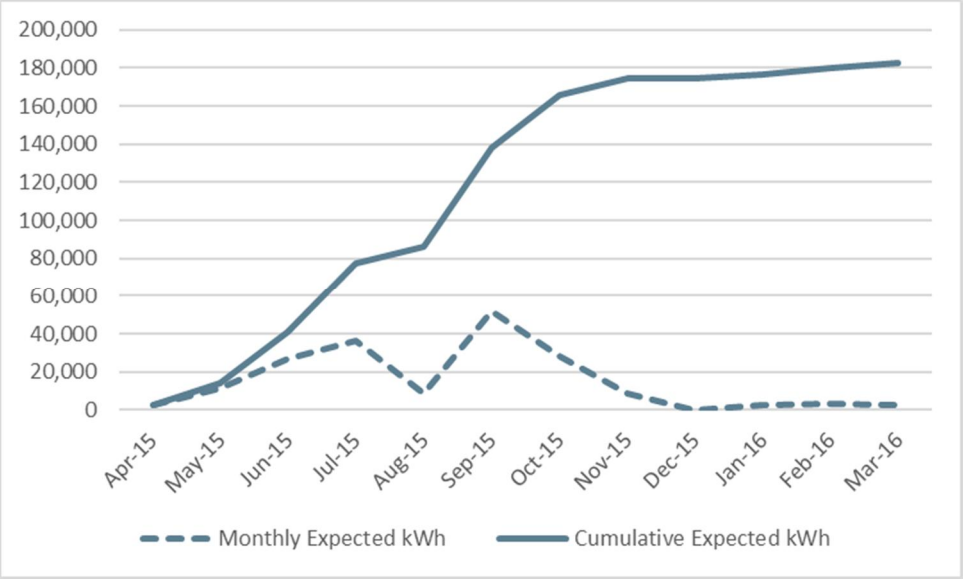
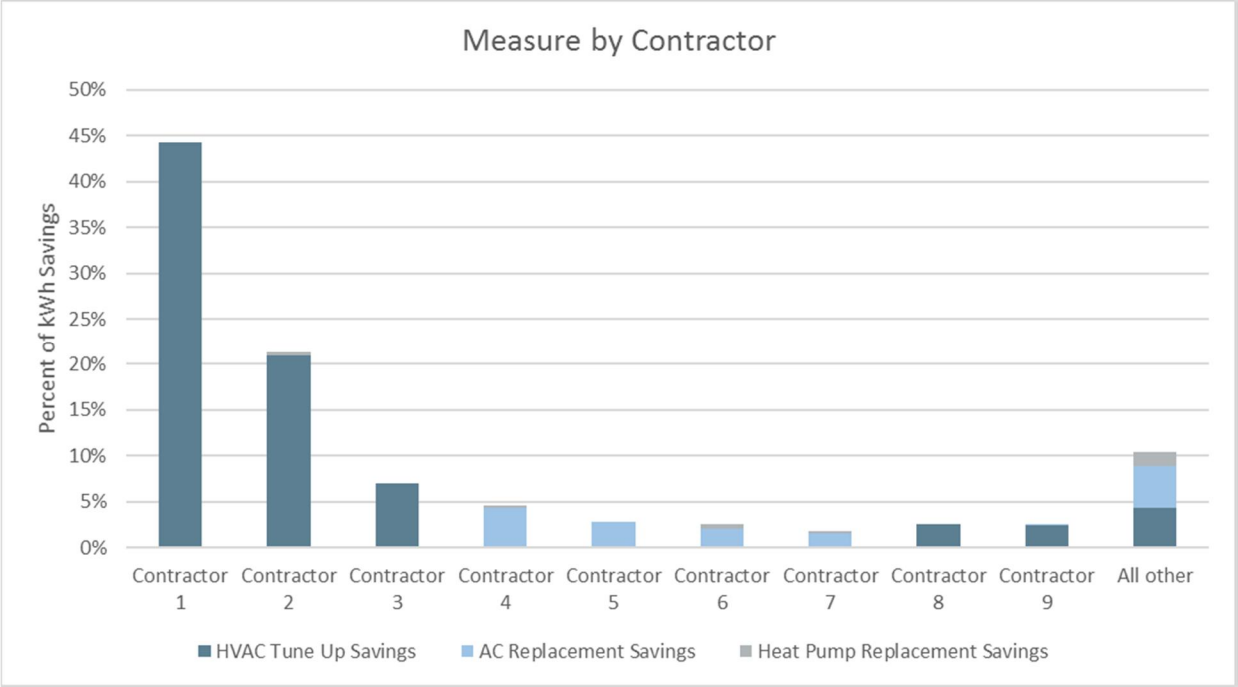


Figure 7-4 displays energy savings by contractor. In total there were 27 trade allies that completed program projects but the four most active accounted for 77% of the program energy savings. As shown, the two contractors with the largest program savings largely generated these savings through tune-ups. Most contractors either performed tune-ups or replacements – only two contractors provided both services during the year.

Figure 7-4 Share of Energy Savings by Program Contractor



7.5.3.3 Program Comparison

The Evaluators reviewed several AC Tune-Up programs from around the country to assess how the Companies' Energy Smart Residential Heating & Cooling Program compared in terms of work performed, available rebates, eligibility, and incentives. The programs included in this comparison are all in comprehensive-phase implementation. However, this difference manifests largely in program scale rather than in program design.

Table 7-16 provides a summary of the programs. The Companies' program differs from other programs reviewed because incentives are provided for air conditioner and heat pump replacements, as well tune-ups. The only other program reviewed that also includes air conditioner and heat pump replacements is the WestPenn Power HVAC & Water-Heating Program. Additionally, NV Energy's EXACTcomfort program offers air conditioner replacements, but does not cover heat pump replacements.

The Companies' program, and the Entergy Arkansas program, are the only utilities among the programs reviewed that provide incentives for tune-ups based on the size of the air conditioning unit.

The Southern California Edison program provides a rebate for an initial assessment and then additional rebates for making improvements that improve the energy efficiency of the unit either through servicing the unit, preventative maintenance, or replacement of the motor with a brushless unit.

The NV Energy program is structured similarly. Prescriptive incentives are provided for an initial assessment and for specific services performed that are intended to improve the efficiency of the unit. Incentives are also provided for brushless motors for multi-family units and for the installation of heat strip controls.

Both the WestPenn Power HVAC & Water-Heating Program and CenterPoint Minnesota Air Conditioner Tune-up Programs provide a single incentive amount for tune-up services. The WestPenn program also provides a rebate for the installation of a brushless motor.

Rebates for duct sealing are provided through NV Energy program. The Companies program plans to offer rebates for duct sealing in PY6.

Table 7-16 Residential Heating & Cooling – Program Benchmarking

Utility	Work Performed	Available Rebates	Incentive Amounts	Eligibility Criteria	Market Sector
Energy Smart Residential Heating & Cooling Program	•Clean condenser coil •Clean evaporator coil •Cleaning blower •Measure refrigerant •Change air filter •Measure & adjust air flow •Measure & adjust refrigerant after performing improvements •Calculate system pre- and post-efficiency	A/C and electric heat pump systems	AC Tune-Up: $150 per unit discount for single family and $75 per unit discount for multi-family. A/C Replacement Incentives vary by size and efficiency of the system: SEER 15: $75 – 250 SEER 16: $100 – 350 SEER 17: $150 – 475 SEER 18+ : $175 - 550 Heat Pump Replacement Incentives: SEER 15: $100 – 325 SEER 16: $125 – 400 SEER 17: $175 – 575 SEER 18+: $200 – 650 SEER 20 (Ductless) : $225 - 700	CoolSaver Tune-Up: Customers of ELL & EGSL that own A/C and electric heat pump systems. Residential systems up to 5 tons and commercial/industrial systems up to 25 tons. System must be at least one year old and cannot have had a CoolSaver tune-up within the past five years. HVAC Replacement: New equipment must meet efficiency requirements. Program-qualified replacement efficiencies are: 1. Split central air conditioners or heat pumps must have a minimum Seasonal Energy Efficiency Ratio of (SEER) 14.5, a minimum Energy Efficiency Ratio (EER) of 12, and a minimum Heating Seasonal Performance Factor of 8.2 (heat pumps only). 2. Packaged central air conditioners and heat pumps must have: a SEER of at least 14.0, an EER of at least 11.0, and a Heating Seasonal Performance Factor of at least 8 (heat pumps only). Systems up to 65,000 btu/h are eligible for replacement. Heat fuel sources cannot be switched when replacing a heat pump or central air conditioning system.	Residential

Utility	*Work Performed*	*Available Rebates*	*Incentive Amounts*	*Eligibility Criteria*	*Market Sector*
Southern California Edison Quality Maintenance Program	•Diagnostic services •Optimization •Measure changes in EER	A/C, brushless fan motors	System Assessment Rebate: $50 instant rebate for allowing a program trade ally to perform a baseline assessment. System Optimization Rebate: If the assessment shows that the unit is operating in suboptimal condition and the trade ally makes improvements then the participant is eligible for an additional $50 rebate. Preventative Maintenance Rebate: Purchasing the 1-year preventative maintenance agreement leads to eligibility for another $50 rebate for customers whose systems meet the requirements for the System Optimization Rebate. Advanced Airflow Rebate: if the owner makes repairs to improve the airflow of the system to 400 cfm per ton or greater, they may be eligible for a $350 rebate. Brushless Fan Motors: if the owner installs a brushless fan motor, they may be eligible for a $220 rebate.	Services must be performed at a single family dwelling with an active SCE Residential account. The Assessment and Optimization service must utilize a Program-approved Diagnostic System with advanced air flow and refrigeration testing. The system must meet Program Test-In and Test-Out diagnostic assessments. Any applicable rebate forms must be complete and submitted by the participating trade ally.	Residential
Entergy Arkansas CoolSaver Program	•Clean evaporator coil •Clean outdoor condenser •Clean indoor blower •Adjust refrigerant charge to manufacturer specifications	A/C and heat pump systems	Tons >= 5: $175 Tons 6-10: $200 Tons 11-15: $300 Tons 16-25: $450 Tons 26-30: $600 Tons 31-50: $900 Tons 51-80: $1800	Customers with a valid account number and whose central air conditioning systems are at least one year old are eligible. Any AC systems that have received a CoolSaver Tune-up in the past five years are not eligible. Systems above 25 tons must be pre-approved on a case-by-case basis by the Program Implementer.	Commercial and residential

Utility	Work Performed	Available Rebates	Incentive Amounts	Eligibility Criteria	Market Sector
	•Airflow correction				
NV Energy EXACTcomfort	AC Improvement Measures: •Diagnostic evaluation •Refrigerant adjustment •Coil cleaning (indoor and outdoor) •Heat strip control install •Heat strip control reset •BPM motor with constant fan •Return air modification AC Early Replacement Measures: •AC replacement with new AC •Heat pump replacement with new heat pump •AC	A/C (heat pumps and ducts)	The program is divided into three sections: AC Improvement Measures, AC Early Replacement Measures, and Duct Testing & Scaling Measures. Rebate size varies with housing type (Single-Family Home, Manufactured Housing, or Multi-Family Housing) AC Improvement Measures: Diagnostic Evaluation: $25 Refrigerant Adjustment: $50 – 75 (Multi-Family Homes receive lower rebate) Outdoor Coil Cleaning: $25 Indoor Coil Cleaning: $50 Heat Strip Control Install: $50 – 75 (Multi-Family Homes receive lower rebate) Heat Strip Control Reset: $20 BPM Motor with Constant Fan: $175 – 350 (Multi-Family Homes receive lower rebate) Return Air Modification: $250 (Multi-Family Homes not eligible) AC Early Replacement Measures: (Multi-Family Homes receive lower rebate) Replace an existing operational AC system with a new AC system with a SEER rating of >= 14: $325 – 400 Replace an existing operational heat pump system with a new heat pump system with a SEER rating of >=14: $400 – 475 Replace an existing operational AC system that has electric strip heat, with new heat	AC Improvement Measures: existing AC must be operational and customer cannot have participated in the same measure in a previous NV Energy program in the past 8 years. AC Early Replacement Measures: Existing AC system must be operational with an EER of <=8, and be a minimum of 10 years old. Customer cannot have participated in an early replacement measure in a previous NV Energy program in the last 20 years. Duct Testing & Sealing Measures: Existing system must be operational and home must be >= 20 years old. Customer cannot have participated in a duct testing and sealing measure in a previous NV Energy program in the last 20 years Overall: Customers in the Southern Service Area. Renters can participate given the permission of the homeowner, homes with multiple AC systems are eligible, and multiple homes owned by the same customer can participate.	Residential

Utility	Work Performed	Available Rebates	Incentive Amounts	Eligibility Criteria	Market Sector
	replacement with heat pump Duct Testing & Sealing Measures: •Leakage reduction		pump system with a SEER rating of >=14: $450 - 475 Duct Testing & Scaling Measures: Tier 1 – Leakage Reduction =< 200 CFM from leaks outside conditioned space: $100 – 125 (Multifamily Homes receive lower rebate) Tier 2 – Leakage Reduction is 201 CFM to 399 CFM from leaks outside conditioned space: $175 – 300 (Multifamily homes receive lowest rebate, Manufactured Housing receives $250) Tier 3 – Leakage Reduction >= 400 CFM from leaks outside conditioned space: $275 – 425 (Multi-Family Housing receives lowest rebate, Manufactured Housing receives $350).		

7.5.4 Program Design, Operations and Activities

The following sections describe program operations and activities and were developed from reviews of program documentation and interviews with program staff.

7.5.4.1 Program Objectives

The primary program objective is to assist residential customers in achieving electric energy savings and peak demand reductions through improving the efficiency of their HVAC systems.

Ancillary program objectives include developing a group of trade allies capable of providing air conditioner tune-ups and replacement services, and to provide educational materials to customers.

The program did not meet its savings objective and a portion of the budget was reallocated to the oversubscribed Home Performance with Energy Star HPwES Program. However, the program savings also do not reflect duct sealing work generated by contractors as part of tune-up projects that was funded through HPwES in PY5. PY6 savings goals will more likely be realized with the addition of the duct sealing component to the program. Additionally, including duct sealing allows contractors to more fully maximize customers' HVAC system performance by enhancing the unit's performance and reducing duct leakage.

7.5.4.2 Program Design and Participation Process

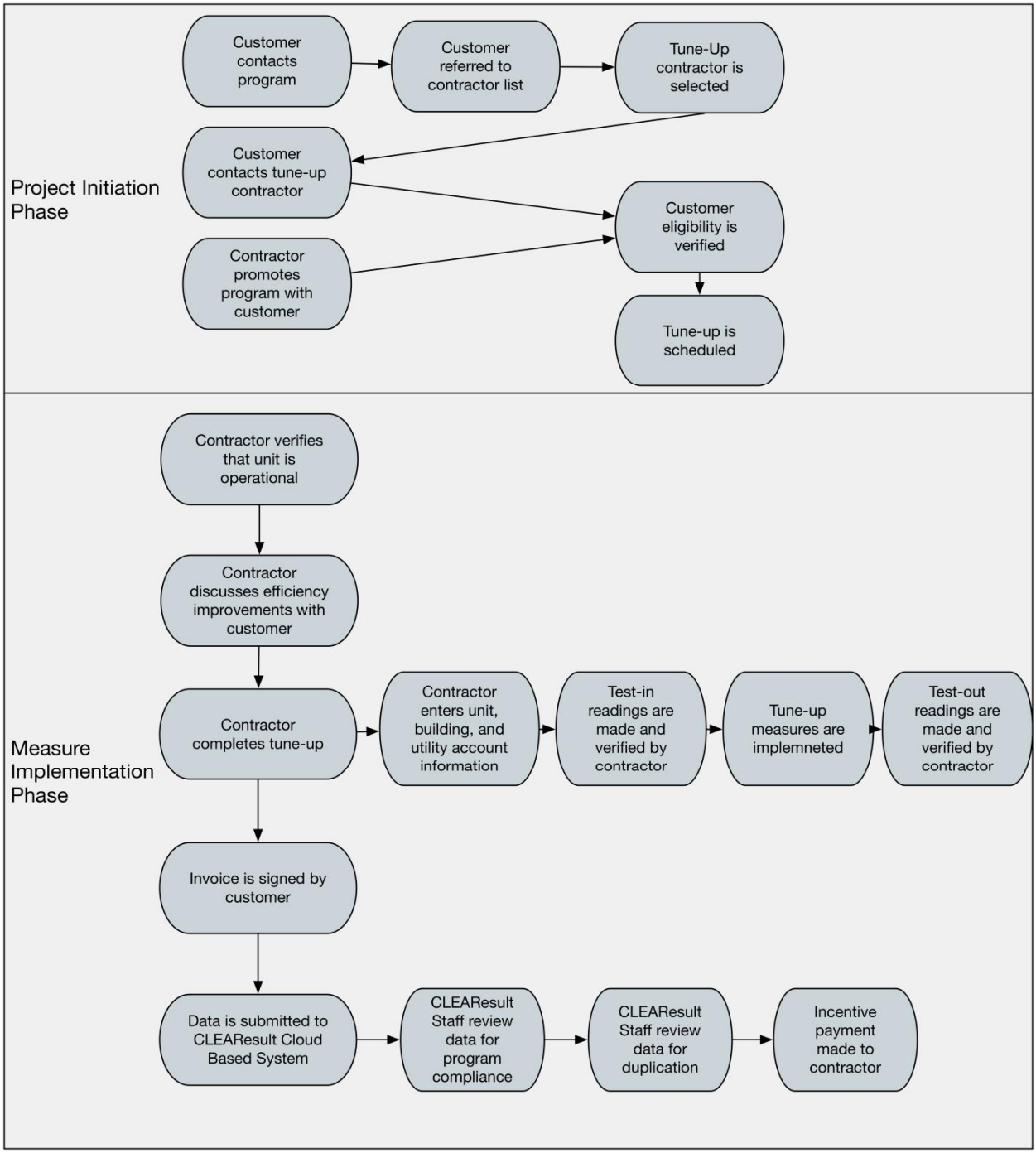
Both the tune-up and replacements incentives are provided in the form of a customer discount. The incentives for tune-ups are designed to cover most of the cost of the tune-up. Program staff noted that some contractors have an additional labor charge and most are charging for the cost of the refrigerant. To qualify for the program, a system must be at least one or more years old and not received a tune up in the last five years. Single and multifamily properties are eligible for tune-ups. Per unit incentives are 50% less for multifamily, which reflects the efficiency with which the tune-ups can be completed by contractors.

Incentives for the HVAC equipment are intended to buy down the cost difference between the efficient unit and standard efficiency equipment. Incentives are tiered based on the size and efficiency of the new system.

Tune-ups are completed using the iManifold system, which is a set of tools for diagnosing system functioning and recording data related to the unit's efficiency before and after the tune-up. This electronic capture and transfer of system performance measurements allows for staff to base savings estimates on measured values and minimizes the chance of incorrect transcriptions or other risks present in a paper process. The required use of this system is new to PY5. Figure 7-5 provides an

overview of the tune-up participation process. Customer participation may be initiated either through the customer contacting program staff, the tune-up trade ally, or through contractor outreach. Once a customer is verified as eligible for the program, an appointment is scheduled to complete the tune-up. During the tune-up, the contractor completes an inspection of the unit and discusses the tune-up measures with the customer. Once the tune-up is completed, the information is submitted electronically to CLEAResult. CLEAResult staff review the submissions and provide payment to the contractor.

Figure 7-5 Residential Heating & Cooling Program Participation Process



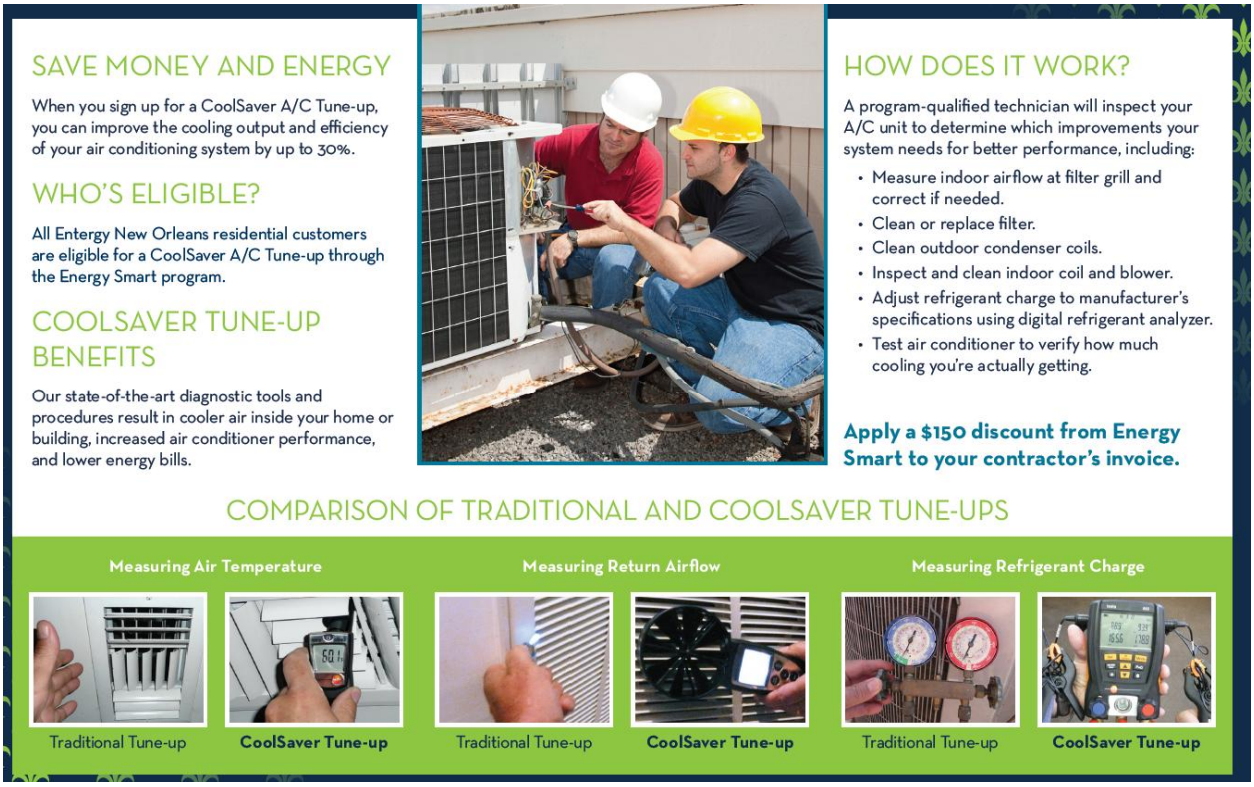
The HVAC replacement process is initiated through customers contacting a participating contractor. Contractors verify that the customer has an ENO or ELL Algiers account in good standing and invites the program implementer to attend the installation. The new system is installed and the contractor submits a completed application, a copy of the invoice, and the AHRI Certificate. CLEAResult reviews the submitted materials and

verifies that the customer and equipment is qualified for incentives and then reimburses the contractor.

7.5.4.3 Program Marketing

Marketing for the Residential Heating & Cooling Program is intended to be largely driven by participating contractors. To support contractors marketing of the program, staff has developed marketing collateral including a truck magnet that advertises the contractor as a participating contractor and a bi-fold brochure (see Figure 7-6). The brochure provides information on benefits, eligibility, participation steps, and differences between standard tune-ups that highlights the technology used to complete the tune up. Overall the brochure includes several elements of good marketing design but could be enhanced with a brief description of the participation steps and a call to action for the customer to have the work performed.

Figure 7-6 Residential Heating & Cooling Brochure



The Evaluators did not receive any marketing materials for promoting the HVAC replacements.

7.5.4.4 Quality Control and Verification Processes

Staff reported that they shadow the first five tune-up projects completed by a contractor, but may attend more if they believe additional training is needed. After the first five visits, 10% of tune-ups performed by a contractor are quality checked.

The program manual does not specify what share of replacement projects will receive verification visits, but staff reported that they are currently verifying most projects completed through the program.

7.5.4.5 Contractor Recruitment and Management

During PY5, the program had 12 participating contractors providing tune-up services and 17 providing system replacements. CLEAResult staff indicated that they view the current number of contractors as satisfactory.

Contractors began using the iManifold™ tool in PY5. Training on use of the tool was provided to participating contractors, largely on a one-on-one basis with the firm. Program staff noted that participating contractors have previously performed similar work but typically need to acquire the iManifold tools. Additionally, not all of the steps and procedures for completing a tune-up are part of contractor's standard practice.

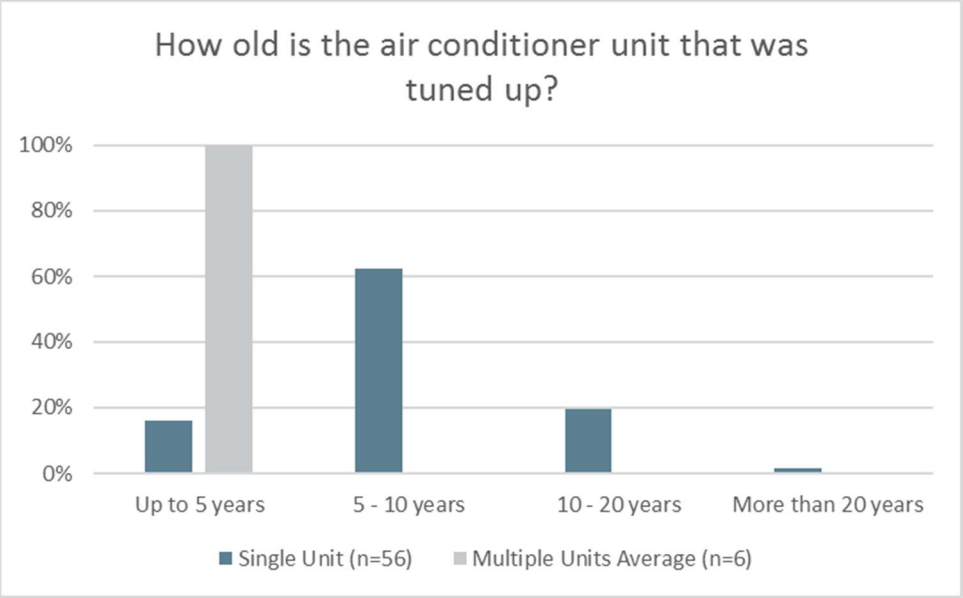
The primary training for the Residential Heating & Cooling program covered the program procedures and use of the Imperial iManifold™ tool for making baseline efficiency measurements and efficiency measurements after the tune-up measures are complete. The training included information qualifying customers and HVAC equipment, tools needed to complete the work, steps for completing the tune-up process, and troubleshooting unusual readings. Trainees were provided with a manual covering program procedures as well. Staff's assessment is that the iManifold™ system is fairly easy to work with and that contractors do not have difficulty with it.

7.5.5 AC Tune-Up Participant Survey Results

In total, 65 participants that completed tune-up projects responded to the survey. Ninety-one percent had a single unit tuned up and 9% had multiple units tuned up. Figure 7-7 summarizes the age of the units that were tuned up broken out by single unit and multiple unit projects.

Participants were asked what the age of their air conditioner units were. For participants that had multiple units tuned up through the program, they were asked to give an average age of all units. The average age across both types of projects was 8.2 years.

Figure 7-7 Average age of Air Conditioner Units



Overall, program participants tended to own their homes, have relatively few household members, and most reported household annual income of less than $50,000.

Table 7-17 Participant Demographics

Demographic Characteristic	***(n=65)***
Average number of home residents	1.72
Percent with income of:[1]	
Less than $25,000 per year	30%
$25,000 to less than $50,000	23%
$50,000 to less than $75,000	7%
$75,000 or more	8%
Percent own home	92%

1. Total does not equal 100% because some respondents did not know their income or declined to state it.

Table 7-18 displays participant household characteristics. A majority of participants resided in older (pre-1990) single family homes. Slightly less than half had electric space heating, and just under 40% of homes had electric water heating. Most homes were larger than 1,500 square feet.

Table 7-18 Residential Demographics

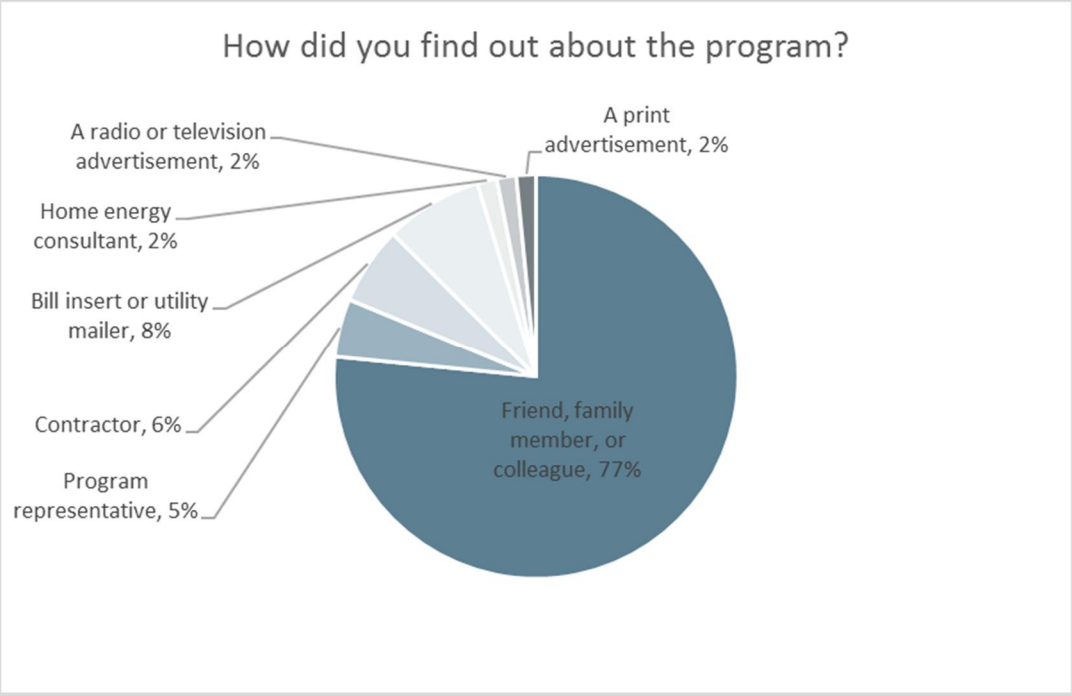
Residence Characteristic	***(n=65)***
Percent Single Family Home	92%
Percent electric space heating	42%
Percent electric water heating	38%
Percent of households built before 1990	65%
Percent with home size of:[2]	
Less than 1,000 ft.^{2}	2%
1,001-1,500 ft.^{2}	14%
1,501-2,000 ft.^{2}	26%
Greater than 2,000 ft.^{2}	28%

1. Total does not equal 100% because some respondents did not know the size of their home or declined to state it.

7.5.5.1 Program Awareness and Participation

Word-of-mouth is the most common means by which program participants learned of the program. As shown in Figure 7-8, more than three-quarters (77%) of respondents heard of the program through friends or colleagues. Bill inserts or mailers were reported as a source of awareness by 8% of program participants, and contractors were stated by 6%. Five percent heard of the program through program representatives, and two percent of participants stated they heard about the program through either a home energy consultant, a print advertisement, or a radio/television advertisement.

Figure 7-8 Source of Program Awareness

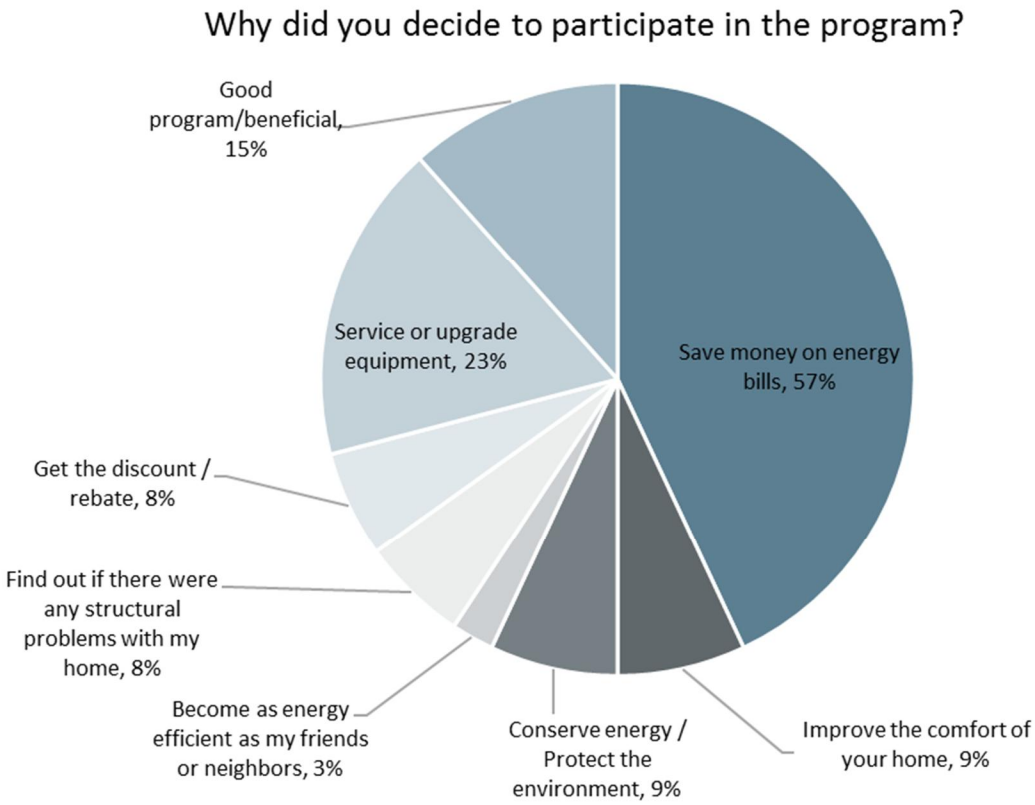


Participants gave a range of reasons for participating in the program. As seen in Figure 7-9, the most common reason for participating in the program was to save money or energy on electric bills, with 57% of participants giving this answer. In addition to financial motives, another 23% reported that they needed to have their equipment serviced. Some of these participants would have likely had maintenance performed without the financial assistance provided by the program but this service may not have had the same energy saving benefits as the program tune-up. Staff noted that contractors' standard maintenance services do not typically include the full range of system enhancements required by the program.

The program's reputation as beneficial, mentioned by 15% of respondents, was also a commonly noted reason for participating.

A number of respondents noted non-energy benefits as motives for participating, specifically, 9% stated that they were motivated for environmental reasons and the same share were motivated by a desire to improve home comfort.

Figure 7-9 Reasons for Participation

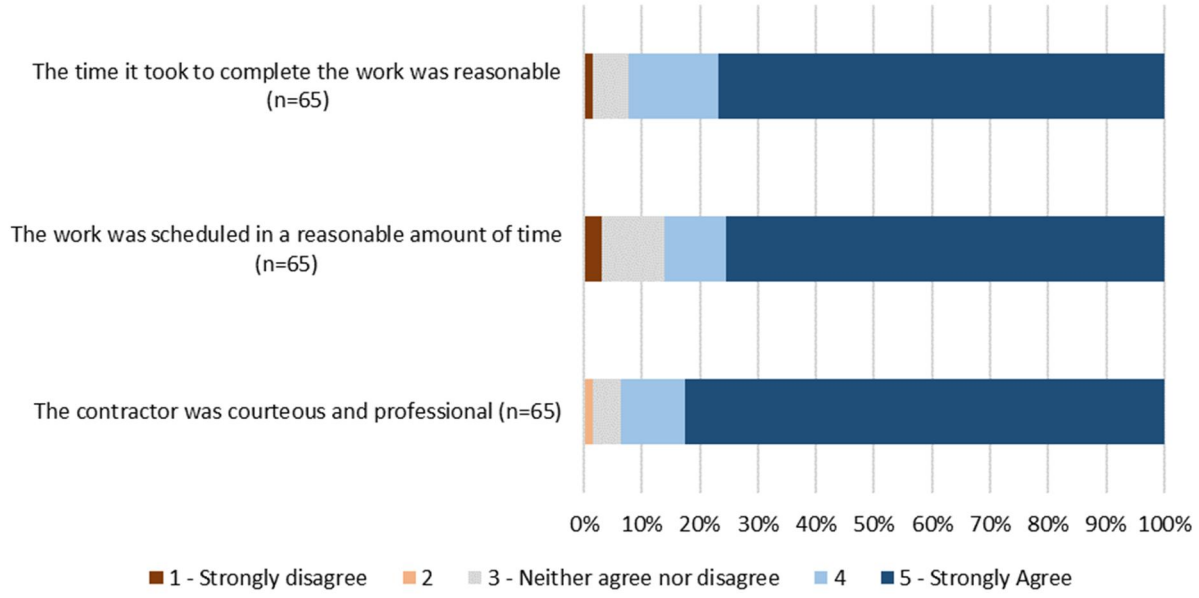


7.5.5.2 Participation Process

Overall, program participants were satisfied with the contractors that completed the tune-ups. As displayed in Figure 7-10, most participants strongly agreed that the contractor was courteous and professional (83%), the time it took to complete was reasonable (77%), and the work was scheduled in a reasonable amount of time (75%).

A small number indicated disagreement with these statements. Respondents were most likely to disagree that the work was scheduled in a reasonable period of time. However, only 3% did not think the work was scheduled in a reasonable period of time.

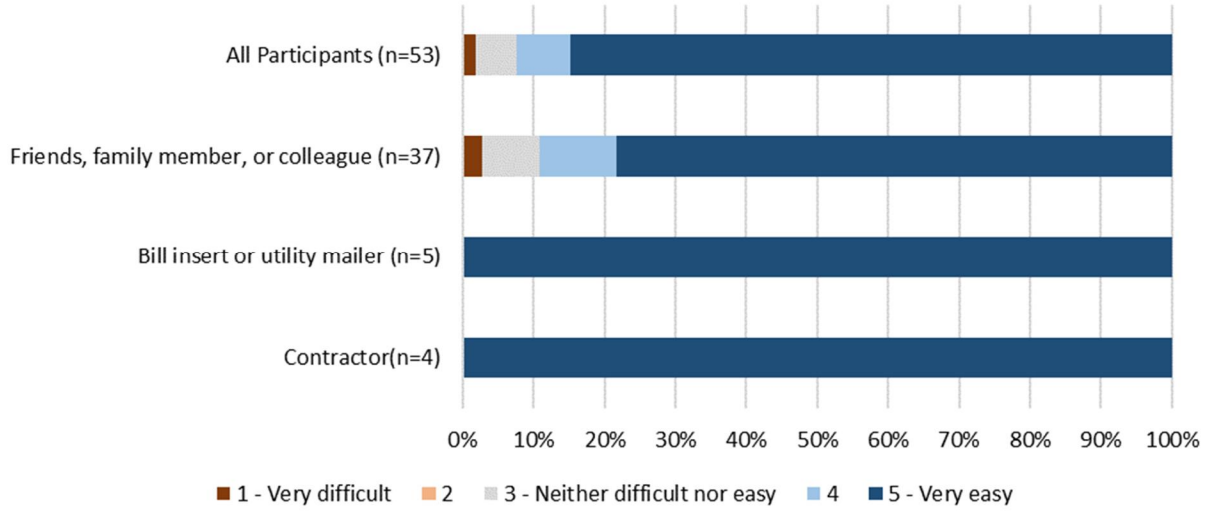
Figure 7-10 Satisfaction with Contractor



Ninety-three percent of participants stated that it was easy or very easy to find participating contractors, with 85% stating that it was very easy. Three participants stated that it was neither easy nor difficult to find a contractor, and one participant stated that it was very difficult to find a contractor who participated in the program.

When broken down by the top three source of awareness, other patterns are found. Most (89%) participants who heard of the program through friends or colleagues stated that it was somewhat or very easy to find a participating contractor, three stated it was neither difficult nor easy, and one participant stated it was very difficult. As shown below in Figure 7-11, the one participant that indicated difficulty finding a contractor learned of the program from a family member, friend or colleague.

Figure 7-11 Ease of Finding Participating Contractors by Source of Awareness



7.5.5.3 Program Satisfaction

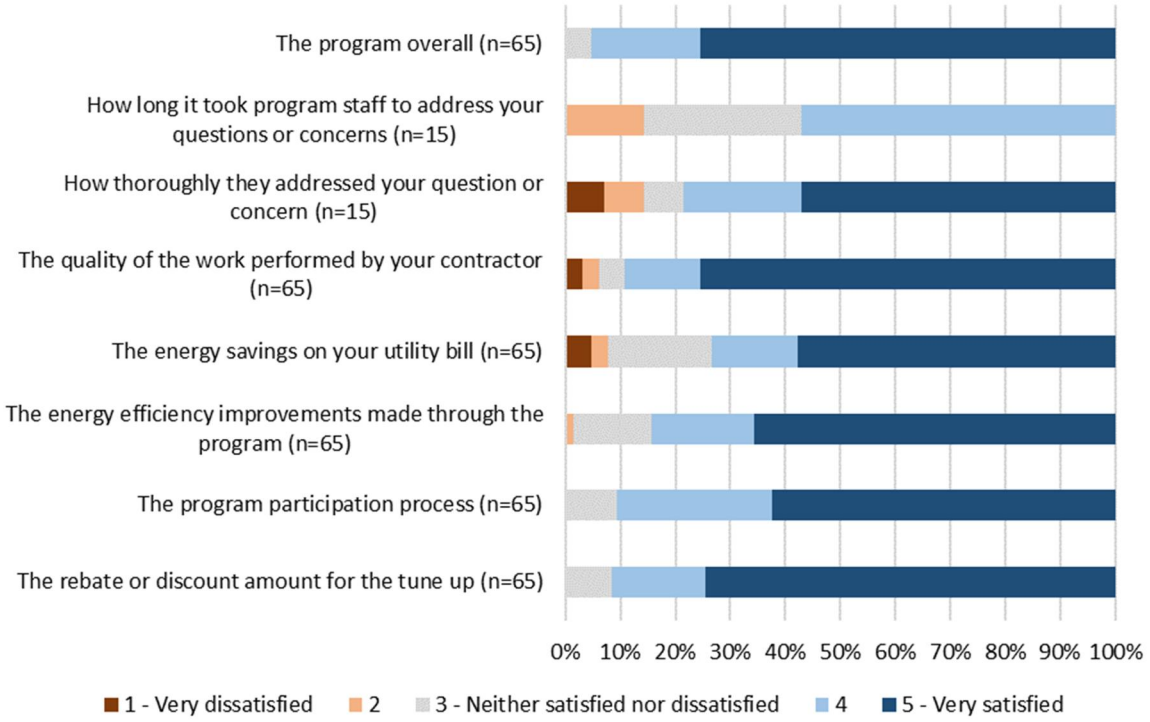
Overall, program participants rated various elements, and the program overall highly. The highest rated elements were the rebate amount, the program participation process, and the overall program. As shown in Figure 7-12, 91% of program participants stated that they were either satisfied or very satisfied with the program participation process, 92% stated that they were satisfied or very satisfied with the rebate or discount amount, and 83% were satisfied or very satisfied with the program overall.

Participants were least satisfied with the energy savings on their utility bill; 73% of participants were satisfied with the savings and 8% were dissatisfied with them.

Most participants (89%) were satisfied with the work performed by the contractor, but 6% indicated dissatisfaction with this aspect of the program

The group of participants who contacted program staff over the course of the project were asked two additional questions regarding their experiences with staff. Although participants were generally satisfied with their interactions with staff, one respondent reported that they were very dissatisfied with both the time it took to get a response from staff and the thoroughness of the response and another respondent was somewhat dissatisfied with the thoroughness of staff's response.

Figure 7-12 Satisfaction with Program Components



Participants that scored any element as 'neither satisfied or dissatisfied' or less were asked to explain in their own words what the sources of their dissatisfaction was. Six participants were dissatisfied with the work performed by the contractor, such as how long it took them to complete the work and commencing work without checking in with the resident. Additionally, four stated they that they had not seen the expected cost savings or were just generally dissatisfied with the program.

Twelve participants reported that they had experienced non-energy benefits. The benefits cited, and the number citing them, are listed below:

- Home is more comfortable (n = 5);
- Air conditioner runs less frequently (n = 2);
- Improved perception of the Companies (n = 2);
- Environmental benefits (n = 2); and
- Easier to keep home at a comfortable temperature (n = 1).

When asked about their overall satisfaction with the Companies as their electrical service provider, more than three-quarters (82%) of participants stated they were either somewhat or very satisfied with the Companies, with more than half (54%) stating they were 'very satisfied'. Eight percent of participants stated that they were somewhat or very dissatisfied the Companies.

Table 7-19 Overall Satisfaction with Entergy

Satisfaction with Entergy	***Percent of Respondents (n=65)***
5 - Very satisfied	54%
4	29%
3 - Neither satisfied nor dissatisfied	8%
2	3%
1 - Very dissatisfied	5%
Don't know	2%

The majority of respondents (81%) stated that their participation in the program somewhat or greatly increased their satisfaction with the Companies.

Table 7-20 Effect of Program on Satisfaction with Entergy

Effect of Program on Satisfaction with Entergy	***Percent of Respondents (n=65)***
Greatly increased your satisfaction with ENO	26%
Somewhat increased your satisfaction with ENO	54%
Did not affect your satisfaction with ENO	14%
Somewhat decreased your satisfaction with ENO	3%
Greatly decreased your satisfaction with ENO	2%

Overall, participants are generally satisfied with the program and ENO as their electrical service provider.

7.5.6 Contractor Interviews Results

The Evaluators completed in-depth interviews with six contractors who participated in the Residential Heating & Cooling Program during PY5. The most active contractors in the program were contacted to complete an interview. The objectives of the interviews were to better understand how contractors are experiencing the Residential Heating & Cooling Program and if implementation strategies and/or program design could be improved to better serve residential customers. To meet these objects, interviewed contractors were asked questions related to: (1) background information about their organization, (2) their marketing strategy, (3) their internal energy assessment procedures, (4) their experiences with program staff and trainings, as well as (5) how the program has impacted their businesses.

7.5.6.1 Background information

The Evaluators asked contractors to provide background information about their organizations. All six contractors specialize in HVAC equipment and maintenance; four of the contractors strictly serve residential customers while two of the contractors interviewed serve both residential and commercial customers. All six contractors reported that they have the competencies to perform both full equipment replacements and system tune-ups, however half of the interviewed contractors indicated they focus on replacements while the other half focuses on tune-ups. Contractors provided the following reasons as to why they focus on one service over the other:

Tune-Ups:

> *"Tune-ups make better sense for most homeowners. Replacements should be a last resort".*
>
> *"The technology is cutting edge and the paperwork is non-existent. Who doesn't like that?"*
>
> *"We really focus on the needs on the customers and most systems just need to be fine-tuned. IManifold has it down to a science and there is no more guess work for techs."*

Replacements:

> *"Replacements, that's where I see the real value. A customer can buy a system from me and have confidence I will maintain it in the long run. I don't have many customers that I don't know personally. My objective is to help them install the most efficient unit possible then I maintain it into the future."*
>
> *"Tune-ups were taking too long. Our price is high because our techs are factory trained and expensive. Replacements are better because consultants can go out and do free estimates. Replacements just make more sense for us, from a cost perspective."*

7.5.6.2 Organizational Impact

Contractors provided insight into how the Residential Heating & Cooling Program has impacted their businesses. The bullet points below summarize their feedback.

- *Increased Customer Base:* The program incentives enable contractors to offer discounted services and equipment to customers who might not have otherwise been interested, thereby increasing the customer base. An inquiry from a homeowner creates an opportunity to not only sell the program but to offer other products and service as well. Contractors described it as "a foot in the door."
- *Improved Technical Competencies of Staff:* Contractors who focus on the HVAC tune-up program component indicated that the technical training their staff

received was very beneficial. Several contractors indicated that the training is an opportunity for both new and senior technicians to receive professional training on cutting edge equipment. One contractor noted that the program has increased his overall understanding of efficiency; now their tune-ups are based on engineering models and statistical data points. As a result, the company has higher company-wide efficiency standards for system tune-ups.

- *Repeat Customers*: Contractors who focus on HVAC tune-ups said customers have been very impressed with the technology used to implement them because they can see the performance data that proves the system is running more efficiently. As a result, the contractor gains credibility and establishes trust with the homeowner. Contractors said these types of customers tend to call back year after year.
- *More Systems with Higher Efficiencies*: One contractor who focuses on replacements indicated that the incentive helps cover the costs associated with the more efficient systems. He believes that the rebate amount is just enough to encourage homeowners to move forward with a more efficient system than they otherwise would have, in turn he is selling more systems with higher rated efficiencies.

7.5.6.3 Marketing

Contractors provided feedback about their marketing strategies and the degree to which they actively reach out to customers to encourage participation. Four of the six contractors interviewed indicated they market their businesses but do not actively market the program discounts. These same four contractors did say that once they have performed the initial assessment they tell customers about incentive opportunities and will let them know if they qualify. Some contractors will explain the program while at the customer's home; others will include the details in a follow up letter or proposal. One contractor prefers to send the program details in a letter to ensure the homeowner is aware of program offerings and they are clear that there are shared costs. One contractor does actively market the program, they include a link to the program website in all staff email signatures and they include program information in their mailers to customers. Feedback suggests that contractors do inform customers about the program once they have visited the home, but most marketing efforts are geared toward the contractors' businesses not the program specific offerings.

Contractor responses suggest that general awareness of the program is low. Two contractors said none of their customers were aware of the program: two said it was less than 5% and two said it was less than 20%.

Contractors provided feedback on the program developed marketing material and overall marketing effort led by the implementation contractor. Below are a few summary points:

- Most indicated they had never seen marketing materials or what they had seen was outdated.
- Contractors offered suggestions as ways to improve the marketing. They suggested the program highlight the new iManifold™ technology for tune-up materials. Another suggestion was to use bill messaging or other utility channels to promote the program.
- Several contractors attributed the lack of program marketing to the limited program budget and therefore did not directly suggest any type of increased marketing effort.

7.5.6.4 Equipment Recommendations and Customer Feedback

The evaluator asked contractors what system efficiency levels they recommend for HVAC replacements. The program guidelines state that new replacement equipment must meet minimum efficiencies that are higher than the current Energy Star criteria.[23] Most contractors indicated that, in their general practice, they recommend SEER 14 equipment and one contractor indicated that manufacture minimums are SEER 14 as of January 2015. Two contractors mentioned units with variable speed systems: one stated they often recommend them and the other indicated they are too new and therefore he is not recommending them at this time.

All contractors interviewed said that homeowners are more concerned with the initial cost of equipment than the longer term savings. Customers are concerned with energy savings but to a lesser degree. Four of the six contractors indicated that approximately 20% or fewer customers are interested in saving energy, but one contractor indicated that approximately 80% of his customers are interested in saving energy.

The feedback indicates that most contractors in the Companies' service territory are recommending HVAC systems with a SEER of 14 or higher. Also the primary concern for customers when purchasing a new system tends to be the initial cost of the equipment, over long term energy savings, although energy savings are a growing concern.

Contractors provided feedback about customers' concerns regarding the HVAC tune-up. All contractors who had tune-up experience indicated that cost is the primary concern. Many assume the tune-up is free and are hesitant to pay a portion of the cost because they either cannot afford it or think they think the contractor is taking advantage of them. When asked what the program can do to reduce these concerns, contractors indicated this is where the marketing materials would be helpful. They

[23] CLEAResult *Entergy New Orleans 2015-16 CoolSavers Program Manual*. (2014)

suggested case studies that provide information on the benefits through other homeowners' experiences. Contractors also suggested increasing incentives to cover 100% of the cost.

7.5.6.5 Program Delivery

Contractors commented on the pre-approval and participation requirements for customers to participate in the program. The program requires that homeowners be residential customers with systems that are at least one-year old. Most contractors thought the participation requirements were reasonable, however one contractor indicated that even new systems require tune-ups. See the comment below:

> *"There are a lot of systems that are not charged properly. New systems are often installed with the manufactures' settings. We can improve air flow, run-times, and efficiency issues. It might not be dirty, but it's not charged correctly."*

Contractors also provided feedback on the application process and supporting documentation requirements. The feedback was largely positive, contractors indicated that the clarity of the application and instructions have greatly improved in recent years. Additionally, contractors are more familiar with the program and guidelines and therefore say the process has gotten easier and more efficient, several contractors referred to this as the "learning curve." Two contractors also made specific reference to the tune-up component. HVAC tune-up project materials and data are transmitted digitally, via the iManifold software application, therefore no paperwork is required. Contractors indicated this is one of the strengths of the tune-up rebate processes.

7.5.6.6 Communication and Training with Program Staff

Contractors provided feedback about their experiences with the program implementation contractor, CLEAResult. Most contractors had very positive feedback, indicating CLEAResult field technicians were knowledgeable, responsive to their questions and always willing to help. Contractors also had positive feedback regarding CLEAResult's administrative staff. One contractor noted that a program staff member visited the office to walk her through the application processes and supporting documentation requirements. These responses suggest communication between program staff and contractors sufficiently supports the program contractors' implementation needs.

The evaluator asked contractors if they have participated in any program provided training; the majority of the contractors said 'yes.' Contractors received in-depth training on how to perform HVAC tune-ups using the iManifold device and software application. The only contractor who did not participate indicated he was only interested in the replacement program component and therefore, the iManifold training was not relevant. The format of the training was in-person at the contractors' offices and the duration was

about five hours. Technicians had to successfully complete five site visits with CLEAResult staff to become program certified.

Feedback about the training process was largely positive. Contractors indicated that program staff was knowledgeable about the equipment and that they provided detailed information on how to troubleshoot the iManifold system and interpret the results. Additionally, contractors noted that program staff provides ongoing support when technical issues arise. There was a general consensus among contractors that the training and ongoing support for the HVAC tune-ups is one of the most valuable aspects of the program.

7.5.6.7 Contractor Satisfaction

The evaluator asked contractors how satisfied they were with the program overall. Five of the six contractors interviewed indicated they were very satisfied; only one contractor was somewhat satisfied. Contractors provided feedback regarding ways the program could be improved or better support their efforts in the field.

- One contractor indicated they were not active in the tune-up program component because the timing of training was inconvenient. They wanted to participate but could not make time in February and March when the program was ramping up. They suggested that the program consider hosting training over the winter months when the HVAC industry slows down.
- Several contractors comment on the lack of funding for the Residential Heating & CoolingProgram. They said the program is beneficial to homeowners and saves energy. However, they have been reluctant to actively market the program because the limited funds create uncertainties for their businesses. Contractors indicated they have the capacity and could complete more projects if the utility would increase the budget.
- Contractors indicated they would like to have better promotional materials to share with customers. Program developed materials would help show that the contractors and the utility are working in partnership to deliver the rebates. Contractors believe this would help convey a sense of legitimacy and build trust with the homeowner.
- Two contractors were not supportive of the new tune-up technology and processes. They indicated that tune-ups now take several hours and their costs have increased as a result. Neither of these contractors are currently active in the tune-up component for these reasons.
- One contractor suggested that program staff consider getting re-acquainted with the local heat pump association. He suggested that a program staff member attend a meeting and talk with the group about the program and how to get involved.

7.5.6.8 Key Findings

The following key findings summarize the most salient themes that surfaced through conversations with program contractors.

- All six contractors specialize in HVAC equipment and maintenance; four of the contractors strictly serve residential customers while two of the contractors interviewed serve both residential and commercial customers. All six contractors have the competencies to do full equipment replacements and system tune-ups, however half of the contractors indicated they focus on replacements while the other half focuses on tune-ups
- The Residential Heating & Cooling Program has had a positive impact on the contractors' businesses. Feedback suggests contractors have experienced an increase in their customer base and they are experience more repeat customers since participating in the program. Additionally, the technical competencies of staff have improved and contractors have been able to install a larger number of more efficient HVAC systems than they otherwise would have been able to without program incentives.
- Research suggests the application process has improved in the recent years, specifically with regards to the HVAC tune-up digital submission process.
- Responses suggest communication between program staff and contractors sufficiently supports the Residential Heating & Cooling Program implementation needs, from the contractors' perspective.
- There was a general consensus among contractors that the training and ongoing support for the HVAC tune-ups is one of the most valuable aspects of the Residential Heating & Cooling Program.

7.5.7 Conclusions

7.5.7.1 Program Design and Participation Process

- Electronic tools and gauges are used to transmit data on the efficiency of the unit, which is effective for providing a "live snapshot" of the unit's energy-use performance. The electronic format reduces paperwork burdens on contractors and program staff and reduces errors that could result from incorrect measurements recorded on paper.
- Residential Heating & Cooling is the only Energy Smart Program that multifamily properties with more than four units are eligible. Approximately one-third of tune up projects were completed at multifamily properties.
- Overall, the program participation process appears to be working effectively for customers. Ninety-three percent of participants reported that finding a program contractor was easy. Most tune-up participants (85% or more) agreed that the contractors scheduled and completed the tune-up in a reasonable amount of time

and that the contractor was courteous and professional. No participants reported dissatisfaction with the participation process and more than 91% were satisfied with it.

- Contractors also provided positive feedback about the participation process. Most indicated that the program the clarity of supporting information and required documentation had improved recently and that the process had become more efficient. Two contractors noted that the iManifold software reduces the paperwork burden and considered this an important aspect of the program. However, two other contractors indicated that using the software took additional time that made completion of tune-up projects cost prohibitive. However, on the whole, contractors liked the software and the electronic process.

  Contractors also praised both program field and administrative staff.

7.5.7.2 Program Marketing and Outreach

- The program is primarily marketed by participating contractors. Four of the six interviewed contractors indicated that they actively promote their services, but not the program specifically. Two contractors reported that they do promote the program to their customers. One contractor sends mailings to customers to make it clear that costs are shared between the customer and the contractor and another stated they include a link to the program website in staff email signatures and include program information in customer mailers.
- The program has developed marketing materials for use by contractors including a brochure and truck magnet, but most interviewed contractors are not aware that these materials exist. Contractors that complete tune-ups suggested materials that highlight the technology used in the process, an aspect of the process that is featured in the current material developed.
- Word-of-mouth is driving most tune-up activity. More than three-quarters of participants learned of the program through a friend, family member, or colleague.

7.5.7.3 Quality Control and Verification

- The program employs appropriate project verification practices. Staff reported that the first five projects completed by a contractor are quality checked, followed by 10% of the projects complete after the first five.
- Training on completing tune-ups using the iManifold system was comprehensive and contractors are provided with a manual of how to complete the tune-ups. Contractors thought the training provided was a strength of the program.
- Review of data quality found that participant customer telephone number was missing for a significant number of records (30%). Additionally, no information

was included on whether or not the HVAC system installed was part of a new construction project or replaced an existing system. The current application form does not collect this information either.

7.5.7.4 Participant and Trade Ally Satisfaction

- 95 percent of participants were satisfied with the program overall. Four participants were dissatisfied with the quality of the work performed by the contractor and two were dissatisfied with program staff's response to inquiries.
- Interviewed trade allies reported satisfaction with the program and noted that improvements had been made to the program recently.

7.5.7.5 Savings Calculations

- HVAC Tune Ups produced quantifiable savings that represented a significant reduction in customer bills. The Evaluators found that HVAC tune-ups saved an average of 4.8% off of customer annual usage (10.1% off of annual cooling load). However, realization was low as the baseline energy use of these units was much lower than anticipated in ex ante savings calculations.
- The program had significant issues with missing data. 42% of Central AC replacements did not have a valid model number indicated in program tracking.
- Central AC replacements used an erroneous baseline. Realization rates for HVAC system replacement were low. The Evaluators attribute this to erroneous use of an early retirement baseline.

7.5.8 Recommendations

The Evaluators' recommendations for the Residential Heating & Cooling Program are as follows:

- **Add an indicator on the HVAC replacement application form to indicate if a project is new construction or replacement.** This information is not currently collected and affects the baseline assumption for the equipment.
- **Develop an amendment to program theory that would address under what circumstances the program would initiate early replacement.** The Evaluators found that implementation staff from CLEAResult did not have a basis for how the Residential Heating & Cooling program would initiate early replacement of central air conditioning systems. As a result the Evaluators disallowed all claims of early retirement savings. If program staff intend to claim early retirement savings in future program years, then the program manual should include language detailing (1) how the program's market interventions would plausibly produce early retirement and (2) define under what conditions the program would allow it.

- **Ensure that HVAC replacements use applicable codes and standards when calculating energy savings.** The sell-through period is over and as a result all units need to use a baseline of 14 SEER and 8.0/8.2 HSPF unless there is adequate basis to support claims of early retirement.
- **Increase awareness of program marketing materials with contractors.** Contractors play an important role in marketing the program but were generally unaware of available program marketing materials. Staff should better inform them of the availability of these materials. Encouraging use of the materials will also help ensure consistency in program messaging. Two contractors reported that they are currently using their own materials to promote the program.
- **Incorporate data verification and/or quality checks to ensure that data fields are populated with valid data.** 41.9% of CAC replacements and 15.4% of heat pump replacements lacked a valid model number in program tracking.
- **Readjust AC tune-up savings based on findings pertaining to actual customer billed use.** The Evaluators found that the AC tune-ups saved a significant amount relative to customer cooling load but were not adjusted to reflect the low billed use of program participants.

8. Energy Smart School Kits & Education

8.1 Program Description

The Energy Smart School Kits and Education (SK&E) Program provides classroom education on energy use and saving energy, energy efficiency kits to students, and adult outreach activities to promote energy efficiency and the rebates and discounts offered by Entergy through the Energy Smart Programs.

The School Kits component of the program includes a 45 to 90-minute presentation given by program staff to 5th, 6th, or 7th grade students. The presentation focuses on energy use the importance of conservation. Students also receive an energy efficiency kit that contains the following items:

- Six compact fluorescent light bulbs (CFLs) – four 13W and two 18 W;
- One LED nightlight;
- Two low-flow faucet aerators;
- One low-flow showerhead;
- A flow-rate bag for measuring the flow rate of faucets and showers; and
- A flyer included in the kit that describes the kit items and their benefits.

The adult outreach activities are intended to educate the Companies' customers about energy efficiency and the Entergy Energy Smart efficiency programs. The outreach activities include:

- Presentations at neighborhood groups and churches;
- Attendance at fairs and festivals; and
- Hosting tables at public events and public buildings.

The adult outreach component also provides energy efficiency retrofits to nonprofits. The primary goal of the retrofits is to inform the membership of energy saving opportunities by demonstrating the benefits of efficient technologies.

A total of 3,683 kits were distributed through the program during Program Year 5. Below, Table 8-1 summarizes the total number of measures distributed through the program and overall expected savings[24]:

[24] Per measure ex ante savings figures were not available.

Table 8-1 Summary of Measures and Expected Savings

Measure	Total Quantity of Measures	Total Expected kWh Savings	Total Expected peak kW Savings
13 W CFLs	14,732	-	-
18 W CFLS	7,366	-	-
LED nightlight	3,683	-	-
Faucet Aerators	3,683	-	-
Showerheads	3,683	-	-
Total	29,464	586,063	83.62

Additionally, staff attended or engaged in 68 outreach activities during the program year and estimated that in total 11,125 participants attended these events and conversations were held with 1,281 attendees.

Total verified savings and percentage of goals for the SBS Program are summarized in Table 8-2

Table 8-2 Savings Goals by Utility

Utility	kWh goal	Realized Net kWh	Percentage of kWh goal realized	kW goal	Realized kW	Percentage of kW goal realized
ENO	926,946	365,288	39.41%	119	41.93	35.24%
ELL Algiers	84,150	47,798	56.44%	53	5.49	10.36%

8.2 Impact Calculation Methodology

For equipment and retrofits rebated through the PY5 SK&E, calculation methodologies were performed as described in the Arkansas TRM (AR TRM). Measure inputs came from the AR TRM, The Pennsylvania TRM 5.0 (PA TRM), EISA lumen table and groundwater data specific to the New Orleans area.

Table 8-3 identifies the source of the inputs used for the verification of measure-level savings under the SK&E.

Table 8-3 Savings Inputs

Measure	Input	Source
CFLs	Baseline wattages	EISA lumen equivalence table
	Annual operating hours, energy factor, demand factor, CF	AR TRM 5.0, Section 2.5.1.1
Faucet Aerators, Low Flow Showerheads	Groundwater and mixed water temperatures	Calculated based on New Orleans groundwater temperatures
	Gallons of water saved per year	AR TRM V3.0, Section 2.3.4 (aerators), & Section 2.3.5 (shower heads)
LEDs nightlights	Delta watts, annual operating hours	PA TRM, Section 2.1.4
	Energy factor, demand factor, CF	AR TRM 5.0, Section 2.5.1.1
All	In-Service Rates	Program participant interviews

8.2.1 Lighting Savings Calculations

Each kit distributed included four 13 watt CFLs and two 18 watts CFLs, plus one LED nightlight.

8.2.1.1 Energy Savings Calculation

Per unit energy savings for lighting is calculated as follows:

$$kWh\ Savings = Hours \times (W_{Base} - W_{Post}) \times IEF \times ISR/1000$$

Where,

- Hours = Annual hours of use
- W_{base} = Baseline watts
- W_{post} = Installed watts
- IEF_E = Energy Interactive Factor, .97
- ISR = In Service Rate
- 1000 = W/kW conversion

Table 8-4 Savings Parameters for Lighting Calculations

Parameter	Deemed Value
Hours	792.6 for CFLs, 4,380 for LED nightlights
W_{base} (13W, 18W, LED)	43, 53, 7
W_{post} (13W, 18W, LED)	13, 18, 1
IEF_D	1.25
ISR (CFL, LED)	66%, 91%

8.2.2 Faucet Aerator Savings Calculations

8.2.2.1 Energy Savings Calculation

Per unit energy savings for lighting is calculated as follows:

$$kWh\ Savings = \frac{\rho\ \times C_p\ \times V\ \times \left(T_{Mixed} - T_{Supply}\right) \times \left(\frac{1}{RE}\right)}{3{,}412} \times ISR \times \%Elec$$

Where,

- ρ = Water density = 8.33 lb/gal
- CP= Specific heat of water = 1 BTU/lb·°F
- V= gallons of water saved per year per faucet
- T_{Mixed} = Mixed water temperature
- T_{Supply} = Average supply water temperature (Water main temperature, specific to New Orleans)
- RE = Recovery Efficiency
- 3,412 = Btu/kWh conversion factor
- ISR = Installation Rate
- %Elec = Percent of participants with electric water heating

Table 8-5 Savings Parameters for Faucet Aerator Calculations

Parameter	***Deemed Value***
V	381
T_{Mixed}	102.64°F
T_{Supply}	74.80°F
RE	.98
ISR	84%
%Elec	30%

8.2.3 Low Flow Showerhead Savings Calculations

8.2.3.1 Energy Savings Calculation

Per unit energy savings for lighting is calculated as follows:

$$kWh\ Savings = \frac{\rho\ \times C_p\ \times V\ \times \left(T_{Mixed} - T_{Supply}\right) \times \left(\frac{1}{RE}\right)}{3{,}412}$$

Where,

- ρ = Water density = 8.33 lb/gal
- CP= Specific heat of water = 1 BTU/lb·°F
- V= gallons of water saved per year per faucet
- T_{Mixed} = Mixed water temperature, 102.64°F
- T_{Supply} = Average supply water temperature, (Water main temperature, specific to New Orleans)
- RE = Recovery Efficiency
- 3,412 = Btu/kWh conversion factor

Table 8-6 Savings Parameters for Low Flow Showerhead Calculations

Parameter	Deemed Value
V	381
T_{Mixed}	102.64°F
T_{Supply}	74.80°F
RE	.98
ISR	63%
%Elec	30%

8.3 Verified Savings by Measure

After reviewing the tracking data and inputs for savings calculations, the Evaluators provided verified gross savings which applied in-service rates developed through surveying of program participants. Savings were verified for the following measures:

- CFLs;
- Faucet Aerators;
- Low Flow Showerheads;
- LED nightlights.

The Evaluators verified measure-level savings according to TRM guidelines and obtained results that differed from CLEAResult's calculations for the all measures. No measure inputs or calculations for this program were made available to the Evaluators, making direct comparisons between inputs or methods impossible. The Evaluators attempted to recreate savings figures using CLEAResult savings calculators developed for other residential programs, but were unable to replicate ex ante savings figures.

8.3.1 Lighting

Table 8-7 Expected and Realized Faucet Aerator Savings

Lamp Type	Realized kWh Savings	Realized Peak kW Savings
13W CFL	146,025	23.74
18W CFL	85,181	13.85
LED Nightlight	77,107	-

8.3.2 Faucet Aerators

Table 8-8 Expected and Realized Faucet Aerator Savings

Realized kWh Savings	***Realized Peak kW Savings***
49,265	5.12

8.3.3 Low Flow Showerheads

Table 8-9 Expected and Realized Low Flow Showerhead Savings

Realized kWh Savings	***Realized Peak kW Savings***
155,468	16.17

8.3.4 Savings Findings

Key drivers of program savings include in-service rates and electric water heating rates. 30% of survey respondents reported having electric water heating. This differs significantly from values observed in other programs sponsored by the Companies. The Evaluators attribute this difference to the fact that other programs often explicitly target homes with electric space heating, and that prevalence of electric space heating may in turn result in greater likelihood of electric water heating. The SK&E Program differs in targeting a wider swath of the Companies' customers, resulting in increased prevalence of natural gas water heating.

Upon reviewing ex ante savings figures using the CLEAResult savings calculator, the Evaluators noticed that faucet aerators and low flow showerheads deemed water temperature inputs for the New Orleans area differed between the measures: Faucet aerator calculations referenced a mixed water temperature of 105°F, whereas low flow showerhead calculations referenced 106.5°F. The Evaluators used 102.64°F for both measures.

Table 8-10 presents the savings results of the evaluation of the PY5 SK&E Program, by measure. Total savings summarizes the savings calculations performed as per TRM protocols for the SK&E. Overall program savings achieved are 528,034 kWh and 60.44 peak kW, 90.1% and 60.44% of expected savings, respectively.

Table 8-10 Verified Savings by Measure Type – New Orleans

Measure	Count	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
13W CFL	13,028		129,129			20.99	
18W CFL	6,514		75,325			12.25	
LED Nightlight	3,257		68,185			-	
Faucet Aerators	3,257		43,564			4.53	
Low flow	3,257		137,479			14.30	
Total	29,313	518,250	453,682	87.5%	70.97	52.07	73.4%

Table 8-11 Verified Savings by Measure Type - Algiers

Measure	Count	Ex Ante kWh Savings	Ex Post kWh Savings	kWh Realization Rate	Ex Ante Peak kW Savings	Ex Post Peak kW Savings	Peak kW Realization Rate
13W CFL	1,704		16,896			2.75	
18W CFL	852		9,856			1.60	
LED Nightlight	426		8,922			-	
Faucet Aerators	426		5,700			0.59	
Low flow	426		17,989			1.87	
Total	3,834	67,813	59,364	87.5%	8.37	6.81	81.4%

In addition, the SK&E Program saved 20,220 Therms of natural gas.

8.4 Estimation of Net Savings

Participant survey responses were used to estimate the net energy impacts of the program. The program net savings are equal to gross savings, less savings associated with free ridership, plus participant spillover savings.

In total, 32 program participants completed the survey. Respondents were asked questions related to the impact of the program on the installation of each measure that they installed.

8.4.1 Estimation of Free Ridership

The objective of the free ridership analysis is to estimate the share of program activity would have occurred in the absence of the program. To accomplish this, the Evaluators administered a survey to program participants that contained questions regarding the participants' plans to implement the kit items and the likelihood of implementing those

measures had they not been provided through the program. Program participants were asked questions regarding:

- Whether or not they had plans to purchase and install the kit item;
- When would they have implemented the kit item in the absence of the program;
- The likelihood of purchasing and installing the kit item had they not received it for free.

Participant responses to these questions were used to calculate two scores corresponding to the presence of prior plans and the likelihood of installing the items in the absence of the program.

8.4.1.1 Prior Plans Score

The prior plans score was calculated as follows:

- Respondents who indicated that they did not have plans to install the kit item were scored as 0.
- Respondents who indicated that they did have plans to install the kit item were scored as 1. This score was adjusted based on the quantity of the number of items the participant planned to install and the timing of that planned installation. The quantity adjustment was based on the share of items sent that the respondent planned to install. That is, if the respondent indicated that they would have installed three of the six CFLs, the score of 1 was multiplied by .5. The timing adjustment was based on when they would have likely installed the items. For respondents that said they would have likely installed the items in the next six months, no timing adjustment was made. Respondents who indicated that they would have installed the item in the next 6 – 12 months, the plans score was multiplied by .5. For those that would have installed in more than 12 months, the plans score was set to 0.

8.4.1.2 Likelihood of Project Completion Score

The score reflecting the likelihood of completing the project in the absence of the program was based on the following question:

- How likely or unlikely would you have been to purchase and install the kit items if you had not received them for free?

A score was assigned to each response for this question as follows:

- Very likely: 1
- Somewhat likely: .75
- Neither particularly likely or unlikely: .5

- Somewhat unlikely: .25
- Very unlikely: 0

8.4.1.3 Final Free Ridership Score

The final free ridership score is equal to the following:

*Free Ridership = Average (Plans Score, Likelihood Score) * Previous experience adjustment*

The previous experience adjustment was based on a question about whether or not the respondent had similar items currently installed in the home. The free ridership score for those that answered "No" to this question was multiplied by .5.

8.4.2 Estimation of Net Savings

Free ridership for the program was estimated by applying measure level free ridership to the associated verified gross kWh savings or peak kW reductions.

Table 8-12 Summary of Verified Net Savings

Utility	Expected kWh Savings	Verified Gross kWh Savings	Free Ridership	Verified Net kWh Savings	Net to Gross Ratio
ELL Algiers	67,813	59,364	11,566	47,798	81%
ENO	519,023	453,682	88,394	365,288	81%
Total	586,836	513,046	99,961	413,086	81%

Table 8-13 Summary of Verified Net Peak Demand Reductions

Utility	Expected Peak kW Reductions	Verified Gross Peak kW Reductions	Free Ridership	Verified Net Peak kW Reductions	Net to Gross Ratio
ELL Algiers	8.37	6.81	1.33	5.49	81%
ENO	71.32	52.07	10.14	41.93	81%
Total	79.69	58.88	11.47	47.42	81%

8.4.2.1 Measure Level Free Ridership Results

Table 8-14 summarizes the average free ridership scores by measure. The results presented show higher free ridership for CFLs and LED nightlights as compared to the other two program measures. Both of these measures may be more familiar to customers as means to save energy than low-flow showerheads and faucet aerators.

Table 8-14 Average Free Ridership by Measure

Measure	Number of Responses	Average Free Ridership
CFLs	28	24%
Faucet aerators	26	14%
Low-flow showerheads	20	11%
LED nightlights	29	27%

8.5 Process Findings

This chapter presents the results of the process evaluation of the Energy Wise Alliance School Kits and Education Program (SK&E) Program, which is comprised of two components: a school kits program that provides energy efficiency kits and education to students and outreach activities intended to inform the Companies' customers about the Energy Smart programs and how they can be used to help them manage their electricity costs. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

The process chapter begins with an overview of data collection activities followed by presentation of detailed program findings. This discussion is followed by a summary of findings and recommendations for program improvement.

8.5.1 Data Collection Activities

The process of evaluation of the SK&E Program included the following data collection activities:

- *ENO Program Staff Interviews*. The Evaluators interviewed staff at ENO involved in the administration of the Energy Smart Programs. The interview focused on higher-level issues related to the administration of the portfolio of programs and included discussion of the process of setting energy saving goals, communications processes, implementation contractor management, the utilities role in marketing the programs, and quality control processes.
- *Energy Wise Alliance Program Staff Interviews*. The Evaluators interviewed staff at Energy Wise Alliance, who implements the program. These interviews were to collect information on implementation activities and clarify questions about program design or processes. Energy Wise Alliance is a subcontractor to CLEAResult.
- *CLEAResult Program Staff Interviews*. The Evaluators interviewed staff at CLEAResult, who provides oversight of Energy Wise Alliance. CLEAResult also manages other required contracting such as with the firm that supplies the efficiency kits, Efficient Products Warehouse. These interviews were to collect information on implementation activities and program objectives.

