

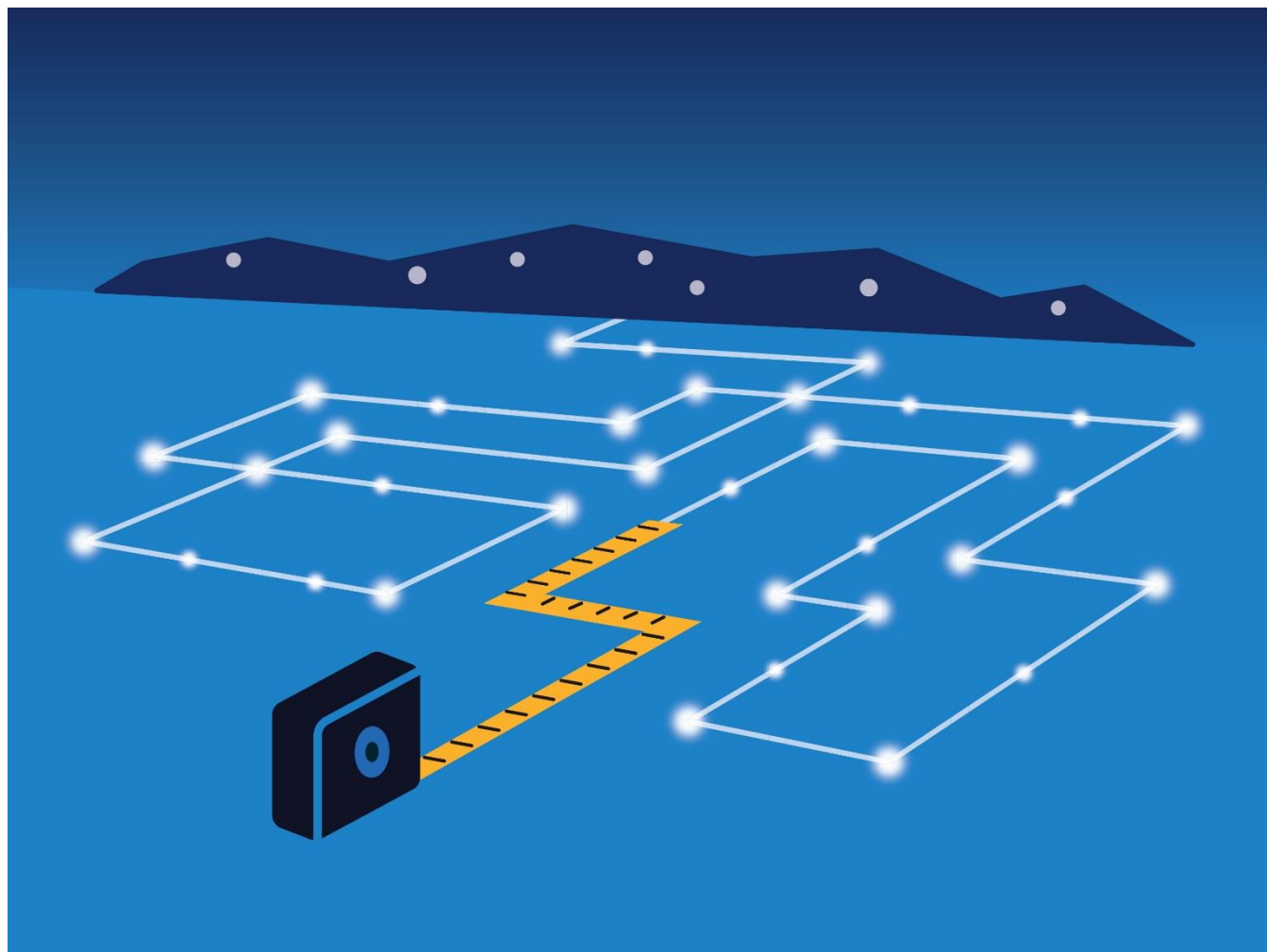


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Impact and Process Evaluation of 2015 (PY8) Illinois Power Agency Rural Efficiency Kits Program

Final

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CADMUS

NAVIGANT



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Table of Contents

1. Executive Summary	1
2. Evaluation Approach	3
2.1 Research Objectives.....	3
2.2 Evaluation Tasks.....	3
2.3 Sources and Mitigation of Error	6
3. Detailed Evaluation Findings.....	7
3.1 Program Description.....	7
3.2 Process Findings.....	7
3.3 Impact Assessment	10
4. Conclusions and Recommendations	17
Appendix A. Rural Kits Program Assumptions and Algorithms.....	18
Appendix B. Natural Gas Impacts	24
Appendix C. Program Collateral	28
Appendix D. Cost-Effectiveness Inputs	31

Table of Tables

Table 1. PY8 Rural Kits Program Net Impacts.....	1
Table 2. PY8 Rural Kit Products	7
Table 3. PY8 Rural Kits Program Evaluation Methods.....	3
Table 4. Program Staff Interviews	4
Table 5. PY8 Rural Kits Program Ex Post Gross Electric Savings—Per Unit Installed.....	5
Table 6. PY8 Rural Kits Ex Post Gross Gas Savings—Per Unit Installed.....	5
Table 7. SAG-Approved PY8 NTGRs.....	5
Table 8. PY8 Rural Kits Program Ex Post Net Electric Savings—Per Unit Installed	6
Table 9. PY8 Rural Kits Ex Post Net Gas Savings—Per Unit.....	6
Table 10. Possible Sources of Error	6
Table 11. PY8 Rural Kits Program Installation Rates.....	10
Table 12. PY8 Rural Kits Program Ex Ante and Ex Post Per-Unit Electric Savings	10
Table 13. PY8 Rural Kits Program Ex Ante and Ex Post Gross Electric Impacts	11
Table 14. Yearly Gross Impact of PY8 Residential Lighting Measures by Assumed Installation Year	13
Table 15. PY8 Total Rural Kits Program Net Electric Savings by Measure.....	15
Table 16. PY8 Rural Kits Ex Ante and Ex Post Per Unit Gas Savings	24
Table 17. PY8 Program Ex Ante and Ex Post Gross Gas Impacts.....	25
Table 18. PY8 Total Program Net Gas Savings by Measure	27
Table 19. Yearly Gross Heating Penalty Impact of Lighting Measures by Assumed Installation Year	31

Table of Figures

Figure 1. Home Starter Kit Label	28
Figure 2. Home Starter Kit Insert, Side A	29
Figure 3. Home Starter Kit Insert, Side B	30

1. Executive Summary

This report presents results from the Program Year 8 (PY8) Residential Rural Efficiency Kits (Rural Kits) Program—one of seven stand-alone Illinois Power Agency (IPA) energy efficiency programs implemented from June 2015 to May 2016. PY8 represents the third full year of Rural Kits Program operation. Leidos Engineering began providing program oversight on behalf of Ameren Illinois Company (AIC) in PY8. CLEAResult has been the program implementer since PY6 (June 1, 2013–May 31, 2014).

In PY8, CLEAResult distributed 21,484 kits containing energy-efficient items via direct mail to unsolicited residential customers targeted for having higher energy use and living in rural areas. The kits contained CFLs, faucet aerators, and shower heads, along with instructional materials to help customers properly set back their water heater temperatures. CLEAResult administers a follow-up survey to a sample of kit recipients to assess satisfaction with kit contents and interest in reducing energy consumption through other IPA and AIC programs. The program sought to increase sales and awareness of ENERGY STAR®-qualified lighting products and to increase awareness of and drive participation in other IPA and AIC program offerings.

Program Impacts

Table 1 summarizes the PY8 Rural Kits Program's gross and net energy and demand savings of 3,454 MWh and 0.575 MW. To determine PY8 gross savings and net realization rates, the evaluation team applied deemed per-unit gross savings inputs, set forth in the Illinois Statewide Technical Reference Manual (IL-TRM) V4.0, in combination with the following:

- PY7 Rural Kits Program installation rates and electric water heater saturation, derived from the PY7 participant survey results¹
- Application of Stakeholder Advisory Group's (SAG) approved net-to-gross ratio (NTGR) for this program (derived from AIC's IPA filing from Docket 12-0544)
- Additionally, for PY8,² the evaluation team included net savings for delayed CFL installations attributed to the PY7 Rural Kits Program

As a result, the program achieved the gross and net savings shown in Table 1. The low gross realization rates for non-CFL measures are primarily because the ex ante installation rates are considerably higher than the ex post installation rates, which are based on evaluated results (from PY7).

