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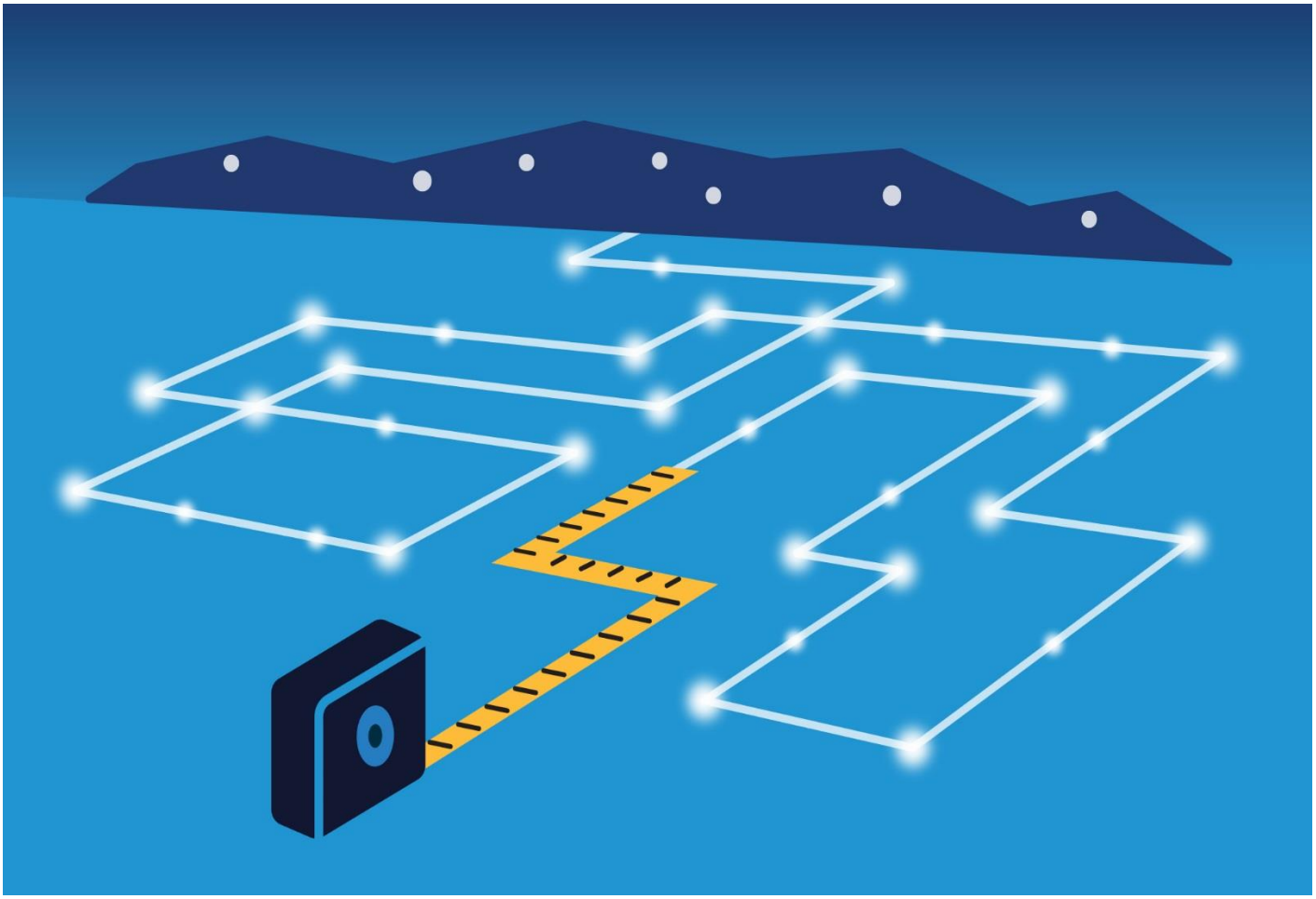

Impact and Process Evaluation of the 2013 (PY6) Ameren Illinois Company Home Performance with ENERGY STAR® Program

Final

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1. Executive Summary

This report presents the results of Opinion Dynamics' evaluation of the sixth program year (PY6) of Ameren Illinois Company's (AIC's) Home Performance with ENERGY STAR® (HPwES) Program. The HPwES Program is a home energy diagnostic program offering audits to all AIC residential customers and retrofits to customers with AIC heating fuel. A component of HPwES, the Electric Space Heat Pilot (ESHP), focuses on older homes equipped with electric space heat.

Formerly known as Home Energy Performance (HEP) Program, the transition to an HPwES program was completed in PY6 (June 2013 to May 2014). Conservation Services Group (CSG) implements the HPwES Program. The Program offers audits, direct install measures, and incentives for additional energy efficiency opportunities.

The evaluation team conducted an impact and process evaluation of the HPwES Program in PY6. To support the process evaluation, we reviewed program materials and program-tracking data, interviewed implementation and AIC staff, and conducted telephone surveys with 238 randomly selected HPwES and ESHP participants. To estimate gross impacts, the evaluation team conducted an engineering analysis. We also conducted, for the second year in a row, a billing analysis in an effort to create adjustment factors for engineering results in the Illinois Statewide TRM for Energy Efficiency Version 2.0 (June 7, 2013). Due to delays in collecting data from HPwES participants' billing records, this report presents impact results based on our engineering analysis only.[1]

The HPwES Program reached 2,863 participants in PY6. There were also 114 ESHP participants. Because HPwES and ESHP follow similar implementation strategies, this report presents results for the HPwES program as whole (i.e., HPwES and ESHP combined), unless otherwise specified.

The HPwES program provides a small percentage of AIC's annual energy savings. AIC expects this program to provide 1.3% of the utility's annual electricity savings and 2.2% of its therm savings from residential and commercial customers.

1.1 Impact Results

This evaluation's primary objective was to estimate the energy savings impacts from installing HPwES measures. To determine gross impacts, we applied the Statewide TRM Version 2 savings algorithms using program-tracking database inputs. To determine net impacts, we applied the PY4 HEP Program measure-specific net-to-gross ratios (NTGRs). Table 1 shows the net impacts for the HPwES program.

[1] A memorandum summarizing the results of our billing analysis is forthcoming.

Table 1. PY6 HPwES Program Net Impacts

Program Component	# of Participants	Ex Ante Net			Ex Post Net		
		kWh	kW	Therms	kWh	kW	Therms
HPwES	2,977	4,107,639	1,882	380,259	3,882,726	1,916	411,594
				Net Realization Rate	**95%**	**102%**	**108%**

The HPwES Program achieved net realization rates above 100% for both kW and therm savings in PY6; however, the net realization rate for kWh savings was lower (95%). This variance in net realization rates can be attributed to differences in input values for ex ante and ex post savings algorithms for air sealing and insulation measures. Specifically, we report differences in values for cooling degree day (CDD), heating degree day (HDD), full load cooling hours, and baseline efficiencies for heating and cooling equipment. In addition, our ex post calculations use a different set of assumptions to estimate savings for rim joist insulation. We provide a detailed explanation of these differences in the gross impacts section of this report.

1.2 Process Results

The HPwES Program operated according to design, with several changes in PY6. The program finalized its transition to an HPwES program. As a result, trade allies are now required to sign up with the Midwest Energy Efficiency Alliance (MEEA), program forms now include HPwES logos and language, intake forms and incentive applications meet HPwES requirements, and measures and incentive levels now support HPwES standards.

Some minor modifications were also made to the implementation of the HPwES Program. PY6 saw greater emphasis on more comprehensive retrofits by program allies. Starting in PY5, the HPwES Program has issued gold and silver Energy Star certificates of completion for homeowners that complete major improvements (and meet certain eligibility requirements) during their upgrade. In PY6, the HPwES Program saw an increase in the number of silver and gold certificates issued to homeowners. By analyzing the program tracking databases for PY5 and PY6, the evaluation team found sizeable increases in average per household (ex ante) savings from PY5 to PY6, further evidence of a shift toward more comprehensive retrofits.

Despite relatively few changes in program design and implementation, program staff noted significant challenges in meeting savings goals. PY6 saw a significant decrease from PY5 in the total number of projects and measures installed. Program staff attributed the drop off in participation to a number of potential causes, including a decline in trade ally support of the program following struggles with the project funding reservation system employed in PY5. Program staff also noted that a particularly cold winter in 2013–2014, coupled with a rebounding economy, might have influenced more customers to participate in larger programs such as HVAC replacement.

1.3 Recommendations

The evaluation team proposes the following recommendations for the HPwES Program:

- **If possible, consider re-establishing the on-bill financing component of the HPwES Program.** In PY6, AIC discontinued the on-bill financing program due to insufficient funds. Program staff expressed concern that dropping the on-bill financing option hurt program participation and reduced trade allies' ability to market the program. Our participant survey showed significant interest in the on-bill financing option. These findings suggest that financing options could help increase conversion rates and lead to retrofits that are more comprehensive.

- **Conduct trade ally interviews in PY7 to gauge contractors' satisfaction with the program and understand the challenges they face.** Program staff noted trade ally dissatisfaction with the incentive level changes and the establishment of a reservation system in PY5. As a result, trade allies may have reduced their involvement with the HPwES Program. Our analysis shows a decrease in the number of trade ally-driven projects in PY6, which may help account for some of the drop-off in program participation. We recommend a more comprehensive process evaluation that includes a trade ally survey or trade ally interviews in order to determine whether trade allies are dissatisfied with program implementation or are diversifying their program participation.

2. Introduction

This report presents the results of Opinion Dynamics' evaluation of the sixth program year (PY6) of AIC's Home Performance with Energy Star (HPwES) Program, which is implemented by Conservation Services Group (CSG).[2] We conducted an impact evaluation and a limited process evaluation. To support the process evaluation, we reviewed program materials and program-tracking data, interviewed implementation and AIC staff, and completed a telephone survey of 238 program participants. Our impact analysis effort included an engineering analysis, which estimated program and measure category gross electric and gas savings, and a billing analysis that sought to produce adjustment factors for the TRM.[3] As noted earlier, the design and implementation of the HPwES Program and its sub-program, the Electric Space Heat Pilot (ESHP), are very similar. Therefore, the evaluation team, in collaboration with AIC, decided to report a single set of results that we simply call HPwES. These results always include ESHP unless otherwise noted.[4]

2.1 Program Description

The HPwES Program is a home energy diagnostic and retrofit program that offers AIC's residential customers audits, direct install measures, and incentives for additional energy efficiency opportunities. Customers can participate in the program either by receiving an audit from an HPwES Energy Advisor and then engaging home contractor services (the CSG-driven approach) or by working with program allies outside of the program's audit process (the program ally-driven approach).

In the CSG-driven approach, a CSG Energy Advisor conducts an "HPwES audit" of the participant's home and installs instant-savings measures (ISMs) such as compact fluorescent lights (CFLs) and domestic hot water (DHW) measures. According to AIC staff, throughout the HPwES audit, auditors educate the homeowner on savings possible through shell measures such as air sealing and wall and attic insulation, in addition to the potential energy savings available through all ActOnEnergy incentive programs. Auditors also recommend HPwES program allies (AIC-approved, Building Performance Institute [BPI]-certified insulation contractors) that offer incentives and install shell measures. In the program ally-driven approach, the HPwES Program allies is marketed directly to eligible customers and no HPwES audit is performed. Instead, program allies offer incentives to homeowners and install selected energy efficiency measures (air sealing and insulation) in the customers' homes.

The HPwES Program also focuses on developing a local home performance industry. In PY6, the program completed its transformation from what had been the Home Energy Performance Program to its more comprehensive form. This transformation included aligning measures offered to Department of Energy standards and co-branding services. The HPwES Program is further developing the local contractor network in Illinois by providing incentives for BPI certification of support staff of current program allies.

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[2] In PY6, the program completed its transition to Home Performance with ENERGY STAR®. The program was formerly known as the Home Energy Performance Program.

[3] As noted earlier, we will provide the results from the billing analysis in a separate memorandum.

[4] Other data-related factors also influenced our decision to report a single set of results. They include a very small participant telephone survey sample from our ESHP census attempt (n=14), questions about the accuracy of the ESHP program flag in the program tracking database, and a sufficiently small ESHP population (n=114) for our billing analysis.

The ESHP, a sub-component of HPwES, focuses on older homes equipped with electric space heat. ESHP customers receive program services that are identical to non-electric space heating customers, with two exceptions. These customers have a dedicated program implementer in CSG and—depending on homeowner eligibility and permission—are provided blower door-assisted air sealing of the home by a team of specially trained air-sealing technicians as part of the initial audit. Table 2 summarizes the HPwES and ESHP offerings.

Table 2. Summary of PY6 HPwES and ESHP Offerings

Program Description	HPwES	ESHP
Audit Description	The audit includes the installation of CFLs and water conservation measures (high-efficiency showerheads and faucet aerators), a thermal scan of the house using an infrared camera, and development of a work order for recommended additional work.	An energy audit is performed and participating households receive CFLs and water conservation measures (high-efficiency showerheads and faucet aerators), a thermal scan of the house using an infrared camera, blower door-assisted air sealing, and a work order for recommended additional work.
Audit Duration	2 hours	3 to 3.5 hours
Audit Cost	$50	$50
Measures Installed during Audit	CFLs, faucet aerators, low-flow showerheads	CFLs, faucet aerators, low-flow showerheads, blower door-assisted air sealing
Measures recommended for incentives	All ActOnEnergy incentives are recommended as appropriate, including HPwES, HVAC, Appliance Recycling and EE rebates (these may include duct and air sealing, additional attic or wall insulation, programmable thermostats, HVAC equipment replacement, and water heater replacement)	All ActOnEnergy incentives are recommended as appropriate, including HPwES, HVAC, Appliance Recycling and EE rebates (these may include additional attic or wall insulation, programmable thermostats, HVAC equipment replacement, and water heater replacement)
Target audience	Audits are offered to all residential customers. Shell measure incentives are offered only to customers heating with an AIC approved fuel.	AIC customers in existing homes with electric heat

2.2 Research Objectives

The objective of the PY6 HPwES Program evaluation is to provide estimates of gross and net electric and gas savings associated with the program. The evaluation team also explored a limited number of process-related research questions.

The impact evaluation answers the research question: What are the gross and net energy savings impacts from the programs?

The process evaluation addresses questions related to program design and implementation, including:

1. Are the programs implemented according to their design?
2. What implementation challenges occurred in PY6 and how were they overcome?
3. Have any changes been made to the program design or implementation from PY5 and, if so, what and why?

3. Evaluation Methods

This section summarizes the evaluation activities we conducted and the methods we used for the PY6 HPwES Program (including ESHP). Our efforts included process and impact evaluations. Table 3 provides a summary of the evaluation methods used.

Table 3. Summary of PY6 Evaluation Methods

Task	PY6 Process	PY6 Impact	Forward Looking	Details
Program Materials Review	✓			Reviewed program materials—including program design, implementation plans, marketing and outreach efforts, market actor training materials, and program databases—to assess program implementation and provide recommendations for improvement, where applicable.
Interviews with Program Staff and Implementers	✓			Interviewed the AIC program manager and CSG program manager in PY6 to understand the program's design, implementation, and evaluation priorities.
Participant Telephone Survey	✓	✓	✓	Interviewed 238 HPwES and ESHP customers to provide prospective NTG values and to inform program process and satisfaction results.
Engineering Review		✓		Conducted an engineering analysis for all PY6 participants to estimate gross impacts.
Billing Analysis[5]			✓	For HPwES PY4 and PY5 participants only, we conducted a billing analysis to quantify the effects of actions taken among the treatment and comparison group members.

Data sources for evaluating the HPwES Program include:

- Information on key program efforts and dates gathered through stakeholder interviews
- Program-tracking databases and ex ante savings for PY5 and PY6 participants
- Telephone interviews with participating customers
- Statewide TRM Version 2[6]
- Measure-specific net-to-gross ratios (NTGRs) from the evaluation of the PY4 HEP Program

[5] We will provide details of the HPwES billing analysis in a separate memorandum.

[6] State of Illinois: Energy Efficiency Technical Reference Manual V2.0. Effective June 1, 2013.

3.1 Data Collection

The following activities informed the PY6 process evaluation of the HPwES program.

3.1.1 Review of Program Materials and Data

The evaluation team reviewed program materials, including implementation plans, marketing and outreach activities, training materials, and the program-tracking database.

3.1.2 Program Staff Interviews

We conducted in-depth interviews with key program staff including one member of the AIC program staff and one member of the CSG implementation team. The purpose of these interviews was to gain insight on whether the program was implemented according to its design and to determine whether there had been any changes in the program's design and implementation from PY5. The interviews also touched on whether any implementation challenges occurred in PY6. The team also inquired about data tracking and customer outreach related to the program.

3.1.3 Participant Survey

The evaluation team implemented a computer-assisted telephone interviewing (CATI) survey with PY6 HPwES and ESHP program participants in July and August 2014. The average length of the interviews was 17 minutes. The survey gathered data to support an estimate of the installation of measures, to collect information useful for the process evaluation, and to field a net-to-gross battery for HPwES participants. [7]

Sample Design

The evaluation team designed a sample that meets the industry-standard two tail 90/10 criteria in terms of sampling error at a measure level. This means that we are 90% confident our results are within 10% of the true value in the population.

We based our final sample design and sample size on a review of PY6 participation data. There were 2,977 unique households in the PY6 HPwES and ESHP database. We were able to use 2,870 valid telephone numbers from which to complete participant telephone surveys. We sampled participants using a two-stage randomization process designed to increase the reliability of measure level findings. We drew a simple random sample of participants for each of the five primary measures installed through the program (CFLs, low-flow showerheads, faucet aerators, air-sealing, and insulation). For customers who received three or more of the five measure types, we randomly selected up to two measures to ask about in the survey. This approach provided us with stronger reliability for measure level estimation and allowed us to minimize survey length and respondent burden. Given the small number of ESHP participants, the evaluation team performed a census

[7] The results of our NTG survey battery will be used in PY8.

attempt in order to maximize the number of ESHP completed surveys. Unfortunately, our attempt yielded only 14 ESHP participants (a 12% response rate).[8]

Survey Disposition and Response Rate

We completed 238 surveys for the HPwES and ESHP programs. Table 4 shows the completed sample points by measure type and MBTU.

Table 4. Completed HPwES Program Survey Points

Project Type	Database Population		Sample Frame		Completed Surveys	
	Households [a]	MBTU Savings	Households	MBTU Savings	Households	MBTU Savings
CFLs	1,546	4,072	1,525	4,016	140	371
Faucet Aerators	1,060	462	1,036	454	107	46
Showerheads	1,072	2,423	1,056	2,392	114	248
Air Sealing	1,431	34,117	1,349	32,276	107	2,512
Insulation	1,342	23,759	1,261	22,287	97	1,587
Water Heater Temp	164	93	n/a [b]	n/a	n/a	n/a
Total	**2,977**	**64,926**	**2,870**	**61,425**	**238**	**4,764**

[a] This is the number of households where each measure type was installed.

[b] Since we did not calculate an NTGR for Water Heater Temp, we did not include a sample flag for this measure.

We calculated the response rate using the standards and formulas set forth by the American Association for Public Opinion Research (AAPOR).[9] We chose to use AAPOR Response Rate 3 (RR3), which includes an estimate of eligibility for sample units that we were unable to reach. We present the formulas used to calculate RR3 below and display the definitions of each variable used in the formulas in the Survey Disposition tables that follow.

$$RR3 = I / ((I + P) + (R+NC+O) + e(UH+UO))$$

We also calculated a cooperation rate, which is the number of completed interviews divided by the total number of eligible sample units actually contacted. In essence, the cooperation rate is the percentage of participants with whom we spoke that completed an interview. To determine the cooperation rate we used AAPOR Cooperation Rate 1 (COOP1), which is calculated as:

$$COOP1 = I / ((I + P)+R))$$

[8] We called each ESHP participant in the sample at least five times during the administration of the survey.

[9] *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, AAPOR, 2011. http://www.aapor.org/AAPORKentico/AAPOR_Main/media/MainSiteFiles/StandardDefinitions2011_1.pdf

Table 5. HPwES Survey Dispositions

Disposition	n
Completed Interviews (I)	**238**
Partial completes	10
Eligible Non-Interviews	**1752**
Refusals (R)	428
Mid-Interview terminate (R)	17
Respondent never available (NC)	250
Answering machine (confirming HH)	1052
Language Problem (NC)	5
Not Eligible (e)	**302**
Fax/Data Line	5
Non-Working	229
Wrong Number	20
Business/Government	29
No Eligible Respondent	15
Duplicate Number	4
Unknown Eligibility Non-Interview (U)	**568**
Not dialed/worked	259
No Answer	298
Busy	9
Call Blocking	2
Total Participants in Sample	**2,870**

Table 6 provides the response and cooperation rates.

Table 6. Survey Response and Cooperation Rates

AAPOR Rate	Percentage
Response Rate (RR3)	9.5%
Cooperation Rate	34%

3.2 Analytical Methods

The primary objective of this evaluation was to estimate the energy savings from installing measures. The evaluation team conducted the engineering analysis outlined below to assess PY6 program impacts.

3.2.1 Gross Impacts

To determine the gross impacts associated with the HPwES Program, we applied savings algorithms from the Statewide IL TRM V2.0 to the information in the program-tracking database. We outline the algorithms used to calculate all evaluated program savings in Appendix A, along with all input variables.

3.2.2 Net Impacts

To estimate net savings, we applied the PY4 HEP Program measure-specific NTGRs to the gross savings to obtain PY6 HPwES Program net savings. Table 7 contains the PY4 NTGRs used for this study.

Table 7. PY4 NTGRs by Measure Category

	Electric			Gas		
Measure Category	FR	SO	NTGR	FR	SO	NTGR
CFLs	0.12	0.09	0.97	--	0.025	--
Faucet Aerator	0.23		0.86	0.28		0.75
Showerhead	0.04		1.05	0.21		0.82
Air Sealing	0.21		0.88	0.20		0.83
Insulation	0.21		0.88	0.23		0.80
Thermostat	--		--	0.13		0.90

The evaluation team also fielded a self-report net-to-gross battery in the participant survey to determine program-level and measure category-level NTGRs to apply in PY8. This updated NTG analysis addresses the significant changes in the program design since PY4. The self-report method asks customers directly a series of questions exploring the program's influence in motivating them to install energy-efficient equipment. Participants were also asked about other actions they may have taken had the incentive not been available. The battery also included an assessment of spillover.

3.3 Sources and Mitigation of Error

Table 8 provides a summary of possible sources of error associated with the data collection conducted for the HPwES Program. We discuss each item in detail below.

Table 8. Potential Sources of Error

Research Task	Survey Error		Non-Survey Error
	Sampling	Non-Sampling	
Participant Survey	• Yes	• Measurement error • Non-response and self-selection bias • Data processing error • External validity	• N/A
Gross Savings Calculations	• No	• N/A	• Analytical error
Net Savings Calculations	• No	• Measurement error • Non-response and self-selection bias • Data processing error • External validity	• Data processing error

The evaluation team took a number of steps to mitigate potential sources of error throughout the planning and implementation of the PY6 evaluation.

Survey Error

- **Sampling Error**
  - The evaluation team designed the telephone survey sample to achieve 90% confidence and +/- 10% relative precision at the measure level. We surveyed 238 customers from a population of 2,870. We stratified our sample by measure category and sampled a sufficient number of participants to ensure a 90/10 confidence and precision level for each measure category.[10]
- **Non-Sampling Error**
  - Measurement Error: We addressed the validity and reliability of quantitative data through multiple strategies. First, we relied on the experience of the evaluation team to create questions that, at face value, appear to measure the idea or construct that they are intended to measure. We reviewed the questions to ensure that we did not ask double-barrelled questions (i.e., questions that ask about two subjects, but with only one response) or loaded questions (i.e., questions that are slanted one way or the other). We also checked the overall logical flow of the questions so as not to confuse respondents, which would decrease reliability.

    Key members of the evaluation team, as well as AIC and (ICC) staff, reviewed all survey instruments. To determine whether the questions were clear and unambiguous, we pre-tested each survey instrument, reviewed the pre-test survey data, and monitored the telephone interviews as they were being conducted. We also used the pre-tests to determine that the length of the survey was reasonable.
  - Non-Response Bias: Since the response rate for the participant survey was approximately 10%, there is the potential for non-response bias. However, we attempted to mitigate possible bias by calling each potential respondent at least five times, or until we received a firm refusal, and by calling at different times of day, as appropriate.[11]
  - Data Processing Error: The team addressed processing error through interviewer training and through quality checks of completed survey data. Opinion Dynamics interviewers went through rigorous training before interviews began. Interviewers received a general overview of the research goals and the intent of each survey instrument. Through survey monitoring, members of the evaluation team also provided guidance on proper coding of survey responses. In addition, we carried out continuous, random monitoring of all telephone interviews and validation of at least 10% of each interviewer's work.
  - External Validity: We addressed external validity (the ability to generalize any findings to the population of interest) through development of an appropriate research design.

[10] The relative precision for each measure category ranged between 3% and 4%.

[11] The evaluation team also checked available program data to see if there were any differences on observable variables. Unfortunately, due to data limitations, there were not many variables available to assess non-response error.

Non-Survey Error

Two types of non-survey errors were possible.