- *Parent or Guardian Survey*. The Evaluators surveyed a sample of parents or guardians that received efficiency kits and provided their contact information to program staff members. The survey addressed issues including participant satisfaction with the program offerings, demographics, and other reasons for not installing kit items.
- *Teacher Survey*. The Evaluators administered an online survey to teacher contacts that participated in program. The survey addressed teachers' perceptions of the program as a learning tool as well as contextual issues related to the participation process.

Table 8-15 summarizes data collection activities for the SK&E Program process evaluation.

Table 8-15 SK&E Data Collection Activities

Activity	***n***
Entergy staff interviews	1
CLEAResult staff interviews	1
Energy Wise Alliance staff interviews	1
Participant teacher survey	14
Parent/guardian survey	57

8.5.2 Detailed Findings

School Kits and Adult Outreach activities are tracked in a spreadsheet shared by CLEAResult and Energy Wise Alliance staff. The Evaluators reviewed the activity tracked in the document and summarized it below.

8.5.2.1 School Kits Participation

Table 8-16 summarizes participation in the School Kits Component. As shown, the program exceeded its goal for the number of schools that participated, but fell short of the number of participating classrooms.

Table 8-16 School Kits Participation Metrics

Kits Participation Metrics	Target	Achieved	Percent of Target Achieved
Number of Classrooms	140	134	96%
Number of Schools	24	34	142%

8.5.2.2 Adult Outreach Activity

Table 8-17 summarizes adult outreach activity. As shown, the program met or exceeded its goals for most metrics tracked except the number of one-on-one conversations had, for which the program achieved 72% of its goal.

Table 8-17 Adult Outreach Metrics

Adult Outreach Metrics	Target	Achieved	Percent of Target Achieved
Fair or Festival	12	16	133%
Neighborhood or Church Presentation	24	26	108%
Entergy Community Care Center Outreach Days	14	14	100%
Nonprofit Retrofit	12	12	100%
One-on-one conversations	1,790	1,281	72%
Number of Participants at Events Attended	6,000	11,125	185%

8.5.2.3 Review of Kit Contents

The energy saving kits include the following items:

- 6 CFL Light Bulbs
- 1 LED Nightlight
- 2 Faucet Aerators
- 1 Showerheads
- Flow Rate Bag
- Flow Rate Exercise
- Installation instructions
- Installed items form

The measures included in the kit are typical of other programs. Other items offered in some utility programs include furnace filter alarms and weather stripping.

The kit content also includes instructions for installing the kit items, a flow-rate bag and exercise, and a form to complete on which the number of items installed can be indicated.

Overall the materials appear to be sufficient to support the installation of the kit items. Although other programs also provide online video instructions on how to install the kit items, the instructions provided appear to be largely sufficient. However, staff should clarify on the instructions page which aerator is intended to be installed in the kitchen and which in a bathroom.

The materials provided provide the website address for the Energy Smart Programs but does not provide information about the availability of program incentives. The Evaluators have seen single-page handouts summarizing efficiency program offerings provided through other kits programs and including such material may present an opportunity to increase awareness of the Energy Smart Programs.

8.5.3 Program Design, Operations and Activities

The following sections describe operations and activities and were developed from reviews of program documentation and interviews with Energy Wise, CLEAResult, and Entergy staff.

8.5.3.1 Program Objectives

The School Kits and Education program is composed of two components: adult outreach and a youth school kits components.

The primary objective of the adult outreach arm of the SK&E program is to raise awareness about residential energy efficiency and help the Companies' customers make energy-conscious choices.

The school kits component provides energy efficiency education to 5^{th} - 7^{th} grade students in Orleans Parish. Students receive a self-install kit of energy-efficiency measures for use in their homes. The primary objective of this component is to assist residential customers in achieving electric energy savings and peak demand reductions through the installation of the kit items. The school kits component also has additional objectives related to educating students and their families about residential energy- and water-use techniques and increasing their interest in conservation.

The primarily metric used to evaluate the success of the school kits component is the number of schools and students that participate and the energy savings that result from the installation of the kit items. As the school kits component takes place in a classroom setting, utility staff also emphasized the importance of providing an engaging and informative experience for students and meeting state-level learning criteria. Teachers are considered to be the core customer of the program, and program staff aspire to be invited return to the school or referred to another teacher.

8.5.3.2 School Kits Program Participation Process

Program staff solicit participating schools and teachers through direct outreach. There is no formal signed agreement between the participating schools and the program, rather a date is set for the presentation. Prior to delivering the presentation, staff discuss with teachers what will be involved and what their expectations are. This conversation has evolved to become increasingly focused on the school's standards for classroom management. Staff noted that they have observed varied standards for what classroom behavior is allowed and that reaching a shared understanding of this in advance of delivering the program at the school is an important step in the process.

The presentation is delivered by educators contracted with the Energy Wise Alliance. The presentation is composed of three components: completion of a puzzle that involves a picture of New Orleans and connecting energy use to its impact on the local environment, a PowerPoint presentation, and an energy bike that generates electricity power different types of light bulbs. Staff reported that the in-class presentation is designed to last 90 minutes but that they will reduce it to 45 minutes at a teacher's request.

The energy efficiency kits are distributed to teachers, who typically distribute these materials at the end of the school day. The kits contain four 13 watt CFL lightbulbs, two 18 watt CFL lightbulbs, one LED nightlight, one low-flow showerhead, one low-flow kitchen sink aerator, one-bathroom sink aerator, and a water flow-rate bag, as well as a brief description of the items contained in the kit, how they can reduce energy use, and how to install them. The flow-rate bag is accompanied by an optional take home assignment that asks the student to use the bag to measure the amount of water used per minute before and after the showerhead and faucet aerators are installed. The task requires timing and measure the water output before and after the installation of the low-flow devices, and then taking the difference to calculate the gallons saved.

In addition, a survey is also sent home with the students to collect data on the number of items installed. Students return the surveys in class, where they are typically collected by program staff during a second visit to the school. Staff reported that they are able to increase the number of completed surveys collected by returning to the school to collect them in person.

In addition to the kit, the program also provides a flow-rate calculation worksheet, which is an optional component of the program. The tasks require timing and measure the water output and subtraction to calculate the gallons saved.

8.5.3.3 Roles and Responsibilities

The program implementer, Energy Wise Alliance, has the following responsibilities:

- Perform school outreach to introduce the program benefits and obtain a signed participation agreement;

- Making the initial outreach contact through an onsite meeting with school leadership;
- Participating in additional onsite meetings for training, student installation, and reporting requirements as necessary; and
- Coordinating the delivery of the school kits to the classroom and distributing the education materials from the program.

Energy Wise Alliance delivers a monthly report to CLEAResult recording the number of activities performed, the number of people reached, and the location and date of each activity.

CLEAResult is responsible for general oversite of the implementer as well as placing and tracking orders for the school kits. CLEAResult also calculates program savings for the measures based on the equipment parameters and the install rates based on forms submitted by parents and guardians.

8.5.3.4 Program Marketing and Outreach

8.5.3.4.1 School Kits Outreach

Program staff indicated that the most successful program outreach has taken the form of conducting school site visits and in-person discussions of the program with educators. However, program staff have also made efforts to promote the program through means other than one-on-one outreach such as contacting a teacher group and getting information about the program presented in a newsletter. The program has also had some success with outreach to local charter school organizations, although the independent administration of the New Orleans schools limits the opportunities for outreach through groups of schools.

An important component of the outreach strategy is to focus on teachers having positive experiences with the program to encourage the spread of information about the program through word-of-mouth marketing. Encouraging word-of-mouth marketing is likely to be the most efficient means of promoting the program with schools.

8.5.3.4.2 Adult Outreach

The education and outreach arm of the program has reached out to neighborhood groups, senior centers, churches, and cultural organizations and attended school-sponsored events. Outreach efforts consist of informing customers about free or affordable energy-efficiency programs, providing services and customer service in the Energy Service Center, and reaching out to community members through nonprofit retrofits. Program staff have found that messaging related to financial savings and home comfort tend to resonate the best among the Companies' customers. Messaging

specifically related to environmental conservation is effective at attracting program volunteers but does not resonate as well with customers' interests.

8.5.3.5 Barriers to Participation in School Kits Component

Program staff report that classroom time constraints is the primary barrier to program participation and successful delivery. Instruction time is very valuable to teachers, and they may struggle to find an opportunity to find time for the program presentation in their curriculum. Program staff noted that teachers sometimes decide to hold the program presentation during a gym or elective period in order to minimize loss of instructional time. As such, it is important that the program both emphasize its ability to meet state educational criteria and ensure that the material in the presentation is presented succinctly and consistently.

Program staff noted that variances in teaching style may play a role in the delivery and success of the presentation. Teachers may have different expectations regarding student discipline and behavior, and as outsiders to the school program presenters may not always be adequately prepared to accommodate different classroom styles. Program staff have made efforts to alleviate this potential barrier to program success by briefing presenters before they enter the classroom; however, these briefings are not always possible depending on the time constraints faced by the teacher.

In addition, in an effort to meet program goals related to the number of kits distributed, the program has expanded into 5th and 7th grade classrooms as well. This decision has helped meet program goals, but ultimately may reduce the efficacy of the program if students receive the same kit multiple times as they continue their education.

8.5.3.6 Quality Control and Verification Processes

The survey completed at home by students' parents is used to calculate in-service rates for the kit items. The survey collects information on the items installed and water heating fuel-type.

Parents are also asked to provide their contact information to complete an online survey. The online survey is used to get feedback from parents on the program. The survey asks parents to provide information on:

- Water heating fuel;
- Which items were installed;
- Whether the faucet aerator fit;
- Whether there were any items the participant did not feel comfortable installing;
- Feedback on the instructions provided;
- Additional efficiency actions taken;

- Average electricity bill;
- Whether they would like someone to contact them about other programs; and
- And their rating of the program.

Program staff do not currently employ any mechanism for verifying that students have met the educational goals of the program. However, staff have been working on ways in which to incorporate informal evaluations of student learning into the program presentation. One such method of evaluating student learning that has been suggested by program staff is asking classrooms relevant questions before and after the presentation.

Program staff solicit feedback from teachers regarding their experiences with the program. Feedback is sought from teachers regarding the consistency of the program content with grade-level expectations and its relevance to the classroom. Additionally, teachers provide feedback on the quality of the instructors. To ensure the continued advance of presentation quality and consistency, program staff are working with teachers and presenters to facilitate communication about program expectations and classroom management. Additionally, staff is considering moving from using contract educators to full-time staff to deliver the presentations to improve the consistency of the presentations delivered.

8.5.4 Parent/Guardian Survey Results

Thirty-two parents or guardians responded to a request to complete an online survey about their use of the kit items and experience with them.

Overall, survey respondents tended to own their homes, have approximately four household members, and the modal income bracket was between $25,000 and $50,000 (Table 8-18).

Table 8-18 Participant Demographics

Demographic Characteristic	***(n = 55)***
Average number of home residents	4.2
Percent with income of:[1]	
Less than $25,000 per year	13%
$25,000 to less than $50,000	44%
$50,000 to less than $75,000	6%
$75,000 or more	19%
Percent own home	66%

1. Total does not equal 100% because some respondents did not know their income or declined to state it.

Table 8-19 displays the respondent household characteristics. A majority of participants resided in an older (pre-1990) single family home with electric space heating. 30% of respondents reported having electric water heating and 60% were larger than 1,500 square feet.

Table 8-19 Participant Home Characteristics

Residence Characteristic	***(n = 55)***
Percent Single Family Home	88%
Percent electric space heating	56%
Percent electric water heating	34%
Percent of households built before 1990	66%
Percent with home size of:[1]	
Less than 1,000 ft.^{2}	9%
1,001-1,500 ft.^{2}	16%
1,501-2,000 ft.^{2}	19%
Greater than 2,000 ft.^{2}	41%

1. Total does not equal 100% because some respondents did not know the size of their home or declined to state it.

8.5.4.1 Kit Usage

Respondents were asked about each of the items included in the kit and how many of the items were currently installed. Of the six CFLs provided in the kit, an average of 3.9 were in use. When asked why some of the bulbs had not been installed, the most commonly reported answer was that residents are waiting for currently installed lightbulbs to burn out. Responses are summarized in the table below.

Table 8-20 Reasons CFLs Have Not Been Installed

Installation Barrier	***Percent of Respondents (n=21)***
Waiting until currently installed light bulbs burn out	57%
The CFLs don't fit in the fixtures where they would have been installed	33%
Preferred LEDs	5%
Do not currently need new bulbs	5%

Respondents were also asked how many of the two faucet aerators they had installed. On average, 1.2 aerators were installed. When asked why some of the aerators were not installed, the most common response was that they did not fit the faucet followed by the respondent reporting that they already had them installed. Responses are summarized in the table below.

Table 8-21 Reasons Faucet Aerators Have Not Been Installed

Installation Barrier	***Percent of Respondents (n=19)***
They did not fit the faucet	37%
Faucet aerators already installed	26%
The water supply pressure is too low	11%
Only received one aerator	11%
Did not understand how to install them	5%
Only needed one	5%
Use other methods to reduce water use	5%

Sixty-three percent of respondents confirmed that they had installed the low-flow showerhead. When those who had not installed the showerhead were asked why, the most common response was that it did not fit the shower. Responses are summarized in the table below.

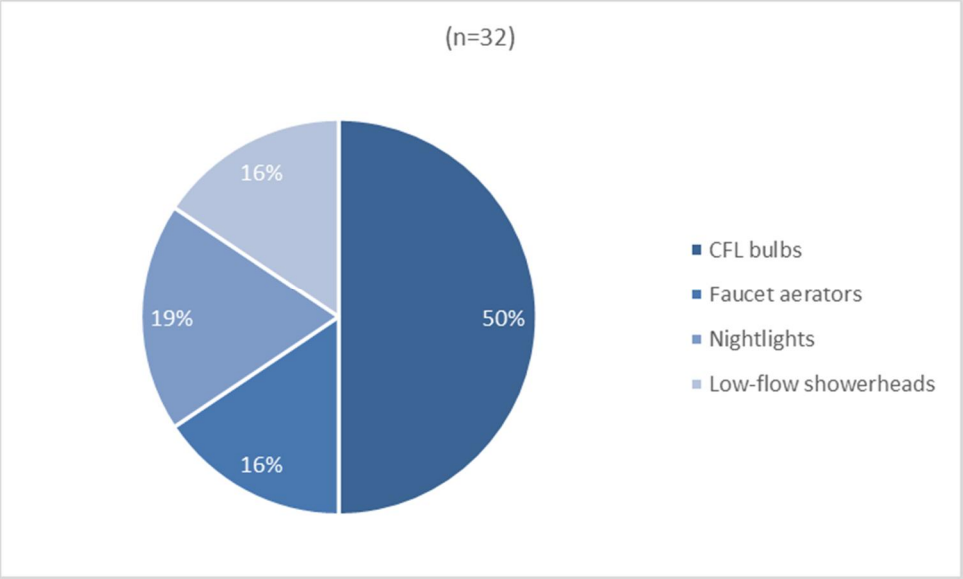
Table 8-22 Reasons The Low-Flow Showerhead Has Not Been Installed

Installation Barrier	***Percent of Respondents (n=12)***
They did not fit the shower	33%
Dislike low-flow showerheads	25%
Don't use the shower	17%
Had trouble installing the showerhead	17%
Low-flow showerhead already installed	8%

Ninety-one percent of respondents confirmed installing the LED nightlight. When those who did not install the nightlight were asked why, two said that they do not need a nightlight and one said that the nightlight was broken.

Respondents were asked which of the kit items they found to be most useful. The most popular items were the CFL bulbs; 50% of respondents stated these were the most useful items. Responses are summarized in the table below.

Figure 8-1 Which Kit Item was Most Useful

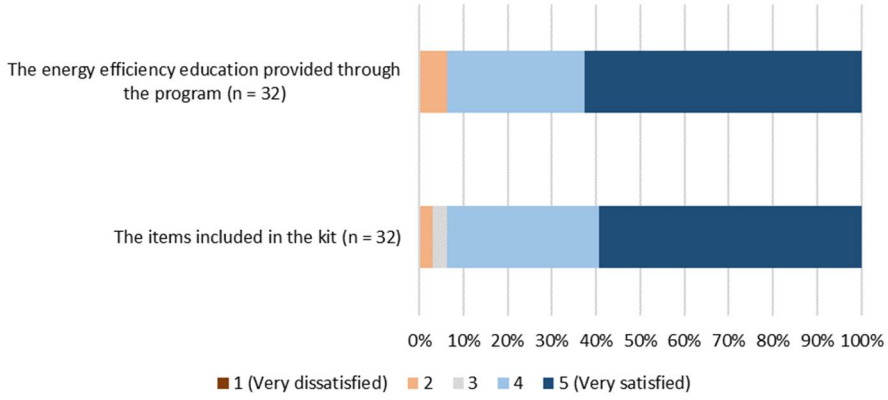


Respondents were also asked whether any of the kit items were broken when they were received. Only one respondent reported broken kit components, which were the LED nightlight and one or more of the faucet aerators.

8.5.4.2 Program Satisfaction

Survey respondents were asked to rate their level of satisfaction with the energy efficiency education provided through the program and the items included in the kits. The results are summarized below in Figure 8-2. Ninety-four percent of respondents reported that they were satisfied with each of these aspects of the program. Respondents were largely satisfied with the kit items and the education provided through program. One of the respondents who indicated dissatisfaction doubted the usefulness of the program.

Figure 8-2 Satisfaction with the Energy Education and Kits Contents



Respondents were asked if they had any suggestions for changes that could be made to the energy efficiency kits. Three respondents requested additional nightlights. One respondent requested additional faucet aerators, while another said that the faucet aerator interfered with the water flow from their faucet. One respondent said, “As an environmentalist I did not need any of these items. I gave most of them away.”

One respondent provided very positive feedback, saying, “My son loves the nightlight. This kit brought awareness to these items. […] was hesitant about the showerhead but was surprisingly pleased with the water flow.”

Overall, these responses do not suggest needed changes to the kit contents.

8.5.4.3 Satisfaction with Entergy

Respondents were also asked about their satisfaction with the Companies as their electrical services provider and how their participation in the program has changed their satisfaction with Entergy. Responses are summarized in the table below.

Table 8-23 Satisfaction with Entergy

Satisfaction with Entergy	***Percent of Respondents (n = 32)***
5 - Very satisfied	38%
4	34%
3 - Neither satisfied nor dissatisfied	19%
2	3%
1 - Very dissatisfied	6%

One respondent who reported dissatisfaction with the Companies said that the rates were too high.

When asked how the program has influenced their satisfaction with Entergy as a utility, most responded positively, saying that their participation in the program has somewhat or greatly increased their satisfaction with Entergy. Responses are summarized in the table below.

Table 8-24 Effect of Program on Satisfaction with Entergy

Effect of Program on Satisfaction with Entergy	***Percent of Respondents (n = 57)***
Greatly increased your satisfaction with ENO	41%
Somewhat increased your satisfaction with ENO	25%
Did not affect your satisfaction with ENO	34%
Somewhat decreased your satisfaction with ENO	0%
Greatly decreased your satisfaction with ENO	0%
Don't know	0%
Refused	0%

8.5.4.4 Cross-Program Awareness

Only 13% of respondents reported awareness of the other Energy Smart efficiency programs.

8.5.4.5 Conclusions

- **Satisfaction with the program is high.** Ninety-four percent of respondents indicated high or very high levels of satisfaction with the items included in the kit and the amount of energy-efficiency education that the kit provides.
- **Lighting measures are the most popular kit elements.** When asked which items proved to be the most useful, 50% said that they found the CFL bulbs to be the most useful, and 19% identified the LED nightlight. In addition, with an installation rate of 91%, the LED nightlight is the most-installed kit component. With an average of 3.9 CFLs installed per 6 distributed, the CFL bulbs are the second-most-installed kit component. When asked for improvements that might be made to the kit in the future, 38% of respondents who made comments recommended providing additional LED nightlights.

8.5.5 Teacher Survey Results

Fourteen teachers responded to a request to complete an online survey covering the delivery of the presentation, the educational value of the presentation, teacher satisfaction with the program, and student outcomes.

8.5.5.1 Sources of Program Awareness

Most respondents (64%) reported that they learned of the program from an Energy Wise Alliance staff member. Another common source of program awareness was staff

members or teachers from another school (reported by 21% of respondents). One participant heard about the program through a parent and another participated in the program in a prior year.

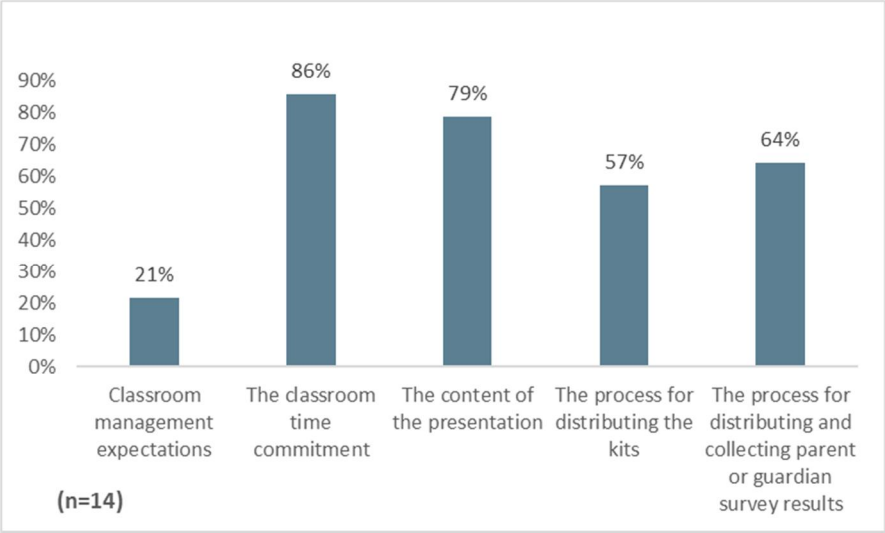
8.5.5.2 Participating Grades

The largest share of teachers (79%) reported that the program was delivered to 6th grade students at their school. Equal shares of teachers, 36%, reported that program was delivered to 5th and 7th grade students. Since the same teacher can provide instruction for multiple grades, the total percentage exceeds 100%.

8.5.5.3 Presentation Implementation and Delivery

All surveyed teachers had some interaction with Energy Wise program staff prior to the delivery of the presentation. These interactions covered a variety of topics, the most popular being discussions of the classroom time commitment and the content of the presentation. A summary of topics discussed between teachers and Energy Wise program staff appears in the figure below. Since the same teacher can provide instruction for multiple grades, the total percentage exceeds 100%.

Figure 8-3 Topics Discussed with Program Staff Prior to the Presentation



Teachers reported that most classrooms (50%) devoted 30 to 60 minutes to the presentation, and most teachers (79%) stated that the time they dedicated to the presentation was appropriate. There was not a strong association between time dedicated to the presentation and teacher likelihood of stating that the presentation had run either too long or too short. The lack of relationships suggests that satisfaction with the presentation time is a function of the individual teacher's time constraints as opposed to the runtime of the presentation itself. In addition, when asked how long the

presentation ought to be, teachers suggested a fairly wide window of 30-60 minutes. These findings are summarized in the tables below.

Table 8-25 Presentation Length

Presentation Length	***Percent of Respondents (n=14)***
Less than 30 minutes	0%
More than 30 minutes to 60 minutes	50%
More than 60 minutes to 90 minutes	43%
More than 90 minutes	7%

Table 8-26 Appropriateness of Presentation Length

Response to Presentation Length	***Percent of Respondents (n=14)***
The presentation length was too short	7%
The presentation length was about right	79%
The presentation length was too long	14%

8.5.5.4 Teachers Assessment of the Program as an Educational Tool

The majority of surveyed teachers (86%) strongly agreed with the sentiment that the presentation was a valuable educational tool. A summary of the responses to this question is displayed in the figure below.

Figure 8-4 Agreement/Disagreement that the Program is a Useful Learning Tool

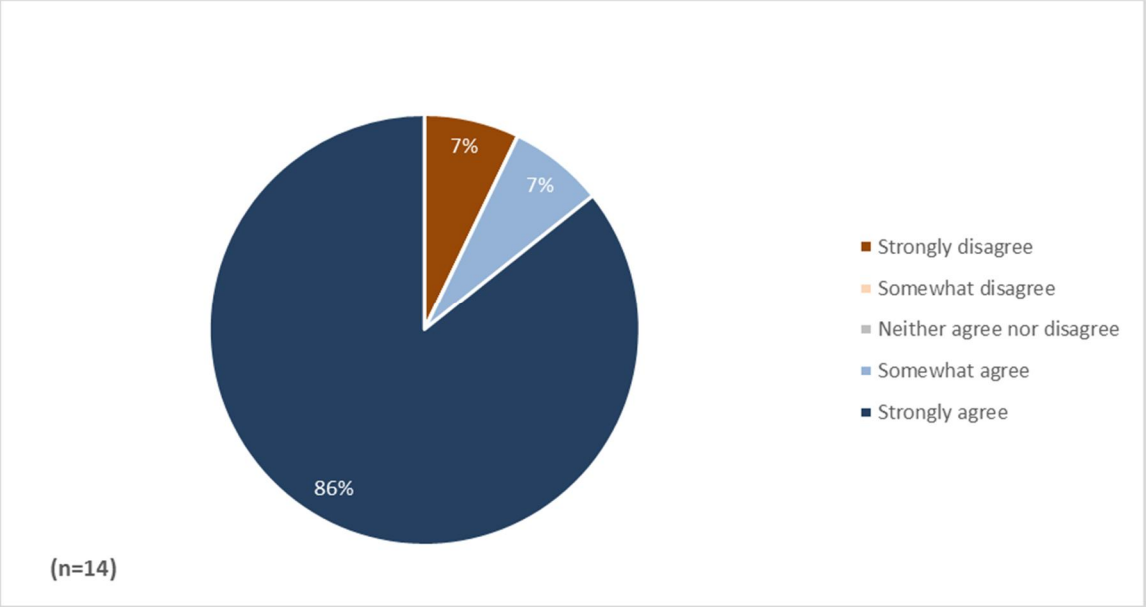


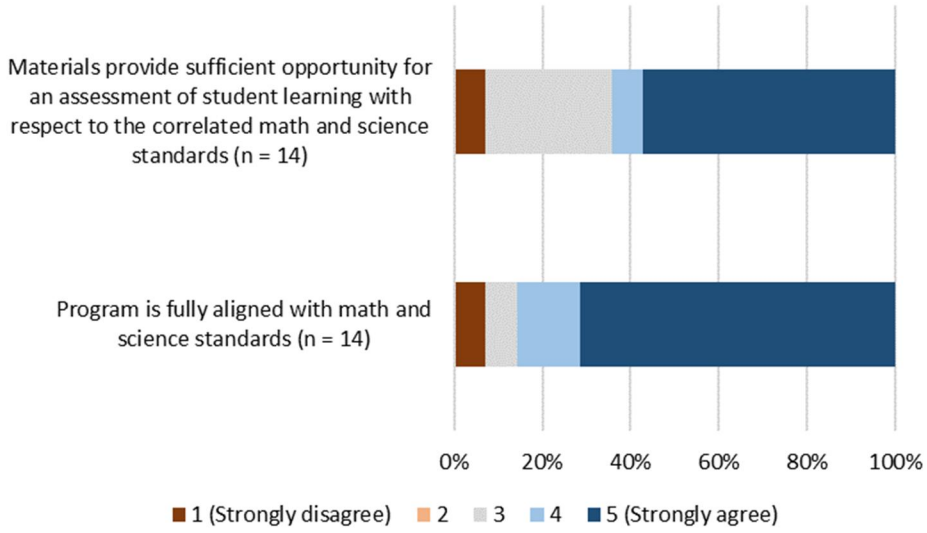
Table 8-27 summarizes teacher perspectives on the appropriateness of the difficulty of the materials used in the program for students in the 5th, 6th, and 7th grades. As shown, most teachers viewed the materials as appropriate for each of the grade levels. This suggests that despite the program being offered to more grade levels than the initially planned 6th grade students, the materials have been well adapted for 5th and 7th grade students.

Table 8-27 Appropriateness of Materials Level of Difficulty by Grade

Grade	1 (Too easy)	2	3 (About right)	4	5 (Too difficult)	Don't know
5th Grade Students (n = 5)	0%	0%	80%	0%	0%	20%
6th Grade Students (n = 11)	0%	18%	73%	9%	0%	0%
7th Grade Students (n = 5)	0%	0%	100%	0%	0%	0%

Figure 8-5 summarizes teacher's perceptions of how well the program aligned with state learning standards. As shown, approximately one-half of respondents reported that the program provides an opportunity for assessing student learning with respect to math and science standards, while a larger share agreed that the program aligned with math and science standards.

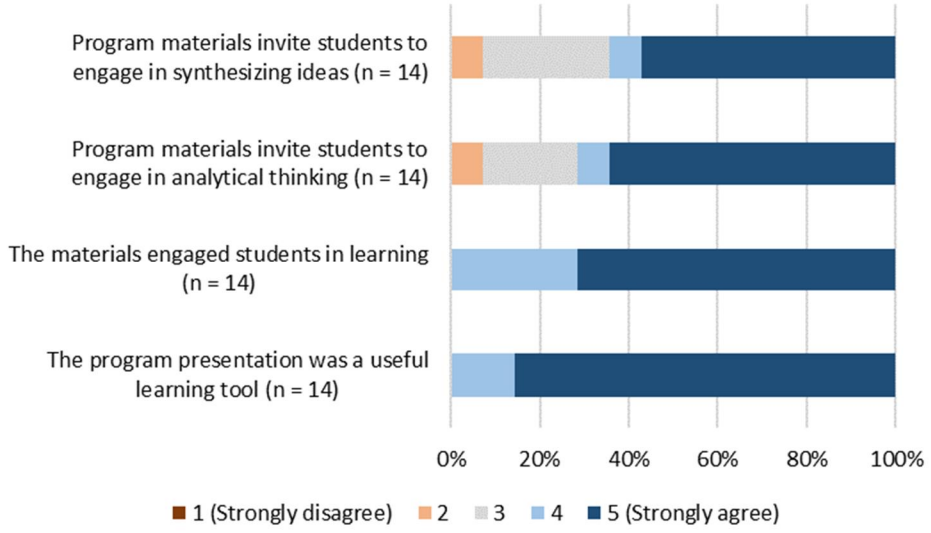
Figure 8-5 Alignment with State Learning Standards



As summarized in Figure 8-6, teacher responses indicate that the program materials are generally effective as learning tools. All teachers agreed that the materials engaged students in learning and that the presentation was a useful learning tool. A smaller

share, agreed that materials provided opportunities for analytical thinking and synthesizing ideas. One respondent who disagreed that the materials were effective stated that students "received a lot of information but did not have a lot of time to analyze or work with the information."

Figure 8-6 Effectiveness of Program Materials as Learning Tools



At various points in the survey, several teachers made pedagogical suggestions. These are provided below:

"More hands on activities…less lecturing."

"More time for kids to interact and analyze the new information instead of just receive it."

"Include more checks for understanding and I would include some sort of five-question survey assessing student understanding."

"They love the bike! It would be helpful to set expectations with some of the giveaways before given to students."

"I would add the energy efficiency activity where they got to see if they did certain things how it changed the cost of their energy bill."

"More application-based information instead of just standard information delivery."

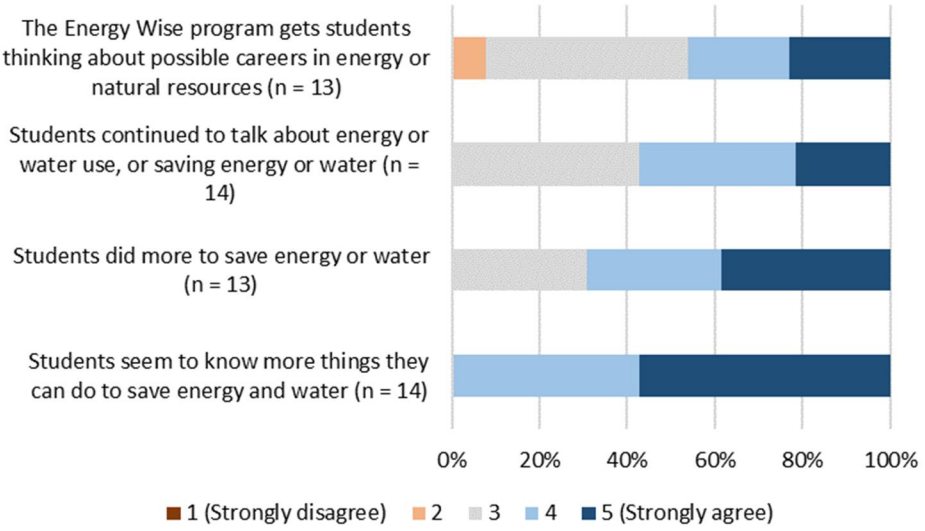
"Maybe provide the students with a reading before they begin activities. I know my 6th graders love to participate but they also hate being wrong."

"I liked the improving the efficiency of your house activity that they did last year and would like to see that implemented again."

8.5.5.5 Student Outcomes

As shown in Figure 8-7, all teachers agreed that the program resulted in students knowing more about how to save energy and water. However, there was less agreement that the program was impacting behaviors. Sixty-eight percent thought that their students now do more to save energy or water and 57% reported that they continue to talk about energy and water use and conservation. Although it is not a specific objective of the program to encourage students pursue careers in energy or natural resources, a little less than one-half of teachers agreed that the program was having this kind of impact.

Figure 8-7 Program Impacts on Knowledge and Behaviors Related to Energy and Water Use and Conservation



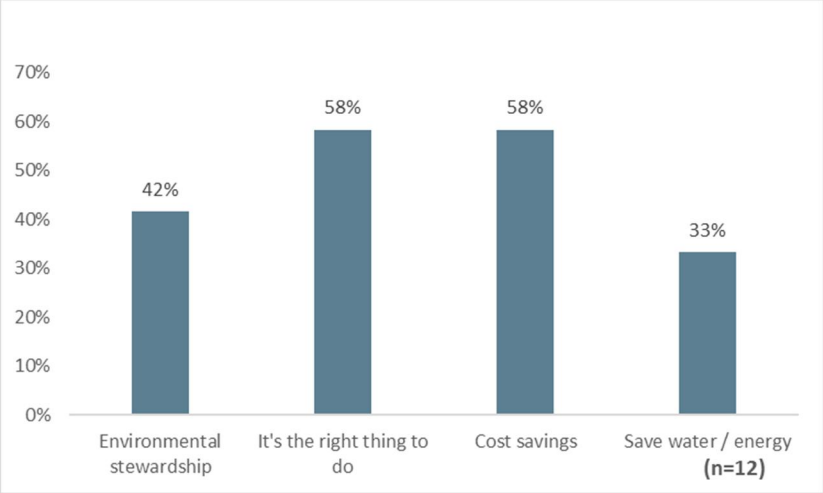
Only one respondent reported that the program did not affect students' motivation to be more energy and water conscious and 43% thought the program made students a lot more motivated to save energy and water.

Table 8-28 Program Impact on Motivation to be More Energy / Water Conscious

Degree of effect on motivation	***Percent of Respondents (n = 14)***
A lot more motivated	43%
Slightly more motivated	15%
Somewhat more motivated	33%
There has been no change in their level of motivation	9%
Don't Know	10%

Surveyed teachers indicated that the most popular messages contributing to this increased environmental awareness were the intrinsic moral value of conserving resources ("It's the right thing to do") and cost savings. The importance of several contributing factors are compared in the figure below. Since teachers could identify more than one contributing factor, total percentages exceed 100%.

Figure 8-8 Messaging Contributing to Environmental Consciousness



8.5.5.6 Overall Assessment of the Program

All surveyed teachers said both that they plan to participate in the program again next year and that they would be somewhat or very likely to recommend the program to another educator. Given that the Energy Wise program relies on high teacher satisfaction to ensure continued program participation, this highly positive response speaks well to the program's ability to continue into the future.

Teachers were also asked to provide open-ended commentary about their program experience and possible future program improvements. With regards to the energy efficiency measures included in the kit, teachers provided the following suggestions:

"I would include a 'how to' guide with pictures for the experiments included in the kit."

"The showerheads and faucets are not universal fittings. I would suggest maybe bringing a bag of conversion kits for the teacher just in case students can't change their faucet/shower aerators."

"It would be good to follow up with the kids directly after."

When asked to make comments on the program overall, teachers provided the following feedback:

"I was impressed with the staff members. They were very knowledgeable and interacted well with the students. They redirected students who went off task and they were enjoyable. They adjusted their instruction to our class schedule and were patient with working around the State testing schedule."

"Videos are super effective in getting students engaged. There were a few things in the slide show that would have lended itself well to some sort of animation or video. Also, have a 'question of the day.' It needs to be [a] one-liner that you announce at the beginning of class and hopefully [lead] the student to answer on their own at the end of the lesson. Something like 'how is electricity made and why should we try to conserve it?' It'll give the lesson a driving goal [and] a key takeaway. Also, don't be afraid to make kids write! Maybe some sort of graphic organizer that you have students fill in as your deliver information. Maybe even a slide show with underlined words and students have the same slides but the underlined words are blank so they have to fill them in. Reward the small participation along the way or students zone out and only pay attention to demos and kits."

8.5.6 Conclusions

The following sections summarize key process evaluation findings.

8.5.6.1 Program Design and Participation Process

- The efficiency measures offered through the Energy Wise school kit component are similar to other school kit programs.
- Staff initially intended to deliver the program to sixth grade students but expanded to fifth and seventh grades when school participation goals fell below expectations. Teacher survey results indicate that the difficulty of the information presented to students was successfully modified to be appropriate for 5th and 7th grade students.
- While expanding to additional grades assisted the program with meeting its participation target, it may reduce its efficacy in meeting future savings goals if the same households receive kits in multiple years and the installation rates decrease.
- The participation process is largely informal. School participation agreements are verbal rather than written and there is no parental consent process to receive the kit items. Prior to delivering the program, staff discusses expectations with participating teachers. Over the course of the program year, staff has identified standards for classroom management to be a key component of this meeting as these standards vary considerably from school-to-school. Teacher responses indicated some variation in what information was discussed prior to participation.
- Staff offers flexibility in the delivery of the program and may modify the presentation time to reduce it to 45 minutes from the intended 90-minute length. Teacher survey results indicated that about one-half of the presentations were

between 30-60 minutes and only 14% reported that the presentation was too long.

- Delivery of the program typically involves two visits to the school: one visit to present the material and a return visit to collect parent/guardian surveys. Kits are either directly mailed to the school or are brought from available supplies by program staff during the day of the presentation.

8.5.6.2 Program Marketing and Outreach

- Staff report that direct outreach to individual schools has been the most effective means of recruiting participation. The independent organization of schools in New Orleans precludes recruitment of schools through district channels or other groups of multiple schools, however, staff has identified and worked with a few charter school organizations. Additionally, staff also attempted to recruit through a teacher group but without success. Moreover, email and telephone recruitment has not been effective.
- Word-of-mouth marketing and repeat participation are likely to be key to future program participation. Both repeat participation and word-of-mouth marketing present opportunities to meet participation goals at a lower cost than direct outreach. Feedback from teachers indicates that the program has succeeded at providing a valued service to teachers and that this will likely serve the program well in future years. Teachers indicated that they were satisfied with the program, would likely participate next year, and would recommend it to another teacher.
- School kits contain limited information for parents on the Energy Smart programs. The printed materials only contain a reference to the program website.
- Adult outreach provided by the Energy Wise Alliances targets neighborhood groups, senior centers, churches, and cultural organizations and attended school-sponsored events. Outreach efforts consist of informing customers about free or affordable energy-efficiency programs, providing services and customer service in the Energy Service Center, and reaching out to community members through nonprofit retrofits. Program staff have found that messaging related to financial savings and home comfort tend to resonate the best among the Companies' customers.

8.5.6.3 Quality Assurance and Quality Control

- Meeting grade level expectations and classroom relevance are key program quality concerns. Staff discusses the program with teachers to assess the extent to the program is providing a quality educational experience.
- Staff estimates installation rates and prevalence of hot water heating through a take home survey completed by parents or guardians.
- Staff is considering hiring full-time educators to improve the consistency of the delivery of the educational presentation. Although a structured presentation is

provided for delivery and staff report that feedback on the instructors has largely been positive, staff noted that different instructors may emphasize different messages or aspects of the presentation.

- Learning objectives are currently not assessed but staff is considering implementing some form of pre- and post-testing to determine if the program learning objectives are being met. However, the assessment of learning objectives through in-class testing could increase the classroom time require and discourage future participation.

8.5.6.4 Teacher Satisfaction and Assessment of Program Effectiveness

- Teachers' responses to the program were very positive. Eighty-six percent of teachers surveyed agreed with the sentiment that the presentation is a valuable educational tool. All surveyed teachers said that they plan to participate in the program again next year and that they would be somewhat or very likely to recommend the program to another educator.
- The presentation is well-matched to teacher's needs and educational standards. All teachers surveyed reported that they felt that the presentation was neither too easy nor too hard for 5th, 6th, and 7th grade students. There was also broad support among surveyed teachers for the sentiments that the Energy Wise program is fully aligned with state standards. Eighty-six percent of teachers confirmed that the program covers topics normally taught in class, and 83% of these teachers said that the program took place at a time of year that corresponded to when they would have taught these concepts.
- Satisfaction with the program is high. Ninety-four percent of respondents indicated high or very high levels of satisfaction with both the items included in the kit and the amount of energy-efficiency education that the kit provides.

8.5.6.5 Kit Items

- Lighting measures were most frequently identified as useful. 50% of respondents reported that the CFLs were the most useful and 19% reported that the LED night lights were the most useful.
- The 91% in-service rate for LED nightlight was the kit component with the highest rate of current use. The in-service rates for the other items were as follows: 84% (faucet aerators), 63% (showerheads), and 66% (CFLs). Approximately one-third or respondents reported that they did not install the faucet aerator or showerhead because it did not fit their faucet or shower. The most commonly given reason for not installing the CFLs, given by 57% of respondents, was that the recipient was waiting until their current lightbulbs burnt out. Three respondents reported installing very few items. Specifically, one respondent reported that they only installed the LED nightlight and another reported installing

one CFL and one faucet aerator, and a third reported that they installed one CFL and one LED nightlight.

8.5.7 Recommendations

The Evaluators' recommendations for the SK&E Program are as follows:

- **Consider developing program handouts that relate the presentation and learning activities with State learning objectives.** Handouts that demonstrate the relationship between the program material and State learning objectives may help convince some teachers of the value of participating in the program.
- **Consider adding take-home activities.** Additional take home activities may promote deeper learning of program material and also provide a way to measure the achievement of learning outcomes without requiring additional class time. One teacher suggested take home readings.
- **Consider developing a checklist covering topics to be discussed with school staff prior to the delivery of the presentation.** During the initial year of operations, staff has developed a better understanding of what topics need to be covered with teachers (e.g., classroom management expectations) prior to agreeing to participate. These lessons may be formalized in a document to assist with the recruitment process to ensure that all key topics are discussed prior to delivering the presentation.
- **Consider developing an optional additional hands-on activity component.** Some teachers indicated that students needed more time to interact with the program material or that more focus should be placed on activities instead of lecturing. Staff may want to consider including more hands on components and providing them as an option to teachers who are willing to give up the classroom time.
- **Seek ways to leverage the positive instructor response in order to promote the program.** Staff focus on teachers as their primary customer because of the importance of their satisfaction to continued participation and recruitment of other teachers. All teachers surveyed reported that they plan to participate in the program again next year and that they would be at least somewhat likely to promote the program to another educator. These positive instructor experiences represent a valuable means of ensuring continued program involvement. Staff should consider strategies for leveraging these positive experiences such as encouraging promotion of the program through social media or recommending other educators.

- **Including a brief take home survey with the kit.** Currently, the program collects installation information from the paper survey. Staff may want to consider including a few additional questions that would replace the second online survey. Reducing the number of "touch-points" required to get feedback may increase the number of kit recipients that provide it.
- **Continue plans to explore the feasibility of incorporating learning assessments.** Staff indicated that they are interested in adding learning assessments into the program but need to balance this with other demands for classroom time. One teacher suggested a brief five-question survey and take home assignments may be another option that would have minimal impact on classroom time.

9. Small Business Solutions

9.1 Program Description

The ENO and Algiers Small Business Solutions Program (SBS) offers enhanced incentives to small business owners to help overcome the first-cost barrier unique to the small business market which interferes with small business adoption of energy efficiency measures. By offering enhanced financial incentives, the program generates significant cost-effective energy savings for small businesses using added market-segmented strategies that encourage the adoption of diverse efficiency measures in target sub-sectors.

The Program is designed to provide small business owners with energy efficiency information and develop awareness of energy/non-energy benefits of energy efficiency. The information helps small business customers invest in energy efficient technologies and help overcome high "first costs." It is intended to increase the awareness of the latest energy efficient technologies available to ENO and Algiers small business customers. Through the SBS Program, a network of contractors was developed that work with small business customers. The Program provides the tools and training for contractors to quantify the energy savings and incentives for small business customers.

The Program offers technical assistance effective in removing market barriers for small business customers. This includes providing free walk through facility assessments to educate the business owner on the value of energy efficiency. Incentives are offered for energy efficiency measures utilizing a streamlined approach for enrollment, installation, and savings verification. The Program develops and maintains a network of contractors to provide additional outreach and customer participation.

Total verified savings and percentage of goals for the SBS Program are summarized in Table 9-1.

Table 9-1 Savings Goals by Utility

Utility	*kWh goal*	*Realized kWh*	*Percentage of kWh goal realized*	*kW goal*	*Realized kW*	*Percentage of kW goal realized*
ENO	3,692,306	3,189,966	86.39%	950	461.08	48.53%
Algiers	339,555	144,696	42.61%%	87	28.60	32.87%%

9.2 M&V Methodology

Evaluation of the SBS Program requires the following:

- Stratified Random Sampling, selecting large saving sites with certainty (as detailed in Section 2.2.1.3);
- Review of deemed savings parameters for prescriptive projects;
- On-site verification;
- On-site metering
- Interviewing of program participants and trade allies.

The main features of the approach used for the impact evaluation are as follows:

- Data for the study have been collected through review of program materials, on-site inspections, and end-use metering. Based on data provided by CLEAResult, sample designs were developed for on-site data collection for the impact evaluation. Sample sizes were determined that provide savings estimates for the program with ±10% precision at the 90% confidence level. Actual sampling precision was 7.64% at 90% confidence.
- On-site visits were used to collect data for savings impacts calculations. The on-site visits were used to verify installations and to determine any changes to the operating parameters since the measures were first installed. Facility staff were interviewed to determine the operating hours of the installed system and to locate any additional benefits or shortcomings with the installed system. Finally, lighting loggers were left on site to record at least two weeks' worth of data from the newly-installed lighting. This data was later extrapolated to annual operating hours.

Parameters required for evaluation of the SBS program are presented in Table 9-2 below.

Table 9-2 Data Sources for Gross Impact Parameters – SBS program

Parameter	Source
Project Details	Program Tracking Data
Energy Efficient Equipment Specifications	Manufacturer's Literature
Lighting Hours of Operation	Deemed hours from secondary research, assignment of new values based upon facility operating hours should deemed values not provide accurate estimates NOAA data-based non-daylight hours.
HVAC Interactive Factors	Simulations of archetypical buildings using local weather data
Lighting Peak Coincident Factor	Review of deemed values, assignment of new values based upon facility operating hours should deemed values not provide accurate estimates

9.3 Gross Impact Findings

Energy savings were estimated using proven techniques, including engineering calculations using industry standards to determine energy savings. Table 9-3 summarizes the total participation in the PY5 Small Business Program.

Table 9-3 PY5 Small Business Program Participation Summary

Utility	# Projects	Expected kWh	Expected Peak kW
ENO	185	3,833,271	546.49
Algiers	6	178,159	34.17
Total	191	4,011,430	580.65

Data provided by CLEAResult showed that during PY5, there were 185 and 6 projects for ENO and Algiers respectively, for a combined total of 191 projects. These projects were expected to provide a combined savings of 4,011,430 kWh and 580.65 kW.

Table 9-4 Small Business Sample Summary

Utility	# Sites in Population	Site Visit Sample Size	# Surveys
ENO	185	26	31
Algiers	6	-	0
Total	191	26	31

Sampling for evaluation of ENO and Algiers' SBS program was developed using the Stratified Random Sampling procedure detailed in Section 2.2.1. This procedure

provides 90% confidence and +/- 10% precision with a significantly reduced sample than simple random sampling would require by selecting the highest saving facilities with certainty, thereby minimizing the variance that non-sampled sites can contribute to the overall results. Actual sampling precision was 7.64% at 90%. The population and sample include both utilities pooled however, savings in this report are presented for each utility as well as combined.

9.3.1.1 Small Business Program Sample Design

The participant population for the SBS was divided into four strata. Table 9-5 summarizes the strata boundaries and sample frames for the SBS and Table 9-6 summarizes expected savings for of both the sample and population.

Table 9-5 Small Business Program Sample Design (Pooled)

	Stratum 1	***Stratum 2***	***Stratum3***	***Stratum 4***	***Stratum 5***	***Totals***
Strata boundaries (kWh)	< 60,000	60,001 - 250,000	23,000 - 50,000	50,000 - 90,000	> 90,000	
Number of projects	95	39	36	14	7	191
Total kWh savings	420,011	592,945	1,227,944	863,513	907,018	4,011,430
Average kWh Savings	4,421	15,204	34,110	61,679	129,574	21,002
Standard deviation of kWh savings	2,156	3,847	8,150	12,103	41,607	1,184
Coefficient of variation	0.488	0.253	0.239	0.196	0.321	1.16
Final design sample	6	5	4	4	7	26

Table 9-6 Expected Savings for Sampled and Non-Sampled Projects by Stratum

Stratum	***Sample Expected Savings***	***Total Expected Savings***
1	17,287	420,011
2	77,655	592,945
3	114,255	1,227,944
4	259,609	863,513
5	907,018	907,018
Total	1,375,824	4,011,430

9.3.1.2 Small Business Site-Level Realization

Sites chosen within each stratum were visited in order to verify installation of rebated measures and to collect data needed for calculation of ex post verified savings. The realization rates for sites within each stratum were then applied to the non-sampled sites within their respective stratum. Table 9-7 presents realization at the stratum level, with Table 9-8 presenting results at the site level.

Table 9-7 Summary of kWh Savings for Small Business Program by Sample Stratum (Pooled)

Stratum	Sample Expected kWh Savings	Sample Realized kWh Savings	Realization Rate
1	17,287	17,544	101.5%
2	77,655	55,188	71.1%
3	114,255	94,615	82.8%
4	259,609	240,694	92.7%
5	907,018	762,256	84.0%

Table 9-8 shows the expected and realized energy savings for the program by project.

Table 9-8 Expected and Realized Savings by Sampled Project

Project ID(s)	Facility Type	Expected kWh Savings	Realized kWh Savings	Realization Rate
PRJ-417337	Gas Station & Convenience Store	422	459	108.8%
PRJ-462424	Grocery Store	422	58	13.7%
PRJ-425594	Office	1,295	976	75.4%
PRJ-422409	Convenience Store	3,396	2,474	72.9%
PRJ-403690	Grocery Store	5,190	2,693	51.9%
PRJ-428782	Sit-down Restaurant	6,562	10,884	165.9%
PRJ-422310	Sit-down Restaurant	10,755	5,356	49.8%
PRJ-394957	Office	12,801	4,722	36.9%
PRJ-402795	Retail	15,612	11,357	72.7%
PRJ-481258	Religious School	15,856	10,780	68.0%
PRJ-654677	Retail	22,631	22,973	101.5%
PRJ-465823	Religious School	24,689	23,122	93.7%
PRJ-473731	Retail	25,401	21,012	82.7%
PRJ-422908	Sit-down Restaurant	26,110	18,667	71.5%
PRJ-420243	Retail	38,055	31,814	83.6%
PRJ-574679	Convenience Store	50,423	57,339	113.7%
PRJ-442901	Condominium Association	60,056	41,904	69.8%
PRJ-463233	Gas Station & Convenience Store	61,844	67,706	109.5%
PRJ-446671	Lodging	87,286	73,745	84.5%
PRJ-448427	Lodging	90,096	51,114	56.7%
PRJ-394938	Retail	90,195	38,962	43.2%
PRJ-420462	Auto Dismantler	92,415	99,886	108.1%
PRJ-560879	Lodging	124,003	110,776	89.3%
PRJ-718708	Parking Garage	156,103	167,535	107.3%
PRJ-706009	Parking Garage	159,162	176,847	111.1%
PRJ-448293	Lodging	195,044	117,136	60.1%
Total		1,375,824	1,170,297	85.1%

9.3.1.3 Small Business Program-Level Realization

Using the realization rates presented in Table 9-8, the Evaluators extrapolated results from sampled sites to non-sampled sites in developing program-level savings estimates. Table 9-9 presents results by stratum.

Table 9-9 Small Business Program-Level Realization by Stratum

Stratum	# Sites	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected kW Savings	Realized kW Savings	kW Realization Rate
1	95	420,011	426,254	101.5%	76.90	77.90	101.3%
2	39	592,945	421,393	71.1%	123.99	88.13	71.1%
3	36	1,227,944	1,011,492	82.4%	208.73	179.53	86.0%
4	14	863,513	800,598	92.7%	61.08	54.96	90.0%
5	7	907,018	761,285	83.9%	109.96	89.15	81.1%
Total	191	4,011,430	3,421,022	85.3%	580.65	489.68	84.3%

9.3.1.4 Small Business Realization by Contractor

The Evaluator extrapolated results from the program into savings by project contractor trade ally. The results are presented below in

Table 9-10.

Table 9-10 Savings by Contractor

Contractor	Expected kWh	Realized kWh	kWh Realization Rate	Expected Peak kW	Realized Peak kW	Peak kW Realization Rate
Large Lighting Contractor	2,198,518	1,766,221	80.3%	315.94	260.37	82.4%
Refrigeration Contractor	310,651	292,047	94.0%	38.70	36.38	94.0%
Other Contractors	1,502,260	1,362,755	90.7%	226.02	192.93	85.4%
Total	4,011,430	3,421,022	85.3%	580.65	489.68	84.3%

9.3.1.5 Small Business – Causes of Savings Deviations

The Evaluators have summarized these adjustments and others in Table 9-11 for illustrative purposes.

Table 9-11 Small Business – Causes of Variance in Savings

Project ID	Expected kWh	Realized kWh	Realization Rate	Causes of Variance in Savings
PRJ-417337	422	459	108.8%	Gas Station & Convenience Store. Ex ante calculations assumed a deemed savings of 422 kWh savings per door while the ex post calculations use site-specific variables, assumptions, and measurements to calculate the savings.
PRJ-462424	422	58	13.7%	Grocery Store. Ex ante calculations assumed a deemed savings of 422 kWh savings per door while the ex post calculations use site-specific variables, assumptions, and measurements to

Project ID	Expected kWh	Realized kWh	Realization Rate	Causes of Variance in Savings
				calculate the savings.
PRJ-425594	1,295	976	75.4%	Office. Logged on-site light hours differed slightly from deemed lighting hours. The ex-ante calculation used deemed hours of 2,808 hours for this building type; the ex post calculation used verified annual hours of 2,763 hours.
PRJ-422409	3,396	2,474	72.9%	Convenience Store. Ex ante calculations assumed a deemed savings of 422 kWh savings per refrigerator door and 2,974 kWh savings per freezer door for the strip curtains while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.
PRJ-403690	5,190	2,693	51.9%	Grocery Store. Ex ante calculations assumed a deemed savings of 422 kWh savings per door for the strip curtains and 1,794 kWh savings per valve for the PRSV, while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.
PRJ-428782	6,562	10,884	165.9%	Sit-down Restaurant. Ex ante calculations assumed a deemed savings of 422 kWh savings per door for the strip curtains and 1,794 kWh savings per valve for the PRSV, while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.
PRJ-422310	10,755	5,356	49.8%	Sit-down Restaurant. Sit-down Restaurant. Ex ante calculations assumed a deemed savings of 422 kWh savings per door for the strip curtains while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings. PRSV savings were predicated on an electric water heating, however on site the Evaluators verified that facility water was heated via natural gas, for which PRSVs cannot provide kWh and peak kW savings.
PRJ-394957	12,801	4,722	36.9%	Office. Non EISA-compliant baseline(s), incorrect non-daylight hours. Also, ex ante calculations assumed 3,737 hours for all interior areas. On-site logging data reported lower operating hours for all areas. Additionally, (17) fixtures and (3) occupancy sensors had not been installed during the time of the onsite visit.
PRJ-402795	15,612	11,357	72.7%	Retail. Non EISA-compliant baseline(s), incorrect non-daylight hours. Through monitoring, the ex post annual operating hours for restrooms was adjusted to 230 hours from 3,406 hours used in the ex ante calculations. Ex ante calculations assumed 3,406 annual hours of operation for all interior fixtures, however through on-site interviews and monitoring the Evaluators developed hours of 230, 3,452 and 8,760 for various areas of the facility.
PRJ-481258	15,856	10,780	68.0%	Religious School. The changes in savings are due to three reasons: 1) Actual hours of operation (1,751 AND 2,149) as determined using light monitoring equipment was greater than the deemed hours used in the ex ante calculations (2,777). 2) On site the Evaluators found that (3) 10W LED fixtures has

Project ID	Expected kWh	Realized kWh	Realization Rate	Causes of Variance in Savings
				not been retrofitted. 3) The ex post calculation used 4,319 hours for exterior; the ex ante estimations used 3,996 hours.
PRJ-654677	22,631	22,973	101.5%	Retail. The changes in savings are due to four reasons: 1) (40) 15W LED lamps were verified to be on 8,760 hours annually instead of 3,668 hours annually. 2) The ex post calculation used 4,319 hours for exterior; the ex ante estimations used 3,996 hours. 3) Through monitoring, the annual hours of operation for the interior lighting of the building ranges from 2,707 to 3,478. The ex ante estimations used 3,668. 4) Use of an 'Undetermined' space heating type with an IEF_E of .98. The Evaluators verified the facility used electrical resistance heating and used .87 in their calculations.
PRJ-465823	24,689	23,122	93.7%	Religious School. The changes in savings are due to three reasons: 1) Actual hours of operation (multiple) as determined using light monitoring equipment was greater than the deemed hours used in the ex ante calculations (2,777). 2) On site the Evaluators found that (7) 36W LED fixtures has not been retrofitted. 3) The ex post calculation used 4,319 hours for exterior; the ex ante estimations used 3,996 hours.
PRJ-473731	25,401	21,012	82.7%	Retail. The kWh realization rate is low because the actual hours of operation (3,541) as determined using light monitoring equipment were less than the deemed hours used in the ex ante calculations (4,368).
PRJ-422908	26,110	18,667	71.5%	Sit-down Restaurant. Non EISA-compliant baseline(s), 'Undetermined' space heating type and incorrect non-daylight hours all contributed to savings adjustments. Additionally, (12) 7W lamps were found installed on the exterior of the building instead of the interior as ex ante calculations suggested.
PRJ-420243	38,055	31,814	83.6%	Retail. The kWh realization rate is low because the actual hours of operation (multiple) as determined using light monitoring equipment were less than the deemed hours used in the ex ante calculations (4,813).
PRJ-574679	50,423	57,339	113.7%	Convenience Store. The kWh realization rate is low because the actual hours of operation (multiple) as determined using light monitoring equipment were different than the deemed hours used in the ex ante calculations (6,900).
PRJ-442901	60,056	41,904	69.8%	Condominium Association. Non EISA-compliant baseline(s). Additionally, on site the Evaluators found that (11) 42W CFLs had not yet been installed.
PRJ-463233	61,844	67,706	109.5%	Gas Station & Convenience Store. Non EISA-compliant baseline(s), incorrect non-daylight hours. Additionally, on site the Evaluators verified continuous operation of interior lighting (8,760), whereas ex ante calculations used (6,900).
PRJ-446671	87,286	73,745	84.5%	Lodging. Non EISA-compliant baseline(s), incorrect non-daylight hours. Additionally, many interior fixtures operated

Project ID	Expected kWh	Realized kWh	Realization Rate	Causes of Variance in Savings
				continuously (8,760) rather than (3,055) stated in ex ante calculations.
PRJ-448427	90,096	51,114	56.7%	Lodging. Non EISA-compliant baseline(s), incorrect non-daylight hours. Additionally, many interior fixtures operated continuously (8,760) rather than (3,055 & 6,630) stated in ex ante calculations.
PRJ-394938	90,195	38,962	43.2%	Retail. Non EISA-compliant baseline(s). Also, actual hours of operation (1,925, 8,760) as determined using light monitoring equipment were different than the deemed hours used in the ex ante calculations (3,668).
PRJ-420462	92,415	99,886	108.1%	Auto Dismantler. Incorrect non-daylight hours.
PRJ-560879	124,003	110,776	89.3%	Lodging. Non EISA-compliant baseline(s), incorrect non-daylight hours. Additionally actual hours of operation for some areas (1,690 & 8,760) as determined using light monitoring equipment were less than the deemed hours used in the ex ante calculations (3,737 & 6,630).
PRJ-718708	156,103	167,535	107.3%	Parking Garage. On site the Evaluators found the (3) lamps had not yet been retrofitted. Also verified on site was continuous operation of facility lighting (8,760) instead of 7,884 used in ex ante calculations.
PRJ-706009	159,162	176,847	111.1%	Parking Garage. On site the Evaluators verified continuous operation of facility lighting (8,760) instead of 7,884 used in ex ante calculations.
PRJ-448293	195,044	117,136	60.1%	Lodging. Non EISA-compliant baseline(s), 'Undetermined' space heating type and incorrect non-daylight hours all contributed to the low realization rate however, on site the Evaluators verified that a total of (96) of the (803) fixtures had not been retrofitted.

Key issues identified in site-level analyses include:

- **Incorrect non-daylight hours**. Ex ante calculations involving 'Outdoor' lighting used the Arkansas TRM-deemed 3,996 as an annual operating hours. The Evaluators used New Orleans annual sunrise and sunset times, downloaded from the National Oceanic and Atmospheric Administration (NOAA), to calculate latitude-specific 4,319 non-daylight hours which were used as annual operating hours for dusk-to-dawn lighting
- **Non EISA-compliant baseline(s).** When installing screw-in LEDs and CFLs, ex ante calculations used listed wattage (40W, 60W, 75W, and 100W) as the baseline. The baseline values need to account for the Energy Independence and Security Act (EISA) baseline values (29W, 43W, 53W, 72W), as the remaining useful life of incandescent lighting is too short to use as the baseline for the life cycle savings of a lighting retrofit.

- **Use of the "Undetermined" space heating type.** Many contractors defaulted to using the "Undetermined" space heating value, which has an Energy Interactive Factor of .98. The Evaluators found that electric radiant heating was used in a large share of small business projects, and energy savings was reduced when the Energy Interactive Factor was corrected to .87.
- **Facility type assignment for nonconforming business types.** Other significant corrections occurred when the program staff was required to make a judgement call in assigning a facility type from the list of Arkansas TRM facilities. The Evaluators made numerous corrections on projects of this type.
- **Incomplete retrofits**. At several sites the Evaluators found partially incomplete retrofits. The incompleteness ranged from (3) lamps to (223) lamps. Savings cannot be attributed to lamps/fixtures which have not been retrofitted.

9.4 Net Impact Findings

Participant survey responses were used to estimate the net energy impacts of the program. The program net savings are equal to gross savings, less savings associated with free ridership, plus participant spillover savings.

In total, 29 program participants completed the survey. Two respondents were removed because the survey was discontinued part way through. Additionally, two respondents were removed from the analysis because they provided "don't know" responses to multiple key free ridership questions.

The final sample used in the net savings analysis was comprised of responses from 25 participants.

9.4.1 Estimating Free Ridership

Several criteria were used for determining what portion of a customer's savings for a particular project should be attributed to free ridership. The first criterion was based on the response to the question: "Would you have been financially able to install energy efficient [Measure/Equipment] at the location without the financial incentive from the Program?" Customers that answer "No" to this question are then asked to rate how certain they are that their organization could not have afforded the measure. If a customer indicated that their organization could not have afforded the measure and indicates that they were very certain of this, the customer was not deemed a free rider.

For decision makers that indicated that they were able to undertake energy efficiency projects without financial assistance from the program, three factors were analyzed to determine what percentage of savings may be attributed to free ridership. The three factors were:

- Plans and intentions of firm to install a measure even without support from the program;
- Influence that the program had on the decision to install a measure; and
- A firm's previous experience with a measure installed under the program.

For each of these factors, rules were applied to develop binary variables indicating whether or not a participant's behavior showed free ridership.

The first factor requires determining if a participant stated that his or her intention was to install an energy efficiency measure even without the program. The answers to a combination of several questions were used with a set of rules to determine whether a participant's behavior indicates likely free ridership. Two binary variables were constructed to account for customer plans and intentions: one, based on a more restrictive set of criteria that may describe a high likelihood of free ridership, and a second, based on a less restrictive set of criteria that may describe a relatively lower likelihood of free ridership.

The first, more restrictive criteria indicating customer plans and intentions that likely signify free ridership are as follows (Definition 1):

- The respondent answers "yes" to the following two questions: "Did you have plans to install energy efficient [Measure/Equipment] at the location before participating in the program?" and "Would you have gone ahead with this planned installation even if you had not participated in the program?"
- The respondent answers "definitely would have installed" to the following question: "If the financial incentive from the program had not been available, how likely is it that you would have installed energy efficient [Measure/Equipment] at the location anyway?"
- The respondent answers "no, program did not affect timing of purchase and installation" to the following question: "Did you purchase and install energy efficient [Measure/Equipment] earlier than you otherwise would have without the program?"
- The respondent answers "no, program did not affect level of efficiency chosen for equipment" in response to the following question: "Did you choose equipment that was more energy efficient than you would have chosen had you not participated in the program?"

The second, less restrictive criteria indicating customer plans and intentions that likely signify free ridership are as follows (Definition 2):

- The respondent answers "yes" to the following two questions: "Did you have plans to install energy efficient [Measure/Equipment] at the location before participating in the

program?" and "Would you have gone ahead with this planned installation even if you had not participated in the program?"

- Either the respondent answers "definitely would have installed" or "probably would have installed" to the following question: "If the financial incentive from the program not been available, how likely is it that you would have installed energy efficient [Measure/Equipment] at the location anyway?"
- Either the respondent answers "no, program did not affect timing of purchase and installation" to the following question: "Did you purchase and install energy efficient [Measure/Equipment] earlier than you otherwise would have without the program?" or the respondent indicates that while program information and financial incentives did affect the timing of equipment purchase and installation, in the absence of the program they would have purchased and installed the equipment within the next two years.
- The respondent answers "no, program did not affect level of efficiency chosen for equipment" in response to the following question: "Did you choose equipment that was more energy efficient than you would have chosen had you not participated in the program?"

The second factor requires determining if a customer reported that a recommendation from a program representative or past experience with the program was influential in the decision to install a particular piece of equipment or measure.

The criterion indicating that program influence may signify a lower likelihood of free ridership is that either of the following conditions is true:

- The respondent answers "very important" to the following question: "How important was previous experience with the program in making your decision to install energy efficient [Measure/Equipment] at the location?"
- The respondent answers "probably would not have" or "definitely would not have" to the following question: "If the program representative that provided the energy assessment of your facility had not recommended [Measure/Equipment], how likely is it that you would have installed it anyway?"

The third factor requires determining if a participant in the program indicates that he or she had previously installed an energy efficiency measure similar to one that they installed under the program without an energy efficiency program incentive during the last three years. A participant indicating that he or she had installed a similar measure is considered to have a likelihood of free ridership.

The criteria indicating that previous experience may signify a higher likelihood of free ridership are as follows:

- The respondent answers “yes” to the following question: “Before participating in the Program, had you installed any equipment or measure similar to energy efficient [Measure/Equipment] at the location?”
- The respondent answers “yes” to the following question: “Has your organization purchased any significant energy efficient equipment in the last three years at the location?” and answered “yes” to the question: “Did you install any of that equipment without applying for a financial incentive through an energy efficiency program?”

The four sets of rules described above were used to construct four different indicator variables that address free ridership behavior. For each customer, a free ridership value was assigned based on the combination of variables. With the four indicator variables, there are 11 applicable combinations for assigning free ridership scores for each respondent, depending on the combination of answers to the questions creating the indicator variables. Table 9-12 shows these values.

Table 9-12 Free Ridership Scores for Combinations of Indicator Variable Responses

Indicator Variables				***Free Ridership Score***
Had Plans and Intentions to Install Measure without Program? (Definition 1)	***Had Plans and Intentions to Install Measure without Program? (Definition 2)***	***Program had influence on Decision to Install Measure?***	***Had Previous Experience with Measure?***	
Y	N/A	Y	Y	100%
Y	N/A	N	N	100%
Y	N/A	N	Y	100%
Y	N/A	Y	N	67%
N	Y	N	Y	67%
N	N	N	Y	33%
N	Y	N	N	33%
N	Y	Y	N	0%
N	N	N	N	0%
N	N	Y	N	0%
N	N	Y	Y	0%

9.4.2 Estimating Spillover

Program participants may implement additional energy saving measures without receiving a program incentive because of their participation in the program. The energy savings resulting from these additional measures constitute program participant spillover effects.

To assess participant spillover savings, survey respondents were asked whether or not they implemented any additional energy saving measures for which they did not receive a program incentive. Respondents that indicated that they did install additional

measures were asked two questions to assess whether or not the savings are attributable to the program. Specifically, respondents were asked:

- "How important was your experience with the <PROGRAM> in your decision to implement this Measure, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"
- "If you had not participated in the <PROGRAM>, how likely is it that your organization would still have implemented this measure, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?"

The energy savings associated with the measure are considered attributable to the program if the average of the rating for the first question, and 10 – the rating for the second question, is greater than seven, the savings are counted as attributable to the program.

None of the survey respondents indicated that they had implemented additional measures that met the criterion for attributing the savings to the program.

9.4.3 Net Savings Results

Table 9-13 summarizes the results of the free ridership scoring. Free ridership for the program was estimated by weighting each participant's response by the associated verified gross kWh savings or peak kW reductions for the measure. Free ridership was low for the program because most participants indicated that they could not have implemented the measures without the program's financial assistance (39%) or that they did not have prior plans to implement the measures (53%). These reasons for the lack of program free ridership are consistent with the theory underlying the SBS program – small businesses face financial and informational barriers that program incentives and the network of program contractors seek to mitigate. However, 7% of survey respondents indicated that they did have some plans to implement the measures in the near term.

Table 9-13 Free-Ridership Scoring Results

Had Plans and Intentions to Install Measure without C&I Program? (Definition 1)	Had Plans and Intentions to Install Measure without C&I Program? (Definition 2)	C&I Program had influence on Decision to Install Measure?	Had Previous Experience with Measure?	Percentage of Total Ex Post Gross kWh Savings	Free Ridership Score
N	N	N	N	31%	0%
N	N	Y	N	22%	0%
N	Y	N	N	7%	33%
N	N	Y	Y	1%	0%
Required program to implement measures.				39%	0%
Total				100%	2%

Table 9-14 and Table 9-15summarize the verified net kWh savings and peak kW demand reductions of the program. Net kWh savings totaled to 3,510,331 kWh and equaled 98% of gross program savings. Net kW reductions totaled 497.82 kW and equaled 96% of verified gross program savings.

Table 9-14 Summary of Net Ex Post kWh Savings

Utility	Expected kWh Savings	Verified Gross kWh Savings	Free Ridership	Spillover	Verified Net kWh Savings	Net to Gross Ratio
ENO	3,833,271	3,272,579	82,613	0	3,189,966	97%
ELL Algiers	178,159	148,444	3,747	0	144,696	97%
Total	4,011,430	3,421,023	86,360	0	3,334,662	97%

Table 9-15 Summary of Ex Post Net Peak kW Reductions

Utility	Expected Peak kW Reductions	Verified Gross Peak kW Reductions	Free Ridership	Spillover	Verified Net kW Savings	Net to Gross Ratio
ENO	546.49	461.08	19.65	0	461.08	96%
ELL Algiers	34.17	28.6	1.22	0	28.60	96%
Total	580.65	489.68	20.87	0	489.68	96%

9.4.4 Data Collection Activities

9.5 Process Findings

This chapter presents the results of the process evaluation of the Small Business Program. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

9.5.1 Data Collection Activities

The process of evaluation of the SBS included the following data collection activities:

Table 9-16 Small Business Program Process Evaluation – Summary of Data Collection

Activity	*Sample Size*
ENO Staff	1
CLEAResult Staff	1
Participant Survey	31
Contractor Interviews	3

9.5.2 Program Overview

The Small Business Program provides energy education to trade allies and customers, and financial incentives to customers, to encourage small businesses to implement energy efficiency projects that reduce their facilities electricity consumption. The program utilizes a network of participating trade allies to assist customers in identifying energy saving opportunities and to promote the incentives available.

Financial incentives are based on expected savings for the measure implemented. Incentives are $0.16 per kWh saved and may cover up to 100% of the project cost. Incentives are paid directly to the trade ally implementing the project to reduce or eliminate the initial cost of the equipment to the customer. Incentives are capped at $25,000.

Energy savings are calculated based on procedures outlined in the Arkansas Technical Resource Manual.

The primary measures offered through the program are the efficient lighting and refrigeration equipment listed below:

- Linear fluorescent lamp and ballast replacement;
- High-intensity discharge (HID) fixture replacement;
- Compact fluorescent lamps (CFLs);
- Interior and exterior light emitting diodes (LEDs);
- Solid and glass door reach in units;
- Electronically commutated motors (ECM) for evaporator fans;
- Door heater controls; and
- Vending misers.

Small business customers may also elect to install additional measures offered through the Large Commercial and Industrial Solutions Program and receive incentives of $0.16 per kWh saved for that equipment.

In order to mitigate barriers to small business participation such as lack of program awareness and energy saving opportunities, the program relies upon a network of participating trade allies to perform direct customer outreach. The program provides trade allies with training and software used to perform on-site assessments and estimate energy savings associated with measures.

Any non-residential ENO customer with maximum peak demand of less than 100 kW is eligible for the program.

9.5.3 Detailed Findings

9.5.3.1 Participation Data Quality Review

The Evaluators reviewed the final program participant tracking data submitted by CLEAResult. Tracking data were submitted in the form of multiple spreadsheets that contained project and measure level information, respectively. The fields provided in the final data largely contained complete records (one project was missing site zip code and another had an invalid zip code). The Evaluators recommend the following amendments to future tracking data submissions:

- Include a common project identification number in the project and measure level data files.
- Include building type in the project or measure level data.
- Include space heating type in project or measure level data.

9.5.3.2 Analysis of Participation Data

Table 9-17 displays program expected savings by measure type. As shown, 86% of program savings were the result of lighting projects, 5% stemmed from refrigeration improvements, 2% from low-flow devices, and less than 1% resulted from HVAC projects.

Table 9-17 Program Savings and Cost per kWh Saved by Measure Type

Measure Type	Expected Savings (kWh)	Share of Program Savings	$ per kWh in Expected Savings
Lighting	3,709,296	86%	$0.12
Refrigeration	221,607	5%	$0.12
Strip Curtains	206,714	5%	$0.12
Door Heater Controls	14,409	<1%	$0.12
Night Covers	484	<1%	$0.12
Low-flow	65,534	2%	$0.07
Pre-Rinse Spray Valve	57,408	1%	$0.08
Aerator*	8,125	<1%	$0.00
HVAC	14,993	<1%	$0.12

* Program data indicated $0 for aerator incentives

Lighting projects typically account for a large share of small business program savings, as shown for several comparison programs in Table 9-18. The predominance of lighting projects in these programs are largely a function of comparatively short payback times, the ubiquity of lighting and potential for efficiency improvements, and the fact that programs typically have several contractors that only provide lighting services.