Table 1. PY8 Rural Kits Program Net Impacts*

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Initial PY8 Ex Post Net Savings	PY7 Ex Post CFL Net Savings Realized in PY8	PY8 Ex Post Net
Energy Savings (MWh)							
Total MWh	7,019	51%	3,546	0.915	3,243	210	3,454
Demand Savings (MW)							
Total MW	1.555	37%	0.582	0.950	0.553	0.022	0.575

* Totals may not sum due to rounding.

¹ Except CFLs, where the evaluation team applied the prescribed 66% first-year installation rate from IL-TRM V4.0.

² PY7 Rural Kits Program participants' 14-watt and 23-watt CFLs estimated to have been installed during PY8 (in accordance with IL-TRM V2.0), are credited to final PY8 Rural Kits Program net impacts.

Note: While this report seeks to summarize IPA program electric savings, the Rural Kits Program achieved some gas savings due to participants with natural gas water heating. Appendix B of this report presents those savings.

Key Findings and Recommendations

As determined through the evaluation team's process review, utility and implementation staff reported high satisfaction levels with program performance in PY8. These stakeholders reported that the program was successful and planned no program changes for PY9. The program exceeded its PY8 20,000 kit distribution goal by 7% while staying on schedule and within budget. Stakeholders reported operations ran smoothly, without significant issues.

Although utility and implementation staff reported that they are satisfied with the program, the evaluation team identified opportunities for improvements and recommends considering the following actions:

- **Key Finding #1:** Program staff could measure the program's marketing effectiveness at increasing participation in other energy efficiency programs or driving traffic to AIC's website.
 - **Recommendation:** Implement a method to gauge whether kits influence recipients' participation in other energy efficiency programs. For example, include a customized URL on the marketing materials to track Rural Kits Program-generated traffic to AIC's website. The program could also consider including a coupon or discount code in the kit, offering a free or discounted Home Efficiency Program energy audit. The coupon or discount code would record customer cross-participation and help homeowners explore opportunities with minimal or no initial investment. The program also could send customized URLs to implementer-surveyed customers who express interest in additional ways to save energy but declined direct energy efficiency specialist follow-up.
- **Key Finding #2:** The program kits do not include CFL disposal instructions. Additional customer education may increase proper CFL disposal rates.
 - **Recommendation:** Include educational materials in the kits to provide participants with instructions for proper CFL disposal and to aid in locating CFL collection and recycling centers.
- **Key Finding #3:** The low gross realization rates for non-CFL measures are primarily because the ex ante installation rates are considerably higher than the ex post installation rates. The evaluation team used installation rates derived from the PY7 Rural Kits participant survey, in accordance with the PY8 Evaluation Plan, to calculate ex post savings, while the implementer used internal estimates to calculate ex ante savings.
 - **Recommendation:** Calculate future ex ante savings using the ex post installation rates from this evaluation report or the most current relevant evaluation report.
- **Key Finding #4:** The implementer did not calculate separate savings estimates for different aerator types and used IL-TRM V4.0 inputs associated with an "Unknown" aerator type, thus overestimating bathroom faucet aerator savings and underestimating kitchen faucet aerator savings.
 - **Recommendation:** Calculate separate ex ante per-unit savings for bathroom faucet aerators and kitchen faucet aerators.

2. Evaluation Approach

The PY8 Rural Kits Program assessment included process and impact analyses as outlined in the following sections.

2.1 Research Objectives

The PY8 Rural Kits impact evaluation sought to provide estimates of gross and net electricity savings associated with the program.³ The impact evaluation researched the following questions:

- How many kits did the program distribute?
- What estimated gross energy and demand impacts did the program produce?
- What estimated net energy and demand impacts did the program produce?

A limited process evaluation investigated how the program performed during its third year by researching the following questions:

- What, if any, implementation changes or challenges occurred in PY8?
- Did the program operate effectively?
- How was the program marketed?
- What quality assurance and quality control processes did the program have in place? Were these processes sufficient to ensure that the program used high-quality products and that customers installed the program's measures?
- What program changes could improve program effectiveness?

2.2 Evaluation Tasks

Table 2 summarizes PY8 evaluation activities conducted for the Rural Kits Program.

Table 2. PY8 Rural Kits Program Evaluation Methods

Activity	PY8 Process	PY8 Impact	Forward Looking	Details
Program Staff In-Depth Interviews	✓			Interviewed four program and implementation staff members (total) to gain insights into the program's design and delivery
Review of Program Materials and Data	✓			Reviewed the implementation plan, program materials, and instructional materials
Impact Analysis: Database Analysis	✓	✓	✓	Summarized database information to determine participation, key program statistics, savings, and delayed CFL installations credited to future program years

³ While this report seeks to summarize IPA program electric savings, the Rural Kits Program achieved some gas savings due to participants with natural gas water heating. Appendix B of this report presents those savings.

2.2.1 Program Staff Interviews

The evaluation team interviewed four AIC and program staff members who were responsible for managing, marketing, and delivering the program. Table 3 lists program stakeholders interviewed to assess the program's design, implementation, communications, strengths, and weaknesses.

Table 3. Program Staff Interviews

Company	Number of Staff Interviewed
CLEAResult	2
Leidos	1
AIC	1

2.2.2 Review of Program Materials and Data

The evaluation team reviewed the following program data:

- Program database
- Program marketing and outreach collateral
- Implementation plans
- Implementer participant survey responses

2.2.3 Impact Analysis

Gross Impacts

The evaluation team used the program's tracking database to verify the reported distribution of kits and to apply the Illinois Statewide Technical Reference Manual (IL-TRM) V4.0's per-unit gross savings inputs, in combination with PY7 participant survey results, to estimate gross electric savings values for program measures. To estimate electric energy savings associated with the program, the team applied an 87% electric water heater saturation rate (determined through the PY7 participant survey) to verified energy kit measure installations to determine electric energy savings associated with the program. Table 4 lists the ex post per-unit gross electric savings.

Table 4. PY8 Rural Kits Program Ex Post Gross Electric Savings—Per Unit Installed

Measure	Gross kWh	Gross kW
14-Watt CFL	23.3	0.002
20-Watt CFL	26.5	0.003
23-Watt CFL	39.4	0.004
1.0 GPM Bath Faucet Aerator	17.0	0.027
2.0 GPM Kitchen Faucet Aerator	137.6	0.032
1.75 GPM High-Efficiency Shower Head	171.6	0.018
Hot Water Temperature Card Thermometer	81.6	0.009

The evaluation team applied a 13% gas water-heating saturation (determined through the PY7 participant survey) to verified installations, producing estimated gas energy savings associated with the program, as shown in Table 5. The team used IL-TRM V4.0 deemed per-unit gross gas savings inputs for program measures to calculate the gross gas savings. As previously noted, Appendix B provides details of the gas savings.

Table 5. PY8 Rural Kits Ex Post Gross Gas Savings—Per Unit Installed

Measure	Gross Therms
1.0 GPM Bath Faucet Aerator	0.7
2.0 GPM Kitchen Faucet Aerator	5.9
1.75 GPM High-Efficiency Shower Head	7.3
Hot Water Temperature Card Thermometer	3.5

Net Impacts

The evaluation team applied net-to-gross ratios (NTGRs), approved by the Illinois Stakeholder Advisory Group (SAG), to PY8 program savings. Table 6 summarizes NTGRs used in the net impact analysis. Applying the NTGRs to the Rural Kits Program resulted in overall, savings-weighted PY8 NTGRs of 0.915 for kWh, 0.95 for kW, and 0.965 for therms.

Table 6. SAG-Approved PY8 NTGRs

Measure Type	Electric NTGR	Gas NTGR
CFLs	0.851	N/A
Faucet Aerator	1.004	1.004
Shower Head	0.941	0.941
Water Heater Setback	1.000	1.000
Program-Level Energy Savings Weighted NTGR	0.915	0.965
Program Level Demand Savings Weighted NTGR	0.950	N/A

Table 7 lists ex post per-unit gross electric savings, SAG-approved NTGR, and ex post net electric savings values.