- **Gross Impact Calculations:** We applied the TRM calculations to the participant data in the tracking database to calculate gross impacts. To minimize analytical errors, all impact calculations were reviewed by a separate team member to verify their accuracy.
- **Net Impact Calculations:** We applied the PY4 measure-level NTGR to gross savings to obtain PY6 HPwES program net savings. Therefore, although possible, we do not anticipate any error in these calculations.

4. Evaluation Findings

4.1 Program Participation

In PY6, the HPwES Program reached 2,977 participants, including ESHP participants. Table 9 provides an overview of participation by services received.

Table 9. Overview of Participation by Household and Services Received in PY6

Approach	Participant Type	Number of Participants	% of Participants
CSG-Driven	CSG Audit & Program Ally Retrofit	449	15%
	CSG Audit Only	1,521	51%
Program Ally-Driven	Program Ally Retrofit	1,007	34%
	Total	2,977	100%

In Table 10, we compare conversion rates between PY5 and PY6. We find a significant increase in the conversion rate for PY6, which may be driven in part by the program's emphasis on more comprehensive retrofits. Also of note, we see that the proportion of program ally-driven projects decreased significantly from PY5 to PY6.

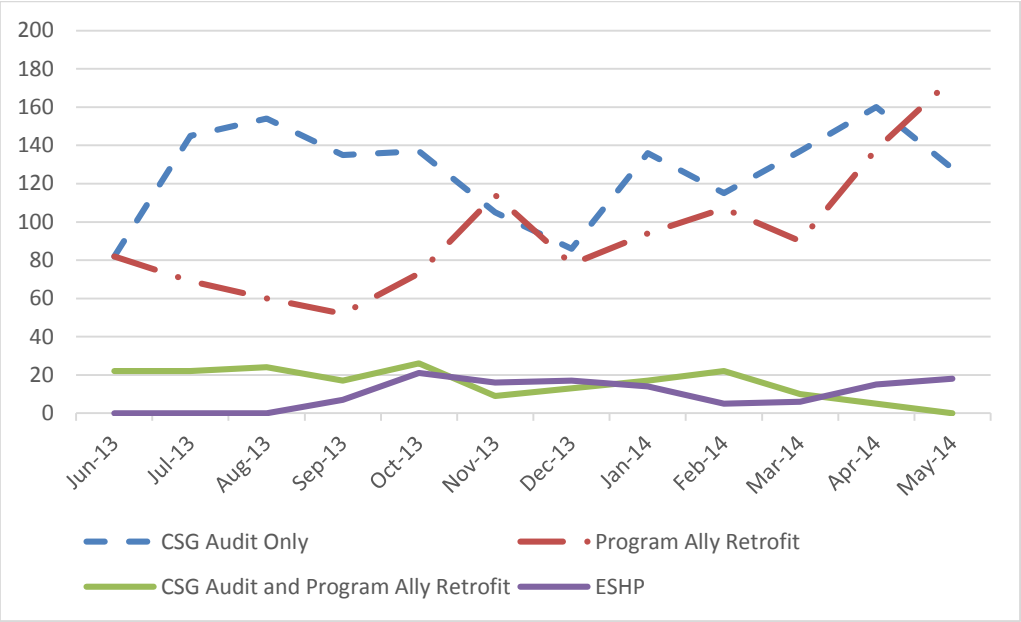
Table 10. PY5 and PY6 Conversion Rates

Approach	Participant Type	PY5 Participants	PY6 Participants
CSG-Driven	CSG Audit & Program Ally Retrofit	353	449
	CSG Audit Only	2,041	1,521
Program Ally-Driven	Program Ally Retrofit	1,758	1,007
	Total	**4,152**	**2,977**
	Conversion Rate [a]	**15%**	**23%**

[a] The conversion rate is calculated by dividing the number of participants who received a retrofit following a CSG audit by the total number of participants who received a CSG audit.

The evaluation team also tracked program participation over time in order to assess whether participation peaked during certain periods of the year. Figure 1 provides a timeline of HPwES and ESHP projects by participant type.

Figure 1. Timeline of HPwES and ESHP Projects by Participant Type



As can be seen, the "CSG Audit Only" category constituted the largest number of program participants, with participation peaking in the spring and summer months. "Program Ally Retrofits" projects saw a sharp increase during the spring while "CSG Audit and Program Ally Incentive" remained consistently below 25 per month, with projects starting to decline at the onset of spring. The number of ESHP customers started out flat but began increasing toward the end of the summer, with participation peaking during the fall and spring.

4.2 Process Assessment

Overall, the HPwES Program operated according to design. The program made several minor design changes in PY6 as it achieved its goal of fully transitioning to a full Home Performance with ENERGY STAR® program. The program now provides HPwES certifications and branding with HPwES logos and language. Its intake forms and incentive applications gather data in support HPwES qualifications, and its measures and incentives meet HPwES standards (including the addition of crawl space insulation as a program measure).

In keeping with our research objectives defined earlier, we use Table 11 to note implementation and program design changes from PY5 to PY6.

Table 11. Program Design and Implementation Changes in PY6

Design Element	Description [a]	Overview of PY6 Change
Transformation into a Comprehensive HPwES Program	Fully transitioned to an HPwES Program: In PY6, the program fully transformed into an HPwES program. Since program inception, CSG has focused on developing a local home performance industry and transforming the program into a more comprehensive HPwES program. That transformation was completed this year.	As program allies further developed their home performance capacity in PY6, the program took several steps in support of the full transition to a HPwES program in PY6, including: • Requiring contractors to sign up with the Midwest Energy Efficiency alliance in order to offer HPwES certificates [b] • Rebranding program forms with HPwES logos and language • Increasing the percentage of quality assurance (QA) inspections to meet guidelines of IL Home Performance with Energy Star
Measures Offered and Incentive Levels	Measures Offered: The program offers a $50 energy audit to customers. The audit includes a thermal scan, and during the audit the Energy Advisor may install free CFLs or water conservation measures. The audit produces a list of recommended and incented retrofit measures, including duct and air sealing; additional attic, wall, crawl space or rim joist insulation; programmable thermostats; and HVAC equipment and water heater replacement. Customers who use program allies are eligible for the program's insulation and air sealing incentives.	Changed Measure Mix The program fully adopted crawlspace insulation as an installed measure, in support of the HPwES program model. Crawlspace insulation is incentivized by the linear foot, in the same way as the rim joist incentive. The program also removed pre-EISA CFLs and programmable thermostats as incentives. Incentive Level: In PY5, the program established a reservation system and lowered incentive levels midway through the year due to growing demand. In PY6, the program lifted the reservation system and raised incentive levels. On-Bill Financing: The program phased out the On-Bill Financing in August of PY6. [c]
Contractor Training	Description of Trade Ally Development: CSG approves contractors who meet several professional criteria (e.g., licenses, insurance); provides them program orientation training and home performance training; requires BPI-certified technicians (building analysts and envelope professionals); and provides incentives for those who add BPI-certified staff.	The program reduced the training session for experienced contractors to one half-day session. The program also implemented new materials and installation standards. The program held two orientation webinars to explain to trade allies how best to use the new guide developed for these new standards.

[a] Source: Ameren Residential Programs Home Performance with Energy Star Program PY6 Implementation Plan, Submittal Date: 05/01/13

[b] The Illinois Home Performance is a version of the national Home Performance with ENERGY STAR Program. Gold certificates are awarded for homes retrofitted by participating contractors that meet ASHRAE 62.2 ventilation requirements, decreased infiltration rates, and four of five of metrics related to duct sealing, wall insulation, attic insulation, basement/crawlspace insulation, and heating and cooling equipment. Silver certificates are awarded for decreased infiltration rates, and attic insulation. (As retrieved on 11/14/2013 from source: http://www.actonenergy.com/portals/0/forms/IHPflyer.pdf.)

[c] Source: Program portfolio reports: "HPwES PY6 Portfolio Reports."

Participation

Program staff noted that the HPwES Program experienced a dramatic decline in the number of participants, from 4,152 in PY5 to 2,977 in PY6. Staff highlighted several factors that may account for this decrease.[12]

First, a mild fall followed by an especially cold winter may have initially reduced customer demand for weatherization and insulation upgrades, and then hindered trade allies' ability to schedule and complete projects during the coldest months. In addition, customers were no longer able to finance their projects through an on-bill financing program, which may have reduced customer interest and removed a key marketing tool for program partners. Furthermore, because PY5 was such a successful year, the program had to institute a "reservation" system to ensure payment for qualifying projects. These changes in the consistency of the incentives available combined with the uncertainty around funding may have dissuaded program allies from pushing the program as robustly as they had in the past. Program staff also speculated that an improving economy increased interest in larger projects, such as HVAC replacement, which may have taken interest and program ally time away from the HPwES program.

Although HPwES recorded fewer projects completed in PY6 than in PY5, program staff emphasized a shift towards more thorough audits and measure installations in an effort to achieve deeper savings. For example, PY6 saw an increase in the number of participants that received silver and gold Energy Star certificates. As mentioned earlier, homeowners receive Energy Star certificates when they make significant energy efficiency improvements during their home upgrades. The eligibility requirements to receive such certificates include criteria such as a 15% modeled total energy savings (compared to the initial home assessment), a 30% reduction below the baseline building infiltration rate, the installation of Energy Star qualified heating and cooling equipment, and the installation of insulation above defined R-values.[13]

Table 12 shows the number and percentage of homes receiving Energy Star certificates in PY5 and PY6. Although still relatively few program participants receive these certificates, it is worth noting the very large increase in the number and percentage of Energy Star certificates issued in PY6.

Table 12. Number of Homes with Energy Star Certificates by Program Year

Energy Star Certificates	PY5	PY6
Silver	90	511
Gold	5	35
Total	**95**	**546**
% of Program Participants	**2%**	**18%**

The evaluation team used the program-tracking database to examine the average ex ante energy savings per participant for PY5 and PY6. We added up all ex ante energy savings in the program database and divided that sum by the number of program participants. To adjust for potential differences in the savings algorithms across program years, the evaluation team applied the PY5 savings algorithms to the data for both PY5 and PY6 data.

[12] Please note that the evaluation team did not interview contractors to confirm these potential determinants of low program participation.

[13] Note that homeowners do not need to satisfy all criteria listed.

From this analysis, we found a 32% increase in the average (per participant) ex ante electricity savings. The key reasons for this increase were higher average savings for CFLs and air sealing.[14] These findings help support the insights from our program staff interviews, which highlighted a shift in PY6 toward more comprehensive retrofits.

Measures Installed

Table 13 shows how many households received measures and how many measures they received. Lighting and air sealing were the most frequently installed measures.

Table 13. Overview of PY6 Participation by Measure Category

Project Type	Database Population		Unit
	Households [a]	Measures	
CFLs	1,546	25,842	Bulb
Air Sealing	1,431	2,432,108	CFM Reduction
Attic Insulation	1,154	1,518,730	SF
Showerheads	1,072	1,668	Showerhead
Faucet Aerators	1,060	2,558	Aerator
Rim Joist Insulation	907	122,942	LF
Wall Insulation	569	436,628	SF
Crawlspace Insulation	397	57,634	LF
Water Heater Temperature Adjustment	164	171	Water Heaters
Total Households	2,977	NA	n/a

[a] This is the number of households in which each measure type was installed.

4.2.1 Participant Survey Results

As noted earlier, the evaluation team surveyed 238 HPwES Program participants, including 14 ESHP customers. Table 14 provides an overview of HPwES participant demographics.

Table 14. Overview of Surveyed Participant Demographics

Demographics[15]	HPwES (n=238)
Single-Family Detached Home	90%
Over 60 years old	51%
Household income over $50,000	50%

Our participant survey covered a variety of topics including perceived barriers to program participation, marketing and outreach, and program satisfaction. In the remainder of this section, we highlight the survey

[14] The higher average savings for CFLs were largely driven by an increase in the number of bulbs installed, which does necessarily equate to more comprehensive retrofits.

[15] While we do not have data available to assess how closely our sample demographics match the AIC territory population, we do know that our sample characteristics match very closely to the PY4 participant survey sample.

findings in these areas. We report our results at the program level and by different customer segments (i.e., audit only, incentive only, and audit and incentive).[16]

Program Barriers

In the survey, we asked all respondents (n=238) to think of any reasons why people might not participate in this program. Overall, 26% of HPwES responses targeted money as a perceived barrier to participation in the program. An additional 25% of responses signaled either a lack of program awareness (14%) or a lack of understanding of the program's purpose (11%).

Table 15. Perceived Barriers to Customer Participation in the Program (Multiple Responses)

Perceived Barriers to Program Participation	% of HPwES Responses
No Reason/Nothing	32%
Money	26%
Not aware of the program	14%
Don't understand purpose	11%
Time	7%
Other	6%
Strangers in the house/don't trust the program	4%
Don't want to be pressured into purchases	3%
Unconcerned with saving energy	3%
Don't know	2%
Don't want improvements/already efficient/new home	1%

Barriers to "CSG-Audit Only" Customers

Overall, 55% of the program participants we surveyed were classified as "audit only." We asked this subset of survey respondents whether they had received any recommendations for their home and whether they had implemented or planned to implement any of those recommendations.

Table 16. "CSG-Audit Only" Participants' Plans to Complete Recommendations[17]

"Audit only" participants who...	% of HPwES Respondents
Received recommendations during audit (n=130)	85%
Indicated that they completed some energy savings recommendations (n=112)	63%[18]
Plan to complete any of the remaining recommendations (n=101)	61%

[16] Please note that we broke out our results into these different customer segments by using the participant type flags in the PY6 program tracking database.

[17] Please note that the sample size differences for these three questions reflect the skip logic of our survey. For instance, if a respondent noted that they did not receive a recommendation, they did not pass through to the remaining questions pertaining to audit recommendations.

[18] This percentage is likely inflated due to many respondents associating the installation of direct install measures with audit recommendations.

We asked the respondents who had not implemented all recommendations which ones they were unlikely to complete. Overall, 30% of respondents indicated they intend to complete all recommendations, while 21% noted that attic, wall, or other insulation were unlikely to be completed.

Table 17. HPwES Recommended Improvements Unlikely to be Completed (Multiple Responses)

Recommendations Unlikely to be Completed by "Audit Only" Participants	% of HPwES Responses (n=100)
None (indicating will do all recommendations)	30%
Don't know	30%
Attic, wall, or other insulation	21%
Other	5%
High efficiency furnace/boiler/heat pump	4%
Air Sealing	3%
Duct sealing or insulating	2%
Low-flow shower heads	1%
CFL bulbs	1%
Programmable Thermostat	1%
Faucet Aerators	0%

When asked why these recommendations were unlikely to be completed, 37% of the HPwES responses indicated project cost as the primary barrier, followed by the savings not being worth the effort (10%) and participants being too busy or not having time to complete all recommendations (10%).

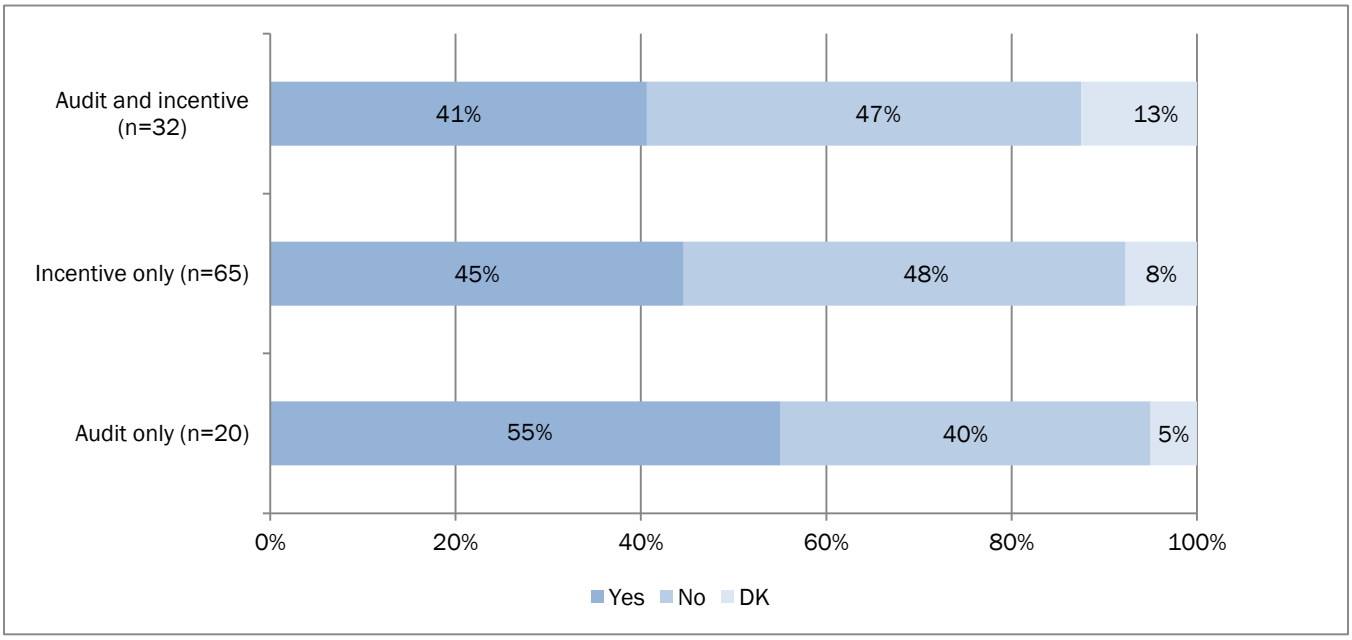
Table 18. Reasons for not Going Forward with HPwES Recommended Measures (Multiple Responses)

Why "Audit Only" Participants are Unlike to Complete Recommendations	% of HPwES Responses (n=41)
Project cost	37%
Savings not worth the effort	10%
Too busy/ Too much time	10%
Other	10%
Unfavorable view of equipment offered	7%
Planning to complete at some point	5%
Not interested	5%
Refused	5%
Don't know	4%
Program allies/Contractor are not available	2%

The results from the survey section on program barriers suggest that a subset of audit only participants may still be considering additional audit recommendations. Currently, the HPwES program does not follow up with participants who receive an audit, but do not install incentivized measures. We understand there can be significant lag between the time an audit occurs and the homeowner decides to install shell measures; however, our survey results suggest that there is a segment of audit only participants who may benefit from additional encouragement to follow through on audit recommendations.

We asked a subset of respondents about on-bill financing and whether having a financing option would make respondents more likely to participate in the program (and complete more recommendations). Overall, 45% of participants indicated an interest in on-bill financing as a way to pay for the installation of additional measures. Figure 2 provides responses by participant type.

Figure 2. Consideration of On-Bill Financing by Participant Type



For those respondents who indicated they would be interested in an on-bill financing option, the evaluation team provided the actual interest rate (4.99%) used previously in Ameren's on-bill financing programs. Respondents were asked to rate on a 0 to 10 scale (where 0 is "not at all likely" and 10 is "extremely likely") how likely they would have been to install additional measures given this financing option. We found that 50% of these respondents (n=27) gave a score of six or above.

Barriers to Obtaining an Audit for "Incentivized-Only" Participants

Consistent with the recommendations of previous evaluations, HPwES has focused on promoting the program through program allies. In PY6, 34% of participants received incentivized measures without receiving an HPwES audit through CSG Energy Advisors.

As part of our survey, we asked these incentivized-only participants whether they knew they were eligible to receive a home energy audit prior to receiving program incentives for air sealing and insulation. Nearly two-thirds (62%) of respondents were unaware of their eligibility for an audit. The remaining 38% noted they were not interested in an audit, already knew what work was necessary, or felt that the audit was too costly.

4.2.2 Marketing & Outreach

Marketing & Outreach Findings

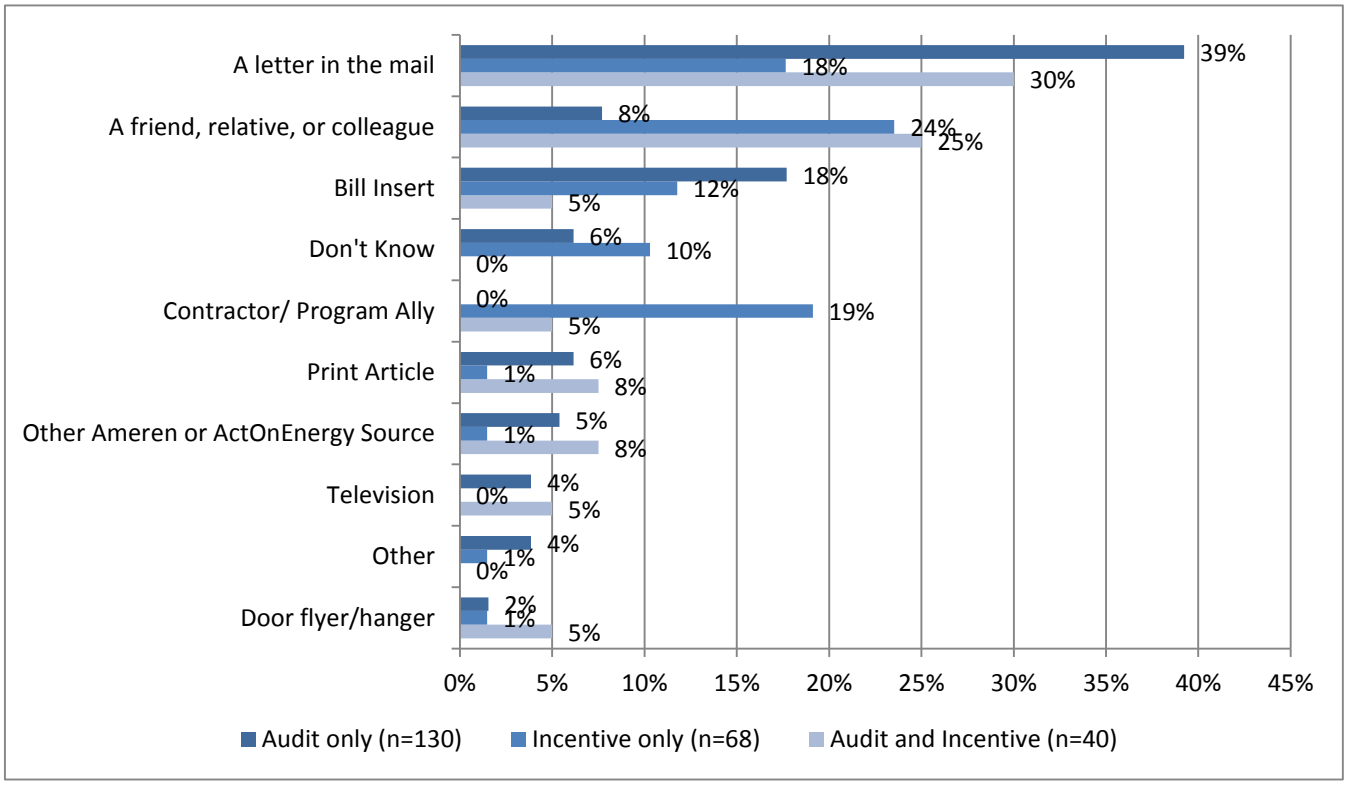
In PY6, the HPwES Program marketed to participants primarily through a targeted direct mail campaign to distinct geographic subsets of the AIC customer base. According to the Program Implementation Plan, CSG

uses customer usage data from AIC and past audit participation trends to stratify customers by expected probability of response based on heating and cooling loads, age and size of home, income range, number of residents, etc. The program also leverages print ads, bill inserts, and home shows to help increase participation.

To explore the effectiveness of these strategies, we asked survey respondents to describe how they became aware of the program. Participants reported hearing about the program through various channels, including a letter in the mail (32%); a friend, relative, or colleague (15%); a bill insert (14%); or a program ally (6%).