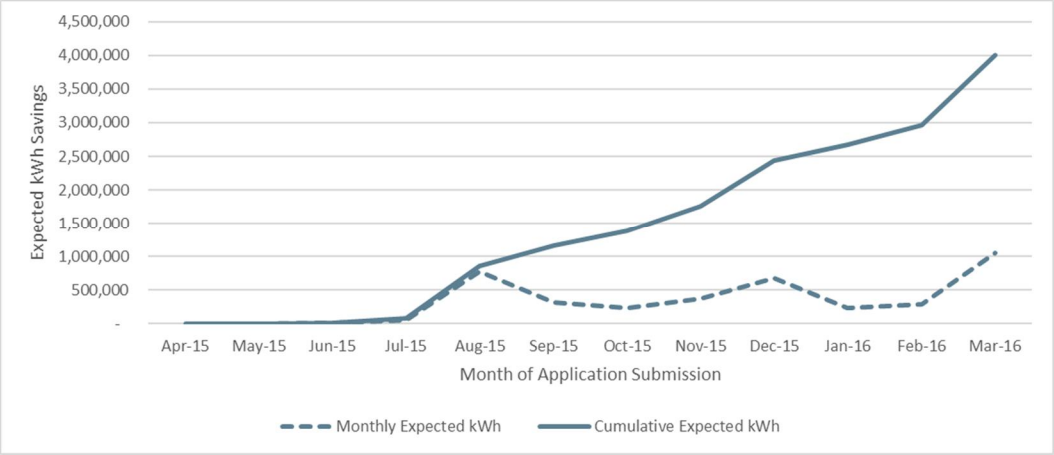
Table 9-18 Share of Program Savings from Lighting Projects

Program (Year)	Percent of Program Savings from Lighting Projects
Entergy Louisiana (2014/2015)	100%
SWEPCO LA (2014/2015)	99%
Public Service Company of New Mexico Quicksaver Program (2015)	98%
ComEd (2014/2015)	97%
Indiana - Michigan (2014)	96%
Entergy Arkansas (2012)	55%*

* The Entergy Arkansas program achieved approximately one-third of program savings through staff's direct installation of water savings devices.

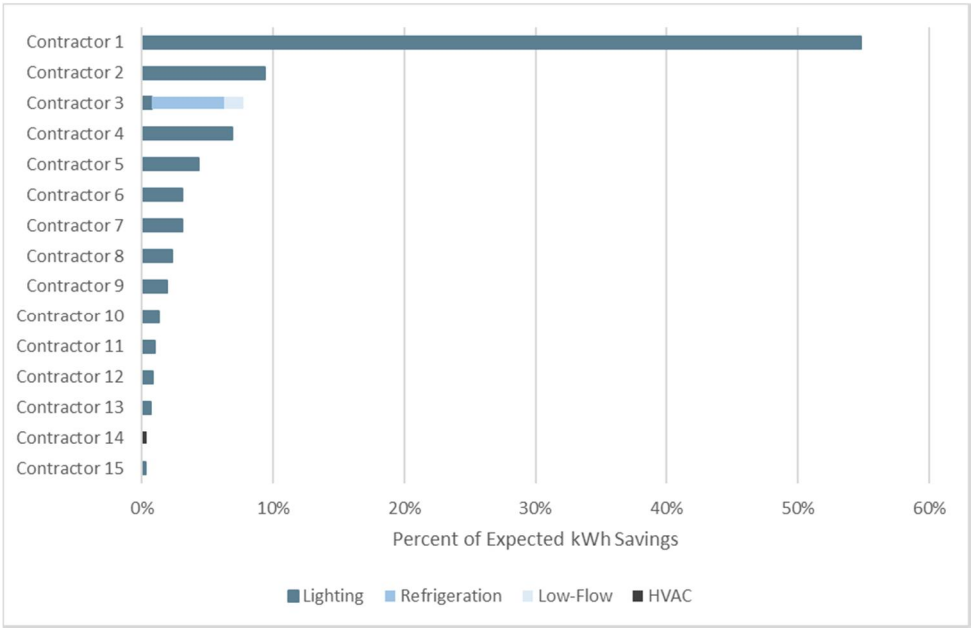
As shown in Figure 9-1, the program did not receive any program applications during the first few months of the program year, after which savings accrued at a steady pace. Expected savings met the program savings goal target in the final month of the program year.

Figure 9-1 Accrual of Expected kWh Program Savings during the Program Year



As shown in Figure 9-2, one contractor firm accounted for more than one-half of program savings. The figure also shows how most program contractors only implemented a single measure type. Only one firm implemented multiple measure types through the program.

Figure 9-2 Contractor Shares of Expected kWh Savings



9.5.3.3 Program Comparison

Table 9-19 provides a summary of other regional programs. The eligible measures offered by the SBS Program are consistent with other program offerings from around the county. The majority of programs focus on lighting and refrigeration, HVAC tune-ups, and controls. Many small business programs offer free direct install measures such

as faucet aerators, pre-rinse sprayers, low-flow showerheads, and CFLs. ENO's direct install measures include faucet aerators, pre-rinse spray valves.

The SBS Program provides incentives of $0.12 per kWh saved. This incentive amount is lower than is provided through other programs. The incentive amount is also consistent with the Large Commercial & Industrial Solutions Program incentives for non-lighting measures.

The SBS Program defines the small business sector as customers who have less than 100 kW in average peak demand over the past 12 months, which is comparable to the demand criteria used by other programs.

Table 9-19 Small Business Direct Install – Regional Benchmarking

Utility	***Available Measures***	***Direct Install***	***Incentive Amount***	***Eligibility Criteria***
ENO and ELL Algiers Small Business Solutions Program	Refrigeration: Solid & glass door reach-ins, ECM evaporator fan motors, door heater controls, vending machine controls. Lighting: Linear fluorescent lamp and ballast replacements, HID fixture replacements, CFLs, LED interior and exterior lamp fixtures. Food Service: ENERGY STAR appliances and cooking equipment. HVAC: Available through Large Business Solutions Program	Low Flow Devices	$0.12/kWh reduced for all qualified measures (excluding low-flow).	Average peak demand of <100kW over the past 12 months
Public Service Company of New Mexico Quicksaver Program	Refrigeration: High efficiency electronically commutated motors and evaporator fan motor controllers, plastic strip curtains for walk in refrigerators and curtains, night covers for refrigerated open display cases, energy efficient anti-sweat heater controls, vending machine controls. Lighting: T12 to T8 lighting retrofits, cold cathode fluorescent lamps, LED exit sign upgrades, Switching from high intensity discharge fixtures to high output T5 fluorescent fixtures in high bay and exterior applications, Installing lighting occupancy sensors.	N/A	Range is between $0.019/kWh-$0.175/kWh	< 150 kW
Oncor Open	Refrigeration: Anti-sweat heater controls for refrigerator doors Lighting: T12 to T8 lighting retrofits, LED lighting upgrades, occupancy sensor installations, LED exit signs.	Lighting and low-flow faucet aerators	Customers with = 100kW demand up to $800/kW Customers with = 10kW demand up to $1,000/kW	< 100 kW

Utility	Available Measures	Direct Install	Incentive Amount	Eligibility Criteria
Entergy Arkansas Small Business Energy Solutions Program	Lighting: Interior/exterior lighting retrofits, interior lighting controls, refrigerated case lighting. Refrigeration: ECMs, anti-sweat heater controls, ECM controls, gaskets and strip curtains.	Low-flow faucet aerators, pre-rinse spray valves, vending misers, showerheads, and CFLs.	Lighting: $0.18/kWh Refrigeration: $0.30/kWh HVAC: $0.18/kWh Lighting Controls: $0.18/kWh Window film: $0.35/kWh Duct Sealing: $0.35/kWh Ceiling Insulation: $0.35/kWh	< 100 kW

9.5.4 Program Design, Operations, and Activities

The following sections describe program design, operations, and activities and were developed from reviews of program documentation and interviews with program staff.

9.5.4.1 Program Objectives

The primary program objective is to assist small businesses in achieving electric energy savings and peak demand reductions through direct outreach, facility walkthrough energy assessments, and financial incentives on energy saving equipment types that are common in small businesses.

To meet the energy saving and peak demand reduction goals, the program has ancillary objectives to mitigate barriers to energy efficiency in small businesses. The program intends to increase awareness of energy and non-energy benefits of energy efficiency measures, help small businesses overcome the initial cost of efficiency measures, and develop a network of contractors that can assist small businesses with energy efficiency improvements.

Overall, both the Companies and CLEAResult staff indicated that the program is well designed to meet its goals and objectives.

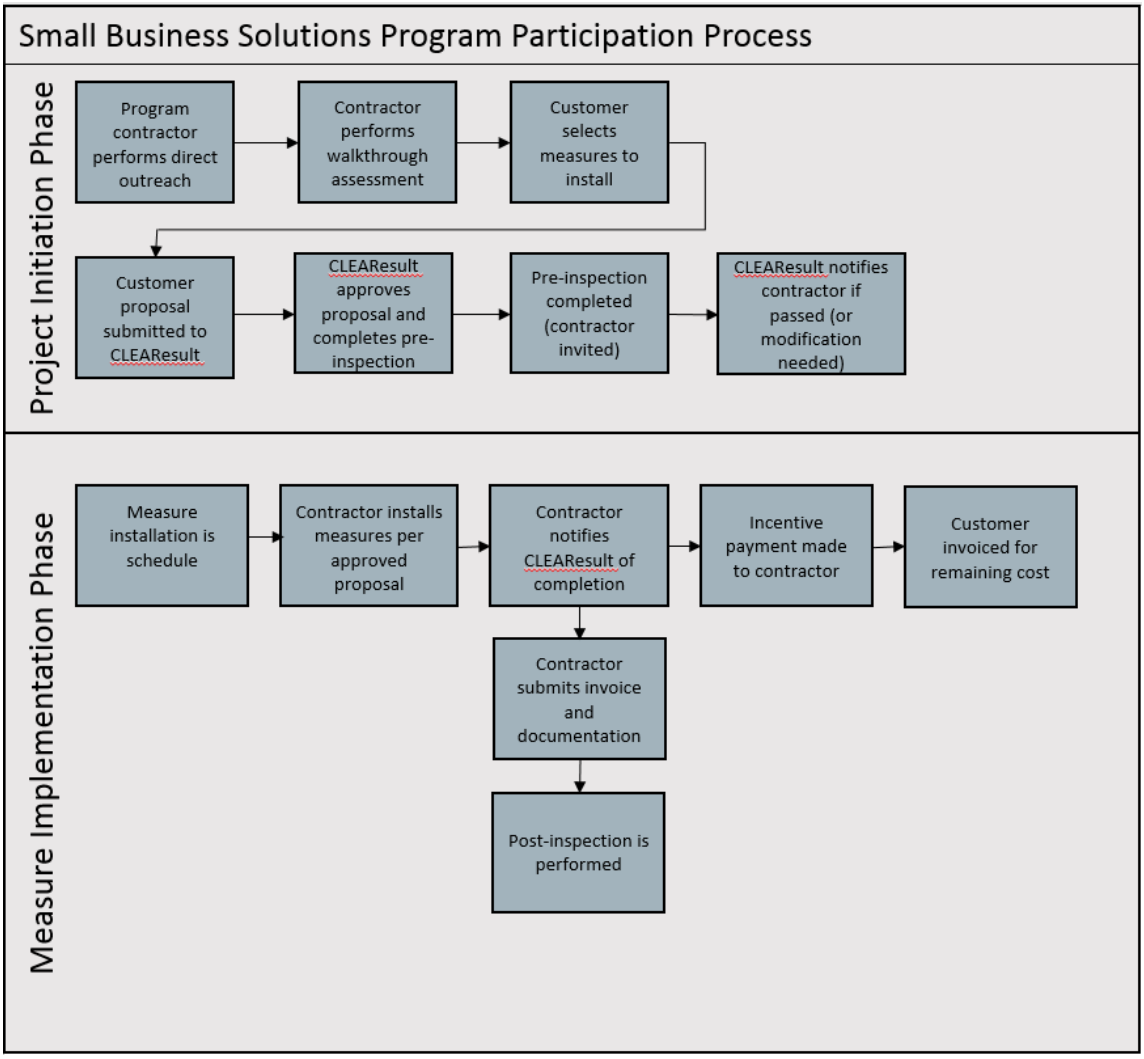
9.5.4.2 Program Participation Process

Figure 9-3 provides an overview of the participation process. The key steps in the participation process are:

- Outreach to customer by the contractor;
- Contractor completion of walkthrough assessment using program provided spreadsheet calculators;
- Customer measure selection and submission of the project proposal;

- CLEAResult's review and approval of the proposal and associated pre-inspection;
- Measure implementation;
- Post-installation inspection; and
- Payment of incentives to the contractor.

Figure 9-3 Small Business Solutions Program Participation Process



9.5.4.3 Program Marketing and Outreach

The program primarily relies upon contractors to market the program to small businesses. These contractors offer potential customers a free, no-commitment walkthrough of their facility to identify energy saving opportunities and discuss the discounts on equipment and services available through the program. Staff has developed a two-page handout to assist contractors with the promotion of the program. The handout is organized in a question and answer format and provides information on

eligibility, benefits of participating, incentives, participation steps, and sources for more information.

The program does not currently provide contractors with co-branded marketing materials such as flyers with space for contractor contact information. These materials are a common feature of small business s program and identify the contractor as program affiliated. The benefit of these materials is that they can improve perceptions of the contractors' credibility when discussing projects with potential clients.

Consistent with the program design, CLEAResult staff reported little direct outreach to customers.

9.5.4.4 Barriers to Participation

The barriers to participation facing small business customers include:

- Lack of awareness of program offerings;
- Lack of knowledge about energy efficient technologies and the cost savings potential; and
- Insufficient financial and staff resources to implement energy saving measures.

The program includes design elements to overcome these barriers, namely direct outreach by contractors to promote the program offerings and higher incentives than those made available to larger customers for lighting measures. Additionally, by providing the incentives to the contractor, who in turn reduces the cost of the equipment services, the program allows small business customers to receive the financial benefit of the incentives without covering the full measure installation cost prior to processing of a rebate.

9.5.4.5 Quality Control and Verification Processes

Several activities are integrated into the program processes to verify that projects are implemented in accordance with program requirements. The key activities are:

- Qualification of customer eligibility;
- Review of customer proposal;
- Pre-inspection of select sites;
- Review of final customer proposal and project documentation;
- Post-inspection of select sites; and
- Review of customer feedback.

Problems identified through the quality control procedures are grouped into critical and non-critical issues. Critical issues that arise may result in the immediate suspension or removal of the contractor from the program. Non-critical issues that do not adversely affect energy savings, peak-demand reductions, or incentive amounts result in the documentation of the issue and corrective action such as further training.

The program manual states that the first five projects completed by a contractor receive pre- and post-inspection; afterwards, 10% of projects completed by the contractor are inspected. However, program staff reported that most projects are receiving verification visits.

CLEAResult also administers satisfaction surveys to program participants. This survey covers several topics including experience in working with program representatives, the program overall, and source of program awareness.

9.5.4.6 Contractor Recruitment and Management

CLEAResult staff indicated that the network of program contractors is well established at this point and sufficient to meet program goals. New contractors must be approved to complete projects through the program and must sign non-disclosure agreements before they can begin participating. Formal training was not offered during the program year, but contractors are invited to attend inspection visits and can receive feedback at that time.

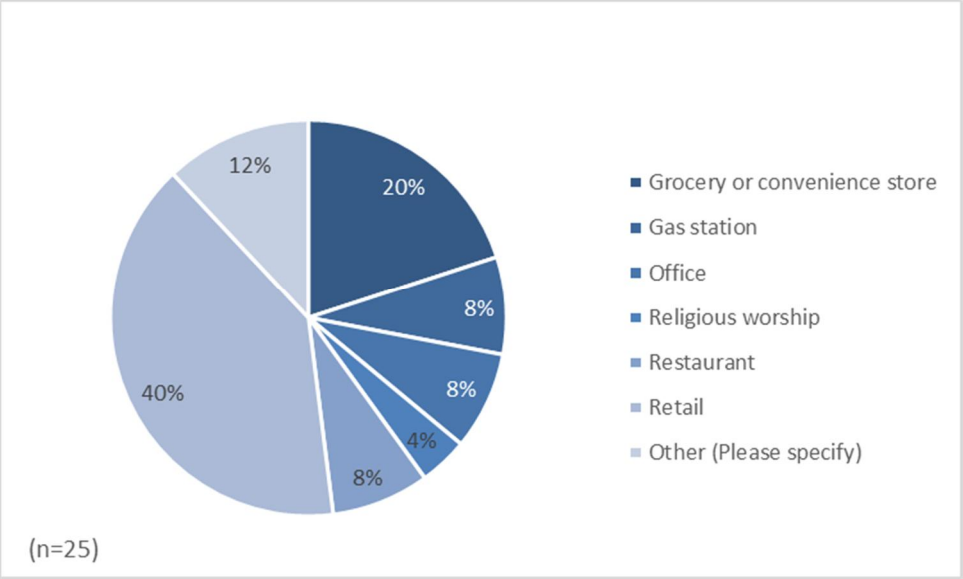
9.5.5 Participant Survey Results

A total of 29 participants in the SBS Program responded to the survey.

9.5.5.1 Firmographics

The facility types reported by survey respondents were typical of small business establishments. Most (40%) surveyed small businesses were retail facilities, followed by grocery or convenience stores (20%). Responses are summarized below in Figure 9-4.

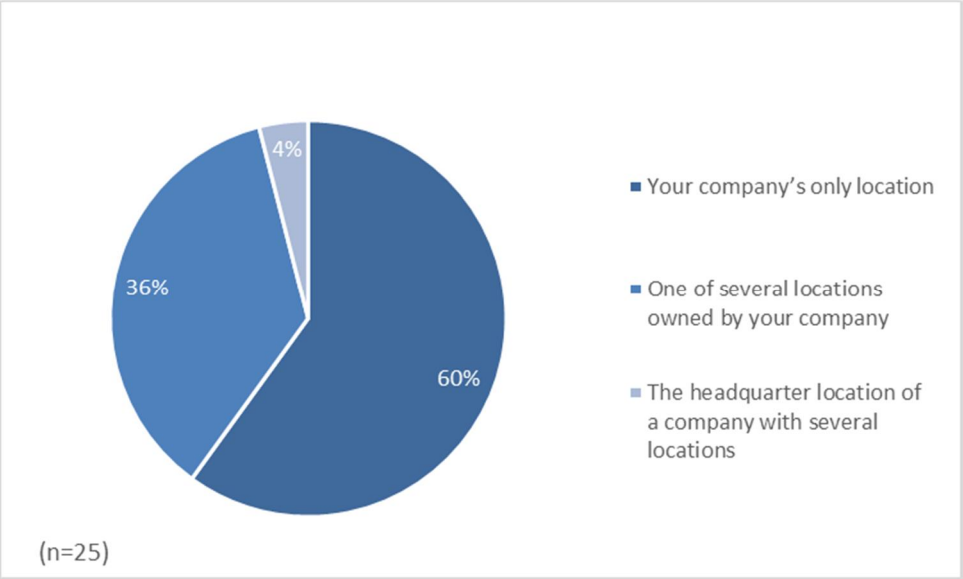
Figure 9-4 Survey Respondent Facility Type



Of those customers who were classified as “Other,” one location was an art gallery, one was a nightclub and bar, and one was a hair salon.

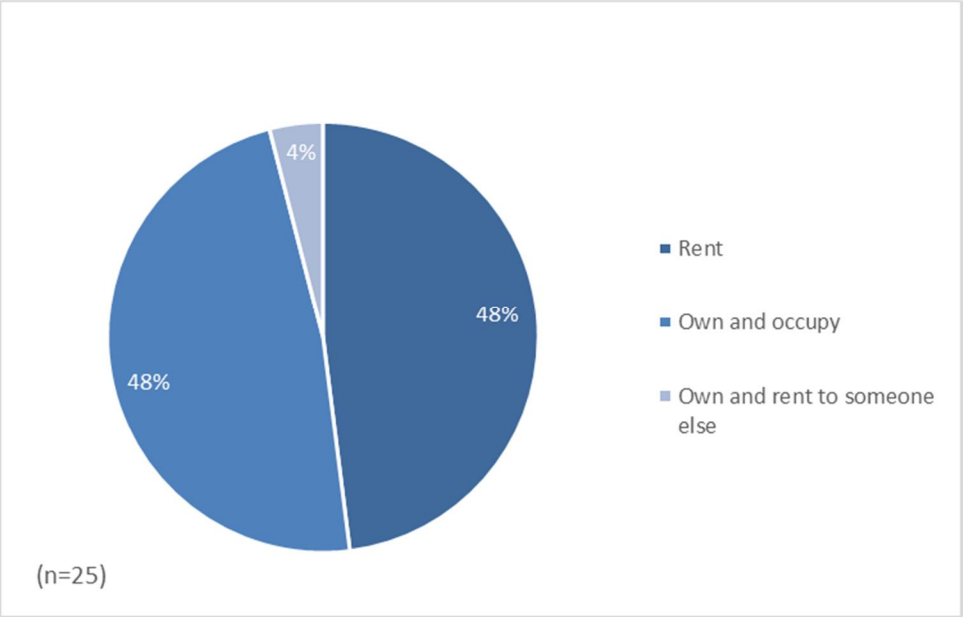
The majority of surveyed customers (60%) reported that the location which participated in the program was their company’s only location (Figure 9-5).

Figure 9-5 Respondent’s Number of Business Locations



An equal number of surveyed customers rent and own their facilities. A small fraction of participants owns and rents their facility to someone else. Responses are summarized in the figure below.

Figure 9-6 Ownership Status



A minority of customers (28%) have electric water heating and 44% have electric space heating.

Table 9-20 Water and Space Heating Fuel Types

Fuel Type	***Water Heating (n = 25)***	***Space Heating (n = 25)***
Natural Gas	40%	40%
Electricity	28%	44%
Propane	0%	0%
Oil	0%	0%
Other	4%	0%
None	4%	4%
Don't Know	24%	12%

One customer reported using equal amounts of gas and electric water heating.

9.5.5.2 Source of Initial Awareness

Most respondents (97%) initially learned of the program from a program contractor that offered to perform an assessment of their business energy use. One customer reported learning about the program from another source, which was a friend or colleague.

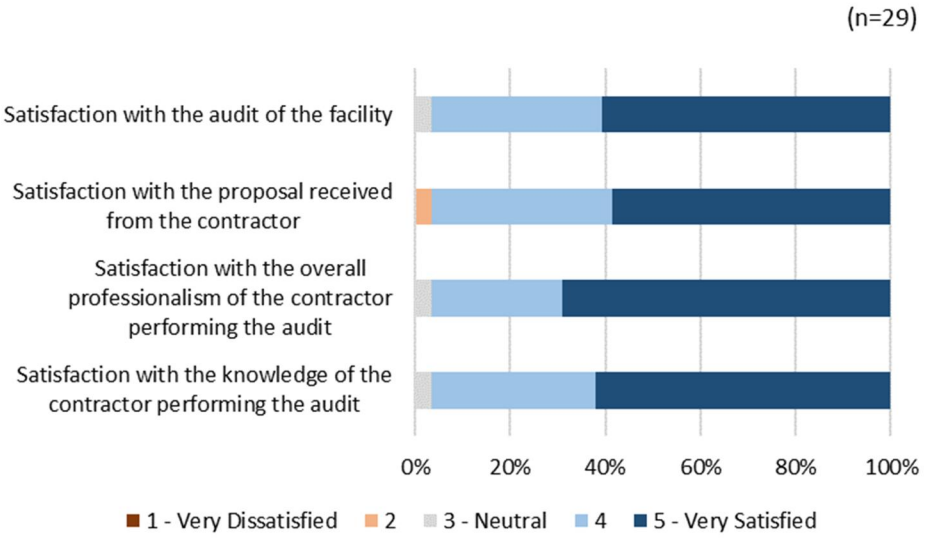
9.5.5.3 Decision to Participate

Twenty-eight percent of survey respondents reported that they initially had concerns about participating when first approached about the program. One-half of these participants were concerned about the legitimacy of the program and the other half were concerned that the financial and energy impacts may not be realized. Most participants reported that these initial concerns were overcome through conversations with program representatives or past participants. The concerns expressed, and means by which they were addressed, emphasize the importance of using the network of program contractors to discuss potential projects with customers and respond to their questions and concerns. Additionally, the responses underscore the value of providing contractors with marketing materials, such as cobranded materials and case studies, that enhance the credibility of the contractor and the potential savings impacts with customers. Relatedly, survey responses indicate that the program marketing materials currently used by the program are effective. Fifty-percent of respondents said that they viewed some program marketing materials when they were learning about the program. Most of these respondents (93%) found these marketing materials to be somewhat or very influential in their decision to participate.

9.5.5.4 Experience with Contractor

Respondents were asked several questions pertaining to their experience working with the contractor who performed their facility audit. Customers were asked to rate their satisfaction with various aspects of the audit on a scale of 1 to 5, where 1 represents “Very Dissatisfied” and 5 represents “Very Satisfied.” Overall, customers were satisfied with the professionalism and knowledge of the contractor, the audit completed, and the proposals received. The only instance of dissatisfaction was with the proposal the customer the received, for which one respondent indicated that they were somewhat dissatisfied. This respondent did not provide any additional information about what was dissatisfactory with the proposal. The satisfaction responses are summarized below in Figure 9-7.

Figure 9-7 Satisfaction with Contractor



Participants that did not report that they were satisfied with the energy assessment were asked if anything could have improved their experience with the assessment. One respondent indicated that the process was good overall but that it was more drawn out than they would have liked. Another respondent indicated that the estimated savings have not materialized and that an exterior lamp was left out of the project.

Participants were also asked to provide open-ended commentary regarding their audit experience. Most respondents provided positive feedback, although two customers did note that some of the equipment installed has broken and another said that the contractor provided inconsistent price estimates. Below is a sample of the comments representative of the positive feedback provided:

> *"They were terrific. They brought enough sample[s] of bulbs to make sure that I liked them."*
>
> *"Very professional and fast."*
>
> *"Good experience and great follow up."*

9.5.5.5 Equipment Installation

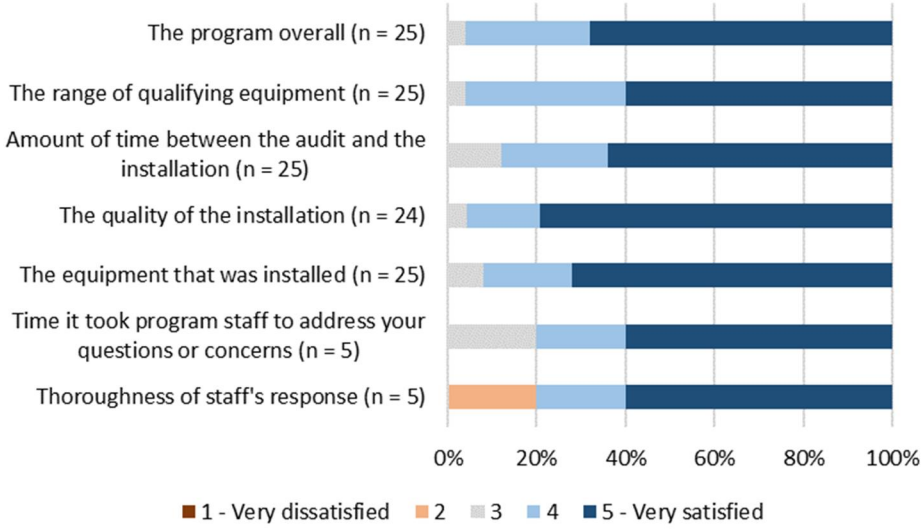
Survey respondents were asked to rate their satisfaction with the range of energy saving equipment available and how well this range of equipment fit their needs. Ratings were provided on a scale of 1 to 5, where 1 represents "Not at all satisfied" and 5 represents "Completely satisfied." Most respondents (93%) gave a satisfaction score of 4 or 5. Only one respondent indicated any degree of satisfaction. When asked to elaborate on the ways in which the range of energy saving equipment offered did not meet their needs, the customer said that they have yet to see energy savings related to the equipment that they installed.

Two survey respondents reported that they had not installed all of the equipment recommended by their contractor. One customer reported not installing interior lighting because the cost was more than they could afford at the time of the project. The other respondent reported not installing exterior lighting because they were currently too busy but would revisit the project in the summer.

9.5.5.6 Program Satisfaction

Survey respondents were asked to rate their satisfaction with various aspects of the program experience on a scale of 1 to 5, where 1 represents "Very Dissatisfied" and 5 represents "Very Satisfied." The program elements that received the highest satisfaction scores were the range of equipment that qualifies for the program and the program overall. The program elements which received the lowest satisfaction scores were how long it took program staff to address concerns or questions and the thoroughness of these responses. It should be noted that only 20% of respondents had any interactions with program staff and only one participant reported that they were dissatisfied with the thoroughness of program staff's responses. Thus, this customer's experience does not typify customers' experiences with the program. When asked to explain why they were dissatisfied, the respondent only noted that it was a long process and did not speak to their interaction with program staff. Survey responses are summarized below in Figure 9-8.

Figure 9-8 Program Satisfaction



Survey respondents were also asked about their satisfaction with the Companies and how their participation in the Small Business program has changed their perception of the utility.

First, respondents were asked to score their satisfaction with the Companies as their electrical service provider on a scale of 1 to 5, where 1 represents "Very Dissatisfied" and 5 represents "Very Satisfied." Most respondents are satisfied with the Companies (71%) and gave a satisfaction score of 4 or 5. The respondent who was dissatisfied with the Companies as their service provided indicated that they wished there was another choice for electrical service provider.

Table 9-21 Satisfaction with Entergy as Electrical Service Provider

Satisfaction with Entergy	***Percent of Respondents (n=24)***
5 - Very satisfied	50%
4	21%
3 - Neither satisfied nor dissatisfied	21%
2	0%
1 - Very dissatisfied	4%
Don't know	2%
Refused	2%

Respondents were also asked whether their participation in the program has increased or decreased their satisfaction with Entergy. Eighty-eight percent of respondents reported that the program has at least somewhat increased their satisfaction with Entergy. Responses are summarized in the table below.

Table 9-22 Effect of Program on Satisfaction with Entergy

Effect of participation on satisfaction with Entergy	***Percent of Respondents (n = 25)***
Greatly increased satisfaction with Entergy	24%
Somewhat increased satisfaction with Entergy	64%
Did not affect satisfaction with Entergy	12%
Somewhat decreased satisfaction with Entergy	0%
Greatly decreased satisfaction with Entergy	0%

Overall, program participation seems to have had a positive effect on customer's satisfaction with Entergy and Entergy itself has been well-received.

9.5.6 Participating Contractor Interviews

The Evaluators completed interviews with program tractors to gain insight into contractor perspectives on the SBS Program. The goals of the interviews were to understand contractor perspectives on program design and implementation. Interview respondents were asked to provide information on their motivation for participating, their

level of marketing effort and use of program marketing materials, any barriers to participation identified, the participation process, support provided by program staff, and overall satisfaction with the program.

The Evaluators contacted all contractors for which contact information was available five times to complete an interview. In total, three contractors responded to the request and were interviewed.

All three interviewed contractors work for businesses that specialize in energy efficient lighting and do not specialize in providing services to any specific business type.

9.5.7 Motivations for Participating

Contractors reported learning about the program through a customer and from a colleague. The primary motivation for working with the program was to provide the financial benefit of the program incentives to their customers.

One contractor stated that they work with all utility programs across Louisiana, while the other two interview respondents only participated in the Companies' Small Business Solutions Program during the program year.

9.5.8 Program Marketing

All of the contractors indicated that they very actively promote the program. The sales tactics used by the contractors largely involved explaining the financial benefits of the project, both the benefits of the program incentives, as well as the long term cost benefits of using less electricity. One contractor elaborated that they explain to the customer that they can install LED lighting at a fraction of the cost that they would normally have to spend because of the program incentives.

Only one contractor reported being aware of program marketing materials. This contractor stated that they use the materials every once in a while, and found them to be very effective when used.

When asked if there was anything the program could do to help them promote the program more effectively, one contractor suggested making the application form as simple as possible.

Information about the program is also available on the program website. This material

9.5.9 Customer Awareness and Barriers to Participation

All three interviewed contractors represented lighting firms, and consistent with this, reported that they only recommend lighting equipment through the program.

When asked how they identify potential customers for the program, two contractors stated that they rely on word of mouth and referrals from customers, and one contractor stated that they identify potential customers who have out of date or high watt

equipment in their businesses and explain to them the benefits of participating in the program.

Contractors generally reported that they were successful at encouraging potential customers to complete a facility assessment, with 25% to 50% of contacted customers reportedly agreeing to an energy assessment.

Two contractors noted that they had heard concerns from potential customers regarding participating in the program. One stated that a few of their customers were skeptical of the program because it seemed “too good to be true”. Another concern raised was confusion over rebate amounts across different service territories in Louisiana. This Contractor stated that their firm works with businesses that have multiple locations in Louisiana where similar small business programs operate, but the incentive amounts vary.

When asked what reasons customers give for not following through with a project, one contractor stated that the timeline to complete the project is too short for some customers, and a second stated that customers still believe the program is too good to be true. One respondent had not heard from customers about why they did not go forward with the project.

Contractors did not report that they had run across any problems with projects qualifying for the program.

All of the surveyed contractors stated that they thought the measures offered through the program met the needs of small businesses.

When asked how aware customers were of the types of energy savings measures that they recommend, two contractors stated that customers are generally very aware, and one contractor stated that about half of their customers are aware of the energy savings measures that they recommend. Contractors also reported that customers were generally aware of LED lighting, but that they were not well informed on project specifics or the most current technologies.

9.5.10 Project Completion Process

Contractors were asked to discuss the project completion process to identify any aspects that were ineffective or inefficient.

All three contractors indicated that the pre-inspection is generally scheduled quickly, within a week of submitting the proposal. Two of three respondents stated that they typically attend the pre-inspection with program staff.

Two of the three contractors stated that they had not had a project fail pre-inspection. The one respondent who had a project not pass inspection indicated that it passed once

some adjustments were made. Overall, these responses suggest that the contractors understand the project qualification requirements.

Once the pre-approval inspection was competed, two contractors reported that notification of project approval was usually received in a day or two, while the third indicated that it could take up to two weeks to get approval. Although two weeks is a relatively long period of time, the responses suggest that overall approvals are complete quickly.

In general, the contractors indicated that the installation of measures took 4 to 6 weeks once the project was approved.

All three contractors stated that information available on the program, customer and measure qualifications, and steps for completing a project application were clear.

One contractor stated that the 60-day timeline required for the program was too restrictive, and recommended loosening this requirement. However, most contractors reported no difficulty of completing the projects within 30 to 45 days, suggesting that the time for project completion is appropriate for most projects and does not significantly impede participation. Additionally, one contractor raised concerns about was perceived as frequent changes made to the program throughout the program year.

9.5.11 Staff Support

All three respondents reported contacting staff about questions regarding the program and reported that the program staff answered their questions thoroughly. Contractors were satisfied with their communications with staff, and did not believe that additional information about the program would have helped answer questions they had for staff as their questions tended to be project specific.

9.5.12 Overall Satisfaction

Contractors were asked a series of questions related to their overall experience with the program.

When asked what they thought were the greatest strengths of the program, all contractors mentioned the customer rebates. One contractor further explained that the rebate amounts give customers a “push” to complete projects by moving projects to within a shorter payback period. A second contractor noted that the incentive amounts are beneficial to customers.

When asked if there was anything that the program could do to improve the program, one contractor stated that the requirements for participating in the program have become more stringent, making it difficult for them to sign up customers for the program because of the short timeline. They also stated that this stops them from signing up

larger small business customers because the timeline is often too short to complete larger projects.

When asked to rate their overall experience with the program on a scale from very dissatisfied to very satisfied, all contractors stated that they were "very satisfied" with the program.

9.5.13 Summary of Interview Findings

Based on feedback from Contractors, the following conclusions are presented:

- **Contractors are very satisfied with the program overall.** All contractors stated that they were very satisfied with the program. This indicates that the program is working well for contractors.
- **Program requirements are communicated effectively.** All contractors stated that the information available on program requirements and the application process were sufficient for their needs.
- **Limited awareness of program marketing materials.** Only one of the interview respondents reported awareness of program marketing materials. This respondent stated that the materials were generally effective.

9.5.14 Conclusions

9.5.14.1 Program Design and Participation Process

- The Small Business Program design is consistent with the design of similar programs offered in other jurisdictions. It incorporates key design characteristics to reduce three common barriers to small business.
    - The program provides relatively high incentives for small businesses that typically have less capital for energy efficiency investments. However, while the incentives are high in comparison to typical commercial program incentive rates (which typically range between $0.05 and $0.08 per kWh saved), the $0.12 per kWh incentive is the same as the incentive for non-lighting measures and $0.02 per kWh higher than lighting incentives offered through the Large C&I Solutions Program.
    - The program uses high-contact, direct outreach from contractors to reduce typical barriers to program awareness.
    - Incentive payments are paid to contractors who offer services and equipment at a discount to reduce the initial cost to participants.
- Small businesses are defined as businesses that with less than 100 kW maximum demand over a 12-month period. This threshold is typical for qualifying customers for small business programs.
- The program utilizes spreadsheet based calculators and paper forms to guide energy assessments and to record project information for customer proposals

and final applications. This paper process differs from the paperless process utilized in other CLEAResult implemented programs in the state, which utilize a software tool. Staff indicated that the choice to not use the software was based on contractor preference.

- Formal training was not completed during the program year. Most of the contractors completing projects through the program have been providing program services for multiple years. Contractors are invited to attend pre- and post- site visits with program staff, which provides staff an opportunity to educate contractors on program requirements and procedures.
- Contractors did not identify any issues with the program participation processes and noted that projects are generally approved quickly. Additionally, program requirements, application materials, and instructions were described as clear.
- Interviewed Contractors stated that the measures offered through the programs met the needs of the small businesses they work with and nearly all participants were satisfied with the equipment offered through the program.
- Few barriers to participation were noted by contractors. Interviewed contractors noted that some customers are skeptical of the program offer and believe it to be "too good to be true." This is also consistent with participant feedback. Approximately one-quarter of program participants had initial concerns about the legitimacy of the program offer. Additionally, one contractor indicated that the 60-day limit for measure implementation may limit project scopes, although all contractors reported that they typically complete measure implementations in in 30 – 45 days.
- Program participants were generally satisfied with the assessment process. Only one participant noted dissatisfaction with any aspect of the assessment, specifically, the proposal received from the contractor. This respondent did not elaborate on the source of their concern. In open-ended narrative about the assessment, one respondent indicated that they had not realized the expected savings and another indicated that an exterior lamp was not included in the assessment.

9.5.14.2 Program Marketing and Outreach

- Program staff is engaged in limited contractor and participant recruitment. Staff indicated that the network of contractors is well established and that consistent with program design, contractors are primarily responsible for enlisting customers. Survey responses indicate that nearly all participants are learning of the program from a contractor.
- Interviewed contractors indicated that they were performing direct outreach to customers and that most projects were initiated this way.
- The program provides a two-page flyer to help contractors promote the program and staff reported that they have developed case study materials. One

interviewed contractor recalled receiving promotional material from program staff and stated that the materials were effective. Approximately one-half of survey respondents reported that they were shown program marketing materials and nearly all of these respondents indicated that the materials were somewhat or very influential on their decision to participate.

- The program does not currently offer co-branded marketing materials for contractor use. These materials are common features of small business programs and help to improve the credibility of the contractor and the offer being made to participants.
- The program website does not currently list participating contractors. Although program model intends for program activity to be driven by contractor outreach efforts, providing information for interested customers on the website would provide an additional channel for assisting customers with participating in the program.

9.5.14.3 Quality Control and Verification Processes

- The program has sufficient verification procedures in place. The procedures outlined in the program manual indicate that the first five projects completed by a new contractor receive pre- and post-verification, followed by 10% of subsequent projects completed by the contractor. However, staff reported that currently most projects are receiving verification visits.
- Inspection procedures include review of documentation, verification of building type (which determines operating hours), photographs of baseline conditions and efficient equipment, and verification that lamps installed are DesignLights Consortium (DLC) or ENERGY STAR ® qualified.
- Despite the apparent sufficiency of the current verification process, 15% of the sampled sites including savings for lamps that had not been installed.

9.5.14.4 Customer and Contractor Satisfaction

- All three interviewed contractors reported that they were very satisfied with the program overall and satisfied with staff's response to questions asked regarding specific projects. However, one contractor indicated that program staff made modifications to the program and did not communicate this to contractors.
- 96% of participants were satisfied with the program overall. Only one participant indicated dissatisfaction with any aspect of the program, specifically the thoroughness of staff's response to a question. This respondent did not elaborate on why the response was dissatisfactory.
- 88% of participants reported that participating in the program increased their satisfaction with the Companies.

9.5.15 Recommendations

The Evaluators' recommendations for the Small Business Solutions Program are summarized in the following categories:

- **Update non-daylight hours**. Non-daylight hours should be updated to reflect the New Orleans latitude.
- **Correct the spreadsheet calculators to account for EISA baseline wattages.** When installing screw-in LEDs and CFLs, ex ante calculations used listed wattage (40W, 60W, 75W, and 100W) as the baseline. The baseline values need to account for the Energy Independence and Security Act (EISA) baseline values (29W, 43W, 53W, 72W), as the remaining useful life of incandescent lighting is too short to use as the baseline for the life cycle savings of a lighting retrofit.
- **Perform more rigorous post-retrofit verification inspections.** At several sites the Evaluators found partially incomplete retrofits. The incompleteness ranged from (3) lamps to (223) lamps. Program staff should verify 100% of equipment retrofits before considering a project complete.
- **Providing training to contractors on identifying space heating type and include in verification process.** Program savings estimates were incorrect in multiple cases because contractors defaulted to use of undefined heating type. Staff should provide training on the importance of correctly identifying space heating type and add it as a checkpoint to project verifications.
- **Consider providing more diverse materials for use in recruiting participants including co-branded materials.** Cobranded marketing materials are a common feature of small business programs and their use by contractors may enhance the perception of contractors' credibility among customers.
- **Consider listing program contractors on the program website.** Although program activity is intended to be primarily driven by contractor outreach efforts, providing this information on the website creates another means for the program to assist customer participation in the program.
- **Consider feasibility of strategies for increasing non-lighting program projects.** In comparison to other small business programs, the Companies' SBS program achieved a larger share of program savings through non-lighting measures. Staff may be able to develop procedures that facilitate lighting contractors' referral of customers to contractors that provide other measure types. Alternatively, staff could follow-up with customers that complete projects through the program who have only completed lighting projects but have facility types with potential for non-lighting savings.

10.Large Commercial & Industrial

10.1 Program Description

The Large Commercial & Industrial Solutions Program (Large C&I) provides financial incentives and technical services to encourage nonresidential customers with greater than 100 kW peak demand to implement energy saving measures. The C&I Program is designed to help this customer segment overcome barriers to energy improvement, such as higher first-cost of efficiency equipment and a lack of technical knowledge or resources.

The incentives provided are summarized below in Table 10-1.

Table 10-1 Summary of Program Incentives

Measure	***Incentive***
Lighting	$0.10 per kWh Saved
Non-Lighting	$0.12 per kWh Saved

Total realized savings and percentage of goals for the Large C&I program are summarized in Table 10-2.

Table 10-2 Savings Goals by Utility

Utility	***kWh goal***	***Net Realized kWh***	***Percentage of kWh goal realized***	***kW goal***	***Net Realized kW***	***Percentage of kW goal realized***
ENO	7,561,766	8,642,831	114.30%	1,265	1,402.92	110.90%
ELL Algiers	644,830	133,404	20.69%	108	5.61	5.19%

10.2 M&V Methodology

The M&V methodology for the Large C&I program is the same as-described for the Small Business Program in Section 9.2.

10.3 Gross Impact Findings

Energy savings was estimated using proven techniques, including engineering calculations using industry standards to determine energy savings. Table 10-3 summarizes the total participation in the PY5 Large C&I program.

Table 10-3 PY5 Large C&I program Participation Summary

# Applicants	# Projects	Expected kWh	Expected kW
ENO	45	9,626,756	1,973.63
Algiers	1	181,099	7.60
Total	46	9,807,855	1,981.23

Data provided by CLEAResult showed that during PY5, there were 45 and 1 projects for ENO and Algiers respectively, for a combined total of 46 projects. These projects were expected to provide a combined savings of 9,807,855 kWh and 1,981.23 kW.

Table 10-4 Large C&I program Sample Summary

Utility	# Sites in Population	Site Visit Sample Size	# Surveys
ENO	45	15	11
Algiers	1	0	1
Total	46	15	12

Sampling for evaluation of ENO's Large C&I program was developed using the Stratified Random Sampling procedure detailed in Section 2.4.2. This procedure provides 90% confidence and ±10% precision with a significantly reduced sample than random sampling would require, by selecting the highest saving facilities with certainty, thereby minimizing the variance that non-sampled sites can contribute to the overall results. Actual precision is 8.15%.

10.3.1.1 Large C&I Sample Design

The participant population for the Large C&I program was divided into four strata. Table 10-5 summarizes the strata boundaries and sample frames for the Large C&I program.

Table 10-5 Large C&I program Sample Design

	Stratum 1	Stratum 2	Stratum3	Stratum 4	Totals
Strata boundaries (kWh)	< 60,000	60,001 - 250,000	500,001 - 700,000	700,001 - 3,000,000	
Number of sites	18	11	11	6	46
Total kWh savings	480,500	1,453,212	3,200,776	4,673,367	9,807,855
Average kWh	26,694	132,110	290,980	778,895	213,214
Standard deviation of kWh savings	22,389	42,471	55,382	626,932	89,244
Coefficient of variation	0.839	0.321	0.190	0.805	1.17
Final sample	4	3	2	6	15

Table 10-6 Expected Savings for Sampled and Non-Sampled Projects by Stratum

Stratum	Sample Expected Savings	Total Expected Savings
1	52,520	480,500
2	370,224	1,453,212
3	435,816	3,200,776
4	4,673,367	4,673,367
Total	5,531,927	9,807,855

10.3.1.2 Large C&I Site-Level Realization

Sites chosen within each stratum are visited in order to verify installation of rebated measures and to collect data needed for calculation of ex post verified savings. The realization rates for sites within each stratum are then applied to the non-sampled sites within their respective stratum. Table 10-7 presents realization at the stratum level, with Table *10-8* presenting results at the site level.

Table 10-7 Summary of kWh Savings for Large C&I by Sample Stratum

Stratum	Expected kWh Savings	Realized kWh Savings	Realization Rate
1	480,500	533,414	111.01%
2	1,453,212	1,098,252	75.57%
3	3,200,776	3,136,749	98.00%
4	4,673,367	4,235,475	90.63%

Table 10-8 Expected and Realized Savings by Project

Project ID(s)	Facility Type	Expected kWh Savings	Realized kWh Savings	Realization Rate
PRJ-418219	Fast Food Restaurant	3,588	4,612	128.5%
PRJ-448713	Convenience Store	5,948	6,106	102.6%
PRJ-477576	Lodging	8,818	10,659	120.9%
PRJ-417568	Fast Food Restaurant	34,166	36,927	108.1%
PRJ-420015	Lodging	73,831	70,222	95.1%
PRJ-417992	Condominium Association	98,498	87,087	88.4%
PRJ-419064	Lodging	197,895	122,485	61.9%
PRJ-419469	Lodging	205,004	170,640	83.2%
PRJ-418918	Parking Garage	230,812	256,458	111.1%
PRJ-419561	Lodging	470,954	387,866	82.4%
PRJ-417350	Parking Garage	525,366	583,740	111.1%
PRJ-419278	Lodging	526,141	458,472	87.1%
PRJ-408788	Parking Garage	532,391	569,593	107.0%
PRJ-517728	Distribution Warehouse	561,295	592,460	105.6%
PRJ-419605	Lodging	2,057,220	1,643,344	79.9%

10.3.1.3 Large C&I Program-Level Realization

Using the realization rates presented in Table 10-7, the Evaluators extrapolated results from sampled sites to non-sampled sites in developing program-level savings estimates. Table 10-9 presents results by stratum.

Table 10-9 Large C&I Program-Level Realization by Stratum

Stratum	# Sites	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected kW Savings	Realized kW Savings	kW Realization Rate
1	18	480,500	533,414	111.01%	47.70	54.27	113.8%
2	11	1,453,212	1,098,252	75.57%	180.22	151.33	84.0%
3	11	3,200,776	3,136,749	98.00%	382.76	368.12	96.2%
4	6	4,673,367	4,235,475	90.63%	1,370.56	868.34	63.4%
Total	46	9,807,855	9,003,889	91.80%	1,981.23	1,442.06	72.8%

Table 10-10 summarizes expected and realized savings estimates by measure category for the Large C&I program.

Table 10-10 Large C&I program Savings by Measure Category

Measure Category	Expected kWh Savings	Realized kWh Savings	kWh Realization Rate	Expected kW Savings	Realized kW Savings	kW Realization Rate
HVAC	2,854,321	2,306,592	80.8%	1,072.67	608.86	56.8%
Lighting	6,313,521	6,166,679	97.7%	826.07	752.97	91.2%
Other/Custom	617,353	583,077	94.4%	79.62	75.85	95.3%
Pre-Rinse Spray Valve	10,764	12,578	116.9%	1.47	1.72	116.9%

Strip Curtains	11,896	12,709	106.8%	1.40	1.47	105.3%
Total	9,807,855	9,081,634	92.6%	1,981.23	1,440.88	72.7%

10.3.1.4 Large C&I – Causes of Low Realization

The Evaluators have summarized these adjustments and others in Table 10-11 for illustrative purposes.

Table 10-11 Large C&I – Causes of Deviation in Savings Estimates

Project ID(s)	***Expected kWh Savings***	***Realized kWh Savings***	***Realization Rate***	***Causes of Deviation in Savings Estimates***
PRJ-418219	3,588	4,612	128.5%	Ex ante calculations assumed a deemed savings of 1,794 kWh savings per valve for the PRSV, while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.
PRJ-448713	5,948	6,106	102.6%	Ex ante calculations assumed a deemed savings of 422 kWh savings per door for the strip curtains while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings
PRJ-477576	8,818	10,659	120.9%	The ex-ante calculations estimated 800 square feet of glazing, however the supporting documentation indicates there are three double-sided skylights each with 16 panes 3 feet by 5 feet resulting in 720 square feet. However, the biggest contributor to the difference in realization is due to the ex-ante and ex-post calculations using different annual solar gain values.
PRJ-417568	34,166	36,927	108.1%	Incorrect non-daylight hours.
PRJ-420015	73,831	70,222	95.1%	Through monitoring the Evaluators verified the AOH of 1,225 and CF of 0.16 in the guestrooms. The ex ante estimation used 3,055 and 0.25 respectively.
PRJ-417992	98,498	87,087	88.4%	Religious School. The changes in savings are due to several reasons: 4) The discrepancies are due to changes in the wattages of new and baseline fixtures, and the heating and cooling types used in some parts of the facility. In the original project application, the wattage of the baseline 400W metal halide fixtures was entered as 447 watts; this was changed to 453 watts in ex post savings calculations. 5) In the project application, the wattage of the LED fixtures which replaced the 4' 2-lamp linear fluorescents was entered as 18W; review of the site invoice revealed that it was actually 16 watt fixtures which were installed. 6) In the project application, the wattage of the baseline 250W metal halide fixtures was recorded as 284 watts, this was changed to 288 watts in ex post savings calculations. 7) On-site evaluation showed that four of the 17W LED lamps were installed in a part of the facility that features gas heating and electric refrigeration. In

				addition, in several parts of the lighting project application, the coincidence factor was incorrectly entered as 0%. This was corrected to 100% and 10%, depending upon area, in the final savings calculations.
PRJ-419064	197,895	122,485	61.9%	The kWh savings is low because, through monitoring, the verified AOH for hotel guest rooms is 1,995; the ex ante estimations used deemed hours of 3,055. Evaluators also found some fixture counts application and heating type varied from the application during the site visit.
PRJ-419469	205,004	170,640	83.2%	Non EISA-compliant baseline(s). Additionally, the CF and annual hours of operation values were found to be lower for some room types after installing lighting monitoring equipment.
PRJ-418918	230,812	256,458	111.1%	Incorrect non-daylight hours.
PRJ-419561	470,954	387,866	82.4%	Non EISA-compliant baseline(s). Additionally, (204) lamps/fixtures and (60) occupancy sensors had not been installed during the time of the onsite visit.
PRJ-417350	525,366	583,740	111.1%	Incorrect non-daylight hours.
PRJ-419278	526,141	458,472	87.1%	The difference in kWh realization is due to the ex-ante calculating savings through an equivalent full load hours method while the ex post calculates savings using a regression model that utilizes historic billing data and site specific hourly weather data. The difference in kW realization is due to the ex-ante calculating kW savings using equivalent useful life and remaining useful life because the project was classified as early retirement.
PRJ-408788	532,391	569,593	107.0%	On site the Evaluators were unable to verify the installation of (183) 18W LED fixtures, leading to lower kWh and kW savings. Due to continuous operating, 8,760 hours were used in place of the 7,884 used in ex ante calculations, increasing the verified kWh savings.
PRJ-517728	561,295	592,460	105.6%	Ex ante savings estimates assumed no area conditioning and used an EIF_E of .87. On site them Evaluators determined that the facility was refrigerated.
PRJ-419605	2,057,220	1,643,344	79.9%	The difference in realization rate is due to the ex-ante calculations using an estimated depreciated chiller efficiency for the baseline chillers while the ex post used the rated chiller efficiency. The ex-ante calculations estimated an approximate 0.5% efficiency per year depreciation resulting in an adjusted efficiency of 1.325 kW/ton. The ex post used the rated efficiency because there was no data available to calculate the baseline chiller's actual efficiency. Therefore, the ex post used the rated efficiency of 1.096 kW/ton.

10.4 Net Impact Findings

Participant survey responses were used to estimate the net energy impacts of the program. The program net savings are equal to gross savings, less savings associated with free ridership, plus participant spillover savings.

In total, 12 program participants completed the survey.

10.4.1 Estimating Free Ridership

Several criteria were used for determining what portion of a customer's savings for a particular project should be attributed to free ridership. The first criterion was based on the response to the question: "Would you have been financially able to install energy efficient [Measure/Equipment] at the location without the financial incentive from the Program?" Customers that answer "No" to this question are asked to rate how certain they are that their organization could not have afforded the measure. If a customer indicated that their organization could not have afforded the measure and indicates that they were very certain of this, the customer was not deemed a free rider.

For decision makers that indicated that they were able to undertake energy efficiency projects without financial assistance from the program, three factors were analyzed to determine what percentage of savings may be attributed to free ridership. The three factors were:

- Plans and intentions of firm to install a measure even without support from the program;
- Influence that the program had on the decision to install a measure; and
- A firm's previous experience with a measure installed under the program.

For each of these factors, rules were applied to develop binary variables indicating whether or not a participant's behavior showed free ridership.

The first factor requires determining if a participant stated that his or her intention was to install an energy efficiency measure even without the program. The answers to a combination of several questions were used with a set of rules to determine whether a participant's behavior indicates likely free ridership. Two binary variables were constructed to account for customer plans and intentions: one, based on a more restrictive set of criteria that may describe a high likelihood of free ridership, and a second, based on a less restrictive set of criteria that may describe a relatively lower likelihood of free ridership.

The first, more restrictive criteria indicating customer plans and intentions that likely signify free ridership are as follows (Definition 1):

- The respondent answers “yes” to the following two questions: “Did you have plans to install energy efficient [Measure/Equipment] at the location before deciding to participate in the program?” and “Would you have gone ahead with this planned project if the you had not received the rebate through the program?”
- The respondent answers “definitely would have installed” to the following question: “If the rebates from the program had not been available, how likely is it that you would have installed energy efficient [Measure/Equipment] at the location anyway?”
- The respondent answers “no, program did not affect timing of purchase and installation” to the following question: “Did you purchase and install energy efficient [Measure/Equipment] earlier than you otherwise would have without the program?”
- The respondent answers “no, program did not affect level of efficiency chosen for equipment” in response to the following question: “Did you choose equipment that was more energy efficient than you would have chosen had you not participated in the program?”

The second, less restrictive criteria indicating customer plans and intentions that likely signify free ridership are as follows (Definition 2):

- The respondent answers “yes” to the following two questions: “Did you have plans to install energy efficient [Measure/Equipment] at the location before participating in the program?” and “Would you have gone ahead with this planned installation even if you had not participated in the program?”
- Either the respondent answers “definitely would have installed” or “probably would have installed” to the following question: “If the rebates from the program had not been available, how likely is it that you would have installed energy efficient [Measure/Equipment] at the location anyway?”
- Either the respondent answers “no, program did not affect timing of purchase and installation” to the following question: “Did you purchase and install energy efficient [Measure/Equipment] earlier than you otherwise would have without the program?” or the respondent indicates that while program information and financial incentives did affect the timing of equipment purchase and installation, in the absence of the program they would have purchased and installed the equipment within the next two years.
- The respondent answers “no, program did not affect level of efficiency chosen for equipment” in response to the following question: “Did you choose equipment that was more energy efficient than you would have chosen had you not participated in the program?”

The second factor requires determining if a customer reported that a recommendation from a program representative or past experience with the program was influential in the decision to install a particular piece of equipment or measure.

The criterion indicating that program influence may signify a lower likelihood of free ridership is that either of the following conditions is true:

- The respondent answers “very important” to the following question: “How important was previous experience with the program in making your decision to install energy efficient [Measure/Equipment] at the location?”
- The respondent answers “probably would not have” or “definitely would not have” to the following question: “If the program representative had not recommended [Measure/Equipment], how likely is it that you would have installed it anyway?”

The third factor requires determining if a participant in the program indicates that he or she had previously installed an energy efficiency measure similar to one that they installed under the program without an energy efficiency program incentive during the last three years. A participant indicating that he or she had installed a similar measure is considered to have a likelihood of free ridership.

The criteria indicating that previous experience may signify a higher likelihood of free ridership are as follows:

- The respondent answers “yes” to the following question: “Before participating in the Program, had you installed any equipment or measure similar to energy efficient [Measure/Equipment] at the location?”
- The respondent answers “yes” to the following question: “Has your organization purchased any significant energy efficient equipment in the last three years at the location?” and answered “yes” to the question: “Did you install any of that equipment without applying for a financial incentive through an energy efficiency program?”

The four sets of rules described above were used to construct four different indicator variables that address free ridership behavior. For each customer, a free ridership value was assigned based on the combination of variables. With the four indicator variables, there are 11 applicable combinations for assigning free ridership scores for each respondent, depending on the combination of answers to the questions creating the indicator variables. Table 10-12 shows these values.

Table 10-12.Free Ridership Scores for Combinations of Indicator Variable Responses

Indicator Variables				Free Ridership Score
Had Plans and Intentions to Install Measure without Program? (Definition 1)	Had Plans and Intentions to Install Measure without Program? (Definition 2)	Program had influence on Decision to Install Measure?	Had Previous Experience with Measure?	
Y	N/A	Y	Y	100%
Y	N/A	N	N	100%
Y	N/A	N	Y	100%
Y	N/A	Y	N	67%
N	Y	N	Y	67%
N	N	N	Y	33%
N	Y	N	N	33%
N	Y	Y	N	0%
N	N	N	N	0%
N	N	Y	N	0%
N	N	Y	Y	0%

10.4.2 Estimating Spillover

Program participants may implement additional energy saving measures without receiving a program incentive because of their participation in the program. The energy savings resulting from these additional measures constitute program participant spillover effects.

To assess participant spillover savings, survey respondents were asked whether or not they implemented any additional energy saving measures for which they did not receive a program incentive. Respondents that indicated that they did install additional measures were asked two questions to assess whether or not the savings are attributable to the program. Specifically, respondents were asked:

- "How important was your experience with the <PROGRAM> in your decision to implement this Measure, using a scale of 0 to 10, where 0 is not at all important and 10 is extremely important?"
- "If you had not participated in the <PROGRAM>, how likely is it that your organization would still have implemented this measure, using a 0 to 10 scale, where 0 means you definitely WOULD NOT have implemented this measure and 10 means you definitely WOULD have implemented this measure?"

The energy savings associated with the measure are considered attributable to the program if the average of the rating for the first question, and 10 – the rating for the second question, is greater than seven, the savings are counted as attributable to the program.

None of the survey respondents indicated that they had implemented additional measures that met the criterion for attributing the savings to the program.

10.4.3 Net Savings Results

Table 10-13 summarizes the results of the free ridership scoring. Free ridership for the program was estimated by weighting each participant's response by the associated realized gross kWh savings or peak kW reductions for the measure. Fifty-seven percent of gross kWh savings were associated with responses that did not meet the criteria that indicate the presence of prior plans and 36% were associated with respondents whose firms could not have afforded the efficiency improvements without the program incentives.

Table 10-13 Free-Ridership Scoring Results

Had Plans and Intentions to Install Measure without C&I Program? (Definition 1)	*Had Plans and Intentions to Install Measure without C&I Program? (Definition 2)*	*C&I Program had influence on Decision to Install Measure?*	*Had Previous Experience with Measure?*	*Percentage of Total Ex Post Gross kWh Savings*	*Free Ridership Score*
N	N	N	N	36%	0%
N	N	Y	N	21%	0%
N	Y	N	N	5%	33%
N	Y	N	Y	1%	67%
Required program to implement measures.				36%	0%
Total				100%	2%

Table 10-14 and Table 10-15 summarize the realized net kWh savings and peak kW demand reductions of the program. Net kWh savings totaled to 8,857,468 kWh and equal 98% of gross program savings. Net kW reductions totaled 1,407.28 kW and equal 98% of realized gross program savings.

Table 10-14 Summary of Net Ex Post kWh Savings

Utility	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Free Ridership*	*Spillover*	*Realized Net kWh Savings*	*Net to Gross Ratio*
ENO	9,626,756	8,867,025	224,194	0	8,642,831	97%
ELL Algiers	181,099	136,864	3,460	0	133,404	97%
Total	9,807,855	9,003,889	227,654	0	8,776,235	97%

Table 10-15 Summary of Ex Post Net Peak kW Reductions

Utility	Expected Peak kW Reductions	Realized Gross Peak kW Reductions	Free Ridership	Spillover	Realized Net kW Savings	Net to Gross Ratio
ENO	1,973.63	1,436.31	33.40	0.00	1,402.92	98%
ELL Algiers	7.60	5.74	0.13	0.00	5.61	98%
Total	1,981.23	1,442.06	33.53	0.00	1,408.53	98%

10.5 Process Findings

This chapter presents the results of the process evaluation of the Large C&I program. The process evaluation focuses on aspects of program policies and organization, as well as the program delivery framework.

10.5.1 Data Collection Activities

The process of evaluation of the C&I Program included the following data collection activities:

Table 10-16 Large Commercial & Industrial Solutions Process Evaluation – Summary of Data Collection

Activity	Sample Size
ENO Staff	1
CLEAResult Staff	1
Participant Survey	12
Contractor Interviews	5

10.5.2 Program Overview

The C&I Program provides financial incentives and technical services to encourage nonresidential customers with greater than 100 kW peak demand to implement energy saving measures. The C&I Program is designed to help this customer segment overcome barriers to energy improvement, such as higher first-cost of efficiency equipment and a lack of technical knowledge or resources.

In addition to encouraging the adoption of energy efficiency measures, the program also intends to transform the energy efficiency market in the Companies' service area through training, education, and program implementation.

The program offers incentives for efficiency measures as well as technical assistance to help customer identify and develop energy efficiency projects.

Financial incentives are based on expected savings for the measure implemented and vary by end–use. The targeted incentive amounts for different end-uses are summarized in Table 10-17.

Table 10-17 Incentive Amount by End-Use for the C&I Program

End-Use	*Incentive Amount*
Lighting	$0.10 / kWh Saved
Non-Lighting	$0.12 / kWh saved

The incentive amounts may be based on one of three calculation methodologies described below.

- Deemed or Stipulated Savings: This approach is the most typical and utilized for projects for which savings can be reasonably estimated using previously collected data on operating hours and energy consumption of pre-existing equipment. This approach does not require the participant to perform any measurement and verification (M&V) activities.
- Simplified Measurement and Verification: This approach is for projects which require short-term metering and utilizes this data in simple engineering calculations to estimate energy savings. Participants are required to submit an M&V plan before beginning the project.
- Full Measurement and Verification: Projects requiring full M&V estimate savings utilizing procedures based on the International Performance Measurement and Verification Protocol and may utilize metering, statistical analysis of billing data, or energy modeling. Participants are required to submit an M&V plan before beginning the project.

10.5.3 Detailed Findings

10.5.3.1 Analysis of Participation Data

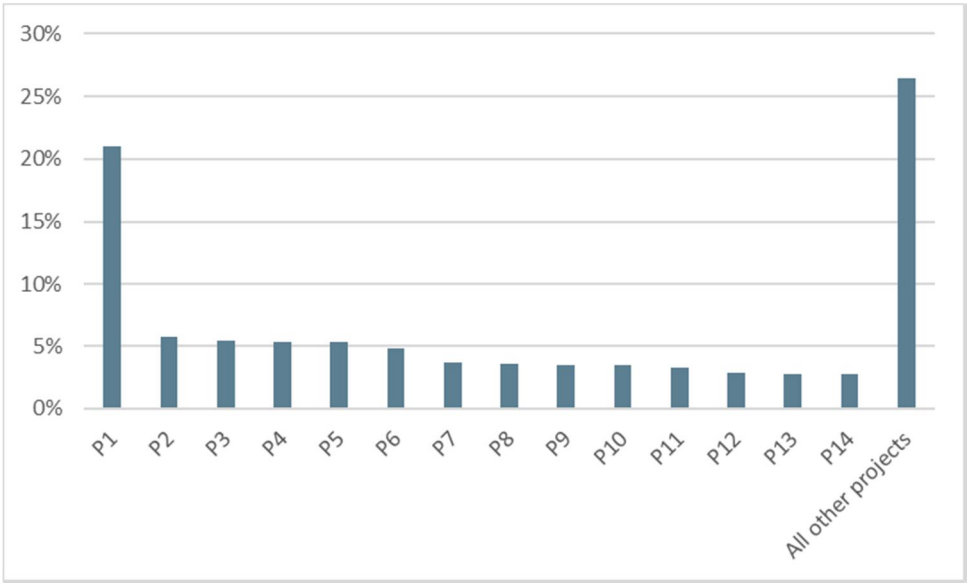
Table 10-18 summarizes program expected savings by measure type. As shown, the expected savings resulted from a diverse range of measure types. Sixty-four percent of program savings resulted from lighting measures, which is a relatively small share. HVAC measures accounted for most of the additional program savings.

Table 10-18 Expected kWh Savings by Measure Type

Measure	Expected kWh Savings	Share of kWh Savings
Lighting	6,313,521	64%
HVAC	2,854,321	29%
Other/Custom	617,353	6%
Strip Curtains	11,896	<1%
Pre-Rinse Spray Valve	10,764	<1%

Figure 10-1 displays the share of savings for each of the 34 projects completed during the program year. One project accounted for 20.9% of expected savings. Other than this, program savings were spread across a large number of projects with no single project accounting for a very large share of program savings.

Figure 10-1 Project Share of Expected kWh Savings



The monthly and cumulative accrual of program savings are displayed in Figure 10-2. Program staff reported that program savings were fully reserved shortly after the start of the program year but as displayed below, projects were completed throughout most of the program year with approximately 40% of PY5 savings resulting from projects completed in the last month of the program year.

Figure 10-2 Monthly and Cumulative Accrual of Expected kWh Savings

10.5.3.2 Program Design, Operations, and Activities

The following sections describe program design, operations, and activities and were developed from reviews of program documentation and interviews with program staff.

10.5.3.3 Program Objectives

The primary program objective is to assist commercial and industrial customers in achieving electric energy savings and peak demand reductions through provision of technical support and financial incentives. To meet the energy saving and peak demand reduction goals, the program has ancillary objectives to mitigate barriers to energy efficiency such as lack of knowledge of energy efficient technologies and lack of awareness of energy saving opportunities in facilities. Additionally, through the incentives and services provided, the program intends to transform the market for energy efficiency in the targeted sector.

The program expected savings exceeded the energy savings goal in PY5.

10.5.3.4 Program Design and Participation Process

The Large C&I Program provides financial incentives and technical assistance to assist businesses in Orleans Parish with an average maximum monthly demand of more than 100 kW. Incentives of $0.10 per kWh saved for lighting projects and $0.12 per kWh saved for non-lighting projects are provided. Projects may receive no more than $50,000 in incentive funding and may not exceed 100% of the project cost. During PY5,

five projects met the incentive cap of $50,000. The effective incentive rate for four of these projects ranged from $0.09 to $0.10 per kWh saved. The effective incentive for the fifth project was equal to $0.02 per kWh saved.

The participation process is initiated with the submission of a signed Letter of Intent (LOI). The LOI states that through the program, the participating customer may receive technical assistance to identify energy saving opportunities and that the program will pay a financial incentive for the reduction usage resulting from the implementation of an eligible energy efficiency measure. The letter states that the customer must return the letter and a project application to reserve incentive funds. The letter also informs the customer that the customer must complete lighting projects within 90 days of the start of the program year or when the pre-application is signed, and within 120 days for non-lighting projects.

Customers may request that CLEAResult staff complete a facility walk-through to identify energy saving opportunities at the customer's location. This assessment may be targeted towards a specific project (e.g., a lighting retrofit) or may be a full facility assessment. At the completion of the assessment, program staff write a scope-of-work for the project to provide to the customer that includes energy saving and financial metrics.

Once a project is identified through an assessment performed by CLEAResult, by the customer, or by a contractor hired by the customer, the participant submits a program application. Program staff reviews the application and complete a pre-installation inspection. Once the project is completed, the customer submits the notice of completion along with supporting documentation such as specification sheets, facility drawings, and invoicing or purchase orders. CLEAResult then reviews documentation and completes a post-installation inspection. Once approved, incentive payment is made to the customer or another party designated by the customer.

10.5.3.5 Roles and Responsibilities

CLEAResult is responsible for the primary program implementation tasks, namely:

- Perform onsite pre- and post-installation inspections and other quality control and quality assurance activities;
- Verifying customer eligibility;
- Contractor education and outreach;
- Customer education and identification of projects;
- Review and approval of proposed projects;
- Payment of incentives; and
- Oversight and training of program trade allies.

CLEAResult staffs the program with a program consultant, an energy engineer, and a program coordinator. These staff members also provide support to the Small Business Program.

10.5.3.6 Program Marketing and Outreach

The program is engaged in little active outreach and marketing of the program. Staff reported that all program incentives were reserved shortly after the start of the program year.

10.5.3.7 Quality Control and Verification Processes

Quality control procedures are similar to those described for the Small Business Program in Section 9.1.5.7.

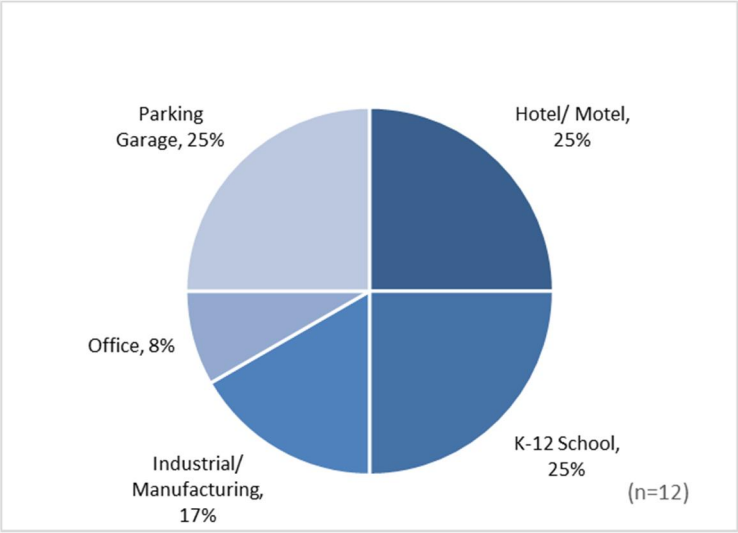
10.5.4 Participant Survey Results

Twelve decision makers completed a survey that contained questions pertaining to their experiences with the Large C&I Program.

10.5.4.1 Firmographics

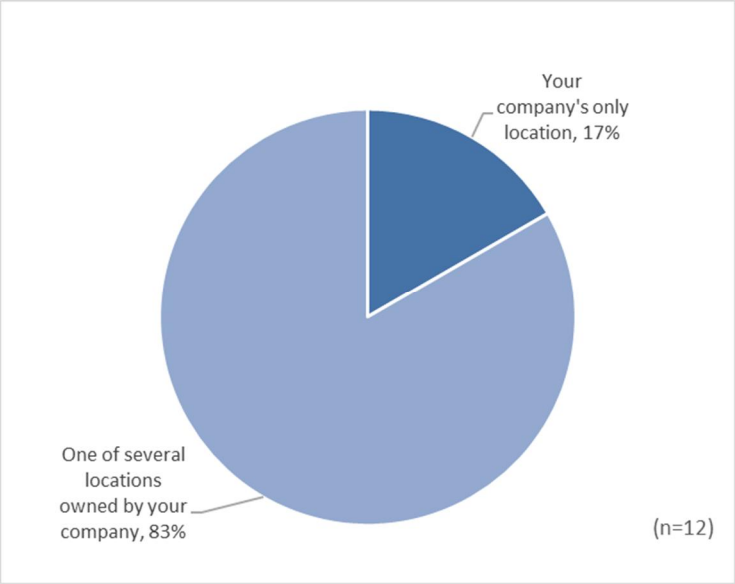
The business types with the highest representation in the survey were hotels/motels, K-12 schools, and parking garages, each of which represent 25% of survey respondents. The complete makeup of survey respondents is summarized in the figure below.

Figure 10-3 Participating Business Types



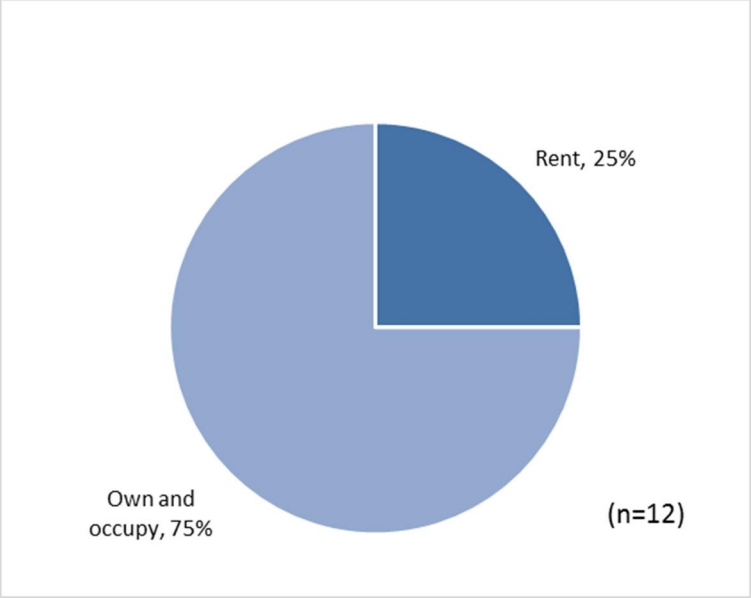
The majority of surveyed businesses (83%) own several locations.

Figure 10-4 Number of Business Locations



In addition, most surveyed businesses (75%) own and occupy the location where renovations took place.