Table 7. PY8 Rural Kits Program Ex Post Net Electric Savings—Per Unit Installed

Measure	Gross kWh	Gross kW	NTGR	Net kWh	Net kW
14-Watt CFL	23.3	0.002	0.851	19.9	0.002
20-Watt CFL	26.5	0.003	0.851	22.6	0.002
23-Watt CFL	39.4	0.004	0.851	33.5	0.003
1.0 GPM Bath Faucet Aerator	17.0	0.027	1.004	17.1	0.027
2.0 GPM Kitchen Faucet Aerator	137.6	0.032	1.004	138.2	0.032
1.75 GPM High-Efficiency Shower Head	171.6	0.018	0.941	161.5	0.017
Hot Water Temperature Card Thermometer	81.6	0.009	1.000	81.6	0.009

Table 8 lists ex post per-unit gross gas savings, SAG-approved NTGR, and ex post net gas savings values.

Table 8. PY8 Rural Kits Ex Post Net Gas Savings—Per Unit

Measure	Gross Therms	NTGR	Net Therms
1.0 GPM Bath Faucet Aerator	0.7	1.004	0.7
2.0 GPM Kitchen Faucet Aerator	5.9	1.004	5.9
1.75 GPM High-Efficiency Shower Head	7.3	0.941	6.9
Hot Water Temperature Card Thermometer	3.5	1.000	3.5

2.3 Sources and Mitigation of Error

Table 9 summarizes possible error sources associated with data collection conducted for the Rural Kits Program. Detailed discussions follow for each item.

Table 9. Possible Sources of Error

Research Task	Survey Error		Non-Survey Error
	Sampling Error	Non-Sampling Error	
Gross Impact Calculations	N/A	N/A	Data processing error
Net Impact Calculations	N/A	N/A	Data processing error

Throughout planning and implementing the PY8 evaluation, the evaluation team took a number of steps to mitigate potential error sources.

Non-Survey Error

Data Processing Errors: The evaluation team applied deemed savings values to participant data in the tracking database to calculate gross impacts. The evaluation team also applied the deemed NTGRs to estimate the program's net impacts. To minimize data processing errors, different team members reviewed all calculations, verifying the calculations' accuracy.

3. Detailed Evaluation Findings

3.1 Program Description

The Rural Kits Program, first offered in Program Year 6 (PY6), provides unsolicited, direct-mail energy efficiency kits to rural residential customers. Target customers are selected through a screening process developed by CLEAResult, the program implementer, that targets high-energy-use households. The program seeks to serve rural customers who may not have access to energy-efficient products typically available in more-urban settings with big box stores.

As shown in Table 10, program kits included an array of efficient products, along with instructions for properly setting back the customer's water heater temperature, as well as a brochure on energy-saving opportunities available through other IPA and AIC programs. (See Appendix C, Program Collateral, for images of kit materials.)

Table 10. PY8 Rural Kit Products

Product	Quantity per Kit
14-Watt CFL	2
20-Watt CFL	1
23-Watt CFL	1
1.0 Gallons per Minute (GPM) Bath Faucet Aerator	2
2.0 GPM Kitchen Faucet Aerator	1
1.75 GPM High-Efficiency Shower Head	1
Hot Water Temperature Card Thermometer	1
Instructional Materials	N/A

CLEAResult and Energy Federation Incorporated (EFI) deliver the program, under CLEAResult's management. EFI mails branded kits and marketing materials directly to customers, drawn from lists created and screened by CLEAResult to target rural, high-energy-use households. To ensure participant overlap does not occur between programs, CLEAResult shared the customer list with AM Conservation, the Moderate Income Customer Kits Program implementer. CLEAResult reports delivery activities and results to Leidos. We provide greater detail on program operations below.

3.2 Process Findings

3.2.1 Program Operations

Leidos Engineering provides oversight for the program, serving as the contact point for day-to-day operational activities, process issues, and program status tracking. CLEAResult's program manager is responsible for program implementation and for reporting activities to Leidos. A data director at CLEAResult produces a list of approximately 100,000 customers predicted to have electric space heat, based on annual kWh consumption. CLEAResult uses available customer demographic data (described in Section 3.2.4) to select about 20,000 kit recipients. As noted above, CLEAResult shares its targeted customer list with AM Conservation, the Moderate Income Customer Kits Program implementer, to avoid potential overlap between the kit programs' targeted recipients. CLEAResult sends this list to EFI for kit distribution. EFI prints the marketing materials, assembles the kits, and ships them to selected customers after verifying the customer names and addresses

have not changed according to the National Change of Address Database.⁴ EFI ships kits four times throughout the program year. The implementer credits returned kits to the program's budget monthly.

3.2.2 Marketing and Outreach

With AIC input, CLEAResult developed the marketing materials contained in the kit, which include a label affixed to kit packaging and an insert that provides installation instructions and descriptions of the kit's contents. While the marketing insert provides summaries of other IPA and AIC programs available to residential customers, it does not include program-specific (i.e., vanity) URLs or phone numbers to track whether the Rural Kits Program generates interest in other AIC programs. See Appendix C, Program Collateral, for examples of these marketing materials.

Program materials also do not include guidelines for CFL disposal or recycling locations. Program staff reported that this was because of decreased county waste management recycling locations in PY8 (due to grant funding limitations), but that the team had explored ways to keep customers informed of proper disposal locations.

With AIC's changes to the Act on Energy logo in PY8, CLEAResult updated the logo on the marketing materials. The program made no other changes or additions to the kit's materials in PY8.

3.2.3 Program Goals

CLEAResult exceeded the PY8 20,000 kit distribution goal (stated in the Implementation Plan),⁵ distributing 21,484 kits within its allotted PY8 program budget.

AIC did not employ formal metrics to track the program's success in increasing energy-use awareness among rural customers through other AIC programs. Currently, AIC program staff do not track kit recipients' visits to the AIC website. CLEAResult tracks participant requests for more information through part of its kit-recipient follow-up survey (53% said that they were interested), but while they were interested in obtaining materials with more information about saving energy, all of these respondents declined the offers to talk to an energy efficiency specialist for follow-up. Program staff also do not track Rural Kits Program customers' participation in other programs.

3.2.4 Screening and Participant Selection

To compile the list of qualified kit recipients, CLEAResult produces a list of residential AIC electric accounts meeting the following characteristics:

- Owner-occupied, single-family home
- An electric heating load greater than 5,000 kWh and less than 40,000 kWh (to identify homes with electric heat)
- No prior participation in a direct-install program (e.g., CFLs, shower heads)
- Did not receive a kit during PY7 or PY6

⁴ Available online at <http://www.nationalchangeofaddress.com>.

⁵ CLEAResult's Program Year Eight Implementation Plan: 2015 Ameren Illinois IPA Programs Energy Efficiency Kits Program PY8 Implementation Plan.

CLEAResult supplements this list with any additional customer data available and with data from AIC and other sources; these may include demographic, segmentation, and/or (participation) propensity () information.

CLEAResult used a map to target rural customers, based on zip codes falling outside of city centers., Leidos staff requested that, for PY9, CLEAResult clearly define its criteria to determine if a customer should be considered “rural” and therefore a program candidate. CLEAResult said it complied with this request by identifying target areas using the U.S. Census Bureau’s population density data by zip code.

3.2.5 Communications and Cooperation

In PY8, AIC introduced Leidos to provide program oversight, which shifted implementer reporting from AIC staff to Leidos. Leidos said that the Rural Kits Program team experienced some communication issues at PY8’s onset. However, as team roles and expectations clarified during the program year, Leidos noted communication improvements.

The program implementer, through Leidos, provides AIC with weekly and monthly program status reports. AIC staff reported strong satisfaction with the oversight and communication among team members.