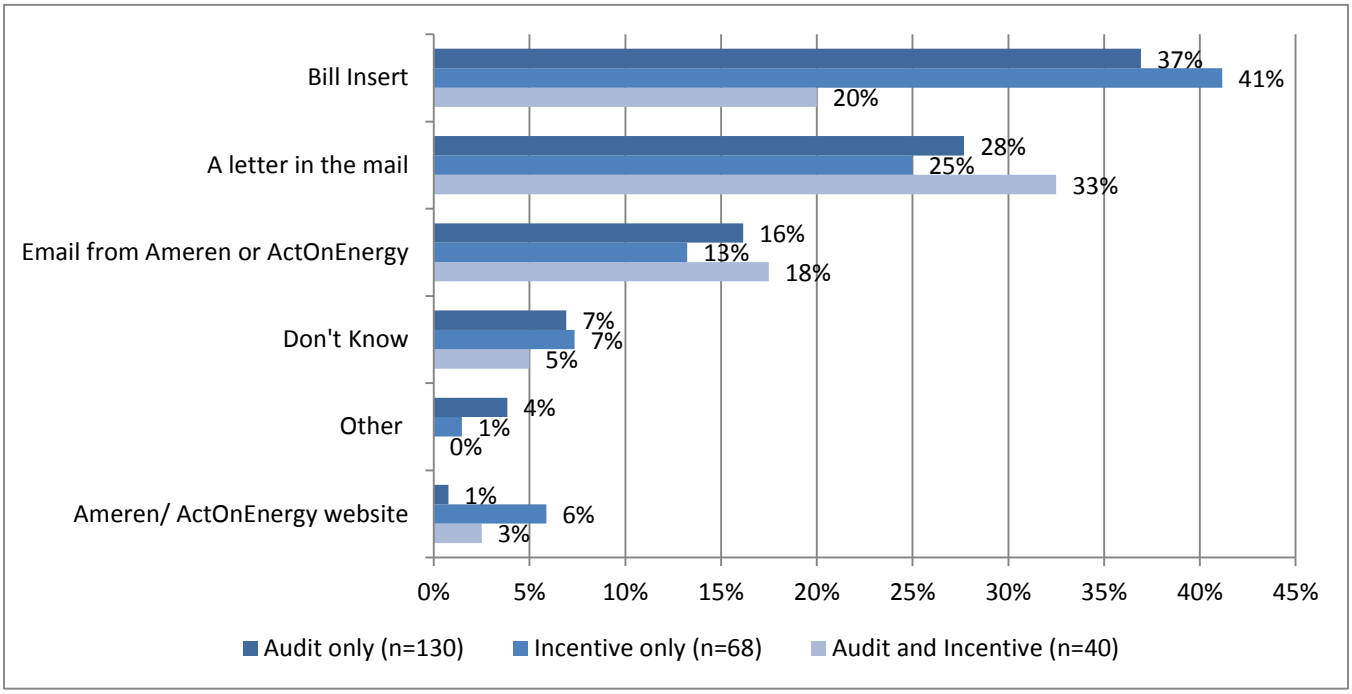
Figure 3 provides responses by participant type (i.e., audit only, incentive only, and audit and incentive). As expected, incentive only participants tended to hear about the program through a friend, relative, or colleague (24%), followed by a contractor or program ally (19%). The primary avenue by which audit only participants learned about the program was a letter in the mail—the direct marketing approach (39%)—followed by a friend, relative, or colleague (24%). Participants who received both an audit and a rebate heard about the program from a variety of channels, including a letter in the mail (30%); friend, relative, or colleague (25%); contractor/program ally (5%); print article (8%); and television (5%).

Figure 3. How Participants Heard About the HPwES Program (Multiple Responses)



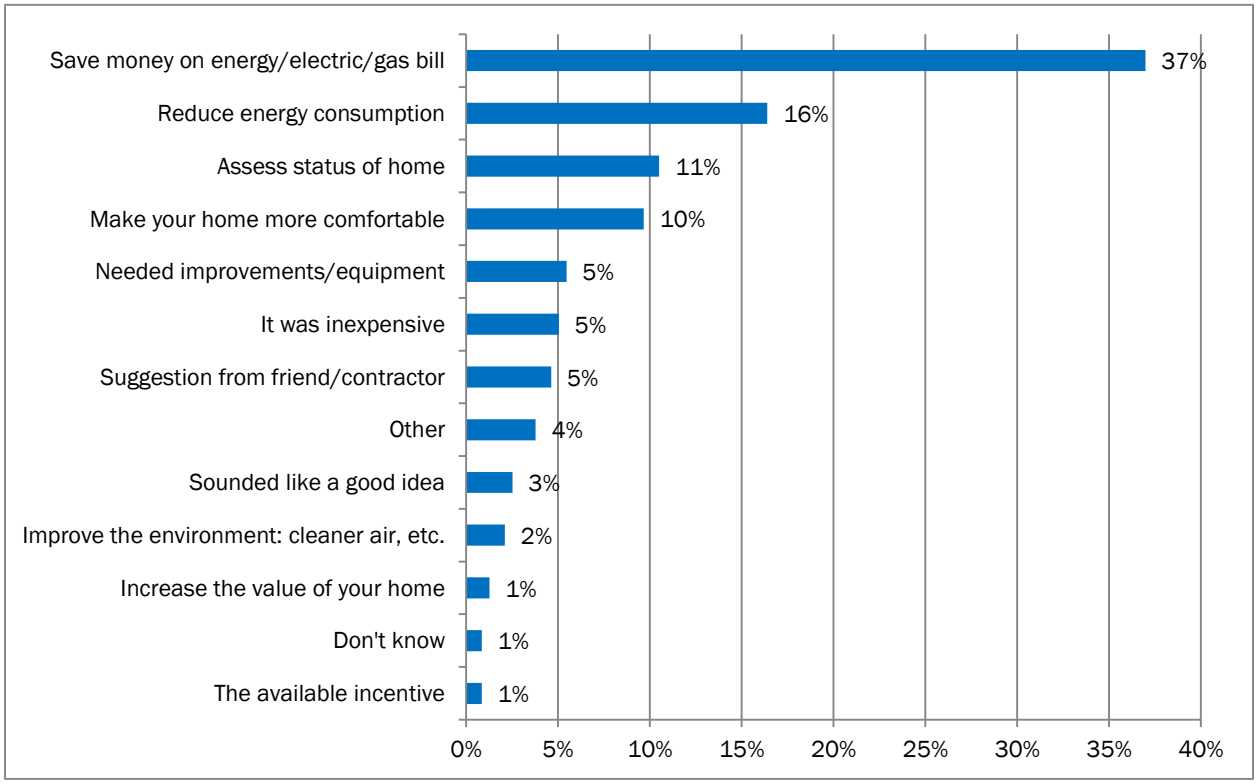
We also asked respondents to share some of the best ways for AIC to inform its customers about the program. Respondents indicated that bill inserts (35%), AIC letters (28%), and emails (16%) were the best ways to increase awareness of the program. We display these results by participant type below in Figure 4. We report few differences among different participant types, though audit only and incentive only participants prefer sharing information through bill inserts, while audit and incentive participants prefer letters in the mail.

Figure 4. Best Ways for Ameren to Inform You about HPwES Program (Multiple Responses)



In addition to exploring program awareness, the survey also asked all respondents (n=238) to indicate their reason(s) for participating in the program (see Figure 5). Not surprisingly, a majority of respondents (37%) mentioned saving money on energy bills as a primary reason for their participation. Respondents also noted reducing energy consumption (16%) and making their home more comfortable (10%) as important factors as well.

Figure 5. Reasons for Participating in the HPwES Program (Multiple Responses)

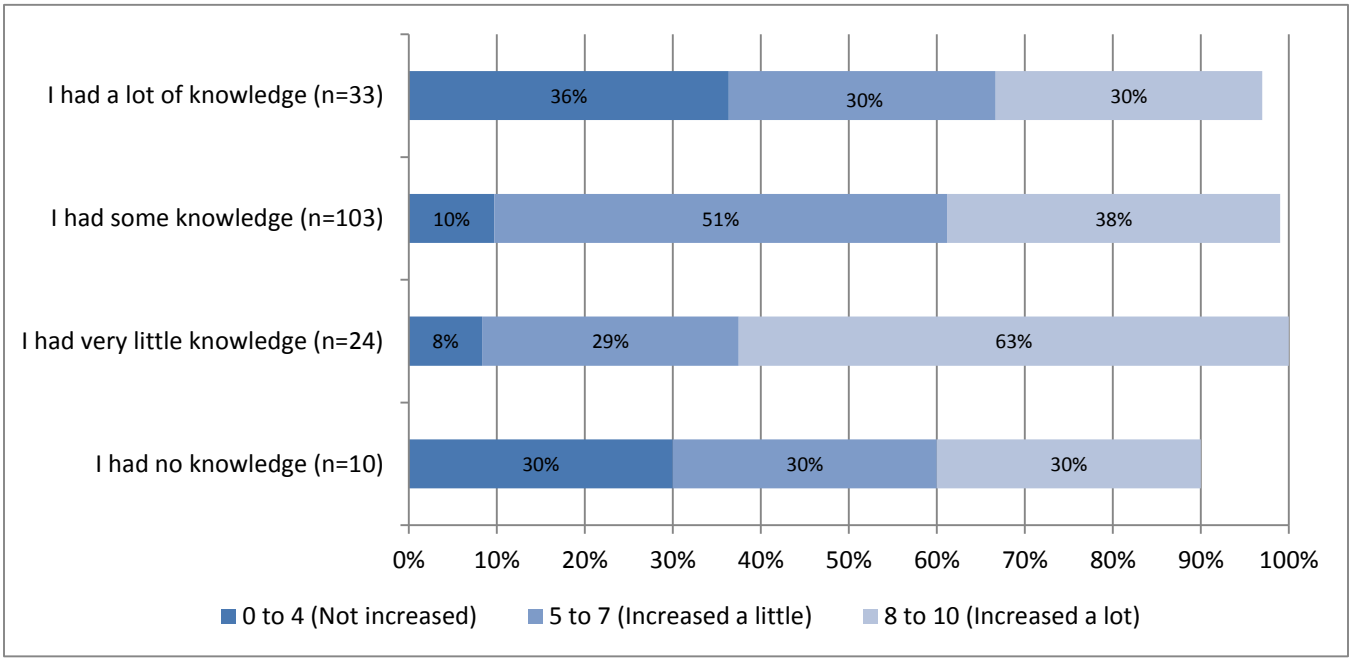


As noted earlier, program allies also directly market the program to customers. According to program materials, CSG assisted HPwES allies in creating or correcting their co-branding for advertising materials and in creating customizable fliers. To assess the effectiveness of program ally marketing of the HPwES program, we examined our results to determine why incentive only survey respondents chose to participate in the HPwES program. We found the most frequent reason for participating was to save money on energy bills (38%), followed by reducing energy consumption (20%). Only 5% of incentive only participants mentioned the trade ally recommendations as a factor in their decision.

Participant Knowledge of Energy Efficiency

The survey also examined whether participation in the program led to self-reported increases in energy efficiency knowledge. We found that 43% of HPwES respondents indicated their knowledge increased a little due to the program, while 39% indicated their knowledge had increased a great deal. We also categorized respondents by how much they knew about home energy improvements before they received a home energy audit. As shown in Figure 6, respondents who had less knowledge before the audit tended to have larger increases in knowledge, while those who knew a great deal before the audit did not increase their knowledge of home energy improvements as much.

Figure 6. Increase in HPwES Participant Knowledge of Home Energy Improvements as a Result of Audit



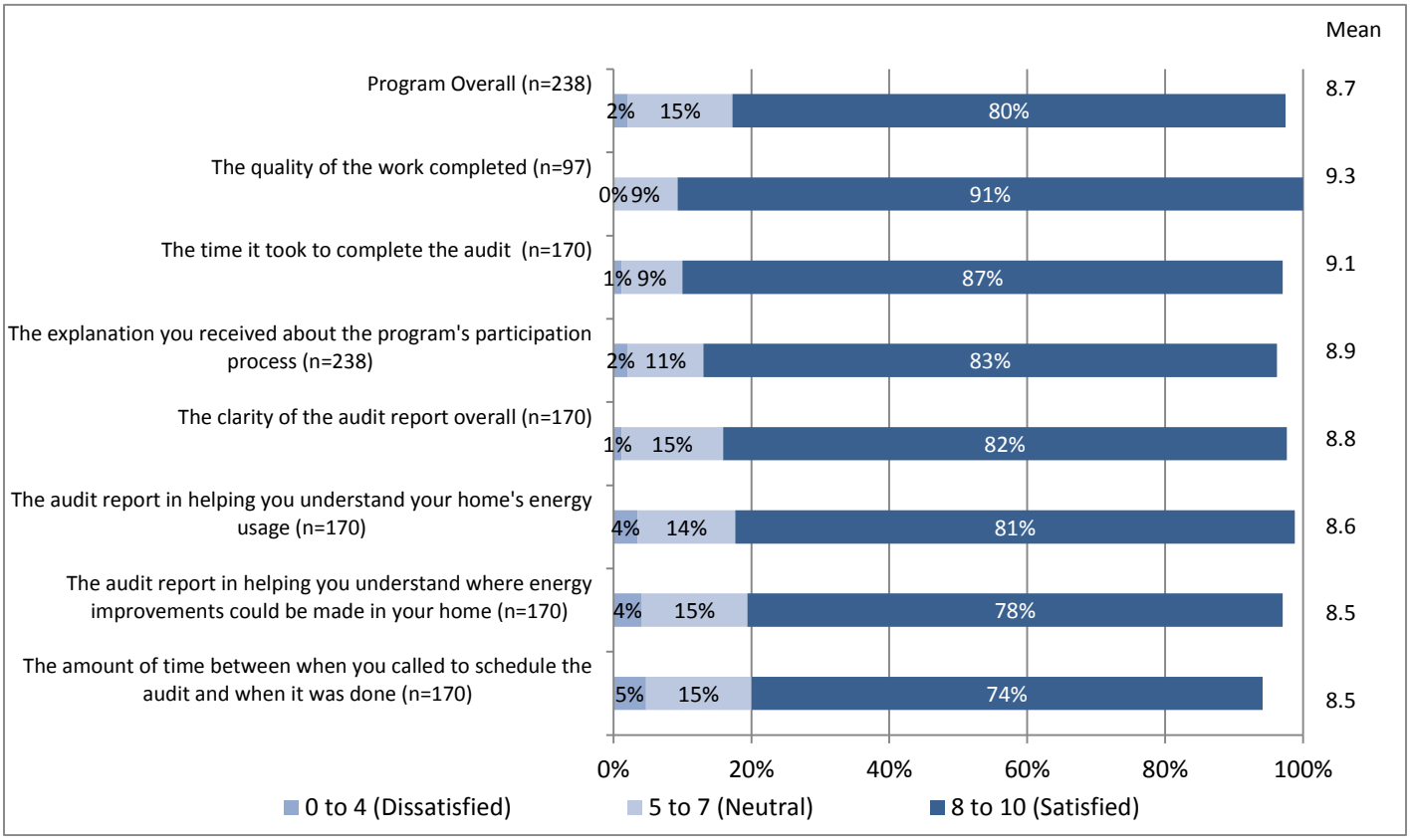
[a] Numbers do not equal 100 because the percentage of respondents that chose "Don't know" or "N/A" is not displayed.

4.2.3 Program Satisfaction

Program Component Satisfaction

The survey also assessed participant satisfaction with the program. Figure 7 shows HPwES respondent satisfaction with various program components. A large majority of respondents (80%) were satisfied with the program overall (i.e., they gave it a score of 8 or above on a scale of 0 to 10, where 0 is dissatisfied and 10 is satisfied). Respondents were most satisfied with the quality of work completed (mean score of 9.3) and the time it took to complete an audit (mean score of 9.1). Program participants were relatively less satisfied with the audit report in helping to understand the home's overall energy use (mean score of 8.5), although these satisfaction scores were still quite high.

Figure 7. HPwES Satisfaction with Program Components

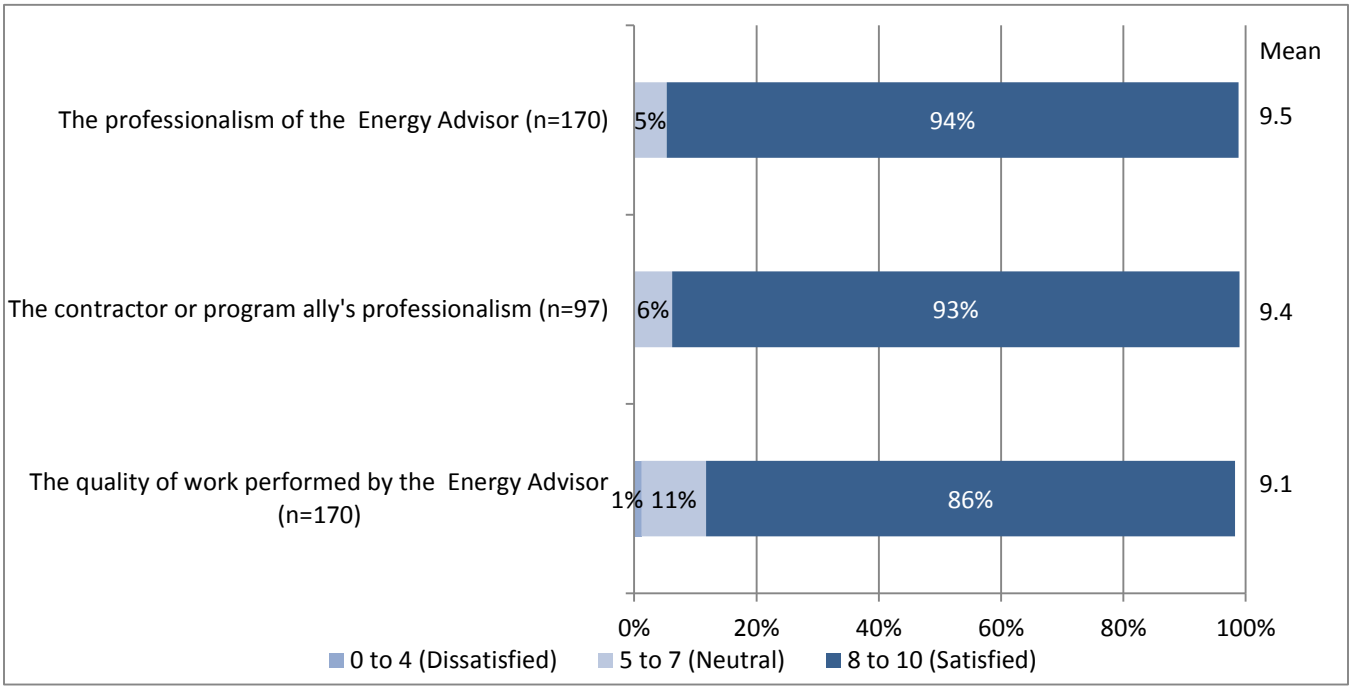


[a] Numbers do not equal 100 because the percentage of respondents that chose "Don't know" or "N/A" is not displayed

Satisfaction with Program Staff

Figure 8 shows respondent satisfaction with the HPwES Program staff that provides services to participants (i.e., Energy Advisor and program allies). Respondents were very satisfied with program staff; the lowest mean score was 9.1. Respondents were most satisfied with the professionalism of the Energy Advisor and program ally.

Figure 8. HPwES Satisfaction with Program Staff

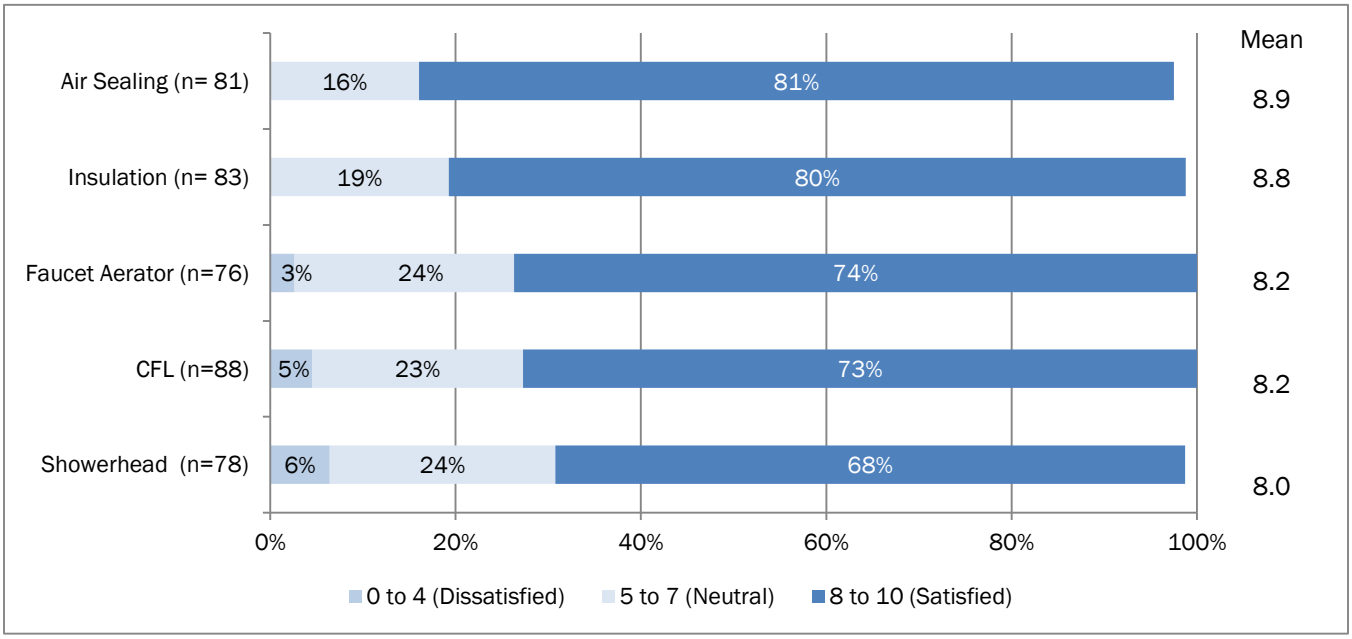


[a] Numbers do not equal 100 because the percentage of respondents that chose "Don't know" or "N/A" is not displayed

Measure Satisfaction

The evaluation team asked respondents to share how satisfied they are with the measures installed through the program (see Figure 9). Each measure offered received a mean satisfaction score greater than 8 (on a scale of 0 to 10, where 0 is dissatisfied and 10 is satisfied), thus indicating high levels of satisfaction across the board. We found that respondents were most satisfied with air sealing and less satisfied with low-flow energy-efficient showerheads.

Figure 9. HPwES Measure Satisfaction



[a] Numbers do not equal 100 because the percentage of respondents that chose "Don't know" or "N/A" is not displayed

A few respondents expressed dissatisfaction with the program measures. The evaluation team analyzed their open-ended responses to our measure satisfaction survey questions. We found that, for the water measures (showerheads and faucet aerators), these respondents were dissatisfied with the water pressure that came from the items. The primary reasons for respondents' dissatisfaction with CFLs were the time it took the bulbs to reach full brightness and the poor quality of their light. Respondents were dissatisfied with air sealing and insulation measures primarily because the measures did not reduce their bills as much as anticipated or because they found the work to be of poor quality or incomplete.

4.2.4 Program Improvements

We finished the survey by asking respondents (n=221) about potential program improvements. Most indicated they had no suggestions for program improvement, but those who did focused on improving the clarity and availability of information from Ameren, on increasing advertising, and on increasing rebates and incentives.

Table 19. Program Improvement Suggestions (Multiple Responses)

Program Improvement Suggestions	% of HPwES Responses
Nothing	41%
Don't know	15%
Improve clarity/more available information/follow-up	12%
More rebates/incentives	11%
Other	7%
More advertising	6%
Easier access to different contractors/auditors/program allies	3%
Speed up process	3%
More thorough audit	2%
Improve implementation of measures	1%

4.3 Impact Assessment

For the engineering analysis, the evaluation team applied the Statewide TRM Version 2 savings algorithms using program-tracking database inputs and the PY4 HEP Program measure-specific net-to-gross ratios (NTGRs) to determine PY6 net savings.

Program Database

We received from CSG a program-tracking database that included HPwES and ESHP projects. The evaluation team found that the database does not provide calculations for how ex ante gross savings values are derived per measure. Also, the following improvements could be made to the database's data tracking:

- **Flag heating fuel type for all project types**. The database inconsistently flags space heating fuel type for projects. Currently, it flags space heating fuel type only for participants who have applied for incentive-based measures (i.e., shell measures). If all projects provided a heating fuel type, evaluators could assess whether the gross savings values assigned per project reflect heating fuel type and whether incentive values or savings values are accurate when discrepancies occur.

- **Flag ESHP customers in database**. The database variable "AUDIT_AIR SEAL" is used to classify customers as either ESHP or HPwES participants. Upon review of the ex ante savings values, we identified a number of cases where ESHP participant records applied both electric and gas ex-ante deemed savings for air sealing measures. CSG commented that, while ESHP is available to customers with electric heat only, auditors found that a number of ESHP homes had gas space heating as their primary fuel type. Regardless of gas heating and non-compliance with ESHP program requirements, savings for these ESHP homes were included in the ESHP database since energy efficient measures were performed. In addition, the evaluation team noticed that customers with the same account numbers were flagged as ESHP participants for some measures and as HPwES participants for others. Because the "AUDIT_AIR SEAL" flag was inconsistently assigned to participants, ex post savings were not reported separately for the ESHP and HPwES programs.

In addition to analyzing program-tracking flags, we compared the ex ante PY4 NTGR (i.e., values that AIC expected to apply to PY6 measures) to ex ante NTGRs found in the program-tracking database. We found minor differences in the gas NTGR for faucet aerators, showerheads, air sealing, and wall insulation (see Table 20, below).

Table 20. PY6 and Program Database NTGR, by Measure

Measure Description	PY6 Electric		PY6 Gas	
	Deemed NTGR*	Program Database NTGR	Deemed NTGR*	Program Database NTGR
CFL - 13 to 15 Watt	0.97	0.97	NA	NA
CFL - 18 to 20 Watt	0.97	0.97	NA	NA
CFL - 23 to 25 Watt	0.97	0.97	NA	NA
Specialty CFL - 9W candelabra	0.97	0.97	NA	NA
Specialty CFL - 14W globe	0.97	0.97	NA	NA
Specialty CFL - 15W reflector	0.97	0.97	NA	NA
Faucet Aerators	0.86	0.82	0.75	0.76
Low-Flow Showerheads	1.05	0.91	0.82	0.85
Air Sealing	0.88	0.89	0.83	0.83
Attic Insulation	0.88	0.86	0.80	0.80
Wall Insulation	0.88	0.86	0.80	0.80
Crawl Space Insulation	0.88	0.86	0.80	0.80
Rim Joist Insulation	0.88	0.86	0.80	0.80
Water Heater Temperature Adjustment	1.00	1.00	1.00	1.00

*Source: Electric and Gas NTGRs sourced from PY4 HEP report.