Figure 10-5 Site Ownership

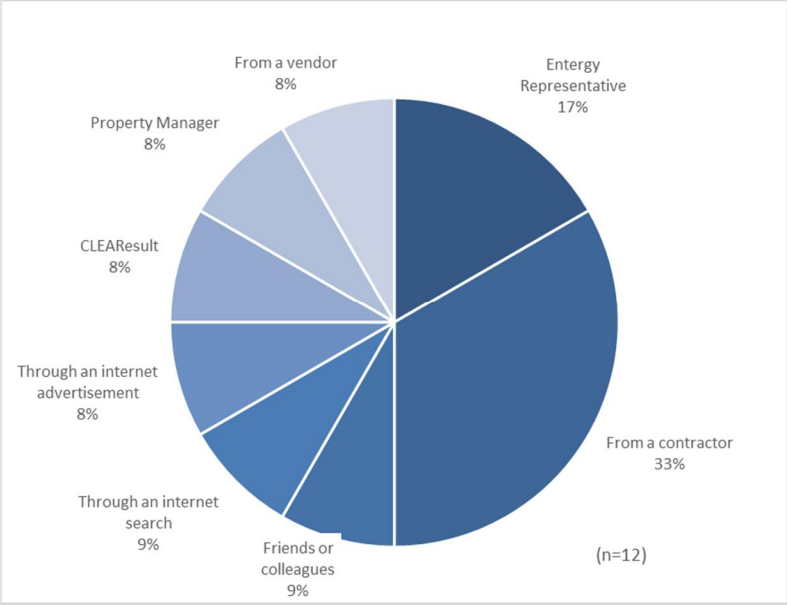


10.5.4.2 Source of Initial Awareness

Thirty-three percent of participants first heard about the incentives for efficient equipment upgrades from a contractor. Two participants (17%) heard about the

program from an Entergy Representative. All sources of program awareness are summarized in the table below.

Figure 10-6 Sources of Program Awareness



10.5.4.3 Reasons for Participation

Respondents were asked if they had had any concerns when they were first approached about participating in the program. Eighty-three percent reported that they had not had any concerns. One of the two respondents was concerned about the legitimacy of the program and the other was concerned about what the costs and benefits of the program would be and what exactly the program would entail. When asked why they decided to participate in the program despite their concerns, both participants implied that their communications with program staff and representatives made them feel more confident about participating in the program.

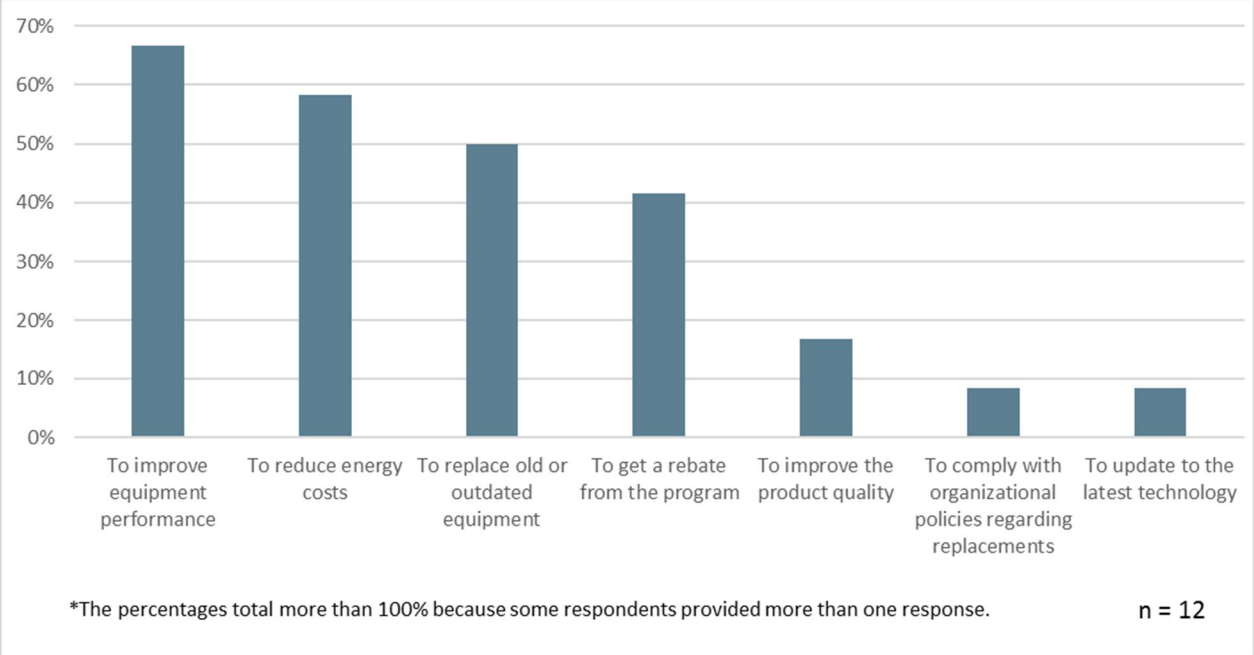
Fifty percent of survey respondents viewed program marketing materials when they were still learning about the program. When asked how significant a role these marketing materials played in their decision to participate, most (50%) said that the materials were slightly influential but one-third reported that they were very influential. All perceptions of the marketing material are summarized in the table below.

Table 10-19 Impact of Marketing Material on Decision to Participate

Impact of Marketing Material	***Percent of Respondents (n = 6)***
Very Influential	33%
Somewhat Influential	0%
Only Slightly Influential	50%
Not at All Influential	17%

Survey respondents also identified their reasons for participating in the program. The most frequently mentioned motivating factor was to improve equipment performance, cited by 67% of respondents. Other popular motivating factors included reducing energy costs (58%) and replacing old or outdated equipment (50%). All responses are summarized in the figure below.

Figure 10-7 Reasons for Participation



10.5.4.4 Participation Process

Most survey respondents (75%) worked on the application for program incentives themselves. As shown below in Table 10-20, contractors assisted 42% of participants with the application and 8% of participants were assisted by a vendor. All responses are summarized in the table below.

Table 10-20 Contributors to the Incentive Application

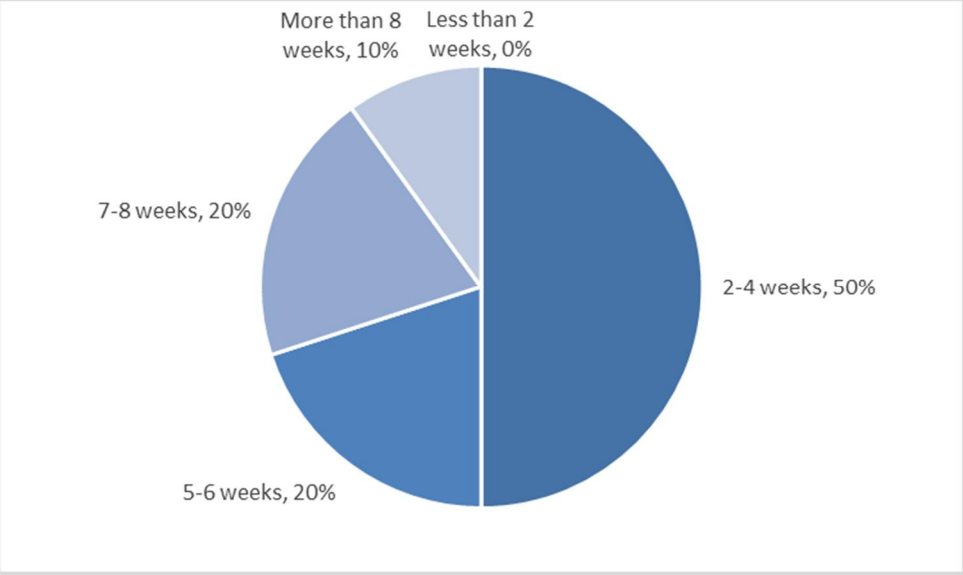
Application Contributor	Percent of Respondents (n=12)*
Yourself	75%
A Contractor	42%
An Equipment Vendor	8%

* The percentages total more than 100% because some respondents provided more than one response.

Most respondents who worked on the application themselves (78%) reported that the information about how to complete the application was completely clear, giving it a score of 5 out of 5 for overall clarity. The remaining respondents gave the clarity of the information a score of 4.

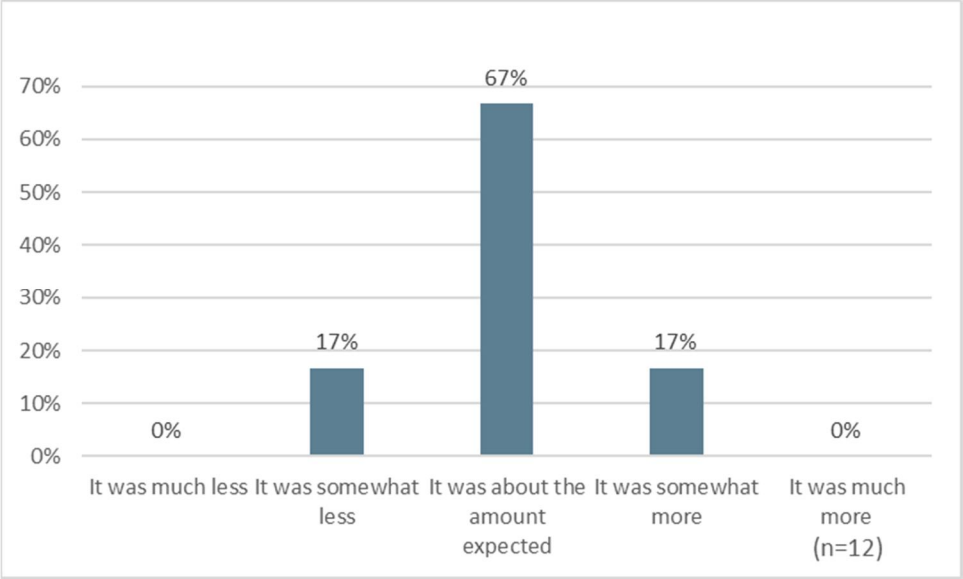
All respondents who worked on the application themselves said they had a clear idea of who to go to for assistance with the application process. None indicated that they felt that there was anything in the application processes which should be further clarified.

Figure 10-8 Time until Incentive Payment was Received



Two-thirds of respondents (67%) felt that the incentive they received was about what they had been expecting (see Figure 10-9). None of the respondents indicated that the incentive amount varied significantly from their expectation, which suggests program tools and processes for ensuring the accuracy of incentive estimates are working well.

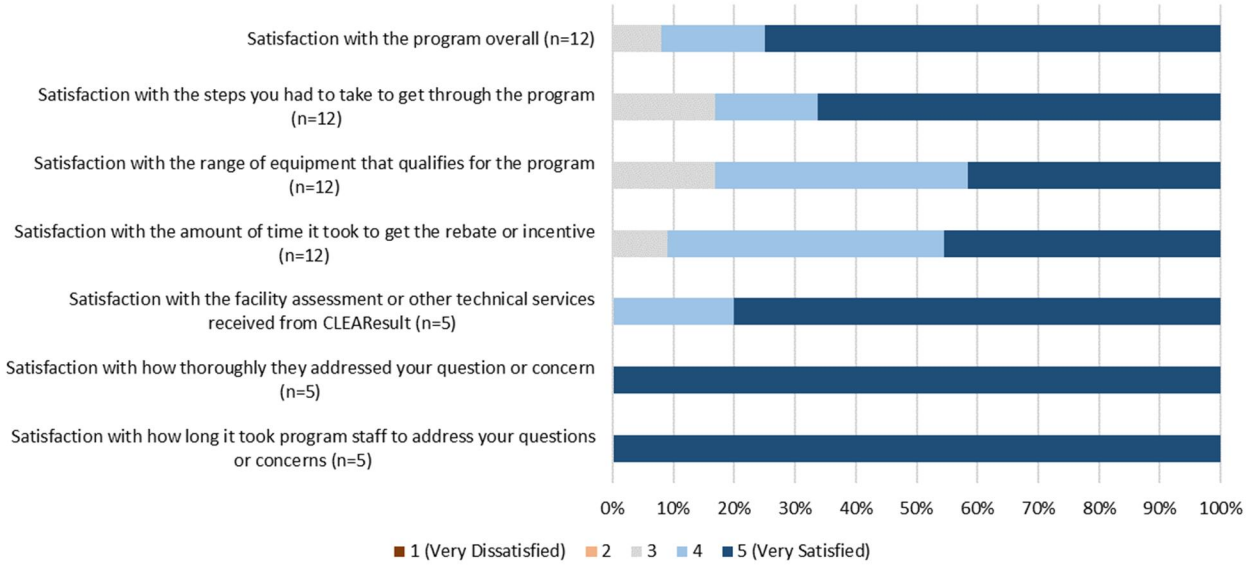
Figure 10-9 Comparison of Actual and Expected Incentive Size



10.5.4.5 Program Satisfaction

Survey respondents were asked to rate their satisfaction with various components of the program on a scale of 1 to 5, where 1 means “very dissatisfied” and 5 means “very satisfied.” All program elements received scores of 4 or 5 from upwards of 80% of survey respondents. No participants reported dissatisfaction with any aspect of the program. All responses are summarized in the figure below.

Figure 10-10 Satisfaction with Program Components



10.5.4.6 Satisfaction with Entergy

Respondents were also asked about their satisfaction with the Companies and how their participation in the program has influenced their opinion of the utility. Eighty-three percent of respondents report that they are satisfied or very satisfied with Entergy as an electrical services provider. All responses are summarized in the table below.

Table 10-21 Satisfaction with Entergy as Electrical Service Provider

Satisfaction Score	***Percent of Respondents (n=12)***
5 (Very Satisfied)	50%
4	34%
3	8%
2	0%
1 (Very Dissatisfied)	8%

Fifty-eight percent of respondents said that their participation in the program somewhat increased their satisfaction with Entergy. The remaining respondents said that their satisfaction was not affected by the program.

Table 10-22 Effect of Program on Satisfaction with Entergy

Effect of Program Participation on Satisfaction with Entergy	***Percent of Respondents (n=12)***
Greatly increased satisfaction with Entergy	0%
Somewhat increased satisfaction with Entergy	58%
Did not affect satisfaction with Entergy	42%
Somewhat decreased satisfaction with Entergy	0%
Greatly decreased satisfaction with Entergy	0%

10.5.5 Participating Contractor Interview Results

The role of contractors in the Large C&I Program is to assist customers in identifying energy saving projects, completing project installations, and assisting customers with program paperwork and savings calculations.

A sample of five contractors that completed projects through the Large C&I Program were interviewed. The goals of the interview were to understand contractor's views of the adequacy of the program design and implementation. Contractors were asked to provide their perspective on the program incentives, communication with and support of contractors, adequacy of application procedures and supporting material, as well as any aspects of the program design that may limit certain customers from participating.

10.5.5.1 Program Participants

Interviewed contractors provide varied services: two respondents were mechanical contractors, two were LED lighting specialists, and one was a specialist in exterior LED lighting for parking lots. Three contractors stated that their business did not specialize in providing services to any specific business type, one contractor stated that their organization specializes in working with organizations in the hospitality sector, and one contractor stated that although they do not target any specific business type, a sizable portion of their customers are chain restaurants.

When asked if they work in other efficiency programs within or outside Louisiana, two respondents stated that they only work with the Large C&I Program, one stated they also work with the Entergy Gulf States program, one stated they work for all utilities in Louisiana, and one stated that they are a national company that works on energy efficiency programs throughout the country.

10.5.5.2 Motivations for Participating

The most common way that contractors reported becoming aware of the program was through a customer. Additionally, one contractor heard about the program through a colleague, and one contacted Large C&I Program staff directly.

When asked what factors influenced their decision to participate in the program, contractors stated either the rebate amount, benefits to their customers, and/or customer interest.

Two of the five contractors interviewed stated that they had initial concerns about participating in the program. Both of these contractors were concerned about lack of rebates available through the program because there was a very short window in which funding was available. One contractor also raised concerns about the DesignLights Consortium™ (DLC) listing requirement. This contractor stated that because there are more options available at a lower cost than DLC qualified equipment, and the efficiency of the non-listed bulbs is increasing, the program has become less cost effective for them and their customers. However, the DLC listing requirement is a common component of commercial lighting programs and is included to ensure that program funds are expended on lamps that meet the groups minimum requirements for efficiency, warranty, and light quality.

10.5.5.3 Promotion of the Program

Only one contractor stated that they actively market or promote the program. This contractor stated they promote the program by speaking to their customers about the program if they are interested in energy efficient equipment. This contractor stated that they generally promote the program to both existing and potential customers. Four contractors stated that they do not actively promote the program for several different reasons. One contractor stated that they do not need to promote the program because they generally work with existing customers. Another contractor had been approached by the only customer that they completed a project for through the program. Additionally, two contractors stated that they have not been actively promoting the program because there has not been funding available. One of these contractors stated that they plan to promote the program in the future, and one contractor was unsure whether they will continue to promote the program because of issues that they have faced as a result of the lack of funding available through the program. Additionally, two contractors stated that more communication about the state of the program would be beneficial. These customers stated that it was not clear when the funding would be available and when it would run out, making it difficult for them to move forward with projects.

When asked if they generally approach customers about the program or if customers approach them, four contractors stated that they exclusively approach customers about the program. Two of these contractors heard of the program through a customer, but since hearing about the program have only approached potential customers. One contractor stated that they generally approach customers but one or two customers had approached them. The contractor responses suggest that they are primarily driving participation in the program by discussing the available incentives with prospective clients.

Overall, contractors indicated that there was limited awareness of the program among their customer base. The lack of reported awareness is likely a function of the limited availability of funds for the program. Sustained program funding is important for developing high levels of awareness of the incentive funds among customer and to ensure that the availability of incentive dollars is impacting customer decisions about facility retrofits.

10.5.5.4 Project Completion Process

Four contractors stated that they had not had problems verifying a customer's eligibility for the program. One contractor stated that they had an issue with one project being categorized incorrectly, resulting in incentives not being available for this customer. The contractor stated that this negatively affected them and the customer.

Only one contractor stated that they had a project or measure rejected because it did not qualify for the program. In this contractor's case, they had trouble with the program energy savings calculator. This difficulty resulted in the contractor having measures on a project rejected because they did not qualify for the program. The contractor stated this situation made it hard for them to continue the project, and hurt their relationship with the customer.

All five contractors stated that the information available on the program and customer qualifications is clear. Similarly, the four contractors that filled out the application form for their customers stated that information on the application and documentation requirements was clear.

All of the four contractors that filled out the rebate application for their customers, all stated that the time commitment for filling out the application was acceptable or average for similar types of programs.

One contractor stated that they had recommendations for improvements to the application process. This contractor stated that they had issues qualifying the customer for the rebate because of an issue they experienced with categorizing a customer correctly. Other than this one issue, the interviewed contractors did not bring up any issues with program eligibility.

10.5.5.5 Program Design and Barriers to Participation

Although the Large C&I Program is limited by its incentive budget rather than by a lack of participation, contractors were asked to discuss the design and any apparent barriers to participation to identify any issues that may prevent some customers from accessing the program.

Four contractors stated that the energy savings measures through the program were comprehensive enough to meet their customers' needs. One contractor recommended

including lighting control systems into the program in addition to lighting occupancy sensors. This contractor explained that there are other programs across the country that offer incentives for this type of equipment and recommended the ENO begin offering these types of incentives based on the additional savings that can be offered.

None of the contractors stated that there were certain business types that were prevented from participating in the program because of the requirements.

Additionally, all contractors stated that the financial incentives were sufficient to encourage customers to install the efficient equipment. One contractor stated that the customers they work with may not feel the same way, and wish that the incentives were higher. A second contractor stated that the incentives for the program were not available for very long, making it difficult for them to participate in the program.

Two of the surveyed contractors stated that potential customers had raised concerns about participating in the program. One contractor stated that a customer was unsure of who would receive the rebates and when. Once this was explained to the customer, they were willing to go ahead with the project. The other contractor stated that one of their customers was concerned about the program being too good to be true.

One contractor stated that a potential customer's reasoning for not participating in the program was related to concerns about the rebate amount, in that they felt that the rebate amounts were not high enough for LEDs. The other four contractors stated that they had either not had customers turn down the program, or had not been approached with reasons for not participating.

One contractor stated that in order to improve the program, Entergy should be clear with contractors about when the incentives are available, and for how long.

Overall, aside from the limited incentive funds available, no significant issues that may prevent certain customers from participating were identified.

10.5.5.6 Training and Staff Support

When asked if they had contacted program staff with any questions about participating in the program, two contractors stated that they had. Both of these contractors stated that the staff had answered their questions adequately.

When asked if there were any questions they had for staff that could have been addressed through more detailed information provided by the program both contractors stated that there were not, that the questions that they had asked were specific to the projects they were working on rather than general questions about the program that could be answered through better program materials.

10.5.5.7 Program Influence on Business

Contractors were asked if participating in the program had an effect on the range of equipment their business offered, or if any staffing changes were made as a result of participating in the program. One contractor stated that they had increased the number of lamps they carried that qualified for DLC, and a second contractor stated that they only carry DLC certified bulbs after becoming involved with the program. None of the contractors stated that they had increased staffing as a result of the program.

10.5.5.8 Overall Satisfaction

Contractors were asked a series of questions related to their overall experience and impressions of the program.

When asked what they felt were the greatest strengths of the program, contractors responded that the rebates, communication from staff, energy costs to the customer, and supporting customers in switching to more energy efficient equipment were great strengths.

Two contractors brought up concerns over the short amount of time that rebates were available. Both contractors stated that there had been issues with the rebates only being available for a short time after the program was open.

One contractor stated that program staff do not always adhere to its timelines for projects, and the waiting period between applying for the rebates and being approved for the rebate is sometimes too long for their customers. This contractor recommended that program staff attempt to stay on track of the timeline as much as possible.

When asked to rate their overall experience with the program on a scale from very dissatisfied to very satisfied, four of five contractors rated their experience as at least somewhat satisfied, with two rating their experience as very satisfied. One contractor stated that they were somewhat dissatisfied with their experience with the program. When asked to explain why they gave this rating, the contractor stated that there was a miscommunication with Entergy staff that resulted in a customer being dissatisfied with the program, and they had run into issues with the funding running out and not being able to sign up customers with the program.

10.5.6 Conclusions

10.5.6.1 Program Design and Participation Process

- Incentives are based on energy savings. The program appropriately offers higher incentives for non-lighting measures of $0.12 per kWh that typically have longer payback periods. Lighting incentives are $0.10 kWh. The higher incentive for non-lighting measures may contributed to the relatively high share of program savings resulting from lighting measures.

- Four of the five interviewed contractors reported that they complete application materials for customers and supply required documentation. None of the contractors identified any suggestions for improving the program application process.
- All respondents reported that the application process was clear and all indicated that it was clear who they should contact for additional assistance.
- No customers reported dissatisfaction with the steps required to participate in the program or the range of equipment that qualifies for the program. All participants were satisfied with the project support received from program staff and staff's response to their questions and concerns.
- Five participants received technical assistance from CLEAResult to implement their project and all of these respondents were satisfied with the assistance received.
- Three of the participant survey respondents reported that it took seven weeks or more to receive their incentives, although none were dissatisfied with that amount of time. One interviewed contractor indicated that payment had been slow for a project.
- Most participants (67%) reported that the incentive amount was what they expected, and none indicated that it was considerably more or less than what they were expecting.

10.5.6.2 Program Marketing and Outreach

- The program is engaged in little program marketing and outreach because it is very budget limited. Program staff reported that all incentive funds were reserved shortly after the start of the program year.
- 41% of participants reported that they learned of the program from a contractor or vendor, 17% from a representative of the Companies, and 8% from a CLEAResult staff member.
- Contractors reported limited outreach activities due to the limited program budget.

10.5.6.3 Quality Control and Verification Processes

- The program has documented robust quality control and verification procedures in place including review of submitted materials and on-site pre- and post-verification for all projects completed. Despite these procedures, the failed to realized significantly fewer lamps that reported in project documentation.
  Other issues identified were:
  - Use of a lighting savings calculator that used non EISA compliant baseline wattages. Staff has corrected a more recent version of the calculator.
  - Incorrect entry of efficient lamp wattages.

- Unspecified heating type lead to incorrect savings estimates because heating

Additional factors that impacted the realization rate were largely due to differences between deemed values from the Arkansas TRM and results based on onsite monitoring. These included:

- Use of 7,884 lighting hours of operation for parking garages with 8,760 operating hours.
- Use of 3,055 for guest room operating hours for which monitored data showed less than 2,000 hours of operation.

10.5.6.4 Contractor and Participant Satisfaction

- 92% of respondents were satisfied with the program overall. None reported dissatisfaction with any aspect of the program. Respondents were very satisfied with the thoroughness and timeliness of CLEAResult's response to inquiries.
- 58% of participants indicated that their experience with the program increased their satisfaction with the Companies.
- Four out of five interviewed contractors were satisfied with the program. One contractor was somewhat dissatisfied. The dissatisfied contractor indicated that a miscommunication with program staff had resulted in a customer being dissatisfied and that the limited funding made it difficult to get customers into the program. In general, contractors reported that staff was responsive to questions and that the questions they had were related to project-specific matters and not information that general instruction or training could address.
- Limited program funding was the greatest concern for contractors. Overall, the primary issue noted by the participating contractors was the lack of funding available for the program. This creates difficulties for contractors in promoting the incentives because of the uncertainty of their availability and may prevent the sustained engagement of contractors with the program.

10.5.7 Recommendations

The Evaluators' recommendations for the Residential Solutions Program are summarized in the following categories:

- **Correct the spreadsheet calculators to account for EISA baseline wattages.** When installing screw-in LEDs and CFLs, ex ante calculations used listed wattage (40W, 60W, 75W, and 100W) as the baseline. The baseline values need to account for the Energy Independence and Security Act (EISA) baseline values (29W, 43W, 53W, 72W), as the remaining useful life of incandescent lighting is too short to use as the baseline for the life cycle savings of a lighting retrofit.

- **Perform more rigorous post-retrofit verification inspections.** At two sites the Evaluators found partially incomplete retrofits. The incompleteness ranged from (263) lamps to (579) lamps. Program staff should verify 100% of equipment retrofits before considering a project complete.

  Modification of the post-inspection form to include an itemized list of measures may assist with improving the verification process.

- **Increase rigor of project documentation reviews.** At one site incorrect lamp wattage was used in the analysis and the wattage used contradicted what was listed in the project invoicing.

- **Providing training to contractors on identifying space heating type and include in verification process.** Program savings estimates were incorrect ins multiple cases because contractors defaulted to use of undefined heating type. Staff should provide training on the importance of correctly identifying space heating type and add it as a checkpoint to project verifications.

- **Revise operating hours assumed for guest rooms and parking garage lighting.** For parking garages with 24/7 lighting, assume 8760 hours of operation. Operating hours for guest rooms should be reduced from the 3,055 hours deemed in the Arkansas TRM. Onsite monitoring found hours to be considerably less – 1,995 and 1,225.

11. Appendix A: Site Reports

Project Number PRJ-417337
Program Small Business Solutions

Project Background

The participant is a gas station with convenience store that received incentives from Entergy New Orleans for implementing energy efficient refrigeration measures. On-site, the Evaluators verified the participant had installed:

- 21 square feet of strip curtains

M&V Methodology

On-site, Evaluators verified the presence of all strip curtains listed on the project application. Savings for the refrigeration measures were calculated using Tamm's Equation and the ASHRAE handbook site-specific inputs. Annual door opening hours, infiltrating air temperature, and refrigerated air temperature were gathered by on-site monitoring as well.

Strip Curtain Savings Parameters

Building Type	*Refrigeration Type*	*Time Open (Minutes/day)*	*Infiltrating Air Temperature*	*Refrigerated Air Temperature*
Convenience Store	Cooler	38	74	39

Savings Calculations

The annual energy savings due to the strip curtains is quantified by multiplying savings per square foot by cooler door area. The source algorithm from which the savings per square foot values are determined is based on Tamm's equation (an application of Bernoulli's equation) and the ASHRAE handbook. Savings were calculated using the following equation:

$$\frac{\Delta kWh}{sqft} = \frac{365 \times t_{open} \times (\eta_{new} - \eta_{old}) \times 20 \times CD \times A \times \left\{\left[\frac{(T_i - T_r)}{T_i}\right] \times g \times H\right\}^{0.5} \times [\rho_i \times h_i - \rho_r \times h_r]}{3{,}412 \frac{Btu}{kWh} \times COP_{adj} \times A}$$

In general, refrigeration is constant for food storage, even outside of normal operating conditions. Therefore, peak demand savings were calculated as follows:

$$\frac{\Delta kW_{peak}}{sqft} = \frac{\Delta kWh}{8{,}760}$$

The calculation assumptions are detailed in the following table.

Strip Curtain Calculation Assumptions for Convenience Stores

Term	*Unit*	*Values*	
		Cooler	*Freezer*
η_{new} , Efficacy of the new strip curtain – an efficacy of 1 corresponds to the strip curtain thwarting all infiltration, while an efficacy of zero corresponds to the absence of strip curtains.	None	0.79	0.83
η_{old} , Efficacy of the old strip curtain with Pre-existing curtain with no Pre-existing curtain unknown	None	 0.58 0.00 0.34	 0.58 0.00 0.30
C_d , Discharge Coefficient: empirically determined scale factors that account for differences between infiltration as rates predicted by application Bernoulli's law and actual observed infiltration rates	None	0.348	0.421
t_{open} , Minutes walk-in door is open per day	$\frac{\text{minutes}}{\text{day}}$	38	9
A , Doorway area	ft^2	21	21
H, Doorway height	ft	7	7
T_i, Dry-bulb temperature of infiltrating air, Rankine = Fahrenheit + 459.67	°F	68	64
T_r, Dry-bulb temperature of refrigerated air, Rankine = Fahrenheit + 459.67	°F	39	5
ρ_i , Density of the infiltration air, based on 55% RH	$\frac{lb}{ft^3}$	0.074	0.075
h_i, Enthalpy of the infiltrating air, based on 55% RH.	$\frac{Btu}{lb}$	25.227	23.087
ρ_r, Density of the refrigerated air, based on 80% RH.	$\frac{lb}{ft^3}$	0.079	0.085
h_r , Enthalpy of the refrigerated air, based on 80% RH.	$\frac{Btu}{lb}$	13.750	2.081
COP_{adj}, Time-dependent (weather dependent) coefficient of performance of the refrigeration system. Based on nominal COP of 1.5 for freezers and 2.5 for coolers.	None	3.07	1.95

Strip Curtains Retrofit kWh Savings Calculations

Type	*Total square footage*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
Cooler	21	422	459	109%
Total		422	459	109%

Strip Curtains Retrofit kW Savings Calculations

Type	*Total square footage*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
Cooler	21	0.05	0.05	105%
Total		0.05	0.05	105%

Results

The kWh realization rate for project #PRJ-417337 is 109% and the kW realization rate is 105%.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
Strip Curtains	459	0.05	109%	105%
Total	459	0.05	109%	105%

Difference in realization due to the ex ante calculations using deemed savings of 422 kWh savings per door while the ex post calculations use site-specific variables, assumptions, and measurements to calculate the savings.

Project Number PRJ-462424
Program Small Business Solutions

Project Background

The participant is a supermarket that received incentives from Entergy New Orleans for implementing energy efficient refrigeration measures. On-site, the Evaluators verified the participant had installed:

- 20 square feet of strip curtains

M&V Methodology

On-site, Evaluators verified the presence of all strip curtains listed on the project application. Savings for the refrigeration measures were calculated using Tamm's Equation and the ASHRAE handbook site-specific inputs. Annual door opening hours, infiltrating air temperature, and refrigerated air temperature were gathered by on-site monitoring as well.

.

Strip Curtain Savings Parameters

Building Type	*Refrigeration Type*	*Time Open (Minutes/day)*	*Infiltrating Air Temperature*	*Refrigerated Air Temperature*
Supermarket	Cooler	3.65	67	34

Savings Calculations

The annual energy savings due to the strip curtains is quantified by multiplying savings per square foot by cooler door area. The source algorithm from which the savings per square foot values are determined is based on Tamm's equation (an application of Bernoulli's equation) and the ASHRAE handbook. Savings were calculated using the following equation:

$$\frac{\Delta kWh}{sqft} = \frac{365 \times t_{open} \times (\eta_{new} - \eta_{old}) \times 20 \times CD \times A \times \left\{\left[\frac{(T_i - T_r)}{T_i}\right] \times g \times H\right\}^{0.5} \times [\rho_i \times h_i - \rho_r \times h_r]}{3{,}412 \frac{Btu}{kWh} \times COP_{adj} \times A}$$

In general, refrigeration is constant for food storage, even outside of normal operating conditions. Therefore, peak demand savings were calculated as follows:

$$\frac{\Delta kW_{peak}}{sqft} = \frac{\Delta kWh}{8{,}760}$$

The calculation assumptions are detailed in the following table.

Strip Curtain Calculation Assumptions for a Supermarket

Term	*Unit*	*Values*	
		Cooler	*Freezer*
η_{new} , Efficacy of the new strip curtain – an efficacy of 1 corresponds to the strip curtain thwarting all infiltration, while an efficacy of zero corresponds to the absence of strip curtains.	None	0.88	0.88
η_{old} , Efficacy of the old strip curtain with Pre-existing curtain with no Pre-existing curtain unknown	None	 0.58 0.00 0.00	 0.58 0.00 0.00
C_d , Discharge Coefficient: empirically determined scale factors that account for differences between infiltration as rates predicted by application Bernoulli's law and actual observed infiltration rates	None	0.366	0.415
t_{open} , Minutes walk-in door is open per day	$\frac{minutes}{day}$	132	102
A , Doorway area	ft^2	35	35
H, Doorway height	ft	7	7
T_i, Dry-bulb temperature of infiltrating air, Rankine = Fahrenheit + 459.67	°F	71	67
T_r, Dry-bulb temperature of refrigerated air, Rankine = Fahrenheit + 459.67	°F	37	5
ρ_i , Density of the infiltration air, based on 55% RH	$\frac{lb}{ft^3}$	0.074	0.074
h_i, Enthalpy of the infiltrating air, based on 55% RH.	$\frac{Btu}{lb}$	26.935	24.678
ρ_r, Density of the refrigerated air, based on 80% RH.	$\frac{lb}{ft^3}$	0.079	0.085
h_r , Enthalpy of the refrigerated air, based on 80% RH.	$\frac{Btu}{lb}$	12.933	2.081
COP_{adj}, Time-dependent (weather dependent) coefficient of performance of the refrigeration system. Based on nominal COP of 1.5 for freezers and 2.5 for coolers.	None	3.07	1.95

Strip Curtain Retrofit kWh Savings Calculations

Type	*Total square footage*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
Cooler	20	422	58	14%

Total	422	58	14%

Strip Curtain Retrofit kW Savings Calculations

Type	*Total square footage*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
Cooler	20	0.05	0.01	13%
Total		0.05	0.01	13%

Results

The kWh realization rate for project #PRJ-417337 is 14% and the kW realization rate is 13%.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
Strip Curtains	58	0.01	14%	13%
Total	58	0.01	14%	13%

Difference in realization due to the ex ante calculations using deemed savings of 422 kWh savings per door while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.

The strip curtain measure's low realization rate can most be attributed to the ex post calculations using monitored data where the door was opened much less compared to stipulated deemed values (about 4 minutes per day compared to the deemed assumptions 132 minutes per day). If the ex ante deemed values were based on the average door open time, they would result in much higher savings compared to the ex post calculated savings.

Project Number PRJ-425594
Program Small Business

Project Background

The participant is a retail facility that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (6) 18W LED tubes, replacing 4' 4-Lamp Fluorescent ES Fixtures

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated using annual Hours of Operation (AOH) and peak coincidence factor (CF) developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Retail: Other	Gas	2,764	1.09	1.20	88%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F44EE to LED018-FIXT	3	6	144	18	2,764	1,295	976	1.09	75.4%
					Total	1,295	976		75.4%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F44EE to LED018-FIXT	3	6	144	18	0.88	0.35	0.34	1.20	97.8%
					Total	0.35	0.34		97.8%

Results

The kWh realization rate for project PRJ-425594 is 75.4% and the kW realization rate is 97.8%.

The kWh realization rate is low based on lighting logger information collected on site. The ex-ante calculation used deemed hours of 3,668 hours for this building type; the ex post calculation used verified annual hours of 2,764 hours.

The kW realization rate is low because the ex-ante used a 90% coincidence factor, while the ex-post calculation used an 88% coincidence factor, also based on lighting logger data.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
F44EE to LED018-FIXT	976	0.34	75.4%	97.8%
Total	976	0.34	75.4%	97.8%

Project Number PRJ-422409
Program Small Business Solutions

Project Background

The participant is a convenience store that received incentives from Entergy New Orleans for implementing energy efficient refrigeration measures. On-site, the Evaluators verified the participant had installed:

- 40 square feet of strip curtains

M&V Methodology

On-site, Evaluators verified the presence of all strip curtains listed on the project application. Savings for the refrigeration measures were calculated using 3.5.9 Strip Curtains for Walk-In Freezers and Coolers in the Pennsylvania 2015 TRM with site specific assumptions. Annual door opening hours, infiltrating air temperature, and refrigerated air temperature were gathered by on-site monitoring data as well as during interviews with facility staff and can be seen below.

Strip Curtain Savings Parameters

Building Type	*Refrigeration Type*	*Time Open (Minutes/day)*	*Infiltrating Air Temperature*	*Refrigerated Air Temperature*
Convenience Store	Cooler	60	73	39
Convenience Store	Freezer	30	75	9

Savings Calculations

The annual energy savings due to the strip curtains is quantified by multiplying savings per square foot by cooler door area. The source algorithm from which the savings per square foot values are determined is based on Tamm's equation (an application of Bernoulli's equation) and the ASHRAE handbook. Savings were calculated using the following equation:

$$\frac{\Delta kWh}{sqft} = \frac{365 \times t_{open} \times (\eta_{new} - \eta_{old}) \times 20 \times CD \times A \times \left\{\left[\frac{(T_i - T_r)}{T_i}\right] \times g \times H\right\}^{0.5} \times [\rho_i \times h_i - \rho_r \times h_r]}{3{,}412 \frac{Btu}{kWh} \times COP_{adj} \times A}$$

In general, refrigeration is constant for food storage, even outside of normal operating conditions. Therefore, peak demand savings were calculated as follows:

$$\frac{\Delta kW_{peak}}{sqft} = \frac{\Delta kWh}{8{,}760}$$

The calculation assumptions are detailed in the following table.

Strip Curtain Calculation Assumptions for Convenience Stores

Term	*Unit*	*Values*	
		Cooler	*Freezer*
η_{new} , Efficacy of the new strip curtain – an efficacy of 1 corresponds to the strip curtain thwarting all infiltration, while an efficacy of zero corresponds to the absence of strip curtains.	None	0.79	0.83
η_{old} , Efficacy of the old strip curtain with Pre-existing curtain with no Pre-existing curtain unknown	None	0.58 0.00 0.34	0.58 0.00 0.30
C_d , Discharge Coefficient: empirically determined scale factors that account for differences between infiltration as rates predicted by application Bernoulli's law and actual observed infiltration rates	None	0.348	0.421
t_{open} , Minutes walk-in door is open per day	$\frac{\text{minutes}}{\text{day}}$	38	9
A , Doorway area	ft^2	21	21
H, Doorway height	ft	7	7
T_i, Dry-bulb temperature of infiltrating air, Rankine = Fahrenheit + 459.67	°F	68	64
T_r, Dry-bulb temperature of refrigerated air, Rankine = Fahrenheit + 459.67	°F	39	5
ρ_i , Density of the infiltration air, based on 55% RH	$\frac{lb}{ft^3}$	0.074	0.075
h_i, Enthalpy of the infiltrating air, based on 55% RH.	$\frac{Btu}{lb}$	25.227	23.087
ρ_r, Density of the refrigerated air, based on 80% RH.	$\frac{lb}{ft^3}$	0.079	0.085
h_r , Enthalpy of the refrigerated air, based on 80% RH.	$\frac{Btu}{lb}$	13.750	2.081
COP_{adj}, Time-dependent (weather dependent) coefficient of performance of the refrigeration system. Based on nominal COP of 1.5 for freezers and 2.5 for coolers.	None	3.07	1.95

Strip Curtain Retrofit kWh Savings Calculations

Type	*Total square footage*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
Cooler	20	422	659	156%
Freezer	20	2,974	1,816	61%
Total		3,396	2,474	73%

Strip Curtain Retrofit kW Savings Calculations

Type	*Total square footage*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
Cooler	20	0.05	0.08	150%
Freezer	20	0.35	0.21	59%
Total		0.40	0.28	71%

Results

The kWh realization rate for project #PRJ-422409 is 73% and the kW realization rate is 71%.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
Strip Curtains	2,474	0.28	73%	71%
Total	2,474	0.28	73%	71%

Difference in realization due to the ex ante calculations using deemed savings of 422 kWh savings per refrigerator door and 2,974 kWh savings per freezer door for the strip curtains while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.

Project Number PRJ-403690
Program Small Business Solutions

Project Background

The participant is a convenience store that received incentives from Entergy New Orleans for implementing energy efficient refrigeration and kitchen measures. On-site, the Evaluators verified the participant had installed:

- 52 square feet of strip curtains
- 1 pre rinse spray valves (PRSV)

M&V Methodology

Strip Curtains

On-site, Evaluators verified the presence of all strip curtains listed on the project application. Savings for the refrigeration measures were calculated using 3.5.9 Strip Curtains for Walk-In Freezers and Coolers in the Pennsylvania 2015 TRM with site specific assumptions. Daily door open hours, infiltrating air temperature, and refrigerated air temperature were gathered by on-site monitoring data as well as during interviews with facility staff and can be seen below.

Strip Curtain Savings Parameters

Building Type	*Refrigeration Type*	*Time Open (Minutes/day)*	*Infiltrating Air Temperature*	*Refrigerated Air Temperature*
Convenience Store	Cooler	38	72	32
Convenience Store	Freezer	9	72	5

Pre Rinse Spray Valves

Evaluators also verified the presence of all pre rinse spray values listed on the project application. Savings for the refrigeration measures were calculated using 3.8.9 Low-Flow Pre-Rinse Spray Valves in the Arkansas TRM v5.0 with New Orleans-specific assumptions seen below.

PRSV Savings Parameters

Building Type	*Fuel Type*	*Average Cold Water Supply Temp*
Fast Food	Electric	61.9

Savings Calculations

Strip Curtains

The annual energy savings due to the strip curtains is quantified by multiplying savings per square foot by cooler door area. The source algorithm from which the savings per square foot values are determined is based on Tamm's equation (an application of Bernoulli's equation) and the ASHRAE handbook. Savings were calculated using the following equation:

$$\frac{\Delta kWh}{sqft} = \frac{365 \times t_{open} \times (\eta_{new} - \eta_{old}) \times 20 \times CD \times A \times \left\{\left[\frac{(T_i - T_r)}{T_i}\right] \times g \times H\right\}^{0.5} \times [\rho_i \times h_i - \rho_r \times h_r]}{3{,}412 \frac{Btu}{kWh} \times COP_{adj} \times A}$$

In general, refrigeration is constant for food storage, even outside of normal operating conditions. Therefore, peak demand savings were calculated as follows:

$$\frac{\Delta kW_{peak}}{sqft} = \frac{\Delta kWh}{8{,}760}$$

The calculation assumptions are detailed in the following table.

Strip Curtain Calculation Assumptions for Convenience Stores

Term	*Unit*	*Values*	
		Cooler	*Freezer*
η_{new} , Efficacy of the new strip curtain – an efficacy of 1 corresponds to the strip curtain thwarting all infiltration, while an efficacy of zero corresponds to the absence of strip curtains.	None	0.79	0.83
η_{old} , Efficacy of the old strip curtain with Pre-existing curtain with no Pre-existing curtain unknown	None	0.58 0.00 0.34	0.58 0.00 0.30
C_d , Discharge Coefficient: empirically determined scale factors that account for differences between infiltration as rates predicted by application Bernoulli's law and actual observed infiltration rates	None	0.348	0.421
t_{open} , Minutes walk-in door is open per day	$\frac{\text{minutes}}{\text{day}}$	38	9
A , Doorway area	ft^2	21	21
H, Doorway height	ft	7	7

T_i, Dry-bulb temperature of infiltrating air, Rankine = Fahrenheit + 459.67	°F	68	64
T_r, Dry-bulb temperature of refrigerated air, Rankine = Fahrenheit + 459.67	°F	39	5
ρ_i , Density of the infiltration air, based on 55% RH	$\frac{lb}{ft^3}$	0.074	0.075
h_i, Enthalpy of the infiltrating air, based on 55% RH.	$\frac{Btu}{lb}$	25.227	23.087
ρ_r, Density of the refrigerated air, based on 80% RH.	$\frac{lb}{ft^3}$	0.079	0.085
h_r , Enthalpy of the refrigerated air, based on 80% RH.	$\frac{Btu}{lb}$	13.750	2.081
COP_{adj}, Time-dependent (weather dependent) coefficient of performance of the refrigeration system. Based on nominal COP of 1.5 for freezers and 2.5 for coolers.	None	3.07	1.95

Strip Curtains Retrofit kWh Savings Calculations

Type	*Total square footage*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
Cooler	26	422	162	38.5%
Freezer	26	2,974	225	7.6%
Total		3,396	387	11.4%

Strip Curtains Retrofit kW Savings Calculations

Type	*Total square footage*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
Cooler	26	0.05	0.019	37.1%
Freezer	26	0.35	0.026	7.3%
Total		0.40	0.044	11.1%

Pre Rinse Spray Valves

The annual energy savings due to the pre rinse spray valves is calculated using 3.8.9 Low-Flow Pre-Rinse Spray Valves in the Arkansas TRM 3.0. Savings were calculated using the following equations:

$$Annual\ kWh\ Savings = \frac{\rho \times C_P \times U \times (F_B - F_P) \times (T_H - T_{Supply}) \times \frac{1}{E_t} \times \frac{Days}{Year}}{\frac{3412BTU}{kWh}}$$

$$Peak\ kW\ Savings = \frac{\rho \times C_P \times U \times (F_B - F_P) \times (T_H - T_{Supply}) \times \frac{1}{E_t} \times P}{\frac{3412BTU}{kWh}}$$

The calculation assumptions are detailed below:

PRSV Calculation Assumptions

Parameter	Description	Value
F_B	Average baseline flow rate of sprayer (GPM)	2.25
F_P	Average post measure flow rate of sprayer (GPM)	1.28
$Days/Year$	Annual operating days for the applications: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 365 365 365 274 200
$Tsupply$	Average supply (cold) water temperature (°F)	61.9
T_H	Average mixed hot water (after spray valve) temperature (°F)	120
U_B	Baseline water usage duration for the following applications: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 45 min/day/unit 105 min/day/unit 210 min/day/unit 210 min/day/unit 105 min/day/unit
ρ	Density of water 8.33 BTU/Gallon	8.33
C_P	Heat capacity of water, 1 BTU/lb°F	1
E_t	Thermal efficiency of water heater	Default value 0.98 for electric and 0.80 for gas
P	Hourly peak demand as a fraction of daily water consumption: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 0.05 0.04 0.03 0.04 0.05

PRSV Retrofit kWh Savings Calculations

Type	*Fuel Type*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
PRSV	Electric	1,794	2,306	128.5%
Total		1,794	2,306	128.5%

PRSV Retrofit kW Savings Calculations

Type	*Fuel Type*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
PRSV	Electric	0.25	0.32	128.4%
Total		0.25	0.32	128.4%

Results

The overall kWh realization rate for project #PRJ-403690 is 51.9% and the kW realization rate is 55.4%.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
Strip Curtains	387	0.4	11.40%	11.10%
Pre Rinse Spray Valves	2,306	0.32	128.5%	128.4%
Total	2,693	0.36	51.9%	55.4%

Difference in realization due to the ex ante calculations using deemed savings of 422 kWh savings per door for the strip curtains and 1,794 kWh savings per valve for the PRSV, while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.

Project Number PRJ-438782
Program Small Business Solutions

Project Background

The participant is a restaurant that received incentives from Entergy New Orleans for implementing energy efficient refrigeration and kitchen measures. On-site, the Evaluators verified the participant had installed:

- 21 square feet of strip curtains
- 2 pre rinse spray valves (PRSV)

M&V Methodology

Strip Curtains

On-site, Evaluators verified the presence of all strip curtains listed on the project application. Savings for the refrigeration measures were calculated using 3.5.9 Strip Curtains for Walk-In Freezers and Coolers in the Pennsylvania 2015 TRM with site specific assumptions. Daily door open hours, infiltrating air temperature, and refrigerated air temperature were gathered by on-site monitoring data as well as during interviews with facility staff and can be seen below.

Strip Curtain Savings Parameters

Building Type	*Refrigeration Type*	*Time Open (Minutes/day)*	*Infiltrating Air Temperature*	*Refrigerated Air Temperature*
Restaurant	Freezer	6	74	2

Pre Rinse Spray Valves

Evaluators also verified the presence of all pre rinse spray values listed on the project application. Pre rinse spray valves save energy by reducing hot water usage and save energy associated with heating the water. Savings for the kitchen measures were calculated using 3.8.9 Low-Flow Pre-Rinse Spray Valves in the Arkansas TRM v5.0 with New Orleans-specific assumptions seen below.

PRSV Savings Parameters

Building Type	*Fuel Type*	*Average Cold Water Supply Temp*	*Door Open (min/day)*
Casual Dining Restaurant	Electric	61.9	6.023

Savings Calculations

Strip Curtains

The annual energy savings due to the strip curtains is quantified by multiplying savings per square foot by cooler door area. The source algorithm from which the savings per square foot values are determined is based on Tamm's equation (an application of Bernoulli's equation) and the ASHRAE handbook. Savings were calculated using the following equation:

$$\frac{\Delta kWh}{sqft} = \frac{365 \times t_{open} \times (\eta_{new} - \eta_{old}) \times 20 \times CD \times A \times \left\{\left[\frac{(T_i - T_r)}{T_i}\right] \times g \times H\right\}^{0.5} \times [\rho_i \times h_i - \rho_r \times h_r]}{3{,}412 \frac{Btu}{kWh} \times COP_{adj} \times A}$$

In general, refrigeration is constant for food storage, even outside of normal operating conditions. Therefore, peak demand savings were calculated as follows:

$$\frac{\Delta kW_{peak}}{sqft} = \frac{\Delta kWh}{8{,}760}$$

The calculation assumptions are detailed in the following table.

Strip Curtain Calculation Assumptions for Restaurants

Term	*Unit*	*Values*	
		Cooler	*Freezer*
η_{new} , Efficacy of the new strip curtain – an efficacy of 1 corresponds to the strip curtain thwarting all infiltration, while an efficacy of zero corresponds to the absence of strip curtains.	None	0.80	0.81
η_{old} , Efficacy of the old strip curtain with Pre-existing curtain with no Pre-existing curtain unknown	None	0.58 0.00 0.33	0.58 0.00 0.26
C_d , Discharge Coefficient: empirically determined scale factors that account for differences between infiltration as rates predicted by application Bernoulli's law and actual observed infiltration rates	None	0.383	0.442
t_{open} , Minutes walk-in door is open per day	$\frac{\text{minutes}}{\text{day}}$	45	38
A , Doorway area	ft^2	21	21
H, Doorway height	ft	7	7

T_i, Dry-bulb temperature of infiltrating air, Rankine = Fahrenheit + 459.67	°F	70	67
T_r, Dry-bulb temperature of refrigerated air, Rankine = Fahrenheit + 459.67	°F	39	8
ρ_i , Density of the infiltration air, based on 55% RH	$\frac{lb}{ft^3}$	0.074	0.074
h_i, Enthalpy of the infiltrating air, based on 55% RH.	$\frac{Btu}{lb}$	26.356	24.678
ρ_r, Density of the refrigerated air, based on 80% RH.	$\frac{lb}{ft^3}$	0.079	0.085
h_r , Enthalpy of the refrigerated air, based on 80% RH.	$\frac{Btu}{lb}$	13.750	2.948
COP_{adj}, Time-dependent (weather dependent) coefficient of performance of the refrigeration system. Based on nominal COP of 1.5 for freezers and 2.5 for coolers.	None	3.07	1.95

Strip Curtains Retrofit kWh Savings Calculations

Type	*Total square footage*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
Freezer	21	2,974	123	4%
Total		2,974	123	4%

Strip Curtains Retrofit kW Savings Calculations

Type	*Total square footage*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
Freezer	21	0.35	0.01	4%
Total		0.35	0.01	4%

Pre Rinse Spray Valves

The annual energy savings due to the pre rinse spray valves is calculated using 3.8.9 Low-Flow Pre-Rinse Spray Valves in the Arkansas TRM 3.0. Savings were calculated using the following equations:

$$Annual\ kWh\ Savings = \frac{\rho \times C_P \times U \times (F_B - F_P) \times (T_H - T_{Supply}) \times \frac{1}{E_t} \times \frac{Days}{Year}}{\frac{3412 BTU}{kWh}}$$

$$Peak\ kW\ Savings = \frac{\rho \times C_P \times U \times (F_B - F_P) \times (T_H - T_{Supply}) \times \frac{1}{E_t} \times P}{\frac{3412 BTU}{kWh}}$$

The calculation assumptions are detailed below:

PRSV Calculation Assumptions

Parameter	Description	Value
F_B	Average baseline flow rate of sprayer (GPM)	2.25
F_P	Average post measure flow rate of sprayer (GPM)	1.28
$Days/Year$	Annual operating days for the applications: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 365 365 365 274 200
$Tsupply$	Average supply (cold) water temperature (°F)	61.9
T_H	Average mixed hot water (after spray valve) temperature (°F)	120
U_B	Baseline water usage duration for the following applications: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 45 min/day/unit 105 min/day/unit 210 min/day/unit 210 min/day/unit 105 min/day/unit
ρ	Density of water 8.33 BTU/Gallon	8.33
C_P	Heat capacity of water, 1 BTU/lb°F	1
E_t	Thermal efficiency of water heater	Default value 0.98 for electric and 0.80 for gas
P	Hourly peak demand as a fraction of daily water consumption: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 0.05 0.04 0.03 0.04 0.05

PRSV Retrofit kWh Savings Calculations

Type	*Fuel Type*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
PRSV	Electric	3,588	10,761	300%
Total		3,588	10,761	300%

PRSV Retrofit kW Savings Calculations

Type	*Fuel Type*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
PRSV	Electric	0.49	1.18	240%
Total		0.49	1.18	240%

Results

The overall kWh realization rate for project #PRJ-438782 is 166% and the kW realization rate is 142%.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
Strip Curtains	123	0.01	4%	4%
Pre Rinse Spray Valves	10,761	1.18	300%	240%
Total	10,884	1.19	166%	142%

Difference in realization due to the ex ante calculations using deemed savings of 422 kWh savings per door for the strip curtains and 1,794 kWh savings per valve for the PRSV, while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.

The strip curtain measure's low realization rate can most be attributed to the ex post calculations using monitored data where the door was opened much less compared to the 2015 PA TRM average (about 6 minutes per day compared to the PA 2015 TRM average of 38 minutes per day). If the ex ante deemed values were based on the average door open time, they would result in much higher savings compared to the ex post calculated savings.

The pre rinse spray valve measure's high realization rate can be attributed to the ex ante calculations using deemed values for a fast food restaurant while the ex post calculations use values and assumptions for a sit down restaurant.

Project Number PRJ-422310
Program Small Business Solutions

Project Background

The participant is a restaurant that received incentives from Entergy New Orleans for implementing energy efficient refrigeration and kitchen measures. On-site, the Evaluators verified the participant had installed:

- 40 square feet of strip curtains
- 2 pre rinse spray valves (PRSV)
- 18 10W LED - Int. Ballast, replacing 18 65W 1-Lamp Halogen with DC - multiple step dimming

M&V Methodology

Strip Curtains

On-site, Evaluators verified the presence of all strip curtains listed on the project application. Savings for the refrigeration measures were calculated using 3.5.9 Strip Curtains for Walk-In Freezers and Coolers in the Pennsylvania 2015 TRM with site specific assumptions. Infiltrating air temperature and refrigerated air temperature were gathered on-site during interviews with facility staff and can be seen below.

Strip Curtain Savings Parameters

Building Type	*Refrigeration Type*	*Time Open (Minutes/day)*	*Infiltrating Air Temperature*	*Refrigerated Air Temperature*
Restaurant	Cooler	45	74	38
Restaurant	Freezer	38	74	19

Pre Rinse Spray Valves

Evaluators also verified the presence of all pre rinse spray values listed on the project application. Pre rinse spray valves save energy by reducing hot water usage and save energy associated with heating the water. However, there are no kWh savings for this measure because the water is heated with a gas water heater.

Lighting

Evaluators also verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated using hours of use cited from the Arkansas TRM 5.0 with New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors. Annual lighting hours of operation (AOH) and peak coincidence factor (CF) were developed by extrapolating on-site monitoring data as well as interviews with facility staff.

Lighting Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Food Service: Sit-Down Restaurant	Gas	2,329	1.09	1.20	0.54

Savings Calculations

Strip Curtains

The annual energy savings due to the strip curtains is quantified by multiplying savings per square foot by cooler door area. The source algorithm from which the savings per square foot values are determined is based on Tamm's equation (an application of Bernoulli's equation) and the ASHRAE handbook. Savings were calculated using the following equation:

$$\frac{\Delta kWh}{sqft} = \frac{365 \times t_{open} \times (\eta_{new} - \eta_{old}) \times 20 \times CD \times A \times \left\{\left[\frac{(T_i - T_r)}{T_i}\right] \times g \times H\right\}^{0.5} \times [\rho_i \times h_i - \rho_r \times h_r]}{3{,}412 \frac{Btu}{kWh} \times COP_{adj} \times A}$$

In general, refrigeration is constant for food storage, even outside of normal operating conditions. Therefore, peak demand savings were calculated as follows:

$$\frac{\Delta kW_{peak}}{sqft} = \frac{\Delta kWh}{8{,}760}$$

The calculation assumptions are detailed in the following table.

Strip Curtain Calculation Assumptions for Restaurants

Term	*Unit*	*Values*	
		Cooler	*Freezer*
η_{new} , Efficacy of the new strip curtain – an efficacy of 1 corresponds to the strip curtain thwarting all infiltration, while an efficacy of zero corresponds to the absence of strip curtains.	None	0.80	0.81
η_{old} , Efficacy of the old strip curtain with Pre-existing curtain with no Pre-existing curtain unknown	None	0.58 0.00 0.33	0.58 0.00 0.26
C_d , Discharge Coefficient: empirically determined scale factors that account for differences between infiltration as rates predicted by application Bernoulli's law and actual observed infiltration rates	None	0.383	0.442

t_{open} , Minutes walk-in door is open per day	$\frac{minutes}{day}$	45	38
A , Doorway area	ft^2	21	21
H, Doorway height	ft	7	7
T_i, Dry-bulb temperature of infiltrating air, Rankine = Fahrenheit + 459.67	°F	70	67
T_r, Dry-bulb temperature of refrigerated air, Rankine = Fahrenheit + 459.67	°F	39	8
ρ_i , Density of the infiltration air, based on 55% RH	$\frac{lb}{ft^3}$	0.074	0.074
h_i, Enthalpy of the infiltrating air, based on 55% RH.	$\frac{Btu}{lb}$	26.356	24.678
ρ_r, Density of the refrigerated air, based on 80% RH.	$\frac{lb}{ft^3}$	0.079	0.085
h_r , Enthalpy of the refrigerated air, based on 80% RH.	$\frac{Btu}{lb}$	13.750	2.948
COP_{adj}, Time-dependent (weather dependent) coefficient of performance of the refrigeration system. Based on nominal COP of 1.5 for freezers and 2.5 for coolers.	None	3.07	1.95

Strip Curtains Retrofit kWh Savings Calculations

Type	*Total square footage*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
Cooler	20	422	632	149.8%
Freezer	20	2,974	2,212	74.4%
Total		3,396	2,843	83.7%

Strip Curtains Retrofit kW Savings Calculations

Type	*Total square footage*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
Cooler	20	0.05	0.0721	144.2%
Freezer	20	0.35	0.2525	72.1%
Total		0.40	0.3246	81.1%

Pre Rinse Spray Valves

No kWh savings were realized for this measure because the water is heated with a gas hot water heater.

PRSV Retrofit kWh Savings Calculations

Type	*Fuel Type*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
PRSV	Gas	3,588	0	0.0%
Total		3,588	0	0.0%

PRSV Retrofit kW Savings Calculations

Type	Fuel Type	Expected kW Savings	kW Savings	Realization Rate
PRSV	Gas	0.49	0	0.0%
Total		0.49	0	0.0%

Lighting

Savings for the lighting measures were calculated using the the following equations:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Lighting Calculation kWh Assumptions

Term	Value
kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Lighting Calculation kW Assumptions

Term	Value
kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	Quantity (Fixtures)		Wattage		AOH	Expected kWh Savings	Realized kWh Savings	IEF_E	Realization Rate
	Base	Post	Base	Post					
H65/1 to LED010-SCRW	18	18	65	10	2,329	3,771	2,513	1.09	66.6%
					Total	3,771	2,513		66.6%

Lighting Retrofit kW Savings Calculations

Measure	Quantity (Fixtures)		Wattage		CF	Expected kW Savings	Realized kW Savings	IEF_D	Realization Rate
	Base	Post	Base	Post					
H65/1 to LED010-SCRW	18	18	65	10	0.54	0.77	0.64	1.20	83.3%
					Total	0.77	0.64		83.3%

Results

The overall kWh realization rate for project #PRJ-422310 is 50% and the kW realization rate is 58%.

Verified Gross Savings & Realization Rates

Measure	Verified			
	kWh Savings	kW Savings	kWh Realization Rate	kW Realization Rate
Strip Curtains	2,843	0.32	83.7%	81.1%
Pre Rinse Spray Valves	0	0.00	0.0%	0.0%
Lighting	2,513	0.642	66.6%	83.3%
Total	5,356	0.966	49.8%	58.2%

Difference in realization due to the ex ante calculations using deemed savings of 422 kWh savings per refrigerator door and 2,974 kWh savings per freezer door for the strip curtains and 1,794 kWh savings per valve for the PRSV, while the ex post calculations use site specific variables, assumptions, and measurements to calculate the savings.

The pre rinse spray valve savings are zero because the hot water heater is a gas hot water heater; therefore no kWh savings are realized.

The low lighting savings is due the ex post calculations using verified hours of operation of 2,329. The ex ante estimations used 4,368 hours. Through monitoring, the Evaluators also verified the CF value the building type is 0.54 as opposed to the ex ante value of 0.81.

Project Number PRJ-394957
Program Small Business

Project Background

The participant is an office building that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (5) 12W LED - Int. Ballast, replacing (5) 23W CFL;
- (2) 12W LED - Int. Ballast, replacing (2) 65W 1-Lamp Halogen;
- (4) 12W LED - Int. Ballast, replacing (4) 60W incandescent;
- (2) 12W LED - Int. Ballast, replacing (2) 65W 1-Lamp Halogen;
- (2) 12W LED - Int. Ballast, replacing (2) 60W incandescent;
- (1) 12W LED - Int. Ballast, replacing (2) 23W CFL;
- (1) 12W LED - Int. Ballast, replacing (1) 23W CFL;
- (1) 12W LED - Int. Ballast, replacing (1) 90W 1-Lamp Halogen;
- (1) 12W LED - Int. Ballast, replacing (1) 65W 1-Lamp Halogen;
- (1) 12W LED - Int. Ballast, replacing (1) 100W incandescent;
- (8) 12W LED - Int. Ballast, replacing (8) 65W 1-Lamp Halogen;
- (2) 12W LED - Int. Ballast, replacing (2) 65W 1-Lamp Halogen;
- (6) 12W LED - Int. Ballast, replacing (5) 65W 1-Lamp Halogen;
- (1) 12W LED - Int. Ballast, replacing (1) 65W 1-Lamp;
- (1) 8W LED - Int. Ballast, replacing (1) 100W incandescent; and
- (4) 17W LED - Int. Ballast, replacing (2) 300W 1-Lamp Halogen.

On-site, the Evaluators could not verify:

- (1) 12W LED - Int. Ballast, replacing (1) 100W incandescent;
- (2) 12W LED - Int. Ballast, replacing (2) 23W CFL with;
- (6) 12W LED - Int. Ballast, replacing (6) 65W 1-Lamp Halogen;
- (6) 12W LED - Int. Ballast, replacing (6) 90W 1-Lamp Halogen;
- (2) 8W LED - Int. Ballast, replacing (2) 100W incandescent with occupancy sensor; and
- (3) Occupancy sensors.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated annual Hours of Operation (AOH) and peak coincidence factor (CF) developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Office	Electric Resistance	2,401	0.87	1.20	0.77
Office	Electric Resistance	518	0.87	1.20	0.01
Office	Electric Resistance	2,006	0.87	1.20	0.35
Office	Electric Resistance	1.984	0.87	1.20	0.56
Exterior	None	3,996	1.00	1.00	0%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total InstalLED fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of InstalLED Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total InstalLED fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
CF23/1-SCRW to LED012-scrw	5	5	23	12	2,401	201	115	0.87	57.0%
H65/1 to LED012-scrw	2	2	65	12	2,401	388	221	0.87	57.0%
I60/1 to LED012-scrw	4	4	43	12	2,401	703	259	0.87	36.8%
H65/1 to LED012-scrw	2	2	65	12	518	388	48	0.87	12.3%
I60/1 to LED012-scrw	2	2	43	12	518	352	28	0.87	7.9%
I100/1 to LED008-scrw	0	0	72	8	518	337	0	0.87	0.0%
CF23/1-SCRW to LED012-scrw	2	1	23	12	518	81	15	0.87	19.0%
CF23/1-SCRW to LED012-scrw	1	1	23	12	518	40	5	0.87	12.3%
H90/1 to LED012-scrw	1	1	72	12	518	286	27	0.87	9.5%
H65/1 to LED012-scrw	1	1	65	12	518	194	24	0.87	12.3%
I100/1 to LED012-scrw	1	1	72	12	518	322	27	0.87	8.4%
H90/1 to LED012-scrw	0	0	72	12	2,006	1,714	0	0.87	0.0%
H65/1 to LED012-scrw	8	8	65	12	2,006	1,553	740	0.87	47.6%
H65/1 to LED012-scrw	2	2	65	12	2,006	388	185	0.87	47.6%
I100/1 to LED012-scrw	0	0	72	12	2,006	322	0	0.87	0.0%
H65/1 to LED012-scrw	5	6	65	12	2,401	970	529	0.87	54.5%
H65/1 to LED012-scrw	0	0	65	12	2,401	970	0	0.87	0.0%
CF23/1-SCRW to LED012-scrw	0	0	23	12	518	81	0	0.87	0.0%
H65/1 to LED012-scrw	1	1	65	12	1,984	207	91	0.87	44.1%
I100/1 to LED008-scrw	1	1	72	8	1,984	346	110	0.87	31.9%
H65/1 to LED012-scrw	0	0	65	12	1,984	207	0	0.87	0.0%
I100/1 to LED008-scrw	0	0	72	8	1,984	691	0	0.87	0.0%
H300/1 to LED017-scrw	2	4	300	17	4,319	2,058	2,298	1.00	111.7%

Total	12,801	4,722		36.9%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
CF23/1-SCRW to LED012-scrw	5	5	23	12	0.77	0.05	0.05	1.20	100.0%
H65/1 to LED012-scrw	2	2	65	12	0.77	0.10	0.10	1.20	100.0%
I60/1 to LED012-scrw	4	4	43	12	0.77	0.18	0.11	1.20	64.6%
H65/1 to LED012-scrw	2	2	65	12	0.01	0.10	0.00	1.20	1.3%
I60/1 to LED012-scrw	2	2	43	12	0.01	0.09	0.00	1.20	0.8%
I100/1 to LED008-scrw	0	0	72	8	0.01	0.09	0.00	1.20	0.0%
CF23/1-SCRW to LED012-scrw	2	1	23	12	0.01	0.02	0.00	1.20	2.0%
CF23/1-SCRW to LED012-scrw	1	1	23	12	0.01	0.01	0.00	1.20	1.3%
H90/1 to LED012-scrw	1	1	72	12	0.01	0.07	0.00	1.20	1.0%
H65/1 to LED012-scrw	1	1	65	12	0.01	0.05	0.00	1.20	1.3%
I100/1 to LED012-scrw	1	1	72	12	0.01	0.08	0.00	1.20	0.9%
H90/1 to LED012-scrw	0	0	72	12	0.35	0.43	0.00	1.20	0.0%
H65/1 to LED012-scrw	8	8	65	12	0.35	0.39	0.18	1.20	45.3%
H65/1 to LED012-scrw	2	2	65	12	0.35	0.10	0.04	1.20	45.3%
I100/1 to LED012-scrw	0	0	72	12	0.35	0.08	0.00	1.20	0.0%
H65/1 to LED012-scrw	5	6	65	12	0.77	0.24	0.23	1.20	95.5%
H65/1 to LED012-scrw	0	0	65	12	0.77	0.24	0.00	1.20	0.0%
CF23/1-SCRW to LED012-scrw	0	0	23	12	0.01	0.02	0.00	1.20	0.0%
H65/1 to LED012-scrw	1	1	65	12	0.56	0.05	0.04	1.20	68.6%
I100/1 to LED008-scrw	1	1	72	8	0.56	0.09	0.04	1.20	49.6%
H65/1 to LED012-scrw	0	0	65	12	0.56	0.05	0.00	1.20	0.0%

I100/1 to LED008-scrw	0	0	72	8	0.56	0.17	0.00	1.20	0.0%
H300/1 to LED017-scrw	2	4	300	17	0.00	0.00	0.00	1.00	N/A
					Total	2.71	0.80		29.6%

Results

The kWh realization rate for project PRJ-394957 is 37.0% and the kW realization rate is 29.6%.

The low kWh realization rate is due to three reasons:

1) (17) Fixtures and (3) occupancy sensors could not be found on-site.
2) The ex post calculations incorporated EISA 2007 lighting standards for 60W, 100W incandescent lamps and 90W halogen lamps. This revised baseline wattages from 60W to 43W, from 100W to 72W, and 90W to 72W.
3) Through monitoring and on site verification, the ex post calculations used verified AOH for various spaces in the building. The verified AOH is lower than the deemed AOH used in the ex ante estimations.

The low kW realization rate is due to reasons 1) and 2) detailed above for kWh. In addition:

4) Through monitoring and on site verification, the ex post calculations used verified CF for various spaces in the building. The verified CF is lower than the deemed CF used in the ex ante estimations.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
CF23/1-SCRW to LED012-scrw	115	0.05	57.0%	100.0%
H65/1 to LED012-scrw	221	0.10	57.0%	100.0%
I60/1 to LED012-scrw	259	0.11	36.8%	64.6%
H65/1 to LED012-scrw	48	0.00	12.3%	1.3%
I60/1 to LED012-scrw	28	0.00	7.9%	0.8%
I100/1 to LED008-scrw	0	0.00	0.0%	0.0%
CF23/1-SCRW to LED012-scrw	15	0.00	19.0%	2.0%
CF23/1-SCRW to LED012-scrw	5	0.00	12.3%	1.3%
H90/1 to LED012-scrw	27	0.00	9.5%	1.0%
H65/1 to LED012-scrw	24	0.00	12.3%	1.3%
I100/1 to LED012-scrw	27	0.00	8.4%	0.9%
H90/1 to LED012-scrw	0	0.00	0.0%	0.0%
H65/1 to LED012-scrw	740	0.18	47.6%	45.3%

H65/1 to LED012-scrw	185	0.04	47.6%	45.3%
I100/1 to LED012-scrw	0	0.00	0.0%	0.0%
H65/1 to LED012-scrw	529	0.23	54.5%	95.5%
H65/1 to LED012-scrw	0	0.00	0.0%	0.0%
CF23/1-SCRW to LED012-scrw	0	0.00	0.0%	0.0%
H65/1 to LED012-scrw	91	0.04	44.1%	68.6%
I100/1 to LED008-scrw	110	0.04	31.9%	49.6%
H65/1 to LED012-scrw	0	0.00	0.0%	0.0%
I100/1 to LED008-scrw	0	0.00	0.0%	0.0%
H300/1 to LED017-scrw	2,298	0.00	111.7%	N/A
Total	4,722	0.80	36.9%	29.6%

Project Number PRJ-402795
Program Small Business

Project Background

The participant is a service facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (2) 7W LED - Int. Ballast, replacing (2) 50W 1-Lamp Halogen;
- (2) 5W LED - Int. Ballast, replacing (2) 40W Inc.;
- (10) 5W LED - Int. Ballast, replacing (10) 40W Inc.;
- (10) 7W LED - Int. Ballast, replacing (10) 50W 1-Lamp Halogen;
- (4) 5W LED - Int. Ballast, replacing (4) 50W 1-Lamp Halogen;
- (2) 5W LED - Int. Ballast, replacing (2) 50W 1-Lamp Halogen;
- (3) 5W LED - Int. Ballast, replacing (3) 50W 1-Lamp Halogen;
- (17) 5W LED - Int. Ballast, replacing (17) 50W 1-Lamp Halogen;
- (2) 7W LED - Int. Ballast, replacing (2) 26W CFL;
- (2) 5W LED - Int. Ballast, replacing (2) 50W 1-Lamp Halogen;
- (3) 7W LED - Int. Ballast, replacing (3) 75W Inc.;
- (4) 5W LED - Int. Ballast, replacing (4) 50W 1-Lamp Halogen;
- (2) 16W LED - Non-Int. Ballast, replacing (1) 4' 4L T8;
- (1) 9W LED - Int. Ballast, replacing (1) 100W Inc.;
- (2) 7W LED - Int. Ballast, replacing (2) 50W 1-Lamp Halogen;
- (2) 5W LED - Int. Ballast, replacing (2) 50W 1-Lamp Halogen;
- (2) 9W LED - Int. Ballast, replacing (2) 100W Inc.;
- (8) 17W LED - Int. Ballast, replacing (8) 100W 1-Lamp Halogen;
- (3) 17W LED - Int. Ballast, replacing (3) 23W CFL;
- (7) 7W LED - Int. Ballast, replacing (7) 50W 1-Lamp Halogen;

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated using annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Service: Excluding Food	Gas	3,452	1.09	1.20	0.85
Service: Excluding Food	Gas	230	1.09	1.20	0.0005
Service: Excluding Food	Gas	8,760	1.09	1.20	1.00
Exterior	None[25]	4,319	1.00	1.00	0.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW

[25] Calculated non-daylight hours based on sunrise/sunset times reported by the NOAA for New Orleans.

CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H50/1 to LED007-SCRW	2	2	39	7	3,452	319	241	1.09	75%
I40/1 to LED005-SCRW	2	2	29	5	3,452	260	181	1.09	70%
I40/1 to LED005-SCRW	10	10	29	5	3,452	1,299	903	1.09	70%
H50/1 to LED007-SCRW	10	10	39	7	3,452	1,596	1,204	1.09	75%
H50/1 to LED005-SCRW	4	4	39	5	230	668	34	1.09	5%
H50/1 to LED005-SCRW	2	2	39	5	3,452	334	256	1.09	77%
H50/1 to LED005-SCRW	3	3	39	5	3,452	501	384	1.09	77%
H50/1 to LED005-SCRW	17	17	39	5	3,452	2,840	2,175	1.09	77%
CF26/1-SCRW to LED007-SCRW	2	2	26	7	8,760	141	363	1.09	257%
H50/1 to LED005-SCRW	2	2	39	5	3,452	334	256	1.09	77%
I75/1 to LED007-SCRW	3	3	53	7	3,452	757	519	1.09	69%
H50/1 to LED005-SCRW	4	4	39	5	3,452	668	512	1.09	77%
F44ILL to LED016-FIXT	1	2	112	16	3,452	297	301	1.09	101%
I100/1 to LED009-SCRW	1	1	72	9	3,452	338	237	1.09	70%
H50/1 to LED007-SCRW	2	2	39	7	3,452	319	241	1.09	75%
H50/1 to LED005-SCRW	2	2	39	5	3,452	334	256	1.09	77%
I100/1 to LED009-SCRW	2	2	72	9	3,452	676	474	1.09	70%
H100/1 to LED017-SCRW	8	8	72	17	4,319	2,653	1,900	1.00	72%
CF23/1-SCRW to LED017-SCRW	3	3	23	17	4,319	72	78	1.00	108%
H50/1 to LED007-SCRW	7	7	39	7	3,452	1,203	843	1.09	70%
Total						15,612	11,357		73%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H50/1 to LED007-SCRW	2	2	39	7	0.85	0.09	0.07	1.20	71%
I40/1 to LED005-SCRW	2	2	29	5	0.85	0.08	0.05	1.20	65%
I40/1 to LED005-SCRW	10	10	29	5	0.85	0.38	0.25	1.20	65%
H50/1 to LED007-SCRW	10	10	39	7	0.85	0.46	0.33	1.20	71%
H50/1 to LED005-SCRW	4	4	39	5	0.00	0.19	0.00	1.20	0%
H50/1 to LED005-SCRW	2	2	39	5	0.85	0.10	0.07	1.20	72%
H50/1 to LED005-SCRW	3	3	39	5	0.85	0.15	0.10	1.20	72%
H50/1 to LED005-SCRW	17	17	39	5	0.85	0.83	0.59	1.20	72%
CF26/1-SCRW to LED007-SCRW	2	2	26	7	1.00	0.04	0.05	1.20	111%
H50/1 to LED005-SCRW	2	2	39	5	0.85	0.10	0.07	1.20	72%
I75/1 to LED007-SCRW	3	3	53	7	0.85	0.22	0.14	1.20	64%
H50/1 to LED005-SCRW	4	4	39	5	0.85	0.19	0.14	1.20	72%
F44ILL to LED016-FIXT	1	2	112	16	0.85	0.09	0.08	1.20	95%
I100/1 to LED009-SCRW	1	1	72	9	0.85	0.10	0.06	1.20	66%
H50/1 to LED007-SCRW	2	2	39	7	0.85	0.09	0.07	1.20	71%
H50/1 to LED005-SCRW	2	2	39	5	0.85	0.10	0.07	1.20	72%
I100/1 to LED009-SCRW	2	2	72	9	0.85	0.20	0.13	1.20	66%
H100/1 to LED017-SCRW	8	8	72	17	0.00	0.00	0.00	1.00	N/A
CF23/1-SCRW to LED017-SCRW	3	3	23	17	0.00	0.00	0.00	1.00	N/A
H50/1 to LED007-SCRW	7	7	39	7	0.85	0.33	0.23	1.20	71%

Total	3.72	2.49		67%

Results

The kWh realization rate for project PRJ-417568 is 73% and the kW realization rate is 67%.

The decrease kWh savings is due to three reasons:

1) EISA 2007 reduced the wattages of these 40W, 60W, 75W, and 100W incandescent lamps, to 29W, 43W, 53W, and 72W, respectively. The ex post calculations follow EISA 2007 incandescent standards for 40W, 75W and 100W incandescent lamps.
2) EISA 2007 reduced the wattages of these 50W halogen lamps to 39.
3) Through monitoring, the ex post annual operating hours for restrooms was adjusted to 230 hours from 3,406 hours used in the ex ante calculations. Ex ante calculations assumed 3,406 annual hours of operation for all interior fixtures, however through on-site interviews and monitoring the Evaluators developed hours of 230, 3,452 and 8,760 for various areas of the facility.

The decrease in kW savings is due to 2 reasons:

1) The ex post calculations follow EISA 2007 incandescent standards for 40W, 75W and 100W incandescent lamps.
2) Through monitoring, the ex post coincidence factor was calculated to be 0.85 for most the building and 0.00 for the restroom. The ex ante estimates used 0.90 for all of the interior spaces.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
H50/1 to LED007-SCRW	241	0.07	75%	71%
I40/1 to LED005-SCRW	181	0.05	70%	65%
I40/1 to LED005-SCRW	903	0.25	70%	65%
H50/1 to LED007-SCRW	1,204	0.33	75%	71%
H50/1 to LED005-SCRW	34	0.00	5%	0%
H50/1 to LED005-SCRW	256	0.07	77%	72%
H50/1 to LED005-SCRW	384	0.10	77%	72%
H50/1 to LED005-SCRW	2,175	0.59	77%	72%
CF26/1-SCRW to LED007-SCRW	363	0.05	257%	111%
H50/1 to LED005-SCRW	256	0.07	77%	72%
I75/1 to LED007-SCRW	519	0.14	69%	64%
H50/1 to LED005-SCRW	512	0.14	77%	72%
F44ILL to LED016-FIXT	301	0.08	101%	95%
I100/1 to LED009-SCRW	237	0.06	70%	66%

H50/1 to LED007-SCRW	241	0.07	75%	71%
H50/1 to LED005-SCRW	256	0.07	77%	72%
I100/1 to LED009-SCRW	474	0.13	70%	66%
H100/1 to LED017-SCRW	1,900	0.00	72%	N/A
CF23/1-SCRW to LED017-SCRW	78	0.00	108%	N/A
H50/1 to LED007-SCRW	843	0.23	70%	71%
Total	11,357	2.49	73%	67%

Project Number PRJ-481258
Program Small Commercial

Project Background

The participant is an educational facility that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (54) 36W LED - Non-Int. Ballast, replacing (54) 4' 4-Lamp T8;
- (13) 36W LED - Non-Int. Ballast, replacing (13) 4' 2-Lamp T8;
- (1) 36W LED - Non-Int. Ballast, replacing (1) 4' 4-Lamp T8; and
- (2) 45W LED - Non-Int. Ballast, replacing (2) 250W Metal Halide.

On-site, the Evaluators were not able to verified (3) 10W LED - Int. Ballast, replacing (3) 43W incandescent lamps.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated using the annual Hours of Operation (AOH) and peak coincidence factor (CF) developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

The Evaluators could not verify (3) exterior wall pack fixtures.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Hallways	Gas	2,149	1.09	1.20	64%
Classroom	Gas	1,751	1.09	1.20	45%
Outdoor	None	3,996	1.00	1.00	100%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	*IEF_E*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F44ILL to LED036-FIXT	54	54	112	36	1,751	12,423	7,833	1.09	63.1%
F42ILL to LED036-FIXT	13	13	58	36	2,149	866	670	1.09	77.4%
F44ILL to LED036-FIXT	1	1	112	36	2,149	230	178	1.09	77.4%
MH250/1 to LED045-FIXT	2	2	288	45	4,319	1,942	2,099	1.00	108.1%
I43/1 to LED010-SCRW	3	0	43	10	4,319	396	0	1.00	0.0%
Total						15,856	10,780		68.0%

Lighting Retrofit kW Savings Calculations

Measure	Quantity (Fixtures)		Wattage		CF	Expected kW Savings	Realized kW Savings	IEF_D	Realization Rate
	Base	Post	Base	Post					
F44ILL to LED036-FIXT	54	54	112	36	0.45	2.31	2.22	1.20	29.8%
F42ILL to LED036-FIXT	13	13	58	36	0.64	0.16	0.22	1.20	100.0%
F44ILL to LED036-FIXT	1	1	112	36	0.64	0.04	0.06	1.20	100.0%
MH250/1 to LED045-FIXT	2	2	288	45	0.09	-	0.04	1.00	N/A
I43/1 to LED010-SCRW	3	0	43	10	0.09	-	-	1.00	N/A
Total						2.52	2.54		100.8%

Results

The kWh realization rate for project PRJ-481258 is 68.0% and the kW realization rate is 100.8%.

The kWh realization rate is low because our ex-post calculation used hours provided by logging hours (1,75 to 2,149) versus higher deemed hours used in the ex-ante calculation (2,777). Also, ex ante calculations assumed 3,996 annual operating hours, however ex post calculations used 4,319. Finally, (3) unverified 10W LED fixtures also contributed to the low kWh savings.

The kW realization rate is high because lighting logger data indicated higher CFs than that used in ex ante estimations.

Verified Gross Savings & Realization Rates

Measure	Verified			
	kWh Savings	kW Savings	kWh Realization Rate	kW Realization Rate
F44ILL to LED036-FIXT	7,833	2.22	63.1%	95.7%
F42ILL to LED036-FIXT	670	0.22	77.4%	136.2%
F44ILL to LED036-FIXT	178	0.06	77.4%	136.2%
MH250/1 to LED045-FIXT	2,099	0.04	108.1%	N/A
I43/1 to LED010-SCRW	0	0	0.0%	N/A
Total	10,780	2.54	68.0%	100.8%

Project Number PRJ-654677
Program Small Business Comprehensive

Project Background

The participant is a retail facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (40) 15W LED - Int. Ballast, replacing (40) 75W 1-Lamp Halogen;
- (1) 15W LED - Int. Ballast, replacing (1) 75W 1-Lamp Halogen;
- (2) 15W LED - Int. Ballast, replacing (2) 75W 1-Lamp Halogen;
- (20) 9W LED - Int. Ballast, replacing (20) 60W 1-Lamp Halogen;
- (20) 8W LED - Int. Ballast, replacing (20) 50W 1-Lamp Halogen;
- (3) 30W LED - Non-Int. Ballast, replacing (3) 4' 3-Lamp T12ES;
- (1) 7W LED - Int. Ballast, replacing (1) 60W incandescent;
- (2) 18W LED - Int. Ballast, replacing (2) 90W 1-Lamp Halogen; and
- (6) 11W LED - Int. Ballast, replacing (6) 90W 1-Lamp Halogen.

On-site, the evaluator also verified the participant removed:

- (9) F44EE
- (3) FU2EE

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated using annual Hours of Operation (AOH) and peak coincidence factor (CF) developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	IEF_E	IEF_D	*CF*
Retail: Other	Electric Resistance	8,760	0.87	1.20	1.00
Retail: Other	Electric Resistance	2,707	0.87	1.20	0.99
Retail: Other	Electric Resistance	3,478	0.87	1.20	0.98
Exterior	None	4,319	1.00	1.00	0.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/Fixture$_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x W/Fixture$_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/Fixture$_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x W/Fixture$_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	*IEF_E*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H75/1 to LED015-SCRW	40	40	53	15	8,760	7,659	11,584	0.87	151.3%
H75/1 to LED015-SCRW	1	1	53	15	3,478	191	115	0.87	60.1%
H75/1 to LED015-SCRW	2	2	53	15	2,707	383	179	0.87	46.7%
H60/1 to LED009-SCRW	20	20	43	9	3,478	3,255	2,058	0.87	63.2%
H50/1 to LED008-SCRW	20	20	29	8	3,478	2,681	1,271	0.87	47.4%
F44EE to LED030-FIXT	3	3	144	30	3,478	1,091	1,035	0.87	94.8%
Delamped F44EE	9	0	144	0	3,478	4,107	3,922	0.87	95.5%

Delamped FU2EE	3	0	72	0	3,478	680	654	0.87	96.2%
I60E/1 to LED007-SCRW	1	1	43	7	3,478	115	109	0.87	94.8%
H90/1 to LED018-SCRW	2	2	72	18	4,319	575	466	1.00	81.1%
H90/1 to LED011-SCRW	6	6	72	11	4,319	1,894	1,581	1.00	83.5%
					Total	22,631	22,973		101.5%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H75/1 to LED015-SCRW	40	40	53	15	1.00	2.59	1.82	1.20	70.4%
H75/1 to LED015-SCRW	1	1	53	15	0.98	0.06	0.04	1.20	69.0%
H75/1 to LED015-SCRW	2	2	53	15	0.99	0.13	0.09	1.20	69.7%
H60/1 to LED009-SCRW	20	20	43	9	0.98	1.10	0.80	1.20	72.6%
H50/1 to LED008-SCRW	20	20	29	8	0.98	0.91	0.49	1.20	54.4%
F44EE to LED030-FIXT	3	3	144	30	0.98	0.37	0.40	1.20	108.9%
Delamped F44EE	9	0	144	0	0.98	1.39	1.52	1.20	109.7%
Delamped FU2EE	3	0	72	0	0.98	0.23	0.25	1.20	110.4%
I60E/1 to LED007-SCRW	1	1	43	7	0.98	0.04	0.04	1.20	108.9%
H90/1 to LED018-SCRW	2	2	72	18	1.00	0.00	0.11	1.00	N/A
H90/1 to LED011-SCRW	6	6	72	11	0.09	0.00	0.03	1.00	N/A
					Total	6.82	5.62		82.3%

Results

The kWh realization rate for project #PRJ-654677 is 101.5% and the kW realization rate is 82.3%.

The changes in kWh savings are due to four reasons:

1) (40) 15W LED lamps were verified to be on 8,760 hours annually instead of 3,668 hours annually.

2) The ex post calculation used 4,319 hours for exterior; the ex ante estimations used 3,996 hours.
3) Through monitoring, the annual hours of operation for the interior lighting of the building range from 2,707 to 3,478. The ex ante estimations used 3,668.
4) The ex post calculations followed EISA standards for 50W, 60W, 75W, and 90W lamps.

The changes in kW savings are due to three reasons.

1) Through monitoring, the coincidence factor for interior lighting was found to range from 0.98 to 1.00. The ex ante estimations used 0.90.
2) For exterior lighting, the coincidence factor used ex post was .09. The ex ante estimations used 0.
3) The ex post calculations followed EISA standards for 50W, 60W, 75W, and 90W lamps.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
H75/1 to LED015-SCRW	11,584	1.82	151.3%	70.4%
H75/1 to LED015-SCRW	115	0.04	60.1%	69.0%
H75/1 to LED015-SCRW	179	0.09	46.7%	69.7%
H60/1 to LED009-SCRW	2,058	0.80	63.2%	72.6%
H50/1 to LED008-SCRW	1,271	0.49	47.4%	54.4%
F44EE to LED030-FIXT	1,035	0.40	94.8%	108.9%
Delamped F44EE	3,922	1.52	95.5%	109.7%
Delamped FU2EE	654	0.25	96.2%	110.4%
I60E/1 to LED007-SCRW	109	0.04	94.8%	108.9%
H90/1 to LED018-SCRW	466	0.11	81.1%	N/A
H90/1 to LED011-SCRW	1,581	0.03	83.5%	N/A
Total	22,973	5.62	101.5%	82.3%

Project Number PRJ-465823
Program Small Business

Project Background

The participant is a service facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (31) 36W LED - Non-Int. Ballast, replacing (31) 4' 2-Lamp T12ES;
- (12) 9W LED - Int. Ballast, replacing (12) 43W Inc.;
- (2) 36W LED - Non-Int. Ballast, replacing (2) 4' 2-Lamp T12ES;
- (4) 36W LED - Non-Int. Ballast, replacing (4) 4' 4-Lamp T12IS;
- (3) 36W LED - Non-Int. Ballast, replacing (3) 4' 2-Lamp T12ES;
- (1) 36W LED - Non-Int. Ballast, replacing (1) 4' 4-Lamp T12IS;
- (3) 36W LED - Non-Int. Ballast, replacing (3) 4' 2-Lamp T12ES;
- (4) 7W LED - Int. Ballast, replacing (4) 43W Inc.;
- (1) 4W LED - Non-Int. Ballast, replacing (1) 29W Inc.;
- (9) 36W LED - Non-Int. Ballast, replacing (9) 4' 4-Lamp T12IS;
- (1) 36W LED - Non-Int. Ballast, replacing (1) 4' 2-Lamp T12ES;
- (1) 36W LED - Non-Int. Ballast, replacing (1) 4' 4-Lamp T12IS;
- (8) 36W LED - Non-Int. Ballast, replacing (8) 4' 4-Lamp T12IS;
- (15) 36W LED - Non-Int. Ballast, replacing (15) 4' 4-Lamp T12IS;
- (6) 17W LED - Int. Ballast, replacing (6) 65W 1-Lamp Halogen;
- (2) 7W LED - Int. Ballast, replacing (2) 43W Inc.;
- (1) 45W LED - Non-Int. Ballast, replacing (1) 150W MH;
- (3) 80W LED - Non-Int. Ballast, replacing (3) 250W MH;
- (1) 70W LED - Non-Int. Ballast, replacing (1) 250W MH; and
- (2) 36W LED - Non-Int. Ballast, replacing (2) 4' 2-Lamp T12ES.

On-site, the Evaluators were unable to verify the installation of:

- (7) 36W LED - Non-Int. Ballast, replacing (7) 4' 2-Lamp T12ES

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated using Annual Hours of Operation (AOH) and peak coincidence factor (CF) developed through two weeks of on-site

metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Education: K-12	Electric Resistance	3,391	0.87	1.20	1.00
Education: K-12	Electric Resistance	1,751	0.87	1.20	0.45
Education: K-12	Electric Resistance	8,760	0.87	1.20	0.96
Outdoor	None	4,319	1.00	1.00	0.00
Education:K-12	Electric Resistance	2,962	0.87	1.20	0.76

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW

CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F42EE to LED036-FIXT	31	31	72	36	3,391	2,696	3,292	0.87	122.1%
I43/1 to LED009-SCRW	12	12	43	9	3,391	986	1,204	0.87	122.1%
F42EE to LED036-FIXT	2	2	72	36	3,391	174	212	0.87	122.1%
F44EIS to LED036-FIXT	4	4	164	36	2,777	1,237	1,237	0.87	100.0%
F42EIS to LED036-FIXT	3	3	82	36	2,962	333	356	0.87	106.7%
F44EIS to LED036-FIXT	1	1	164	36	8,760	309	976	0.87	315.4%
F42EIS to LED036-FIXT	3	3	82	36	2,777	333	333	0.87	100.0%
I43/1 to LED007-SCRW	4	4	43	7	2,777	348	348	0.87	100.0%
I29/1 to LED004-FIXT	1	1	29	4	8,760	60	191	0.87	315.4%
F44EIS to LED036-FIXT	9	9	164	36	2,777	2,783	2,783	0.87	100.0%
F42EIS to LED036-FIXT	1	1	82	36	2,777	111	111	0.87	100.0%
F44EIS to LED036-FIXT	1	1	164	36	2,777	309	309	0.87	100.0%
F44EIS to LED036-FIXT	8	8	164	36	2,777	2,474	2,474	0.87	100.0%
F44EIS to LED036-FIXT	15	15	164	36	2,777	4,639	4,639	0.87	100.0%
H65/1 to LED017-SCRW	6	6	65	17	4,319	1,151	1,244	1.00	108.1%
I43/1 to LED007-SCRW	2	2	43	7	4,319	288	311	1.00	108.1%
MH150/1 to LED045-FIXT	1	1	183	45	4,319	551	596	1.00	108.1%
MH250/1 to LED080-FIXT	3	3	288	80	4,319	2,494	2,695	1.00	108.1%
MH250/1 to LED070-FIXT	1	1	288	70	4,319	871	942	1.00	108.1%
F42EE to LED036-FIXT	2	2	72	36	2,777	783	174	0.87	22.2%
H65/1 to LED009-SCRW	13	13	65	9	3,391	1,759	2,148	0.87	122.1%

Total	24,690	23,122		93.7%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	*IEF_D*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F42EE to LED036-FIXT	31	31	72	36	1.00	0.63	1.34	1.20	212.8%
I43/1 to LED009-SCRW	12	12	43	9	1.00	0.23	0.49	1.20	212.8%
F42EE to LED036-FIXT	2	2	72	36	1.00	0.04	0.09	1.20	212.8%
F44EIS to LED036-FIXT	4	4	164	36	1.00	0.29	0.61	1.20	212.8%
F42EIS to LED036-FIXT	3	3	82	36	0.76	0.08	0.13	1.20	161.7%
F44EIS to LED036-FIXT	1	1	164	36	1.00	0.07	0.15	1.20	212.8%
F42EIS to LED036-FIXT	3	3	82	36	1.00	0.08	0.17	1.20	212.8%
I43/1 to LED007-SCRW	4	4	43	7	1.00	0.08	0.17	1.20	212.8%
I29/1 to LED004-FIXT	1	1	29	4	1.00	0.01	0.03	1.20	212.8%
F44EIS to LED036-FIXT	9	9	164	36	0.45	0.65	0.62	1.20	95.7%
F42EIS to LED036-FIXT	1	1	82	36	0.45	0.03	0.02	1.20	95.7%
F44EIS to LED036-FIXT	1	1	164	36	0.45	0.07	0.07	1.20	95.7%
F44EIS to LED036-FIXT	8	8	164	36	0.45	0.58	0.55	1.20	95.7%
F44EIS to LED036-FIXT	15	15	164	36	0.45	1.08	1.04	1.20	95.7%
H65/1 to LED017-SCRW	6	6	65	17	0.00	0.00	0.00	1.00	N/A
I43/1 to LED007-SCRW	2	2	43	7	0.00	0.00	0.00	1.00	N/A
MH150/1 to LED045-FIXT	1	1	183	45	0.00	0.00	0.00	1.00	N/A
MH250/1 to LED080-FIXT	3	3	288	80	0.00	0.00	0.00	1.00	N/A

MH250/1 to LED070-FIXT	1	1	288	70	0.00	0.00	0.00	1.00	N/A
F42EE to LED036-FIXT	2	2	72	36	0.45	0.18	0.04	1.20	21.3%
H65/1 to LED009-SCRW	13	13	65	9	1.00	0.41	0.87	1.20	212.8%
					Total	4.51	6.40		141.7%

Results

The kW realization rate for PRJ-465823 is 93.7% and the kWh realization rate is 141.7%.

The kWh realization rate is high because the verified AOH, determined by monitoring, was greater than the deemed hours used in the ex ante estimations.

The kW realization rate is high because the verified CF in various spaces are higher than the deemed values.

Finally, (7) unverified 36W LED lamps impacted both kWh and kW realization rates.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
F42EE to LED036-FIXT	3,292	1.34	122.1%	212.8%
I43/1 to LED009-SCRW	1,204	0.49	122.1%	212.8%
F42EE to LED036-FIXT	212	0.09	122.1%	212.8%
F44EIS to LED036-FIXT	1,510	0.61	122.1%	212.8%
F42EIS to LED036-FIXT	356	0.13	106.7%	161.7%
F44EIS to LED036-FIXT	976	0.15	315.4%	212.8%
F42EIS to LED036-FIXT	407	0.17	122.1%	212.8%
I43/1 to LED007-SCRW	425	0.17	122.1%	212.8%
I29/1 to LED004-FIXT	191	0.03	315.4%	212.8%
F44EIS to LED036-FIXT	1,755	0.62	63.1%	95.7%
F42EIS to LED036-FIXT	70	0.02	63.1%	95.7%
F44EIS to LED036-FIXT	195	0.07	63.1%	95.7%
F44EIS to LED036-FIXT	1,560	0.55	63.1%	95.7%
F44EIS to LED036-FIXT	2,925	1.04	63.1%	95.7%
H65/1 to LED017-SCRW	1,244	0.00	108.1%	N/A
I43/1 to LED007-SCRW	311	0.00	108.1%	N/A
MH150/1 to LED045-FIXT	596	0.00	108.1%	N/A
MH250/1 to LED080-FIXT	2,695	0.00	108.1%	N/A
MH250/1 to LED070-FIXT	942	0.00	108.1%	N/A
F42EE to LED036-FIXT	110	0.04	14.0%	21.3%
H65/1 to LED009-SCRW	2,148	0.87	122.1%	212.8%

Total	23,122	6.40	93.7%	141.7%

Project Number PRJ-473731
Program Small Business

Project Background

The participant is a restaurant that received incentives from Entergy New Orleans for implementing energy efficient lighting indoors. On-site, the Evaluators verified the participant had installed:

- (138) 7W LED - Int. Ballast, replacing (138) 50W 1-Lamp Halogen.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Sit-Down Restaurant	None	Electric Resistance	1.00	1.20	0.95

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H50/1 to LED007-SCRW	138	138	39	7	3,541	25,401	15,637	1.00	61.6%
Total						25,401	15,637	1.00	61.6%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H50/1 to LED007-SCRW	138	138	39	7	0.95	5.77	5.03	1.20	87.3%
Total						5.77	5.03	1.20	87.3%

Results

The kWh realization rate for PRJ-473731 is 61.6% and the kW realization rate is 87.3%.

The changes in kW savings are due to two reasons:

1) The monitoring data device that was installed recorded a higher peak coincidence factor (95%) than deemed values.
2) Ex post calculations follow EISA standards for 50W lamps.

The changes in kWh savings are due to two reasons

1) The monitoring data device recorded a lower annual lighting number than deemed hours.
2) Ex post calculations follow EISA standards for 50W lamps.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
H50/1 to LED007-SCRW	21,012	6.76	82.7%	117.3%
Total	21,012	6.76	82.7%	117.3%

Project Number PRJ-422908
Program Small Business

Project Background

The participant is bar and kitchen that received incentives from Entergy New Orleans for retrofitting energy efficient lighting in both the interior and exterior of the facility. On-site, the Evaluators verified the participant had installed:

- (33) 5W LED - Int. Ballast, replacing (33) 60W incandescent;
- (2) 9W LED - Int. Ballast, replacing (4) 100W incandescent;
- (8) 5W LED - Int. Ballast, replacing (8) 50W 1-Lamp Halogen;
- (3) 15W LED - Non-Int. Ballast, replacing (7) 4' 1-Lamp T8;
- (5) 8W LED - Int. Ballast, replacing (5) 13W CFL;
- (7) 7W LED - Int. Ballast, replacing (7) 50W 1-Lamp Halogen;
- (14) 9W LED - Int. Ballast, replacing (14) 40W incandescent;
- (12) 7W LED - Int. Ballast, replacing (12) 45W 1-Lamp Halogen;
- (6) 40W LED - Non-Int. Ballast, replacing (6) 1-Lamp T12ES U-Tube;
- (6) 13W LED - Int. Ballast, replacing (6) 50W 1-Lamp Halogen;
- (11) 13W LED - Int. Ballast, replacing (11) 26W CFL;

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Outside	None	4,319[26]	1.00	1.00	0%
Interior (Custom)	Natural Gas	6,552[27]	1.09	1.20	100%
Interior (Custom)	Natural Gas	4,004[2]	1.09	1.20	100%
Interior (Office)	Natural Gas	3,737	1.09	1.20	77%
Walk-in Cooler	None	3,798	1.30	1.25	84%

[26] Calculated non-daylight hours based on sunrise/sunset times reported by the NOAA for New Orleans.

[27] Developed with information from on-site interviews with facility staff.

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon ENO-defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	*IEF_E*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I60/1 to LED005-SCRW	33	33	42	5	6,552	11,037	8,720	1.09	79.0%
I100/1 to LED009-SCRW	2	2	72	9	3,737	1,995	513	1.09	25.7%
H50/1 to LED005-SCRW	8	8	39	5	6,552	2,189	1,943	1.09	88.7%
F41ILL to LED015-FIXT	3	3	31	15	3,798	869	237	1.30	27.3%
CF13/1-SCRW to LED008-SCRW	5	5	13	8	6,552	152	179	1.09	117.4%
H50/1 to LED007-SCRW	7	7	39	7	4,004	1,830	978	1.09	53.4%

I40/1 to LED009-SCRW	14	14	29	9	6,552	2,639	2,000	1.09	75.8%
H45/1 to LED007-SCRW	12	12	45	7	4,319	2,773	1,969	1.00	71.0%
FU2EE to LED040-FIXT	6	6	72	40	4,004	1,168	838	1.09	71.8%
H50/1 to LED013-SCRW	6	6	39	13	4,319	887	674	1.00	76.0%
CF26/1-SCRW to LED013-SCRW	11	11	26	13	4,319	571	618	1.00	108.1%
					Total	26,110	18,667		71.5%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I60/1 to LED005-SCRW	33	33	42	5	1.00	0.00	1.47	1.20	N/A
I100/1 to LED009-SCRW	2	2	72	9	0.77	0.00	0.12	1.20	N/A
H50/1 to LED005-SCRW	8	8	39	5	1.00	0.00	0.33	1.20	N/A
F41ILL to LED015-FIXT	3	3	31	15	0.84	0.00	0.05	1.25	N/A
CF13/1-SCRW to LED008-SCRW	5	5	13	8	1.00	0.00	0.03	1.20	N/A
H50/1 to LED007-SCRW	7	7	39	7	1.00	0.00	0.27	1.20	N/A
I40/1 to LED009-SCRW	14	14	29	9	1.00	0.00	0.34	1.20	N/A
H45/1 to LED007-SCRW	12	12	45	7	0.00	0.00	0.00	1.00	N/A
FU2EE to LED040-FIXT	6	6	72	40	1.00	0.00	0.23	1.20	N/A
H50/1 to LED013-SCRW	6	6	39	13	0.00	0.00	0.00	1.00	N/A
CF26/1-SCRW to LED013-SCRW	11	11	26	13	0.00	0.00	0.00	1.00	N/A
					Total	0.00	2.82		N/A

Results

The kWh realization rate for project PRJ-422908 is 76.3%. On site the Evaluators found that (6) 9W LED lamps in the office area and (4) 15 LED fixtures in the cooler had not

been installed, reducing the number of lamps in ex post calculations. Additionally, a total of (49) 100, 60 and 40 watt incandescent baselines were changed to EISA-correct 72, 42 and 20 watt baselines, respectively and (21) 50 watt halogen baselines were changes to EISA-corrected 39 watt baseline.. (12) 45 watt PAR20 halogen lamps were verified on the exterior of the building instead of on the interior, where ex ante calculations assumed they were. This decreased both the operating hours and the associated interactive effects, both decreasing savings. Ex ante calculations also assumed an "Undetermined" heating type, though while on site the Evaluators found that the building was heated by natural gas, which slightly increased ex post savings.

No peak kW reductions were accounted for in ex ante calculations. Ex ante calculations relied on a custom building type, which did not factor in a coincidence factor, effectively making the factor zero in calculations. Based on facility operating hours, ex post calculations include a 100% coincident factor for interior lamps. The Evaluators found a 3.02 kW reduction in peak kW as a result of the retrofit.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
I60/1 to LED005-SCRW	8,720	1.47	79.0%	N/A
I100/1 to LED009-SCRW	513	0.12	25.7%	N/A
H50/1 to LED005-SCRW	1,943	0.33	88.7%	N/A
F41ILL to LED015-FIXT	237	0.05	27.3%	N/A
CF13/1-SCRW to LED008-SCRW	179	0.03	117.4%	N/A
H50/1 to LED007-SCRW	978	0.27	53.4%	N/A
I40/1 to LED009-SCRW	2,000	0.34	75.8%	N/A
H45/1 to LED007-SCRW	1,969	0.00	71.0%	N/A
FU2EE to LED040-FIXT	838	0.23	71.8%	N/A
H50/1 to LED013-SCRW	674	0.00	76.0%	N/A
CF26/1-SCRW to LED013-SCRW	618	0.00	108.1%	N/A
Total	18,667	2.82	71.5%	N/A

Project Number PRJ-420243
Program Small Business

Project Background

The participant is a retail facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (6) 42W LED - Non-Int. Ballast, replacing (6) 8' 2-Lamp T12ES;
- (3) 42W LED - Non-Int. Ballast, replacing (3) 4' 2-Lamp T12ES;
- (7) 7W LED - Int. Ballast, replacing (7) 60W Inc.;
- (8) 13W LED - Int. Ballast, replacing (8) 65W Inc.;
- (7) 11W LED - Int. Ballast, replacing (7) 65W Inc.;
- (11) 42W LED - Non-Int. Ballast, replacing (11) 4' 2-Lamp T8;
- (2) 63W LED - Non-Int. Ballast, replacing (2) 4' 4-Lamp T8;
- (4) 20W LED - Int. Ballast, replacing (4) 4' 2-Lamp T8;
- (4) 21W LED - Non-Int. Ballast, replacing (4) 4' 2-Lamp T8;
- (8) 11W LED - Int. Ballast, replacing (8) 65W Inc.;
- (8) 20W LED - Int. Ballast, replacing (8) 4' 2-Lamp T8;
- (1) 42W LED - Non-Int. Ballast, replacing (1) 4' 2-Lamp T8;
- (3) 7W LED - Int. Ballast, replacing (3) 60W Inc.;
- (4) 42W LED - Non-Int. Ballast, replacing (4) 4' 2-Lamp T12ES;
- (2) 11W LED - Int. Ballast, replacing (2) 65W Inc.;
- (3) 7W LED - Int. Ballast, replacing (3) 60W Inc.;
- (12) 13W LED - Int. Ballast, replacing (12) 1-Lamp 32W CFL Twin;
- (6) 42W LED - Non-Int. Ballast, replacing (6) 4' 2-Lamp T12ES;
- (8) 13W LED - Int. Ballast, replacing (8) 90W Inc.;
- (2) 16W LED - Int. Ballast, replacing (2) 75W Inc.;
- (2) 7W LED - Int. Ballast, replacing (2) 60W Inc.;
- (2) 22W LED - Non-Int. Ballast, replacing (2) 70W MH;
- (2) 16W LED - Int. Ballast, replacing (2) 75W Inc.;
- (38) 11W LED - Int. Ballast, replacing (38) 65W Inc.;
- (2) 7W LED - Int. Ballast, replacing (2) 60W Inc.;
- (9) 13W LED - Int. Ballast, replacing (9) 65W Inc.; and
- (14) 11W LED - Int. Ballast, replacing (14) 75W Inc.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Retail: Enclosed Mall	Electric Resistance	3,866	0.87	1.20	0.99
Outdoor	None	4,319	1.00	1.00	0.09
Retail: Enclosed Mall	Electric Resistance	4,269	0.87	1.20	1.00
Retail: Enclosed Mall	Electric Resistance	8,381	0.87	1.20	1.00
Retail: Enclosed Mall	Electric Resistance	5,169	0.87	1.20	1.00
Retail: Enclosed Mall	Electric Resistance	2,920	0.87	1.20	0.93

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F82EE to LED042-FIXT	6	6	123	42	4,269	2,035	1,805	0.87	88.7%
F42EE to LED042-FIXT	3	3	72	42	4,269	377	334	0.87	88.7%
I60/1 to LED007-SCRW	7	7	43	7	4,269	1,553	936	0.87	60.2%
I65/1 to LED013-SCRW	8	8	65	13	3,866	1,742	1,399	0.87	80.3%
I65/1 to LED011-SCRW	7	7	65	11	3,866	1,583	1,271	0.87	80.3%
F42ILL to LED042-FIXT	11	11	58	42	8,381	737	1,283	0.87	174.1%
F44ILL to LED063-FIXT	2	2	112	63	8,381	410	715	0.87	174.1%
F42ILL to LED020-SCRW	4	4	58	20	5,169	636	684	0.87	107.4%
F42ILL to LED021-FIXT	4	4	58	21	5,169	620	666	0.87	107.4%
I65/1 to LED011-SCRW	8	8	65	11	8,381	2,713	3,150	0.87	116.1%
F42ILL to LED020-SCRW	8	8	58	20	8,381	1,273	2,217	0.87	174.1%
F42ILL to LED042-FIXT	1	1	58	42	8,381	67	117	0.87	174.1%
I60/1 to LED007-SCRW	3	3	43	7	2,920	666	274	0.87	41.2%
F42EE to LED042-FIXT	4	4	72	42	2,920	502	305	0.87	60.7%
I65/1 to LED011-SCRW	2	2	65	11	2,920	452	274	0.87	60.7%
I60/1 to LED007-SCRW	3	3	43	7	2,920	666	274	0.87	41.2%
CFT32/1-L to LED013-SCRW	12	12	34	13	3,866	1,055	848	0.87	80.3%

F42EE to LED042-FIXT	6	6	72	42	3,866	754	605	0.87	80.3%
I90/1 to LED013-SCRW	8	8	72	13	4,319	2,462	2,039	1.00	82.8%
I75/1 to LED016-SCRW	2	2	53	16	4,319	472	320	1.00	67.8%
I60/1 to LED007-SCRW	2	2	43	7	4,319	424	311	1.00	73.4%
MH70/1 to LED022-FIXT	2	2	91	22	4,319	551	596	1.00	108.1%
I75/1 to LED016-SCRW	2	2	53	16	3,866	494	249	0.87	50.4%
I65/1 to LED011-SCRW	38	38	65	11	3,866	9,271	6,902	0.87	74.4%
I60/1 to LED007-SCRW	2	2	43	7	3,866	444	242	0.87	54.6%
I65/1 to LED013-SCRW	9	9	65	13	4,319	1,870	2,021	1.00	108.1%
I75/1 to LED011-SCRW	14	14	53	11	3,866	4,226	1,978	0.87	46.8%
Total						38,055	31,814		83.6%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F82EE to LED042-FIXT	6	6	123	42	1.00	0.54	0.58	1.20	107.5%
F42EE to LED042-FIXT	3	3	72	42	1.00	0.10	0.11	1.20	107.5%
I60/1 to LED007-SCRW	7	7	43	7	1.00	0.41	0.30	1.20	73.0%
I65/1 to LED013-SCRW	8	8	65	13	0.99	0.46	0.49	1.20	106.5%
I65/1 to LED011-SCRW	7	7	65	11	0.99	0.42	0.45	1.20	106.5%
F42ILL to LED042-FIXT	11	11	58	42	1.00	0.20	0.21	1.20	107.5%
F44ILL to LED063-FIXT	2	2	112	63	1.00	0.11	0.12	1.20	107.5%
F42ILL to LED020-SCRW	4	4	58	20	1.00	0.17	0.18	1.20	107.5%
F42ILL to LED021-FIXT	4	4	58	21	1.00	0.17	0.18	1.20	107.5%
I65/1 to LED011-SCRW	8	8	65	11	1.00	0.72	0.52	1.20	71.7%

F42ILL to LED020-SCRW	8	8	58	20	1.00	0.34	0.36	1.20	107.5%
F42ILL to LED042-FIXT	1	1	58	42	1.00	0.02	0.02	1.20	107.5%
I60/1 to LED007-SCRW	3	3	43	7	0.93	0.18	0.12	1.20	67.9%
F42EE to LED042-FIXT	4	4	72	42	0.93	0.13	0.13	1.20	100.0%
I65/1 to LED011-SCRW	2	2	65	11	0.93	0.12	0.12	1.20	100.0%
I60/1 to LED007-SCRW	3	3	43	7	0.93	0.18	0.12	1.20	67.9%
CFT32/1-L to LED013-SCRW	12	12	34	13	0.99	0.28	0.30	1.20	106.5%
F42EE to LED042-FIXT	6	6	72	42	0.99	0.20	0.21	1.20	106.5%
I90/1 to LED013-SCRW	8	8	72	13	0.09	0.00	0.04	1.00	N/A
I75/1 to LED016-SCRW	2	2	53	16	0.09	0.00	0.01	1.00	N/A
I60/1 to LED007-SCRW	2	2	43	7	0.09	0.00	0.01	1.00	N/A
MH70/1 to LED022-FIXT	2	2	91	22	0.09	0.00	0.01	1.00	N/A
I75/1 to LED016-SCRW	2	2	53	16	0.99	0.13	0.09	1.20	66.8%
I65/1 to LED011-SCRW	38	38	65	11	0.99	2.47	2.44	1.20	98.7%
I60/1 to LED007-SCRW	2	2	43	7	0.99	0.12	0.09	1.20	72.3%
I65/1 to LED013-SCRW	9	9	65	13	0.09	0.00	0.05	1.20	N/A
I75/1 to LED011-SCRW	14	14	53	11	0.99	1.00	0.70	1.20	69.9%
Total						8.48	7.97		94.0%

Results

The kWh realization rate for PRJ-420243 is 83.6% and the kW realization rate is 94.0%.

The kWh is lower because, through monitoring, the verified annual hours of operation was lower than the deemed hours used in the ex ante estimations.

The kW is high because CF values used in the building is higher than the values used in the ex ante estimation.

The ex post calculations followed EISA 2007 standards for 60W, 75W, and 90W incandescent lamps. The ex ante estimations did not follow EISA 2007 standards.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
F82EE to LED042-FIXT	1,805	0.58	88.7%	107.5%
F42EE to LED042-FIXT	334	0.11	88.7%	107.5%
I60/1 to LED007-SCRW	936	0.30	60.2%	73.0%
I65/1 to LED013-SCRW	1,399	0.49	80.3%	106.5%
I65/1 to LED011-SCRW	1,271	0.45	80.3%	106.5%
F42ILL to LED042-FIXT	1,283	0.21	174.1%	107.5%
F44ILL to LED063-FIXT	715	0.12	174.1%	107.5%
F42ILL to LED020-SCRW	684	0.18	107.4%	107.5%
F42ILL to LED021-FIXT	666	0.18	107.4%	107.5%
I65/1 to LED011-SCRW	3,150	0.52	116.1%	71.7%
F42ILL to LED020-SCRW	2,217	0.36	174.1%	107.5%
F42ILL to LED042-FIXT	117	0.02	174.1%	107.5%
I60/1 to LED007-SCRW	274	0.12	41.2%	67.9%
F42EE to LED042-FIXT	305	0.13	60.7%	100.0%
I65/1 to LED011-SCRW	274	0.12	60.7%	100.0%
I60/1 to LED007-SCRW	274	0.12	41.2%	67.9%
CFT32/1-L to LED013-SCRW	848	0.30	80.3%	106.5%
F42EE to LED042-FIXT	605	0.21	80.3%	106.5%
I90/1 to LED013-SCRW	2,039	0.04	82.8%	N/A
I75/1 to LED016-SCRW	320	0.01	67.8%	N/A
I60/1 to LED007-SCRW	311	0.01	73.4%	N/A
MH70/1 to LED022-FIXT	596	0.01	108.1%	N/A
I75/1 to LED016-SCRW	249	0.09	50.4%	66.8%
I65/1 to LED011-SCRW	6,902	2.44	74.4%	98.7%
I60/1 to LED007-SCRW	242	0.09	54.6%	72.3%
I65/1 to LED013-SCRW	2,021	0.05	108.1%	N/A
I75/1 to LED011-SCRW	1,978	0.70	46.8%	69.9%
Total	31,814	7.97	83.6%	94.0%

Project Number PRJ-574679
Program Small Business

Project Background

The participant is a retail facility that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (4) 70W LED - Non-Int. Ballast, replacing (4) 8' 2-Lamp T12;
- (1) 70W LED - Non-Int. Ballast, replacing (1) 150W Metal Halide;
- (12) 114W LED - Non-Int. Ballast, replacing (20) 320W Metal Halide;
- (23) 49W LED - Non-Int. Ballast, replacing (23) 8' 2-Lamp T12;
- (18) 22W LED - Non-Int. Ballast, replacing (18) 5' 1-Lamp T12HO;
- (2) 10W LED - Int. Ballast, replacing (2) 65W 1-Lamp Halogen;
- (4) 26W LED - Non-Int. Ballast, replacing (4) 8' 1-Lamp T8;
- (1) 10W LED - Int. Ballast, replacing (1) 100W incandescent;
- (1) 10W LED - Int. Ballast, replacing (1) 75W incandescent;
- (2) 40W LED - Non-Int. Ballast, replacing (4) 4' 2-Lamp T8;
- (3) 10W LED - Int. Ballast, replacing (3) 65W 1-Lamp Halogen; and
- (2) 10W LED - Int. Ballast, replacing (2) 75W incandescent.

On-site, the Evaluators did not verify the participant had installed:

- (4) 70W LED - Non-Int. Ballast; and
- (3) 49W LED - Non-Int. Ballast.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks. Exterior non-daylight operating hours were calculated using sunrise/sunset times from National Oceanic and Atmospheric Administration (NOAA) New Orleans- specific data

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Exterior	None	4,319	1.00	1.00	9%
Sales Area	Electric Resistance	8,760	0.87	1.20	100%
Cooler	Med. Temp Refrigeration	8,760	1.25	1.25	100%
Freezer	Low Temp Refrigeration	8,760	1.30	1.30	100%
Restroom	Electric Resistance	2,498	0.87	1.20	46%
Office	Electric Resistance	4,438	0.87	1.20	80%
Kitchen	Electric Resistance	7,633	0.87	1.20	100%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F82SL to LED070-FIXT	4	4	110	70	4,319	639	691	1.00	108.1%
MH150/1 to LED070-FIXT	1	1	183	70	4,319	2,258	488	1.00	21.6%
MH320/1 to LED114-FIXT	20	12	362	114	4,319	23,465	25,361	1.00	108.1%
F82SL to LED049-FIXT	23	23	110	49	8,760	7,540	10,693	0.87	141.8%
F51SHS to LED022-FIXT	18	18	92	22	8,760	10,868	13,797	1.25	127.0%
H65/1 to LED010-SCRW	2	2	65	10	8,760	949	1,205	1.25	127.0%
F81ILU to LED026-FIXT	4	4	67	26	8,760	1,471	1,868	1.30	127.0%
I100E/1 to LED010-SCRW	1	1	72	10	8,760	556	706	1.30	127.0%
I75E/1 to LED010-SCRW	1	1	53	10	2,498	258	93	0.87	36.2%
F42ILL to LED040-FIXT	4	2	58	40	7,633	912	1,009	0.87	110.6%
H65/1 to LED010-SCRW	3	3	65	10	7,633	990	1,096	0.87	110.6%
I75E/1 to LED010-SCRW	2	2	53	10	4,438	516	332	0.87	64.3%
					Total	50,422	57,339		113.7%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F82SL to LED070-FIXT	4	4	110	70	0.09	0.00	0.01	1.00	N/A
MH150/1 to LED070-FIXT	1	1	183	70	0.09	0.00	0.01	1.00	N/A
MH320/1 to LED114-FIXT	20	12	362	114	0.09	0.00	0.53	1.00	N/A
F82SL to LED049-FIXT	23	23	110	49	1.00	1.43	1.68	1.20	117.6%
F51SHS to LED022-FIXT	18	18	92	22	1.00	1.50	1.58	1.25	105.3%
H65/1 to LED010-SCRW	2	2	65	10	1.00	0.13	0.14	1.25	105.3%
F81ILU to LED026-FIXT	4	4	67	26	1.00	0.20	0.21	1.30	105.3%

I100E/1 to LED010-SCRW	1	1	72	10	1.00	0.08	0.08	1.30	105.3%
I75E/1 to LED010-SCRW	1	1	53	10	0.46	0.05	0.02	1.20	48.4%
F42ILL to LED040-FIXT	4	2	58	40	1.00	0.17	0.18	1.20	105.3%
H65/1 to LED010-SCRW	3	3	65	10	1.00	0.19	0.20	1.20	105.3%
I75E/1 to LED010-SCRW	2	2	53	10	0.80	0.10	0.08	1.20	84.2%
					Total	3.85	4.73		123.0%

Results

The kWh realization rate for project PRJ-574679 is 113.7% and the kW realization rate is 123.0%.

The high kWh realization rate is due to multiple areas of the building had higher hours of use, verified by monitoring, than stipulated in ex ante calculations.

High realized kW savings are attributable to increased peak coincident factor that was a result of several spaces operating at or near 24/7.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
F82SL to LED070-FIXT	691	0.01	108.1%	N/A
MH150/1 to LED070-FIXT	488	0.01	21.6%	N/A
MH320/1 to LED114-FIXT	25,361	0.53	108.1%	N/A
F82SL to LED049-FIXT	10,693	1.68	141.8%	117.6%
F51SHS to LED022-FIXT	13,797	1.58	127.0%	105.3%
H65/1 to LED010-SCRW	1,205	0.14	127.0%	105.3%
F81ILU to LED026-FIXT	1,868	0.21	127.0%	105.3%
I100E/1 to LED010-SCRW	706	0.08	127.0%	105.3%
I75E/1 to LED010-SCRW	93	0.02	36.2%	48.4%
F42ILL to LED040-FIXT	1,009	0.18	110.6%	105.3%
H65/1 to LED010-SCRW	1,096	0.20	110.6%	105.3%
I75E/1 to LED010-SCRW	332	0.08	64.3%	84.2%
Total	57,339	4.73	113.7%	123.0%

Project Number PRJ-442901
Program Small Business

Project Background

The participant is a service facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (3) 6W LED, replacing (3) 60W Incandescent
- (16) 6W LED - Int. Ballast, replacing (16) 42W CFL;
- (90) 6W LED - Int. Ballast, replacing (90) 60W incandescent;
- (31) 9W LED - Int. Ballast, replacing (31) 27W CFL;
- (13) 9W LED - Int. Ballast, replacing (13) 75W incandescent;
- (1) 10W LED - Int. Ballast, replacing (1) 60W incandescent;
- (20) 6W LED - Int. Ballast, replacing (20) 60W incandescent;
- (23) 9W LED - Int. Ballast, replacing (23) 60W incandescent; and
- (29) 10W LED - Int. Ballast, replacing (29) 60W incandescent.

On-site, the Evaluators were not able to verify (7) 10W LED - Int. Ballast, replacing (7) 42W CFLs or (4) 9W LED – Int. Ballast, replacing (4) 29W incandescent lamps.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	IEF_E	IEF_D	*CF*
Outdoor	None	3,996	1.00	1.00	0%
Multi-Family Housing	Electric Resistance	4,772	0.87	1.20	87%
Multi-Family Housing	Electric Resistance	8,740	0.87	1.20	100%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I60/1 to LED006-SCRW	3	3	42	6	4,772	673	448	0.87	66.7%
CF42/1-SCRW to LED006-SCRW	16	16	42	6	4,319	2,302	2,488	1.00	108.1%
I60/1 to LED006-SCRW	90	90	42	6	4,319	19,421	13,994	1.00	72.1%
CF27/1-SCRW to LED009-SCRW	31	31	27	9	8,760	4,243	4,253	0.87	100.2%
CF42/1-SCRW to LED010-SCRW	13	13	42	10	8,760	4,866	3,170	0.87	65.1%
I75/1 to LED009-SCRW	8	8	53	9	4,772	2,192	1,461	0.87	66.7%

I60/1 to LED010-SCRW	1	1	42	10	8,760	380	244	0.87	64.1%
I60/1 to LED006-SCRW	20	20	42	6	4,772	4,484	2,989	0.87	66.7%
I60/1 to LED009-SCRW	23	23	42	9	8,760	10,470	5,784	0.87	55.2%
I60/1 to LED010-SCRW	29	29	42	10	8,760	11,026	7,072	0.87	64.1%
					Total	60,056	41,904		69.8%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	*IEF_D*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I60/1 to LED006-SCRW	3	3	42	6	0.87	0.17	0.11	1.20	66.7%
CF42/1-SCRW to LED006-SCRW	16	16	42	6	0.09	0.00	0.05	1.00	N/A
I60/1 to LED006-SCRW	90	90	42	6	0.09	0.00	0.29	1.00	N/A
CF27/1-SCRW to LED009-SCRW	31	31	27	9	1.00	0.67	0.67	1.20	100.0%
CF42/1-SCRW to LED010-SCRW	13	13	42	10	1.00	0.77	0.50	1.20	65.0%
I75/1 to LED009-SCRW	8	8	53	9	0.87	0.55	0.37	1.20	66.7%
I60/1 to LED010-SCRW	1	1	42	10	1.00	0.06	0.04	1.20	64.0%
I60/1 to LED006-SCRW	20	20	42	6	0.87	1.13	0.75	1.20	66.7%
I60/1 to LED009-SCRW	23	23	42	9	1.00	1.65	0.91	1.20	55.1%
I60/1 to LED010-SCRW	29	29	42	10	1.00	1.74	1.11	1.20	64.0%
					Total	6.74	4.81		71.3%

Results

The kWh realization rate for project PRJ-442901 is 69.8% and the kW realization rate is 71.3%.

On-site, the Evaluators were not able to verify (7) 10W LEDs or (4) 9W LED which resulted in low kW and kWh realization rates.

The ex-ante estimates did not use EISA 2007 standards for incandescent lamps; while the ex-post calculations followed EISA 2007 standards, which lowered the wattage for 60W and 75W incandescent lamps. This also contributed to the lower kWh and kW realization rates.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
I60/1 to LED006-SCRW	448	0.11	66.7%	66.7%
CF42/1-SCRW to LED006-SCRW	2,488	0.05	108.1%	N/A
I60/1 to LED006-SCRW	13,994	0.29	72.1%	N/A
CF27/1-SCRW to LED009-SCRW	4,253	0.67	100.2%	100.0%
CF42/1-SCRW to LED010-SCRW	3,170	0.50	65.1%	65.0%
I75/1 to LED009-SCRW	1,461	0.37	66.7%	66.7%
I60/1 to LED010-SCRW	244	0.04	64.1%	64.0%
I60/1 to LED006-SCRW	2,989	0.75	66.7%	66.7%
I60/1 to LED009-SCRW	5,784	0.91	55.2%	55.1%
I60/1 to LED010-SCRW	7,072	1.11	64.1%	64.0%
Total	41,904	4.81	69.8%	71.3%

Project Number PRJ-463233
Program Small Business Comprehensive

Project Background

The participant is a service facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (24) 114W LED - Non-Int. Ballast, replacing (24) 400W MH;
- (2) 120W LED - Non-Int. Ballast, replacing (2) 1000W MH;
- (10) 10W LED - Int. Ballast, replacing (10) 150W MH;
- (51) 18W LED - Non-Int. Ballast, replacing (17) 4' 3-Lamp T8;
- (4) 18W LED - Non-Int. Ballast, replacing (2) 4' 2-Lamp T8;
- (10) 26W LED - Non-Int. Ballast, replacing (10) 4' 2-Lamp T8 HLO;
- (1) 9W LED - Int. Ballast, replacing (1) 75W incandescent;
- (2) 9W LED - Int. Ballast, replacing (2) 14W CFL;
- (2) 9W LED - Int. Ballast, replacing (2) 15W CFL;
- (4) 9W LED - Int. Ballast, replacing (2) 2-Lamp 42W CFL Multi 4-Pin;
- (2) 9W LED - Int. Ballast, replacing (2) 60W incandescent;
- (4) 10W LED - Non-Int. Ballast, replacing (4) 2' 1-Lamp T8;
- (2) 9W LED - Int. Ballast, replacing (2) 75W incandescent; and
- (4) 9W LED - Int. Ballast, replacing (4) 75W incandescent.

On-site, the Evaluators found that occupancy sensors were not installed in the restrooms.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Exterior	None	4,319[28]	1.00	1.00	0.09
Food Sales: 24-Hour Supermarket	Gas	8,760	1.09	1.20	1.00
Food Sales: 24-Hour Supermarket	Med. Temp. Refrigeration (33-41°F)	8,760	1.25	1.25	1.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

[28] Calculated non-daylight hours based on sunrise/sunset times reported by the NOAA for New Orleans.

Lighting Retrofit kWh Savings Calculations

Measure	Quantity (Fixtures)		Wattage		AOH	Expected kWh Savings	Realized kWh Savings	IEF_E	Realization Rate
	Base	Post	Base	Post					
MH400/1 to LED114-FIXT	24	24	453	114	4,319	32,511	35,139	1.00	108.1%
MH1000/1 to LED120-FIXT	2	2	1,078	120	4,319	7,656	8,275	1.00	108.1%
MH150/1 to LED010-SCRW	10	10	183	10	4,319	6,913	7,472	1.00	108.1%
F43LL to LED018-FIXT	17	51	93	18	8,760	4,986	6,331	1.09	127.0%
F42LL to LED018-FIXT	2	4	60	18	8,760	414	526	1.25	127.0%
F42ILL-H to LED026-FIXT	10	10	66	26	8,760	3,450	4,380	1.25	127.0%
I75/1 to LED009-SCRW	1	1	53	9	8,760	496	420	1.09	84.6%
CF14/1-SCRW to LED009-SCRW	2	2	14	9	8,760	75	95	1.09	127.0%
CF15/1-SCRW to LED009-SCRW	2	2	15	9	8,760	90	115	1.09	127.0%
CFM42/2-L to LED009-SCRW	2	4	93	9	8,760	1,128	1,432	1.09	127.0%
I60/1 to LED009-SCRW	2	2	43	9	8,760	767	649	1.09	84.6%
F21ILL to LED010-FIXT	4	4	18	10	8,760	276	350	1.25	127.0%
I75/1 to LED009-SCRW	2	2	53	9	8,760	993	840	1.09	84.6%
I75/1 to LED009-SCRW	4	4	53	9	8,760	1,986	1,681	1.09	84.6%
					Total	61,743	67,706		109.7%

Lighting Retrofit kW Savings Calculations

Measure	Quantity (Fixtures)		Wattage		CF	Expected kW Savings	Realized kW Savings	IEF_D	Realization Rate
	Base	Post	Base	Post					
MH400/1 to LED114-FIXT	24	24	453	114	0.00	0.00	0.00	1.00	N/A
MH1000/1 to LED120-FIXT	2	2	1,078	120	0.00	0.00	0.00	1.00	N/A
MH150/1 to LED010-SCRW	10	10	183	10	0.00	0.00	0.00	1.00	N/A
F43LL to LED018-FIXT	17	51	93	18	1.00	0.76	0.80	1.20	105.3%
F42LL to LED018-FIXT	2	4	60	18	1.00	0.06	0.06	1.25	105.3%

F42ILL-H to LED026-FIXT	10	10	66	26	1.00	0.48	0.50	1.25	105.3%
I75/1 to LED009-SCRW	1	1	53	9	1.00	0.08	0.05	1.20	70.2%
CF14/1-SCRW to LED009-SCRW	2	2	14	9	1.00	0.01	0.01	1.20	105.3%
CF15/1-SCRW to LED009-SCRW	2	2	15	9	1.00	0.01	0.01	1.20	105.3%
CFM42/2-L to LED009-SCRW	2	4	93	9	1.00	0.17	0.18	1.20	105.3%
I60/1 to LED009-SCRW	2	2	43	9	1.00	0.12	0.08	1.20	70.2%
F21ILL to LED010-FIXT	4	4	18	10	1.00	0.04	0.04	1.25	105.3%
I75/1 to LED009-SCRW	2	2	53	9	1.00	0.15	0.11	1.20	70.2%
I75/1 to LED009-SCRW	4	4	53	9	1.00	0.30	0.21	1.20	70.2%
					Total	2.16	2.05		94.8%

Results

The kWh realization rate for project# PRJ-463233 is 109.5% and the kW realization rate is 94.2%.

The changes in kWh savings are due to three reasons:

1) Ex ante calculations assumed lighting operating hours of 6,900 for the interior and 3,996 for the exterior. Interior lighting operates continuously and 8,760 were used in ex post calculations. Exterior lighting was adjusted 4,319 to reflect dusk-to-dawn hours at this latitude.
2) Ex ante calculations used pre-EISA baselines. The ex post calculations follow EISA 2007 standards for 60W and 75W incandescent lamps.
3) On site, the Evaluators did not find functioning occupancy sensors claimed in the ex ante estimations.

The changes in kW savings are due to three reasons

1) Since the facility operates continuously, the interior lighting CF was changed from 0.95 to 1.00.
2) The ex post calculations follow EISA 2007 standards for 60W and 75W incandescent lamps also affect kW savings.
3) On site, the Evaluators did not find functioning occupancy sensors claimed in the ex ante estimations.

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
MH400/1 to LED114-FIXT	35,139	0.00	108.1%	N/A
MH1000/1 to LED120-FIXT	8,275	0.00	108.1%	N/A
MH150/1 to LED010-SCRW	7,472	0.00	108.1%	N/A
F43LL to LED018-FIXT	6,331	0.80	127.0%	105.3%
F42LL to LED018-FIXT	526	0.06	127.0%	105.3%
F42ILL-H to LED026-FIXT	4,380	0.50	127.0%	105.3%
I75/1 to LED009-SCRW	420	0.05	84.6%	70.2%
CF14/1-SCRW to LED009-SCRW	95	0.01	127.0%	105.3%
CF15/1-SCRW to LED009-SCRW	115	0.01	127.0%	105.3%
CFM42/2-L to LED009-SCRW	1,432	0.18	127.0%	105.3%
I60/1 to LED009-SCRW	649	0.08	84.6%	70.2%
F21ILL to LED010-FIXT	350	0.04	127.0%	105.3%
I75/1 to LED009-SCRW	840	0.11	84.6%	70.2%
I75/1 to LED009-SCRW	1,681	0.21	84.6%	70.2%
Occupancy Sensors	0	0.00	0.0%	0.0%
Total	67,706	2.05	109.5%	94.2%

Project Number PRJ-446671
Program Small Business

Project Background

The participant is a hotel that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (4) 6W LED - Int. Ballast, replacing (4) 60W incandescent ;
- (4) 8W LED - Int. Ballast, replacing (4) 45W 1-Lamp Halogen;
- (34) 9W LED - Int. Ballast, replacing (34) 65W 1-Lamp Halogen;
- (4) 7W LED - Int. Ballast, replacing (4) 75W 1-Lamp Halogen;
- (1) 36W LED - Non-Int. Ballast, replacing (1) 4' 2-Lamp T8;
- (21) 9W LED - Int. Ballast, replacing (21) 65W 1-Lamp Halogen;
- (11) 7W LED - Int. Ballast, replacing (11) 60W incandescent;
- (13) 14W LED - Int. Ballast, replacing (13) 75W 1-Lamp Halogen;
- (26) 7W LED - Int. Ballast, replacing (26) 100W incandescent;
- (8) 9W LED - Int. Ballast, replacing (8) 75W 1-Lamp Halogen;
- (142) 6W LED - Int. Ballast, replacing (142) 40W incandescent;
- (40) 7W LED - Int. Ballast, replacing (40) 23W CFL;
- (40) 7W LED - Int. Ballast, replacing (40) 23W CFL;
- (41) 7W LED - Int. Ballast, replacing (41) 60W incandescent;
- (21) 7W LED - Int. Ballast, replacing (21) 23W CFL;
- (60) 6W LED - Int. Ballast, replacing (60) 40W incandescent;
- (15) 7W LED - Int. Ballast, replacing (15) 23W CFL;
- (60) 7W LED - Int. Ballast, replacing (60) 23W CFL;
- (15) 7W LED - Int. Ballast, replacing (15) 60W incandescent;
- (15) 7W LED - Int. Ballast, replacing (15) 60W incandescent;
- (20) 6W LED - Int. Ballast, replacing (20) 40W incandescent;
- (10) 7W LED - Int. Ballast, replacing (10) 23W CFL;
- (16) 7W LED - Int. Ballast, replacing (16) 60W incandescent;
- (16) 6W LED - Int. Ballast, replacing (16) 60W incandescent;
- (8) 7W LED - Int. Ballast, replacing (8) 60W incandescent; and
- (16) 8W LED - Int. Ballast, replacing (16) 45W 1-Lamp Halogen.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Outdoor	None	4,319	1.00	1.00	9%
Interior: Rooms	Electric Resistance	3,055	0.87	1.20	25%
Interior: Common	Electric Resistance	8,760	0.87	1.20	82%
Interior: Lobby	Electric Resistance	294	0.87	1.20	5%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I60/1 to LED006-SCRW	4	4	43	6	294	1,246	38	0.87	3.0%
H45/1 to LED008-SCRW	4	4	39	8	294	854	32	0.87	3.7%
H65/1 to LED009-SCRW	34	34	65	9	8,760	10,982	14,511	0.87	132.1%
H75/1 to LED007-SCRW	4	4	53	7	294	1,569	47	0.87	3.0%
F42ILL to LED036-FIXT	1	1	58	36	8,760	127	168	0.87	132.1%
H65/1 to LED009-SCRW	21	21	65	9	8,760	6,783	8,963	0.87	132.1%
I60/1 to LED007-SCRW	11	11	43	7	8,760	3,363	3,018	0.87	89.7%
H75/1 to LED014-SCRW	13	13	53	14	8,760	4,574	3,864	0.87	84.5%
I100/1 to LED007-SCRW	26	26	72	7	4,319	9,662	7,299	1.00	75.5%
H75/1 to LED009-SCRW	8	8	53	9	4,319	2,110	1,520	1.00	72.1%
I40/1 to LED006-SCRW	142	142	29	6	3,055	12,832	8,681	0.87	67.6%
CF23/1-SCRW to LED007-SCRW	40	40	23	7	3,055	1,701	1,701	0.87	100.0%
CF23/1-SCRW to LED007-SCRW	40	40	23	7	3,055	1,701	1,701	0.87	100.0%
I60/1 to LED007-SCRW	41	41	43	7	3,055	5,776	3,923	0.87	67.9%
CF23/1-SCRW to LED007-SCRW	21	21	23	7	3,055	893	893	0.87	100.0%
I40/1 to LED006-SCRW	60	60	29	6	3,055	5,422	3,668	0.87	67.6%
CF23/1-SCRW to LED007-SCRW	15	15	23	7	3,055	638	638	0.87	100.0%
CF23/1-SCRW to LED007-SCRW	60	60	23	7	3,055	2,552	2,552	0.87	100.0%

I60/1 to LED007-SCRW	15	15	43	7	3,055	2,113	1,435	0.87	67.9%
I60/1 to LED007-SCRW	15	15	43	7	3,055	2,113	1,435	0.87	67.9%
I40/1 to LED006-SCRW	20	20	29	6	3,055	1,807	1,223	0.87	67.6%
CF23/1-SCRW to LED007-SCRW	10	10	23	7	3,055	425	425	0.87	100.0%
I60/1 to LED007-SCRW	16	16	43	7	3,055	2,254	1,531	0.87	67.9%
I60/1 to LED006-SCRW	16	16	43	6	3,055	2,296	1,573	0.87	68.5%
I60/1 to LED007-SCRW	8	8	43	7	3,055	1,127	765	0.87	67.9%
H45/1 to LED008-SCRW	16	16	39	8	4,319	2,366	2,142	1.00	90.6%
					Total	87,286	73,745		84.5%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I60/1 to LED006-SCRW	4	4	43	6	0.05	0.21	0.01	1.20	4.0%
H45/1 to LED008-SCRW	4	4	39	8	0.05	0.15	0.01	1.20	4.9%
H65/1 to LED009-SCRW	34	34	65	9	0.82	1.87	1.87	1.20	100.0%
H75/1 to LED007-SCRW	4	4	53	7	0.05	0.27	0.01	1.20	3.9%
F42ILL to LED036-FIXT	1	1	58	36	0.82	0.02	0.02	1.20	100.0%
H65/1 to LED009-SCRW	21	21	65	9	0.82	1.16	1.16	1.20	100.0%
I60/1 to LED007-SCRW	11	11	43	7	0.82	0.57	0.39	1.20	67.9%
H75/1 to LED014-SCRW	13	13	53	14	0.82	0.78	0.50	1.20	63.9%
I100/1 to LED007-SCRW	26	26	72	7	0.09	0.00	0.15	1.00	N/A
H75/1 to LED009-SCRW	8	8	53	9	0.09	0.00	0.03	1.00	N/A
I40/1 to LED006-SCRW	142	142	29	6	0.25	1.45	0.98	1.20	67.6%
CF23/1-SCRW to LED007-SCRW	40	40	23	7	0.25	0.19	0.19	1.20	100.0%
CF23/1-SCRW to LED007-SCRW	40	40	23	7	0.25	0.19	0.19	1.20	100.0%

I60/1 to LED007-SCRW	41	41	43	7	0.25	0.65	0.44	1.20	67.9%
CF23/1-SCRW to LED007-SCRW	21	21	23	7	0.25	0.10	0.10	1.20	100.0%
I40/1 to LED006-SCRW	60	60	29	6	0.25	0.61	0.41	1.20	67.6%
CF23/1-SCRW to LED007-SCRW	15	15	23	7	0.25	0.07	0.07	1.20	100.0%
CF23/1-SCRW to LED007-SCRW	60	60	23	7	0.25	0.29	0.29	1.20	100.0%
I60/1 to LED007-SCRW	15	15	43	7	0.25	0.24	0.16	1.20	67.9%
I60/1 to LED007-SCRW	15	15	43	7	0.25	0.24	0.16	1.20	67.9%
I40/1 to LED006-SCRW	20	20	29	6	0.25	0.20	0.14	1.20	67.6%
CF23/1-SCRW to LED007-SCRW	10	10	23	7	0.25	0.05	0.05	1.20	100.0%
I60/1 to LED007-SCRW	16	16	43	7	0.25	0.25	0.17	1.20	67.9%
I60/1 to LED006-SCRW	16	16	43	6	0.25	0.26	0.18	1.20	68.5%
I60/1 to LED007-SCRW	8	8	43	7	0.25	0.13	0.09	1.20	67.9%
H45/1 to LED008-SCRW	16	16	39	8	0.09	0.00	0.04	1.00	N/A
					Total	9.96	7.82		78.6%

Results

The kWh realization rate for project PRJ-446671 is 84.5% and the kW realization rate is 78.6%.