3.2.6 CLEAResult Participant Surveys

CLEAResult’s participant survey is the primary quality assurance and quality control process in place for the Rural Kits Program. Approximately 3 weeks after each of the four kit shipments, the CLEAResult Customer Contact Center contacted a sample of kit recipients and completed 279 customer surveys. CLEAResult reported contacting participants at random until reaching the survey quota, which indicates there is potential for nonresponse bias. The evaluation team reviewed these survey results, which included data gathered on the following topics:

- Customer satisfaction with the kit measures
- Familiarity with other AIC programs
- Customer interest in receiving more information about energy efficiency

The CLEAResult-administered survey asked respondents to rate their overall satisfaction with products in the kit (on a 1 to 5 scale, with 1 being very unsatisfied and a 5 being very satisfied). Respondents provided an average satisfaction score of 4.6 for the kits.

Additionally, more than half of the survey respondents (53%, n=279) reported interest in learning about more ways to save energy and money. In following up on the survey, CLEAResult contacted customers who had been identified as “interested” by phone, seeking to recruit them for an audit through the Home Performance with ENERGY STAR Program or to participate in other IPA or AIC energy efficiency programs. The implementer reported that survey phone calls did not result in any kit recipients agreeing to pursue Home Performance with ENERGY STAR program audits; however, they did not track kit recipients’ participation in other energy efficiency programs.

Surveyed customers also received an Aggregate Potential (AP) Score, based on their specific responses to CLEAResult’s survey, which gauged the likelihood that customers would participate in other AIC energy efficiency programs. CLEAResult compared these scores to kit recipients’ demographics and reported the targeting strategy correlated strongly with higher AP Scores.

3.3 Impact Assessment

3.3.1 Gross Impacts

The evaluation team used its PY7 participant survey results to estimate installation rates for kit items, except CFL measures (which, as discussed, used the prescribed value in IL-TRM V4.0). Table 11 lists reported ex ante and evaluated ex post installation rates for each kit measure used in the electric and gas savings calculations.⁶ The implementer's ex ante savings calculations used installation rates derived from multiple sources, including the IL-TRM V4.0, the IL-TRM V3.0, and internal implementer estimates. The low gross realization rates for non-CFL measures are primarily because the ex ante installation rates are considerably higher than the ex post installation rates, which were based on evaluated results from PY7.

Table 11. PY8 Rural Kits Program Installation Rates

Measure	Evaluated Ex Ante Installation Rate	Evaluated Ex Post Installation Rate
14-Watt CFL	72.2%	66%
20-Watt CFL	72.2%	66%
23-Watt CFL	72.2%	66%
1.0 GPM Bath Faucet Aerator	60%	17%
2.0 GPM Kitchen Faucet Aerator	60%	20%
1.75 GPM High-Efficiency Shower Head	80%	39%
Hot Water Temperature Card Thermometer	50%	10%

Table 12 lists the reported ex ante and evaluated ex post per-unit electric savings.

Table 12. PY8 Rural Kits Program Ex Ante and Ex Post Per-Unit Electric Savings

Measure	Reported Ex Ante Gross kWh	Evaluated Ex Post Gross kWh	Reported Ex Ante Gross kW	Evaluated Ex Post Gross kW
14-Watt CFL	18.6	23.3	0.003	0.002
20-Watt CFL	20.5	26.5	0.003	0.003
23-Watt CFL	30.4	39.4	0.005	0.004
1.0 GPM Bath Faucet Aerator	72.2	17.0	0.031	0.027
2.0 GPM Kitchen Faucet Aerator	72.2	137.6	0.031	0.032
1.75 GPM High-Efficiency Shower Head	171.6	171.6	0.016	0.018
Hot Water Temperature Card Thermometer	86.4	81.6	0.010	0.009

⁶ Appendix B of this report provides gas savings.

Gross Electric Impacts

Based on reported program participation and ex post savings values, the program achieved total gross electric savings of 3,546 MWh and demand savings of 0.582 MW. Table 13 shows ex ante and ex post gross electric and demand impacts. The difference between reported and verified measures resulted from application of installation rates developed from the PY7 Rural Kits Program participant survey and IL-TRM V4.0, which varied from the ex ante assumptions.⁷

Table 13. PY8 Rural Kits Program Ex Ante and Ex Post Gross Electric Impacts*

Measure	Reported Ex Ante Installation Rate	Ex Ante Gross Impacts		Reported Measures ^a	Evaluated Ex Post Installation Rate ^b	Verified Measures ^c	Ex Post Gross Impacts		Gross Realization Rate ^d	
		MWh	MW				MWh	MW	MWh	MW
14-Watt CFL	72.2%	566	0.096	42,052	66%	27,754	648	0.063	114%	66%
20-Watt CFL	72.2%	311	0.053	21,026	66%	13,877	368	0.036	118%	68%
23-Watt CFL	72.2%	462	0.078	21,026	66%	13,877	547	0.054	118%	68%
1.0 GPM Bath Faucet Aerator	60%	1,586	0.671	36,585	17%	6,219	106	0.166	7%	25%
2.0 GPM Kitchen Faucet Aerator	60%	793	0.335	18,293	20%	3,659	503	0.118	63%	35%
1.75 GPM High-Efficiency Shower Head	80%	2,511	0.231	18,293	39%	7,134	1,224	0.128	49%	55%
Hot Water Temperature Card Thermometer	50%	790	0.090	18,293	10%	1,829	149	0.017	19%	19%
Total	67%	7,019	1.555	175,567	42%	74,350	3,546	0.582	51%	37%

* Totals may not sum due to rounding.

^a Based on PY7 Rural Kits Program participant survey data, assuming 87% of total verified water-saving measures were installed in homes with electric water heating.

^b Reported percentages are rounded from their true value.

^c The difference between reported measures and verified measures results from application of installation rates.

^d Realization rates that differ from 1.0 result from differences between ex ante and ex post installation rates and per-unit savings: gross realization rate = ex post gross savings ÷ ex ante gross savings.

⁷ For the 14-watt, 20-watt, and 23-watt CFL measures, the evaluation team used the IL-TRM V4.0's prescribed installation rate of 66% for energy efficiency kits.

The evaluation team received ex ante electric savings estimates from the Rural Kits Program implementer and reviewed the assumed estimates for comparison with ex post electric savings methodologies. The differences between total ex ante and ex post electric savings estimates resulted from differences in ex ante and ex post gross electric per-unit savings assumptions and installation rates. Descriptions follow addressing discrepancies for each program measure:

- **CFLs.** The ex ante 14-watt CFL per-unit savings estimate of 18.6 kWh was lower than the ex post per-unit savings estimate of 23.3 kWh, calculated in accordance with IL-TRM V4.0. The ex ante 20-watt CFL per-unit savings estimate of 20.5 kWh was below the ex post per-unit savings estimate of 26.5 kWh, calculated in accordance with IL-TRM V4.0. The ex ante 23-watt CFL per-unit savings estimate of 30.4 kWh was below the ex post per-unit savings estimate of 39.4 kWh, calculated in accordance with IL-TRM V4.0. The lower ex ante per-unit kWh savings estimates for the CFL measures primarily resulted from the implementer assuming, when calculating the heating penalty, that Rural Kits Program participants did not have gas HVAC space heating. In accordance with IL-TRM V4.0, the evaluation team assumed all participants had gas space heating.⁸

A component of the ex ante per-unit kWh savings estimate that, holding all else equal, resulted in overestimated savings was the implementer using an “Unknown” location hours-of-use value of 1,000 for CFLs (from IL-TRM V3.0). The evaluation team used the most current “residential interior and in-unit multifamily” lighting hours-of-use value of 759 (from IL-TRM V4.0). Ex ante savings used an in-service rate (ISR) of 72.2% (based on the “Retail [Time of Sale]” from IL-TRM V3.0), while the evaluation team used an ISR of 66% (prescribed in IL-TRM V4.0 for “Direct Mail Kits”) to calculate ex post gross savings. Additionally, ex post per-unit demand savings were lower than ex ante estimates for all CFL measures because the implementer used a 9.5% coincidence factor value from IL-TRM V3.0, while the evaluation team used an updated coincidence factor value of 7.1% from IL-TRM V4.0.