In-Service Rate Adjustments

The evaluation team also used the results from the participant survey to adjust in-service rates for direct install and shell measures. We asked sampled participants to confirm program-tracking measure quantities and, if necessary, provide the corrected quantity. We also asked participants to confirm whether program measures were still installed in their homes. Table 21 provides the survey-derived verification rates for each measure category.

Table 21. PY6 HPwES In-Service Rates by Measure Category

Measure	In-Service Rate
CFLs	0.96
Faucet Aerators	0.96
Showerheads	0.96
Insulation	0.99
Air Sealing	1.0

4.3.1 Gross Impacts

The evaluation team conducted an engineering analysis to derive PY6 HPwES gross impacts. Table 22 summarizes these results.

Table 22. PY6 HPwES Gross Impacts

Program Component	Number of Participants	Ex Ante Gross[a]			Ex Post Gross		
		kWh	kW	Therms	kWh	kW	Therms
HPwES	2,977	4,536,890	2,112	463,638	4,260,899	2,163	503,875
Gross Realization Rate[b]					94%	102%	109%

[a] Source of ex ante savings: PY6 program-tracking database.
[b] The gross realization rate is calculated as the PY6 gross ex post savings divided by the PY6 ex ante gross savings.

Detailed Results

Below we provide gross impact results by measure. We calculated ex post gross savings using inputs and algorithms from the 2013 (V2.0) Illinois TRM. CSG provided the evaluation team with documentation of the inputs and algorithms to calculate ex ante savings. The gross realization rates were 94% for electric savings, 102% for demand savings, and 109% for gas savings

Table 23. PY6 HPwES Program Gross Impacts by Measure (Includes ESHP Participants)

Measure	Ex Ante Gross Impacts			Ex Post Gross Impacts [a]			Gross Realization Rate [b]		
	kWh	kW	Therms	kWh	kW	Therms	kWh	kW	Therms
CFL – 13 to 15 Watt	367,822	41.63	-	380,248	40.33	-	103%	97%	NA
CFL – 18 to 20 Watt	75,794	8.66	-	82,504	8.75	-	109%	101%	NA
CFL – 23 to 25 Watt	99,605	11.27	-	105,220	11.16	-	106%	99%	NA
Specialty CFL - 9W candelabra	155,707	16.12	-	164,479	15.82	-	106%	98%	NA
Specialty CFL - 14W globe	313,033	32.52	-	330,653	32.39	-	106%	100%	NA
Specialty CFL - 15W reflector	123,286	13.94	-	130,242	13.81	-	106%	99%	NA
Faucet Aerator – Electric	25,374	12.38	-	25,758	12.47	-	102%	101%	NA
Faucet Aerator – Gas	-	-	3,679	-	-	3,743	NA	NA	102%
Showerhead – Electric	158,911	10.24	-	155,562	10.03	-	98%	98%	NA
Showerhead – Gas	-	-	19,331	-	-	18,925	NA	NA	98%
Air Sealing	2,302,982	1,713.84	245,559	2,079,694	1,718.84	270,207	90%	100%	110%
Attic Insulation	496,784	122.99	80,585	396,183	137.48	80,096	80%	112%	99%
Wall Insulation	215,954	99.44	72,352	197,130	113.82	87,869	91%	114%	121%
Rim Joist Insulation	82,331	19.13	18,729	116,393	32.60	34,265	141%	170%	183%
Crawlspace	117,838	9.77	22,417	98,471	15.29	7,784	84%	156%	35%

Measure	Ex Ante Gross Impacts			Ex Post Gross Impacts [a]			Gross Realization Rate [b]		
	kWh	kW	Therms	kWh	kW	Therms	kWh	kW	Therms
Water Heater Temperature Adjustment – Electric WH	1,469	0.17	-	1,469	0.17	-	100%	100%	NA
Water Heater Temperature Adjustment – Gas WH	-	-	986	(3,107)	-	986	NA	NA	100%
Total	**4,536,890**	**2,112.09**	**463,638**	**4,260,899**	**2,162.96**	**503,875**	**94%**	**102%**	**109%**

Note: Numbers may not total due to rounding.
[a] Ex post gross impacts are based on the application of Illinois V2.0 (2013) TRM derived savings values to verified participation numbers.
[b] Gross Realization Rate = ex post gross value / ex ante gross value.

Differences in ex post and ex ante gross savings stem from differences in input values for the savings algorithms for each measure. Through our discussions with CSG, we identified the sources of these differences. Table 24 summarizes these findings.

Table 24. Gross Realization Rates per Measure

Measure	kWh RR	kW RR	Therms RR	CDD, HDD, FLH	Pre & Post R-Value	Framing Factor	Waste Heat Factors	Other (Specified)
Rim Joist Insulation	141%	170%	183%	X	X	X		- Misapplied ex ante per-unit value for homes with CAC - Height of installed rim joist insulation
Lighting (CFLs)	103% - 109%	97% - 101%	NA				X	
Wall Insulation	91%	114%	121%	X	X			- Misapplied ex ante per-unit value for homes with CAC
Air Sealing	90%	100%	110%	X				- Misapplied ex ante per-unit value for homes with CAC - Latent Multiplier - IL TRM CFM Conversion Factor (Nheat)
Crawl Space Insulation	84%	156%	35%	X	X			- Misapplied ex ante per-unit value for homes with CAC
Attic Insulation	80%	112%	99%	X	X	X		- Misapplied ex ante per-unit value for homes with CAC

Measure	kWh RR	kW RR	Therms RR	CDD, HDD, FLH	Pre & Post R-Value	Framing Factor	Waste Heat Factors	Other (Specified)
Faucet Aerator	102%	101%	102%					
Showerheads	98%	98%	98%					
Water Heater Temperature Adjustment	100%	100%	100%					

Inputs for air sealing and insulation measures have the largest impact on program-level realization rates. Because air sealing measures account for 51% of the kWh program savings, and insulation measures account for 20% of the kWh program savings, any differences within these measures affect the program savings significantly. We describe the differences in the ex ante and ex post savings calculations for these two measures as well as CFLs in detail below. Note that, while certain inputs may increase savings, others decrease savings. The combination of all inputs brings about the overall realization rate for a specific measure.

- **CDD, HDD, and Full Load Cooling Hours (FLHclg):** CSG applied the CDD, HDD, and FLHclg input values for Springfield to all projects regardless of location to estimate ex ante savings, while the evaluation team used input values appropriate for the location of each participating home. Using location-appropriate values for these inputs as directed by the TRM yields ex post per-unit savings estimates for shell measures that are on average 8% lower than the ex ante due to the change in HDDs (i.e., fewer HDDs) and 1% lower due to the change in CDDs.

- **Pre and Post R-Value:** CSG applied the same pre-existing and post-retrofit R-values for all participants to estimate ex ante savings despite the availability of actual pre-existing and post-retrofit R-values in the database. The evaluation team, however, used the actual pre and post R-values from the database to calculate ex post savings per participant. As a result, the per-unit savings for shell measures increased by an average of 8%.

- **Framing Factor (Attic Insulation)**: The savings algorithm for attic insulation in the Statewide TRM Version 2 stipulates that the framing factor for attic insulation be divided by two. Ex ante calculations did not divide the framing factor by two, except in cases where savings are claimed for electric cooling only, and as such underestimated savings. The per-unit savings for attic insulation increased by 8% when dividing the framing factor by two.

- **Framing Factor (Rim Joist Insulation):** Ex ante calculations for rim joist insulation underestimate savings by including a framing factor of 0.15, which assumes that insulation is installed in either the studs or cavity. According to the Statewide TRM Version 2, a framing factor of zero should be used for spray foam insulation and 0.15 for cavity insulation. Ex post calculations applied a framing factor of zero for participants who installed spray foam rim joist insulation (75%) and for participants where the type of rim joist insulation is unknown (21%). A framing factor of 0.15 was applied for those who installed rigid rim joist insulation (4%). As a result, the per-unit savings increased by 16% when applying framing factors based on the type of installed rim joist insulation (spray foam vs. cavity).

- **Height of Rim Joist Insulation:** The tracking database includes only the linear feet of installed rim joist insulation and does not indicate the rim joist height. CSG applied a rim joist height value of 11.2" to calculate ex ante savings, while the evaluation team used a value of 12" to calculate ex post savings. The database shows that 96% of participants who installed rim joist insulation used

spray foam insulation, which is often irregular and uneven in depth between joists. We believe it is best to slightly overestimate the rim joist height to account for the imprecise installation of spray foam insulation. The per-unit savings increased by 8% when assuming a rim joist height of 12".

- **Waste Heat Factors***:* Consistent with past evaluations and per agreements between ICC staff and AIC regarding the treatment of waste heat factors, we did not include waste heat factors for lighting in the calculation of ex post savings, but we will include calculations with waste heat factors for the cost-effectiveness analysis.[19] The discrepancy in realization rate is due to the inclusion of waste heat factors for electric heating in the ex ante savings, which is an average 6.35% kWh penalty. The average kWh realization rate for ex post savings for lighting measures is 106%. Had we applied the electric waste heat factors, the ex post values would have been reduced and the realization rate would have been close to 100%.

- **Latent Multiplier for Air Sealing:** The latent multiplier accounts for latent cooling demand for air sealing measures and is dependent on project location. The ex ante savings calculations applied the latent multiplier for Springfield to all projects regardless of their location. The ex post calculations applied the latent multiplier for each project's actual location. As a result, the per-unit savings for air sealing measures decreased by an average of 3%.

- **Nheat for Air Sealing:** The Nheat conversion factor (converting CFM50 to CFMnat) is based on the climate zone, building height, and level of wind exposure. The ex ante savings calculations applied a Nheat of 16.7 (assuming 1.5 stories) to all homes. The database does not include the number of stories per participant, and, therefore, ex post calculations used the average Nheat of 15.75 since we did not know how many stories a single home had. Because this ex post input value is lower than the ex ante value, the per-unit savings for air sealing measures increased by an average of 5%.

- **Misapplied Ex Ante Per Unit Value:** For customers with cooling only (68% of participants with shell measures), the per-unit ex ante values found in the program database for attic insulation, rim joist insulation, wall insulation, crawlspace insulation, and air sealing are inconsistent with the per unit values in a secondary source received from CSG. The ex ante per-unit values in the database apply the sum of the per-unit values for cooling and runtime savings due to reduced heating loads (for those with gas heating) to all participants with cooling only. However, the database includes separate measure labels for participants with runtime savings. In other words, ex ante per-unit values for runtime savings are applied twice for these participants since runtime savings are accounted for in the cooling-only measures and then once again in the runtime savings measures. As a result, ex ante savings are double-counted for these participants. In addition, not all participants with cooling only have gas heat, but the ex ante per-unit value assumes that this is the case. Once we made these adjustments, the per-unit ex post savings for customers with cooling only decreased by an average of 42%. While the majority of participants who installed shell measures saw an average decrease in per-unit ex post savings of 42%, overall program savings were not significantly affected because the savings for those affected by the double-counting issue were relatively small. Nevertheless, we recommend that the cooling-only and runtime savings be assigned separately to avoid double counting runtime energy savings.

[19] Appendix B provides the program savings with these factors included.

4.3.2 Net Impacts

Following the NTGR framework, we applied the NTGR values available prior to the start of the program year (PY4).[20] Ex post net savings were calculated by applying the PY4 HEP measure-specific NTGRs to obtain PY6 net savings (see Table 25, below).[21]

Table 25. PY6 HPwES Program Net Impacts

Program Component	# of Participants	Ex Ante Net			Ex Post Net		
		kWh	kW	Therms	kWh	kW	Therms
HPwES	2,977	4,107,639	1,882	380,259	3,882,726	1,916	411,594
Net Realization Rate					**95%**	**102%**	**108%**

In Table 26, we provide the net impact results by measure.

Table 26. PY6 HPwES Net Impacts by Measure

Measure	*Ex Ante* Net Impacts			*Ex Post* Net Impacts [a]			Net Realization Rate [b]		
	kWh	kW [c]	Therms	kWh	kW	Therms	kWh	kW	Therms
CFL - 13 to 15 Watt	356,787	40.38	NA	368,841	39.12	NA	103%	97%	NA
CFL - 18 to 20 Watt	73,521	8.40	NA	80,029	8.49	NA	109%	101%	NA
CFL - 23 to 25 Watt	96,617	10.93	NA	102,063	10.82	NA	106%	99%	NA
Specialty CFL - 9W candelabra	151,036	15.64	NA	159,545	15.35	NA	106%	98%	NA
Specialty CFL - 14W globe	303,642	31.54	NA	320,734	31.42	NA	106%	100%	NA
Specialty CFL - 15W reflector	119,587	13.52	NA	126,334	13.40	NA	106%	99%	NA
Faucet Aerator - Electric	20,807	10.15	NA	22,152	10.72	NA	106%	106%	NA
Faucet Aerator - Gas	NA	NA	2,796	NA	NA	2,808	NA	NA	100%
Showerhead - Electric	144,609	9.32	NA	163,340	10.54	NA	113%	113%	NA
Showerhead - Gas	NA	NA	16,431	NA	NA	15,518	NA	NA	94%
Air Sealing	2,054,389	1,526.27	204,779	1,830,131	1,512.58	224,271	89%	99%	110%
Attic Insulation	427,234	105.77	64,468	348,641	120.98	64,076	82%	114%	99%
Wall Insulation	185,721	85.52	57,881	173,475	100.16	70,295	93%	117%	121%
Rim Joist Insulation	70,880	16.45	14,983	102,426	28.69	27,412	145%	174%	183%

[20] Source: Electric NTGRs sourced from the PY4 HEP report.

[21] We applied these ratios to ESHP as well because the program had no primary data collection and is embedded within HPwES.

Measure	*Ex Ante* Net Impacts			*Ex Post* Net Impacts [a]			Net Realization Rate [b]		
	kWh	kW [c]	Therms	kWh	kW	Therms	kWh	kW	Therms
Crawl Space Insulation	101,341	8.40	17,934	86,655	13.45	6,227	86%	160%	35%
Water Heater Temperature Adjustment – Electric WH	1,469	0.17	NA	1,469	0.17	NA	100%	100%	NA
Water Heater Temperature Adjustment – Gas WH	NA	NA	986	(3,107)	NA	986	NA	NA	100%
Total	**4,107,639**	**1,882.46**	**380,259**	**3,882,726**	**1,915.89**	**411,594**	**95%**	**102%**	**108%**

Note: Numbers may not total due to rounding.
[a] Ex post net impacts are based on the application of TRM-derived savings values to verified participation numbers.
[b] Net Realization Rate = ex post net value / ex ante net value.

The ex ante NTGRs applied to water conservation measures differ from the ex post NTGRs. The ex ante NTGRs were not provided by the implementer and were empirically determined using data from the program tracking database. Ex post net savings differ from ex ante net savings for domestic hot water measures for the following reasons. (Differences in building shell and lighting measures are explained in the section above.)

- Faucet aerators have a 106% kWh and kW net realization rate. The ex ante net kWh and kW used an NTGR of 0.82 instead of the 0.86 specified for low-flow aerators with electric water heaters. The application of NTGRs for ex ante net savings were determined by comparing the total net ex ante savings and the total gross ex ante savings for each measure.

- Showerheads have a 113% kWh, 113% kW, and 94% therm net realization rate. The ex ante net kWh and kW used an NTGR of 0.91 instead of the 1.05 specified for low-flow showerheads. In addition, the therm net realization rate of 94% is due to the application of an NTGR of 0.85 for ex ante instead of the specified 0.82.

4.4 Conclusions and Recommendations

The HPwES Program experienced a significant decline in the number of participants from PY5 to PY6. During our process evaluation, we documented several small changes to program design and implementation from PY5. These changes include the full transition to an HPwES program, the removal of incentive restrictions and the reservation system established in PY5, and modifications to the program's materials and installation standards. Our in-depth interviews with program staff highlighted potential trade ally dissatisfaction (given their experiences in PY5), the removal of an on-bill financing option, and a mild winter as potential reasons for lower participation in PY6. Despite these issues in participation growth, the evaluation team did find evidence of more comprehensive project installations. Through our review of program materials and program tracking databases, we found more Energy Star certificates awarded in PY6 than in PY5, along with higher per participant average ex ante savings.

Turning to the results of our impact analysis, we report net realization rates above 100% for both kW and therms savings; however, the net realization rate for kWh savings was lower at 95%. Based on our analysis of the program database and our discussions with CSG, the evaluation team identified differences in input values between the ex ante and ex post savings calculations for air sealing and insulation as the main reasons for the differences in net realization rates.

Given the challenges faced by HPwES in achieving the participation and energy savings goals for the year, our recommendations focus primarily on identifying the sources of these challenges. With this in mind, our recommendations are as follows:

- **Consider conducting trade ally interviews to understand contractors' satisfaction with the program and the challenges they face.** Program staff noted trade ally dissatisfaction with the incentive level changes and the establishment of a reservation system in PY5. As a result, trade allies may have reduced their involvement with the HPwES Program. Our analysis does show a decrease in the number of trade ally-driven projects in PY6, which may help to account for some of the drop-off in program participation. We recommend a more comprehensive process evaluation that includes a trade ally survey or trade ally interviews in order to identify whether trade allies are dissatisfied with the program's implementation.
- **If possible, consider re-establishing the on-bill financing component of the HPwES Program.** AIC discontinued the on-bill financing program in PY6 due to insufficient funds. Program staff expressed concern that eliminating the on-bill financing option hurt program participation and reduced trade allies' ability to market the program. Our participant survey results show significant interest in the on-bill financing option. The findings suggest that financing options could help increase conversion rates and lead to retrofits that are more comprehensive.

4.5 Inputs for Future Program Planning

4.5.1 Net to Gross

Consistent with the PY6 evaluation plan, the evaluation team fielded a self-report net-to-gross battery within the program participant survey to determine program-level and measure-category-level NTGRs to apply in PY8. The self-report method asks the customer directly about the influence of program activities on their actions and assesses potential participant spillover. We present the detailed methodology and findings for this research in Appendix C.

Table 27 shows the free ridership, spillover, and NTGR estimates by measure type for electricity and gas respectively.

Table 27. PY6 NTGRs by Measure Category

Measure Category	Electric			Gas		
	FR	SO	NTGR	FR	SO	NTGR
CFLs	0.19	0.010	0.82	--	0.025	--
Faucet Aerator	0.09		0.92	0.08		0.95
Showerhead	0.15		0.86	0.11		0.92
Air Sealing	0.30		0.71	0.30		0.73
Insulation	0.23		0.78	0.24		0.79
Thermostat	--		--	0.13		0.90

A. Appendix – Engineering Analysis Algorithms

The PY6 program evaluation estimated gross savings impacts for ESHP and HPwES participants by applying savings algorithms from the Illinois Statewide Technical Reference Manual V2.0 (2013 TRM)[22] to the information in the program-tracking database.

We present below the algorithms we used to calculate all evaluated program savings along with all input variables. We applied PY4 NTGRs to ESHP and HPwES gross savings to obtain PY6 net savings.

A.1 LIGHTING ALGORITHMS

The evaluation team determined ex post lighting savings using the algorithms below.

Equation 1. Interior Standard and Specialty Hardwired CFL Algorithms

Energy Savings: $\Delta kWh = ((WattsBase - WattsEE) / 1{,}000) * ISR * HOURS * WHF_e$

Demand Savings: $\Delta kW = ((WattsBase - WattsEE) / 1{,}000) * ISR * WHFd * CF$

Where:

WattsBase = Wattage of existing equipment

Table 28. Baseline Wattages for Lighting Measures

Measure	EISA Adjusted[1]	Baseline Wattage
CFL - Low 13 to 15 Watt	No	60
CFL - Medium 18 to 20 Watt	Yes	53
CFL - High 23 to 25 Watt	Yes	72
Specialty CFL – 9W Candelabra	No	40
Specialty CFL – 14W Globe	No	60
Specialty CFL – 15W Reflector	No	65

[1] The EISA schedule requires baseline adjustments to measures with incandescent baseline wattages of 100W (as of June 2012) and 75W (as of June 2013). Lighting measures with incandescent baseline wattages of 60W and 40W, scheduled for EISA adjustments beginning June 2014, will affect the PY7 lighting estimates.

WattsEE = Wattage of installed equipment

ISR = In-service rate or the percentage of units rebated that get installed = 96%[23]

HOURS = Annual operating hours

[22] State of Illinois: Energy Efficiency Technical Reference Manual V2.0. Effective June 1, 2013.
[23] ISR calculated using PY6 survey data.

Table 29. Annual Hours of Use for Lighting Measures

Measure	Hours
Standard CFL (Spiral)	938
Specialty CFL (Globe)	1,240
Specialty CFL (Candelabra)	1,328
Specialty CFL (Interior Reflector)	938

WHF_e = Waste heat factor for energy (accounts for cooling savings from efficient lighting) = 1.06

WHF_d = Waste heat factor for demand (accounts for cooling savings from efficient lighting) = 1.11

CF = Summer Peak Coincidence Factor

Table 30. Coincidence Factors for Lighting Measures

Measure	CF
Standard CFL (Spiral)	0.095
Specialty CFL (Globe)	0.116
Specialty CFL (Candelabra)	0.122
Specialty CFL (Interior Reflector)	0.095

A.2 Lighting Measures Heating Penalty

The evaluation team determined heating penalties for electric- and gas-heated homes using the algorithms below. Based on the agreement between the ICC and AIC, we do not include heating penalties in the ex post energy savings, but will include this in data in the PY6 cost analysis.

Equation 2. Heating Penalty Algorithms

Heating Energy Savings: $\Delta kWh = -(((WattsBase - WattsEE) / 1{,}000) * ISR * HOURS * HF) / \eta Heat$

Heating Therm Savings: $\Delta therms = -(((WattsBase - WattsEE) / 1{,}000) * ISR * Hours * HF * 0.03412) / \eta Heat$

Where:

WattsBase = Wattage of existing equipment

Table 31. Baseline Wattages for Lighting Measures

Measure	EISA Adjusted[1]	Baseline Wattage
CFL - Low 13 to 15 Watt	No	60
CFL - Medium 18 to 20 Watt	Yes	53
CFL - High 23 to 25 Watt	Yes	72
Specialty CFL – 9W Candelabra	No	40
Specialty CFL – 14W Globe	No	60
Specialty CFL – 15W Reflector	No	65

[1] The EISA schedule requires baseline adjustments to measures with incandescent baseline wattages of 100W (as of June 2012) and 75W (as of June 2013). Lighting measures with incandescent baseline wattages of 60W and 40W are scheduled for EISA adjustments beginning June 2014. This will impact the PY7 lighting estimates.

WattsEE = Wattage of installed equipment

ISR = In-service rate or the percentage of units rebated that get installed = 96%[24]

HOURS = Annual operating hours

Table 32. Annual Hours of Use for Lighting Measures

Measure	Hours
Standard CFL (Spiral)	938
Specialty CFL (Globe)	1,240
Specialty CFL (Candelabra)	1,328
Specialty CFL (Interior Reflector)	938

HF = Heating Factor = .49

ηHeat = Efficiency of Heating equipment (Assumed COP 2.0 for heat pumps, 1.0 COP for electric resistance heating, and AFUE 0.7 for gas heating)

Heating penalties vary based on the type of heating equipment in each home. Table 33, below, summarizes, by type of heating equipment, the heating penalties for the lighting measures offered through the program.

[24] ISR calculated using PY6 survey data.

Table 33. Heating Penalty

Heating Penalty	Heating Equipment	ΔkWh	ΔkW	Δtherms
CFL - Low 13 TO 15 Watt	Heat Pump (htg only)	-10.25	n/a	n/a
CFL - Medium 18 to 20 Watt	Heat Pump (htg only)	-7.58	n/a	n/a
CFL - High 23 to 25 Watt	Heat Pump (htg only)	-10.92	n/a	n/a
CFL - Low 13 TO 15 Watt	Electric Resistance	-20.51	n/a	n/a
CFL - Medium 18 to 20 Watt	Electric Resistance	-15.16	n/a	n/a
CFL - High 23 to 25 Watt	Electric Resistance	-21.85	n/a	n/a
CFL - Low 13 TO 15 Watt	Gas Heating	n/a	n/a	-1.00
CFL - Medium 18 to 20 Watt	Gas Heating	n/a	n/a	-0.74
CFL - High 23 to 25 Watt	Gas Heating	n/a	n/a	-1.06
Specialty CFL - 9W candelabra	Heat Pump (htg only)	-9.77	n/a	n/a
Specialty CFL - 14W globe	Heat Pump (htg only)	-13.54	n/a	n/a
Specialty CFL - 15W reflector	Heat Pump (htg only)	-11.13	n/a	n/a
Specialty CFL - 9W candelabra	Electric Resistance	-19.55	n/a	n/a
Specialty CFL - 14W globe	Electric Resistance	-27.08	n/a	n/a
Specialty CFL - 15W reflector	Electric Resistance	-22.27	n/a	n/a
Specialty CFL - 9W candelabra	Gas Heating	n/a	n/a	-0.95
Specialty CFL - 14W globe	Gas Heating	n/a	n/a	-1.32
Specialty CFL - 15W reflector	Gas Heating	n/a	n/a	-1.08

A.3 Water Heating Measure Algorithms

The evaluation team determined *ex post* water heating conservation measure savings using the algorithms below.