The kWh and kW savings are low because the ex post calculations followed EISA 2007 standards for 40W, 60W, 100W incandescent lamps and 45W and 75W halogen lamps, reducing the wattages to 29W, 43W, 72W, 39W, and 53W, respectively. The ex ante estimations did not follow EISA 2007 standards.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
I60/1 to LED006-SCRW	38	0.01	3.0%	4.0%
H45/1 to LED008-SCRW	32	0.01	3.7%	4.9%

H65/1 to LED009-SCRW	14,511	1.87	132.1%	100.0%
H75/1 to LED007-SCRW	47	0.01	3.0%	3.9%
F42ILL to LED036-FIXT	168	0.02	132.1%	100.0%
H65/1 to LED009-SCRW	8,963	1.16	132.1%	100.0%
I60/1 to LED007-SCRW	3,018	0.39	89.7%	67.9%
H75/1 to LED014-SCRW	3,864	0.50	84.5%	63.9%
I100/1 to LED007-SCRW	7,299	0.15	75.5%	N/A
H75/1 to LED009-SCRW	1,520	0.03	72.1%	N/A
I40/1 to LED006-SCRW	8,681	0.98	67.6%	67.6%
CF23/1-SCRW to LED007-SCRW	1,701	0.19	100.0%	100.0%
CF23/1-SCRW to LED007-SCRW	1,701	0.19	100.0%	100.0%
I60/1 to LED007-SCRW	3,923	0.44	67.9%	67.9%
CF23/1-SCRW to LED007-SCRW	893	0.10	100.0%	100.0%
I40/1 to LED006-SCRW	3,668	0.41	67.6%	67.6%
CF23/1-SCRW to LED007-SCRW	638	0.07	100.0%	100.0%
CF23/1-SCRW to LED007-SCRW	2,552	0.29	100.0%	100.0%
I60/1 to LED007-SCRW	1,435	0.16	67.9%	67.9%
I60/1 to LED007-SCRW	1,435	0.16	67.9%	67.9%
I40/1 to LED006-SCRW	1,223	0.14	67.6%	67.6%
CF23/1-SCRW to LED007-SCRW	425	0.05	100.0%	100.0%
I60/1 to LED007-SCRW	1,531	0.17	67.9%	67.9%
I60/1 to LED006-SCRW	1,573	0.18	68.5%	68.5%
I60/1 to LED007-SCRW	765	0.09	67.9%	67.9%
H45/1 to LED008-SCRW	2,142	0.04	90.6%	N/A
Total	73,745	7.82	84.5%	78.6%

Project Number PRJ-448427
Program Small Business Comprehensive

Project Background

The participant is a lodging establishment that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (14) 6W LED - Int. Ballast, replacing (14) 60W Inc.;
- (1) 10W LED - Int. Ballast, replacing (1) 13W CFL;
- (8) 10W LED - Int. Ballast, replacing (8) 75W Inc.;
- (2) 10W LED - Int. Ballast, replacing (2) 13W CFL;
- (4) 6W LED - Int. Ballast, replacing (4) 40W Inc.;
- (10) 6W LED - Int. Ballast, replacing (10) 60W Inc.;
- (4) 10W LED - Int. Ballast, replacing (4) 60W Inc.;
- (6) 10W LED - Int. Ballast, replacing (6) 13W CFL;
- (4) 10W LED - Non-Int. Ballast, replacing (2) 1-Lamp T8 U-Tube;
- (4) 40W LED - Non-Int. Ballast, replacing (4) 2-Lamp T12 U-Tube;
- (4) 10W LED - Int. Ballast, replacing (4) 13W CFL;
- (1) 10W LED - Int. Ballast, replacing (1) 75W Inc.;
- (30) 10W LED - Int. Ballast, replacing (30) 13W CFL;
- (15) 6W LED - Int. Ballast, replacing (15) 60W Inc.;
- (10) 10W LED - Int. Ballast, replacing (10) 60W Inc.;
- (15) 10W LED - Int. Ballast, replacing (15) 40W Inc.;
- (5) 10W LED - Int. Ballast, replacing (5) 13W CFL;
- (15) 10W LED - Int. Ballast, replacing (15) 75W Inc.;
- (10) 10W LED - Int. Ballast, replacing (10) 13W CFL;
- (24) 6W LED - Int. Ballast, replacing (24) 60W Inc.;
- (8) 10W LED - Int. Ballast, replacing (8) 13W CFL;
- (6) 10W LED - Int. Ballast, replacing (6) 60W Inc.;
- (4) 10W LED - Int. Ballast, replacing (4) 40W Inc.;
- (36) 6W LED - Int. Ballast, replacing (36) 60W Inc.;
- (8) 6W LED - Int. Ballast, replacing (8) 40W Inc.;
- (6) 10W LED - Int. Ballast, replacing (6) 13W CFL;
- (4) 10W LED - Int. Ballast, replacing (4) 60W Inc.;
- (4) 10W LED - Int. Ballast, replacing (4) 100W Inc.;
- (24) 10W LED - Int. Ballast, replacing (24) 13W CFL;
- (12) 10W LED - Int. Ballast, replacing (12) 13W CFL;
- (12) 10W LED - Int. Ballast, replacing (12) 13W CFL;
- (8) 10W LED - Int. Ballast, replacing (8) 100W Inc.;
- (63) 9W LED - Int. Ballast, replacing (63) 65W 1-Lamp Halogen;

- (42) 10W LED - Int. Ballast, replacing (42) 13W CFL;
- (42) 10W LED - Int. Ballast, replacing (42) 100W Inc.;
- (84) 6W LED - Int. Ballast, replacing (84) 60W Inc.;
- (63) 10W LED - Int. Ballast, replacing (63) 13W CFL;
- (9) 10W LED - Int. Ballast, replacing (9) 40W Inc.;
- (12) 6W LED - Int. Ballast, replacing (12) 40W Inc.;
- (6) 10W LED - Int. Ballast, replacing (6) 13W CFL;
- (6) 10W LED - Int. Ballast, replacing (6) 100W Inc.;
- (12) 10W LED - Int. Ballast, replacing (12) 13W CFL;
- (5) 17W LED - Int. Ballast, replacing (5) 25W CFL;
- (11) 10W LED - Int. Ballast, replacing (11) 65W 1-Lamp Halogen;
- (9) 6W LED - Int. Ballast, replacing (9) 40W Inc.;
- (12) 6W LED - Int. Ballast, replacing (12) 40W Inc.;
- (9) 17W LED - Int. Ballast, replacing (9) 90W 1-Lamp Halogen;
- (3) 10W LED - Int. Ballast, replacing (3) 100W Inc.;

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	IEF_E	IEF_D	*CF*
Lodging (Hotel/Motel/Dorm): Common Areas	Electric Resistance	8,760	0.87	1.20	1.00
Lodging (Hotel/Motel/Dorm): Common Areas	Electric Resistance	1,392	0.87	1.20	0.22
Lodging (Hotel/Motel/Dorm): Rooms	Electric Resistance	2,140	0.87	1.20	0.46
Lodging (Hotel/Motel/Dorm): Common Areas	Electric Resistance	6,630	0.87	1.20	0.82
Exterior	None	4,319	1.00	1.00	0.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/Fixture$_{base}$ / 1000 W/kW
kWpost	Total InstalLED fixtures x W/Fixture$_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of InstalLED Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/Fixture$_{base}$ / 1000 W/kW
kW_{post}	Total InstalLED fixtures x W/Fixture$_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I60E/1 to LED006-scrw	14	14	43	6	8,760	4,912	3,948	0.87	80%
CF13/1-SCRW to LED010-SCRW	1	1	13	10	8,760	19	23	0.87	117%
I75E/1 to LED010-SCRW	8	8	53	10	8,760	3,379	2,622	0.87	78%
CF13/1-SCRW to LED010-SCRW	2	2	13	10	8,760	39	46	0.87	117%
I40E/1 to LED006-scrw	4	4	29	6	8,760	884	701	0.87	79%
I60E/1 to LED006-scrw	10	10	43	6	8,760	3,509	2,820	0.87	80%
I60E/1 to LED010-SCRW	4	4	43	10	8,760	1,299	1,006	0.87	77%
CF13/1-SCRW to LED010-SCRW	6	6	13	10	8,760	117	137	0.87	117%

FU2ILL to LED010-FIXT	2	4	59	10	8,760	507	594	0.87	117%
FU2SE to LED040-FIXT	4	4	72	40	8,760	832	976	0.87	117%
CF13/1-SCRW to LED010-SCRW	4	4	13	10	1,392	78	15	0.87	19%
I75E/1 to LED010-SCRW	1	1	53	10	6,630	422	248	0.87	59%
CF13/1-SCRW to LED010-SCRW	30	30	13	10	2,140	269	168	0.87	62%
I60E/1 to LED006-scrw	15	15	43	6	2,140	2,425	1,033	0.87	43%
I60E/1 to LED010-SCRW	10	10	43	10	2,140	1,497	614	0.87	41%
I40E/1 to LED010-SCRW	15	15	29	10	2,140	1,347	531	0.87	39%
CF13/1-SCRW to LED010-SCRW	5	5	13	10	2,140	45	28	0.87	62%
I75E/1 to LED010-SCRW	15	15	53	10	2,140	2,919	1,201	0.87	41%
CF13/1-SCRW to LED010-SCRW	10	10	13	10	2,140	90	56	0.87	62%
I60E/1 to LED006-scrw	24	24	43	6	2,140	3,880	1,653	0.87	43%
CF13/1-SCRW to LED010-SCRW	8	8	13	10	2,140	72	45	0.87	62%
I60E/1 to LED010-SCRW	6	6	43	10	2,140	898	369	0.87	41%
I40E/1 to LED010-SCRW	4	4	29	10	2,140	359	141	0.87	39%
I60E/1 to LED006-scrw	36	36	43	6	2,140	5,820	2,479	0.87	43%
I40/1 to LED006-scrw	8	8	40	6	2,140	814	506	0.87	62%
CF13/1-SCRW to LED010-SCRW	6	6	13	10	2,140	54	34	0.87	62%
I60E/1 to LED010-SCRW	4	4	43	10	2,140	599	246	0.87	41%
I100E/1 to LED010-SCRW	4	4	72	10	2,140	1,078	462	0.87	43%
CF13/1-SCRW to LED010-SCRW	24	24	13	10	2,140	216	134	0.87	62%
CF13/1-SCRW to LED010-SCRW	12	12	13	10	2,140	108	67	0.87	62%
CF13/1-SCRW to LED010-SCRW	12	12	13	10	2,140	108	67	0.87	62%
I100E/1 to LED010-SCRW	8	8	72	10	2,140	2,156	923	0.87	43%
H65/1 to LED009-SCRW	63	63	65	9	2,140	10,562	6,567	0.87	62%
CF13/1-SCRW to LED010-SCRW	42	42	13	10	2,140	377	235	0.87	62%
I100E/1 to LED010-SCRW	42	42	72	10	2,140	11,317	4,847	0.87	43%
I60E/1 to LED006-scrw	84	84	43	6	2,140	13,580	5,785	0.87	43%
CF13/1-SCRW to LED010-SCRW	63	63	13	10	2,140	566	352	0.87	62%
I40E/1 to LED010-SCRW	9	9	29	10	2,140	808	318	0.87	39%
I40E/1 to LED006-scrw	12	12	29	6	2,140	1,222	514	0.87	42%
CF13/1-SCRW to LED010-SCRW	6	6	13	10	2,140	54	34	0.87	62%
I100E/1 to LED010-SCRW	6	6	72	10	2,140	1,617	692	0.87	43%
CF13/1-SCRW to LED010-SCRW	12	12	13	10	2,140	108	67	0.87	62%
CF25/1-SCRW to LED017-SCRW	5	5	25	17	4,319	160	173	1.00	108%
H65/1 to LED010-SCRW	11	11	65	10	4,319	2,418	2,613	1.00	108%
I40E/1 to LED006-scrw	9	9	29	6	4,319	1,223	894	1.00	73%
I40E/1 to LED006-scrw	12	12	29	6	4,319	1,630	1,192	1.00	73%

H90/1 to LED017-SCRW	9	9	72	17	4,319	2,625	2,138	1.00	81%
I100E/1 to LED010-SCRW	3	3	72	10	4,319	1,079	803	1.00	74%
Total						90,096	51,114		57%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	*IEF_D*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I60/1 to LED006-scrw	14	14	43	6	1.00	0.74	0.62	1.20	84%
CF13/1-SCRW to LED010-SCRW	1	1	13	10	1.00	0.00	0.00	1.20	122%
I75/1 to LED010-SCRW	8	8	53	10	1.00	0.51	0.41	1.20	81%
CF13/1-SCRW to LED010-SCRW	2	2	13	10	1.00	0.01	0.01	1.20	122%
I40/1 to LED006-scrw	4	4	29	6	1.00	0.13	0.11	1.20	82%
I60/1 to LED006-scrw	10	10	43	6	1.00	0.53	0.44	1.20	84%
I60/1 to LED010-SCRW	4	4	43	10	1.00	0.20	0.16	1.20	80%
CF13/1-SCRW to LED010-SCRW	6	6	13	10	1.00	0.02	0.02	1.20	122%
FU2ILL to LED010-FIXT	2	4	59	10	1.00	0.08	0.09	1.20	122%
FU2SE to LED040-FIXT	4	4	72	40	1.00	0.13	0.15	1.20	122%
CF13/1-SCRW to LED010-SCRW	4	4	13	10	0.22	0.01	0.00	1.20	27%
I75/1 to LED010-SCRW	1	1	53	10	0.82	0.06	0.04	1.20	66%
CF13/1-SCRW to LED010-SCRW	30	30	13	10	0.46	0.03	0.05	1.20	185%
I60/1 to LED006-scrw	15	15	43	6	0.46	0.24	0.31	1.20	127%
I60/1 to LED010-SCRW	10	10	43	10	0.46	0.15	0.18	1.20	122%
I40/1 to LED010-SCRW	15	15	29	10	0.46	0.14	0.16	1.20	117%
CF13/1-SCRW to LED010-SCRW	5	5	13	10	0.46	0.00	0.01	1.20	185%
I75/1 to LED010-SCRW	15	15	53	10	0.46	0.29	0.36	1.20	123%
CF13/1-SCRW to LED010-SCRW	10	10	13	10	0.46	0.01	0.02	1.20	185%
I60/1 to LED006-scrw	24	24	43	6	0.46	0.39	0.49	1.20	127%
CF13/1-SCRW to LED010-SCRW	8	8	13	10	0.46	0.01	0.01	1.20	185%
I60/1 to LED010-SCRW	6	6	43	10	0.46	0.09	0.11	1.20	122%
I40/1 to LED010-SCRW	4	4	29	10	0.46	0.04	0.04	1.20	117%
I60/1 to LED006-scrw	36	36	43	6	0.46	0.58	0.74	1.20	127%
I40/1 to LED006-scrw	8	8	40	6	0.46	0.08	0.15	1.20	185%
CF13/1-SCRW to LED010-SCRW	6	6	13	10	0.46	0.01	0.01	1.20	185%
I60/1 to LED010-SCRW	4	4	43	10	0.46	0.06	0.07	1.20	122%
I100/1 to LED010-SCRW	4	4	72	10	0.46	0.11	0.14	1.20	128%
CF13/1-SCRW to LED010-SCRW	24	24	13	10	0.46	0.02	0.04	1.20	185%
CF13/1-SCRW to LED010-SCRW	12	12	13	10	0.46	0.01	0.02	1.20	185%

CF13/1-SCRW to LED010-SCRW	12	12	13	10	0.46	0.01	0.02	1.20	185%
I100/1 to LED010-SCRW	8	8	72	10	0.46	0.22	0.28	1.20	128%
H65/1 to LED009-SCRW	63	63	65	9	0.46	1.06	1.96	1.20	185%
CF13/1-SCRW to LED010-SCRW	42	42	13	10	0.46	0.04	0.07	1.20	185%
I100/1 to LED010-SCRW	42	42	72	10	0.46	1.13	1.45	1.20	128%
I60/1 to LED006-scrw	84	84	43	6	0.46	1.36	1.73	1.20	127%
CF13/1-SCRW to LED010-SCRW	63	63	13	10	0.46	0.06	0.11	1.20	185%
I40/1 to LED010-SCRW	9	9	29	10	0.46	0.08	0.10	1.20	117%
I40/1 to LED006-scrw	12	12	29	6	0.46	0.12	0.15	1.20	125%
CF13/1-SCRW to LED010-SCRW	6	6	13	10	0.46	0.01	0.01	1.20	185%
I100/1 to LED010-SCRW	6	6	72	10	0.46	0.16	0.21	1.20	128%
CF13/1-SCRW to LED010-SCRW	12	12	13	10	0.46	0.01	0.02	1.20	185%
CF25/1-SCRW to LED017-SCRW	5	5	25	17	0.00	0.00	0.00	1.00	N/A
H65/1 to LED010-SCRW	11	11	65	10	0.00	0.00	0.00	1.00	N/A
I40/1 to LED006-scrw	9	9	29	6	0.00	0.00	0.00	1.00	N/A
I40/1 to LED006-scrw	12	12	29	6	0.00	0.00	0.00	1.00	N/A
H90/1 to LED017-SCRW	9	9	72	17	0.00	0.00	0.00	1.00	N/A
I100/1 to LED010-SCRW	3	3	72	10	0.00	0.00	0.00	1.00	N/A
Total						8.93	11.08		124%

Results

The kWh realization rate for project PRJ-448427 is 59.7% and the kW realization rate is 124.1%.

The low kWh savings is due to 2 reasons:

1) Deviations from the ex ante savings were incurred when the ex post calculations were adjusted to follow EISA 2007 standards for incandescent lamps.
2) Ex ante calculations used deemed hours for guest rooms of 3,055 hours per year. On-site monitoring verified that guest room annual operating hours is 2,140.

The high kW realization rate is due to verified CF for guest room is 0.46. The ex ante estimations used deemed CF of 0.25.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
I60/1 to LED006-scrw	3,948	0.62	80%	84%

CF13/1-SCRW to LED010-SCRW	23	0.00	117%	122%
I75/1 to LED010-SCRW	2,622	0.41	78%	81%
CF13/1-SCRW to LED010-SCRW	46	0.01	117%	122%
I40/1 to LED006-scrw	701	0.11	79%	82%
I60/1 to LED006-scrw	2,820	0.44	80%	84%
I60/1 to LED010-SCRW	1,006	0.16	77%	80%
CF13/1-SCRW to LED010-SCRW	137	0.02	117%	122%
FU2ILL to LED010-FIXT	594	0.09	117%	122%
FU2SE to LED040-FIXT	976	0.15	117%	122%
CF13/1-SCRW to LED010-SCRW	15	0.00	19%	27%
I75/1 to LED010-SCRW	248	0.04	59%	66%
CF13/1-SCRW to LED010-SCRW	168	0.05	62%	185%
I60/1 to LED006-scrw	1,033	0.31	43%	127%
I60/1 to LED010-SCRW	614	0.18	41%	122%
I40/1 to LED010-SCRW	531	0.16	39%	117%
CF13/1-SCRW to LED010-SCRW	28	0.01	62%	185%
I75/1 to LED010-SCRW	1,201	0.36	41%	123%
CF13/1-SCRW to LED010-SCRW	56	0.02	62%	185%
I60/1 to LED006-scrw	1,653	0.49	43%	127%
CF13/1-SCRW to LED010-SCRW	45	0.01	62%	185%
I60/1 to LED010-SCRW	369	0.11	41%	122%
I40/1 to LED010-SCRW	141	0.04	39%	117%
I60/1 to LED006-scrw	2,479	0.74	43%	127%
I40/1 to LED006-scrw	506	0.15	62%	185%
CF13/1-SCRW to LED010-SCRW	34	0.01	62%	185%
I60/1 to LED010-SCRW	246	0.07	41%	122%
I100/1 to LED010-SCRW	462	0.14	43%	128%
CF13/1-SCRW to LED010-SCRW	134	0.04	62%	185%
CF13/1-SCRW to LED010-SCRW	67	0.02	62%	185%
CF13/1-SCRW to LED010-SCRW	67	0.02	62%	185%
I100/1 to LED010-SCRW	923	0.28	43%	128%
H65/1 to LED009-SCRW	6,567	1.96	62%	185%
CF13/1-SCRW to LED010-SCRW	235	0.07	62%	185%
I100/1 to LED010-SCRW	4,847	1.45	43%	128%
I60/1 to LED006-scrw	5,785	1.73	43%	127%
CF13/1-SCRW to LED010-SCRW	352	0.11	62%	185%
I40/1 to LED010-SCRW	318	0.10	39%	117%
I40/1 to LED006-scrw	514	0.15	42%	125%

CF13/1-SCRW to LED010-SCRW	34	0.01	62%	185%
I100/1 to LED010-SCRW	692	0.21	43%	128%
CF13/1-SCRW to LED010-SCRW	67	0.02	62%	185%
CF25/1-SCRW to LED017-SCRW	173	0.00	108%	N/A
H65/1 to LED010-SCRW	2,613	0.00	108%	N/A
I40/1 to LED006-scrw	894	0.00	73%	N/A
I40/1 to LED006-scrw	1,192	0.00	73%	N/A
H90/1 to LED017-SCRW	2,138	0.00	81%	N/A
I100/1 to LED010-SCRW	803	0.00	74%	N/A
Total	51,114	11.08	56.7%	124.1%

Project Number PRJ-394938
Program Small Business Comprehensive

Project Background

The participant is a retail facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (4) 7W LED - Int. Ballast, replacing (4) 50W 1-Lamp Halogen;
- (306) 7W LED - Int. Ballast, replacing (306) 50W 1-Lamp Halogen;
- (61) 8W LED - Int. Ballast, replacing (61) 50W 1-Lamp Halogen;
- (36) 9W LED - Int. Ballast, replacing (36) 60W Inc.;
- (10) 5W LED - Int. Ballast, replacing (10) 40W Inc.;
- (49) 9W LED - Int. Ballast, replacing (49) 100W Inc.;
- (8) 9W LED - Int. Ballast, replacing (8) 42W CFL;
- (11) 9W LED - Int. Ballast, replacing (11) 13W CFL;
- (3) 9W LED - Int. Ballast, replacing (3) 26W CFL; and
- (47) 8W LED - Int. Ballast, replacing (47) 50W 1-Lamp Halogen.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Retail: Other	Gas	8,760	1.09	1.20	1.00
Retail: Other	Gas	1,958[29]	1.09	1.20	0.62

[29] Extrapolated from on-site monitoring data.

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	*IEF_E*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H50/1 to LED007-SCRW	4	4	39	7	8,760	618	1,222	1.09	197.7%
H50/1 to LED007-SCRW	306	306	38	7	1,958	47,298	20,245	1.09	42.8%
H50/1 to LED008-SCRW	61	61	38	8	1,958	9,209	3,906	1.09	42.4%
I60/1 to LED009-SCRW	36	36	43	9	1,958	6,600	2,612	1.09	39.6%
I40/1 to LED005-SCRW	10	10	29	5	1,958	1,258	512	1.09	40.7%

I100/1 to LED009-SCRW	49	49	72	9	1,958	16,028	6,588	1.09	41.1%
CF42/1-SCRW to LED009-SCRW	8	8	42	9	1,958	949	563	1.09	59.4%
CF13/1-SCRW to LED009-SCRW	11	11	13	9	1,958	158	94	1.09	59.4%
CF26/1-SCRW to LED009-SCRW	3	3	26	9	1,958	183	109	1.09	59.4%
H50/1 to LED008-SCRW	47	47	39	8	1,958	7,892	3,110	1.09	39.4%
					Total	90,195	38,962		43.2%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	*IEF_D*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H50/1 to LED007-SCRW	4	4	39	7	1.00	0.19	0.15	1.20	82.7%
H50/1 to LED007-SCRW	306	306	38	7	0.62	14.21	7.06	1.20	49.7%
H50/1 to LED008-SCRW	61	61	38	8	0.62	2.77	1.36	1.20	49.2%
I60/1 to LED009-SCRW	36	36	43	9	0.62	1.98	0.91	1.20	45.9%
I40/1 to LED005-SCRW	10	10	29	5	0.62	0.38	0.18	1.20	47.2%
I100/1 to LED009-SCRW	49	49	72	9	0.62	4.82	2.30	1.20	47.7%
CF42/1-SCRW to LED009-SCRW	8	8	42	9	0.62	0.29	0.20	1.20	68.9%
CF13/1-SCRW to LED009-SCRW	11	11	13	9	0.62	0.05	0.03	1.20	68.9%
CF26/1-SCRW to LED009-SCRW	3	3	26	9	0.62	0.06	0.04	1.20	68.9%
H50/1 to LED008-SCRW	47	47	39	8	0.62	2.13	1.08	1.20	50.8%
					Total	26.86	13.31		49.6%

Results

The kWh realization rate for project# PRJ-394938 is 43.2% and the kW realization rate is 49.6%.

The low kWh savings is due to two reasons

1) The ex post calculations follow EISA 2007 standards for 40W, 60W, 100W incandescent lamps and 50W halogen lamps. The standards reduced the baseline wattage for the lamps to 29W, 43W, 72W, and 39W, respectively.

2) Through monitoring, the Evaluators determined the AOH for most areas of the facility are 1,925 hours instead of 3,668 hours, used in the ex ante estimations.

The low kW savings is due to two reasons.

1) The ex post calculations follow EISA 2007 standards for 40W, 60W, 100W incandescent lamps and 50W halogen lamps.
2) Through monitoring, the Evaluators determined the CF of the facility is 0.62 in most areas instead of 0.90, used in the ex ante estimations.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
H50/1 to LED007-SCRW	1,222	0.15	197.7%	82.7%
H50/1 to LED007-SCRW	20,245	7.06	42.8%	49.7%
H50/1 to LED008-SCRW	3,906	1.36	42.4%	49.2%
I60/1 to LED009-SCRW	2,612	0.91	39.6%	45.9%
I40/1 to LED005-SCRW	512	0.18	40.7%	47.2%
I100/1 to LED009-SCRW	6,588	2.30	41.1%	47.7%
CF42/1-SCRW to LED009-SCRW	563	0.20	59.4%	68.9%
CF13/1-SCRW to LED009-SCRW	94	0.03	59.4%	68.9%
CF26/1-SCRW to LED009-SCRW	109	0.04	59.4%	68.9%
H50/1 to LED008-SCRW	3,110	1.08	39.4%	50.8%
Total	38,962	13.31	43.2%	49.6%

Project Number PRJ-420462
Program Small Business

Project Background

The participant is a service facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (8) 320W MH, replacing (8) 1000W MH;
- (5) 320W MH, replacing (5) 1000W MH;
- (46)200WMH,replacing(46)400WMH;and
- (12) 200W MH, replacing (12) 400W MH

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through calculation of total daylight hours based off of NOAA data. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Outdoor Non-daylight	None	4,319[30]	1.00	1.00	0.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures

[30] Calculated non-daylight hours based on sunrise/sunset times reported by the NOAA for New Orleans.

AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH1000/1 to MH320/1-L	8	8	1,078	343	4,319	23,496	25,396	1.00	108.1%
MH1000/1 to MH320/1-L	5	5	1,078	343	4,319	14,685	15,872	1.00	108.1%
MH400/1 to MH200/1-L	46	46	453	219	4,319	43,013	46,490	1.00	108.1%
MH400/1 to MH200/1-L	12	12	453	219	4,319	11,221	12,128	1.00	108.1%
					Total	92,415	99,886		108.1%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH1000/1 to MH320/1-L	8	8	1,078	343	0.00	0.00	0.00	1.00	N/A
MH1000/1 to MH320/1-L	5	5	1,078	343	0.00	0.00	0.00	1.00	N/A
MH400/1 to MH200/1-L	46	46	453	219	0.00	0.00	0.00	1.00	N/A
MH400/1 to MH200/1-L	12	12	453	219	0.00	0.00	0.00	1.00	N/A
					Total	0.00	0.00		N/A

Results

The kWh realization rate for PRJ-420462 is 108%. The kWh is slightly high because the verified annual hours of lighting operation (4,319) are higher than the deemed value used in ex ante calculations (3,996).

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
MH1000/1 to MH320/1-L	25,396	0.00	108.1%	N/A
MH1000/1 to MH320/1-L	15,872	0.00	108.1%	N/A
MH400/1 to MH200/1-L	46,490	0.00	108.1%	N/A
MH400/1 to MH200/1-L	12,128	0.00	108.1%	N/A
Total	99,886	0.00	108.1%	N/A

Project Number PRJ-560879
Program Small Business

Project Background

The participant is a service facility that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (4) 11W LED - Non-Int. Ballast, replacing (4) 65W incandescent;
- (1) 11W LED - Int. Ballast, replacing (1) 60W incandescent;
- (6) 11W LED - Non-Int. Ballast, replacing (6) 50W incandescent;
- (2) 17W LED - Non-Int. Ballast, replacing (2) 90W 1-Lamp Halogen;
- (4) 11W LED - Non-Int. Ballast, replacing (4) 50W incandescent;
- (3) 11W LED - Non-Int. Ballast, replacing (3) 65W incandescent;
- (2) 18W LED - Non-Int. Ballast, replacing (1) 4' 4-Lamp T8;
- (3) 11W LED - Non-Int. Ballast, replacing (3) 50W incandescent;
- (3) 11W LED - Non-Int. Ballast, replacing (3) 65W incandescent;
- (32) 18W LED - Non-Int. Ballast, replacing (16) 4' 2-Lamp T8;
- (4) 18W LED - Non-Int. Ballast, replacing (2) 4' 2-Lamp T8;
- (8) 11W LED - Non-Int. Ballast, replacing (8) 65W incandescent;
- (24) 11W LED - Non-Int. Ballast, replacing (24) 65W incandescent;
- (25) 11W LED - Int. Ballast, replacing (25) 60W incandescent;
- (414) 11W LED - Non-Int. Ballast, replacing (414) 65W incandescent; and
- (299) 11W LED - Int. Ballast, replacing (299) 60W incandescent.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Outdoor	None	4,339	1.00	1.00	0%
Indoor: Office	Electric Resistance	1,690	0.87	1.20	17%
Indoor: Rooms	Electric Resistance	3,055	0.87	1.20	
Indoor: Hallway and Stairwells	Electric Resistance	8,760	0.87	1.20	100%
Indoor: Other Common Areas	Electric Resistance	6,630	.87	1.20	82%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/Fixture$_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x W/Fixture$_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/Fixture$_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x W/Fixture$_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	*IEF_E*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I65/1 to LED011-FIXT	4	4	65	11	4,319	863	933	1.00	108.1%
I60/1 to LED011-SCRW	1	1	43	11	6,630	283	185	0.87	65.3%
I50/1 to LED011-FIXT	6	6	45	11	6,630	1,350	1,177	0.87	87.2%
H90/1 to LED017-FIXT	2	2	70	17	6,630	842	611	0.87	72.6%
I50/1 to LED011-FIXT	4	4	45	11	6,630	900	784	0.87	87.2%
I65/1 to LED011-FIXT	3	3	65	11	6,630	934	934	0.87	100.0%
F44ILL to LED018-FIXT	1	2	112	18	1,690	247	112	0.87	45.2%

I50/1 to LED011-FIXT	3	3	45	11	1,690	380	150	0.87	39.4%
I65/1 to LED011-FIXT	3	3	65	11	1,690	527	238	0.87	45.2%
F42ILL to LED018-FIXT	16	32	58	18	8,760	2,030	2,683	0.87	132.1%
F42ILL to LED018-FIXT	2	4	58	18	8,760	254	335	0.87	132.1%
I65/1 to LED011-FIXT	8	8	65	11	8,760	2,492	3,292	0.87	132.1%
I65/1 to LED011-FIXT	24	24	65	11	8,760	7,475	9,877	0.87	132.1%
I60/1 to LED011-SCRW	25	25	43	11	6,630	7,066	4,614	0.87	65.3%
I65/1 to LED011-FIXT	414	414	65	11	3,055	59,419	59,419	0.87	100.0%
I60/1 to LED011-SCRW	299	299	43	11	3,055	38,940	25,430	0.87	65.3%
					Total	124,003	110,776		89.3%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
I65/1 to LED011-FIXT	4	4	65	11	0.00	0.00	0.00	1.00	N/A
I60/1 to LED011-SCRW	1	1	43	11	0.82	0.05	0.03	1.20	65.3%
I50/1 to LED011-FIXT	6	6	45	11	0.82	0.23	0.20	1.20	87.2%
H90/1 to LED017-FIXT	2	2	70	17	0.82	0.14	0.10	1.20	72.6%
I50/1 to LED011-FIXT	4	4	45	11	0.82	0.15	0.13	1.20	87.2%
I65/1 to LED011-FIXT	3	3	65	11	0.82	0.16	0.16	1.20	100.0%
F44ILL to LED018-FIXT	1	2	112	18	0.17	0.07	0.02	1.20	21.6%
I50/1 to LED011-FIXT	3	3	45	11	0.17	0.11	0.02	1.20	18.9%
I65/1 to LED011-FIXT	3	3	65	11	0.17	0.15	0.03	1.20	21.6%
F42ILL to LED018-FIXT	16	32	58	18	1.00	0.35	0.42	1.20	122.0%
F42ILL to LED018-FIXT	2	4	58	18	1.00	0.04	0.05	1.20	122.0%
I65/1 to LED011-FIXT	8	8	65	11	1.00	0.43	0.52	1.20	122.0%
I65/1 to LED011-FIXT	24	24	65	11	1.00	1.28	1.56	1.20	122.0%

I60/1 to LED011-SCRW	25	25	43	11	0.82	1.21	0.79	1.20	65.3%
I65/1 to LED011-FIXT	414	414	65	11	0.25	6.71	6.71	1.20	100.0%
I60/1 to LED011-SCRW	299	299	43	11	0.25	4.40	2.87	1.20	65.3%
					Total	15.46	13.61		88.0%

Results

The kWh realization rate for project #PRJ-560879 is 89.3% and the kW realization rate is 88.0%.

The decrease in kWh savings is due to lower annual hours of operation reported by facility staff than those used in ex ante calculations. The decrease in kW reduction is due to differences in CF developed from staff interviews and those used in ex ante calculations. Finally, the ex post calculation followed EISA 2007 standards for general service lamps (40W, 60W) as well as for interior and exterior flood lamps (50W, 90W).

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
I65/1 to LED011-FIXT	933	0.00	108.1%	N/A
I60/1 to LED011-SCRW	185	0.03	65.3%	65.3%
I50/1 to LED011-FIXT	1,177	0.20	87.2%	87.2%
H90/1 to LED017-FIXT	611	0.10	72.6%	72.6%
I50/1 to LED011-FIXT	784	0.13	87.2%	87.2%
I65/1 to LED011-FIXT	934	0.16	100.0%	100.0%
F44ILL to LED018-FIXT	112	0.02	45.2%	21.6%
I50/1 to LED011-FIXT	150	0.02	39.4%	18.9%
I65/1 to LED011-FIXT	238	0.03	45.2%	21.6%
F42ILL to LED018-FIXT	2,683	0.42	132.1%	122.0%
F42ILL to LED018-FIXT	335	0.05	132.1%	122.0%
I65/1 to LED011-FIXT	3,292	0.52	132.1%	122.0%
I65/1 to LED011-FIXT	9,877	1.56	132.1%	122.0%
I60/1 to LED011-SCRW	4,614	0.79	65.3%	65.3%
I65/1 to LED011-FIXT	59,419	6.71	100.0%	100.0%
I60/1 to LED011-SCRW	25,430	2.87	65.3%	65.3%
Total	110,776	13.61	89.3%	88.0%

Project Number PRJ-718708
Program Small Business

Project Background

The participant received incentives from Entergy New Orleans for implementing energy efficient lighting in a parking structure. On-site, the Evaluators verified the participant had installed:

- (84) 63W LED - Non-Int. Ballast, replacing (84) 250W Metal Halide

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Parking Structure	None	8,760	1.00	1.00	100%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH250/1 to LED063-FIXT	85	85	288	63	8,760	156,103	167,535	1.00	107.3%
					Total	156,103	165,564		107.3%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH250/1 to LED063-FIXT	85	85	288	63	1.00	19.80	19.13	1.00	96.6%
					Total	19.80	18.90		96.6%

Results

The kWh realization rate for project PRJ-718708 is 107.3% and the kW realization rate is 99.6%. During the on-site verification, the Evaluators found three baseline fixtures involved in the project which had not yet been retrofitted with efficient equipment, bringing the verified total form (88) fixtures to (85) fixtures, lowering kW savings. Also, ex ante calculations assumed 7,884 AOH, however facility staff stated that the lights operate 8,760 annually. This increased to kWh savings to a sufficient extent that its effects fully offset the reduced number of fixtures.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
MH250/1 to LED063-FIXT	167,535	19.13	107.3%	96.6%
Total	167,535	19.13	107.3%	96.6%

Project Number PRJ-706009
Program Small Business

Project Background

The participant is a service facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking structure. On-site, the Evaluators verified the participant had installed:

- (98) 82W LED fixtures, replacing (98) 250W metal halide fixtures

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Parking Structure	None	8,760	1.00	1.00	100%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH250/1 to LED082-FIXT	98	98	288	82	8,760	159,162	176,847	1.00	111.1%
					Total	159,162	176,847		111.1%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH250/1 to LED082-FIXT	98	98	288	82	1.00	20.19	20.19	1.00	100.0%
					Total	20.19	20.19		100.0%

Results

The kWh realization rate for project PRJ-706009 is 111.1% and the kW realization rate is 100.0%. Ex ante calculations assumed 7,884 AOH however, facility staff reported that the lighting operates continuously throughout the year, raising the ex post kWh.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
MH250/1 to LED082-FIXT	176,847	20.19	111.1%	100.0%
Total	176,847	20.19	111.1%	100.0%

Project Number PRJ-448293
Program Small Business

Project Background

The participant is a service facility that received incentives from Entergy New Orleans for implementing interior and exterior energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (3) 9W LED - Int. Ballast, replacing (3) 65W 1-Lamp Halogen;
- (3) 71W LED - Non-Int. Ballast, replacing (3) 300W 1-Lamp Halogen;
- (49) 9W LED - Int. Ballast, replacing (49) 23W CFL;
- (32) 36W LED - Non-Int. Ballast, replacing (32) 4' 2-Lamp T12ES;
- (2) 29W LED - Non-Int. Ballast, replacing (2) 500W 1-Lamp Halogen;
- (2) 17W LED - Int. Ballast, replacing (2) 300W 1-Lamp Halogen;
- (191) 6W LED - Int. Ballast, replacing (191) 40W incandescent;
- (2) 71W LED - Non-Int. Ballast, replacing (2) 700W Mercury Vapor;
- (56) 6W LED - Int. Ballast, replacing (56) 50W incandescent;
- (5) 10W LED - Int. Ballast, replacing (3) 14W CFL;
- (3) 36W LED - Non-Int. Ballast, replacing (3) 4' 2-Lamp T12ES;
- (11) 6W LED - Int. Ballast, replacing (11) 40W incandescent;
- (2) 10W LED - Int. Ballast, replacing (2) 60W incandescent;
- (3) 4W LED - Non-Int. Ballast, replacing (3) 50W incandescent;
- (102) 6W LED - Int. Ballast, replacing (102) 40W incandescent;
- (13) 10W LED - Int. Ballast, replacing (13) 14W CFL;
- (2) 10W LED - Int. Ballast, replacing (2) 40W incandescent;
- (5) 4W LED - Non-Int. Ballast, replacing (5) 50W incandescent;
- (103) 6W LED - Int. Ballast, replacing (103) 40W incandescent;
- (13) 10W LED - Int. Ballast, replacing (13) 14W CFL;
- (4) 36W LED - Non-Int. Ballast, replacing (4) 4' 2-Lamp T12ES;
- (4) 4W LED - Non-Int. Ballast, replacing (4) 50W incandescent;
- (76) 6W LED - Int. Ballast, replacing (76) 40W incandescent;
- (13) 10W LED - Int. Ballast, replacing (13) 14W CFL;
- (2) 36W LED - Non-Int. Ballast, replacing (2) 4' 3-Lamp T12ES; and
- (6) 4W LED - Non-Int. Ballast, replacing (6) 50W incandescent.

On site, the evaluator was unable to verify a large number of the claimed retrofits. A detailed list of these items is provided later in this report.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	*IEF_E*	*IEF_D*	*CF*
Exterior	None	4,319[31]	1.00	1.20	0%
Interior: Logger Hours	Electric Resistance	6,227	0.87	1.00	69%
Interior: Common Spaces	Electric Resistance	6,630	0.87	1.00	100%
Interior: 24/7	Electric Resistance	8,760	0.87	1.00	100%

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

[31] Calculated non-daylight hours based on sunrise/sunset times reported by the NOAA for New Orleans.

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H65/1 to LED009-SCRW	3	3	65	9	8,760	1,442	1,280	0.87	88.8%
H300/1 to LED071-FIXT	3	3	300	71	4,319	2,745	2,967	1.00	108.1%
CF23/1-SCRW to LED009-SCRW	49	49	23	9	4,319	3,413	2,963	1.00	86.8%
F42EIS to LED036-FIXT	32	32	82	36	8,760	12,895	12,895	1.00	100.0%
H500/1 to LED029-FIXT	2	2	500	29	4,319	3,764	4,068	1.00	108.1%
H300/1 to LED017-SCRW	2	2	300	17	4,319	2,262	2,445	1.00	108.1%
I40/1 to LED006-SCRW	191	191	29	6	4,319	25,950	18,973	1.00	73.1%
MV700/1 to LED071-FIXT	2	2	780	71	4,319	5,666	6,124	1.00	108.1%
I50/1 to LED004-FIXT	0	0	45	4	8,760	2,418	0	1.00	0.0%
I40/1 to LED006-SCRW	56	56	29	6	8,760	34,150	9,816	0.87	28.7%
CF14/1-SCRW to LED010-SCRW	5	5	14	10	8,760	412	152	0.87	37.0%
F42EE to LED036-FIXT	3	3	72	36	8,760	927	823	0.87	88.8%
I40/1 to LED006-SCRW	11	11	29	6	8,760	3,503	1,928	0.87	55.0%
I60/1 to LED010-SCRW	2	2	43	10	8,760	858	503	0.87	58.6%
I50/1 to LED004-FIXT	3	3	29	4	8,760	1,185	572	0.87	48.2%
I40/1 to LED006-SCRW	102	102	29	6	6,277	29,772	12,811	0.87	43.0%
CF14/1-SCRW to LED010-SCRW	13	13	14	10	6,277	446	284	0.87	63.6%
I40/1 to LED010-SCRW	2	2	29	10	6,277	515	208	0.87	40.3%

I50/1 to LED004-FIXT	5	5	29	4	8,760	1,975	953	0.87	48.2%
I40/1 to LED006-SCRW	103	103	29	6	8,760	30,356	18,055	0.87	59.5%
CF14/1-SCRW to LED010-SCRW	13	13	14	10	8,760	721	396	0.87	55.0%
F42EE to LED036-FIXT	4	4	72	36	6,630	1,236	831	0.87	67.2%
I50/1 to LED004-FIXT	4	4	45	4	8,760	1,580	1,250	0.87	79.1%
I40/1 to LED006-SCRW	76	76	29	6	8,760	22,183	13,322	0.87	60.1%
CF14/1-SCRW to LED010-SCRW	13	13	14	10	8,760	446	396	0.87	88.8%
F44EE to LED036-FIXT	2	2	144	36	6,630	1,854	1,246	0.87	67.2%
I50/1 to LED004-FIXT	6	6	45	4	8,760	2,369	1,875	0.87	79.1%
					Total	195,044	117,136		60.1%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
H65/1 to LED009-SCRW	3	3	65	9	1.00	0.20	0.20	1.20	100.0%
H300/1 to LED071-FIXT	3	3	300	71	0.00	0.00	0.00	1.00	0.0%
CF23/1-SCRW to LED009-SCRW	49	49	23	9	0.00	0.00	0.00	1.00	0.0%
F42EIS to LED036-FIXT	32	32	82	36	1.00	1.47	1.47	1.00	100.0%
H500/1 to LED029-FIXT	2	2	500	29	0.00	0.00	0.00	1.00	0.0%
H300/1 to LED017-SCRW	2	2	300	17	0.00	0.00	0.00	1.00	0.0%
I40/1 to LED006-SCRW	191	191	29	6	0.00	0.00	0.00	1.00	0.0%
MV700/1 to LED071-FIXT	2	2	780	71	0.00	0.00	0.00	1.00	0.0%
I50/1 to LED004-FIXT	0	0	45	4	1.00	0.28	0.00	1.00	0.0%
I40/1 to LED006-SCRW	56	56	29	6	1.00	4.77	1.55	1.20	32.4%
CF14/1-SCRW to LED010-SCRW	5	5	14	10	1.00	0.06	0.02	1.20	41.7%
F42EE to LED036-FIXT	3	3	72	36	1.00	0.13	0.13	1.20	100.0%

I40/1 to LED006-SCRW	11	11	29	6	1.00	0.49	0.30	1.20	62.0%
I60/1 to LED010-SCRW	2	2	43	10	1.00	0.12	0.08	1.20	66.0%
I50/1 to LED004-FIXT	3	3	29	4	1.00	0.17	0.09	1.20	54.3%
I40/1 to LED006-SCRW	102	102	29	6	0.69	4.16	1.94	1.20	46.7%
CF14/1-SCRW to LED010-SCRW	13	13	14	10	0.69	0.06	0.04	1.20	69.0%
I40/1 to LED010-SCRW	2	2	29	10	0.69	0.07	0.03	1.20	43.7%
I50/1 to LED004-FIXT	5	5	29	4	1.00	0.28	0.15	1.20	54.3%
I40/1 to LED006-SCRW	103	103	29	6	1.00	4.24	2.84	1.20	67.0%
CF14/1-SCRW to LED010-SCRW	13	13	14	10	1.00	0.10	0.06	1.20	61.9%
F42EE to LED036-FIXT	4	4	72	36	1.00	0.17	0.17	1.20	100.0%
I50/1 to LED004-FIXT	4	4	45	4	1.00	0.22	0.20	1.20	89.1%
I40/1 to LED006-SCRW	76	76	29	6	1.00	3.10	2.10	1.20	67.6%
CF14/1-SCRW to LED010-SCRW	13	13	14	10	1.00	0.06	0.06	1.20	100.0%
F44EE to LED036-FIXT	2	2	144	36	1.00	0.26	0.26	1.20	100.0%
I50/1 to LED004-FIXT	6	6	45	4	1.00	0.33	0.30	1.20	89.1%
					Total	20.75	12.00		57.8%

Results

The kWh realization rate for project PRJ-448293 is 60.1% and the kW realization rate is 57.8%.

The low realization rates are due to the incompleteness of the project, inappropriate lighting baselines and inappropriate IEFs. Below is a list of fixtures which the Evaluators were not able to verify installation of on site.

- (12) LED009-SCRW Building Down Lights
- (6) LED004-FIXT Garage Exit Lights
- (61) LED006-SCRW 1St Floor Ceiling/Wall sconces
- (7) LED010-SCRW 1St Floor Cans
- (1) LED006-SCRW Lobby Lights

- (1) LED006-SCRW 3Rd Floor Ceiling/Wall Sconces
- (8) LED010-SCRW 3rd Floor Cans

Calculations for incandescent retrofits used nominal wattage baselines instead of EISA-correct baselines, further reducing savings.

Finally, ex ante calculations specified an "Undetermined' heating type for interior spaces with an IEF_E value of 0.98. On site, the Evaluators determined that the facility was heated by electrical resistance elements and used an IEF_E of 0.87 in ex post calculations, further reducing savings.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
H65/1 to LED009-SCRW	1,280	0.20	88.8%	100.0%
H300/1 to LED071-FIXT	2,967	0.00	108.1%	0.0%
CF23/1-SCRW to LED009-SCRW	2,963	0.00	86.8%	0.0%
F42EIS to LED036-FIXT	12,895	1.47	100.0%	100.0%
H500/1 to LED029-FIXT	4,068	0.00	108.1%	0.0%
H300/1 to LED017-SCRW	2,445	0.00	108.1%	0.0%
I40/1 to LED006-SCRW	18,973	0.00	73.1%	0.0%
MV700/1 to LED071-FIXT	6,124	0.00	108.1%	0.0%
I50/1 to LED004-FIXT	0	0.00	0.0%	0.0%
I40/1 to LED006-SCRW	9,816	1.55	28.7%	32.4%
CF14/1-SCRW to LED010-SCRW	152	0.02	37.0%	41.7%
F42EE to LED036-FIXT	823	0.13	88.8%	100.0%
I40/1 to LED006-SCRW	1,928	0.30	55.0%	62.0%
I60/1 to LED010-SCRW	503	0.08	58.6%	66.0%
I50/1 to LED004-FIXT	572	0.09	48.2%	54.3%
I40/1 to LED006-SCRW	12,811	1.94	43.0%	46.7%
CF14/1-SCRW to LED010-SCRW	284	0.04	63.6%	69.0%
I40/1 to LED010-SCRW	208	0.03	40.3%	43.7%
I50/1 to LED004-FIXT	953	0.15	48.2%	54.3%
I40/1 to LED006-SCRW	18,055	2.84	59.5%	67.0%
CF14/1-SCRW to LED010-SCRW	396	0.06	55.0%	61.9%
F42EE to LED036-FIXT	831	0.17	67.2%	100.0%
I50/1 to LED004-FIXT	1,250	0.20	79.1%	89.1%
I40/1 to LED006-SCRW	13,322	2.10	60.1%	67.6%
CF14/1-SCRW to LED010-SCRW	396	0.06	88.8%	100.0%
F44EE to LED036-FIXT	1,246	0.26	67.2%	100.0%
I50/1 to LED004-FIXT	1,875	0.30	79.1%	89.1%
Total	117,136	12.00	60.1%	57.8%

Project Number PRJ-418219
Program Large C&I

Project Background

The participant is a fast food restaurant that received incentives from Entergy New Orleans for implementing energy efficient food service equipment. On-site, the Evaluators verified the participant had installed:

- (2) Pre-rinse spray valves (PRSV).

M&V Methodology

On-site, Evaluators verified the presence of all PRSVs listed on the project application. Flow rates and fuel type were collected through onsite verification.

Impact Parameters

Building Type	Fuel Type
Fast food	Electric

Savings Calculations

Annual kWh electric and peak kW savings can be calculated using the following equations:

$$Annual\ kWh\ Savings = \frac{\rho \times C_P \times U \times (F_B - F_P) \times (T_H - T_{Supply}) \times \frac{1}{E_t} \times \frac{Days}{Year}}{\frac{3412BTU}{kWh}}$$

$$Peak\ kW\ Savings = \frac{\rho \times C_P \times U \times (F_B - F_P) \times (T_H - T_{Supply}) \times \frac{1}{E_t} \times P}{\frac{3412BTU}{kWh}}$$

The calculation assumptions are detailed below:

PRSV Calculation Assumptions for Supermarkets

Parameter	Description	Value
F_B	Average baseline flow rate of sprayer (GPM)	2.25
F_P	Average post measure flow rate of sprayer (GPM)	1.28
$Days/Year$	Annual operating days for the applications: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 365 365 365 274 200
$Tsupply$	Average supply (cold) water temperature (°F)	61.9
T_H	Average mixed hot water (after spray valve) temperature (°F)	120
U_B	Baseline water usage duration for the following applications: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 45 min/day/unit 105 min/day/unit 210 min/day/unit 210 min/day/unit 105 min/day/unit
ρ	Density of water 8.33 BTU/Gallon	8.33
C_P	Heat capacity of water, 1 BTU/lb°F	1
E_t	Thermal efficiency of water heater	Default value 0.98 for electric and 0.80 for gas
P	Hourly peak demand as a fraction of daily water consumption: 1. Fast food restaurant 2. Casual dining restaurant 3. Institutional 4. Dormitory 5. K-12 school	 0.056 0.048 0.038 0.048 0.058

PRSV kWh Savings Calculations

Quantity	Fuel Type	Expected kWh Savings	kWh Savings	Realization Rate
2	Electric	3,588	4,612	128.5%
Total		3,588	4,612	128.5%

PRSV kW Savings Calculations

Quantity	Fuel Type	Expected kW Savings	kW Savings	Realization Rate
2	Electric	0.49	0.63	128.4%
Total		0.49	0.63	128.4%

Results

The kWh realization rate for project# PRJ-418219 is 128.5% and the kW realization rate is 1284%. The ex post analysis incorporated facility-specific data. The ex ante energy savings is based on deemed estimates. The deemed estimates likely account for averages of building types and other variables.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
Strip Curtains	4,612	0.63	128.5%	128.4%
Total	4,612	0.63	128.5%	128.4%

Project Number PRJ-448713
Program Large Commercial and Industrial

Project Background

The participant is a convenience store that received incentives from Entergy New Orleans for implementing energy efficient refrigeration. On-site, the Evaluators verified that the participant had installed:

- 42 square feet of strip curtains

M&V Methodology

On-site, Evaluators verified the presence of all strip curtains listed on the project application. Savings for the refrigeration measures were calculated using ASHRAE algorithms with New Orleans-specific inputs. Annual door opening hours, infiltrating air temperature, and refrigerated air temperature were gathered by on-site monitoring data as well as interviews with facility staff.

Impact Parameters

Building Type	***Refrigeration Type***	***Time Open (Minutes/day)***	***Infiltrating Air Temperature***	***Refrigerated Air Temperature***
Convenience Store	Freezer	62	64	12
Convenience Store	Freezer	80	22	12

Savings Calculations

The annual energy savings due to infiltration barriers is quantified by multiplying savings per square foot by area using assumptions for independent variables. The source algorithm from which the savings per square foot values are determined is based on Tamm's equation (an application of Bernoulli's equation) and the ASHRAE handbook.

Savings shall be calculated using the following equation:

$$\frac{\Delta kWh}{sqft} =$$

$$\frac{365 \times t_{open} \times (\eta_{new} - \eta_{old}) \times 20 \times CD \times A \times \left\{\left[\frac{(T_i - T_r)}{T_i}\right] \times g \times H\right\}^{0.5} \times [\rho_i \times h_i - \rho_r \times h_r]}{3{,}412 \frac{Btu}{kWh} \times COP_{adj} \times A}$$

In general, refrigeration is constant for food storage, even outside of normal operating conditions. Therefore, peak demand savings shall be calculated as follows:

$$\frac{\Delta kW_{peak}}{sqft} = \frac{\Delta kWh}{8{,}760}$$

The calculation assumptions are detailed in the table on the following page.

Strip Curtain Calculation Assumptions for Convenience Stores

Term	Unit	Values		Source
		Cooler	Freezer	
η_{new}, Efficacy of the new strip curtain – an efficacy of 1 corresponds to the strip curtain thwarting all infiltration, while an efficacy of zero corresponds to the absence of strip curtains	*None*	0.79	0.83	1
η_{old}, Efficacy of the old strip curtain with Pre-existing curtain with no Pre-existing curtain unknown	*None*	0.58 0.00 0.34	0.58 0.00 0.30	1
C_d, Discharge Coefficient: empirically determined scale factors that account for differences between infiltration as rates predicted by application Bernoulli's law and actual observed infiltration rates	*None*	0.348	0.421	1
t_{open}, Minutes walk-in door is open per day	$\frac{minutes}{day}$	38	9	1
A, Doorway area	ft^2	21	21	1
H, Doorway height	ft	7	7	1
T_i, Dry-bulb temperature of infiltrating air, Rankine = Fahrenheit + 459.67	$°F$	68	64	1 and 2
T_r, Dry-bulb temperature of refrigerated air, Rankine = Fahrenheit + 459.67	$°F$	39	5	1
ρ_i, Density of the infiltration air, based on 55% RH	$\frac{lb}{ft^3}$	0.074	0.075	3
h_i, Enthalpy of the infiltrating air, based on 55% RH	$\frac{Btu}{lb}$	25.227	23.087	3
ρ_r, Density of the refrigerated air, based on 80% RH	$\frac{lb}{ft^3}$	0.079	0.085	3
h_r, Enthalpy of the refrigerated air, based on 80% RH	$\frac{Btu}{lb}$	13.750	2.081	3
COP_{adj}, Time-dependent (weather dependent) coefficient of performance of the refrigeration system; based on nominal COP of 1.5 for freezers and 2.5 for coolers	*None*	3.07	1.95	1 and 2

Refrigeration Retrofit kWh Savings Calculations

Type	Total square footage	Expected kWh Savings	kWh Savings	Realization Rate
Freezer	21	2,974	3,827	128.7%
Freezer	21	2,974	2,278	76.6%
Total		5,948	6,106	102.6%

Refrigeration Retrofit kW Savings Calculations

Type	Total square footage	Expected kW Savings	kW Savings	Realization Rate
Freezer	21	0.35	0.44	124.8%
Freezer	21	0.35	0.26	74.3%
Total		0.70	0.70	99.6%

Results

The kWh realization rate for project# PRJ-448713 is 102.6% and the kW realization rate is 99.6%.

The ex post analysis uses engineering equations, site specific information, and post monitoring data. The ex ante analysis utilizes deemed estimates.

Verified Gross Savings & Realization Rates

Measure	Verified			
	kWh Savings	kW Savings	kWh Realization Rate	kW Realization Rate
Strip Curtains	6,106	0.70	102.6%	99.6%
Total	6,106	0.70	102.6%	99.6%

Project Number PRJ-477576 - 1
Program Large C&I

Project Background

The participant is a hotel that received incentives from Entergy New Orleans for installing window film. On-site, the Evaluators verified the participant had installed:

- 360 square feet of east-facing window film
- 360 square feet of west-facing window film

M&V Methodology

On-site, Evaluators verified the presence of the window film listed on the project application. Savings for the window film was calculated using equations and solar heat gain factor tables found in 1997 ASHRAE Standard Handbook - Fundamentals[32]. Heat gain through the retrofitted windows was calculated for an entire year using baseline and as-built site specific glazing properties as well as ASHRAE accepted glazing properties when site specific properties were not available. Specific parameters used in the analysis can be seen below:

Window Glazing Savings Parameters

Building Type	***Window Direction***	***Window Area***	***Baseline Shading Coefficient[33]***	***As-Built Shading Coefficient***
Hotel	East	360	0.95	0.21
Hotel	West	360	0.95	0.21

Savings Calculations

The annual energy savings due to the window film is quantified by multiplying savings per square foot by window film area. Savings were calculated using the following equations:

$$q = SC * SHGF + U(t_o - t_i)$$

Where:
q= Daily heat gain
SC= Rated shading coefficient of the glazing system
SHGF= Daily solar heat gain factor

[32] Simplified Methods for Predicting Heat Transfer Through Fenestration, pg. 29.27

[33] 1997 ASHRAE Standard Handbook - Fundamentals, Table 29, pg 29.40 for Single glass, ¼ in. Clear

U= Rated U-factor of the glazing system
t_o-t_i= Difference between outside and inside temperatures

$$\Delta kWh = \left(A * (q_{base} - q_{as-built}) * Days_{cooling}\right)/eff$$

Where:
A= Window film area (ft^2)
q_{base}= Daily heat gain using baseline SC and U-Factor
$q_{as\text{-}built}$= Daily heat gain using as-built SC and U-Factor
$Days_{cooling}$= Cooling Days
eff= Efficiency of the cooling system

Hourly instantaneous heat gain solar heat gain factors are provided in the 1997 ASHRAE Standard Handbook - Fundamentals. Therefore, peak demand savings were calculated using the instantaneous heat transfer during Louisiana peak hours and the following equation:

$$\Delta kW_{peak} = \left(\mathrm{A} * \left(q_{A,base} - q_{A,as-built}\right)\right)/eff$$

Where:
A= Window film area
q_{base}= Instantaneous heat gain using baseline SC and U-Factor
eff= Efficiency of the cooling system

The results of the savings calculations are detailed in the following table.

Window Glazing Retrofit kWh Savings Calculations

Type	*Total square footage*	*Expected kWh Savings*	*kWh Savings*	*Realization Rate*
Window Film	360	8,818	10,659	120.9%
Total		8,818	10,659	120.9%

Window Glazing Retrofit kW Savings Calculations

Type	*Total square footage*	*Expected kW Savings*	*kW Savings*	*Realization Rate*
Window Film	360	7.04	9.12	129.5%
Total		7.04	9.12	129.5%

Results

The kWh realization rate for project #PRJ-477576 is 120.9% and the kW realization rate is 129.5%.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
Window Film	8,818	10,659	120.9%	129.5%

Total	8,818	10,659	120.9%	129.5%

The difference in realization is due to the ex-ante and ex-post calculations using different window glazing areas and different annual solar gain values. The ex-ante calculations estimated 800 square feet of glazing, however the supporting documentation indicates there are three double-sided skylights each with 16 panes 3 feet by 5 feet resulting in 720 square feet. However, the biggest contributor to the difference in realization is due to the ex-ante and ex-post calculations using different annual solar gain values. A comparison between the ex-ante and ex-post's four standard orientation's annual solar gain values can be seen below:

Window Direction	*Ex-Ante Annual Solar Gain*	*Ex-Post Annual Solar Gain*
North	76,627	70,114
South	135,656	147,830
East	150,040	199,248
West	150,040	199,248

No supporting calculations were included the ex-ante calculations for the calculation of annual solar gain; therefore, no attributable comparison can be inferred.

Project Number PRJ-417568
Program Large C&I

Project Background

The participant is a dining facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (10) 223W LED fixtures, replacing (10) 1000W Metal Halide fixtures.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Savings for the lighting measures were calculated using known fixture wattage inputs and annual operating hours (AOH) developed through analysis of NOAA data to determine total non-daylight hours specific to the New Orleans latitude. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Impact Parameters

Building Type	Heating Type	Annual Hours	IEF_E	IEF_D	CF
Exterior	None	4,319	1.00	1.00	0%

Savings Calculations

Using deemed values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH1000/1 to LED	10	10	1,078	223	3,996	34,166	36,927	1.00	108.1%
					Total	34,166	36,927		108.1%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH1000/1 to LED	10	10	1,078	223	0%	0	0	1.00	N/A
					Total	0	0		N/A

Results

The kWh realization rate for project# PRJ-417568 is 108.1% and the kW realization rate is 100.0%. The high kWh realization rate is due to the Evaluators using latitude-adjusted non-daylight hours (4,319) instead of the deemed value (3,996) used in ex ante calculations.

. Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
MH1000/1 to LED	36,927	0	108.1%	N/A
Total	36,927	0	108.1%	N/A

Project Number PRJ-420015
Program Large C&I

Project Background

The participant is a lodging establishment that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (782) 12W LED - Int. Ballast, replacing (782) 20W CFLs;
- (1230) 12W LED - Int. Ballast, replacing (1230) 20W CFLs;

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Impact Parameters

Building Type	Heating Type	Annual Hours	IEF_E	IEF_D	CF
Lodging (Hotel/Motel/Dorm): Common Areas	Gas	8,760	1.09	1.20	0.82
Lodging (Hotel/Motel/Dorm): Rooms	Electric Resistance	1,225	0.87	1.20	0.15

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
CF20/1-SCRW to LED012-SCRW	782	782	20	12	8,760	47,678	59,735	1.09	125.3%
CF20/1-SCRW to LED012-SCRW	1230	1230	20	12	1,225	26,153	10,487	0.87	40.1%
Total						73,831	70,222		95.1%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	*IEFD*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
CF20/1-SCRW to LED012-SCRW	782	782	20	12	1.00	7.51	7.51	1.20	100.0%
CF20/1-SCRW to LED012-SCRW	1230	1230	20	12	0.16	2.95	1.89	1.20	64.0%
Total						10.46	9.40		89.8%

Results

The kWh realization rate for project PRJ-420015 is 95.1% and the kW realization rate is 89.8%.

Through monitoring the Evaluators verified the AOH of 1,225 and CF of 0.16 in the guestrooms. The ex ante estimation used 3,055 and 0.25 respectively.

Verified Gross Savings & Realization Rates

Measure	*Verified*

	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
CF20/1-SCRW to LED012-SCRW	59,735	7.51	125.3%	100.0%
CF20/1-SCRW to LED012-SCRW	10,487	1.89	40.1%	64.0%
Total	70,222	9.40	95.1%	89.8%

Project Number PRJ-417992
Program Large C&I

Project Background

The participant is a housing facility that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking garage. On-site, the Evaluators verified the participant had installed:

- (15) 90W LED fixtures, replacing (19) 400W Metal Halide fixtures;
- (92) 16W LED fixtures, replacing (46) 4' 2-lamp Linear Fluorescent fixtures;
- (5) 80W LED fixtures, replacing (5) 400W Metal Halide fixtures;
- (4) 80W LED fixtures, replacing (4) 250W Metal Halide fixtures;
- (2) 17W LED lamps, replacing (2) 65W Halogen lamps;
- (4) 17W LED lamps, replacing (4) 65W Halogen lamps; and
- (52) 16W LED fixtures, replacing (26) 4' 2-lamp Linear Fluorescent fixtures.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff.

Deemed Savings Parameters

Building Type	Heating Type	Annual Hours	IEF_E	IEF_D	CF
Parking Structure	None	8,760	1.00	1.00	100%
Parking Structure	None	3,833	1.00	1.00	2.1%
Parking Structure	Gas	8,760	1.00	1.00	100%

Savings Calculations

Using deemed values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH400/1 to LED090-FIXT	19	15	453	90	8,760	62,576	63,571	1.00	101.6%
F42ILL to LED016-FIXT	46	92	58	16	8,760	7,701	4,584	1.00	59.5%
MH400/1 to LED080-FIXT	5	5	453	80	7,884	14,468	7,148	1.00	49.4%
MH250/1 to LED080-FIXT	4	4	288	80	7,884	6,440	3,189	1.00	49.5%
H65/1 to LED017-SCRW	2	2	65	17	8,760	826	841	1.00	101.8%
H65/1 to LED017-SCRW	4	4	65	17	8,760	1,652	1,833	1.09	111.0%
F42ILL to LED016-FIXT	26	52	58	16	8,760	4,836	5,922	1.00	122.5%
					Total	98,498	87,087		88.4%

Lighting Retrofit kW Savings Calculations

Measure	Quantity (Fixtures)		Wattage		CF	Expected kW Savings	Realized kW Savings	IEF_D	Realization Rate
	Base	Post	Base	Post					
MH400/1 to LED090-FIXT	19	15	453	90	100%	0	7.26	1.00	N/A
F42ILL to LED016-FIXT	46	92	58	16	100%	0.98	0.12	1.00	12.8%
MH400/1 to LED080-FIXT	5	5	453	80	100%	1.84	0.19	1.00	10.6%
MH250/1 to LED080-FIXT	4	4	288	80	100%	0.82	0.09	1.00	10.6%
H65/1 to LED017-SCRW	2	2	65	17	100%	0	0.10	1.00	NA
H65/1 to LED017-SCRW	4	4	65	17	100%	0	0.19	1.09	NA
F42ILL to LED016-FIXT	26	52	58	16	100%	0	0.68	1.00	NA
Total						3.63	8.63		237.7%

Results

The kWh realization rate for Project 417992 is 88.4% and the kW realization rate is 237.7%. The discrepancies are due to changes in the wattages of new and baseline fixtures, and the heating and cooling types used in some parts of the facility. In the original project application, the wattage of the baseline 400W metal halide fixtures was entered as 447 watts; this was changed to 453 watts in final savings calculations. In the project application, the wattage of the LED fixtures which replaced the 4' 2-lamp linear fluorescents was entered as 18W; review of the site invoice revealed that it was actually 16 watt fixtures which were installed. In the project application, the wattage of the baseline 250W metal halide fixtures was recorded as 284 watts, this was changed to 288 watts in the final savings calculations. On-site evaluation showed that four of the 17W LED lamps were installed in conditioned space. In addition, in several parts of the lighting project application, the coincidence factor was incorrectly entered as 0%. This was corrected to 100% and 10%, depending upon area, in the final savings calculations.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
MH400/1 to LED090-FIXT	63,571	7.26	101.6%	NA
F42ILL to LED016-FIXT	4,584	0.12	59.5%	12.8%
MH400/1 to LED080-FIXT	7,148	0.19	49.4%	10.6%
MH250/1 to LED080-FIXT	3,189	0.09	49.5%	10.6%
H65/1 to LED017-SCRW	841	0.10	101.8%	NA
H65/1 to LED017-SCRW	1,833	0.19	111.0%	NA
F42ILL to LED016-FIXT	5,922	0.68	122.5%	NA
Total	87,087	8.63	88.4%	237.7%

Project Number PRJ-419064
Program Large C&I

Project Background

The participant is a hotel that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (1076) 13W LED - Int. Ballast, replacing (1076) 26W CFL;
- (173) 7W LED - Int. Ballast, replacing (173) 65W Inc.;
- (651) 7W LED - Int. Ballast, replacing (651) 26W CFL;
- (214) 10W LED - Int. Ballast, replacing (214) 65W Inc.;
- (230) 13W LED - Int. Ballast, replacing (230) 26W CFL;
- (32) 7W LED - Int. Ballast, replacing (32) 26W CFL;
- (68) 19W LED - Non-Int. Ballast, replacing (68) 26W CFL;

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	Heating Type	Annual Hours	IEF_E	IEF_D	CF
Lodging(Hotel/Motel/Dorm): Rooms	Electric Resistance	1,995	0.87	1.20	0.31
Lodging(Hotel/Motel/Dorm): Common Areas	Gas	8,760	1.09	1.20	1.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/$Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x W/$Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/$Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x W/$Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	*IEF_E*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
CF26/1-SCRW to LED013-Scrw	1076	1076	26	13	1,995	46,579	24,276	0.87	52.1%
I65/1 to LED007-Scrw	173	173	65	7	1,995	33,413	17,414	0.87	52.1%
CF26/1-SCRW to LED007-Scrw	651	651	26	7	1,995	41,188	21,467	0.87	52.1%
I65/1 to LED010-Scrw	214	214	65	10	1,995	39,194	20,427	0.87	52.1%
CF26/1-SCRW to LED013-Scrw	230	230	26	13	8,760	29,687	28,550	1.09	96.2%
CF26/1-SCRW to LED007-Scrw	32	32	26	7	8,760	4,394	5,805	1.09	132.1%
CF26/1-SCRW to LED019-FIXT	68	68	26	19	8,760	3,440	4,545	1.09	132.1%
					Total	197,895	122,485		61.9%

Lighting Retrofit kW Savings Calculations

Measure	Quantity (Fixtures)		Wattage		CF	Expected kW Savings	Realized kW Savings	IEF_D	Realization Rate
	Base	Post	Base	Post					
CF26/1-SCRW to LED013-Scrw	1076	1076	26	13	0.31	4.20	5.13	1.20	122.2%
I65/1 to LED007-Scrw	173	173	65	7	0.31	3.01	3.68	1.20	122.2%
CF26/1-SCRW to LED007-Scrw	651	651	26	7	0.31	3.71	4.53	1.20	122.2%
I65/1 to LED010-Scrw	214	214	65	10	0.31	3.53	4.31	1.20	122.2%
CF26/1-SCRW to LED013-Scrw	230	230	26	13	1.00	4.04	3.59	1.20	88.8%
CF26/1-SCRW to LED007-Scrw	32	32	26	7	1.00	0.60	0.73	1.20	122.0%
CF26/1-SCRW to LED019-FIXT	68	68	26	19	1.00	0.47	0.57	1.20	122.0%
Total						19.56	22.54		115.2%

Results

The kWh realization rate for PRJ-419064 is 61.9% and the kW realization rate is 115.2%.

kWh savings were reduced in ex post calculations due to findings from on-site metering that the guest room spaces had 1,995 hours of operation (lower than the value of 3,055 used in deemed savings estimates). Evaluators also found some fixture counts application and heating type varied from the application during the site visit.

The kW savings are high because, through monitoring, the verified CF for the hotel guest rooms is 0.31; the ex ante estimations used deemed CF of 0.25.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
CF26/1-SCRW to LED013-Scrw	24,276	5.13	52.1%	122.2%
I65/1 to LED007-Scrw	17,414	3.68	52.1%	122.2%
CF26/1-SCRW to LED007-Scrw	21,467	4.53	52.1%	122.2%
I65/1 to LED010-Scrw	20,427	4.31	52.1%	122.2%
CF26/1-SCRW to LED013-Scrw	28,550	3.59	96.2%	88.8%
CF26/1-SCRW to LED007-Scrw	5,805	0.73	132.1%	122.0%
CF26/1-SCRW to LED019-FIXT	4,545	0.57	132.1%	122.0%
Total	122,485	22.54	61.9%	115.2%

Project Number PRJ-419469
Program Large C&I

Project Background

The participant is a hotel that received incentives from Entergy New Orleans for implementing energy efficient lighting indoors. On-site, the Evaluators verified the participant had installed:

- (23) 10W LED - Non-Int. Ballast, replacing (23) 1-Lamp 42W CFL Multi 4-Pin;
- (29) 10W LED - Non-Int. Ballast, replacing (29) 1-Lamp 42W CFL Multi 4-Pin;
- (354) 11W LED - Int. Ballast, replacing (354) 100W Inc.;
- (16) 11W LED - Int. Ballast, replacing (16) 100W Inc.;
- (16) 11W LED - Int. Ballast, replacing (16) 53W Inc.;
- (4) 13W LED - Non-Int. Ballast, replacing (4) 1-Lamp 42W CFL Multi 4-Pin;
- (57) 13W LED - Non-Int. Ballast, replacing (57) 1-Lamp 42W CFL Multi 4-Pin;
- (30) 13W LED - Non-Int. Ballast, replacing (30) 150W Inc.;
- (29) 21W LED - Non-Int. Ballast, replacing (29) 4' 2-Lamp T8;
- (4) 32W LED - Non-Int. Ballast, replacing (4) 3-Lamp T12 U-Tube;
- (20) 32W LED - Non-Int. Ballast, replacing (20) 4' 2-Lamp T8;
- (3) 41W LED - Non-Int. Ballast, replacing (3) 4' 4-Lamp T8;
- (10) 41W LED - Non-Int. Ballast, replacing (10) 4' 2-Lamp T8;
- (7) 41W LED - Non-Int. Ballast, replacing (7) 4' 2-Lamp T8;
- (5) 41W LED - Non-Int. Ballast, replacing (5) 4' 2-Lamp T8;
- (8) 41W LED - Non-Int. Ballast, replacing (8) 4' 2-Lamp T8;
- (8) 4W LED - Int. Ballast, replacing (8) 40W Inc.;
- (28) 4W LED - Int. Ballast, replacing (28) 40W Inc.;
- (4) 66W LED - Non-Int. Ballast, replacing (4) 175W MH;
- (6) 6W LED - Int. Ballast, replacing (6) 50W 1-Lamp Halogen;
- (333) 7W LED - Int. Ballast, replacing (333) 53W Inc.;
- (8) 7W LED - Int. Ballast, replacing (8) 53W Inc.;
- (44) 8W LED - Int. Ballast, replacing (44) 53W Inc.; and
- (5) 9W LED - Non-Int. Ballast, replacing (5) 50W 1-Lamp Halogen.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Space Type	Heating Type	Annual Hours	IEF_E	IEF_D	CF
Service: Sit Down Rest.	Electric Resistance	3,702	1.09	1.20	0.23
Lodging (Common Area)	Electric Resistance	6,630	0.87	1.20	0.82
Lodging (Rooms)	Gas	3,055	0.87	1.20	0.25
Outdoor	None	4,319	1.00	1.00	0.00
Assembly	Electric Resistance	71	1.20	0.87	0.09
Corridor	Electric Resistance	8,760	1.20	0.87	1.00
Office	Electric Resistance	8,760	1.20	0.87	1.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
CFM42/1-L to LED010-FIXT	23	23	46	10	3,702	3,147	3,341	1.09	106.2%
CFM42/1-L to LED010-FIXT	29	29	46	10	6,630	6,022	7,545	1.09	125.3%
I100/1 to LED011-SCRW	354	354	72	11	3,055	83,738	57,394	0.87	68.5%
I100/1 to LED011-SCRW	16	16	72	11	6,630	8,214	7,053	1.09	85.9%
I53/1 to LED011-SCRW	16	16	53	11	6,630	3,876	4,856	1.09	125.3%
CFM42/1-L to LED013-FIXT	4	4	46	13	4,319	659	570	1.00	86.5%
CFM42/1-L to LED013-FIXT	57	57	46	13	6,630	11,421	13,593	1.09	119.0%
I150/1 to LED013-FIXT	30	30	150	13	71	11,319	137	1.09	1.2%
F42ILL to LED021-FIXT	29	29	58	21	8,760	6,204	10,245	1.09	165.2%
FU3SE to LED032-FIXT	4	4	115	32	3,055	882	882	0.87	100.0%
F42ILL to LED032-FIXT	20	20	58	32	71	1,382	32	0.87	2.3%
F44ILL to LED041-FIXT	3	3	112	41	8,760	1,623	2,034	1.09	125.3%
F42ILL to LED041-FIXT	10	10	58	41	8,760	1,036	1,623	1.09	156.6%
F42ILL to LED041-FIXT	7	7	58	41	6,630	553	860	1.09	155.6%
F42ILL to LED041-FIXT	5	5	58	41	6,630	1,471	614	1.09	41.8%
F42ILL to LED041-FIXT	8	8	58	41	6,630	1,014	983	1.09	96.9%
I40/1 to LED004-SCRW	8	8	29	4	3,055	765	532	0.87	69.4%
I40/1 to LED004-SCRW	28	28	29	4	6,630	9,137	5,059	1.09	55.4%
MH175/1 to LED066-FIXT	4	4	208	66	4,319	2,270	2,453	1.00	108.1%
H50/1 to LED006-SCRW	6	6	50	6	6,630	2,538	1,908	1.09	75.2%

I53/1 to LED007-SCRW	333	333	53	7	3,055	40,713	40,713	0.87	100.0%
I53/1 to LED007-SCRW	8	8	53	7	6,630	978	2,123	0.87	217.0%
I53/1 to LED008-SCRW	44	44	53	8	3,055	5,263	5,263	0.87	100.0%
H50/1 to LED009-FIXT	5	5	50	9	3,702	779	827	1.09	106.2%
Total						205,004	170,640		83.2%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
CFM42/1-L to LED010-FIXT	23	23	46	10	0.23	0.80	0.23	1.20	28.4%
CFM42/1-L to LED010-FIXT	29	29	46	10	0.82	1.03	1.03	1.20	100.0%
I100/1 to LED011-SCRW	354	354	72	11	0.25	9.45	6.48	1.20	68.5%
I100/1 to LED011-SCRW	16	16	72	11	0.82	1.40	0.96	1.20	68.5%
I53/1 to LED011-SCRW	16	16	53	11	0.82	0.66	0.66	1.20	100.0%
CFM42/1-L to LED013-FIXT	4	4	46	13	0.00	0.00	0.00	1.00	N/A
CFM42/1-L to LED013-FIXT	57	57	46	13	0.82	1.95	1.85	1.20	95.0%
I150/1 to LED013-FIXT	30	30	150	13	0.09	3.31	0.19	1.20	5.8%
F42ILL to LED021-FIXT	29	29	58	21	1.00	0.98	1.29	1.20	131.4%
FU3SE to LED032-FIXT	4	4	115	32	0.25	0.10	0.10	1.20	100.0%
F42ILL to LED032-FIXT	20	20	58	32	0.09	0.16	0.06	1.20	36.0%
F44ILL to LED041-FIXT	3	3	112	41	1.00	0.26	0.26	1.20	98.3%
F42ILL to LED041-FIXT	10	10	58	41	1.00	0.16	0.20	1.20	127.5%
F42ILL to LED041-FIXT	7	7	58	41	0.82	0.16	0.12	1.20	74.5%
F42ILL to LED041-FIXT	5	5	58	41	0.82	0.25	0.07	1.00	27.8%
F42ILL to LED041-FIXT	8	8	58	41	0.82	0.13	0.13	1.20	106.7%

I40/1 to LED004-SCRW	8	8	29	4	0.25	0.09	0.06	1.20	69.4%
I40/1 to LED004-SCRW	28	28	29	4	0.82	1.56	0.69	1.20	44.2%
MH175/1 to LED066-FIXT	4	4	208	66	0.00	0.00	0.00	1.00	N/A
H50/1 to LED006-SCRW	6	6	50	6	0.82	0.43	0.26	1.20	60.0%
I53/1 to LED007-SCRW	333	333	53	7	0.25	4.60	4.60	1.20	100.0%
I53/1 to LED007-SCRW	8	8	53	7	0.82	0.11	0.36	1.20	328.0%
I53/1 to LED008-SCRW	44	44	53	8	0.25	0.59	0.59	1.20	100.0%
H50/1 to LED009-FIXT	5	5	50	9	0.23	0.20	0.06	1.20	28.4%
Total						28.38	20.24		71.3%

Results

The kWh realization rate for PRJ-419469 is 83.2% and the kW realization rate is 71.3%.

The kW and kWh realization rats are low because CF and annual hours of operation values were found to be lower for some room types after installing lighting monitoring equipment. Evaluators also found that some fixture counts and heating type varied after visiting the establishment to verify savings. The ex post calculations followed EISA 2007 standards for 100W and 40W incandescent lamps. The ex ante estimations did not follow EISA 2007 standards.

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
CFM42/1-L to LED010-FIXT	3,341	0.23	106.2%	28.4%
CFM42/1-L to LED010-FIXT	7,545	1.03	125.3%	100.0%
I100/1 to LED011-SCRW	57,394	6.48	68.5%	68.5%
I100/1 to LED011-SCRW	7,053	0.96	85.9%	68.5%
I53/1 to LED011-SCRW	4,856	0.66	125.3%	100.0%
CFM42/1-L to LED013-FIXT	570	0.00	86.5%	N/A
CFM42/1-L to LED013-FIXT	13,593	1.85	119.0%	95.0%
I150/1 to LED013-FIXT	137	0.19	1.2%	5.8%
F42ILL to LED021-FIXT	10,245	1.29	165.2%	131.4%
FU3SE to LED032-FIXT	882	0.10	100.0%	100.0%
F42ILL to LED032-FIXT	32	0.06	2.3%	36.0%
F44ILL to LED041-FIXT	2,034	0.26	125.3%	98.3%
F42ILL to LED041-FIXT	1,623	0.20	156.6%	127.5%
F42ILL to LED041-FIXT	860	0.12	155.6%	74.5%
F42ILL to LED041-FIXT	614	0.07	41.8%	27.8%
F42ILL to LED041-FIXT	983	0.13	96.9%	106.7%
I40/1 to LED004-SCRW	532	0.06	69.4%	69.4%
I40/1 to LED004-SCRW	5,059	0.69	55.4%	44.2%
MH175/1 to LED066-FIXT	2,453	0.00	108.1%	N/A
H50/1 to LED006-SCRW	1,908	0.26	75.2%	60.0%
I53/1 to LED007-SCRW	40,713	4.60	100.0%	100.0%
I53/1 to LED007-SCRW	2,123	0.36	217.0%	328.0%
I53/1 to LED008-SCRW	5,263	0.59	100.0%	100.0%
H50/1 to LED009-FIXT	827	0.06	106.2%	28.4%
Total	170,640	20.24	83.2%	71.3%

Project Number PRJ-418918
Program Large Commercial and Industrial

Project Background

The participant is a parking structure that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (249) 18W LED - Non-Int. Ballast, replacing (166) 150W HPS;
- (15) 18W LED - Non-Int. Ballast, replacing (15) 150W HPS;

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Savings Parameters

Building Type	Heating Type	Annual Hours	IEF_E	IEF_D	CF
Parking Structure	None	8,760	1.000	1.000	1.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
HPS150/1 to LED018-FIXT	166	249	188	18	8,760	210,708	234,120	1.00	111.1%
HPS150/1 to LED018-FIXT	15	15	188	18	8,760	20,104	22,338	1.00	111.1%
					Total	230,812	256,458		111%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
HPS150/1 to LED018-FIXT	166	249	188	18	1.00	26.73	26.73	1.00	100.0%
HPS150/1 to LED018-FIXT	15	15	188	18	1.00	2.55	2.55	1.00	100.0%
					Total	29.28	29.28		100.0%

Results

The kWh realization rate for project# PRJ-418918 is 111.1% and the kW realization rate is 100.0%.