- **Bathroom Faucet Aerators.** The ex ante bathroom faucet aerator per-unit savings estimate of 72.2 kWh was higher than the ex post per-unit savings estimate of 17.0 kWh, calculated in accordance with the IL-TRM V4.0. The implementer did not calculate separate savings estimates for the different aerator types, and used 72.2 kWh and 0.031 kW gross per-unit savings estimates for both bathroom and kitchen faucet aerators. In calculating the single aerator savings value, the implementer relied on IL-TRM V4.0 inputs associated with an “Unknown” aerator type and overestimated the bathroom aerator gross savings. Ex post gross population savings that were less than ex ante gross population savings resulted from the difference in installation rates used for the calculations. A major driver in the ex ante gross population savings being less than ex post gross population savings is that the implementer used an ISR of 60% to calculate ex ante savings,⁹ while the evaluation team used a bathroom faucet aerator-specific ISR of 17% (calculated from the PY7 Rural Kits Program participant survey, in accordance with the PY8 Evaluation Plan) to calculate ex post gross savings.
- **Kitchen Faucet Aerators.** The ex ante kitchen faucet aerator per-unit savings estimate of 72.2 kWh fell below the ex post per-unit savings estimate of 137.6 kWh, calculated in accordance with the IL-TRM V4.0. As discussed, the implementer did not calculate separate savings estimates for the different aerator types and used 72.2 kWh and 0.031 kW gross per-unit savings estimates for both kitchen and bathroom faucet aerators. In calculating the single aerator savings value, the implementer relied on IL-TRM V4.0 inputs, associated with an “Unknown” aerator type, and underestimated the kitchen aerator gross savings. A source of ex post gross population savings less than ex ante gross population

⁸ Gas heating penalty therms for cost-effectiveness inputs are included in Appendix D.

⁹ Internal implementer estimate.

savings resulted from the difference in installation rates used for the ex post and ex ante gross savings. The major driver in the ex ante gross population savings being less than ex post gross population savings is that the implementer used an ISR of 60% to calculate ex ante savings,¹⁰ while the evaluation team used a kitchen faucet aerator-specific ISR of 20% (calculated from the PY7 Rural Kits Program participant survey, in accordance with the PY8 Evaluation Plan) to calculate ex post gross savings.

- **Shower Heads.** The ex ante and ex post shower head per-unit kWh savings were both estimated as 171.6 kWh. Ex post gross population kWh savings lower than ex ante gross population kWh savings resulted from the difference in installation rates used for ex post and ex ante gross savings. The major driver in the ex ante gross population savings being less than ex post gross population savings is that the implementer used an ISR of 80% to calculate ex ante savings,¹¹ while the evaluation team used a shower head-specific ISR of 39% (calculated from the participant survey, in accordance with IL-TRM V4.0) to calculate ex post gross savings. Ex post per-unit demand savings (0.0179 kW) that were higher than ex ante per-unit demand savings (0.0158 kW) resulted from the implementer using a hot water recovery-hours value of 302, associated with single-family direct-install measures from the IL-TRM V4.0, while the evaluation team used the 266 single-family energy-efficient kits value from IL-TRM V4.0.
- **Water Heater Temperature Card Thermometers.** Ex ante water heater temperature card thermometer per-unit savings estimates of 86.4 kWh and 0.0099 kW were more than ex post per-unit deemed savings estimates of 81.6 kWh and 0.0093 kW, calculated in accordance with the IL-TRM V4.0. The main difference that resulted in lower ex post per-unit savings estimates was that implementer used IL-TRM V3.0 savings calculations, while the evaluation team utilized the updated savings algorithm from IL-TRM V4.0. Another source of ex post gross population savings being below ex ante gross population savings resulted from different installation rates used for ex post and ex ante gross savings. The major driver in the ex ante gross population savings being less than ex post gross population savings is that the implementer used an ISR of 50%¹² to calculate ex ante savings, while the evaluation team used the water heater temperature card thermometer-specific ISR of 10% (calculated from the PY7 Rural Kits participant survey, in accordance with the PY8 Evaluation Plan) to calculate the ex post gross savings.

In addition to gross savings achieved from measure installations in PY8, the evaluation team calculated gross savings from delayed CFL installations, per the IL-TRM V4.0. In particular, the TRM assumed consumers would install 93% of kit CFLs within 3 years. Table 14 shows savings from bulbs provided to participants in PY8 and realized in PY8, along with later installations assumed for PY9 and PY10.

Table 14. Yearly Gross Impact of PY8 Residential Lighting Measures by Assumed Installation Year

Measure	Energy (MWh)			Demand (MW)		
	PY8	PY9	PY10	PY8	PY9	PY10
14-Watt CFL	648	137	118	0.063	0.013	0.012
20-Watt CFL	368	78	67	0.036	0.008	0.007
23-Watt CFL	547	116	99	0.054	0.011	0.010
Total	1,563	332	284	0.153	0.032	0.028

¹⁰ Internal implementer estimate.

¹¹ Internal implementer estimate.

¹² Internal implementer estimate.

In the PY9 evaluation report, the evaluation team will include PY9 savings.

3.3.2 Net Impacts

The evaluation team credited the PY8 Rural Kits Program with the PY7 Rural Kits Program's 239 MWh gross energy savings and 0.025 MW gross demand savings derived from delayed CFL installations realized in PY8.¹³ The evaluation team applied these savings by multiplying the gross savings by the PY7 Rural Kits Program CFL-specific NTGR of 0.88 to arrive at 210 MWh net energy savings and 0.022 MW net demand savings for PY7 delayed CFL installations realized in PY8.

Net Impacts

The program achieved total net electric and demand savings of 3,243 MWh and 0.553 MW, respectively, based on the following: verified program participation, the IL-TRM V4.0 deemed per-unit gross savings values, installation rates calculated in accordance with the PY8 IPA Evaluation Plan, and the SAG-approved NTGRs.

Table 15 shows net electric savings results by measure. Additionally, the evaluation team included the PY7 Rural Kits Program net CFL savings, realized in PY8, which brought the totals to 3,454 MWh and 0.575 MW.¹⁴ The low overall net realization rate for the program is partially due to the implementer calculating only a single aerator savings value and applying it to both bathroom and kitchen faucet aerators, thus severely overestimating bathroom faucet aerator ex ante gross savings. The low overall net realization rate for the program is also because the ex ante installation rates are considerably higher than the ex post installation rates for non-CFL measures.

¹³ Delayed 14-watt and 23-watt CFL installations by PY7 Rural Kits Program participants, estimated to have been installed during PY8 (in accordance with IL-TRM V2.0), are credited to final PY8 Rural Kits Program net impacts.

¹⁴ Delayed 14-watt and 23-watt CFL installations by PY7 Rural Kits Program participants, estimated to have been installed during PY8 (in accordance with Illinois Statewide TRM V2.0), are credited to final PY8 Rural Kits Program net impacts.

Table 15. PY8 Total Rural Kits Program Net Electric Savings by Measure*

Measure	Ex Ante Net Savings (MWh)	Ex Ante Net Savings (MW)	Initial Ex Post Net Savings (MWh)	Initial Ex Post Net Savings (MW)	PY7 Ex Post CFL Net Savings Realized in PY8 (MWh)	PY7 Ex Post CFL Net Savings Realized in PY8 (MW)	PY8 Ex Post Savings (MWh)	PY8 Ex Post Savings (MW)
14-Watt CFL	481	0.082	551	0.054	78	0.008	629	0.062
20-Watt CFL	265	0.045	314	0.031	0	0	314	0.031
23-Watt CFL	393	0.067	466	0.046	132	0.014	598	0.060
1.0 GPM Bath Faucet Aerator	1,592	0.674	106	0.167	0	0	106	0.167
2.0 GPM Kitchen Faucet Aerator	796	0.337	505	0.118	0	0	505	0.118
1.75 GPM High-Efficiency Shower Head	2,363	0.218	1,152	0.120	0	0	1,152	0.120
Hot Water Temperature Card Thermometer	790	0.090	149	0.017	0	0	149	0.017
Total	6,681	1.511	3,243	0.553	210	0.022	3,454	0.575
Net Realization Rate^a			49%	37%			52%	38%

* Totals may not sum due to rounding.

^a Net realization rate = ex post net savings ÷ ex ante net savings.