Equation 3. Showerhead Algorithms

Energy Savings: $\Delta kWh = \%ElectricDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * SPCD * 365.25 / SPH) * EPG\_electric * ISR$

Demand Savings: $\Delta kW = \Delta kWh / Hours * CF$

Therm Savings: $\Delta Therms = \%FossilDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * SPCD * 365.25 / SPH) * EPG\_gas * ISR$

Equation 4. Faucet Aerator Algorithms

Energy Savings: $\Delta kWh = \%ElectricDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * 365.25 * DF / FPH) * EPG\_electric * ISR$

Demand Savings: $\Delta kW = \Delta kWh / Hours * CF$

Therm Savings: $\Delta Therms = \%FossilDHW * ((GPM\_base * L\_base - GPM\_low * L\_low) * Household * 365.25 * DF / FPH) * EPG\_gas * ISR$

Where:

%ElectricDHW = 100% if electric water heater, 0% if gas water heater

%GasDHW = 100% if gas water heater, 0% if electric water heater

GPM_base = Flow rate of the baseline showerhead/faucet aerator

GPM_low = As-used flow rate of the low-flow showerhead/faucet aerator

Table 34. GPM for Water Heating Measures

Measure	GPM_base	GPM_low
Faucet aerator	1.20	0.94
Showerhead	2.67	1.75

L_base = Average baseline length faucet use per capita for all faucets in minutes

Table 35. L_base for Water Heating Measures

Measure	Minutes
Faucet aerator	9.85
Showerhead	8.20

L_low = Average retrofit length faucet use per capita for all faucets in minutes (same as L_base)

Household = Average number of people in household = 2.56

SPCD = Showers Per Capita Per Day = 0.75

SPH = Showerheads Per Household = 1.79

DF = Drain Factor = 0.795 (unknown location)

FPH = Faucets Per Household = 3.83 (unknown location)

EPG_electric = Energy per gallon of hot water supplied by electric

EPG_gas = Energy per gallon of hot water supplied by gas

Table 36. EPG for Water Heating Measures

Measure	EPG_electric	EPG_gas
Faucet Aerator	0.0894	0.0040
Showerhead	0.1270	0.0054

ISR = In-Service Rate[25]

Table 37. ISR for Water Heating Measures

Measure	ISR
Faucet Aerator	96%
Showerhead	96%

Hours = Annual electric DHW recovery hours

Table 38. Hours for Water Heating Measures

Measure	Hours
Faucet Aerator[a]	45
Showerhead[b]	431

(a) Hours of use for single family with unknown location
(b) Hours of use for single family direct install

CF = Coincidence Factor for electric load reduction

Table 39. CF for Water Heating Measures

Measure	CF
Faucet Aerator	0.0220
Showerhead	0.0278

A.4 Air Sealing Algorithms

The evaluation determined ex post air sealing savings using the algorithms below.

Equation 5. Air Sealing Algorithms

Energy Savings: $\Delta kWh = (\Delta kWh\_cooling + \Delta kWh\_heating) * ISR$

$\Delta kWh\_cooling = [((CFM50\_existing - CFM50\_new)/N\_cool) * 60 * 24 * CDD * DUA * 0.018) / (1{,}000 * \eta Cool)] * LM$

$\Delta kWh\_heating\ (electric\ heat) = (((CFM50\_existing - CFM50\_new)/N\_heat) * 60 * 24 * HDD * 0.018) / (\eta Heat * 3{,}412)$

Demand Savings: $\Delta kW = (\Delta kWh\_cooling / FLH\_cooling) * CF$

Gas Savings (gas heat): $\Delta Therms = (((CFM50\_existing - CFM50\_new)/N\_heat) * 60 * 24 * HDD * 0.018) / (\eta Heat * 100{,}000)$

$\Delta kWh\_heating\ (gas\ heat\ furnace\ fan\ run\ time\ reduction) = \Delta Therms * F_e * 29.3$

[25] ISR calculated using PY6 survey data.

Where:

ISR = In-service rate or the percentage of units rebated that get installed = 100%[26]

CFM_existing = Infiltration at 50 Pascals as measured by blower door before air sealing

CFM_new = Infiltration at 50 Pascals as measured by blower door after air sealing

N_Cool = Conversion factor from leakage at 50 Pascal to leakage at natural conditions = 18.5[27]

CDD = Cooling Degree Days (applied per participant based on location)

Table 40. Cooling Degree Days by Climate Zone

Climate Zone	CDD 65
1 (Rockford)	820
2 (Chicago)	842
3 (Springfield)	1,108
4 (Belleville)	1,570
5 (Marion)	1,370

DUA = Discretionary Use Adjustment = 0.75

ηCool = Seasonal Energy Efficiency Ratio (SEER) of cooling system (used age of existing equipment pre 2006)

Table 41. ηCool for Air Sealing Measures

Measure	ηCool (Pre 2006)	ηCool (Post 2006)
Central Air Conditioner	10	13
ASHP	10	13

LM = Latent Multiplier to account for latent cooling demand (applied per participant based on project location)

[26] ISR calculated using PY6 survey data.
[27] Assumed Zone 2 Normal Exposure.

Table 42. Latent Multiplier by Climate Zone

Climate Zone	Latent Multiplier
1 (Rockford)	8.5
2 (Chicago)	6.2
3 (Springfield)	6.6
4 (Belleville)	5.8
5 (Marion)	6.6

N_heat = Conversion factor from leakage at 50 Pascal to leakage at natural conditions = 15.75[28]

HDD = Heating Degree Days (applied per participant based on location)

Table 43. Heating Degree Days by Climate Zone

Climate Zone	HDD 65
1 (Rockford)	6,569
2 (Chicago)	6,339
3 (Springfield)	5,497
4 (Belleville)	4,379
5 (Marion)	4,476

ηHeat = Efficiency of heating system (based on heating equipment type per participant) (used age of existing equipment pre 2006)

Table 44. ηHeat for Air Sealing Measures

Measure	ηHeat (pre 2006)		ηHeat (post 2006)	
	COP	AFUE	COP	AFUE
Gas Furnace	n/a	0.7	n/a	0.7
Electric Resistance	1.00	n/a	1.00	n/a
Air Source Heat Pump (ASHP)	1.70	n/a	1.92	n/a

FLH_cooling = Full Load Hours of air conditioning (applied per participant based on project location)

[28] Applied average of 1, 1.5, 2 and 3 story homes for homes with normal exposure in Zone 2.

Table 45. FLH_cooling by Climate Zone

Climate Zone	FLH_cooling
1 (Rockford)	512
2 (Chicago)	570
3 (Springfield)	730
4 (Belleville)	1,035
5 (Marion)	903

CF = Coincidence Factor = 0.915

F_e = Furnace fan energy consumption as a percentage of annual fuel consumption = 3.14%

A.5 Attic and Wall Insulation Algorithms

The evaluation determine ex post attic and wall insulation savings using the algorithms below.

Equation 6. Attic Insulation Algorithms

Energy Savings: $\Delta kWh = (\Delta kWh\_cooling + \Delta kWh\_heating) * ISR$

$\Delta kWh\_cooling = (((1/R\_old - 1/R\_new) * A\_attic * (1\text{-}Framing\_Factor/2)) * 24 * CDD * DUA) / (1{,}000 * \eta Cool)$

$\Delta kWh\_heating\ (electric\ heat) = (((1/R\_old - 1/R\_new) * A\_attic\ *(1\text{-}Framing\_Factor/2))) * 24 * HDD) / (\eta Heat * 3{,}412)$

Demand Savings: $\Delta kW = (\Delta kWh\_cooling / FLH\_cooling) * CF$

Gas Savings (gas heat): $\Delta Therms = (((1/R\_old - 1/R\_new) * A\_attic * (1\text{-}Framing\_Factor/2)) * 24 * HDD) / (\eta Heat * 100{,}067\ Btu/therm)$

$\Delta kWh\_heating\ (gas\ heat\ furnace\ fan\ run\ time\ reduction) = \Delta Therms\ * F_e * 29.3$

Equation 7. Wall Insulation Algorithms

Energy Savings: $\Delta kWh = (\Delta kWh\_cooling + \Delta kWh\_heating) * ISR$

$\Delta kWh\_cooling = (((1/R\_old - 1/R\_new) * A\_wall * (1\text{-}Framing\_factor)) * 24 * CDD * DUA) / (1{,}000 * \eta Cool)$

$\Delta kWh\_heating\ (electric\ heat) = (((1/R\_old - 1/R\_new) * A\_wall* (1\text{-}Framing\_factor))) * 24 * HDD) / (\eta Heat * 3{,}412)$

Demand Savings: $\Delta kW = (\Delta kWh\_cooling / FLH\_cooling) * CF$

Gas Savings (gas heat): $\Delta Therms = (((1/R\_old - 1/R\_new) * A\_wall * (1\text{-}Framing\_factor)) * 24 * HDD) / (\eta Heat * 100{,}067\ Btu/therm)$

$\Delta kWh\_heating\ (gas\ heat\ furnace\ fan\ run\ time\ reduction) = \Delta Therms\ * F_e * 29.3$

Where:

ISR = In-service rate or the percentage of units rebated that get installed = 99%[29]

R_new = Total attic or wall assembly R-value after the installation of additional insulation (see Equation 8 for assembly R-value algorithms)

R_old = R-value of existing attic or wall assembly and any existing insulation with a minimum of R-5 (see Equation 8 for assembly R-value algorithms)

A_wall = Total area of insulated wall (ft^2)

A_attic = Total area of insulated attic (ft^2)

Framing_factor = Adjustment to account for area of framing = 0.15 (Framing Factor included in the assembly R-value algorithms; see Equation 8)

CDD = Cooling Degree Days (applied per participant based on project location)

Table 46. Cooling Degree Days by Climate Zone

Climate Zone	CDD
1 (Rockford)	820
2 (Chicago)	842
3 (Springfield)	1,108
4 (Belleville)	1,570
5 (Marion)	1,370

DUA = Discretionary Use Adjustment = 0.75

ηCool = Seasonal Energy Efficiency Ratio of cooling system (actual if available, 10 SEER if unknown) (used age of existing equipment pre 2006)

Table 47. ηCool for Attic and Wall Insulation Measures

Measure	ηCool (Pre 2006)	ηCool (Post 2006)
Central Air Conditioner	10	13
ASHP	10	13

HDD = Heating Degree Days (applied per participant based on project location)

Table 48. Heating Degree Days by Climate Zone

Climate Zone	HDD
1 (Rockford)	5,352
2 (Chicago)	5,113

[29] ISR calculated using PY6 survey data.

3 (Springfield)	4,379
4 (Belleville)	3,378
5 (Marion)	3,438

ηHeat = Efficiency of heating system (applied based on heating equipment type per participant) (used age of existing equipment pre 2006)

Table 49. Assumed ηHeat by Heat Type

Measure	ηHeat (pre 2006)		ηHeat (post 2006)	
	COP	AFUE	COP	AFUE
Gas Furnace	n/a	0.7	n/a	0.7
Electric Resistance	1.00	n/a	1.00	n/a
Air Source Heat Pump (ASHP)	1.70	n/a	1.92	n/a

FLH_cooling = Full Load Hours of air conditioning (applied per participant based on project location)

Table 50. FLH_cooling by Climate Zone

Climate Zone	FLH_cooling
1 (Rockford)	512
2 (Chicago)	570
3 (Springfield)	730
4 (Belleville)	1,035
5 (Marion)	903

CF = Coincidence Factor = 0.915

F_e = Furnace fan energy consumption as a percentage of annual fuel consumption = 3.14%

Because the R-values in these algorithms are stated to be assembly R-values, our engineering calculations deviated somewhat from the TRM as follows:

- We determined the assembly wall value using the ASHRAE Isothermal Planes method (page 27.3, ASHRAE Fundamentals, 2013).
- This method includes the IL TRM framing factor within the calculations as shown below
- Equation 8 was not applied to calculate assembly R-values for existing attic or wall insulation with R-values less than 5. These cases were assigned an assembly R-value of 5 for both attic and wall insulation.

We used the following algorithms to calculate the assembly R-values for attic insulation and wall insulation:

Equation 8. Attic and Wall Assembly R-value Algorithms

$$\textit{Attic Assembly R-value} = ((1/\textit{R-value}_{database}) * \%\ of\ Assembly + 1/\textit{R-value}_{Joist} * Framing\_Factor/2) + (\textit{R-value}_{indoor\ air\ film} + \textit{R-value}_{plywood} + \textit{R-value}_{gypsum} + \textit{R-value}_{indoor\ air\ film})$$

$$\textit{Wall Assembly R-value} = ((1/\textit{R-value}_{database}) * \%\ \textit{of Assembly} + 1/\textit{R-value}_{WoodStud2x4} * \textit{Framing\_Factor}) + (\textit{R-value}_{outdoor\ air\ film} + \textit{R-value}_{claytile} + \textit{R-value}_{rigid\ foam} + \textit{R-value}_{gypsum} + \textit{R-value}_{indoor\ air\ film})$$

Where:

$\text{R-value}_{database}$ = Pre or post insulation R-value found in the database (for R-values that are greater than 5)

Framing_factor = Adjustment to account for area of framing = 0.15

Figure 10. Engineering Factors Used within Attic Insulation Calculations

No Insulation				With Insulation			
N	Element	R	R	N	Element	R	R
1	indoor air film, still air		0.68	1	indoor air film, still air		0.68
2	air[a]	0.86	0.92	2	mineral fiber batt insulation	19	16.22
3	Joist (nominal 5.5") - southern pine	5.78		3	Joist (nominal 5.5") - southern pine	5.8	
4	plywood, 5/8", douglas fir		0.85	4	plywood, 5/8", douglas fir		0.85
5	gypsum wallboard, 0.5 inch		0.45	5	gypsum wallboard, 0.5 inch		0.45
6	indoor air film, still air		0.68	6	indoor air film, still air		0.68
	R value		3.6		R value		18.9
	U value		0.28		U value		0.05
	% of assembly	0.925	0.075		% of assembly	0.925	0.075
	U of assembly	0.28			U of assembly	0.05	
	R of assembly	3.58			R of assembly	18.88	

[a]horizontal position, up heat flow, 50 degree mean with 30 degree difference, emissivity of 0.82 for building materials, 5.5" air space

Figure 11. Engineering Factors Used within Wall Insulation Calculations

No Insulation				With Insulation			
N	Element	R	R	N	Element	R	R
1	Outdoor Air film, 15 mph wind		0.17	1	Outdoor Air film, 15 mph wind		0.17
2	clay tile, 1 cell deep, 4", no insulation		1.11	2	clay tile, 1 cell deep, 4", no insulation		1.11
3	rigid foam insulating sheathing		4	3	rigid foam insulating sheathing		4
4	air[a]	1.25	1.40	4	mineral fiber batt insulation	13	10.04
5	Wood stud (nominal 2 x 4)	4.38		5	Wood stud (nominal 2 x 4)	4.38	
6	gypsum wallboard, 0.5 inch		0.45	6	gypsum wallboard, 0.5 inch		0.45
7	indoor air film, still air		0.68	7	indoor air film, still air		0.68
	R value		7.8		R value		16.5
	% of assembly	0.85	0.15		% of assembly	0.85	0.15
	R of assembly	7.81			R of assembly	16.45	

[a]vertical position, horizontal heat flow, 50 degree mean with 30 degree difference, emissivity of 0.82 for building materials

A.6 RIM JOIST INSULATION ALGORITHMS

The evaluation team calculated the ex post rim joist insulation savings using the algorithms below. The TRM does not have algorithms specifically for rim joists; therefore, the basement sidewall insulation algorithms were used.

Equation 9. Rim Joist Insulation Algorithms

Energy Savings: $\Delta kWh = (\Delta kWh\_cooling + \Delta kWh\_heating) * ISR$

$$\Delta kWh\_cooling = (((1/R\_old\_AG - (1/(R\_new + R\_old\_AG))) * L\_rimjoist * H\_rimjoist * (1\text{-}Framing\_factor)) * 24 * CDD * DUA) / (1{,}000 * \eta Cool)$$

$$\Delta kWh\_heating\ (electric\ heat) = (((1/R\_old\_AG - (1/(R\_new + R\_old\_AG))) * L\_rimjoist * H\_rimjoist * (1\text{-}Framing\_factor)) * 24 * HDD) / (3{,}412 * \eta Heat)$$

Demand Savings: $\Delta kW = (\Delta kWh\_cooling / FLH\_cooling) * CF$

Gas Savings (gas heat): $\Delta Therms = (((1/R\_old\_AG - (1/(R\_new + R\_old\_AG))) * L\_rimjoist * H\_rimjoist * (1\text{-}Framing\_factor)) * 24 * HDD) / (100{,}067 * \eta Heat)$

$$\Delta kWh\_heating\ (gas\ heat\ furnace\ fan\ run\ time\ reduction) = \Delta Therms * F_e * 29.3$$

Where:

ISR = In-service rate or the percentage of units rebated that get installed = 99%[30]

R_old_AG = R-value of existing foundation wall assembly above grade = R-2.25

R_new = R-value of added insulation (spray foam, rigid foam, cavity)

L_rimjoist = Total linear feet of installed rim joist insulation (ft)

H_rimjoist = Height of floor joist in which rim joist insulation is installed = 1.0 ft

Framing_factor = Adjustment to account for area of framing (applied per participant based on type of installed rim joist insulation; FF of 0.0 for spray foam and 0.15 for studs and cavity insulation)

CDD = Cooling Degree Days (assumed unconditioned basement) (applied per participant based on project location)

Table 51. Cooling Degree Days by Climate Zone for Unconditioned Basement

Climate Zone	CDD
1 (Rockford)	263
2 (Chicago)	281
3 (Springfield)	436
4 (Belleville)	538
5 (Marion)	570

DUA = Discretionary Use Adjustment = 0.75

ηCool = Seasonal Energy Efficiency Ratio of cooling system (actual if available, 10 SEER if unknown) (used age of existing equipment pre 2006)

[30] ISR calculated using PY6 survey data.

Table 52. ηCool for Rim Joist Insulation Measures

Measure	ηCool (Pre 2006)	ηCool (Post 2006)
Central Air Conditioner	10	13
ASHP	10	13

HDD = Heating Degree Days (assumed unconditioned basement) (applied per participant based on project location)

Table 53. Heating Degree Days by Climate Zone for Unconditioned Basement

Climate Zone	HDD
1 (Rockford)	3,322
2 (Chicago)	3,079
3 (Springfield)	2,550
4 (Belleville)	1,789
5 (Marion)	1,796

ηHeat = Efficiency of heating system (applied per participant based on heating equipment type) (used age of existing equipment pre 2006)

Table 54. Assumed ηHeat by Heat Type

Measure	ηHeat (pre 2006)		ηHeat (post 2006)	
	COP	AFUE	COP	AFUE
Gas Furnace	n/a	0.7	n/a	0.7
Electric Resistance	1.00	n/a	1.00	n/a
Air Source Heat Pump (ASHP)	1.70	n/a	1.92	n/a

FLH_cooling = Full Load Hours of air conditioning (applied per participant based on project location)

Table 55. FLH_cooling by Climate Zone

Climate Zone	FLH_cooling
1 (Rockford)	512
2 (Chicago)	570
3 (Springfield)	730
4 (Belleville)	1,035
5 (Marion)	903

CF = Coincidence Factor = 0.915

F_e = Furnace fan energy consumption as a percentage of annual fuel consumption = 3.14%

A.7 CRAWLSPACE INSULATION ALGORITHMS

The evaluation team calculated the ex post crawlspace insulation savings using the algorithms below.

Equation 10. Crawlspace Insulation Algorithms

Energy Savings: $\Delta kWh = (\Delta kWh\_cooling + \Delta kWh\_heating) * ISR$

$$\Delta kWh\_cooling = (((1/R\_old\_AG - (1/(R\_added + R\_old\_AG))) * LF * H\_AG * (1\text{-}Framing\_factor)) * 24 * CDD * DUA) / (1{,}000 * \eta Cool)$$

$$\Delta kWh\_heating\ (electric\ heat) = [(((1/R\_old\_AG - (1/(R\_added + R\_old\_AG))) * LF * H\_AG * (1\text{-}Framing\_factor)) + ((1/R\_old\_BG - (1/R\_added + R\_old\_BG))) * LF * H\_BG * (1\text{-}Framing\_Factor))) * 24 * HDD] / (3{,}412 * \eta Heat)$$

Demand Savings: $\Delta kW = (\Delta kWh\_cooling / FLH\_cooling) * CF$

Gas Savings (gas heat): $\Delta Therms = [(((1/R\_old\_AG - (1/(R\_added + R\_old\_AG))) * LF * H\_AG * (1\text{-}Framing\_factor)) + ((1/R\_old\_BG - (1/R\_added + R\_old\_BG))) * LF * H\_BG * (1\text{-}Framing\_Factor))) * 24 * HDD] / (100{,}067 * \eta Heat)$

$$\Delta kWh\_heating\ (gas\ heat\ furnace\ fan\ run\ time\ reduction) = \Delta Therms * F_e * 29.3$$

Where:

ISR	= In-service rate or the percentage of units rebated that get installed = 99%[31]
R_old_AG	= Above grade existing R-value of crawlspace insulation (assume ¾" plywood subfloor and carpet with pad) = 2.25
R_old_BG	= Below grade existing R-value of crawlspace insulation (assume 2' below grade) = 6.66
R_added	= R-value of additional insulation (spray foam, rigid foam, cavity)
LF	= Total linear feet of installed insulation (ft^2) (from database)
H_AG	= Height of crawlspace wall above grade = 1 foot
H_BG	= Height of crawlspace wall below grade = 2 feet
Framing_factor	= Adjustment to account for area of framing = 0
CDD	= Cooling Degree Days (assumed unconditioned (vented) crawlspace) (applied per participant based on project location)

[31] ISR calculated using PY6 survey data.

Table 56. Cooling Degree Days by Climate Zone for Unconditioned (Vented) Crawlspace

Climate Zone	CDD
1 (Rockford)	263
2 (Chicago)	281
3 (Springfield)	436
4 (Belleville)	538
5 (Marion)	570

DUA = Discretionary Use Adjustment = 0.75

ηCool = Seasonal Energy Efficiency Ratio of cooling system (actual if available, 10 SEER if unknown) (used age of existing equipment pre 2006)

Table 57. ηCool for Crawl Space Insulation Measures

Measure	ηCool (Pre 2006)	ηCool (Post 2006)
Central Air Conditioner	10	13
ASHP	10	13

HDD = Heating Degree Days (assumed unconditioned (vented) crawlspace) (applied per participant based on project location)

Table 58. Heating Degree Days by Climate Zone for Unconditioned (Vented) Crawlspace

Climate Zone	HDD
1 (Rockford)	3,322
2 (Chicago)	3,079
3 (Springfield)	2,550
4 (Belleville)	1,789
5 (Marion)	1,796

ηHeat = Efficiency of heating system (applied per participant based on heating equipment type) (used age of existing equipment pre 2006)

Table 59. Assumed ηHeat by Heat Type

Measure	ηHeat (pre 2006)		ηHeat (post 2006)	
	COP	AFUE	COP	AFUE
Gas Furnace	n/a	0.7	n/a	0.7
Electric Resistance	1.00	n/a	1.00	n/a
Air Source Heat Pump (ASHP)	1.70	n/a	1.92	n/a

FLH_cooling = Full Load Hours of air conditioning (applied per participant based on project location)

Table 60. FLH_cooling by Climate Zone

Climate Zone	FLH_cooling
1 (Rockford)	512
2 (Chicago)	570
3 (Springfield)	730
4 (Belleville)	1,035
5 (Marion)	903

CF = Coincidence Factor = 0.915

F_e = Furnace fan energy consumption as a percentage of annual fuel consumption = 3.14%

A.8 Water Heater Temperature Setback Algorithms

The evaluation team calculated the ex post water heater temperature setback savings using the algorithms below.

Equation 11. Water Heater Temperature Setback Algorithms (Electric Water Heater)

Energy Savings: *ΔkWh = 86.4 kWh (Deemed value)*

*Demand Savings: ΔkW = ΔkWh / Hours * CF*

Equation 12. Water Heater Temperature Setback Algorithms (Gas Water Heater)

Energy Savings: *ΔkWh = - 34.2 kWh (Deemed value) * %DW*

Therm Savings: *Δtherms = 6.4 therms (Deemed value)*

Where:

Hours = Annual hours of Use in which water heater is operating or idle = 8,766 hours

CF = Coincidence Factor = 1.0

%DW = Percentage of homes with dishwashers = 59%

For homes with gas water heaters, a negative electricity savings is achieved due to an increase in supplemental heating for homes with dishwashers. The negative impact was included in the program's ex post savings. The reason for this is that the electric penalty is embedded within the deemed kWh savings for those with electric water heaters, and since it was applied to paritcipants with electric water heaters, it needs to be included for those with gas water heaters.

B. Appendix – Cost-Effectiveness Inputs

Table 61 presents total net impacts for the AIC cost-effectiveness calculations. These values differ from those in the main report due to the inclusion of heating penalties for lighting measures. This approach was taken based on discussions with AIC and on past agreement between AIC and ICC staff that heating penalties would not be included in savings calculations for goal attainment. Total net program savings decreased by 2.6% for kWh and 4.8% for therms after the application of waste heat factors.