The Evaluators monitored the parking structure lighting and determined the annual operating hours to be 8,760. The ex ante estimations used 7,884 hours. This difference contributed to the higher kWh realization rate.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
HPS150/1 to LED018-FIXT	234,120	26.73	111.1%	100.0%
HPS150/1 to LED018-FIXT	22,338	2.55	111.1%	100.0%
Total	256,458	29.28	111.1%	100.0%

Project Number PRJ-419561
Program Large C&I

Project Background

The participant is a hotel that received incentives from Entergy New Orleans for implementing energy efficient lighting and occupancy sensors. On-site, the Evaluators verified the participant had installed:

- (1,321) 4W LED fixtures, replacing (1,321) 40W Incandescent fixtures; and
- (60) 15W LED fixtures, replacing (60) 4' 1-lamp Linear Fluorescent fixtures.

While on site, the Evaluators found that (579) of the proposed (1,585) 4W LEDs lamps and (60) occupancy sensors had not been installed.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEF_E) and interactive effects factor for demand (IEF_D) factors.

Deemed Savings Parameters

Building Type	***Heating Type***	***Annual Hours***	***IEF_E***	***IEF_D***	***CF***
Sit-Down Restaurant	Gas	8,760	1.09	1.20	100%
Public Assembly	Gas	8,760	1.09	1.20	100%
Office	Gas	8,760	1.09	1.20	100%
Custom	Gas	8,760	1.09	1.20	100%

Savings Calculations

Using deemed values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW

AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*	*Wattage*	*AOH*	*Expected kWh*	*Realized kWh*	*IEF_E*	*Realization Rate*

	Base	*Post*	*Base*	*Post*		*Savings*	*Savings*		
I40/1 to LED004-SCRW	250	230	29	4	8,760	42,850	60,441	1.09	141.1%
I40/1 to LED004-SCRW	250	168	29	4	8,760	85,936	62,809	1.09	73.1%
I40/1 to LED004-SCRW	300	300	29	4	8,760	103,123	71,613	1.09	69.4%
F41EE to LED015-FIXT	60	60	43	15	8,760	16,254	16,041	1.09	98.7%
I40/1 to LED004-SCRW	100	96	29	4	8,760	34,374	24,024	1.09	69.9%
I40/1 to LED004-SCRW	125	125	29	4	8,760	42,968	29,839	1.09	69.4%
I40/1 to LED004-SCRW	50	6	29	4	8,760	8,570	13,616	1.09	158.9%
I40/1 to LED004-SCRW	25	15	29	4	8,760	4,285	6,350	1.09	148.2%
I40/1 to LED004-SCRW	250	206	29	4	8,760	85,936	61,358	1.09	71.4%
I40/1 to LED004-SCRW	25	25	29	4	8,760	2,588	5,968	1.09	230.6%
I40/1 to LED004-SCRW	50	50	29	4	8,760	7,332	11,936	1.09	162.8%
I40/1 to LED004-SCRW	100	100	29	4	8,760	34,374	23,871	1.09	69.4%
Total						468,589	387,866		82.8%

Lighting Retrofit kW Savings Calculations

Measure	Quantity (Fixtures)		Wattage		CF	Expected kW Savings	Realized kW Savings	IEF_D	Realization Rate
	Base	Post	Base	Post					
I40/1 to LED004-SCRW	250	230	29	4	100%	8.75	7.60	1.20	86.8%
I40/1 to LED004-SCRW	250	168	29	4	100%	10.80	7.89	1.20	73.1%
I40/1 to LED004-SCRW	300	300	29	4	100%	12.96	9.00	1.20	69.4%
F41EE to LED015-FIXT with occupancy sensors	60	60	43	15	100%	2.07	2.02	1.20	97.4%
I40/1 to LED004-SCRW	100	96	29	4	100%	4.32	3.02	1.20	69.9%
I40/1 to LED004-SCRW	125	125	29	4	100%	5.40	3.75	1.20	69.4%
I40/1 to LED004-SCRW	50	6	29	4	100%	1.75	1.71	1.20	97.8%
I40/1 to LED004-SCRW	25	15	29	4	100%	0.87	0.80	1.20	91.2%
I40/1 to LED004-SCRW	250	206	29	4	100%	10.80	7.71	1.20	71.4%
I40/1 to LED004-SCRW	25	25	29	4	100%	0.60	0.75	1.20	124.0%
I40/1 to LED004-SCRW	50	50	29	4	100%	1.66	1.50	1.20	90.2%
I40/1 to LED004-SCRW	100	100	29	4	100%	4.32	3.00	1.20	69.4%
Total						64.31	48.75		75.9%

Results

The kWh realization rate for PRJ-419561 is 82.8% and the kW realization rate is 75.9%.

The low kWh and kW savings is due to two reasons:

1) 1,585 new lamps/fixtures were planned to be installed at the facility. On-site verification confirmed the presence of only 1,321 lamps/fixtures and no occupancy sensors.
2) The ex post calculations follow EISA 2007 standards for 40W incandescent lamps, the ex-ante estimations did not follow EISA standards.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
I40/1 to LED004-SCRW	60,441	7.60	141.1%	86.8%
I40/1 to LED004-SCRW	62,809	7.89	73.1%	73.1%
I40/1 to LED004-SCRW	71,613	9.00	69.4%	69.4%
F41EE to LED015-FIXT	16,041	2.02	98.7%	97.4%
I40/1 to LED004-SCRW	24,024	3.02	69.9%	69.9%
I40/1 to LED004-SCRW	29,839	3.75	69.4%	69.4%
I40/1 to LED004-SCRW	13,616	1.71	158.9%	97.8%
I40/1 to LED004-SCRW	6,350	0.80	148.2%	91.2%
I40/1 to LED004-SCRW	61,358	7.71	71.4%	71.4%
I40/1 to LED004-SCRW	5,968	0.75	230.6%	124.0%
I40/1 to LED004-SCRW	11,936	1.50	162.8%	90.2%
I40/1 to LED004-SCRW	23,871	3.00	69.4%	69.4%
Occupancy Sensors	0	0.00	0.0%	0.0%
Total	387,866	48.75	82.8%	75.9%

Project Number PRJ-417350
Program Large C&I

Project Background

The participant is a parking garage that received incentives from Entergy New Orleans for implementing energy efficient lighting. On-site, the Evaluators verified the participant had installed:

- (525) 63W LED fixtures;
- (75) 45W LED fixtures; and
- (90) 49W LED fixtures.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Annual Hours of Operation (AOH) and peak coincidence factor (CF) were stipulated based on known 24/7 operation.

Deemed Savings Parameters

Building Type	***Heating Type***	***Annual Hours***	***IEF_E***	***IEF_D***	***CF***
Parking Structure	None	8,760	1.00	1.00	100%

Savings Calculations

Using deemed values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F82LHL to LED063-FIXT	460	460	160	63	8,760	351,784	390,871	1.00	111.11%
F82EHE to LED063-FIXT	65	65	207	63	8,760	73,794	81,994	1.00	111.11%
F42EIS to LED045-FIXT	21	21	82	45	8,760	6,126	6,807	1.00	111.11%
F82LHL to LED049-FIXT	90	90	160	49	8,760	78,761	87,512	1.00	111.11%
F82LHL to LED045-FIXT	27	54	160	45	8,760	14,901	16,556	1.00	111.11%
					Total	525,336	583,740		111.11%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F82LHL to LED063-FIXT	460	460	160	63	100%	44.62	44.62	1.00	100.0%
F82EHE to LED063-FIXT	65	65	207	63	100%	9.36	9.36	1.00	100.0%
F42EIS to LED045-FIXT	21	21	82	45	100%	0.78	0.78	1.00	100.0%
F82LHL to LED049-FIXT	90	90	160	49	100%	9.99	9.99	1.00	100.0%
F82LHL to LED045-FIXT	27	54	160	45	100%	1.89	1.89	1.00	100.0%
Total						66.64	66.64		100.0%

Results

The kWh realization rate for Project 417350 is 111.11% and the kW realization rate is 100.0%. The kWh realization rate is high because on-site evaluation verified that the facility lighting operates 8,760 hours per year, as opposed to the 7,884 hours listed on the project application.

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Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
F82LHL to LED063-FIXT	390,871	44.62	111.11%	100.0%
F82EHE to LED063-FIXT	81,994	9.36	111.11%	100.0%
F42EIS to LED045-FIXT	6,807	0.78	111.11%	100.0%
F82LHL to LED049-FIXT	87,512	9.99	111.11%	100.0%
F82LHL to LED045-FIXT	16,556	1.89	111.11%	100.0%
Total	583,740	66.64	111.11%	100.0%

Project Number PRJ-419278
Program Large C&I

Project Background

The participant is a hotel that received incentives from Entergy New Orleans for installing energy efficiency chillers. On-site, the Evaluators verified the participant had installed:

- (2) Carrier 225 Ton Chillers
- (1) Carrier 150 Ton Chiller
- (1) Trane Packaged Rooftop Unit

M&V Methodology

On-site, Evaluators verified the presence of the chillers listed on the project application. Savings for the chillers were calculated using a pre/post retrofit billing regression to derive an equation that predicts monthly energy consumption dependent upon local weather. Seven months of historical billing data before and after the retrofit was used to develop the regression model. Savings are normalized using TMY3 weather data.

Savings Calculations

The kWh regression resulted with an adjusted R^2 of 0.954 and calculates monthly energy consumption for the post configuration with the following equation:

$$kWh_{Monthly} = (14{,}591 * \#Days) + (817 * CDD) + (-429 * CDDPost) + (84 * HDD) + (-58 * HDDPost) + 23{,}337$$

Where:

$kWh_{Monthly}$	*= Monthly kWh consumption*
#Days	*= Number of days in the month*
CDD	*= Number of Cooling Degree Days for the month*
CDDPost	*= Number of Cooling Degree Days for only post retrofit months*
HDD	*= Number of Heating Degree Days for the month*
HDDPost	*= Number of Heating Degree Days for only post retrofit months*

The kW regression resulted with an adjusted R^2 of 0.918 and calculates monthly peak demand for the post configuration with the following equation:

$$kWh_{Monthly} = (1.28 * CDD) + (-0.50 * CDDPost) + (0.28 * HDD) + (-0.23 * HDDPost) + 754$$

Using TMY3 weather data and the aforementioned equation, ADM was able to calculate the typical annual energy savings for the facility. The TMY3 monthly kWh and kW reduction can be seen in the following table:

As-Built TMY3 kWh Consumption

Month	# Days	CDD	HDD	kW Savings	kWh Savings
1	31	0	780	177	45,151
2	28	6	550	128	34,578
3	31	12	349	85	25,428
4	30	37	207	66	27,918
5	31	88	84	63	42,573
6	30	176	5	90	75,635
7	31	207	2	104	88,620
8	31	230	3	117	98,808
9	30	121	41	70	54,231
10	31	29	240	69	26,285
11	30	17	299	76	24,538
12	31	1	636	145	37,191
Total					580,957

The facility also had a lighting project (PRJ-419064) completed at the same time as the chiller and rooftop unit project. The regression analysis used for calculating the predicted energy consumption at this site captures the savings from both the lighting project and the HVAC project. Therefore, the lighting project's savings must be subtracted off the regression analysis savings so as to not double count. The lighting project saved 122,485 kWh and 22.54 kW and the resulting HVAC savings for this project can be seen below.

HVAC Retrofit kWh Savings Calculations

Type	Expected kWh Savings	kWh Savings	Realization Rate
Chillers & RTU	526,036	458,472	87.2%
Total	526,036	458,472	87.2%

HVAC Retrofit kW Savings Calculations

Type	Expected kW Savings	kW Savings	Realization Rate
Chillers & RTU	24.02	81.83	340.7%
Total	24.02	81.83	340.7%

Results

The kWh realization rate for project #PRJ-419278 is 87.2% and the kW realization rate is 340.7%.

Verified Gross Savings & Realization Rates

Measure	Verified			
	kWh Savings	kW Savings	kWh Realization Rate	kW Realization Rate
Chillers & RTU	458,472	81.83	87.2%	340.7%
Total	458,472	81.83	87.2%	340.7%

The difference in kWh realization is due to the ex-ante calculating savings through an equivalent full load hours method while the ex post calculates savings using a regression model that utilizes historic billing data and site specific hourly weather data.

The difference in kW realization is due to the ex-ante calculating kW savings using effective useful life and remaining useful life because the project was classified as early retirement.

Project Number PRJ-408788
Program Large Commercial and Industrial

Project Background

The participant is a parking structure that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (210) 18W LED - Non-Int. Ballast, replacing (53) 4' 4-Lamp T8;
- (12) 18W LED - Non-Int. Ballast, replacing (3) 4' 4-Lamp T8;
- (184) 18W LED - Non-Int. Ballast, replacing (92) 4' 4-Lamp T8;
- (12) 18W LED - Non-Int. Ballast, replacing (3) 4' 4-Lamp T8;
- (211) 18W LED - Non-Int. Ballast, replacing (106) 4' 4-Lamp T8;
- (12) 18W LED - Non-Int. Ballast, replacing (3) 4' 4-Lamp T8;
- (218) 18W LED - Non-Int. Ballast, replacing (109) 4' 4-Lamp T8;
- (12) 18W LED - Non-Int. Ballast, replacing (3) 4' 4-Lamp T8;
- (208) 18W LED - Non-Int. Ballast, replacing (109) 4' 4-Lamp T8;
- (12) 18W LED - Non-Int. Ballast, replacing (3) 4' 4-Lamp T8;
- (218) 18W LED - Non-Int. Ballast, replacing (109) 4' 4-Lamp T8;
- (12) 18W LED - Non-Int. Ballast, replacing (3) 4' 4-Lamp T8;
- (210) 18W LED - Non-Int. Ballast, replacing (105) 4' 4-Lamp T8;
- (4) 18W LED - Non-Int. Ballast, replacing (1) 4' 4-Lamp T8;
- (16) 18W LED - Non-Int. Ballast, replacing (8) 4' 2-Lamp T8;
- (52) 18W LED - Non-Int. Ballast, replacing (26) 4' 2-Lamp T8;
- (10) 180W LED - Non-Int. Ballast, replacing (10) 1000W MH; and
- (6) 65W LED - Non-Int. Ballast, replacing (6) 250W MH.

On site, the Evaluators also verified the removal of (11) 4’ 2-Lamp T8 fixtures.

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

The Evaluators found some lighting fixture counts deviated from those listed in the project application. Annual lighting hours of operation (AOH) and peak coincidence factor (CF) were developed by extrapolating on-site monitoring data as well as interviews with facility staff.

Savings Parameters

Building Type	*Heating Type*	*Annual Hours*	IEF_E	IEF_D	*CF*
Parking Structure	None	8,760	1.000	1.000	1.00

Savings Calculations

Using values from the table above, the Evaluators calculated lighting savings as follows:

$$Annual\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/Fixture$_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x W/Fixture$_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Peak\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x W/Fixture$_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x W/Fixture$_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	*IEF_E*	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F44ILL/2 to LED018-FIXT	53	210	116	18	8,760	32,608	20,236	1.00	62.1%
Delamped F44ILL/2	2	0	58	0	8,760	915	1,016	1.00	111.1%
F44ILL/2 to LED018-FIXT	3	12	116	18	8,760	1,041	1,156	1.00	111.1%
F44ILL/2 to LED018-FIXT	92	184	116	18	8,760	58,026	64,474	1.00	111.1%
Delamped F44ILL/2	6	0	58	0	8,760	2,744	3,048	1.00	111.1%
F44ILL/2 to LED018-FIXT	3	12	116	18	8,760	1,041	1,156	1.00	111.1%
Delamped F44ILL/2	1	0	58	0	8,760	457	508	1.00	111.1%

F44ILL/2 to LED018-FIXT	106	211	116	18	8,760	67,487	73,934	1.00	109.6%
Delamped F44ILL/2	1	0	58	0	8,760	457	508	1.00	111.1%
F44ILL/2 to LED018-FIXT	3	12	116	18	8,760	1,041	1,156	1.00	111.1%
F44ILL/2 to LED018-FIXT	109	218	116	18	8,760	73,164	76,387	1.00	104.4%
Delamped F44ILL/2	1	0	58	0	8,760	457	508	1.00	111.1%
F44ILL/2 to LED018-FIXT	3	12	116	18	8,760	1,041	1,156	1.00	111.1%
F44ILL/2 to LED018-FIXT	109	218	116	18	8,760	68,748	76,387	1.00	111.1%
F44ILL/2 to LED018-FIXT	3	12	116	18	8,760	1,041	1,156	1.00	111.1%
F44ILL/2 to LED018-FIXT	109	218	116	18	8,760	68,748	76,387	1.00	111.1%
F44ILL/2 to LED018-FIXT	3	12	116	18	8,760	1,041	1,156	1.00	111.1%
F44ILL/2 to LED018-FIXT	105	210	116	18	8,760	66,226	73,584	1.00	111.1%
F44ILL/2 to LED018-FIXT	1	4	116	18	8,760	347	385	1.00	111.1%
F42ILL to LED018-FIXT	8	16	58	18	8,760	1,388	1,542	1.00	111.1%
F42ILL to LED018-FIXT	26	52	58	18	8,760	4,510	5,011	1.00	111.1%
MH1000/1-L to LED180-FIXT	10	10	1,067	180	8,760	69,931	77,701	1.00	111.1%
MH250/1-L to LED065-FIXT	6	6	275	65	8,760	9,934	11,038	1.00	111.1%
					Total	532,391	569,593		107.0%

Lighting Retrofit kW Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*CF*	*Expected kW Savings*	*Realized kW Savings*	IEF_D	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
F44ILL/2 to LED018-FIXT	53	210	116	18	1.00	4.14	2.31	1.00	55.9%
F42ILL to Delamped	2	0	58	0	1.00	0.12	0.12	1.00	100.0%
F44ILL/2 to LED018-FIXT	3	12	116	18	1.00	0.13	0.13	1.00	100.0%
F44ILL/2 to LED018-FIXT	92	184	116	18	1.00	7.36	7.36	1.00	100.0%
F42ILL to Delamped	6	0	58	0	1.00	0.35	0.35	1.00	100.0%
F44ILL/2 to LED018-FIXT	3	12	116	18	1.00	0.13	0.13	1.00	100.0%

F42ILL to Delamped	1	0	58	0	1.00	0.06	0.06	1.00	100.0%
F44ILL/2 to LED018-FIXT	106	211	116	18	1.00	8.56	8.44	1.00	98.6%
F42ILL to Delamped	1	0	58	0	1.00	0.06	0.06	1.00	100.0%
F44ILL/2 to LED018-FIXT	3	12	116	18	1.00	0.13	0.13	1.00	100.0%
F44ILL/2 to LED018-FIXT	109	218	116	18	1.00	9.28	8.72	1.00	94.0%
F42ILL to Delamped	1	0	58	0	1.00	0.06	0.06	1.00	100.0%
F44ILL/2 to LED018-FIXT	3	12	116	18	1.00	0.13	0.13	1.00	100.0%
F44ILL/2 to LED018-FIXT	109	218	116	18	1.00	8.72	8.72	1.00	100.0%
F44ILL/2 to LED018-FIXT	3	12	116	18	1.00	0.13	0.13	1.00	100.0%
F44ILL/2 to LED018-FIXT	109	218	116	18	1.00	8.72	8.72	1.00	100.0%
F44ILL/2 to LED018-FIXT	3	12	116	18	1.00	0.13	0.13	1.00	100.0%
F44ILL/2 to LED018-FIXT	105	210	116	18	1.00	8.40	8.40	1.00	100.0%
F44ILL/2 to LED018-FIXT	1	4	116	18	1.00	0.04	0.04	1.00	100.0%
F42ILL to LED018-FIXT	8	16	58	18	1.00	0.18	0.18	1.00	100.0%
F42ILL to LED018-FIXT	26	52	58	18	1.00	0.57	0.57	1.00	100.0%
MH1000/1-L to LED180-FIXT	10	10	1,067	180	1.00	8.87	8.87	1.00	100.0%
MH250/1-L to LED065-FIXT	6	6	275	65	1.00	1.26	1.26	1.00	100.0%
					Total	67.53	65.02		96.3%

Results

The kWh realization rate for project# PRJ-408788 is 107.0% and the kW realization rate is 96.3%.

The high kWh realization rate is due to two reasons:

1) The ex post calculations used verified Annual Operating Hours of 8,760. The ex ante estimations used 7,884 hours.
2) Ex ante estimations assumed (1,564) 18W LED fixtures were installed, however on site the Evaluators found that (183) of these fixtures had not been installed.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
F44ILL/2 to LED018-FIXT	20,236	2.31	62.1%	55.9%
Delamped F44ILL/2	1,016	0.12	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	64,474	7.36	111.1%	100.0%
Delamped F44ILL/2	3,048	0.35	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
Delamped F44ILL/2	508	0.06	111.1%	100.0%
F44ILL/2 to LED018-FIXT	73,934	8.44	109.6%	98.6%
Delamped F44ILL/2	508	0.06	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	76,387	8.72	104.4%	94.0%
Delamped F44ILL/2	508	0.06	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	76,387	8.72	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	76,387	8.72	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	73,584	8.40	111.1%	100.0%
F44ILL/2 to LED018-FIXT	385	0.04	111.1%	100.0%
F42ILL to LED018-FIXT	1,542	0.18	111.1%	100.0%
F42ILL to LED018-FIXT	5,011	0.57	111.1%	100.0%
MH1000/1-L to LED180-FIXT	77,701	8.87	111.1%	100.0%
MH250/1-L to LED065-FIXT	11,038	1.26	111.1%	100.0%
Total	569,593	65.02	107.0%	96.3%

Project Number PRJ-517728
Program Large Commercial and Industrial

Project Background

The participant is a warehouse that received incentives from Entergy New Orleans for implementing energy efficient lighting in the parking lot. On-site, the Evaluators verified the participant had installed:

- (102) 237W LED - Non-Int. Ballast, replacing (102) 350W Metal Halide;
- (25) 237W LED - Non-Int. Ballast, replacing (35) 350W Metal Halide;
- (10) 237W LED - Non-Int. Ballast, replacing (15) 350W Metal Halide;
- (63) 237W LED - Non-Int. Ballast, replacing (63) 350W Metal Halide;
- (36) 153W LED - Non-Int. Ballast, replacing (36) 350W Metal Halide;
- (30) 153W LED - Non-Int. Ballast, replacing (30) 350W Metal Halide;
- (5) 153W LED - Non-Int. Ballast, replacing (6) 350W Metal Halide;
- (24) 237W LED - Non-Int. Ballast, replacing (24) 350W Metal Halide;
- (12) 153W LED - Non-Int. Ballast, replacing (18) 350W Metal Halide;
- (4) 153W LED - Non-Int. Ballast, replacing (6) 350W Metal Halide;
- (15) 153W LED - Non-Int. Ballast, replacing (15) 350W Metal Halide;
- (5) 153W LED - Non-Int. Ballast, replacing (15) 350W Metal Halide;
- (6) 153W LED - Non-Int. Ballast, replacing (6) 350W Metal Halide;
- (2) 153W LED - Non-Int. Ballast, replacing (2) 350W Metal Halide;
- (4) 153W LED - Non-Int. Ballast, replacing (5) 350W Metal Halide; and
- (343) lighting occupancy sensors throughout the facility

In addition to verifying the installation and operation of these measures, the Evaluators also left light-monitoring equipment on site to monitor a portion of the newly-installed lighting for two or more weeks.

M&V Methodology

On-site, Evaluators verified the presence of all fixtures listed on the project application. Annual Hours of Operation (AOH) and peak coincidence factor (CF) were developed through two weeks of on-site metering as well as interviews with facility staff. Ex Post calculations incorporated New Orleans-specific interactive effects factor for energy (IEFE) and interactive effects factor for demand (IEFD) factors.

Savings Parameters

Space	Heating Type	Annual Hours	IEF_E	IEF_D	CF	PAF
CTW	Electric Resistance	6,570	1.000	1.200	0.91	0.84
Drive-through	None	7,200	1.000	1.000	0.90	0.69
Back Dock	None	7,900	1.000	1.000	1.00	0.75
Warehouse	None	7,731	1.000	1.000	0.94	0.71
POS Area	None	4,066	1.000	1.000	0.80	0.70
Warehouse: Refrigerated	Med. Temp. Refrigeration (33-41°F)	3,798	1.250	1.250	0.61	0.76

Savings Calculations

Using values from the table above, the Evaluators calculated annual kWh savings as follows:

$$Lighting\ kWh\ Savings = \left(kW_{base} * AOH_{base} - kW_{post} * AOH_{post}\right) * IEF_E$$

$$Lighting\ Controls\ kWh\ Savings = kW_{post} * (AOH_{base} - (AOH_{base} * (1 - PAF)) * IEF_E$$

$$Total\ kWh\ Savings = Lighting\ kWh\ Savings + Lighting\ Controls\ kWh\ Savings$$

Parameters for kWh Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kWpost	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
AOH_{base}	Annual Operating Hours of Baseline Fixtures
AOH_{post}	Annual Operating Hours of Installed Fixtures
IEF_E	Heating/Cooling Energy Interactive Effects Factor
PAF	Power Adjusted Control Factor

Following this, the Evaluators calculated peak kW savings. This is based upon Louisiana defined peak hours during summer weekdays. Peak kW savings are calculated as:

$$Lighting\ kW\ Savings = \left(kW_{base} - kW_{post}\right) * CF * IEF_D$$

$$Lighting\ Controls\ kW\ Savings = kW_{post} * (CF - (PAF * CF)) * IEF_D$$

$$Total\ kW\ Savings = Lighitng\ kW\ Savings + Lighting\ Controls\ kW\ Savings$$

Parameters for Peak Demand (kW) Savings Calculation of Lighting Retrofit Measures

kW_{base}	Total Baseline fixtures x $W/Fixture_{base}$ / 1000 W/kW
kW_{post}	Total Installed fixtures x $W/Fixture_{post}$ / 1000 W/kW
CF	Peak Demand Coincident Factor, % Time During the Peak Period in Which Lighting is Operating
IEF_D	Heating/Cooling Demand Interactive Effects Factor

Lighting Retrofit kWh Savings Calculations

Measure	*Quantity (Fixtures)*		*Wattage*		*AOH*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
	Base	*Post*	*Base*	*Post*					
MH350/1 to LED237-FIXT	102	102	391	237	6,570	89,785	89,785	0.87	100.0%
MH350/1 to LED237-FIXT	35	25	391	237	3,798	36,841	36,841	1.25	100.0%
MH350/1 to LED237-FIXT	15	10	391	237	3,798	16,593	16,593	1.25	100.0%
MH350/1 to LED237-FIXT	63	63	391	237	7,200	60,773	69,854	1.00	114.9%
MH350/1 to LED153-FIXT	36	36	391	153	7,900	58,888	67,687	1.00	114.9%
MH350/1 to LED153-FIXT	30	30	391	153	7,731	48,022	55,197	1.00	114.9%
MH350/1 to LED153-FIXT	6	5	391	153	7,731	10,633	12,222	1.00	114.9%
MH350/1 to LED237-FIXT	24	24	391	237	4,066	13,074	15,028	1.00	114.9%
MH350/1 to LED153-FIXT	18	12	391	153	4,066	18,402	21,151	1.00	114.9%
MH350/1 to LED153-FIXT	6	4	391	153	4,066	6,134	7,050	1.00	114.9%
MH350/1 to LED153-FIXT	15	15	391	153	7,731	24,011	27,599	1.00	114.9%
MH350/1 to LED153-FIXT	15	5	391	153	7,731	34,301	39,427	1.00	114.9%
MH350/1 to LED153-FIXT	6	6	391	153	7,731	9,604	11,039	1.00	114.9%
MH350/1 to LED153-FIXT	2	2	391	153	7,731	3,201	3,680	1.00	114.9%
MH350/1 to LED153-FIXT	5	4	391	153	7,731	9,033	10,382	1.00	114.9%

Total	439,295	483,536		110.1%

Lighting Retrofit kW Savings Calculations

Measure	Quantity (Fixtures)		Wattage		CF	Expected kW Savings	Realized kW Savings	IEF_D	Realization Rate
	Base	Post	Base	Post					
MH350/1 to LED237-FIXT	102	102	391	237	0.91	16.96	17.15	1.20	101.1%
MH350/1 to LED237-FIXT	35	25	391	237	0.61	8.15	5.95	1.25	73.1%
MH350/1 to LED237-FIXT	15	10	391	237	0.61	3.67	2.68	1.25	73.1%
MH350/1 to LED237-FIXT	63	63	391	237	0.90	11.64	8.69	1.00	74.7%
MH350/1 to LED153-FIXT	36	36	391	153	1.00	10.28	8.57	1.00	83.3%
MH350/1 to LED153-FIXT	30	30	391	153	0.94	8.57	6.68	1.00	77.9%
MH350/1 to LED153-FIXT	6	5	391	153	0.94	1.90	1.48	1.00	77.9%
MH350/1 to LED237-FIXT	24	24	391	237	0.80	3.55	2.96	1.00	83.3%
MH350/1 to LED153-FIXT	18	12	391	153	0.80	4.99	4.16	1.00	83.3%
MH350/1 to LED153-FIXT	6	4	391	153	0.80	1.66	1.39	1.00	83.3%
MH350/1 to LED153-FIXT	15	15	391	153	0.94	4.28	3.34	1.00	77.9%
MH350/1 to LED153-FIXT	15	5	391	153	0.94	6.12	4.77	1.00	77.9%
MH350/1 to LED153-FIXT	6	6	391	153	0.94	1.71	1.34	1.00	77.9%
MH350/1 to LED153-FIXT	2	2	391	153	0.94	0.57	0.45	1.00	77.9%
MH350/1 to LED153-FIXT	5	4	391	153	0.94	1.61	1.26	1.00	77.9%
					Total	85.68	70.86		82.7%

Occupancy Sensor kWh Savings Calculations

Quantity (Fixtures)	Controlled Wattage	Annual Operating Hours	Control Factor	Expected kWh Savings	Realized kWh Savings	IEFE	Realization Rate
102	237	6,570	84%	41,453	22,335	0.87	53.9%

25	237	3,798	76%	8,439	6,888	1.25	81.6%
10	237	3,798	76%	3,375	2,755	1.25	81.6%
63	237	7,200	69%	28,058	32,938	1.00	117.4%
36	153	7,900	75%	11,357	10,933	1.00	96.3%
30	153	7,731	71%	9,261	10,366	1.00	111.9%
5	153	7,731	71%	1,544	1,728	1.00	111.9%
24	237	4,066	70%	6,036	6,938	1.00	114.9%
12	153	4,066	70%	1,948	2,240	1.00	114.9%
4	153	4,066	70%	649	747	1.00	114.9%
15	153	7,731	71%	4,631	5,183	1.00	111.9%
5	153	7,731	71%	1,544	1,728	1.00	111.9%
6	153	7,731	71%	1,852	2,073	1.00	111.9%
2	153	7,731	71%	617	691	1.00	111.9%
4	153	7,731	71%	1,235	1,382	1.00	111.9%
Total				122,000	108,924		89.3%

Occupancy Sensor kW Savings Calculations

Quantity (Fixtures)	*Controlled Wattage*	*CF*	*Control Factor*	*Expected kWh Savings*	*Realized kWh Savings*	IEF_E	*Realization Rate*
102	237	0.91	0.84	7.83	4.27	1.20	54.5%
25	237	0.61	0.76	1.87	1.11	1.25	59.6%
10	237	0.61	0.76	0.75	0.45	1.25	59.6%
63	237	0.90	0.69	5.38	4.10	1.00	76.2%
36	153	1.00	0.75	1.98	1.38	1.00	69.8%
30	153	0.94	0.71	1.65	1.25	1.00	75.9%
5	153	0.94	0.71	0.28	0.21	1.00	75.9%
24	237	0.80	0.70	1.64	1.37	1.00	83.3%
12	153	0.80	0.70	0.53	0.44	1.00	83.3%
4	153	0.80	0.70	0.18	0.15	1.00	83.3%
15	153	0.94	0.71	0.83	0.63	1.00	75.9%
5	153	0.94	0.71	0.28	0.21	1.00	75.9%
6	153	0.94	0.71	0.33	0.25	1.00	75.9%
2	153	0.94	0.71	0.11	0.08	1.00	75.9%
4	153	0.94	0.71	0.22	0.17	1.00	75.9%
Total				23.84	16.06		67.4%

Results

The kWh realization rate for project# PRJ-517728 is 105.6% and the kW realization rate is 79.4%.

The high kWh savings is due the ex post calculations used IEF_E values of 1.00 for all areas besides refrigerated warehouse because these areas did not use heating. The ex ante estimates used 0.87.

The low kW savings is due to two reasons:

1) Through monitoring, the Evaluators determined that CF some of the areas in the warehouse is lower than the values used in the ex ante estimation, as shown in the tables above.
2) The monitoring data also verified that the PAF for certain areas are greater than 70%, as shown in the tables above.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
MH350/1 to LED237-FIXT	89,785	17.15	100.0%	101.1%
MH350/1 to LED237-FIXT	36,841	5.95	100.0%	73.1%
MH350/1 to LED237-FIXT	16,593	2.68	100.0%	73.1%
MH350/1 to LED237-FIXT	69,854	8.69	114.9%	74.7%
MH350/1 to LED153-FIXT	67,687	8.57	114.9%	83.3%
MH350/1 to LED153-FIXT	55,197	6.68	114.9%	77.9%
MH350/1 to LED153-FIXT	12,222	1.48	114.9%	77.9%
MH350/1 to LED237-FIXT	15,028	2.96	114.9%	83.3%
MH350/1 to LED153-FIXT	21,151	4.16	114.9%	83.3%
MH350/1 to LED153-FIXT	7,050	1.39	114.9%	83.3%
MH350/1 to LED153-FIXT	27,599	3.34	114.9%	77.9%
MH350/1 to LED153-FIXT	39,427	4.77	114.9%	77.9%
MH350/1 to LED153-FIXT	11,039	1.34	114.9%	77.9%
MH350/1 to LED153-FIXT	3,680	0.45	114.9%	77.9%
MH350/1 to LED153-FIXT	10,382	1.26	114.9%	77.9%
Occupancy Sensors	108,924	16.06	89.3%	67.4%
Total	592,460	86.92	105.6%	79.4%

Results

The kWh realization rate for project# PRJ-408788 is 102.1% and the kW realization rate is 91.9%.

On site the Evaluators were unable to verify the installation of (263) 18W LED fixtures, leading to lower kWh and kW savings. Due to continuous operating, 8,760 hours were used in place of the 7,884 used in ex ante calculations, increasing the verified kWh savings.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
F44ILL/2 to LED018-FIXT	20,043	2.29	61.5%	55.3%
Delamped F44ILL/2	1,016	0.12	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	64,474	7.36	111.1%	100.0%
Delamped F44ILL/2	3,048	0.35	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
Delamped F44ILL/2	508	0.06	111.1%	100.0%
F44ILL/2 to LED018-FIXT	60,619	6.92	89.8%	80.8%
Delamped F44ILL/2	508	0.06	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	72,182	8.24	98.7%	88.8%
Delamped F44ILL/2	508	0.06	111.1%	100.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	72,883	8.32	106.0%	95.4%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	71,832	8.20	104.5%	94.0%
F44ILL/2 to LED018-FIXT	1,156	0.13	111.1%	100.0%
F44ILL/2 to LED018-FIXT	73,742	8.42	111.3%	100.2%
F44ILL/2 to LED018-FIXT	385	0.04	111.1%	100.0%
F42ILL to LED018-FIXT	1,542	0.18	111.1%	100.0%
F42ILL to LED018-FIXT	4,625	0.53	102.6%	92.3%
MH1000/1-L to LED180-FIXT	77,701	8.87	111.1%	100.0%
MH250/1-L to LED065-FIXT	11,038	1.26	111.1%	100.0%
Total	543,593	62.05	102.1%	91.9%

Project Number PRJ-419605
Program Large C&I

Project Background

The participant is an office/hotel that received incentives from Entergy New Orleans for implementing an energy efficiency chiller measure. On-site, the Evaluators verified the participant had installed the following chillers:

- (2) 500 Ton Maquay-Daiken magnetic bearing water cooled chillers
  - Model: Magnitude WME0500S
- (1) 350 Ton Maquay-Daiken magnetic bearing water cooled chiller
  - Model: Magnitude WMC400DC

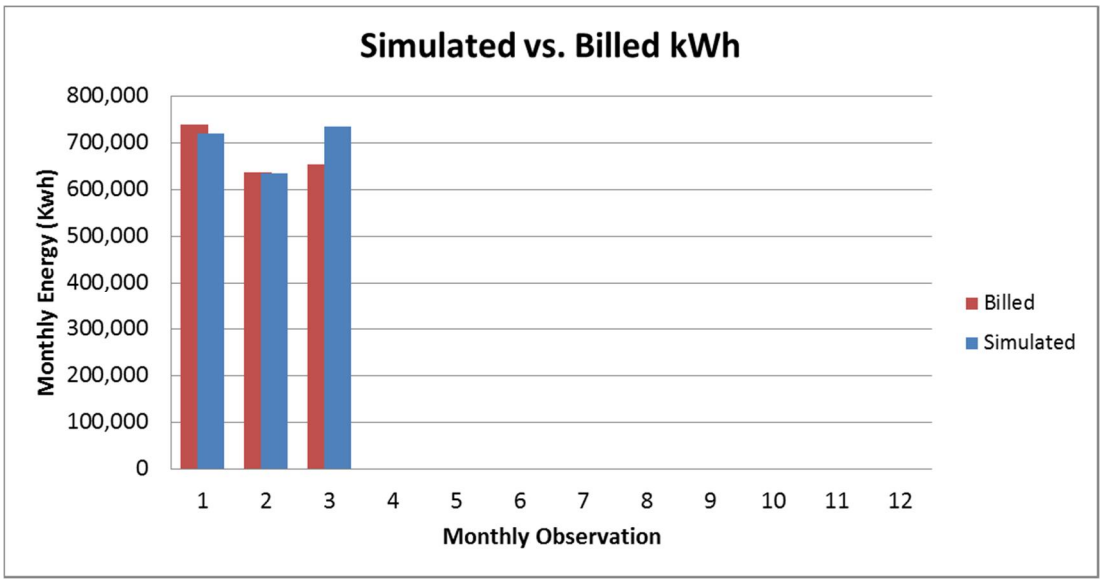
The three new chillers replaced the following two old chillers:

- (2) 650 Ton York chillers
  - Model: YDTL131

M&V Methodology

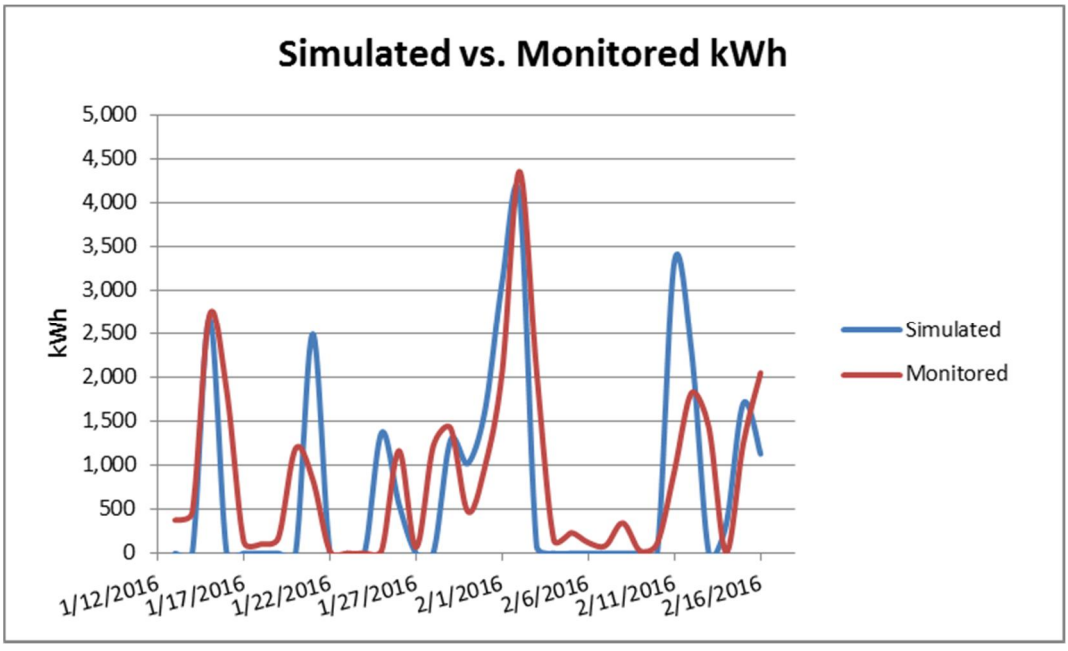
On-site, Evaluators verified the presence of the chillers listed on the project application. Savings were calculated using the eQuest simulation program. Two models were constructed (baseline and as-built) where the savings is the difference of the two. Mechanical, architectural, electrical, equipment, and control schedules were used to create a model of the building and its HVAC systems. The as-built model was calibrated to available billing data using a custom weather file from New Orleans International Airport during a period after the installation date and once the chiller plant was running normally. Because the chiller plant was operating normally after 12/15/2015, only 3 months of billing data were available for calibration. However, the three months used for calibration were each within 10% of the past 2 year average kWh monthly usage. This indicates the months used for the calibration represent the buildings typical use. The results of the calibration effort can be seen below:

Total kWh Calibration Results



In addition to whole building calibration, the as-built model's chiller plant was also compared to chiller plant monitoring data collected by the implementer. Monitoring data collected from 1/13/2016 – 2/16/2016 was used to compare the as-built model's chiller plant energy use. The chiller plant's total energy use during the period was 30,300 kWh compared to the simulated chiller plant energy use of 27,032 kWh during the same period. The visual comparison and the period's summed simulated kWh vs monitored kWh difference of 9% indicate the eQuest model accurately simulates the as-built chiller plant. The results of the comparison can be seen below:

Chiller Plant kWh Calibration Results



Savings Calculations

Using the calibrated eQuest model and TMY3 weather data from the New Orleans International Airport, normalized as-built and baseline models were simulated.

The baseline model consisted of two chillers with the rated capacities and efficiencies of the previously installed chillers; two 650 Ton York chillers (Model: YDTL131) with standard efficiency chilled water pumps. The baseline chiller's rated efficiencies were 1.096 kW/ton. The baseline model also included the seven converted hotel floors to keep the building type in the pre and post retrofit periods consistent.

The as-built model consisted of three chillers with the rated capacities and efficiencies of the installed chillers; two 500 ton Maquay-Daiken chillers and one 350 ton Maquay-Daiken chiller (Models: Magnitude WME0500S and Magnitude WMC400DC respectively) with high efficiency chilled water pumps. The two 500 ton chillers were rated at 0.543 kW/ton and the 350 ton chiller was rated at 0.566 kW/ton. Specific end-use energy usage and resulting savings from the baseline and as-built simulations can be seen in the table below:

End-Use kWh Summary

End-Use Category	kWh			kW		
	Baseline	As-Built	Savings	Baseline	As-Built	Savings
Lighting	2,680,911	2,680,911	0	574.34	574.34	0.00
Task Lighting	0	0	0	0.00	0.00	0.00
Miscellaneous	2,030,976	2,030,976	0	401.25	401.25	0.00
Heating	135,379	135,470	-91	0.01	0.01	0.00
Cooling	2,783,297	1,217,354	1,565,943	891.69	399.50	492.19
Heat Rejection	54,765	44,800	9,965	17.20	11.60	5.60
Auxiliary	484,869	418,834	66,035	115.89	94.52	21.37
Vent Fan	2,119,467	2,117,976	1,491	294.49	294.46	0.03
Refrigeration Systems	0	0	0	0.00	0.00	0.00
Supplemental Heat Pump	0	0	0	0.00	0.00	0.00
Domestic Hot Water	110,866	110,865	1	24.17	24.17	0.00
Exterior	0	0	0	0.00	0.00	0.00
Total	10,400,530	8,757,186	1,643,344	2,319.04	1,799.85	519.19

Results

The kWh realization rate for project #PRJ-419605 is 79.9% and the kW realization rate is 50.0%.

The difference in realization rate is due to the ex-ante calculations using an estimated depreciated chiller efficiency for the baseline chillers while the ex post used the rated

chiller efficiency. The ex-ante calculations estimated an approximate 0.5% efficiency per year depreciation resulting in an adjusted efficiency of 1.325 kW/ton. The ex post used the rated efficiency because there was no data available to calculate the baseline chiller's actual efficiency. Therefore, the ex post used the rated efficiency of 1.096 kW/ton.

Verified Gross Savings & Realization Rates

Measure	*Verified*			
	kWh Savings	*kW Savings*	*kWh Realization Rate*	*kW Realization Rate*
Chillers	1,643,344	519.19	79.9%	50.0%
Total	1,643,344	519.19	79.9%	50.0%

12.Appendix B: Survey Instruments & Interview Guides

This appendix contains the survey instruments and interview guides used in this evaluation.

Entergy Internal Staff Interview Guide

Roles and Responsibilities

1. Let's start with a bit about you and your roll in regards to the Energy Smart programs.
    a. How long have you been at Entergy?
    b. Briefly, what are your responsibilities at Entergy overall, including with the Energy Efficiency Programs?
    c. How long have you had those responsibilities?

Program Management

2. Who do you report to for the program?
    a. Is there staff that reports to you? What are their roles?
3. AS NEEDED: Who else at Entergy do you interact with relating to the programs, and what are their roles?
4. RE: CSAs & KARs – What roles do CSAs (Customer Service Advisors) and KARs (Key Account reps) play in the program, if any?
    a. What kinds of program training do they receive, if any?
5. What support does the program need from other Entergy departments or divisions to make it successful?
    a. Does it get the support it needs?
    b. What additional support, if any, does the program need?

Program Goals

Now I'd like to hear about program goals.

6. I would like some more information on how the kWh savings goals were set.
    a. Were the goals set through the most recent integrated resource planning process?
    b. Were the goals set for each program through that process or for the residential and commercial sectors overall?

c. Did Entergy have much influence on what the [overall] goals were set at?

d. Is Lost contribution to fixed cost recovery dependent on only meeting the kWh goals or the peak demand reduction goals as well? Is that the same for the performance incentives?

7. Aside from kWh and demand reduction goals, are there are other goals or objectives for the portfolio of programs that you think are important?

   a. Customer satisfaction?

   b. Educational goals?

   c. Are there any other key performance indicators aside from energy savings and demand reductions that Entergy monitors?

8. I didn't see a separate goal and budget for Green Light Direct install? To which program are costs and savings assigned to?

   a. Have you previously considered bundling DI with the HPwES assessments or measure implementations?

9. I would like to discuss the performance of the programs in meeting their savings goals:

   - HPwES/aHPwES
   - AC Tune up
   - Lighting and appliances
   - LI
   - Large C&I
   - Small C&I

   a. [If indicates any issues:] What particular issues or concerns do you have about the design of the programs?

   b. [If not obvious] What needs to change to address those concerns?

   c. [If all ok] What factors

   d. What might prevent those changes?

   e. How and when might changes to address those concerns occur?

10. Historically have there been greater challenges in meeting goals in Algiers vs ENO?

11. Are there any other opportunities that this program might address? [e.g., additional measures, other customers or trade allies, additional services, other market segments?]
12. Can program budgets roll over from year to year?

Implementation Partners

CLEAResult

13. How long have you been working with CLEAResult?
14. So far, has CLEAResult's efforts met your expectations? If not, in what way do they fall short of expectations?
    a. [Probe about differences between the programs and about each of the following:]
        - Marketing and outreach
        - Application processing
        - M&V (measurement and verification)
        - QA/QC (quality assurance and quality control)
        - Reporting
15. Is there anything else that CLEAResult needs to be doing?

Green Light New Orleans

16. For how long has the program been working with Green Light New Orleans?
17. Aside from completing the direct installs, does Green Light support the program in other ways?
18. Do you have any direct interactions with Green Light?
19. What do you see as the primary benefits of this partnership? [Aside from actually doing the direct installs, are there other benefits for the programs from working with Green Light?]

NOLA Wise

20. For how long has the program been working with NOLA Wise?
21. Can you tell me about the educational and marketing support that NOLA Wise provides to the program?
22. Do you have any direct interactions with NOLA Wise?

23. What do you think are the primary benefits of the partnership with NOLA Wise?

Other Partners

24. Are there any other partners for the Energy Smart Programs?

Internal Communications

Next I'd like to hear about how communication processes, starting with internal communication.

25. What, if any, regularly scheduled program communication do you have with other Entergy staff regarding the efficiency programs? Anything else?

    [Do you meet with the EGSL and ELL team? (i.e., Heather)]

    For each item:

    [If issues – what are they, any suggested solutions]

Communication with Implementers

26. What, if any, regularly scheduled program communication do you have with CLEAResult regarding the program? Anything else?

    For each item:

    a. Who
    b. Method
    c. Frequency
    d. Purpose/objectives
    e. Meet objectives
    f. Why or why not
    g. What's working well
    h. Any problems or suggested improvements

27. Are updates to the ELL and EGSL programs provided during the same meetings as the ENO and Algiers updates?

28. Overall, how would you characterize your communications with CLEAResult?

29. [If issues – what are they, any suggested solutions]

Trade Allies & Other Program Partners

30. What interaction, if any, does Entergy staff have with trade allies and other program partners? Does this vary by individual program (Residential solutions, small business, large C&I)? (PROBE for which individual Entergy staff members interact with each type of trade ally/partner.)

31. From your perspective, how well is CLEAResult managing trade allies or other program partners?

32. [IF CONCERNS NOTED] What is being done about those concerns? What else should be done? [Probe about the various aspects of managing TAs – recruiting, training, keeping them informed, maintaining a TA list on the website.]

33. Do you have any suggestions for ways to improve the program with regard to trade allies and program partners?

34. Have you heard any feedback from trade allies or program partners about the program, and if so, what have you heard?

Marketing

INTERVIEWER NOTE: PROBE AS NEEDED ABOUT DIFFERENCES BY: program, participant type, and trade ally type.

35. What responsibilities for marketing and outreach does …

    a. Entergy have?

    b. CLEAResult have?

36. What marketing channels does Entergy use to reach potential customers? [mass marketing, organizations –types, how often, other?] How does this differ for the various programs?

37. How are websites and Internet activities used for marketing?

38. What feedback have you gotten so far on how marketing and outreach activities are working? [Probe about different programs and different sub-segments]

39. How are changes in the program communicated to the target market?

40. What success or challenges are partners and implementers having with communicating changes?

Tracking & Reporting

41. How well is the current tracking and reporting process working to meet your needs?

    c. What reports or other information provided by CLEAResult do you find to be most useful? Least useful (if anything)? Why?

    d. What would you like to see improved or streamlined, if anything? [PROBE FOR SPECIFIC REPORT REFERENCE(S)]

    e. Are reports provided in a timely manner?

    f. Is all needed information available, or are some data points missing or not readily available? If so, what?

42. How well have the recent tracking changes for the current cycle worked out from your perspective?

43. Regarding using the Vault SharePoint to share reports and other documents between Entergy and CLEAResult– what is working well, and what needs improvement?

Quality Control

Now let's talk about Quality Control…

44. What types of Quality Control activities are done by Entergy staff? By CLEAResult?

45. From your perspective, how adequate are CLEAResult's procedures for ensuring quality control?

46. What are typical types of QC issues that come up now? How is different from in the past?

47. How are the issues addressed?

48. Are there problems that are more common with a specific type of partners, participants, contractors, or sector? How do you address these issues?

49. Have you had any feedback about the program? If so, from whom and what was the nature of the feedback?

Conclusion

50. What would you say are the greatest strengths of the program?

51. What would you say most needs to be changed about the program?

52. Are you aware of opportunities to streamline any of the program activities? If so, which activities, and what changes would you like to see, and what would have to occur for those changes to be implemented?

53. Is there anything else about the program that we have not discussed that you feel should be mentioned?

CLEAResult Program Manager Interview Guide

Staff Roles and Organization

1. I assume your responsibilities are essentially the same as for the other Entergy programs. Is there anything different about your role for the New Orleans and Algiers programs?

[FROM LA PROGRAM INTERVIEWS: Manage day to day operations of the program report to the client, run team meetings, run retail teams, residential teams, set goals and targets with them.

Recruit contractors, ensure that contractors that meet standards, centralized support services.]

2. Now I would like to talk about staffing. To begin with, I would like to review the staff with responsibilities for all programs.

3. For the Louisiana programs, you mentioned that you have a daily brief meeting and bi-weekly meetings. Do those meetings cover the New Orleans programs as well?

Coordination with Other Utility Programs

4. CR is implementing a similar set of programs for SWEPCO and Cleco. Do you have any regularly scheduled communications with the other utility teams?
    a. Who
    b. Method
    c. Frequency
    d. Purposes and Objectives
    e. What is working well / what isn't
5. How much coordination is there in Trade Ally training and management

Program Goals and Objectives

6. Programs that did not meet goals
    a. Tune-Ups
    b. Kits
    c. Green Light
    d. ELA business programs

7. Reading the council resolutions on the PY4 programs, it looks like a goal or concern raised was the lack of non-lighting energy savings. Has the program taken any specific steps to try to target non-lighting projects?
    a. Is there anything being considered to increase the share of savings from non-lighting measures?

8. Is there any program or program component that did not perform as well as you expected? Why?
9. In terms of goals, program design, or measures offered, is there anything you are considering changing about the programs?
10. It looks like in your internal reporting you are not tracking assisted HPwES savings progress separate from the mass market program. Why not (they have separate goals in filing)?

Marketing and Outreach

11. I would like to discuss marketing and outreach beginning with the residential programs.
    a. What are the primary outreach methods used to promote the program?
    b. Does CLEAResult staff engage in any direct outreach with multi-family owner or operators?
    c. What outreach or marketing strategies or methods have you found to be particularly effective at promoting one or more of the programs?
    d. Is the expectations that contractors will drive most of the program activity for HPwES or Assisted HPwES? Is this happening?
    e. Does CR provide any information to assist contractors in identifying income qualified customers for Assisted HPwES?
    f. We received copies of the marketing collateral for use by contractors (e.g, truck magnets, pre-approved cobranded materials). How does the program provide this to contractors? Upon request, at beginning of year?
    g. What cross-promotion, if any occurs with Kits and CFL DI?
    h. Do the walk through energy assessments for HPwES direct customers to the Tune-Up program?
12. How about the commercial programs?
    a. Is the expectation that contractors will drive program activity for Small Business? Is this happening?
    b. What outreach does CR engage in to promote large and small business programs?
    c. What role, if any, does Entergy customer service staff or large account reps play in promoting the Large CI program?

d. What outreach or marketing strategies or methods have you found to be particularly effective at promoting one or more of the programs?

Program Design Questions

13. Now I have a few program specific questions.
    a. Large and Small C&I –
        i. Is there a list of prescriptive rebates for these programs? If not why not?
        ii. What is the maximum incentive cap based on, site address, account number?
        iii. The program manuals I have state that incentive caps set at 100% of the installed cost for large and small C&I. Is that correct?
            1. How was that cap set?
            2. I have more commonly seen caps such as 50% of incremental cost for general C&I programs and
    b. HPwES and Assisted HPwES
        i. Why is DI not bundled with the HPwES program?
        ii. This program does not use the OPEN tool to perform audits, correct?
            1. Why not?
            2. Are contractors given checklists or other materials to guide the energy walkthrough?
            3. Are they provided with calculators to estimate energy savings? Are they Excel based?
        iii. Does the $75 deduction for the survey cover the full cost of the survey?
        iv. Are the incentive amounts set to target a specific $ per kWh saved amount?
            1. Do the duct sealing incentives typically cover the full project cost?
                a. How about air sealing and insulation incentives?
        v. Are only select contractors approved to complete Assisted HPwES projects? Reviewing the tracking data it looked like a small number of contractors completed these projects.
        vi. The savings for the program accrued more slowly, any thoughts on why?
        vii. What is the income qualification requirement for assisted HPwES?
        viii. MF with 4 or more units is not eligible to participate. Does that mean that MF properties are only eligible for tune-ups?

c. CoolSaver
    i. Does the New Orleans program also use the iManifold toolkit for the tune-ups?
    ii. Cobranded materials
    iii. Is the tune-up incentive designed to cover the full cost the service?
        1. The $150 SF / $75 MF incentives are per unit, correct?
        2. Administratively, do you have separate budgets and goals for tune ups and HVAC replacements?
        3. Are there any efforts to cross-promote tune ups and HPwES measures?

d. School Kits
    i. I understand that this is the first year that Energy Wise Alliance is administering the program. Who administered last year? Why was the change made?
    ii. Is the programming targeting 5 -7th grade classes in PY6?
e. CFL DI
    i. WRITE AFTER INTERVIEW
    ii. Do you think this program competes in any way with the lighting discount program?
f. Has the program considered other low-flow measures for DI? (is there much electric water heating in NO?)
g. What is CLEAResults role in managing kits supplier?
h. Is the number and mix of Small Business contractors about right?
i. Any plans to list approved Small Business contractors on the website?
j. Large C&I
    i. For large or small CI are there any thresholds for the number of allowed burned out lamps in a retrofit project? For example, can a customer get a rebate for replacement of burnt out lamps if they represent some small share of the total number of replacements?
    ii. New construction qualifies under Large CI
    iii. All incentives are calculated based on energy savings rather than $ per widget, right?
    iv. Are there any tools provided to contractors or customers to estimate savings, or do customers need to submit an application for an incentive estimate?
    v. Do all large CI projects get pre and post inspections? What percent get pre / post?

vi. How does a customer get a copy of the LOI form or application form? Why is it not provided on the website? Are the forms fillable PDFs?
vii. We received an excel tool for a large CI facility lighting assessment. Is that tool provided to contractors or customers, or is it only used by CR staff? Are similar tools for non-lighting measures developed?

k. Small C&I

i. Do contractors do the energy assessments or does CR? (Website says Contact Energy Smart for a free assessment by our staff to identify qualifying energy efficiency projects.)
ii. The OPEN tool is not used for Small Business, correct?
    1. Why not?
iii. Does the program provide tools or lists to verify that customers have peak demand of less than 100 kW or is it verified by program staff?
    1. Is the peak demand
iv. Are there any checklists, forms, excel spreadsheets to guide contractors in completing a facility survey?
v. How is the project proposal, notice of completion, and invoicing submitted?
vi. How are approvals communicated to contractors?
vii. Does the customer get notified of project approval or incentive payment?
viii. Small business contractors have to be approved to work with the program, correct?
    1. Is co-branding allowed (either via guidelines or preprinted materials)?

Contractor / Trade Ally Management

14. Training
    l. I think you said you didn't do any training of contractors for PY5, correct?
    m. How are annual program changes communicated to contractors?
    n. How are program updates (e.g., status of budget) communicated to contractors?
15. Does the program solicit feedback from contractors on how it is designed or operated?

QC Processes

16. HPwES and Assisted HPwES –
    a. Pre and post inspection of 10% of projects
    b. Consistency of reported information on performance testing, site information, measures installed. Discussion of TA satisfaction
17. First 5, then 10%, what info
    c. Replacement verification that installed consistently with what is documented
    d.

Utility Communications and Reporting

18. What, if any, regularly scheduled program communication do you have with [UTILITY] regarding the program? Anything else?
    a. Who
    b. Method
    c. Frequency
    d. Purpose/objectives
    e. Meet objectives
    f. Why or why not
    g. What's working well
    h. Any problems or suggested improvements

19. What interactions, if any, do you have Entergy key account representatives?
    a. Do you coordinate with them on gaining access to large account customers?
    b. Have they provided sufficient support to your efforts?
20. What information are you tracking and reporting to Entergy?
21. Is there other information that you are tracking and monitoring internally?
    a. For residential solutions and small business, are you monitoring rates of customers that receive assessments who install program measures?
    b. Do you monitor trade ally activity?
22. Is customer satisfaction data being collected? If so how is the stored and tracked? What is being done with it? Yes, for all programs. Reported to Entergy. Do that annually. Leanne meets with GCR.
23. Have you discovered any tracking needs that are not being well met by the current system?

Conclusions

24. What would you say are the greatest strengths of the program?

25. What would you say most needs to be changed about the program?
26. Are you aware of opportunities to streamline any of the program activities? If so, which activities, and what changes would you like to see, and what would have to occur for those changes to be implemented?
27. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Green Light New Orleans Interview Guide

1. How long has Green Light been performing the installations of CFLs?
2. Did your organization install CFLs before Energy Smart began providing funding?
3. Reading your website, it seems like your organization is primarily motivated by environmental concerns. Is that correct? Are there other social concerns that you are focused on?
    a. Does Entergy's involvement through the Energy Smart programs support how your organization addresses these other social concerns? How so?
4. Participants request the bulbs using the website correct? Are there other ways they can request them?
5. Does Green Light New Orleans promote the availability of the free CFLs to New Orleans residents?
    a. How is this done?
6. How many bulbs may a person receive through the program? Are all of the bulbs installed in a residence funded by the Energy Smart program?
    a. If not how is it determined what share of bulbs installed will be funded by Energy Smart?
7. Is the goal to replace all screw in type light bulbs in a participant's home?
8. Who is eligible for the CFLs?
    a. MF?
    b. Renters / owners
9. Are there any guidelines in place regarding whether the existing light bulb is…
    a. Working
    b. An incandescent bulb
    c. The location of the bulbs replaced
10. How is the wattage of CFLs installed selected?
11. Can participants participate more than once? In a year? At a different residence?
12. Do you have a specific budget allocation from the Energy Smart program to fund the CFL installations?

a. Is the amount of budget provided about right in relation to the number of requests you meet or is challenging to expend the funds or could you spend additional funds if available?

b. Does your organization provide input on what the annual budget for this should be?

13. Where do you purchase the CFLs? About what percent of the Energy Smart budget is used for purchasing the light bulbs?

14. I would like to understand the process of how an installation is completed from when the bulbs are requested to the completion of the installation.

    a. Who processes the request?

    b. Who does the installations? Are they paid or are they volunteers?

    c. How does the assignment to who does the direct install get made?

    d. Who schedules the install appointment with the customer?

    e. What information is recorded by the program? The tracking data columns include the phrase “per customer” (e.g., installed 13W equ60 per customer). Does that mean that the customer reports that information?

        i. What is the data collected on?

        ii. How is it tracked (e.g., database)?

    f. Do the installers provide any additional information on ways the participants can save energy?

    g. Do they provide information on Entergy rebates and discounts?

    h. Do they serve any other functions while at the residence aside from installing the CFLs?

15. Has there been any discussion of including low-flow faucet aerators or showerheads in the program?

16. Does the program promote the rebates and discounts available through the Energy Smart programs during visits?

Energy Wise Alliance Interview Guide

1. I understand that you are the Executive Director of Energy Wise Alliance
    a. What is your role in role in supporting the kits program and the outreach that support the Entergy Energy Smart Programs?
    b. How many other staff support the kits and outreach efforts?
    c. How long has Energy Wise Alliance been working with Entergy and the Energy Smart Programs?
    d. How long has the kits program been running?
2. School Presentations for Kits Program
    a. Overall, what are the goals either numeric or more qualitative, of the program?
    b. What metrics are tracked to monitor progress toward goals?
    c. I would like to understand about the educational component of the program including how it is delivered, who delivers (teachers, Energy Wise staff), and what educational materials are provided.
        i. Is the presentation delivered in class rooms or as assemblies?
        ii. How long does the presentation last?
        iii. Is it delivered by teachers, Energy Wise staff, or both?
        iv. Are there workbooks, activities, or other materials provided to students and/or teachers?
        v. Are any of the program learning objectives assessed? How?
            1. Pre and post-tests?
            2. Grade assignments?
    d. I have a few questions about the energy saving kits program:
        i. Are the kits and the educational presentations always paired together? That is, can a school just receive kits or just have presentations?
        ii. Do parents have to provide permission for their students to receive the kits? How is that given?
        iii. Kits are distributed to teachers who distribute it to the students, correct?
        iv. Have there been any issues with students transporting the kits home on the school bus?
        v. Are there activities associated with installing the kit items (e.g., use of the flow-rate bag)?
        vi. Where are the kits contents purchased from? Are they bundled already?

vii. Is there a process for recipients to notify staff and request replacements if any kit items are broken?

e. I understand that there is an effort to get parents and guardians to complete a survey about their participation.
   i. How are responses to the survey solicited?
   ii. What is asked about in the survey?
   iii. What is the data used for?
   iv. How would you characterize the response rate? Great, good, so-so, not so good
f. Are Entergy's Energy Smart rebates promoted through the kits program?
g. Does Energy Wise promote the Energy Smart rebates to the participating schools?
h. How are schools recruited to participate in the program?
   i. What concerns do they raise about participating?
i. Overall, what do you think are the key strengths or successes of the kits program?
j. What, if anything, would you like to see changed?

3. Outreach
   a. To begin with can you provide me with an overview of the types of outreach activities Energy Wise engages in to support the Entergy Energy Smart programs?
      i. Are you targeting any specific groups through your outreach?
         1. Res vs non res
         2. Low income residents
      ii. What messaging is used? (cost savings, environmental benefits)

   b. Regarding the program outreach activities, I received a link to a google spreadsheet from Alex titled Outreach and Education Tracking 2015-16 Energy Smart. Are you familiar with that worksheet?
      i. Is it maintained by Energy Wise or CLEAResult?
      ii. Is it kept current (i.e., can I use it to summarize outreach activities)?
   c. What do you think are the strengths of Energy Wise Outreach efforts?
      i. Are there specific audiences you are particularly effective with?
      ii. Are there specific activities that have been particularly effective?
      iii. Is there anything you would like to see changed about the outreach effort?

4. Now I would like to talk about reporting and communication processes.
    a. Do you have any interactions with Entergy staff?
        i. With whom
        ii. Frequency
        iii. Purpose
        iv. Sufficiency?
    b. Who do you interact with at CLEAResult?
        i. Frequency
        ii. Purpose
        iii. Sufficiency?
5. What reporting is Energy Wise responsible for?
        i. What is reported on?
        ii. What is the frequency of reporting
6. Do you have information needs from CLEAResult? (e.g., for purposes of coordinating outreach, sharing leads).
    a. Are they being met?

HPwES/aHPwES Trade Ally Interview Guide

Hi, may I please speak with [Trade Ally Name]

My name is ___ and I'm calling, on behalf of the Entergy We're talking to contractors who completed projects through Entergy's Home Performance with ENERGY STAR® Program as part of our evaluation of that program. Our records indicate that you completed some projects through the program in the last year. We would like to include your opinions of the program in our evaluation report. Entergy plans to use this information to improve the energy efficiency programs and services it offers to its customers. Is now a good time to talk? The call should take about 15 minutes.

[If not: Can you suggest a time when I could call you back?]

Background Information

First, I would like a little background information on your business.

1. What services does your organization specialize in?
    a. Do you focus on EE?
    b. Considering there is an income qualified component to this program, do you target low income? (assisted)

[Q2 & Q3 For direct install contractors]

[Tracking data shows firms that implemented direct install measures]

2. Does your organization specifically target the direct install measures?
3. If additional weatherization work needs to be done, do you refer the customer to another contractor or in those cases has a contractor already completed the Wx and referred you to the homeowner?

4. How many years have you participated in the Home Performance with ES Program?
5. Has your organization benefited from participating in the program? If so, how?

Marketing

6. Would you say that you actively reach out to customers to encourage their participation in the program?
    a. Can you describe the ways your company markets or promotes the program? (e.g., direct outreach, advertisements (where?))

b. Is this different for Income Assisted customers?

7. Have you used any of the program developed marketing materials to promote the program with potential customers?
    a. [MARKETING MATERIALS FOR REFERENCE: Bi-fold flyer, trifold for all programs, and truck magnets
    b. Do you think these materials help you sell projects to your customers? If so, why, and if not, why not?
    c. Do you have any suggestions for improving the current materials or for additional materials?

8. About what share of your customers are already aware of the program?
    a. Is this the same for Income Assisted?

9. What, if any, program (Utility or CR) marketing efforts directed at customers are you aware of?
    a. How effective are the marketing efforts? Do you have suggestions for improving them? (Are there certain messages about the program benefits that the program should emphasize more or less?)
    b. Are you aware of any outreach activities that target low income?

Program Delivery

I'd like to switch gears and discuss the home energy survey/assessment process.

10. Does your organization perform all of the energy assessments/surveys or do have those already been done by the time the job comes to you?
    a. If the assessment is done by another company? What information from the energy survey is provided? Is it sufficient?

11. My notes indicate that the initial home energy assessment is guided by a tool called OPEN, is that accurate?
    a. Do you use the tool or do you use a proprietary tool?
    b. Regarding the tool you use: What are the tool's features?
    c. If they use OPEN: Do you have any suggestions to improve the tool? Does it meet your needs?

12. In what format do you provide the recommendations?

13. What do you see is the value of the energy survey to customers? Why are they an important part of the program?

14. Do you discuss with residents how they use energy in the home (thermostat settings, number of hours at home, which rooms get used more or less) and other issues such as health and safety concerns and home comfort concerns?

Communications with Staff and Training

Now I'd like to discuss your communication with program staff and any program training you've participated in.

15. Can you comment on the nature and frequency of communication with program staff?
    a. Entergy – How well did they address your questions? Was it timely?
    b. ClearResult - How well did they address your questions? Was it timely?

16. Have you participated in any program provided training?
    a. If yes, could you describe the format?
    b. Do you receive information on contractor performance standards?
    c. Do you participate annually?

17. Have you participated in any program sponsored webinars or in-person meetings that present information about the program design?
    a. If yes, do you have any feedback?
    b. Any topics that were not covered that should have been?

Business and Market Impact

18. Is there any aspect of the energy assessment or installation work that you provide through the program that you would say you did not routinely provide before participating in the program?

19. How has the program impacted your business?
    a. Has your business increased its sales because of the program?
    b. About what share of your business comes from program projects?

20. Have you noticed any trends in the market? [prompt: With regards to homeowners' preferences, level of awareness of EE or of the program]

Overall Impressions

21. Do you have any recommendations on:
    a. How to improve the program or the role that contractors play in the program?
    b. How the program could keep you better informed?
    c. Do you have any suggestions for improving the forms or the process for submitting for a project?

d. Is there anything the program could do to help you be more effective in promoting the program?

22. Thinking of your OVERALL experience with the program, how satisfied are you with the program? Would you say you are very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, or very dissatisfied?
    1. Very satisfied
    2. Somewhat satisfied
    3. Neither satisfied nor dissatisfied
    4. Somewhat dissatisfied
    5. Very dissatisfied
    6. Refused
    7. Don’t know

Residential HVAC Trade Ally Interview Guide

Hi, may I please speak with [Trade Ally Name]

My name is ___ and I'm calling, on behalf of the Entergy We're talking to contractors who completed projects through Entergy's Residential Heating and Cooling Program as part of our evaluation of that program. Our records indicate that you completed some projects through the program in the last year. We would like to include your opinions of the program in our evaluation report. Entergy plans to use this information to improve the energy efficiency programs and services it offers to its customers. Is now a good time to talk? The call should take about 15 minutes.

[If not: Can you suggest a time when I could call you back?]

Background Information

First, I would like a little background information on your business.

1. Does your business specialize in energy efficiency?
2. The Energy Smart CoolSavers Program provides incentives for both Tune-Ups and Replacements. Does your organization focus on one over the other, or both?
3.
4. How many years have you participated in the CoolSavers Program?
5. Did you have any concerns about participating in the program?
6. Has your organization benefited from participating in the program? If so, how?

Marketing

7. Would you say that you actively reach out to customers to encourage their participation in the program?
    a. Can you describe the various ways your company markets or promotes the program? (e.g., direct outreach, advertisements (where?))
    b. About what share of your customers are already aware of the program?
8. Have you used any of the program developed marketing materials to promote the program to potential customers?
    a. [MARKETING MATERIALS FOR REFERENCE: Bi-fold flyer, trifold for all programs, and truck magnets and tri-fold for tune ups]
    b. Do you think these materials help you sell projects to your customers? If so, why, and if not, why not?
    c. Do you have any suggestions for improving the current materials or for additional materials?

9. Are you aware of any utility marketing efforts? If so, what are they?
    a. How effective are the marketing efforts? Do you have suggestions for improving them?
    b. Are there certain messages about the program benefits that the program should emphasize more or less?

10. [ASK IF REPLACEMENTS] When discussing the HVAC replacements with eligible customers, how often do you recommend SEER 14 or higher A/C units or heat pumps to your customers versus standard efficiency units?
    a. How often do you recommend SEER 15 or higher equipment?
    b. How important are the energy savings from efficient HVAC equipment for your customers in comparison to the cost of the equipment?
    c. What share of your customers would you say are very interested in saving energy?

11. [ASK IF TUNE UP CONTRACTOR] What sort of concerns, if any, do potential customers raise about the tune-ups or participating in the program?
    a. Is there anything the program can do to reduce the types of concerns customers have?
    b. What reasons do customers give you for not wanting to complete a tune-up project?

Program Delivery

12. Describe the steps that you must make to qualify customers for the program? Do you think the qualification requirements are reasonable?

13. Thinking about the forms you have to complete a project and the documentation you have to submit, are the guidelines and other information you received on how to complete those forms clear?

Training and other Communications with Staff

Now I'd like to discuss your communication with program staff and any program training you've participated in.

14. Can you comment on the nature and frequency of communication with program staff?
    a. Entergy – How well did they address your questions? Was it timely?
    b. ClearResult - How well did they address your questions? Was it timely?

15. Have you participated in any program provided training?

a. If yes, could you describe the format?
b. Do you receive information on contractor performance standards?
c. Do you participate annually?

16. Have you participated in any program sponsored webinars or in-person meetings that present information about the program design?
    a. If yes, do you have any feedback?
    b. Any topics that were not covered that should have been?

Business and Market Impact

17. [ASK IF AC TUNE UP] Is there any aspect of the tune-up services that you provide through the program that you would say you did not routinely provide before participating in the program?

18. How has the program impacted your business?
    a. Has your business increased its sales because of the program?
    b. About what share of your business comes from program projects?

19. Can you comment on any trends you're seeing in the market (among homeowners)?
    a. Level of program awareness? (Program or EE in general)
    b. Measure trends?
    c. Access to $

Overall Impressions

20. Do you have any recommendations on:
    a. How to improve the program or the role that contractors play in the program?
    b. How the program could keep you better informed?
    c. Is there anything the program could do to help you be more effective in promoting the program?

21. Thinking of your OVERALL experience with the program, how satisfied are you with the program? Would you say you are very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, or very dissatisfied?
    a. Very satisfied
    b. Somewhat satisfied
    c. Neither satisfied nor dissatisfied
    d. Somewhat dissatisfied
    e. Very dissatisfied
    f. Refused
    g. Don't know

Small Business Solutions Trade Ally Interview Guide

Hi, may I please speak with [Trade Ally Name]

My name is ___ and I'm calling, on behalf of the [UTILTY]. We're talking to Trade Allies who completed projects through [UTILITY] [PROGRAM NAME] as part of our evaluation of that program. Our records indicate that you completed some projects through the program in the last year. We would like to include your opinions of the program in our evaluation report. [UTILITY] plans to use this information to improve the energy efficiency programs and services it offers to its customers. Is now a good time to talk? The call should take about 15 minutes.

[If not: Can you suggest a time when I could call you back?]

Background Information

First, I would like a little background information on your organization.

1. Does your business specialize in energy efficiency or a specific type of equipment?
2. Does your business specialize in providing services to specific business types? If so, what business types?
3. Does your business work with other small business efficiency programs in Louisiana? How about in other states?
4. How did your business first become aware of [UTILITY] Program?
5. Did you have any concerns about participating in the program?
6. What factors influenced your decision to participate in the program?

Promotion of the Program and Barriers to Participation

7. How actively would you say you have been in promoting the program to customers?
    a. What kinds of concerns, if any, do you hear from customers about participating in the program?

8. How do you identify businesses to promote the program to? (IF NEEDED: Do you target specific business types or sizes? Are there aspects of the business that you look for that suggests they might be a good candidate for the program?)