Table 16 shows the gross and net savings associated with CFLs distributed and installed in PY8 as well as the gross and net savings associated with CFLs distributed in PY7 that were installed during PY8.

Table 16. PY8 Rural Kits Program Total Savings Claimed for CFL Measures by Program Year

Program Year / CFL Wattage	Reported CFLs Distributed	1st Year Installation Rate	2nd Year Installation Rate	CFLs Installed in PY8	Ex Post Gross Per-Unit kWh	Ex Post Gross Per-Unit kW	Ex Post Gross Impacts kWh	Ex Post Gross Impacts kW	NTGR	Ex Post Net Impacts kWh	Ex Post Net Impacts kW
PY8 / 14-watt	42,052	66%	-	27,754	23.3	0.0023	647,554	63	0.851	551,069	54
PY8 / 20-watt	21,026	66%	-	13,877	26.5	0.0026	368,436	36	0.851	313,539	31
PY8 / 23-watt	21,026	66%	-	13,877	39.4	0.0039	547,072	54	0.851	465,558	46
PY7 / 14-watt	20,022	-	15.4%	3,083	28.8	0.0031	88,856	9	0.88	78,194	8
PY7 / 23-watt	20,022	-	15.4%	3,083	48.7	0.0052	150,137	16	0.88	132,120	14
Total							1,802,055	178		1,540,480	153

4. Conclusions and Recommendations

The PY8 Rural Kits Program delivered 21,484 kits to rural customers. In the third year of operation, program staff continued to refine the methodology used to identify customers with high-energy use. Although utility and implementation staff reported that they are satisfied with the program, the evaluation team identified opportunities for improvements and recommends considering the following actions:

- **Key Finding #1:** Program staff could measure the program's marketing effectiveness at increasing participation in other energy efficiency programs or driving traffic to AIC's website.
 - **Recommendation:** Implement a method to gauge whether kits influence recipients' participation in other energy efficiency programs. For example, include a customized URL on the marketing materials to track Rural Kits Program-generated traffic to the AIC website. The program could also consider including a coupon or discount code in the kit, offering a free or discounted Home Efficiency Program energy audit. The coupon or discount code would record customer cross-participation and help homeowners explore opportunities with minimal or no initial investments. The program also could send customized URLs to implementer-surveyed customers who express interest in additional ways to save energy but declined direct energy efficiency specialist follow-up.
- **Key Finding #2:** The program kits do not include CFL disposal instructions. Additional customer education may increase proper CFL disposal.
 - **Recommendation:** Include educational materials in the kits to provide participants with instructions for proper CFL disposal and to aid in locating CFL collection and recycling center
- **Key Finding #3:** The low gross realization rates for non-CFL measures are primarily because the ex ante installation rates are considerably higher than the ex post installation rates. The evaluation team used installation rates derived from the PY7 Rural Kits participant survey, in accordance with the PY8 Evaluation Plan, to calculate ex post savings, while the implementer used internal estimates to calculate ex ante savings.
 - **Recommendation:** Calculate future ex ante savings using the ex post installation rates from this evaluation report or the most current relevant evaluation.
- **Key Finding #4:** The implementer did not calculate separate savings estimates for different aerator types and used IL-TRM V4.0 inputs associated with an "Unknown" aerator type, thus overestimating bathroom faucet aerator savings and underestimating kitchen faucet aerator savings.
 - **Recommendation:** Calculate separate ex ante per-unit savings for bathroom faucet aerators and kitchen faucet aerators.

Appendix A. Rural Kits Program Assumptions and Algorithms

Compact Fluorescent Lights

The evaluation team used the following equations from the IL-TRM V4.0 to estimate energy and demand savings for compact fluorescent lights (CFLs).

Equation 1. ENERGY STAR CFL Energy Algorithm

$$\Delta kWh = \left(\frac{Watts_{base} - Watts_{EE}}{1,000} \right) \times ISR \times Hours \times WHFe$$

Equation 2. ENERGY STAR CFL Demand Algorithm

$$\Delta kW = \left(\frac{Watts_{base} - Watts_{EE}}{1,000} \right) \times ISR \times WHFd \times CF$$

Table 17 provides assumptions used to estimate ex post savings for the CFL measures.

Table 17. Ex Post Assumptions for ENERGY STAR CFL

Parameter	Value	Units	Notes/Reference
Watts _{base}	13W CFL: 43 20W CFL: 53 23W CFL: 72	watts	Base watts incandescent equivalent (IL-TRM V4.0)
Watts _{EE}	13W CFL: 13 20W CFL: 20 23W CFL: 23	watts	Actual wattage of CFL installed (IL-TRM V4.0)
1,000	1,000	W/kW	Conversion factor
ISR	66%	N/A	Installation rate (IL-TRM V4.0) – ‘Direct Mail Kits’. Evaluation team applied the 66% ISR to reported measures distributed and did not apply any ISR to the per-unit savings values reported in the evaluation report.
Hours	759	Hours	IL-TRM V4.0 – ‘Residential Interior and in-unit Multi Family’
WHFe	1.06	N/A	Waste heat factor for energy (IL-TRM V4.0) – ‘Interior single family or unknown location’.
WHFd	1.11	N/A	Waste heat factor for demand (IL-TRM V4.0) – ‘Interior single family or unknown location’.
CF	7.1%	N/A	Summer peak coincidence factor (IL-TRM V4.0).

Bathroom and Kitchen Faucet Aerators

The evaluation team used the following equations from the IL-TRM V4.0 to estimate energy and demand savings for faucet aerators.

Equation 3. Faucet Aerator Electric Energy Algorithm

$$\Delta kWh = \%ElectricDHW \left(\frac{(GPM_{base} * L_{base} - GPM_{low} * L_{low}) * Household * 365.25 * DF}{FPH} \right) \times EPG_{electric} \times ISR$$

Equation 4. Faucet Aerator Gas Energy Algorithm

$$\Delta Therms = \%FossilDHW \left(\frac{(GPM_{base} * L_{base} - GPM_{low} * L_{low}) * Household * 365.25 * DF}{FPH} \right) \times EPG_{gas} \times ISR$$

Equation 5. Faucet Aerator Demand Algorithm

$$\Delta kW = \left(\frac{\Delta kWh}{Hours} \right) \times CF$$

Table 18 provides assumptions used to estimate ex post savings for bathroom faucet aerators.

Table 18. Ex Post Assumptions for Bathroom Faucet Aerators

Parameter	Value	Units	Notes/Reference
%ElectricDHW	100%	N/A	In accordance with the PY8 Evaluation Plan, we used the PY7 Rural Kits participant survey data to estimate an electric and gas water heater saturation rates. 87% of program measures were installed in residences with electric water heating and 13% installed in homes with gas water heating. This evaluation used these fuel saturations and applied it to installed measures to create separate analyses for electric and gas.
%FossilDHW	100%	N/A	
GPM _{base}	1.39	gal/min	Base case flow (IL-TRM V4.0)
GPM _{low}	0.94	gal/min	Low case flow (IL-TRM V4.0)
L _{base}	1.6	min/day	Base case use length (IL-TRM V4.0)
L _{low}	1.6	min/day	Low case use length (IL-TRM V4.0)
Household	2.56	# of people	Average number of people per household (IL-TRM V4.0) – ‘Single-Family’
365.25	365.25	Average days in a year	Days in a year, on average (IL-TRM V4.0)
DF	90%	Percent	Drain factor (IL-TRM V4.0) – ‘Bath’
FPH	2.83	Faucets per household	Bath faucets per household (IL-TRM V4.0) – ‘Single-Family’.

Parameter	Value	Units	Notes/Reference
EPG_electric	0.0795	kWh/gal	Energy per gallon of hot water supplied by electricity (IL-TRM V4.0) – ‘Bath’
EPG_gas	0.00341	Therm/gal	Energy per gallon of hot water supplied by gas (IL-TRM V4.0) – ‘Single-Family - Bath’
ISR	17%	N/A	Evaluation team applied the 17% ISR calculated from the PY7 Rural Kits participant survey data, in accordance with the PY8 Rural Kits Evaluation Plan, to reported measures distributed and did not apply any ISR to the per-unit savings values reported in the evaluation report.
Hours	14	Hours/Year	Annual electric water heating recovery hours for faucet use per faucet (IL-TRM V4.0) – ‘Single-Family - Bathroom’.
CF	0.022	N/A	Coincidence Factor for electric load reduction (IL-TRM V4.0)

Table 19 provides assumptions used to estimate ex post savings for kitchen faucet aerators.