Table 61. PY5 HPwES Net Impacts (Including Heating Penalties)

	Electric Savings (kWh)	Demand Savings (kW)	Gas Savings (Therms)
Total	3,781,832	1,916	391,634

Lighting Heating Penalty

The inclusion of waste heat factors for lighting is based on the concept that heating loads are increased to supplement the reduction in heat that was once provided by the existing lamp type. We applied the heating penalty to 25,842 lamps based on heating fuel type and installed lamp type. The heating fuel type is known for 9% (2,229 lamps) of the installed lighting measures. For the remaining 23,613 lamps with unknown space heating fuel types, waste heat factors were applied based on the percentage of installed lighting measures where heating fuel types were known. Therefore, waste heat factors for electric resistance heating were applied to 2,564 lamps (10.9%), waste heat factors for heat pumps were applied to 3,506 lamps (14.8%), and waste heat factors for gas heating were applied to 17,543 lamps (74.3%). These percentages for lighting measures with known heating fuel types are shown in Table 62.

Table 62. PY6 HPwES Known Heating Fuel Type for Lighting Measures

Heating Fuel	Heating Equipment	% of Htg Fuel Type Known
Electric	Electric Resistance	10.9%
Electric	Heat Pump	14.8%
Gas	Furnace/Boiler	74.3%

The total heating penalty for lighting measures is 100,894 kWh and 19,960 therms.

C. Appendix – PY6 NTG Research

Net to Gross

Consistent with the PY6 evaluation plan, the team fielded a self-report net-to-gross battery within the survey of program participants to determine program-level and measure-category-level NTGRs to apply in PY8. The self-report method asks the customer directly about the influence of program activities on their actions. We based the estimates on a series of questions that explored not only the program's effectiveness in getting participants to install energy-efficient equipment but also other actions participants may have taken had the incentive not been available.

Free Ridership

To calculate free ridership scores for the HPwES program measures, the evaluation team developed a scoring algorithm that incorporates aspects of program component influence, measure quantity and installation timing, and other factors that may have influenced measure adoption (our relative program influence score). We outline the scoring algorithms later in this section.

The free ridership questions for air-sealing and insulation measures included a consistency check that was triggered when an individual's responses appeared to be inconsistent.[32] Analyzing the consistency check data, the evaluation team modified a very small portion of the free ridership scores and created adjusted and unadjusted measure-level free ridership values for air-sealing and insulation measures. However, this adjustment had no effect on either the air sealing or insulation free ridership values, primarily due to the small number of participants that triggered the consistency check. The measure-level free ridership values appear in Table 63 below.

Table 63. Free Ridership Values

Measure	Free Ridership Value	
	Electric	Gas
CFL	0.19	--
Faucet Aerator	0.09	0.08
Showerhead	0.15	0.11
Air Sealing	0.30	0.30
Insulation	0.23	0.24
Thermostat	--	0.13 (PY3 value)

In PY6, we report higher free ridership values for CFLs and air sealing and lower free ridership values for faucet aerators and showerheads (therms only) compared to PY4. The evaluation team did some analysis to explore the sources of these differences. We found that our unweighted PY6 free ridership scores were not statistically different from the unweighted PY4 scores. Rather, we found differences between PY4 and PY6 only when we weighted the free ridership scores by energy savings. This may be explained, in part, by the lower number of HPwES participants in PY6. By having significantly fewer program participants in PY6, those that did participate may have been more likely to install energy saving measures on their own. In other words, there may be important underlying differences between our population of participants in PY4 and PY6, which help to account for these differences in weighted

[32] This strategy is consistent with the NTG approach used in PY4.

free ridership scores. However, the evaluation team cautions that more data is needed to test this hypothesis.

Participant Spillover

The evaluation team also included a battery of qualitative questions to assess spillover among HPwES participants, for example:

- We asked if the participant had made any additional improvements to reduce their household energy consumption since the HPwES energy audit for which they did not receive a utility incentive or discount.

- If the respondent indicated making additional improvements, we asked them to rate from 0 to 10 how much their experience with the HPwES program influenced them to make these additional improvements.

We calculated spillover for any respondents who gave a rating of 8 or higher for our program influence question (SO2). We based our spillover energy and demand savings on the type of fuel for water heaters and space-heating equipment for installed measures, where savings depend on these types of equipment. We used the Statewide TRM Version 2 to determine the energy savings for each identified measure.

To calculate the spillover rate, we first summed the total energy and demand impacts from the sampled participants who installed additional measures due to participation in the program and then divided this sum by the total ex post sample energy and demand impacts.

$$Energy\ or\ Demand\ Spillover\ Rate = \frac{Sum\ of\ Energy\ or\ Demand\ Impacts\ from\ Additional\ Measured\ Installed}{Sample\ Ex\ Post\ Gross\ Energy\ or\ Demand\ Impacts}$$

We then used these spillover rates to calculate the net spillover savings for the population of participants. To do this, the evaluation team multiplied the spillover rate by the ex post gross savings for the program to calculate the net spillover savings. We summarize this approach in the equation below.

$$Population\ Energy\ or\ Demand\ Spillover\ Savings =$$

$$Energy\ or\ Demand\ Spillover\ Rate * Population\ Energy\ or\ Demand\ Ex\ Post\ Gross\ Savings$$

In Table 64, below, we summarize our spillover estimates. We provide a more detailed description of these estimates later in the appendix. Note that spillover savings for PY6 are significantly lower than the spillover estimate calculated in PY4.[33] There may be several reasons for this decrease in the spillover rate. The evaluation team reviewed the PY4 spillover calculations and found that the high spillover rate was due primarily to several electric heat households installing windows and central air conditioning. In PY6, we found lower spillover savings for windows and no central air conditioning installations.

[33] The PY4 spillover rates were as follows: kWh, 9%; kW, 9%; Therms, 2.5%

Table 64. Participant Spillover Estimates

	kWh	kW	Therms
Total Spillover Savings (n=23)	3,225	0.75	893.6
Total Verified Savings for Surveyed Sample (n=238)	328,351	146.64	36,492.7
% Spillover for HPwES	0.98%	0.51%	2.45%

Non-Participant Spillover

We did not collect data on non-participant spillover as part of this evaluation.

NTGR Ratio

The evaluation team calculated the net-to-gross ratio (NTGR) as follows:

NTGR = 1 – Free-Ridership Rate + Spillover

In Table 65 below, we summarize our NTGR findings for both electric and gas savings.

Table 65. PY6 NTGRs by Measure Category

	Electric			Gas		
Measure Category	FR	SO	NTGR	FR	SO	NTGR
CFLs	0.19	0.010	0.82	--	0.025	--
Faucet Aerator	0.09		0.92	0.08		0.95
Showerhead	0.15		0.86	0.11		0.92
Air Sealing	0.30		0.71	0.30		0.73
Insulation	0.23		0.78	0.24		0.79
Thermostat	--		--	0.13		0.90

Net-to-Gross Methodology

The evaluation team estimated net program impacts by determining the level of free ridership (FR) and spillover (SO). We calculated the net-to-gross ratio (NTGR) as follows:

NTGR = 1 – Free-Ridership Rate + Spillover

To arrive at measure-level FR values, the evaluation team first calculated FR values for each individual measure across each survey respondent receiving it. Next, we weighted these FR values by individual ex post energy and demand savings. Finally, we arrived at measure-level NTGRs by adding in program-level spillover.

Measure-Level Free Ridership Scoring for ISMs (example for CFLs)

In this section, we provide the measure-level free ridership scoring for the Program's instant savings measures (ISMs). We illustrate our methodology using CFLs as an example.

The evaluation team asked participating customers a series of free rider questions for CFLs and developed a score for this measure based on responses to this battery of questions. This approach

provided several important features and benefits, such as the ability to derive a partial FR score based on the likelihood that similar actions will be taken in the absence of an incentive.

If participating customers would not have installed CFLs without the program, we categorize them as 0% free riders. We categorize customers who would have installed the measure without the program as 100% free riders.

Participating customers can also be partial free riders. Partial scores are assigned to customers who had plans to install the measure, but the program had at least some influence over that decision, particularly in terms of timing (e.g., the program might have accelerated the installation) or quantity (e.g., the program might have led to the installation of additional measures).

Direct Install Measure FR Algorithm

Table 66 provides an overview of the questions used to determine FR scores.

Table 66. FR Algorithm Framework

Question Type	Algorithm Component	Survey Question	Potential Response	Potential Score
PI	If you had not received free CFLs during the energy audit, how likely is it that you would have **installed any CFLs on your own within the next year**?	CFL8	• Scalar, 0 to 10, 0=not at all likely, 10= extremely likely.	0 to 1 based on response to scale 0 to 10 scale (DK removed from analysis)
PT1	If you had not received free CFLs during the energy audit, would you have **installed the same number or fewer CFLs** than were installed?	CFL9	• Fewer • The same • More • None	Fewer = 0.5, Same = 1, More =1 (DK removed from analysis)
PT2	If you had not received free CFLs from the energy audit, **when would you have installed CFLs** on your own?	CFL10	• Same time • Within six months • Within a year • More than a year	Same time = 1, within a few months= 0.5, within a year =0.33, more than a year=0 (DK removed from analysis)

Often, NTGR algorithms include three distinct components, each made up of several questions. We typically average the three values from each component to obtain the final NTGR. However, for this survey, we asked only three questions for CFLs to reduce respondent burden. As such, these three questions are comparable to a single component in the longer battery of free ridership questions and we did not average them. Instead, we multiplied them together; this was the logical way to combine the information from three questions addressing the same concept. We present the FR algorithm below.

» FR = PI*PT1*PT2
  - FR=1: 100% free rider; FR=0: not at all free rider

Discounted Measure Free Ridership Scoring

To determine measure-level NTG values for the discounted envelope measures, the evaluation team weighted the FR scores by ex post energy savings for each participant.

FR Algorithm

Below, we provide the FR algorithm framework. Please note that we used the same methodology as in PY4 (i.e., the last time we calculated measure level FR scores).

Table 67. HEP FR Algorithm Framework

Algorithm Component	Survey Question	Algorithm Use
On your 2013 federal tax return, did you claim or do you plan to claim a tax credit for the <MEAS1> that you <RMEAS1>ed?	N1	Role of FTC (RPI)
When did you first learn that you would be charged a price that was significantly below market rate for the <MEAS1>? Was it before or after < RMEAS1>ing your <MEAS1>?	N3	Overall Program Influence (OPI)
Just to be clear, did you have the <MEAS1> <RMEAS1>ed and then find out that the price was significantly lower than usual?	N3a	Overall Program Influence (OPI)
Importance of factors that might have influenced your decision to install the measure.		
• The availability of the utility discount	N5a	Program Component (PC)
• The availability of Federal tax credit	N5b	Role of FTC (RPI)
• The energy audit you received	N5c	Program Component (PC)
• Information from the utility marketing materials	N5d	Program Component (PC)
• Information from the contractor or program ally	N5e	Program Component (PC)
If the program had not been available, how likely is it that you would have < RMEAS1>ed the same <MEAS1> at all? Please use a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely". [RECORD 0-10 98=Don't know; 99=Refused]	N6	Overall Program Influence (OPI)
If you had not participated in the program, how likely is it that you would have as much <MEAS1> <RMEAS1>ed as you did? Please use a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely".	N8	Efficiency adjustment (ADJ_E&T)
Did participating in the program cause you to < RMEAS1> <MEAS1> earlier than you were planning or did participating have no influence on when you did it?	N7a	Timing adjustment (ADJ_E&T)
If you hadn't participated in the program, when would you have <RMEAS1>ed your <MEAS1>? Would you say…?	N7b	Timing adjustment (ADJ_E&T)
Just to make sure I understand, please explain the importance of the program on your decision to install your <MEAS1>.	N9	Consistency check

For each survey respondent, we calculated a raw, unadjusted FR score and then adjusted it when the consistency check was triggered and the information it provided clearly indicated that the FR value should be increased or decreased. In this section, we first address the calculation for the unadjusted score, and then we describe how the consistency check data was used to adjust a subset of the FR values.

Unadjusted Base FR Score

The unadjusted, basic free ridership factor consists of two scores:[34]

1. **Overall Program Influence (OPI).** This score reflects the degree of influence the program had on the customer's decision to have the specified measures installed. This score is based on two survey questions. The first asks respondents if they knew they would receive a program discount before or after they installed the equipment. If respondents learned about the program discount *after* installing the energy-efficient equipment, they are considered free riders. The second question asks respondents who learned about the program discount *before* they installed the measure to rate the likelihood that they would have installed the measure in the absence of the program (on a 0 to 10 scale, where 0 is not at all likely and 10 is extremely likely). A higher likelihood value means a higher level of free ridership, i.e., a lower level of attribution to the program.

    - **Timing and Efficiency Adjustment Factor (ADJ_E&T).** This factor adjusts the OPI score downward for gains in efficiency and earlier installation of equipment due to the program. It is based on two questions asked of respondents who said they likely would have installed the equipment without the program. The first asks how likely they would have been to install as much weatherization on their own (on a 0 to 10 scale). The second asks respondents if the program caused them to install the weatherization earlier, and if so, how much earlier (four categories of time intervals). The responses to the two questions are averaged together to derive the Program Influence Adjustment Factor. This factor is then multiplied by the Overall Program Influence score to create an adjusted program influence score.[35] The following algorithm defines this part of the scoring:

      Overall Program Influence (OPI) based on N3, N3a, N6,

      (IF QN3A=1) OPI=1

      (IF QN3=1) OPI=QN6/10

      Timing and Efficiency Adjustment Factor (ADJ_E&T) based on N8, N7a and N7b

      ADJ_E=QN8/10

      (IF QN7B=1) ADJ_T=1

      (IF QN7B=2) ADJ_T=.66

      (IF QN7B=3) ADJ_T=.33

[34] This algorithm is based on the basic rigor self-report method used in California.

[35] Note that this adjustment factor can reduce the level of free ridership, but not increase it. If the respondent indicates that the equipment would have been of the same efficiency and installed at the same time without the program, the Program Influence Adjustment Factor is 1 and the adjusted program influence score is the same as the Overall Program Influence score.

(IF QN7B=4) ADJ_T=0

(IF QN7A=2) ADJ_T=1

(IF QN7A=3) ADJ_T=0

ADJ_E&T= MEAN (ADJ_E, ADJ_T)

Adjusted Program Influence

OPI_ADJ=OPI* ADJ_E&T.

1. **Influence of Program Components (PC).** This score is based on a series of four questions which asked respondents to rate the importance of four program components, on a scale of 0 to 10 (where 0 is not at all important and 10 is very important): the availability of the program discount, the availability of the audit, recommendations from the contractor, and program information or marketing materials. Greater importance of the program components means a lower level of free ridership. To align with the OPI score, we calculated four PC scores by dividing each QN5a, c, d, and e score by 10 and then subtracting it from 1.The final Program Components free-ridership score was the lowest of these values, such that the highest original program components scores became the lowest possible free-ridership component score. The following algorithm defines this part of the scoring:

   Program Component Influence (PCI) based on N5a, N5c, N5d, and N5e

   Program Components

   PC1=1-QN5A/10

   PC2=1-QN5C/10

   PC3=1-QN5D/10

   PC4=1-QN5E/10

   PC= Minimum (PC1, PC2, PC3, PC4)

2. **Relative Program Influence Score (RPI).** This score only adjusts the PC score when respondents said they have submitted or plan to claim the measures on their federal tax return. It is based on two questions. The first asked if the respondents plan to claim the measures on their tax return. The second asked respondents how important (on a 0 to 10 scale) the tax credits were to their decision to have the weatherization measures installed.

   The score on the second question was used to determine relative program influence against the tax credit by adding the tax credit score to the raw, highest PC score to become the total influence, of which the portion that is the PC score is the adjustment factor. For example, if the highest, raw PC score was 8 and the importance of the tax credit was 6, then the RPI score is 8/(6+8)=0.57.

   Relative Program Influence Score (RPI) based on N1 and N5b

   When N1=1 OR 2:

   (IF QN5B <98)

FTC=1-QN5B/10

RPI=1-(Maximum (QN5A, QN5C, QN5D, QN5E))/(Maximum (QN5A, QN5C, QN5D, QN5E))+QN5B))

(If RPI is greater than or equal to 0) PC=RPI.

Whether we used the PC or the RPI score, we reversed the score (by subtracting it from 1) so that low values indicate low free ridership and high values indicate high free ridership. This step was necessary for combining this score with the OPI and developing the final free ridership score.

The overall, unadjusted free ridership score is the average of the Overall Program Influence (adjusted by the Timing and Efficiency Adjustment Factor) and the Program Components score (for which the Relative Program Influence score was also used when appropriate), divided by 10. The free ridership score for each respondent thus ranges from 0 (0% free ridership, 100% program attribution) to 1 (100% free ridership, 0% program attribution).

Final Unadjusted Free Ridership Score
FR=MEAN[OPI_ADJ, (PC)]

Adjusting Base FR Scores with Consistency Check Data

When a respondent's answers appeared to be possibly contradictory with regard to program influence, a consistency check was triggered and a follow-up question was asked to gain additional, clarifying information. For example, if a respondent scored the program incentive highly on their decision to implement the envelope measure but also said there was a high likelihood that they would have done the same thing without the program, we asked for clarification regarding program influence (N9).

For Air Sealing (AS) and Insulation (Ins) measures, the consistency check question was triggered when there was a difference of 3 or less between the highest program element score (QN5a, 5c, 5d, and 5e) and participants' likelihood to participate score (Q9), e.g., 8,10; 10,10; 8,8; 9;7; etc. This set included about 15% of the cases, as shown in Table 68. The remaining respondents received the unadjusted FR scores.

Table 68. Number of Extracted Triggered Responses Analyzed

Measure	Consistency Check Cases Triggered	Consistency Check Not Triggered
Air Sealing *(n=59)*	10 *(17%)*	49 *(83%)*
Insulation *(n=76)*	10 *(13%)*	66 *(87%)*

We coded the open-end responses into clear statements of program influence (Coding=1), when a participant indicated that they were free riders (Coding=2), or when we could not determine whether there were clear statements for program influence or free ridership (i.e., ambiguous/neutral statements) (Coding=3). We had high inter-rater reliability among two analysts who completed the coding and reached a consensus for the few cases we had earlier disagreed on. As shown in Table 69, our coding indicated that less than a quarter of cases should be adjusted, and the adjustments were fairly balanced between revising the free ridership score up or down.

Table 69. Number of Extracted Triggered Responses Coded

Measure	Program Influence	FR	Ambiguous/Neutral
Air Sealing *(n=10)*	1 *(10%)*	1 *(10%)*	8 *(80%)*
Insulation *(n=10)*	2 *(20%)*	1 *(10%)*	7 *(70%)*

We determined that a reasonable approach to increasing or decreasing the existing FR values would be to focus on the QN6 value, which is the basis of the OPI score in the algorithm, and on the maximum of the program components scores, which is the basis for the PC score. Since these two scores are averaged together to calculate the unadjusted FR value, decreasing one increases the relative value of the other. Thus, to decrease the FR score, we decreased the adjusted program influence scores (OPI_adj) by half, and to increase the FR score, we decreased the PC score by half. (Participants whose responses we coded as ambiguous or neutral received the unadjusted FR value). In this way, we adjusted two air sealing scores and three insulation scores for these respondents, as shown in Table 70.

Table 70. Average FR Values Before and After Consistency Check Adjustment

Measure	Average FR Value Before Adjustment		Average FR Value After Adjustment	
	kWh	Therms	kWh	Therms
Air Sealing *(n=59)*	0.30	0.30	0.30	0.30
Insulation *(n=76)*	0.23	0.24	0.23	0.24

As shown in Table 71, incorporating these new adjusted FR scores has no effect on our estimates. This is due to the small number of cases adjusted and the relative balance between the number of participants that received an adjustment upwards or downwards.

Table 71. NTG Values Before and After Consistency Check Adjustment

Measure	Average NTG Value Before Adjustment		Average NTG Value After Adjustment	
	kWh	Therms	kWh	Therms
Air Sealing	0.70	0.70	0.70	0.70
Insulation	0.77	0.76	0.77	0.76

The analysis outlined above is expressed by the following algorithm. Changes in the algorithm stemming from the consistency check analysis and from what appears above in the unadjusted values section are indicated in italics.

Overall Program Influence (OPI) based on N3, N3a, N6,

(IF QN3A=1) OPI=1

(IF QN3=1) OPI=QN6/10

*(IF Ins_FR_coding = 1) Ins_OPI_3=Ins_OPI_2 * .5.*

Timing and Efficiency Adjustment Factor (ADJ_E&T) based on N8, N7a and N7b

ADJ_E=QN8/10

(IF QN7B=1) ADJ_T=1

(IF QN7B=2) ADJ_T=.66

(IF QN7B=3) ADJ_T=.33

(IF QN7B=4) ADJ_T=0

(IF QN7A=2) ADJ_T=1

(IF QN7A=3) ADJ_T=0

ADJ_E&T= MEAN (ADJ_E, ADJ_T)

Adjusted Program Influence

OPI_ADJ=OPI* ADJ_E&T.

Program Component Influence (PCI) based on N5a, N5c, N5d, and N5e

Program Components

PC1=QN5A

PC2=QN5C

PC3=QN5D

PC4=QN5E

PC= 1-[Minimum (PC1, PC2, PC3, PC4)/10]

(IF Ins_FR_coding = 2) Ins_PC_adj=1-((MAX(QN5Ab, QN5Cb, QN5Db, QN5Eb))/(10/2).

Relative Program Influence Score (RPI) based on N1 and N5b

When N1=1 OR 2:

(IF QN5B <98)

FTC=1-QN5B/10

RPI=1-(Maximum (QN5A, QN5C, QN5D, QN5E))/(Maximum (QN5A, QN5C, QN5D, QN5E))+QN5B))

(IF Ins_FR_coding = 2 & Ins_RPI ge 0) Ins_RPI_adj=1-((MAX(QN5Ab, QN5Cb, QN5Db, QN5Eb))/2)/((MAX(QN5Ab, QN5Cb, QN5Db, QN5Eb))/2+QN5Bb).

(If RPI is greater than or equal to 0) PC=RPI.

Final Unadjusted Free Ridership Score

FR=MEAN[OPI_ADJ, (PC)]

Spillover Scoring

The evaluation team also included a battery of qualitative questions to assess spillover. Key questions are included in Table 72.

Table 72. Key Questions Used to Determine Spillover

Survey Question	Survey Number
Since your participation in the <PROGRAM NAME>, have you made any additional energy saving home improvements for which you did not receive a utility incentive, rebate, or other discount?	SO1
Did the <PROGRAM> influence you in any way to make these additional improvements?	SO1a
How influential was your participation in the <PROGRAM> on your decision to make additional energy efficiency improvements on your own? Please use a scale that ranges from 0 to 10 where 0 is "not at all influential" and 10 is "extremely influential".	SO2
More specifically, how did Ameren's <PROGRAM > influence your decision to make additional home improvements to increase your energy savings?	SO3

We calculated spillover savings for program participants who indicated installing additional energy efficient measures. We categorized energy savings for installed measures as spillover savings when customers meet two specific criteria: the customer installed an energy efficient measure not rebated by the program, and the customer indicated a high level of program influence on the choice to install the measure.[36]

Using these criteria, the evaluation team identified 30 participants from the sample of 238 survey participants that qualified as potential spillover. Of this total, 23 participants actually qualified for spillover savings. We dropped eight participants who indicated in other questions that either they received a rebate or they did not provide any information related to the installation of the additional measures.

Respondents indicated 14 different types of spillover measures, as shown in Table 73.

[36] The customer must have answered an 8 or higher on a 0 to10 point scale where 0 means no influence and 10 means greatly influenced.

Table 73. Summary of Spillover Measures

Spillover Measure	Number Participants	Quantity of Measures	Measure Units
New Windows	6	50	Windows
LEDs (Gas htg)	8	36	Lamps
ES Refrigerator	6	6	Refrigerator
LEDs (Electric htg)	2	6	Lamps
Gas Storage Water Heater	4	4	WH
ES Dishwasher (Gas WH)	4	4	DW
ES Clothes Washer (Gas WH)	4	4	CW
ES Room AC	3	3	A/C
ES Freezer	1	1	Freezer
High Efficiency Gas Furnace (TOS) - 95% AFUE	1	1	Furnace
Attic Hatch Insulation (Gas Htg)	1	1	Participant
Programmable Thermostat (Gas htg)	1	1	PT
Attic Fan Cover	1	1	Cover
ES Bathroom Exhaust Fan/Light	1	1	Fan

The evaluation team used algorithms from the Statewide Illinois Technical Reference Manual (TRM) V2.0 to calculate energy savings for each identified measure. Table 74 shows the per-unit savings values and the assumptions used to calculate spillover savings associated with each measure.