9. Are familiar with any program marketing materials available for your use in promoting the program with customers?
    a. How often do you use these materials?
    b. How effective do you think these materials are to encourage businesses to participate?
    c. Do you have suggestions for improving them?
10. Is there anything the program could do to help you be more effective in promoting the program?
11. When discussing the program with a customer, what are the key selling points [e.g., energy assessment, energy savings, non-energy benefits, incentives]?
12. About what share of the businesses you have talked to about the program agreed to an energy survey?
13. What type of equipment do you recommend do you typically recommend to customers when completing the energy survey? [IF ONE OR MORE FROM BELOW IS NOT STATED, ASK IF IT IS EVER RECOMMENDED]
    a. Lighting (lamps)
    b. Lighting controls
    c. Refrigeration
14. What concerns, if any, do customers raise about participating in the program?
    a. What reasons do customers give for not participating in the program?

Program Processes

15. Have you had any difficulty in verifying a customer's eligibility for the program? Have you submitted any projects which were rejected because the customer was not qualified?
16. Have you had any projects rejected because the measures proposed did not qualify for the program? If yes, can you provide an example of when that happened?
17. How clear is the information available through the program on customer qualifications and equipment qualifications? [FOLLOW UP WITH WHAT ADDITIONAL TRAINING OR INFORMATION WOULD BE NEEDED TO MAKE THAT CLEARER]
18. How about the information available on how to complete applications and documentation requirements? Is it sufficiently clear? [FOLLOW UP WITH WHAT ADDITIONAL TRAINING OR INFORMATION WOULD BE NEEDED TO MAKE THAT CLEARER]
19. Do you think that the energy saving measures that are allowed through the program is comprehensive enough to meet all of your business customer's needs? If not, what additional measures should be covered?
20. Once a customer proposal is approved, how long does it typically take to schedule a pre-inspection?
    a. Do you typically attend the pre-inspection along with program staff?
    b. How long does it take to receive notification that a site passed pre-inspection? How is that notification communicated to you?
    c. Have you had any projects that did not pass pre-inspection? Why?

21. How long does it typically take to schedule and complete the installation of the measures once you are notified of passing pre-inspection?

22. Do you have any recommendations for improvements to the application form or application process?

Training and other Communications with Staff

23. Have you contacted program staff with any questions about participating in the program or about completing a project?
    a. What questions have you had for staff?
    b. How well does staff address your questions?
    c. Is their response generally timely?

24. Are there any common questions that you have for staff that could be addressed if the program provided more detailed information?

Program Influence on Projects

25. How are aware are customers of the energy saving measures you recommend?
    a. Are there certain measures that they are generally more or less aware of?

Overall Impressions

26. Overall, what are the greatest strengths of the program are?

27. Do you have any recommendations on how to improve the program or the role that trade allies play in the program?

28. Thinking of your OVERALL experience with the program, how satisfied are you with the program? Would you say you are very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, or very dissatisfied?
    a. Very satisfied
    b. Somewhat satisfied
    c. Neither satisfied nor dissatisfied
    d. Somewhat dissatisfied
    e. Very dissatisfied
    f. Refused
    g. Don't know

29. [IF 3, 4 or 5] What about the program would have to change to make you more satisfied?

Large C&I Solutions Trade Ally Interview Guide

Script

Hi, may I please speak with [Trade Ally Name]

My name is ___ and I'm calling, on behalf of the [UTILTY]. We're talking to Trade Allies who completed projects through [UTILITY] [PROGRAM NAME] as part of our evaluation of that program. Our records indicate that you completed some projects through the program in the last year. We would like to include your opinions of the program in our evaluation report. [UTILITY] plans to use this information to improve the energy efficiency programs and services it offers to its customers. Is now a good time to talk? The call should take about 15 minutes.

[If not: Can you suggest a time when I could call you back?]

Background Information

First, I would like a little background information on your organization and how you learned of the program.

1. Does your business specialize in energy efficiency or a specific type of equipment or service?
2. Does business specialize in providing services to specific business or building types? If so, what types?
3. Do you work with other efficiency programs in Louisiana? How about outside of Louisiana?
4. How did you first learn of the [PROGRAM NAME]?
5. Did you have any concerns about participating in the program?
6. What factors influenced your decision to participate in the program?

Promotion of the Program and Barriers to Participation

7. Does your company actively market or promote the program to potential customers?
    a. Can you describe the various ways your company markets or promotes the program? (e.g., direct outreach, advertisements (where?))
    b. Do you typically promote the program to existing customers, to potential new customers, or both?
    c. What share of customers that you discuss the program with first approach you about it?

8. About what share of your customers with whom who talk to about the program were previously aware of it?
9. Are familiar with any program marketing materials available for your use in promoting the program with customers?
    a. How often do you use these materials?
    b. How effective do you think these materials are to encourage businesses to participate?
    c. Do you have suggestions for improving them?
10. Is there anything the program could do to help you be more effective in promoting the program?
11. What concerns, if any, do customers raise about participating in the program?
    a. What reasons do customers give for not participating in the program?

Program Design and Incentive Project Process

12. Have you had any difficulty in verifying a customer's eligibility for the program? Have you submitted any projects which were rejected because the customer was not qualified?
13. Have you had any projects rejected because the measures proposed did not qualify for the program? If yes, can you provide an example of when that happened?
14. How clear is the information available through the program on customer qualifications and equipment qualifications? [FOLLOW UP WITH WHAT ADDITIONAL TRAINING OR INFORMATION WOULD BE NEEDED TO MAKE THAT CLEARER]
15. How about the information available on how to complete applications and documentation requirements? Is it sufficiently clear? [FOLLOW UP WITH WHAT ADDITIONAL TRAINING OR INFORMATION WOULD BE NEEDED TO MAKE THAT CLEARER]
16. Do you think that the energy saving measures that are allowed through the program is comprehensive enough to meet all of your business customer's needs? If not, what additional measures should be covered?

17. Are there any program requirements that prevent certain types of business customers from participating? (IF NEEDED: That is, are there any site qualification requirements or participation requirements such as timelines or verification requirements?

18. Do you think the financial incentives are sufficient to encourage customers to install energy efficient equipment? If not, what should the incentives be?

19. Do customers fill out the rebate application form or do you fill out the form for them? [Probe: To what extent do you help customers fill out the rebate application?]

a. How much effort is it for your company to fill out the information requirements on the program application forms?
b. [If they help] How much time does it take you to help customers with the application?]
c. Do you have any recommendations for improvements to the application form or application process?

Training and other Communications with Staff

20. Have you contacted program staff with any questions about participating in the program or about completing a project?
    a. What questions have you had for staff?
    b. How well does staff address your questions?
    c. Is their response generally timely?

21. Are there any common questions that you have for staff that could be addressed if the program provided more detailed information?

Business and Market Impact

22. Have you made any changes to the products or services you offer as a result of [UTILITY]'s programs?

23. Has your business increased staffing as a result of this program?

Overall Impressions

24. Overall, what are the greatest strengths of the program are?

25. Do you have any recommendations on how to improve the program or the role that trade allies play in the program?

26. Thinking of your OVERALL experience with the program, how satisfied are you with the program? Would you say you are very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, or very dissatisfied?
    a. Very satisfied
    b. Somewhat satisfied
    c. Neither satisfied nor dissatisfied
    d. Somewhat dissatisfied
    e. Very dissatisfied
    f. Refused
    g. Don't know

27. [IF 3, 4 or 5] What about the program would have to change to make you more satisfied?

Entergy Energy Smart Residential Program Participant Survey

Overview:
Interviewer instructions are shown in all caps enclosed in parentheses, e.g., (INTERVIEWER INSTRUCTION)
Do not read response options in ALL CAPS
Prepopulated variables are shown in all caps enclosed in brackets,e.g., [PREPOPULATED VARIABLE]
Programming instructions are shown in all caps, bold-type, enclosed in brackets, e.g., **[PROGRAMMING INSTRUCTION]**

Predefined Variables:

Variable	**Definition**
CONTACT_NAME	Customer contact first and last name
UTILITY_FULL	Full name of utility implementing program
UTILITY_SHORT	Abbreviated name of utility
PROGRAM_NAME	Name of program
MEASURE_1_EFF	First selected incentivized measure, referencing efficiency
MEASURE_2_EFF	Second selected incentivized measure, referencing efficiency
MEASURE_1_NOEFF	First selected incentivized measure, not referencing efficiency
MEASURE_2_NOEFF	Second selected incentivized measure, not referencing efficiency
MEASURE_COUNT	Number of measure types installed, 0 if CFLs direct install
ASSESSMENT	1 if received assessment (Note: 0 if Assisted HPwES)
LOCATION	Site street address
PROJECT_DESCRIPTION	Description of project.

ASSESS_YEAR	Year assessment performed
MEASURE_YEAR	Year assessment performed
CFL_TOTAL	Total number of CFLs installed
INSTALL_COMPLETE_1	
INSTALLED_COMPLETED_1	
INSTALL_COMPLETE_2	
INSTALLED_COMPLETED_2	
ASSISTED	1 if Assisted HPwES participant, else 0
STAND_OPT	1 if installed equipment for which there is a standard efficiency option, else = 0.
CONTRACTOR_PROJ	1 if contractor implemented project
TUNEUP_UNITS	Number of AC units that were tuned-up

Survey instrument

Hello. May I please speak with [CONTACT_NAME]:_____)?

[DISPLAY IF CFL_TOTAL = 0]

Hello. My name is _____ and I am calling on behalf of [UTILITY_FULL] about the [PROGRAM NAME] Program. Through this program, you received a discount or rebate on [PROJECT DESCRIPTION].

[DISPLAY IF CFL_TOTAL > 0]

Hello. My name is _____ and I am calling on behalf of Entergy about the Green Light New Orleans Light Bulb Program. Through this program, you received some compact fluorescent lights or CFLs. This program received funding through Entergy's Energy Smart Program.

[DISPLAY ALL]

This is not a sales call. We are conducting a study on behalf of [UTILITY_FULL] to help them improve their programs that service their customers.

Are you the person who is most familiar with participating in this program?

(NOTE: SOME PARTICIPANTS MAY NOTE THAT THEY HAVE PARTICIPATED IN MULTIPLE PROGRAMS. IN THESE CASES, STATE THAT THE SURVEY IS ABOUT THEIR PARTICIPATION IN THE PROGRAM IDENTIFIED ABOVE)

(IF NOT RIGHT PERSON) *May I have the name and telephone number for the person who would know the most about the participation in the program?*

Name:

Telephone:

(IF RIGHT PERSON)

The interview will take approximately 10 minutes.

May I ask you a few questions? (IF NO, SCHEDULE CALL BACK)

Thank you. During the remainder of the interview I will refer to [UTILITY_FULL] as [UTILITY_SHORT].

[DISPLAY Q1 IF ASSESSMENT = 1]

1. Just to confirm, did you receive a home energy assessment through [UTILITY_SHORT]'s [PROGRAM_NAME] Program at [LOCATION] in [ASSESS_YEAR]? (IF RESPONDENT INDICATES PARTICIPATING IN ANOTHER PROGRAM, CONFIRM PARTICIPATION IN THE PROGRAM ASKED ABOUT IN THE QUESTION)

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q2 IF MEASURE_COUNT > 0]

2. Our records indicate that you installed [PROJECT_DESCRIPTION] through [UTILITY_SHORT]'s [PROGRAM_NAME] in [MEASURE_YEAR]. Is that correct? (IF RESPONDENT INDICATES PARTICIPATING IN ANOTHER PROGRAM, CONFIRM PARTICIPATION IN THE PROGRAM ASKED ABOUT IN THE QUESTION)

1. Yes
2. No (THANK AND TERMINATE CALL)
98. DON'T KNOW (THANK AND TERMINATE CALL)
99. REFUSED (THANK AND TERMINATE CALL)

[DIPLAY Q3 IF CFL_TOTAL > 0]

3. Just to confirm, were some compact fluorescent light bulbs, or CFLs, installed in your home located at [LOCATION] through the Green Light New Orleans Program? (IF RESPONDENT INDICATES PARTICIPATING IN ANOTHER PROGRAM, CONFIRM PARTICIPATION IN THE PROGRAM ASKED ABOUT IN THE QUESTION)

1. Yes

2. No (THANK AND TERMINATE CALL)
98. DON'T KNOW (THANK AND TERMINATE CALL)
99. REFUSED (THANK AND TERMINATE CALL)

CFL VERIFICATION AND IN-SERVICE RATE

[DIPLAY Q4 IF CFL_TOTAL > 0]

4. Thanks for confirming my information. Now I would like to verify the quantity of CFLs that were installed in your home.

5. According to our records, [CFL_TOTAL] CFLs were installed in your home. Does that sound about right?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q6 IF Q4 = 2]

6. How many CFLs were installed in your home?

1. (RECORD QUANTITY) **[RECORD AS CFL_TOTAL FOR USE IN LATER QUESTIONS]**
98. DON'T KNOW
99. REFUSED

[DIPLAY Q7 IF CFL_TOTAL > 0]

7. We would like to know what type of bulbs the new CFLs replaced. Did any of the [CFL_TOTAL] CFLs that were installed replace existing CFLs or LEDs that were installed in your home?

1.Yes
2.No
98.DON'T KNOW
99.REFUSED

[DISPLAY Q8 IF Q7 = 1]

8. How many of the [CFL_TOTAL] replaced CFLs or LEDs?

1. (NUMBER OF CFLS OR LEDS REPLACED)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q9 IF Q4 = 1 OR [Q4 = 2 AND Q6 <> 98, 99]]

9. Have you removed any of the [CFL_TOTAL] CFLs that were installed since they were installed?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q10 IF Q9 = 1]

10. How many of the [CFL_TOTAL] have you removed?

1. (NUMBER REMOVED)
98. DON'T KNOW
99. REFUSED

PROGRAM AWARENESS AND DECISION MAKING

I have a few questions about how you learned of the program and your decision to participate in the [PROGRAM_NAME].

11. How did you first learn first learn of the program? (DO NOT READ LIST)

1. Contractor
2. Home energy consultant
3. Program representative
4. Program website
4. Friend, family member, or colleague
5. Bill insert or utility mailer
6. Email from [UTILITY_SHORT]
7. From [UTILITY_SHORT]'s website
8. Social media post (e.g., Facebook, Twitter, Flickr)
9. Through an internet search (e.g., Google search)
10. Through an internet advertisement
11. A radio or television advertisement
12. A print advertisement
13. Through a retailer
13. Other (please explain)
98. DON'T KNOW
99. REFUSED

12. Why did you decide to participate in the program? [MULTI-SELECT] (DO NOT READ)

1. Save money on energy bills
2. Improve the comfort of your home

3. Conserve energy/Protect the environment
4. Improve the value of the residence
5. Become as energy efficient as my friends or neighbors
6. Find out if there were any structural problems with my home
7. Get the discount/rebate
8. Get the free CFLs
9. Other (VERBATIM)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q13 IF TUNEUP_UNITS =1]

13. How old is the air conditioner that was tuned up?

1. _____(YEARS)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q14 IF TUNEUP_UNITS >1]

14. About how old, on average, are the air conditioners that were tuned up?

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q15 IF TUNEUP_UNITS >0]

15. Had you had air conditioner tune-ups completed at this location before you participated in [UTILITY_SHORT]'s program?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q16 IF Q15 = 1]

16. When was the last tune-up completed? Was it…

1. 0-6 months ago
2. 7-12 months ago
3. 1 to 2 years ago
4. 2 to 3 years ago
5. 3 to 5 years ago
6. More than 5 years ago
98. DON'T KNOW
99. REFUSED

PARTICIPATION PROCESS

[DISPLAY Q17 IF Q1 = 1]

17. I have a few questions about your experience with the home energy assessment that was provided by the home energy consultant you worked with.

18. Using a scale where one means "strongly disagree" and five means "strongly agree", please indicate how much you disagree or agree with the following statements regarding your experience your home energy assessment:

[RECORD 1 -5]
98. DON'T KNOW
99. REFUSED

a. The energy saving recommendations were easy to understand
b. My energy consultant was courteous and professional
c. The energy recommendations were relevant for my home

[DISPLAY Q19 IF Q1 = 1 AND MEASURE_COUNT = 0]

19. Did your energy consultant discuss the availability of [UTILITY_SHORT] rebates or discounts for the energy saving recommendations with you?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q20 IF MEASURE_COUNT = 0 AND Q1 = 1]

20. According to our records you have <u>NOT</u> completed any air sealing, duct sealing, or added insulation to your home. Is that correct?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q21 IF Q20= 2]

21. Which of those energy efficiency improvements have you done?

1. (VERBATIM)
98. NOT SURE

99. REFUSED

[DISPLAY Q22 IF Q20= 2]

22. Why did you not apply for an incentive through the [PROGRAM_NAME] Program for those efficiency improvements?

1. (VERBATIM)
2. Did apply for an incentive
98. NOT SURE
99. REFUSED

[DISPLAY Q23 IF Q20 = 1]

23. Were any of those energy efficiency improvements recommended to you during the energy assessment?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q24 IF Q23= 1]

24. Why have you not implemented any of those energy efficiency improvements?

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q25 IF Q23= 1]

25. Using a scale of one to five, where one means "not at all likely" and five means "very likely", how likely do you think you are to implement one or more of those energy efficiency improvements in the future?

[RECORD 1 -5]
98. DON'T KNOW
99. REFUSED

[DISPLAY Q26 IF CONTRACTOR_PROJ = 1]

26. Now I have a few questions about the contractor that completed the [PROJECT_DESCRIPTION] project. Using a scale where one means "strongly disagree" and five means "strongly agree", please rate how much you disagree or agree with the following statements regarding your experience with the contractor:

1. **[RECORD 1-5]**
98. DON'T KNOW
99. REFUSED

a. The contractor was courteous and professional
b. The work was scheduled in a reasonable amount of time
c. The time it took to complete the work was reasonable

[DISPLAY Q27 IF CONTRACTOR_PROJ = 1]

27. Using a scale of one to five, where one means "very difficult" and five means "very easy", how difficult or easy was it to find a participating contractor for the [MEASURES] project?

[RECORD 1-5]
98. DON'T KNOW
99. REFUSED

[**DISPLAY Q28 IF CFL_TOTAL > 0]**

28. Approximately how many weeks did it take to have the CFLs installed after you requested them?

1. (RECORD NUMBER OF WEEKS)
98. DON'T KNOW
99. REFUSED

[**DISPLAY Q29 IF CFL_TOTAL > 0]**

29. Prior to this call, were you aware that Entergy offers discounts on energy efficient CFLs and LED light bulbs purchased at select retail locations?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[**DISPLAY Q30 IF CFL_TOTAL > 0]**

30. Were you aware that these discounts were available BEFORE you requested the installation of the free CFLs?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[**DISPLAY Q31 IF CFL_TOTAL > 0]**

31. Were you aware that Entergy also provides rebates and discounts for energy efficient home improvements and appliances?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

FREE-RIDERSHIP

[**DISPLAY Q32 IF CFL_TOTAL > 0]**

32. Before you requested the free CFLs, did you have specific plans to purchase CFLs for your home?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q33 IF Q32 = 1]

33. How many CFLs were you planning to purchase before you heard of the program?

1. (RECORD QUANTITY)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q34 IF Q32 = 1]

34. When do you think you would have purchased those CFLs if they had not been provided for free through the program? Would you say…

1. Within 6 months of when you requested the free CFLs
2. Between 6 and 12 months
3. In more than a year
98. DON'T KNOW
99. REFUSED

[**DISPLAY Q35 IF CFL_TOTAL > 0]**

35. Overall, how likely or unlikely would you have been to purchase CFLs if you had not received them for free? Would you say…

1. Very likely
2. Somewhat likely
3. Neither particularly likely nor unlikely
4. Somewhat unlikely
5. Very unlikely
98. DON'T KNOW
99. REFUSED

[DISPLAY Q36 IF Q1 = 1]]

36. Prior to learning about the program, did you have plans to have an energy assessment of your home performed?
    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q37 IF ASSISTED = 0 AND MEASURE_COUNT = 1 OR 2]

37. Prior to learning about the program, did you have plans to [INSTALL_COMPLETE_1] the [MEASURE_1_EFF] that you received a discount or rebate for?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q38 IF Q37 = 1 AND STAND_OPT = 1]

38. Just to be clear, did you have plans to specifically install an [MEASURE_1_EFF] as opposed to a standard efficiency [MEASURE_1_NOEFF]?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q39 IF ASSISTED = 0 AND MEASURE_COUNT = 1 OR 2]

39. Would you have been financially able to [INSTALL_COMPLETE_1] the [MEASURE_1_EFF] if a discount or rebate had not been provided through the program?
    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q40 IF ASSISTED = 0 AND MEASURE_COUNT = 1 OR 2]

40. How likely is it that you would have [INSTALLED_COMPLETED_1] the same [MEASURE_1_EFF] that you [INSTALLED_COMPLETED_1] through the program if the discount or rebate was not available? Would you say...

1. Very likely
2. Somewhat likely
3. Neither particularly likely nor unlikely
4. Somewhat unlikely
5. Very unlikely
98. DON'T KNOW
99. REFUSED

[DISPLAY Q41 IF Q1 = 1 AND MEASURE_COUNT = 1 OR 2]

41. How likely is that you would have [INSTALLED_COMPLETED_1] the same [MEASURE_1_EFF] had it not been recommended through the energy assessment of your home? Would you say…
    1. Very likely
    2. Somewhat likely
    3. Neither particularly likely nor unlikely
    4. Somewhat unlikely
    5. Very unlikely
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q42 IF ASSISTED = 0 AND MEASURE_COUNT = 1 OR 2 AND [Q41 = 1, 2, 3, or 4 OR Q40 = 1, 2, 3, or 4]]

42. When might you have [INSTALLED_COMPLETED_1] the same [MEASURE_1_EFF] if you had not participated in the program? Would you say in…
    1 0 to 6 months
    2 6 months to 1 year
    3 1 to 2 years
    4 2 to 3 years
    5 More than 3 years
    6 NEVER
    98 DON'T KNOW
    99 REFUSED

[DISPLAY Q43 IF ASSISTED = 0 AND MEAS_COUNT = 2]

43. Prior to learning about the program, did you have plans to [INSTALL_COMPLETE_2] the [MEASURE_2_EFF] that you received a discount or rebate for?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q38 IF Q43 = 1 AND STAND_OPT = 1]

44. Just to be clear, did you have plans to specifically [INSTALL_COMPLETE_2] an [MEASURE_2_EFF] as opposed to a standard efficiency [MEASURE_2_NOEFF]?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q45 IF ASSISTED = 0 AND MEAS_COUNT = 2]

45. Would you have been financially able to [INSTALL_COMPLETE_2] the [MEASURE_2_EFF] if a discount or rebate had not been provided through the program?
1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q46 IF ASSISTED = 0 AND MEAS_COUNT = 2]

46. How likely is it that you would have [INSTALLED_COMPLETED_2] the same [MEASURE_2_EFF] that you [INSTALLED_COMPLETED_2] through the program if the discount or rebate was not available? Would you say...
1. Very likely
2. Somewhat likely
3. Neither particularly likely nor unlikely
4. Somewhat unlikely
5. Very unlikely
98. DON'T KNOW
99. REFUSED

[DISPLAY Q47 IF Q1 = 1 AND IF MEAS_COUNT = 2]

47. How likely is that you would have [INSTALLED_COMPLETED_2] the same [MEASURE_2_EFF] had it not been recommended through the energy assessment of your home? Would you say…
1. Very likely
2. Somewhat likely
3. Neither particularly likely nor unlikely
4. Somewhat unlikely
5. Very unlikely
98. DON'T KNOW
99. REFUSED

[DISPLAY Q48 IF ASSISTED = 0 AND MEAS_COUNT = 2 AND [Q46= 1, 2, 3, or 4 OR Q47 = 1, 2, 3, or 4]]

48. When might you have [INSTALLED_COMPLETED_2] the same [MEASURE_2_EFF] if you had not participated in the program? Would you say in…
    1 0 to 6 months
    2 6 months to 1 year
    3 1 to 2 years
    4 2 to 3 years
    5 More than 3 years
    6 NEVER
    98 DON'T KNOW
    99 REFUSED

SPILLOVER

[DISPLAY Q49 IF ASSISTED = 0 AND CFL_TOTAL = 0]

49. Because of your experience with the [PROGRAM_NAME] Program, have you bought and installed any additional energy efficient items on your own without a rebate or discount from Entergy?
    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q50 IF Q49 =1]

50. We would like to know what you purchased and installed because of your experience with the program that you did not get a rebate or discount for. For each of the following items, please tell me if you purchased and installed them without getting a rebate or discount. (READ LIST)
    1. CFLs (Compact Fluorescent Light bulbs)
    2. LED Light Bulbs
    3. An energy efficient appliance such as a refrigerator, dishwasher, clothes washer, or clothes dryer.
    4. Water Heater Pipe Insulation
    5. Water Heater Jacket/Blanket/Insulation
    6. Low Flow Faucet Aerators
    7. Low Flow Showerhead
    8. Something else
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q51 IF Q50= 1]

51. How many CFLs did you purchase and install?
1. (RECORD QUANTITY)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q52 IF Q50= 2]

52. How many LEDs did you purchase and install?
1. (RECORD QUANTITY)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q53 IF Q50= 3]

53. What kind of appliance did you purchase?

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q54 IF Q50= 3]

54. How do you know it is an energy efficient appliance?

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q55 IF Q50= 4]

55. Do you know about how many feet of water heater pipe insulation you purchased and installed?
1. (RECORD QUANTITY IN FEET)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q56 IF Q50= 6]

56. How many low flow faucet aerators did you install in bathroom sinks?
1. (RECORD QUANTITY)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q57 IF Q50= 6]

57. How many low flow faucet aerators did you install in kitchen sinks?
1. (RECORD QUANTITY)

98. DON'T KNOW
99. REFUSED

[DISPLAY Q58 IF Q50= 7]

58. How many low flow shower heads did you install?
1. (RECORD QUANTITY)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q59 IF Q50= 8]

59. What other energy efficient items did you install?

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

[DISPLAY Q60 IF Q49 = 1]

60. On a scale of 0 to 10, where 0 represents "not at all important" and 10 represents "extremely important", how important was the experience with the program in your decision to purchase the items you just mentioned?
[RECORD 0-10]
98. DON'T KNOW
99. REFUSED

[DISPLAY Q61 IF Q49 = 1]

61. On a scale of 0 to 10, where 0 represents "not at all likely" and 10 represents "extremely likely," how likely would you have been to purchase those items if you had not participated in the program?
[RECORD 0-10]
98. DON'T KNOW
99. REFUSED

Customer Satisfaction

[DISPLAY Q62 IF CFL_TOTAL = 0]

62. Not counting any contractors or energy consultants that you hired, in the course of completing the project, did you contact program staff from [UTILITY_SHORT] or CLEAResult with questions about completing your project?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

63. Using a scale of one to five, where one is "very dissatisfied" and five is "very satisfied", please rate how dissatisfied or satisfied you are with each of the following … [ASK A AND B FIRST, RANDOMIZE ORDER OF C - I, ASK J AND K LAST]

[RECORD 1-5]
98. DON'T KNOW
99. REFUSED

a. **[DISPLAY IF Q62 =1]** how long it took program staff to address your questions or concerns
b. **[DISPLAY IF Q62=1]** how thoroughly they addressed your question or concern
c. **[DISPLAY IF CONTRACTOR_PROJ = 1]** the quality of the work performed by your contractor
d. [**DISPLAY IF CFL_TOTAL > 0]** The process of having the CFLs installed in your home
e. the energy savings on your utility bill
f. **[DISPLAY IF MEASURE_COUNT > 0]** the energy efficiency improvements made through the program
g. [**DISPLAY IF CFL_TOTAL > 0]** the CFLs installed in your home
h. the program participation process
i. **[DISPLAY IF MEASURE_COUNT > 0]** the rebate or discount amount for the [MEASURE]
j. the program overall
k. [UTILITY_SHORT] as your electrical service provider

[DISPLAY Q64 IF ANY IN Q63 <3]

64. You indicated some dissatisfaction. Why were you dissatisfied?

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

65. Would you say that your participation in [UTILITY_SHORT]'s [PROGRAM_NAME] Program has:

1. Greatly increased your satisfaction with [UTILITY_SHORT]
2. Somewhat increased your satisfaction with [UTILITY_SHORT]
3. Did not affect your satisfaction with [UTILITY_SHORT]
4. Somewhat decreased your satisfaction with [UTILITY_SHORT]
5. Greatly decreased your satisfaction with [UTILITY_SHORT]

98. DON'T KNOW
99. REFUSED

[DISPLAY IF MEASURE_COUNT > 0]

66. Aside from any energy or cost saving benefits that might have resulted from completing this project, have there been any other benefits from having the efficiency improvements made?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q67 IF Q66 = 1]

67. What benefits have there been? [MULTI-SELECT] (DO NOT READ)

1. Home is more comfortable
2. There is less outside noise
3. The home is less drafty
4. It's easier to keep the home at a comfortable temperature
5. The air conditioner or heater runs less often
6. Environmental benefits
7. Other (VERBATIM)
98. DON'T KNOW
99. REFUSED

DEMOGRAPHIC

68. I now have a couple of questions about this residence. These are anonymous and will be used solely for the purpose of combining different customers' responses. If you do not want to answer any of these, let me know. It is okay to not answer any of these questions.

69. Which of the following best describes this residence? (READ LIST)

1. Single family detached home
2. Townhome
3. Mobile or manufactured home
4. Apartment 2-4 units
5. Apartment 5-10 units
6. Apartment with more than 10 units
98. DON'T KNOW
99. REFUSED

70. When was this residence built? (IF RESPONDENT DOES NOT GIVE VERBATIM ANSWER, READ OFF YEAR RANGES UNTIL RESPONDENT INDICATES ONE)

1. Verbatim____
2. Before 1970's
3. 1970's
4. 1980's
5. 1990's
7. 2000-2009
8. 2010 or newer
98. DON'T KNOW
99. REFUSED

71. What is the approximate square footage of this residence? (IF RESPONDENT DOES NOT GIVE VERBATIM ANSWER, READ OFF SIZE RANGES UNTIL RESPONDENT INDICATES ONE)

1. (VERBATIM)
2. Less than 1,000
3. 1,001-1,500
4. 1,501-2,000
5. 2,001-2,500
6. Greater than 2,500
98. DON'T KNOW
99. REFUSED

72. What type of heating system does this residence have?

1. Natural gas heating
2. Electric heating
3. Combination of types (VERBATIM)
4. Other (VERBATIM)
98. DON'T KNOW
99. REFUSED

73. What type of water heater does this residence have?

1. Natural gas water heater
2. Electric water heater
3. Other (VERBATIM)
98. DON'T KNOW

74. Do you own, rent, or own and rent to someone else the property located at [LOCATION]?

1. Own

2. Rent
3. Own and rent to someone else
98. DON'T KNOW
99. REFUSED
98. REFUSED

75. Including yourself, how many people currently live in this residence year-round?

1. (RECORD QUANTITY)
98. DON'T KNOW
99. REFUSED

76. I'm going to read off a list of income ranges, please indicate which range your total household income falls into. Is the total annual income of your household:

1. Less than $25,000
2. $25,000 - $50,000
3. $51,000 - $75,000
4. $76,000 – $100,000
5. Greater than $100,000
98. DON'T KNOW
99. REFUSED

77. What's the highest level of education you've completed? (DON'T READ)

1. Did not graduate high school
2. High school graduate
3. Associates degree, vocational/technical school, or some college
4. Four-year college degree
5. Graduate or professional degree
98. DON'T KNOW
99. REFUSED

School Kits & Education Parent Survey (Email)

1. **According to our records, you received an Energy Conservation Kit supplied by Entergy that was requested through your child's school. This kit included six compact fluorescent light bulbs, two low-flow faucet aerators, a low flow showerhead, and an LED nightlight.**

   Do you recall receiving those items?

   1. Yes
   2. No **[SKIP TO TERMINATION PAGE]**
   98 Don't know **[SKIP TO TERMINATION PAGE]**

[INSERT PAGE BREAK]

2. **To begin with we would like to get some information on your use of the kit items. How many of the six CFLs are currently installed?**
   1. 1
   2. 2
   3. 3
   4. 4
   5. 5
   6. 6
   98 Don't know

[DISPLAY Q3 IF Q2 < 6]

3. **Why are you not currently using one or more of the CFLs included in the kit?**
   1. You are waiting until currently installed light bulbs burn out
   2. You don't like the color of the CFLs
   3. The CFLs make a strange sound
   4. The CFLs don't fit in the fixtures where you would have installed them
   5. They were broken
   6. Other (Please specify)
   98 Don't know

4. **And how many of the two faucet aerators are currently installed?**
   1. 1
   2. 2
   98 Don't know

[DISPLAY Q5 IF Q4 < 2]

5. **Why are you not currently using one or more of the faucet aerators?**
   1. You already have faucet aerators installed
   2. You did not understand how to install them

3. You did not fit faucet (wrong size)
5. The water supply pressure is too low
6. You dislike faucet aerators
7. Other (Please specify)
98 Don't know

6. **Is the low-flow showerhead currently installed?**
   1. Yes
   2. No
   98. Don't know

[DISPLAY Q7 IF Q0 = 2]

7. **Why are you not currently using the low-flow showerhead?**
   1. You already have low-flow showerheads installed
   2. You did not understand how to install
   3. It did not fit your shower (wrong size)
   5. The water supply pressure is too low
   6. You dislike low-flow showerheads
   7. Other (Please specify)
   98. Don't know

8. **Is the LED nightlight currently installed?**
   1. Yes
   2. No
   98. Don't know

[DISPLAY Q9 IF Q8 = 2]

9. **Why are you not currently using the LED nightlight?**
   1. Dislikes it
   2. Does not have a need for a nightlight
   3. It was broken
   4. Other (Please specify)
   98. Don't know

10. **Did you have any of the following kit items installed in your home before you received the kit?** [FOR EACH, 1 = Yes, 2 = No, 98 = Don't know]

    a. CFLs
    b. Low-flow faucet aerators
    c. Low flow showerheads
    d. LED nightlights

11. **Before you received the kit, did you have specific plans to purchase any of the following kit items?** [FOR EACH, 1 = Yes, 2 = No, 98 = Don't know]

    a. **[DISPLAY IF Q2 > 0]** Any of the six CFLs

b. **[DISPLAY IF Q4 > 0]** Any of the two low-flow faucet aerators
c. **[DISPLAY IF Q0 = 1]** The low flow shower head
d. **[DISPLAY IF Q8 = 1]** The LED nightlight

[DISPLAY Q33 IF Q11a = 1]

12. **How many of the six CFLs were you planning to purchase before you received the kit?**
    1. Yes
    2. No
    98. Don't know

[DISPLAY Q34 IF Q11a = 1]

13. **When do you think you would have purchased those CFLs if they had not been provided for free through the program?**
    1. Within 6 months of when you received them
    2. Between 6 and 12 months
    3. In more than a year
    98. Don't know

[DISPLAY Q14 IF Q11b = 1]

14. **How many of the two faucet aerators were you planning to purchase before you received the kit?**
    1. Yes
    2. No
    98. Don't know

[DISPLAY Q15 IF Q11b = 1]

15. **When do you think you would have purchased those faucet aerators if they had not been provided for free through the program?**
    1. Within 6 months of when you received them
    2. Between 6 and 12 months
    3. In more than a year
    98. Don't know

[DISPLAY Q16 IF Q11c = 1]

16. **When do you think you would have purchased a low-flow showerhead if it had not been provided for free through the program?**
    1. Within 6 months of when you received them
    2. Between 6 and 12 months
    3. In more than a year
    98. Don't know

[DISPLAY Q17 IF Q11d = 1]

17. **When do you think you would have purchased an LED nightlight if it had not been provided for free through the program?**
    1. Within 6 months of when you received them
    2. Between 6 and 12 months
    3. In more than a year
    98. Don't know

18. **Using a scale where 1 means very likely and 5 means very unlikely, how likely or unlikely would you have been to purchase and install the following kit items if you had not received them for free.**

    a. **[DISPLAY IF Q2 > 0]** The CFLs
    b. **[DISPLAY IF Q4 > 0]** The faucet aerators
    c. **[DISPLAY IF Q0 = 1]** The low flow shower head
    d. **[DISPLAY IF Q8 = 1]** The LED nightlight

19. **Were any of the kit items broken or not working when you received them?**
    1. Yes
    2. No
    98. Don't know

[DISPLAY Q20 IF Q19 = 1]

20. **Which items were not working?** [MULTI-SELECT]
    1. One or more of the CFLS
    2. One or more of the faucet aerators
    3. The low flow showerhead
    4. The LED night light
    98. Don't know

21. **Which of the following kit items was MOST useful to you?**
    1. CFL Bulbs
    2. Faucet Aerators
    3. Nightlights
    4. Low flow showerhead
    98. Don't know

22. **Do you have any suggested changes that should be made to the items included in the energy efficiency kit?**

    [OPEN ENDED LONG ESSAY TEXT BOX]

23. **How dissatisfied or satisfied you are with each of the following …**

[1 = Very dissatisfied, 2 = Dissatisfied, 3 = Neither dissatisfied nor satisfied, 4 = Satisfied, 5 = Very satisfied, 98 = Don't know]

a. The items included in the kit
b. The energy efficiency education provided through the program
c. Entergy as your electrical service provider

[DISPLAY Q24 IF Q**Error! Reference source not found.**a, Q**Error! Reference source not found.**b, OR Q**Error! Reference source not found.**c < 3]

24. **Why were you dissatisfied with those things you just mentioned?**

[OPEN ENDED LONG ESSAY TEXT BOX]

25. **Would you say that your participation in the Schools Kits and Energy Education Program has:**
    1. Greatly increased your satisfaction with Entergy
    2. Somewhat increased your satisfaction with Entergy
    3. Did not affect your satisfaction with Entergy
    4. Somewhat decreased your satisfaction with Entergy
    5. Greatly decreased your satisfaction with Entergy
    98. Don't know

26. **Were you aware that Entergy provides rebates and discounts for energy efficient home improvements, appliances, and light bulbs?**
    1. Yes
    2. No
    98. Don't know
    99. REFUSED

DEMOGRAPHIC

We have a few of questions about this residence. These are anonymous and will be used solely for the purpose of combining different customers' responses. It is okay to not answer any of these questions.

27. **Which of the following best describes this residence?**
    1. Single family detached home

2. Townhome

3. Mobile or manufactured home

4. Apartment 2-4 units

5. Apartment 5-10 units

6. Apartment with more than 10 units

98. Don't know

28. **When was this residence built?**

1. Before 1970
2. 1970's
3. 1980's
4. 1990's
5. 2000's
7. 2010 or newer
98. Don't know

29. **What is the approximate square footage of this residence?**

1. Less than 1,000
2. 1,001-1,500
3. 1,501-2,000
4. 2,001-2,500
5. Greater than 2,500
98. Don't know

30. **Do you own or rent your residence?**

1. Own
2. Rent
3. Own and rent to someone else
98. Don't know

31. **What type of heating system does this residence have?**

1. Natural gas heating
2. Electric heating
3. Other (Please specify)
98. Don't know

32. **What type of water heater does this residence have?**

1. Natural gas water heater
2. Electric water heater
3. Other (VERBATIM)
98. Don't know

33. **Including yourself, how many people currently live in this residence year-round?**

1. **[USE OTHER BOX TYPE QUESTION]**
98. Don't know

34. **What is the approximate total income of your household?**

1. Less than $25,000
2. $25,000 - $50,000
3. $51,000 - $75,000
4. $76,000 – $100,000
5. Greater than $100,000
98. Don't know

35. **What's the highest level of education you've completed?**

1. Did not graduate high school
2. High school graduate
3. Associates degree, vocational/technical school, or some college
4. Four-year college degree
5. Graduate or professional degree
98. Don't know

Small Business Participant Survey

Overview:
Interviewer instructions are shown in all caps enclosed in parentheses, e.g., (INTERVIEWER INSTRUCTION)
Prepopulated variables are shown in all caps enclosed in brackets,e.g., [PREPOPULATED VARIABLE]
Programming instructions are shown in all caps, bold-type, enclosed in brackets, e.g., **[PROGRAMMING INSTRUCTION]**

Predefined Variables:

Variable	**Definition**
CONTACT NAME	Customer contact first and last name
UTILITY_FULL	Full name of utility implementing program
UTILITY_SHORT	Short name of utility implementing program
PROGRAM NAME	Name of program
COMPANY	Customer company name
LOCATION	Location description
TRADE ALLY NAME	Name of contractor customer worked with
MEASURE IMPLEMENT IMPLEMENTED IMPLEMENTING	Measure description referencing energy efficiency
MEASURE2	Measure description without reference to efficiency
ENERGY_USING	Yes if equipment is energy consuming and can be more efficient or standard
MEAS_QUANT	Number of units installed

Survey instrument

Hello. May I please speak with [CONTACT NAME]: _____)?

Hello. My name is _____ and I am calling on behalf of [UTILITY_FULL] about the [PROGRAM NAME] Program. Through this program, your facility received an onsite assessment and incentives for the installation of energy saving equipment.

This is not a sales call. We are conducting a study on behalf of [UTILITY_FULL] to help them improve their programs that service their customers.

Are you the person who is most familiar with your facility's participation in this program?

(IF NOT RIGHT PERSON) *May I have the name and telephone number for the person who would know the most about your facility's participation in this program?*

Name:

Telephone:

(IF RIGHT PERSON) *During the remainder of the interview I will refer to [UTILITY_FULL] as [UTILITY_SHORT].*

The interview will take approximately 10 minutes.

May I ask you a few questions? (IF NO, SCHEDULE CALL BACK)

Thank you.

1. **Just to confirm, did [COMPANY] receive discounted energy efficiency improvements through [UTILITY_SHORT]'s [PROGRAM NAME] Program at [LOCATION]?**

   1. Yes
   2. No (THANK AND TERMINATE CALL)
   98. DON'T KNOW (THANK AND TERMINATE CALL)
   99. REFUSED (THANK AND TERMINATE CALL)

2. **Did you first learn of the program from a program contractor that offered to perform an assessment of your businesses energy use?**

   1. Yes
   2. No
   98. DON'T KNOW
   99. REFUSED

[DISLPAY Q2 IF Q3 = 2]

3. **How did you first learn about [UTILITY_SHORT]'s [PROGRAM NAME] Program incentives for efficient equipment or upgrades? (DO NOT READ LIST)**

   1. From an [UTILITY_SHORT] Program Representative
   2. From a contractor
   3. Friends or colleagues
   4. Bill insert
   5. Email from [UTILITY_SHORT]
   6. From [UTILITY_SHORT]'s website
   7. Social media post (e.g., Facebook, Twitter, Flickr)
   8. From a [UTILITY_SHORT]'s customer service representative / employee
   9. Through an internet search (e.g., Google search)
   10. Through an internet advertisement
   11. Other (please explain)
   98. DON'T KNOW
   99. REFUSED

Program Delivery Efficiency

4. **When you were first approached about the program, did you have any concerns about participating?**

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q5 IF Q4=1]

5. **What were your concerns?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q6 IF Q4=1]

6. **Why did you decide to participate despite your concerns?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

7. **Did you view any program marketing materials, such as brochures, when you were learning about the program?**

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q8 IF Q7]

8. **How influential were those materials in your decision to participate? Would you say that they were…**

    1. Very influential
    2. Somewhat influential
    3. Only slightly influential
    4. Not at all influential
    98. DON'T KNOW
    99. REFUSED

9. **We would like some information on your experience in working with [TRADE ALLY NAME], the contractor that completed your project.**

Using a scale of one to five, where one is very dissatisfied and five is very satisfied please rate how dissatisfied or satisfied you are with each of the following … [RECORD 1- 5]
98. DON'T KNOW
99. REFUSED

The knowledge of the contractor performing the audit

The overall professionalism of the contractor performing the audit

The proposal you received from your contractor

The audit of your facility

[DISPLAY Q10 IF Q9a, Q9b, Q9c, Q9d < 3]

10. **What could [TRADE ALLY NAME] have done differently that would have improved your assessment of the service they provided?**

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

11. **Do you have any additional comments regarding your experience working with [TRADE ALLY NAME]?**

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

Equipment Selection [DO NOT DISPLAY]

Now we would like some information on the equipment that was recommended to you.

12. **Did you install all of the energy saving equipment your contractor recommended?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q13 IF Q12 =2]

13. **What types of recommended equipment did you decide NOT to install? (DO NOT READ)** [MULTI-SELECT]

1. Exterior lighting
2. Interior lighting
3. Solid and glass door coolers or freezers
4. ECM evaporated fan motors
5. Door heater controls
6. Vending controls

7. HVAC equipment upgrades
8. ENERGY STAR appliances and cooking equipment
98. DON"T KNOW
99. REFUSED

[DISPLAY Q14 IF Q12 =2]

14. **Why did you not install that equipment?**

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

15. **Using a scale of one to five, where one is "not at all" and five is "completely", how well did the range of energy saving equipment options offered through the program fit your needs?**

[RECORD 1 – 5]
98. DON'T KNOW
99. REFUSED

[DISPLAY Q16 ONLY IF Q15< 4]

16. **In what ways did the range of energy saving equipment options offered not meet your needs?**

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

12.1 PROJECT DECISION MAKING

17. **Not including the [MEASURE] project that your received a discount for, has your organization completed any significant energy efficiency projects in the last three years?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q18 IF Q17 = 1]

18. **Did you complete any of those projects without receiving a program discount or rebate?**

1. Yes
2. No
98. DON'T KNOW

99. REFUSED

[DISPLAY Q19 IF Q17 = 1]

19. **Which of the following financial methods, if any, does your organization typically use to evaluate energy efficiency improvements?** [MULTI SELECT] **(READ LIST)**

    1. Initial Cost
    2. Simple payback
    3. Internal rate of return
    4. Life cycle cost
    5. DO NOT TYPICALLY USE FINANCIAL METHODS
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q20 if Q19 = 2]

20. **What payback time do you typically use when assessing energy efficiency projects?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q21 if Q19 = 3]

21. **What rate of return do you typically use when assessing energy efficiency projects?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

22. **Now I would like to ask you some questions about your decision to [IMPLEMENT] the [MEASURE] at [LOCATION].**

    In deciding to do a project of this type, there are usually a number of reasons why it may be undertaken. In your own words, can you tell me why this project was implemented? [MULTI SELECT] **(IF NEEDED: Were there any other reasons?) (UP TO THREE.) (DO NOT READ LIST)**

    1. Participation was easy
    2. Because the contractor recommended it
    3. The maintenance downtime and associated expenses for the old equipment were too high
    4. To improve equipment performance
    5. To get a discount from the program
    6. To protect the environment
    7. To reduce energy costs

8. To reduce energy use/power outages
9. To update to the latest technology
10. Other [RECORD VERBATIM]
98. Don't know
99. (Refused)

23. **Before participating in the [PROGRAM NAME] Program had you [IMPLEMENTED] any energy efficient equipment similar to the [MEASURE] at your facility located at [ADDRESS]?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

24. **Did you have plans to [IMPLEMENT] the [MEASURE] at the facility before deciding to participate in the [PROGRAM NAME] Program and receiving the energy assessment?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q25 IF Q24= 1]

25. **Would you have gone ahead with this planned project even if you had not received the energy assessment and the program discount?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

26. **Did you have previous experience with the [PROGRAM NAME] Program prior to [IMPLEMENTING] the [MEASURE]?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q27 IF Q26 = 1]

27. **How important was your previous experience with the program in making your decision to [IMPLEMENT] the [MEASURE] at your facility? Would you say that it was…**

1. Very important
2. Somewhat important

3. Only slightly important
4. Not at all important
98. DON'T KNOW
99. REFUSED

28. **If the program contractor that provided the energy assessment of your facility had not recommended [IMPLEMENTING] the [MEASURE], how likely is it that you would have [IMPLEMENTED] it anyway? Would you say that you…**

1. Definitely would have
2. Probably would have
3. Probably would not have
4. Definitely would not have
98. DON'T KNOW
99. REFUSED

29. **Would you have been financially able to [IMPLEMENT] the [MEASURE] at your facility if the program discount had not been available?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q30 IF Q29 = 2]

30. **How certain are you that your organization would NOT have been financially able to [IMPLEMENT] the [MEASURE] without the discount provided by the program? Would you say….**

1. Very certain
2. Somewhat certain
3. Not very certain
98. DON'T KNOW
99. REFUSED

31. **If the discount from the [PROGRAM NAME] Program had not been available, how likely is it that you would have [IMPLEMENTED] the [MEASURE] at your facility anyway? Would you say that you…**

1 Definitely would have
2 Probably would have
3 Probably would not have
4 Definitely would not have
98. DON'T KNOW
99. REFUSED

[DISPLAY Q32 IF MEAS_QUANT >1]

32. **We would like to know whether the availability of information and rebates through the [PROGRAM NAME] Program affected the quantity (or number of units) of [MEASURE] that you [IMPLEMENT] at your facility.**

    Did you [IMPLEMENT] more [MEASURE] than you otherwise would have without the program?

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q33 IF ENERGY_USING = 1]

33. **We would like to know whether the availability of information and rebates through the [PROGRAM NAME] Program affected the level of energy efficiency you chose for the [MEASURE2] at your facility.**

    Did you choose equipment that was more energy efficient than you would have chosen had you not participated in the program?

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q34 IF Q33 =1]

34. **What type of equipment, if any, would you have installed if you had not participated in the program?**

    1. (VERBATIM):
    98. DON'T KNOW
    99. REFUSED

35. **We would like to know whether the availability of information and rebates through the [PROGRAM NAME] Program affected the timing of your [MEASURE] project at your facility.**

    Did you [IMPLEMENT] the [MEAURE] earlier than you otherwise would have without the program?

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q36 IF Q35 = 1]

36. **When would you otherwise have [IMPLEMENTED] the [MEASURE]? Would you have done it in…**

1 within 6 months
2 7 months to 1 year
3 more than 1 year up to 2 years
4 more than 2 years up to 3 years
5 more than 3 years up to 5 years
6 More than 5 years
98 DON'T KNOW
99 REFUSED

Customer Satisfaction

37. **In the course of doing this project did you contact program staff from [UTILITY_SHORT] or CLEAResult with questions about the program or the participation process?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

38. **Using a scale of one to five, where one means "very dissatisfied" and five means "very satisfied", how dissatisfied or satisfied were you with: [**ASK A AND B FIRST, ASK C- F IN RANDOM ORDER, ASK G AND H LAST**]**

[RECORD 1 – 5]
98. DON'T KNOW
99. REFUSED

[DISPLAY IF **Q37 = 1]** how long it took program staff to address your questions or concerns

[DISPLAY IF **Q37 = 1]** how thoroughly they addressed your question or concern

…the amount of time between the audit and the installation of the equipment

…the range of equipment that qualifies for the program

…the equipment that was installed

… the quality of the installation

…the program overall

…[UTILITY_SHORT] as your electrical service provider

[DISPLAY Q64 IF ANY IN Q38 <3]

39. **You indicated some dissatisfaction. Why were you dissatisfied?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

40. **Would you say that your participation in [UTILITY_SHORT]'s [PROGRAM NAME] Program has:**

    1. Greatly increased your satisfaction with [UTILITY_SHORT]
    2. Somewhat increased your satisfaction with [UTILITY_SHORT]
    3. Did not affect your satisfaction with [UTILITY_SHORT]
    4. Somewhat decreased your satisfaction with [UTILITY_SHORT]
    5. Greatly decreased your satisfaction with [UTILITY_SHORT]
    98. DON'T KNOW
    99. REFUSED

FIRMOGRAPHIC

Thank you for your responses. I have just a few more questions about your facility.

41. **Which best describes your facility located at [LOCATION]? Would you say the facility is…**

    1. Your company's only location
    2. One of several locations owned by your company
    3. The headquarter location of a company with several locations
    98. DON'T KNOW
    99. REFUSED

42. **Does your company rent or own and occupy, or own and rent the facility to someone else at this location?**

    1. Rent
    2. Own and occupy
    3. Own and rent to someone else
    98. DON'T KNOW
    99. REFUSED

43. **What is the primary water heating fuel type for the facility located at [LOCATION]?**

    1. Natural gas
    2. Electricity
    3. Propane
    4. Oil
    5. Other (Please specify)
    98. DON'T KNOW

99. REFUSED

44. **What is the primary space heating fuel type for the facility located at [LOCATION]?**

1. Natural gas
2. Electricity
3. Propane
4. Oil
5. Other (Please specify)
98. DON'T KNOW
99. REFUSED

45. **Which of the following best describes how your organization is billed for electricity used at this location?**

1. We are billed directly by [UTILITY_SHORT for the electricity we use
2. We are NOT billed directly by [UTILITY_SHORT] for the electricity we use. Our electric bill is handled by another part of our company or a third party service provider
3. We are NOT billed directly by [UTILITY_SHORT] for the electricity we use. The cost for our electricity is included in our rent/lease
98. DON'T KNOW
99. REFUSED

46. **What type of business is at this location? (DO NOT READ)**

1. Grocery or convenience store
2. Hotel / motel
3. K-12 school
4. Medical / healthcare
5. Office
6. Religious worship
7. Restaurant
8. Retail
9. Other (Please specify)
98. DON'T KNOW
99. REFUSED

Large C&I Solutions Participant Survey

Overview:
Interviewer instructions are shown in all caps enclosed in parentheses, e.g., (INTERVIEWER INSTRUCTION)
Prepopulated variables are shown in all caps enclosed in brackets,e.g., [PREPOPULATED VARIABLE]
Programming instructions are shown in all caps, bold-type, enclosed in brackets, e.g., **[PROGRAMMING INSTRUCTION]**

Predefined Variables:

Variable	**Definition**
CONTACT NAME	Customer contact first and last name
UTILITY_FULL	Full name of utility implementing program
UTILITY_SHORT	Short name of utility implementing program
PROGRAM_NAME	Name of program
COMPANY	Customer company name
LOCATION	Address in form of "street in city"
MEASURE	Measure installed stated as efficient equipment, e.g., energy efficient lighting.
IMPLEMENT	Verb describing the installation
IMPLEMENTED	Verb describing the installation
IMPLEMENTING	Verb describing the installation
MEASURE2	Description of measure that does not reference energy efficiency
MEAS_QUANT	Count of measures installed
ENERGY_USING	1 if measure is energy consuming equipment (e.g. lighting), 0 if not (e.g., control system)

Survey instrument

Hello. May I please speak with [CONTACT NAME]: _____)?

Hello. My name is _____ and I am calling on behalf of UTILITY_ FULL. Through this program, your facility received incentives for the installation of energy saving equipment.

This is not a sales call. We are conducting a study on behalf of [UTILITY_FULL] to help them improve their programs that service their customers.

Are you the person who is most familiar with your facility's participation in this program?

(IF NOT RIGHT PERSON) *May I have the name and telephone number for the person who would know the most about your facility's participation in this program?*

Name:

Telephone:

(IF RIGHT PERSON)

May I ask you a few questions?

Thank you. During the remainder of the interview I will refer to [UTILITY_FULL] as [UTILITY_SHORT].

47. **Just to confirm, did [COMPANY] receive an incentive or discount for [IMPLEMENTING] [MEASURE] through [UTILITY_SHORT]'s [PROGRAM_NAME] Program at [LOCATION]**

    1. Yes
    2. No (THANK AND TERMINATE CALL)
    98. DON'T KNOW (THANK AND TERMINATE CALL)
    99. REFUSED (THANK AND TERMINATE CALL)

48. **How did you first learn about [UTILITY_SHORT]'s [PROGRAM_NAME] Program incentives for efficient equipment or upgrades? (DO NOT READ LIST)**

    1. From an [UTILITY_SHORT] Account Representative
    2. From a contractor
    3. Friends or colleagues
    4. From [UTILITY_SHORT]'s website
    5. Social media post (e.g., Facebook, Twitter, Flickr)
    6. From a [UTILITY_SHORT]'s customer service representative
    7. Through an internet search (e.g., online search engine)
    8. Through an internet advertisement
    9. Other (please explain)
    98. DON'T KNOW
    99. REFUSED

Program Delivery Efficiency

49. **Did you have any concerns about participating in the program when you first learned of it?**

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q50 IF Q49=1]

50. **What were your concerns?**

    1. (VERBATIM)

98. DON'T KNOW
99. REFUSED

[DISPLAY Q51 IF Q49=1]

51. **Why did you decide to participate despite your concerns?**

1. (VERBATIM)
98. DON'T KNOW
99. REFUSED

52. **Did you view any program marketing materials, such as brochures, when you were learning about the program?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q53 IF Q52 = 1]

53. **How influential were those materials in your decision to participate? Would you say that they were…**

1. Very influential
2. Somewhat influential
3. Only slightly influential
4. Not at all influential
98. DON'T KNOW
99. REFUSED

54. **Did you receive any technical services such as a facility assessment or other assistance with identifying and selecting equipment from a CLEAResult program representative?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

Project Decision-Making

55. **Not including the [MEASURE] project that your received a rebate or incentive for, has your organization completed any significant energy efficiency projects in the last three years?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q18 IF Q17 = 1]

56. **Did you complete any of those projects without receiving a program incentive or rebate?**

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q19 IF Q17 = 1]

57. **Which of the following financial methods, if any, does your organization typically use to evaluate energy efficiency improvements?** [MULTI SELECT] **(READ LIST)**

    1. Initial Cost
    2. Simple payback
    3. Internal rate of return
    4. Life cycle cost
    5. DO NOT TYPICALLY USE FINANCIAL METHODS
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q21 if Q19 = 2]

58. **What payback time do you typically target when assessing energy efficiency projects?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q21 if Q19 = 3]

59. **What rate of return do you typically target when assessing energy efficiency projects?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

60. **Now I would like to ask you some questions about your decision to [IMPLEMENT] the [MEASURE] at [LOCATION].**

    In deciding to do a project of this type, there are usually a number of reasons why it may be undertaken. In your own words, can you tell me why this project was implemented? (IF NEEDED: Were there any other reasons? MULTIPLE RESPONSE. UP TO THREE.) (DO NOT READ LIST)

1. To replace old or outdated equipment
2. As part of a planned remodeling, build-out, or expansion
3. To gain more control over how the equipment was used
4. The maintenance downtime and associated expenses for the old equipment were too high
5. Had process problems and were seeking a solution
6. To improve equipment performance
7. To improve the product quality
8. To comply with codes set by regulatory agencies
9. To comply with organizational policies regarding regular/normal maintenance/replacement policy
10. To get a rebate from the program
11. To protect the environment
12. To reduce energy costs
13. To reduce energy use/power outages
14. To update to the latest technology
15. Other (VERBATIM)
98. Don't know
99. (Refused)

61. **Before participating in the [PROGRAM_NAME] Program had you implemented any energy efficient equipment or project similar to the [MEASURE] at your facility located at [ADDRESS]?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

62. **Did you have plans to [IMPLEMENT] the [MEASURE] at the facility before deciding to participate in the [PROGRAM_NAME] Program?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q25 IF Q62 = 1]

63. **Would you have gone ahead with this planned project even if you had not received a rebate through [UTILITY_SHORT]'s program?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

64. **Did you have previous experience with the [PROGRAM_NAME] Program prior to [IMPLEMENTING] the [MEASURE]?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q27 IF Q26 = 1]

65. **How important was your previous experience with the program in making your decision to [IMPLEMENT] the [MEASURE] at your facility? Would you say that it was…**

    1. Very important
    2. Somewhat important
    3. Only slightly important
    4. Not at all important
    98. DON'T KNOW
    99. REFUSED

66. **Did a [PROGRAM_NAME] Program representative or other [UTILITY_SHORT] representative recommend that you [IMPLEMENT] the [MEASURE] at your facility?**

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q67 IF Q54= 1]

67. **Did a CLEAResult program representative recommend the [MEASURE] through the technical support or facility assessment that your received?**

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q28 IF [Q66 = 1 OR Q67=1]

68. **If the [PROGRAM_NAME] Program representative had not recommended [IMPLEMENTING] the [MEASURE], how likely is it that you would have [IMPLEMENTED] it anyway? Would you say that you…**

    1. Definitely would have
    2. Probably would have
    3. Probably would not have
    4. Definitely would not have
    98. DON'T KNOW

99. REFUSED

69. **Would you have been financially able to [IMPLEMENT] the [MEASURE] at your facility if the rebates from the [PROGRAM_NAME] Program were not available?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q30 IF Q29 = 2]

70. **How certain are you that your organization would NOT have been financially able to [IMPLEMENT] the [MEASURE] without the rebates provided by the program? Would you say….**

1. Very certain
2. Somewhat certain
3. Not very certain
98. DON'T KNOW
99. REFUSED

71. **If the rebates from the [PROGRAM_NAME] Program had not been available, how likely is it that you would have [IMPLEMENTED] the [MEASURE] at your facility anyway? Would you say that you…**

1 Definitely would have
2 Probably would have
3 Probably would not have
4 Definitely would not have
98. DON'T KNOW
99. REFUSED

[DISPLAY Q32 IF MEAS_QUANT >1]

72. **We would like to know whether the availability of information and rebates through the [PROGRAM_NAME] Program affected the quantity (or number of units) of [MEASURE] that you [IMPLEMENT] at your facility.**

Did you [IMPLEMENT] more [MEASURE] than you otherwise would have without the program?

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q33 IF ENERGY_USING = 1]

73. **We would like to know whether the availability of information and rebates through the [PROGRAM_NAME] Program affected the level of energy efficiency you chose for the [MEASURE2] at your facility.**

    Did you choose equipment that was more energy efficient than you would have chosen had you not participated in the program?

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q34 IF Q33 =1]

74. **What type of equipment, if any, would you have installed if you had not participated in the program?** [MULTI SELECT] **(READ LIST**

    1. (VERBATIM):
    98. DON'T KNOW
    99. REFUSED

75. **We would like to know whether the availability of information and rebates through the [PROGRAM_NAME] Program affected the timing of your [MEASURE] project at your facility.**

    Did you [IMPLEMENT] the [MEAURE] earlier than you otherwise would have without the program?

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q36 IF Q35 = 1]

76. **When would you otherwise have [IMPLEMENTED] the [MEASURE]? Would you have done it …**

    1 within 6 months
    2 7 months to 1 year
    3 more than 1 year up to 2 years
    4 more than 2 years up to 3 years
    5 more than 3 years up to 5 years
    6 More than 5 years
    98 DON'T KNOW
    99 REFUSED

Program Participation Process

The next few questions are about the program participation process.

77. **Which of the following people worked on completing your application for program incentives (including gathering required documentation)?** [MULTISELECT] **(READ LIST)**

    1. Yourself
    2. Another member of your company
    3. A contractor
    4. An equipment vendor
    5. A designer or architect
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q78 IF Q77=1]

78. **Using a scale of 1 to 5, where 0 is not at all clear and 5 is completely clear, how clear was the information on how to complete the application…**

    [RECORD 1 – 5]
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q79 ONLY IF Q78< 4]

79. **What information, including instructions on forms, needs to be further clarified?**

    1. (VERBATIM):
    98. DON'T KNOW
    99. REFUSED

[DISPLAY Q80 IF Q77=1]

80. **Did you have a clear sense of whom you could go to for assistance with the application process?**

    1. Yes
    2. No
    98. DON'T KNOW
    99. REFUSED

81. **How did the final incentive payment that you received compare to what you were expecting when you submitted your final application materials? Would you say that …**

    1. It was much less
    2. It was somewhat less

3. It was about the amount expected
4. It was somewhat more
5. It was much more
98. DON'T KNOW
99. REFUSED

82. **Once you submitted the final application and paperwork, how much time passed until your organization received the incentive payment? (DO NOT READ)**

1. Less than 2 weeks
2. 2-4 weeks
3. 5-6 weeks
4. 7-8 weeks
5. More than 8 weeks
98. DON'T KNOW
99. REFUSED

Customer Satisfaction

83. **In the course of doing this project did you contact program staff from [UTILITY_SHORT] or CLEAResult with questions about the program or the participation process?**

1. Yes
2. No
98. DON'T KNOW
99. REFUSED

[DISPLAY Q84 IF Q37=1]

84. **Did you speak with a [UTILITY_SHORT] employee or a CLEAResult staff member, or staff from both [UTILITY_SHORT] and CLEAResult?**

1. [UTILITY_SHORT] staff
2. CLEAResult staff
3. Both
98. DON'T KNOW
99. REFUSED

85. **Using a scale of one to five, where one is "very dissatisfied", five is "very satisfied", and a please rate how satisfied or dissatisfied you are with each of the following ….**[ASK A AND B FIRST, ASK C – F IN RANDOM ORDER], ASK G AND H LAST]
[RECORD 1 – 5]
98. DON'T KNOW
99. REFUSED

[DISPLAY IF Q37 =1] …how long it took program staff to address your questions or concerns

[DISPLAY IF Q37 =1] … how thoroughly they addressed your question or concern

[DISPLAY IF Q54=1] …the facility assessment or other technical services receive from CLEAResult

…the amount of time it took to get the rebate or incentive

…the range of equipment that qualifies for the program

…the steps you had to take to get through the program

…the program overall

…[UTILITY_SHORT] as your electrical service provider

[DISPLAY Q64 IF ANY IN Q85 <3]

86. **You indicated some dissatisfaction. Why were you dissatisfied?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

87. **Would you say that your participation in [UTILITY_SHORT]'s [PROGRAM_NAME] Program has:**

    1. Greatly increased your satisfaction with [UTILITY_SHORT]
    2. Somewhat increased your satisfaction with [UTILITY_SHORT]
    3. Did not affect your satisfaction with [UTILITY_SHORT]
    4. Somewhat decreased your satisfaction with [UTILITY_SHORT]
    5. Greatly decreased your satisfaction with [UTILITY_SHORT]
    98. DON'T KNOW
    99. REFUSED

88. **Do you have any suggestions for improving the program?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

FIRMOGRAPHIC [DO NOT DISPLAY]

Thank you for your responses. I have just a few more questions about your facility.

89. **Which best describes your facility at [LOCATION]? Would you say the facility is:**

    1. Your company's only location
    2. One of several locations owned by your company
    3. The headquarter location of a company with several locations
    98. DON'T KNOW
    99. REFUSED

90. **Does your company rent or own and occupy, or own and rent the facility to someone else at this location?**

    1. Rent
    2. Own and occupy
    3. Own and rent to someone else
    98. DON'T KNOW
    99. REFUSED

91. **Which of the following best describes how your organization is billed for electricity used at this location?**

    1. We are billed directly by [UTILITY_SHORT for the electricity we use
    2. We are NOT billed directly by [UTILITY_SHORT] for the electricity we use. Our electric bill is handled by another part of our company or a third party service provider
    3. We are NOT billed directly by [UTILITY_SHORT] for the electricity we use. The cost for our electricity is included in our rent/lease
    98. DON'T KNOW
    99. REFUSED

92. **What type of business is at this location? (DO NOT READ)**

    1. College / University
    2. Grocery or convenience store
    3. Hotel/Motel
    4. Industrial/Manufacturing
    5. K-12 School
    6. Medical / healthcare
    7. Office
    8. Religious worship
    9. Restaurant
    10. Retail
    11. Warehouse
    12. Other (Specify)
    98. DON'T KNOW
    99. REFUSED

93. **Do you have any other comments that you would like to relay to [UTILITY_SHORT] about energy efficiency in the commercial and industrial sector or about their programs?**

    1. (VERBATIM)
    98. DON'T KNOW
    99. REFUSED

13.Appendix C: Cost Benefit Testing

This appendix provides an overview of each programs' participation, verified reduction in peak load, verified kWh savings, annual admin costs, total program costs, as well as a summary of the cost effectiveness analysis.

13.1 Cost Effectiveness Summary

This appendix covers all verified electricity and peak demand savings, and associated program costs incurred in the implementation of the Companies' PY5 energy efficiency portfolio.

The cost-effectiveness of the Companies' PY5 programs was calculated based on reported total spending, verified energy savings, and verified demand reduction for each of the energy efficiency and demand response programs. All spending estimates were provided by the Companies. The methods used to calculate cost-effectiveness are informed by the California Standard Practice Manual.[34]

The demand reduction (kW) and energy savings (kWh) presented throughout this appendix represent savings at the generator by adjusting for line losses.

In order to calculate the cost-effectiveness of each program, measure lives were assigned on a measure-by-measure basis. Incremental costs were taken directly from the program filing documents.

Avoided energy, capacity, and transmission/distribution costs used to calculate cost-effectiveness were provided by the Companies.

The tables below each program included in this analysis, along with the final verified savings estimates, total expenditures, Utility Cost Test (UCT)[35] results, and Total Resource Cost Test (TRC) results.

In addition to UCT and TRC results, results from the Ratepayer Impact Measure (RIM), Participant Cost Test (PCT) and Societal Cost Test (SCT) are included in the body of this appendix.

Based on verified program impacts and spending during PY5, the Companies' overall portfolio is cost-effective based on both the UCT and TRC.

34California Standard Practice Manuel: Economic Analysis of Demand Side Management Programs, October 2001. Available at: http://www.cpuc.ca.gov/NR/rdonlyres/004ABF9D-027C-4BE1-9AE1-CE56ADF8DADC/0/CPUC_STANDARD_PRACTICE_MANUAL.pdf

35 The UCT is also referred to as the Program Administrator Cost Test (PACT).

Table 13-1 Cost-Effectiveness by Program – New Orleans

Program	Net Peak Demand Reduction (kW)	Net Annual Energy Savings (kWh)	Total Program Expenditures	TRC (b/c ratio)	UCT (b/c ratio)
Home Performance w Energy Star	798.82	3,771,339	$511,180	3.18	3.86
Green Light New Orleans	83.82	1,043,383			
Assisted Home Performance w ES	322.16	515,529	$421,506	1.62	1.51
Consumer Products	199.58	1,149,201	$684,763	1.53	1.55
Residential Heating & Cooling	117.22	358,291	$451,411	1.57	1.22
Energy Smart School Kits	41.93	365,288	$368,943	0.61	0.37
Small Business Solutions	461.08	3,189,966	$942,064	1.44	1.72
Large Commercial and Industrial	1,402.92	8,642,831	$1,774,136	2.05	2.66
Total	3,427.53	19,035,828	$5,154,003	1.95	2.21

Table 13-2 Cost-Effectiveness by Program - Algiers

Program	Net Peak Demand Reduction (kW)	Net Annual Energy Savings (kWh)	Total Program Expenditures	TRC (b/c ratio)	UCT (b/c ratio)
Home Performance w Energy Star	105.72	465,490	$43,870	3.56	4.53
Green Light New Orleans	112.26	291,163			
Assisted Home Performance w ES	18.15	111,640	$34,912	1.65	1.49
Consumer Products	15.25	92,433	$58,564	1.91	1.57
Residential Heating & Cooling	8.1	27,280	$85,963	1.05	1.17
Energy Smart School Kits	5.49	47,498	$32,751	0.38	0.23
Small Business Solutions	28.6	144,696	$85,461	1.02	1.13
Large Commercial and Industrial	5.61	133,404	$153,103	0.54	0.61
Total	299.18	1,313,604	$494,624	1.59	1.62

13.2 Energy Efficiency Program Results

The Companies' energy efficiency portfolio in PY1 consisted of five programs. Total spending in PY1 equaled $3,187,175.

13.2.1 Home Performance with ENERGY STAR

Table 13-3 HPwES Benefit/Cost Tests – New Orleans

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	3.18	3.86	10.12	.46.	4.15
Total Benefits	$3,449,701	$3,132,256	$7,815,557	$3,132,256	$4,429,074
Total Costs	$1,085,520	$810,994	$772,021	$6,816,424	$1,085,520

Table 13-4 HPwES Benefit/Cost Tests - Algiers

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	3.56	4.53	9.61	0.46	4.60
Total Benefits	$474,126	$418,281	$1,086,207	$418,281	$611,750
Total Costs	$133,081	$92,381	$113,016	$906,908	$133,081

13.2.1 Assisted Home Performance with ENERGY STAR

Table 13-5 aHPwES Benefit/Cost Tests – New Orleans

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.62	1.51	NA	0.43	2.16
Total Benefits	$1,001,122	$933,456	$2,177,017	$933,456	$1,337,133
Total Costs	$617,651	$617,651	$0	$2,179,412	$617,651

Table 13-6 aHPwES Benefit/Cost Tests - Algiers

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.65	1.49	NA	0.44	2.19
Total Benefits	$101,338	$91,743	$220,235	$91,743	$134,938
Total Costs	$61,521	$61,521	$0	$209,542	$61,521

13.2.2 Residential Heating & Cooling

Table 13-7 RH&C Benefit/Cost Tests – New Orleans

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.57	1.22	9.22	0.36	1.92
Total Benefits	$272,800	$272,800	$697,132	$272,800	$334,039
Total Costs	$173,880	$224,287	$75,648	$755,751	$173,880

Table 13-8 RH&C Benefit/Cost Tests - Algiers

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.05	1.17	4.96	0.37	1.34
Total Benefits	$22,599	$22,599	$ 55,108.63	$22,599	$28,788
Total Costs	$21,541	$19,311	$11,105	$61,841	$21,541

13.2.3 Consumer Products

Table 13-9 Consumer Products Benefit/Cost Tests – New Orleans

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.53	1.55	6.20	0.32	1.76
Total Benefits	$632,310	$497,535	$1,596,443	$497,535	$728,648
Total Costs	$413,132	$321,135	$257,663	$1,536,896	$413,132

Table 13-10 Consumer Products Benefit/Cost Tests - Algiers

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.91	1.57	12.77	0.31	2.09
Total Benefits	$46,513	$34,695	$112,503	$34,695	$51,002
Total Costs	$24,389	$22,095	$8,810	$111,550	$24,389

13.2.4 School Kits & Education

Table 13-11 SE&K Benefit/Cost Tests – New Orleans

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	0.61	0.37	NA	0.19	0.70
Total Benefits	$249,212	$153,646	$693,373	$153,646	$284,884
Total Costs	$406,884	$420,477	$0	$821,532	$406,884

Table 13-12 SE&K Benefit/Cost Tests - Algiers

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	0.38	0.23	NA	0.15	0.44
Total Benefits	$32,606	$20,103	$89,277	$20,103	$37,274
Total Costs	$84,710	$85,963	$0	$138,441	$84,710

13.2.5 Small Business Solutions

Table 13-13 SBS Benefit/Cost Tests – New Orleans

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.44	1.72	7.29	0.33	1.73
Total Benefits	$1,619,372	$1,619,372	$4,641,143	$1,619,372	$1,935,516
Total Costs	$1,121,593	$942,053	$636,955	$4,843,672	$1,121,593

Table 13-14 SBS Benefit/Cost Tests - Algiers

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.02	1.13	6.61	0.31	1.22
Total Benefits	$77,316	$77,316	$214,776	$77,316	$92,515
Total Costs	$76,044	$68,551	$32,496	$245,528	$76,044

13.2.1 Large Commercial & Industrial Solutions

Table 13-15 LCI Benefit/Cost Tests – New Orleans

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	2.05	2.66	9.34	0.36	2.45
Total Benefits	$4,464,705	$4,464,705	$12,135,383	$4,464,705	$5,338,433
Total Costs	$2,178,987	$1,679,320	$1,299,741	$12,250,290	$2,178,987

Table 13-16 LCI Benefit/Cost Tests - Algiers

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	0.54	0.61	5.57	0.23	0.64
Total Benefits	$60,853	$60,853	$196,695	$60,853	$72,546
Total Costs	$112,524	$98,952	$35,304	$262,117	$112,524

13.2.2 Whole-Portfolio

Table 13-17 Whole-Portfolio Benefit/Cost Tests – New Orleans

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.95	2.21	9.78	0.38	2.40
Total Benefits	$11,689,222	$11,073,770	$29,756,048	$11,073,770	$14,387,727
Total Costs	$5,997,647	$5,015,917	$3,042,028	$29,203,977	$5,997,647

Table 13-18 Whole-Portfolio Benefit/Cost Tests - Algiers

Metric	Total Resource Cost Test	Utility Cost Test	Participant Cost Test	Ratepayer Impact Measure	Societal Cost Test
Benefit/Cost Ratio	1.59	1.62	9.84	0.37	2.00
Total Benefits	$815,351	$725,590	$1,974,802	$725,590	$1,028,813
Total Costs	$513,810	$448,774	$200,731	$1,935,927	$513,810