Table 19. Ex Post Assumptions for Kitchen Faucet Aerators

Parameter	Value	Units	Notes/Reference
%ElectricDHW	100%	N/A	In accordance with the PY8 Evaluation Plan, we used the PY7 Rural Kits participant survey data to estimate an electric and gas water heater saturation rates. 87% of program measures were installed in residences with electric water heating and 13% installed in homes with gas water heating. This evaluation used these fuel saturations and applied it to installed measures to create separate analyses for electric and gas.
%FossilDHW	100%	N/A	
GPM _{base}	1.39	gal/min	Base case flow (IL-TRM V4.0)
GPM _{low}	0.94	gal/min	Low case flow (IL-TRM V4.0)
L _{base}	4.5	min/day	Base case use length (IL-TRM V4.0)
L _{low}	4.5	min/day	Low case use length (IL-TRM V4.0)
Household	2.56	# of people	Average number of people per household (IL-TRM V4.0) – ‘Single-Family’
365.25	365.25	Average days in a year	Days in a year, on average (IL-TRM V4.0)
DF	75%	Percent	Drain factor (IL-TRM V4.0) – ‘Bath’
FPH	1.0	Kitchen faucets per household	Kitchen faucets per household (IL-TRM V4.0).
EPG_electric	0.0969	kWh/gal	Energy per gallon of hot water supplied by electricity (IL-TRM V4.0) – ‘Kitchen’
EPG_gas	0.00415	Therm/gal	Energy per gallon of hot water supplied by gas (IL-TRM V4.0) – ‘Kitchen’

Parameter	Value	Units	Notes/Reference
			TRM V4.0) – ‘Single-Family - Kitchen’
ISR	20%	N/A	Evaluation team applied the 20% ISR calculated from the PY7 Rural Kits participant survey data, in accordance with the PY8 Rural Kits Evaluation Plan, to reported measures distributed and did not apply any ISR to the per-unit savings values reported in the evaluation report.
Hours	94	Hours/Year	Annual electric water heating recovery hours for faucet use per faucet (IL-TRM V4.0) – ‘Single-Family - Kitchen’.
CF	0.022	N/A	Coincidence Factor for electric load reduction (IL-TRM V4.0)

Shower Heads

The evaluation team used the following equations from the IL-TRM V4.0 to estimate energy and demand savings for shower heads.

Equation 6. Shower Head Electric Energy Algorithm

$$\Delta kWh = \%ElectricDHW \left(\frac{(GPM_{base} * L_{base} - GPM_{low} * L_{low}) * Household * SPCD * 365.25}{SPH} \right) \times EPG_{electric} \times ISR$$

Equation 7. Shower Head Gas Energy Algorithm

$$\Delta Therms = \%FossilDHW \left(\frac{(GPM_{base} * L_{base} - GPM_{low} * L_{low}) * Household * SPCD * 365.25}{SPH} \right) \times EPG_{gas} \times ISR$$

Equation 8. Shower Head Demand Algorithm

$$\Delta kW = \left(\frac{\Delta kWh}{Hours} \right) \times CF$$

Table 20 provides assumptions used to estimate ex post savings for shower heads.

Table 20. Ex Post Assumptions for Shower Heads

Parameter	Value	Units	Notes/Reference
%ElectricDHW	100%	N/A	In accordance with the PY8 Evaluation Plan, we used the PY7 Rural Kits participant survey data to estimate an electric and gas water heater saturation rates. 87% of program measures were installed in residences with electric water heating and 13% installed in homes with gas water heating. This evaluation used these fuel saturations and applied it to installed measures to create separate analyses for
%FossilDHW	100%	N/A	

Parameter	Value	Units	Notes/Reference
			electric and gas.
GPM _{base}	2.35	gal/min	Base case flow (IL-TRM V4.0)
GPM _{low}	1.75	gal/min	Actual case flow
L _{base}	7.8	min/day	Base case use length (IL-TRM V4.0)
L _{low}	7.8	min/day	Low case use length (IL-TRM V4.0)
Household	2.56	# of people	Average number of people per household (IL-TRM V4.0) – ‘Single-Family’
SPCD	0.6	Showers per capita per day	Showers per capita per day (IL-TRM V4.0)
365.25	365.25	Average days in a year	Days in a year, on average (IL-TRM V4.0)
SPH	1.79	Shower heads per household	Shower heads per household (IL-TRM V4.0) – ‘Single-Family’
EPG _{electric}	0.117	kWh/gal	Energy per gallon of hot water supplied by electricity (IL-TRM V4.0)
EPG _{gas}	0.00501	Therm/gal	Energy per gallon of hot water supplied by gas (IL-TRM V4.0) – ‘Single-Family’
ISR	39%	N/A	Evaluation team applied the 39% ISR calculated from the PY7 Rural Kits participant survey data, in accordance with the PY8 Rural Kits Evaluation Plan, to reported measures distributed and did not apply any ISR to the per-unit savings values reported in the evaluation report.
Hours	266	Hours/Year	Annual electric water heating recovery hours for showerhead use (IL-TRM V4.0) – ‘SF Retrofit & EE Kits & TOS’
CF	0.0278	N/A	Coincidence Factor for electric load reduction (IL-TRM V4.0)

Hot Water Temperature Card Thermometer

The evaluation team used the following equations from the IL-TRM V4.0 to estimate energy and demand savings for hot water temperature card thermometers.

Equation 9. Hot Water Temperature Card Thermometer Electric Energy Algorithm

$$\Delta kWh = \left(\frac{(UA * (T_{pre} - T_{post}) * Hours)}{3,412 * RE_{electric}} \right)$$

Equation 10. Hot Water Temperature Card Thermometer Gas Energy Algorithm

$$\Delta Therms = \left(\frac{(UA * (T_{pre} - T_{post}) * Hours)}{100,000 * RE_{gas}} \right)$$

Equation 11. Hot Water Temperature Card Thermometer Demand Algorithm

$$\Delta kW = \left(\frac{\Delta kWh}{Hours} \right) \times CF$$

Table 21 provides assumptions used to estimate ex post savings for hot water temperature card thermometers.

Table 21. Ex Post Assumptions for Hot Water Temperature Card Thermometers

Parameter	Value	Units	Notes/Reference
%ElectricDHW	100%	N/A	In accordance with the PY8 Evaluation Plan, we used the PY7 Rural Kits participant survey data to estimate an electric and gas water heater saturation rates. 87% of program measures were installed in residences with electric water heating and 13% installed in homes with gas water heating. This evaluation used these fuel saturations and applied it to installed measures to create separate analyses for electric and gas.
%FossilDHW	100%	N/A	
U	0.083	Btu/Hr-°F-ft ²	Overall heat transfer coefficient of tank (IL-TRM V4.0)
A	24.99	Square Feet	Surface area of storage tank (IL-TRM V4.0)
T _{pre}	135	Degrees °F	Deemed hot water set point prior to adjustment (IL-TRM V4.0)
T _{post}	120	Degrees °F	Deemed new hot water set point (IL-TRM V4.0)
Hours	8,766	Hours	Number of hours in a year
3412	3412	N/A	Conversion from Btu to kWh (IL-TRM V4.0)
RE _{electric}	0.98	kWh/gal	Recovery efficiency of electric hot water heater (IL-TRM V4.0)
RE _{gas}	0.78	Therm/gal	Recovery efficiency of gas water heater (IL-TRM V4.0) – ‘Single-Family’
ISR	10%	N/A	Evaluation team applied the 10% ISR calculated from the PY8 implementer-administered web-based student participant survey data, in accordance with the PY8 Rural Kits Evaluation Plan, to reported measures distributed and did not apply any ISR to the per-unit savings values reported in the evaluation report.
CF	1	N/A	Coincidence Factor for electric load reduction (IL-TRM V4.0)

Appendix B. Natural Gas Impacts

Gross Impacts

Table 22 lists the reported ex ante and evaluated ex post per-unit gas savings. There are large differences between ex ante and ex post per-unit gross savings for the bathroom and kitchen faucet aerators because the implementer did not calculate separate savings estimates for the different aerator types.