Table 74. Spillover Measure Assumptions and per Unit Savings

Spillover Measure	Savings kWh/unit	Savings kW/unit	Savings Therms/unit	units	Quantity	Source	Assumptions
New Windows	CZ2 5.2 CZ3 6.8 CZ4 9.6	0.006	CZ2 15.3 CZ3 13.1 CZ4 10.1	3x5 window	50	– IL TRM V2.0 – PY6 HPwES Database (htg fuel type) – ASHRAE 2009 Chp 15[a] – IECC 2006[b] – CCRPC[c]	Six participants indicated installing new windows. We assumed that the new windows replaced single pane windows. The new window type is unknown, therefore we assumed dual pane low-e windows were installed. We used specific weather variable assumptions from IL TRM based on project location. The PY6 HPwES database was referenced to determine space heating fuel type.
LEDs (Gas htg)	35.3	0.003	(0.80)	lamp	36	– IL TRM V2.0 – PY6 HPwES Database (htg fuel type)	Eight participants (with gas heating) indicated installing LEDs. We referenced the PY6 HPwES database to determine space heating fuel type (gas); Quantity of installed LEDs was provided within the survey response. The wattage of the installed LED is unknown; we chose a 13W lamp because this is the default wattage according to the IL TRM.
ES Refrigerator	121.0	0.018	n/a	Refrigerator	6	– IL TRM V2.0	Six participants indicated installing a new ENERGY STAR refrigerator. Size and type of refrigerator unknown. We calculated savings using TRM default value of 14.75 cuft for refrigerator size. We calculated per-unit savings using the average of top mount freezer, side-by-side, and bottom mount freezer refrigerator types. All other variable inputs are from the IL TRM V2.0
LEDs (Electric htg)	24.4	0.003	n/a	Lamp	6	– IL TRM V2.0 – PY6 HPwES Database	Two participants (with electric heating) indicated installing LEDs. We referenced the PY6 HPwES database to determine space heating fuel type (electric); Quantity of installed LEDs was provided within the survey

Spillover Measure	Savings kWh/unit	Savings kW/unit	Savings Therms/unit	units	Quantity	Source	Assumptions
							response. The wattage of the installed LED is unknown, we chose a 13W lamp because this is the default wattage according to the IL TRM.
Gas Storage Water Heater	n/a	n/a	20.6	Water Heater	4	– IL TRM V2.0 – PY6 HPwES Database	Four participants indicated installing a new gas storage water heater. Size of water heater is unknown, we assumed 40-gallon tank which is typical in residential applications. All other variable inputs are from the IL TRM V2.0
ES Dishwasher (Gas WH)	26.4	0.003	1.4	DW	4	– IL TRM V2.0 – PY6 HPwES Database	Four participants indicated installing ENERGY STAR dishwashers. We referenced the PY6 HPwES database to determine water heating fuel type; All other variable inputs are from IL TRM V2.0
ES Clothes Washer (Gas WH)	75.7	0.010	2.3	CW	4	– IL TRM V2.0 – PY6 HPwES Database	Four participants indicated installing ENERGY STAR clothes washers. We referenced the PY6 HPwES database to determine water heating fuel type; We assumed that the existing dryer type is electric as this is typical in residential applications. All other variable inputs are from IL TRM V2.0
ES Room AC	CZ3 48.5 CZ4 65.1	0.046	n/a	AC	3	– IL TRM V2.0	Three participants indicated installing ENERGY STAR window air conditioners. We used specific weather variable assumptions from IL TRM based on project location. All other variable inputs are from IL TRM V2.0
ES Freezer	54.6	0.009	n/a	Freezer	1	– IL TRM V2.0	One participant indicated installing a new ENERGYSTAR freezer. Size and type of freezer unknown. We calculated savings using TRM default value of 27.9 cuft for freezer size. We calculated per-unit savings using the average of up-right and chest freezer types. All other variable inputs are from IL TRM V2.0
High Efficiency Gas Furnace (TOS) - 95% AFUE	n/a	n/a	136.2	Furnace	1	– IL TRM V2.0	One participant indicated installing a new high efficient gas furnace. All variable inputs used default values from IL TRM V2.0

Spillover Measure	Savings kWh/unit	Savings kW/unit	Savings Therms/unit	units	Quantity	Source	Assumptions
Attic Hatch Insulation (Gas Htg)	3.2	0.004	2.4	Per 10sf	1	– IL TRM V2.0 – PY6 HPwES Database	One participant indicated installing attic hatch insulation. We referenced the PY6 HPwES database to determine space heating fuel type; We used specific weather variable assumptions from IL TRM based on project location. We assumed that the area of the attic hatch is about 10 sf. We used the spillover savings for attic insulation and then applied for an area of 10 sf.
Programmable Thermostat (Gas htg)	n/a	n/a	45.1	PT	1	– IL TRM V2.0 – PY6 HPwES Database	One participant indicated installing a programmable thermostat. We referenced the PY6 HPwES database to determine space heating fuel type; We used specific weather variable assumptions from IL TRM based on project location. All other variable inputs from IL TRM V2.0
Attic Fan Cover	n/a	n/a	9.6	Fan Cover	1	– IL TRM V2.0 – PY6 HPwES Database	One participant indicated installing an attic fan cover. This is a difficult measure to determine savings. Attic fan covers provide savings during the heating season only. We calculated spillover savings using air sealing algorithms within the IL TRM V2.0. The algorithm calls for a change in cfm. To calculate spillover savings for this measure, we used the average change in cfm in the PY6 HPwES database for those with gas heating (n=1,098) and then used 5% of that value to be the savings from a fan cover.
ES Bathroom Exhaust Fan/Light	88.6	0.010	n/a	Fan	1	– IL TRM V2.0	One participant indicated installing an ENERGY STAR Bathroom exhaust fan. All variable inputs are from IL TRM V2.0

(a) ASHRAE 2009 Fundamentals Chapter 15 used to determine the u-value for single pane window
(b) IECC 2006 used to determine the national standard u-value requirement
(c) Algorithm used to calculate window savings from http://www.ccrpc.org/eecbg/images/Calculating_Energy_Savings_Windows.pdf

In Table 75, we show the total calculated spillover savings per measure and the program-level spillover percentage.

Table 75. Total Spillover Savings per Measure

Measure	kWh	kW	Therms
New Windows	347	0.280	631.4
LEDs (Gas htg)	1,272	0.125	(28.7)
ES Refrigerator	726	0.109	-
LEDs (Electric htg)	147	0.021	-
Gas Storage Water Heater	-	-	82.5
ES Dishwasher (Gas WH)	106	0.011	5.8
ES Clothes Washer (Gas WH)	303	0.039	9.3
ES Room AC	179	0.137	-
ES Freezer	55	0.009	-
High Efficiency Gas Furnace (TOS) - 95% AFUE	-	-	136.2
Attic Hatch Insulation (Gas Htg)	3	0.004	2.4
Programmable Thermostat (Gas htg)	-	-	45.1
Attic Fan Cover	-	-	9.6
ES Bathroom Exhaust Fan/Light	89	0.010	-
Total Spillover Savings (n=23)	**3,225**	**0.75**	**893.6**
Total Verified Savings for Surveyed Sample (n=238)	**328,351**	**146.64**	**36,492.7**
% Spillover for HPwES	**0.98%**	**0.51%**	**2.45%**

D. Appendix – Data Collection Instruments

Ameren Home Performance with Energy Star / ESHP Participant Phone Survey

July 16, 2014

Survey Overview

[This is a telephone survey with expected completes for approximately 300 HPwES customers and ESHP customers. The survey will gather information regarding program awareness, program satisfaction, preferred methods for receiving energy efficiency information, actions taken, measures received and installed, and key demographics. In addition, for HPwES participants we will also field a net-to-gross battery to assess program attribution and spillover of measures. The survey will also assess barriers to installation of discounted measures and opportunities to overcome those barriers.]

Introduction

[CALCULATE PROG_FLAG]
[Home Performance with Energy Star Participants = HPwES]
[Electric Space Heat Pilot Program = ESHP]
[CALCULATE TYPE_FLAG]
[Audit Only = AUDIT_FLAG]
[Rebate Only = REBATE_FLAG]
[Audit & Rebate = AUDITREBATE_FLAG]

Hello, my name is _____ and I am calling from Opinion Dynamics, an independent research firm, on behalf of Ameren Illinois. We're calling recent participants in Ameren's [IF PROG_FLAG=HPwES, "Home Performance with Energy Star Audit Program", IF PROG_FLAG=ESHP "Air Sealing Program"] to learn about their experience and satisfaction with the program. Ameren Illinois will use this information to improve their programs to benefit customers. I want to assure you that this is not a sales call and your answers will be strictly confidential. This survey will just take about 20 minutes of your time.

(IF NEEDED: The Ameren [IF PROG_FLAG=HPwES, "Home Performance with Energy Star Audit Program", IF PROG_FLAG=ESHP "Air Sealing Program"] offers $50 in-home energy audits, free energy efficiency products such as CFLS, or incentives for recommended energy efficiency upgrades through program allied contractors.)

May I speak with [CONTACT NAME] or someone in your household who is familiar with the [IF PROG_FLAG=HPwES, "Home Performance with Energy Star Audit Program", IF PROG_FLAG=ESHP "Air Sealing Program"]?

C1. Are you currently talking to me on a regular landline phone or a cell phone?

1. Regular landline phone
2. Cell Phone
8. (Don't know)
9. (Refused)

[ASK IF C1 = 2; ELSE GO TO SURVEY START]

C2. Are you currently in a place where you can talk safely and answer my questions?

1. Yes
2. No [Schedule call back]
8. (Don't know) [Schedule call back]
9. (Refused) [Schedule call back

Screeners

S1. Our records show that you participated in the [IF PROG_FLAG=HPwES, "Home Performance with Energy Star Audit Program", IF PROG_FLAG=ESHP "Air Sealing Program"]. Since there are many ways Ameren customers can participate in the program, please tell me about your participation by answering yes or no to each question. Did you: [INSERT NEXT ITEM AND REPEAT FOR ALL ITEMS.] [1=YES, 2=NO, 98=DON'T KNOW, 99=REFUSED]

a. Receive an in-home energy audit, where an energy advisor installed free energy saving products such as CFL bulbs, faucet aerators, or showerheads, and recommended upgrades such as [READ IN: IF PROG_FLAG= HPwES, "air sealing or insulation", IF PROG_FLAG=ESHP, "insulation"]?
b. Have incentivized [READ IN: IF PROG_FLAG= HPwES, "air sealing or insulation", IF PROG_FLAG=ESHP, "insulation"] installed in your home by Ameren program allies? (IF NECESSARY, "AMEREN PROGRAM ALLIES ARE AMEREN-AFFILIATED CONTRACTORS")
c. [ASK IF Multi_prop_flag] Do you own or occupy more than one home at which the program made energy improvements?

[GEN AUDIT_FLAG_CONF IF S1a=1 AND S1b<>1]

[GEN AUDITREBATE_FLAG_CONF IF S1a=1 AND S1b=1]

[GEN REBATE_FLAG_CONF IF S1a<>1 AND S1b=1]

[GEN Multi_prop_flag_CONF IF S1c=1]

[IF S1a<>1 AND S1b<>1, THANK AND TERMINATE: "Thank you. We do not have any more questions for you today.]

S2. Are you an employee of Ameren Illinois or Conservation Services Group?

1. Yes [THANK AND TERMINATE]
2. No
8. (Don't know) [THANK AND TERMINATE]
9. (Refuse) [THANK AND TERMINATE]

[ASK IF CHAMPAIGN_FLAG = 1]

C3. Did you receive an additional incentive from the city of Champaign for your participation in the program?

1. Yes

2. No
8. (Don't know)
9. (Refuse)

Program Awareness

IF Multi_prop_flag_CONF=1, READ "Since you represent multiple homes that participated in the program, please answer the questions based on a typical home.

PA1. Where did you first hear about the [IF PROG_FLAG=HPwES, "Home Performance with Energy Star Audit Program", IF PROG_FLAG=ESHP "Air Sealing Program"]?

1. (Ameren/ActOnEnergy website)
2. (Email from Ameren or ActOnEnergy)
3. (Other Ameren or ActOnEnergy source)
4. (Energy Star website)
5. (Internet search engine, such as Google, Bing or Yahoo)
6. (A friend, relative or colleague)
7. (Contractor/ Program Ally)
8. (Neighborhood associations)
9. (A letter in the mail)
10. (A Postcard)
11. (Door flyer/hanger)
12. (Radio ad)
13. (Print Article)
14. (Home Show)
15. (A public event)
00. (Other, please specify)
98. (Don't Know)
99. (Refused)

PA2. What are the best ways for Ameren to inform you about the energy efficiency programs it offers residential customers? [MULTIPLE RESPONSE; UP TO 3]

1. (Ameren/ActOnEnergy website)
2. (Email from Ameren or ActOnEnergy)
3. (A friend, relative or colleague)
4. (Contractor/Program Ally)
5. (Neighborhood associations)
6. (Bill Inserts)
7. (A letter in the mail)
8. (A Postcard)
9. (Door flyer)
10. (Print Advertisement)
11. (Home Show)
12. (A public event)
00. (Other, please specify)
98. (Don't Know)
99. (Refused)

[SKIP IF PA1=1, 2 OR 3]

PA3. And in general, do you consider Ameren a resource for energy efficiency information?

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

Program Processes

[ASK ALL]

First I would like to ask you about your participation in the program.

PP1. Why did you decide to participate in this program? [RECORD ALL THAT APPLY]

1. (Save money on energy/electric/gas bill)
2. (Reduce energy consumption)
3. (Make your home more comfortable)
4. (Increase the value of your home)
5. (Improve the environment: cleaner air, etc.)
6. (The available incentive)
7 (It was inexpensive)
00. (Other [Specify])
98. (Don't know)
99. (Refused)

PP2. Do you recall receiving any information about getting a silver or gold certificate of completion for your home from the auditor?

PP3. To the best of your knowledge, did your home earn either a silver or gold certification of completion through your participation in the [IF PROG_FLAG = HPwES, "Home Performance with ENERGY STAR audit", if PROG_FLAG = ESHP, "Air Sealing"] Program? It would have been awarded to homeowners who met special, select criteria during their participation. You would have received a large, colorful paper certificate with the Illinois Home Performance and ENERGY STAR logos on it.

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

[ASK IF PP3=1]

PP4. What do you think were the main benefits of getting a silver or gold certification of completion for your home?

1. (Saving money, lower energy bills)
2. (Increase value of their home, resale value, equity)
3. (Protecting the environment, being green)
4. (Making my home more comfortable, getting rid of drafts)
5. (None)
0. (Other, specify)
8. (Don't Know)

9. (Refused)

Energy Education

[ASK SECTION FOR AUDIT_FLAG_CONF=1 OR AUDITREBATE_FLAG_CONF=1]

E1a. What best describes your knowledge of home energy improvements BEFORE receiving your home energy audit?

1. I had no knowledge
2. I had very little knowledge
3. I had some knowledge
4. I had a lot of knowledge

8. (Don't know)

9. (Refused)

E1b. On a scale from 0 to 10, where 0 is "NOT increased at all," and 10 is "increased A LOT," how much has your KNOWLEDGE of home energy improvements INCREASED based on the information provided in the energy audit?

[0-10, 98=Don't know, 99=Refused]

Barriers to Audit Recommendations

[ASK SECTION FOR AUDIT_FLAG_CONF=1 OR AUDITREBATE_FLAG_CONF=1]

B1. Do you recall receiving recommendations for how to save energy in your home from the auditor?

1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF B1=1 AND AUDIT_FLAG_CONF=1]
B2. Would you say you have completed all, some, or none of the energy saving recommendations you received from the auditor?

1. All
2. Some
3. None
8. (Don't know)
9. (Refused)

[ASK IF B1=1 AND AUDITREBATE_FLAG_CONF=1]
B2a. Would you say you have completed all or some of the energy saving recommendations you received from the auditor?

1. All
2. Some
8. (Don't know)

9. (Refused)

[ASK IF (B2=2 OR 3) OR (B2A=2)]
B3. Do you have any current plans to complete any of the remaining energy saving recommendations?

1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF (B2=2 OR 3) OR (B2A=2)]
B4. What did the program recommend you install that you are unlikely to ever actually install?" [OPEN END; Multiple Response Up to 5]

1. (CFL bulbs)
2. (Faucet Aerators)
3. (Low-Flow Shower Heads)
4. (Air Sealing)
5. (Duct sealing or insulating)
6. (Attic, wall or other insulation)
7. (Programmable Thermostat)
8. (High efficiency Air conditioner)
9. (High efficiency Furnace/Boiler/Heat Pump)
00. (Other: Specify)
96. (None)
98. (Don't know)
99. (Refused)

[ASK IF B4 =00 through 10]
B5. Why aren't these recommendations likely to be completed? [OPEN END; Multiple Responses Up to 5]

1. (Project cost)
2. (Too busy/ Too much time)
3. (Don't know which contractors to use)
4. (The savings are not worth the effort)
5. (Not interested)
6. (Program allies/Contractor are not available)
7. (Program allies/Contractors are more expensive than non-program contractors)
00. (Other: Specify)
96. (None)
98. (Don't know)
99. (Refused)

Channeling

[ASK ALL]

CH1. Do you recall learning about other Ameren Illinois programs through your participation in the <PROGRAM> program?

1. Yes
2. No

8. (Don't know)
9. (Refused)

[ASK IF CH1=1, ELSE SKIP TO RP1]
CH2. Which other Ameren Illinois programs did you learn about? [Multiple Response Up to 3]

1. (Old/inefficient refrigerator or freezer recycling; "Appliance Recycling Program")
2. (Central air conditioner/ Heat pump/ Gas furnace or boiler replacements; "HVAC Program")
3. (Rebates for efficient air purifier/ water heater; "Rebates on Energy-saving Products for your Home Program")
4. (Rebates for Air Source Heat Pump/Ductless Mini Splits; "All Electric Homes Program")
00. (Other: Specify)
98. (Don't know)
99. (Refused)

[ASK IF CH1=1]
CH3. How did you hear about the other programs? [Open End] [Multiple Response Up to 3]

1. (Energy advisor /auditor/ audit report)
2. (Contractor/ Program ally)
3. (CSG or Ameren Illinois employee)
4. (Ameren Illinois website)
00. (Other: Specify)
98. (Don't know)
99. (Refused)

[ASK IF CH2<98]
CH4. In which of the other programs, if any, have you participated? [MULTIPLE RESPONSE up to 5]

1. (Old/inefficient refrigerator or freezer recycling; "Appliance Recycling Program")
2. (Gas furnace replacements - "HVAC Program")
3. (Central air conditioner -"HVAC Program")
4. (Heat pump replacements -"HVAC Program")
5. (Boiler replacement - "HVAC Program")
6. (Rebates for efficient air purifier - "Rebates on Energy-saving Products for your Home Program")
7. (Rebates for efficient room air conditioner - "Rebates on Energy-saving Products for your Home Program")
8. (Rebates for efficient water heater - "Rebates on Energy-saving Products for your Home Program")
9. (Rebates for smart strips; "Rebates on Energy-saving Products for your Home Program")
10. (Rebates for programmable thermostats; "Rebates on Energy-saving Products for your Home Program")
11. (Rebates for Air Source Heat Pump/Ductless Mini Splits; "All Electric Homes Program")
12. (Purchased discounted CFL bulbs)
00. (Other: Specify)
96. (None)
98. (Don't know)

99. (Refused)

Rebate Process

[ASK IF REBATE_FLAG_CONF=1]

RP1. Before you received program incentives for having air sealing or insulation upgrades installed by Ameren program allies did you know that you were eligible to receive a home energy audit?

1. Yes
2. No
8. (Don't know)
9. (Refuse)

[ASK IF RP1=1]

RP2. Why didn't you get an audit? [Multiple response up to 3]

1. (An audit is not required to get incentives for air sealing or insulation)
2. (Already knew what work was necessary/desired)
3. (Too much time)
4. (Too costly)
5. (Didn't understand eligibility requirements)
6. (Didn't have enough information)
7. (Not interested)
00. (Other: Specify)
98. (Don't Know)
99. (Refuse)

Measure Verification

CFL Measure Verification and Free Ridership

[ROTATE SECTIONS]

[ASK SECTION IF CFL_SAMPLE_FLAG=1]

CFL1. Our records show that you had <cfl_qty>CFLs installed in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your house"] during the audit.

Is this correct?

1. Yes
2. No, quantity incorrect
3. (Did not receive any CFL bulbs at all) [SKIP TO FA1]
8. (Don't know) [SKIP TO FA1]
9. (Refused) [SKIP TO FA1]

[ASK IF CFL1=2]

CFL2. How many CFLs, in total, were installed during the audit? [NUMERIC OPEN END]

96. (None are installed)
98. (Don't know)
99. (Refused)

[SKIP TO FA1 IF CFL2 EQUALS DK/REFUSED/NONE]

[CREATE VERIFIED CFL TOTAL AND CFLS BY WATTAGE]

CFL3. Are all of the CFLs still installed?
1. Yes
2. No
8. (Don't know) [SKIP TO FA1]
9. (Refused) [SKIP TO FA1]

[SKIP TO CFL7 IF CFL3=1]

CFL4a. How many CFLs, in total, are still in installed? [NUMERIC OPEN END: SHOULD NOT EXCEED <VTOTACFL>]

96. (None are installed)
98. (Don't know)
99. (Refused)

CFL5. Why did you remove the CFLs?
00. [OPEN END]
98. (Don't know)
99. (Refused)

CFL6. What did you do with the CFLs that are not installed?
1. (Stored them for future use)
2. (Stored them to give to someone else later)
3. (Stored them to dispose of later)
4. (Recycled them)
5. (Threw them away in the garbage)
6. (Gave them to someone else)
7. (Other, specify)
98. (Don't know)
99. (Refused)

[ASK IF VTOTACFL>0]

CFL7. Did the CFLs installed during the energy audit replace standard incandescent bulbs or older CFLs?
1. (Incandescent Standard)
2. (CFLs)
3. (Both)
8. (Don't know)
9. (Refused)

[ASK IF PROG_FLAG=HPwES, ELSE SKIP TO CFL11]

CFL8. If you had not received free CFLs during the energy audit, how likely is it that you would have installed any CFLs on your own within the next year? Please use a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely". [RECORD 0-10 98=Don't know; 99=Refused]

[ASK IF HPwES AND 0<CFL8<98, ELSE SKIP TO CFL11]

CFL9. If you had not received CFLs during the energy audit, would you have installed the same number or fewer CFLs than were installed?

1. (We would have installed FEWER CFLs)
2. (We would have installed the SAME number of CFLs)
3. (We would have installed more)
4. (We would NOT have installed any)
8. (Don't know)
9. (Refused)

[ASK IF HPwES AND CFL9<>4]

CFL10. If you had not received CFLs during the energy audit when would you have installed CFLs on your own?

1. At roughly the same time
2. Within six months
3. Within a year
4. More than a year
8. (Don't know)
9. (Refused)

CFL11. On a scale from 0 to 10, where 0 is "extremely dissatisfied" and 10 is "extremely satisfied", how would you rate your overall satisfaction with the CFLs that you received?
[0-10, 98=DON'T KNOW, 99=REFUSED]

[ASK IF CFL11 <6]

CFL12. Why did you give this rating?

1. [OPEN END]
98. (Don't know)
99. (Refused)

Faucet Aerator Measure Verification

[ASK SECTION IF AERATOR_SAMPLE_FLAG=1]

FA1. Our records indicated that you had [FAQUANT] faucet aerator(s) installed in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"] during the audit, is that correct?

1. Yes
2. No, quantity incorrect
3. (No, aerators were installed at all.) [SKIP TO SH1]
8. (Don't know) [SKIP TO SH1]
9. (Refused) [SKIP TO SH1]

[ASK IF FA1=2]

FA2. How many faucet aerators did you have installed in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"] during the audit? [NUMERIC OPEN END, 1-90]

96. (None) [SKIP TO SH1]
98. (Don't know) [SKIP TO SH1]
99. (Refused) [SKIP TO SH1]

FA3. Are all of the faucet aerators you received through the program still installed?

1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF FA3=2, ELSE SKIP TO FA6]
FA4. How many of the faucet aerators are still installed?
96. (None)
98. (Don't know)
99. (Refused)

FA5. Why did you remove the faucet aerators?
00. [OPEN END]
98. (Don't know)
99. (Refused)

[ASK IF PROG_FLAG=HPwES, ELSE SKIP TO FA9]
FA6 If you had not received free faucet aerators during the audit, how likely is it that you would have installed any faucet aerators on your own within the next year? Please use a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely". [RECORD 0-10 98=Don't know; 99=Refused]

[ASK IF HPwES AND 0<FA6<98; ELSE SKIP TO FA9]
FA7. If you had not received faucet aerators during the energy audit, would you have installed the same number or fewer faucet aerators than were installed?
1. We would have installed FEWER faucet aerators
2. We would have installed the SAME number of faucet aerators
3. (We would have installed more)
4. (We would NOT have installed any)
8. (Don't know)
9. (Refused)

[ASK IF HPwES AND FA7 < >4, ELSE SKIP TO FA9]
FA8. If you had not received faucet aerators during the energy audit when would you have installed faucet aerators on your own?
1. At roughly the same time
2. Within six months
3. Within a year
4. More than a year
8. (Don't know)
9. (Refused)

FA9. On a scale from 0 to 10, where 0 is "extremely dissatisfied" and 10 is "extremely satisfied", how would you rate your overall satisfaction with the faucet aerators you received?
[0-10, 98=DON'T KNOW, 99=REFUSED]

[ASK IF FA9 <6]
FA10. Why did you give this rating?
00. [OPEN END]
98. (Don't know)
99. (Refused)

High Efficiency Showerhead Measure Verification
[ASK SECTION IF SHOWERHEAD_SAMPLE_FLAG=1]

SH1. Our records indicated [SHQUANT] high efficiency showerhead(s) were installed in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"] during the audit, is that correct?
1. Yes
2. No, quantity incorrect
3. (No, showerheads were installed at all.) [SKIP TO AS1]
8. (Don't know) [SKIP TO AS1]
9. (Refused) [SKIP TO AS1]

[ASK if SH1=2]
SH2. How many high efficiency showerheads were installed when the auditor assessed [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"]? [NUMERIC OPEN END, 1-90]
96. (None) [SKIP TO AS1]
98. (Don't know) [SKIP TO AS1]
99. (Refused) [SKIP TO AS1]

SH4. Are all of the high efficiency showerheads you had installed through the program still installed in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"]?
1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF SH4=2, ELSE SKIP TO SH7]
SH5. How many of the high efficiency showerheads are still installed in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"]?
00. [OPEN END]
98. (Don't know)
99. (Refused)

SH6. Why did you remove [some of] the high efficiency showerheads?
00. [OPEN END]
98. (Don't know)
99. (Refused)

[ASK IF PROG_FLAG=HPwES, ELSE SKIP TO SH10]
SH7. If you had not received free high efficiency showerheads during the audit, how likely is it that you would have installed any high efficiency showerheads on your own within the next year? Please use a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely". [RECORD 0-10 98=Don't know; 99=Refused]

[ASK IF HPwES AND 0<SH7<98; ELSESKIP TO SH10]
SH8. If you had not received high efficiency showerheads during the energy audit, would you have installed the same number or fewer high efficiency showerheads than were installed?
1. We would have installed FEWER high efficiency showerheads
2. We would have installed the SAME number of high efficiency showerheads
3. (We would have installed more)

4. (We would NOT have installed any)
8. (Don't know)
9. (Refused)

[ASK IF HPwES AND SH8<>4, ELSE SKIP TO SH10]

SH9. If you had not received high efficiency showerheads during the energy audit when would you have installed high efficiency showerheads on your own?
1. At roughly the same time
2. Within six months
3. Within a year
4. More than a year
8. (Don't know)
9. (Refused)

SH10. On a scale from 0 to 10, where 0 is "extremely dissatisfied" and 10 is "extremely satisfied", how would you rate your overall satisfaction with the high efficiency showerheads you received? [0-10, 98=DON'T KNOW, 99=REFUSED]

[ASK IF SH10<6]

SH11. Why did you give this rating?
1. [OPEN END]
98. (Don't know)
99. (Refused)

Air Sealing Measure Verification

[ASK SECTION IF AIRSEALING_SAMPLE_FLAG=1]

AS1. Our records indicate that you had air sealing improvements such as caulk, spray foam, weather stripping or duct upgrades completed in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"] through the program. Is that correct?
1. Yes
2. No
8. (Don't know)
9. (Refused)

[SKIP TO IN1 IF AS1=2,8,9]

AS2. Are all of the air sealing measures still in place?
1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF AS2=2]

AS3. What air sealing measures were removed? [OPEN END, 98=DON'T KNOW, 99=REFUSE]

[ASK IF AS2=2]

AS4. Why did you remove these air sealing measures?

00. [OPEN END]
98. (Don't know)
99. (Refused)

AS7. On a scale from 0 to 10, where 0 is "extremely dissatisfied" and 10 is "extremely satisfied", how would you rate your overall satisfaction with the air sealing you received?
[0-10, 98=DON'T KNOW, 99=REFUSED]

[ASK IF AS7<6]
AS8. Why did you give this rating?
1. [OPEN END]
98. (Don't know)
99. (Refused)

Insulation Measure Verification

[ASK SECTION IF INSULATION_SAMPLE_FLAG=1]
IN1. Our records indicate that you had insulation work done on ceilings, walls, floors, crawlspaces or in your attic through the program. Is that correct?
1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF IN1=1, ELSE SKIP TO N1]
IN2. Through your program ally you could have received incentives on insulation upgrades such as wall, attic, ceiling, basement, rim joist, knee wall and crawl space insulation. Which types of insulation upgrades did you receive? [MULTIPLE RESPONSE]
1. (Wall)
2. (Attic)
3. (Ceiling)
4. (Basement)
5. (Rim joist)
6. (Knee wall)
7. (Crawl space)
00. (Other insulation specify: _____)
98. (Don't know)
99. (Refused)

IN3. On a scale from 0 to 10, where 0 is "extremely dissatisfied" and 10 is "extremely satisfied", how would you rate your overall satisfaction with the insulation you received?
[0-10, 98=DON'T KNOW, 99=REFUSED]

[ASK IF IN3<6]
IN4. Why did you give this rating?
1. [OPEN END]
98. (Don't know) 99. (Refused)

DHW Turndown Verification
[ASK IF DHWTURNDOWN_FLAG = 1]

TD1. Our records indicated that your electric hot water heater had its temperature turned down in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"] during the audit, is that correct?
1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF TD1 = 1]
TD2. Have you since turned the water heater temperature back up in [IF Multi_prop_flag_CONF=1, "multiple homes", ELSE "your home"]?
1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF TD2 = 1]
TD3. Why did you turn the water heater temperature back up?
[OPEN END, 98 Don't Know, 99 Refused]

Free Ridership

[ASK IF PROG_FLAG=HPwES]

ASK SECTION FOR EACH MEASURE: "AIR SEALING" (AIRSEALING_SAMPLE_FLAG=1) AND "INSULATION" (INSULATION_SAMPLE_FLAG =1)

[ASK IF (AIRSEALING_SAMPLE_FLAG =1 AND PROG_FLAG=HPwES) OR INSULATION_SAMPLE_FLAG =1, ELSE SKIP TO SO1]

[FOR MEAS1 READ-IN USE THE FOLLOWING:
IF AIRSEALING_SAMPLE_FLAG = 1, READ IN "AIR SEALING"
IF INSULATION_SAMPLE_FLAG = 1, READ-IN "INSULATION"]

[FOR RMEAS1 READ-IN USE THE FOLLOWING:
IF AIRSEALING_SAMPLE_FLAG = 1, READ-IN "PERFORM"
IF INSULATION_SAMPLE_FLAG = 1, READ-IN "INSTALL"]

For the next series of questions, please think about the <MEAS1> you had <RMEAS1>ed by program allies using the program incentives. IF Multi_prop_flag_CONF=1, READ "Since you represent multiple homes that participated in the program, please answer the questions based on the typical home.

N1. On your 2014 federal tax return, did you claim or do you plan to claim a tax credit for the <MEAS1> that you <RMEAS1>ed?
1. (Yes, I did claim that expense)
2. (Yes, I plan to claim that expense)
3. (No to both)
8. (Don't know)
9. (Refused)

N2. Our records show that for having <MEAS1> <RMEAS1>ed, you received an incentive from Ameren Illinois [IF C3=1 and the City of Champaign incentives"]. Do you recall receiving this incentive? [IF NEEDED: IF INSULATION_SAMPLE_FLAG = 1: The incentive would have covered some of the costs of having insulation installed in your home, either in the attic, crawlspace, walls, or rim joists of your home. IF AIR SEALING_SAMPLE_FLAG = 1: The incentive would have covered some of the costs of having small leaks in your home, such as near windows or doors, sealed to prevent heating/cooling loss and drafts.]

1. (Yes)
2. (No)
8. (Don't know)
9. (Refused)

N3. When did you first learn that you could receive incentives from Ameren [IF C3=1 "and the city of Champaign] for the <MEAS1>? Was it before or after < your <MEAS1> was RMEAS1>ed?

1. Before
2. After
8. (Don't know)
9. (Refused)

[ASK IF N3=2, ELSE SKIP TO N5]

N3a. Just to be clear, did you have the <MEAS1> <RMEAS1>ed and then find out that you could receive incentives from Ameren [IF C3=1 "and the City of Champaign]?

1. (Yes) [SKIP TO SO1]
2. (No)
8. (Don't know)
9. (Refused)

N5. I'm going to ask you to rate the importance of several factors that might have influenced your decision to <RMEAS1> the <MEAS1>. Please use a scale from 0 to 10, where 0 is "not at all important" and 10 is "extremely important". How important was…in your decision to <RMEAS1> the <MEAS1>? [0-10; 96=Not Applicable; 98=Don't Know; 99=Refused]

N5a. The availability of the incentive from Ameren [IF C3=1 "and the City of Champaign]
N5b. [ASK IF N1=1] The availability of Federal tax credits
N5c. [ASK IF AUDITFLAGCONF=1 OR AUDITREBATELFLAGCONF=1] The energy audit you received
N5d. Information from the Ameren marketing materials
N5e. Information from the contractor or program ally

N6. If the programs had not been available, how likely is it that you would have < RMEAS1>ed the same <MEAS1> at all. Please use a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely". [RECORD 0-10 98=Don't know; 99= Refused]

[SKIP TO N9 IF N6<5, 98, 99]

[ASK IF MEAS1=INSULATION OR AIRSEAL]

N8. If you had not participated in the program, how likely is it that you would have as much <MEAS1> <RMEAS1>ed as you did? Please use a likelihood scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely". [RECORD 0-10 98=Don't know; 99=Refused]

N7a. Did participating in the program cause you to < RMEAS1> <MEAS1> earlier than you were planning or did participating have no influence on when you did it?
1. <RMEAS1>ed earlier
2. Did not change when I <RMEAS1>ed it
3. Would not have done it at all without the program
8. (Don't know)
9. (Refused)

[ASK IF N7a=1]

N7b. If you hadn't participated in the program, when would you have <RMEAS1>ed your <MEAS1>? Would you say…?
1. Within 6 months of when you did,
2. 6 months to 1 year later,
3. 1-2 years later,
4. or more than 2 years later
8. Don't know
9. Refused

[ASK IF N6>4 AND N5a or c or d or e>4, ELSE SKIP TO MEAS2]

N9. Just to make sure I understand, please explain the importance of the program on your decision to install your <MEAS1>.
00. [OPEN END]
98. (Don't know)
99. (Refused)

Spillover

[ASK IF HPwES=1]

SO1. Since your participation in the Home Performance with Energy Start program, have you made any additional energy saving home improvements for which you did NOT receive a utility incentive, rebate, or other discount?
1. Yes
2. No
98. (Don't Know)
99. (Refused)

[ASK IF SO1=1, ELSE SKIP TO SAT1]

SO1a. Can you briefly explain why you decided to make these energy efficient home improvements? [NOTE TO INTERVIEWER: IF THE RESPONDENT MENTIONS HPwES AS A FACTOR IN MAKING THE ENERGY EFFICIENCY IMPROVEMENTS, PLEASE RECORD THE OPEN-END RESPONSE AND SELECT THE FIELD CODED RESPONSE BELOW]

00. [OPEN END]
01. (PROGRAM INFLUENCE), Specify: [OPEN END]
98. DON'T KNOW
99. REFUSED

[ASK IF SO1a <>1]
SO1b. Did the <PROGRAM> influence you in any way to make these additional improvements?

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

[ASK IF SO1a=1 or SO1b=1; ELSE SKIP TO SAT1]
SO2. How influential was your participation in the <PROGRAM> on your decision to make additional energy efficiency improvements on your own? Please use a scale that ranges from 0 to 10 where 0 is "not at all influential" and 10 is "extremely influential", [RECORD 0-10; 98=Don't Know; 99=Refused]

[ASK IF SO2=8, 9 or 10; ELSE SKIP TO SAT1]
SO3. More specifically, how did Ameren's <PROGRAM > influence your decision to make additional home improvements to increase your energy savings? [OPEN END; 98=Don't Know; 99=Refused]

SO4. Now I have a few questions about the energy saving improvements you made <u>that did not receive incentives from Ameren.</u> Did you: [1=Yes; 2=No; 98=Don't Know; 99=Refused]

a. Purchase an ENERGY STAR Appliance?
b. Purchase a new high efficiency water heater?
c. Purchase a new ENERGY STAR room air conditioner?
d. Purchase a new energy efficient furnace?
e. Purchased new windows?
f. Purchase a new Central Air Conditioning System or Heat Pump?
g. Purchase new energy efficient lighting, such as CFLs or LEDs?

[ASK IF SO4a=1]
SO5a. Did you purchase an ENERGY STAR refrigerator, dishwasher, clothes washer or freezer? [MULTIPLE RESPONSE]

1. (Yes, Refrigerator)
2. (Yes, Dishwasher)
3. (Yes, clothes washer)
4. (Yes, freezer)
5. (No)
98. (Don't Know)
99. (Refused)

[ASK IF SO4b=1 ELSE SKIP TO SO5c]
SO5b.Was the water heater you purchased an electric or gas water heater?

1. Electric water heater
2. Electric heat pump water heater
3. ENERGY STAR Gas water heater
98. (Don't Know)
99. (Refused)

[ASK IF SO4b=1 & SO5B=1, 3]
SO5bb. Was it a storage or tankless water heater?

1. Tankless water heater
2. Storage water heater
98. (Don't Know)
99. (Refused)

[ASK IF SO4c=1]
SO5c. How many ENERGY STAR room air conditioners did you install?
[NUMERIC OPEN END. 98=DON'T KNOW, 99= REFUSE]

[READ IF SO5c > 1 AND SO5c < 98]

For the next few questions, please just think of one of the new ENERGY START room air conditioners you purchased.

[ASK IF SO5c>0 & SO5c<98]
SO5ca. Was the new unit you purchased a replacement for an old room air conditioner?

1. Yes
2. No
8. (Don't Know)
9. (Refused)

[ASK IF SO5ca=1]
SO5caa. How old was the room air conditioner you replaced?
[NUMERIC OPEN END. 98=DON'T KNOW, 99= REFUSE]

[ASK IF SO5ca=1]
SO5cab. How well was the old room air conditioner you replaced working before you replaced it? Would you say…

1. It was working well with no real problems
2. It was working okay but needed a few minor repairs
3. It was not working well and needed major repairs
4. It was not working at all
8. (Don't Know)
9. (Refused)

[ASK IF SO4c=1]
SO5cb. Did you receive a government tax credit or rebate for the room air conditioner(s) you purchased?

1. Yes
2. No
8. (Don't Know)
9. (Refused)

[ASK IF SO4c=1]
SO5cc. Do you happen to know the size, in BTUs or Tons, for your new room air conditioner?

1. Yes
2. No

8. (Don't Know)
9. (Refused)

[ASK IF SO5cc=1]
SO5cd. What are the BTUs or tons for the new room air conditioner? [Two boxes, only need data in one]
[BTUS: NUMERIC OPEN END, 998=DON'T KNOW, 999= REFUSE]
[TONS: NUMERIC OPEN END, 998=DON'T KNOW, 999= REFUSE]

[ASK IF SO4d=1, ELSE SKIP TO SO5e]
SO5d. Did you receive a government tax credit or rebate for the furnace you purchased?
1. Yes
2. No
8. (Don't Know)
9. (Refused)

SO5da. What fuel does the furnace use?
1. Electricity
2. Natural Gas
3. Oil
4. (Other, specify)
5. (Don't Know)
6. (Refused)

SO5db. Is the new furnace a high efficiency model?
1. Yes
2. No
8. (Don't Know)
9. (Refused)

SO5dc. Was the new unit you installed a replacement for an old furnace?
1. Yes
2. No
8. (Don't Know)
9. (Refused)

[ASK IF SO5dc=1]
SO5dd. How old was the furnace you replaced?
[NUMERIC OPEN END. 98=DON'T KNOW, 99= REFUSE]

[ASK IF SO5dc=1]
SO5de. How well was the old room furnace you replaced working before you replaced it? Would you say…
1. It was working well with no real problems
2. It was working okay but needed a few minor repairs
3. It was not working well and needed major repairs
4. It was not working at all

8. (Don't Know)
9. (Refused)

SO5df. Do you happen to know the efficiency, or AFUE value, for your new furnace?
1. Yes
2. No
8. (Don't Know)
9. (Refused)

[ASK IF SO5df=1]
SO5dg. What is the AFUE value for your new furnace?
[NUMERIC OPEN END, 998=DON'T KNOW, 999= REFUSE]

[ASK IF SO4e=1]
SO5e. How many windows did you install? [NUMERIC OPEN END, 98=DON'T KNOW, 99= REFUSE]

[ASK IF SO4g=1]

SO6a. How many CFLs did you install since you participated in the program?
[NUMERIC OPEN END, 998=DON'T KNOW, 999= REFUSE]

[ASK IF SO4g=1]

SO6b. How many LEDs did you install since you participated in the program?
[NUMERIC OPEN END, 998=DON'T KNOW, 999= REFUSE]

[ASK IF (AUDIT_FLAG_CONF=1 OR AUDITREBATE_FLAG_CONF=1) AND ANY SO4a-e=1]
SO7. Were any of these improvements we've just talked about recommended during the audit you received?
1. Yes
2. No
8. (Don't know)
9. (Refused)

SO8. Did you make any other improvements that were recommended during the audit that did not receive incentives and that we haven't talked about yet?

1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF SO8=1, ELSE SKIP TO SAT1]
SO9. What were these other energy efficient improvements?

1. (Wall Insulation)
2. (Ceiling or Attic Insulation)
3. (Basement Insulation)
4. (Programmable thermostat)
5. (Additional Air Sealing)
6. (HVAC equipment)

7. (Water Heater)
00. (Other [SPECIFY])
98. (Don't know)
99. (Refused)

[ASK FOR EACH SO9=1-00, ELSE SKIP TO SAT1]
SO10. Why didn't you use the Ameren incentives for the [Insert each SO9=1-00]? [MULTIPLE RESPONSE; UP TO 3]

1. (Haven't gotten around to submitting the paperwork)
2. (The paperwork is too much of a hassle)
3. (Was not aware rebates were available)
4. (Forgot about the rebates)
00. (Other: specify_____)
98. (Don't Know)
99. (Refused)

Program Satisfaction

[ASK ALL]

SAT1. Please think about your experience with the <PROGRAM NAME> program. On a scale of 0 to 10 where 0 is 'extremely dissatisfied' and 10 is 'extremely satisfied', how satisfied were you with <PROGRAM NAME> program overall? [INDICATE NUMBER 0 THROUGH 10, 98=DON'T KNOW, 99=REFUSED]

[ASK IF SAT1 <6]
SAT1a. Why did you give this rating? (OPEN END) [PROBE FOR SPECIFICS]

[ASK IF AUDIT_FLAG_CONF=1 OR AUDITREBATE_FLAG_CONF=1]

SAT2. Using the same scale where 0 is 'extremely dissatisfied' and 10 is 'extremely satisfied'… how satisfied were you with… [INDICATE NUMBER 0 THROUGH 10, 98=DON'T KNOW, 99=REFUSED]

[ASK IF AUDIT_FLAG_CONF=1 OR AUDITREBATE_FLAG_CONF=1] [ROTATE]
a. The amount of time between when you called to schedule the audit and when it was done
b. The professionalism of the Energy Advisor who visited your home
c. The time it took to complete the audit
d. The quality of work performed by the Energy Advisor
e. The clarity of the audit report overall
f. The audit report in helping you understand your home's energy usage
g. The audit report in helping you understand where energy improvements could be made in your home

[ASK IF REBATE_FLAG=1 OR AUDITREBATE_FLAG=1]
h. The contractor or program ally's professionalism
i. The quality of the work completed at [IF Multi_prop_flag_CONF=1, "the multiple homes in which you had changes or upgrades made", ELSE "your home"]
j. The rebate amounts offered per item
k. The amount of time it took to receive your rebate

[ASK ALL]

SAT3. Using the same scale where 0 is 'extremely dissatisfied' and 10 is 'extremely satisfied' how satisfied were you with the explanation you received about the program's participation process? [INDICATE NUMBER 0 THROUGH 10, 96= I was not given an explanation, 98=DON'T KNOW, 99=REFUSED]

[ASK IF SAT3<6]

SAT4. Can you please explain which part of the participation process was not clearly explained to you?

00. OPEN END
98. (Don't know)
99. (Refused)

SAT5. From your perspective, what if anything, could be done to improve the program?

00. OPEN END
96. (No/nothing)
98. (Don't know)
99. (Refused)

SAT6. Can you think of any reasons why people might not participate in this program?

00. OPEN END
01. (Not aware of the program)
96. (No/nothing)
98. (Don't know)
99. (Refused)

On-Bill Financing

[ASK IF REBATE_FLAG=1 OR AUDITREBATE_FLAG=1]

"I would like to ask you about financing this project. When I say financing, I mean when you borrow money and repay it over time. It could include a credit card, taking out a loan, getting a personal loan, getting financing through your contractor, retail finance, refinancing your home mortgage etc."

F1. Did you finance all or part of this project?
01. (Yes)
02. (No) [SKIP TO F3]
98. (Don't Know) [SKIP TO F3]
99. (Refused) [SKIP TO F3]

F2. What type of financing did you use? [MULTIPLE RESPONSE UP TO 3]
01. (Credit Card)
02. (Contractor financing)
03. (Personal loan from Bank - unsecured) [FOR INTERVIEWER: a loan without any collateral]
04. (Retail financing) [FOR INTERVIEWER: for example, taking a store loan from SEARS to buy an appliance)
05. (Equity line of credit)
06. (Home equity/Mortgage loan)
07. (Equipment Lease)

08. (Loan through family member/friend)
00. (Other, please specify)
98. (Don't Know)
99. (Refused)

[ASK ALL]

F3. "On-bill" financing is a financing option which allows utility customers to install high efficiency equipment in their homes, without having to pay for it up front. The cost of the equipment is added to the customer's utility bill. In most cases, the savings achieved by installing new equipment is equal to the equipment cost, so customer's bill remains the same. Before our call today, had you heard of on-bill financing?
01. (Yes)
02. (No)
98. (Don't Know)
99. (Refused)

F4. If on-bill financing had been available for your project, would you be interested in using it to pay for the installation of additional energy saving measures?
01. (Yes)
02. (No)
98. (Don't Know)
99. (Refused)

[ASK IF F4 = 1]

F5 The last time Ameren Illinois offered on bill financing, the interest rate was 4.99%. Using a scale where 0 is 'not at all likely' and 10 is 'extremely likely' how likely would you have been to install additional measures recommended to you after your audit if this type of on-bill financing, had been available? [INDICATE NUMBER 0 THROUGH 10, 96=NEED MORE INFORMATION 98=DON'T KNOW, 99=REFUSED]

Demographics

We're almost finished. I just have a few questions about your household. These are for background purposes only.

IF Multi_prop_flag_CONF=1, READ "Since you represent multiple homes that participated in the program, please answer the questions based on a typical home.

D1. What type of house do you live in? Is it a ....?

1. Single Family Detached Home (No common walls)
2. Single Family Attached Home (Townhouse or Duplex)
00. Other, specify
98. (Don't know)
99. (Refused)

D2. Do you or members of your household own this home or do you rent?
1. Own/Buying
2. Rent/Lease
3. (Occupied without payment of rent)
00. Other, specify

8. (Don't know)
9. (Refused)

D3. Counting yourself, how many people normally live in your household on a FULLTIME basis. (IF NECESSARY "Please include everyone who lives in your home whether or not they are related to you BUT EXCLUDE anyone who is just visiting or children who may be away at college or in the military. [NUMERIC OPEN END]

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

[ASK D4 IF D2=2 OR 3]

D4. Do you pay your utility bill directly to your utility company or are your utilities included in your rent or condo fee?

1. Pay directly to utility company
2. Utilities included in rent or condo fee
3. (Pay some utilities directly and some are included in rent or condo fee)
4. (Paid for in some other way)
8. (Don't know)
9. (Refused)

[ASK D4=3]

D4a. Which utilities do you pay directly to the utility company? [MULTIPLE RESPONSE, UP TO 3]

1. Natural gas
2. Electricity
00. (Other: specify)
98. (Don't know)
99. (Refused)

[SKIP IF SO5b=1]

D5. Is your water heater gas or electric?

1. (Gas)
2. (Electric)
8. (Don't know)
9. (Refused)

D6. Do you use a space heater, and if so, is it gas or electric?

1. (Gas)
2. (Electric)
3. (Do not use a space heater)
8. (Don't know)
9. (Refused)

D7. What is the highest level of education that the head of household has completed so far?

1. Less than ninth grade
2. Ninth to twelfth grade (no diploma)
3. High school graduate (includes GED)
4. Some college, No degree
5. Associates degree
6. Bachelors degree
7. Graduate or professional degree
8. (Don't know)
9. (Refused)

D8. In what year were you born?

00. [NUMERIC OPEN END; 1900-1995]
9999. (Refused)

D9. Which category best describes your total household income in 2013, before taxes? Please stop me when I get to the appropriate category.

1. Less than $15,000
2. $15,000 to less than $20,000
3. $20,000 to less than $30,000
4. $30,000 to less than $40,000
5. $40,000 to less than $50,000
6. $50,000 to less than $75,000
7. $75,000 to less than $100,000
8. $100,000 to less than $150,000
9. $150,000 or more
98. (Don't know)
99 (Refused)

CLOSING. We appreciate the information that you have provided. This information is valuable to understanding the effects of the program. Would you be willing to have your individual responses shared with Ameren Illinois and the Illinois Commerce Commission to assist them in making decisions about future programs?
1. Yes
2. No
8. (Don't know)
9. (Refused)

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