Table 22. PY8 Rural Kits Ex Ante and Ex Post Per Unit Gas Savings

Measure	Reported Ex Ante Gross (therms)	Evaluated Ex Post Gross (therms)
1.0 GPM Bath Faucet Aerator	3.1	0.7
2.0 GPM Kitchen Faucet Aerator	3.1	5.9
1.75 GPM High-Efficiency Shower Head	7.3	7.3
Hot Water Temperature Card Thermometer	6.4	3.5

The implementer did not estimate ex ante gas population savings for the program, as they assumed 100% of the kits were distributed to homes using electricity as their primary water heating energy source. Thirteen percent of participants surveyed in PY7 reported using natural gas as their primary water heating energy source. Given the implementer's assumptions, the evaluation team did not receive ex ante gross population therm savings values. Rather, the implementer provided ex ante per-unit therm savings estimates, and the evaluation team used those to calculate the ex ante gross population therm savings presented in Table 23.

Based on verified program participation, the program achieved total gross gas energy savings of 12,690 therms. Table 23 shows ex ante and ex post gross gas impacts. The low gross realization rates are primarily because the ex ante installation rates are considerably higher than the ex post installation rates, which are based on evaluated results (from PY7).

Table 23. PY8 Program Ex Ante and Ex Post Gross Gas Impacts

Measure	Reported Ex Ante Installation Rate	Reported Ex Ante Gross Impacts (therms)	Reported Measures ^a	Evaluated Ex Post Installation Rate	Verified Measures ^b	Ex Post Gross Impacts (therms)	Gross Realization Rate ^c
1.0 GPM Bath Faucet Aerator	60%	10,159	5,467	17%	929	679	7%
2.0 GPM Kitchen Faucet Aerator	60%	5,079	1,301	20%	547	3,222	63%
1.75 GPM High-Efficiency Shower Head	80%	16,069	1,301	39%	1,066	7,834	49%
Hot Water Temperature Card Thermometer	50%	8,747	1,301	10%	273	956	11%
Total	62%	40,054	5,206	21%	2,815	12,690	32%

^a Based on PY7 Rural Kits participant survey data; the evaluation team assumed 13% of total verified water-saving measures were installed in homes with gas water heating.

^b The difference between reported measures and verified measures resulted from the application of installation rates developed from the PY7 Rural Kits participant survey effort.

^c Realization rates different from 1.0 resulted from differences between ex ante and ex post per-unit savings. Reported results have been rounded. Gross realization rate = ex post gross savings ÷ ex ante gross savings.

The evaluation team received ex ante gas savings estimates from the program implementer and reviewed the assumed estimates for comparisons to the ex post gas savings methodologies. The differences between total ex ante and ex post gas savings estimates resulted from differences in the ex ante and ex post gross gas per-unit savings assumptions and installation rates. Descriptions follow addressing discrepancies for each program measure:

- **Bathroom Faucet Aerators.** The ex ante bathroom faucet aerator per-unit savings estimate of 3.1 therms was more than the ex post per-unit savings estimate of 0.7 therms (calculated in accordance with IL-TRM V4.0). The implementer did not calculate separate savings estimates for the different aerator types, using a 3.1 therms gross per-unit savings estimate for both bathroom and kitchen faucet aerators. In calculating the single aerator savings value, the implementer relied on IL-TRM V4.0 inputs associated with an “Unknown” aerator type and overestimated bathroom aerator gross savings. Differences in installation rates used for ex post and ex ante gross savings also resulted in ex post gross population savings being less than ex ante gross population savings. A major driver in the ex ante gross population savings being less than ex post gross population savings is that the implementer used an ISR of 60% (estimated by the implementer) to calculate ex ante savings, while the evaluation team used the bathroom faucet aerator-specific ISR of 17%, calculated from the PY7 Rural Kits Program participant survey (in accordance with the PY8 Evaluation Plan) to calculate ex post gross savings.
- **Kitchen Faucet Aerators.** The ex ante kitchen faucet aerator per-unit savings estimate of 3.1 therms fell below the ex post per-unit savings estimate of 5.9 therms, calculated in accordance with the IL-TRM V4.0. The implementer did not calculate separate savings estimates for the different aerator types, using a 3.1 therms gross per-unit savings estimate in calculating both kitchen and bathroom faucet aerator ex ante gross savings.

In calculating the single aerator savings value, the implementer relied on IL-TRM V4.0 inputs associated with an “Unknown” aerator type, thus underestimating the kitchen aerator gross savings. Ex post gross population savings were less than ex ante gross population savings due to differences in the installation rates used for ex post and ex ante gross savings. A major driver in the ex ante gross population savings being less than ex post gross population savings is that the implementer used an ISR of 60% (estimated by the implementer) to calculate ex ante savings, while the evaluation team used the kitchen faucet aerator-specific ISR of 20% (calculated from the PY7 Rural Kits Program participant survey, in accordance with the PY8 Evaluation Plan) to calculate ex post gross savings.

- **Shower Heads.** The ex ante shower head per-unit savings estimate of 7.35 therms matched the ex post per-unit savings estimate of 7.35 therms, which the evaluation team calculated in accordance with IL-TRM V4.0. Ex post gross population savings were less than ex ante gross population savings due to differences in the installation rates used for ex post and ex ante gross savings. The major driver in the ex ante gross population savings being less than ex post gross population savings is that the implementer used an ISR of 80% (estimated by the implementer), while the evaluation team used the shower head-specific 39% ISR (calculated from the PY7 participant survey and in accordance with the PY8 Evaluation Plan) to calculate ex post gross savings.
- **Water Heater Temperature Card Thermometers.** The ex ante water heater temperature card thermometer per-unit savings estimate of 6.4 therms exceeded the ex post per-unit savings estimate of 3.5 therms, calculated in accordance with the IL-TRM V4.0. The main difference for the lower ex post per-unit savings estimates resulted from the implementer using IL-TRM V3.0 savings calculations, while the evaluation team used the updated savings algorithm from IL-TRM V4.0. Ex post gross population savings were also less than ex ante gross population savings due to differences in installation rates used for ex post and ex ante gross savings. A major driver in the ex ante gross population savings being less than ex post gross population savings is that the implementer used an ISR of 50% (estimated by the implementer), while the evaluation team used the water heater temperature card thermometer-specific ISR of 10% (calculated from the PY7 Rural Kits participant survey and in accordance with the PY8 Evaluation Plan) to calculate ex post gross savings.

Net Impacts

The program achieved total net gas savings of 12,259 therms, based on the following: verified program participation, IL-TRM V4.0 deemed per-unit gross savings inputs, installation rates in accordance with the PY8 IPA Evaluation Plan, and SAG-approved NTGRs. Table 24 shows net gas savings results by measure. The low overall net realization rate for the program is partially due to the implementer calculating only a single aerator savings value and applying it to both bathroom and kitchen faucet aerators, thus severely overestimating bathroom faucet aerator ex ante gross savings. The low overall net realization rate for the program is also because the ex ante installation rates are considerably higher than the ex post installation rates, which were based on evaluated results (from PY7).

Table 24. PY8 Total Program Net Gas Savings by Measure*

Measure	Ex Ante Net Savings (therms)	Ex Post Net Savings (therms)
1.0 GPM Bath Faucet Aerator	10,199	681
2.0 GPM Kitchen Faucet Aerator	5,100	3,235
1.75 GPM High-Efficiency Shower Head	15,121	7,372
Hot Water Temperature Card Thermometer	8,747	956
Total	39,167	12,243
Net Realization Rate^a		31%

* Totals may not sum due to rounding.

^a Net realization rate = ex post net savings ÷ ex ante net savings.

Appendix C. Program Collateral

Figure 1. Home Starter Kit Label



Figure 2. Home Starter Kit Insert, Side A



Ameren Illinois
Energy Efficiency Program
HOME STARTER KIT



INSTALLATION INSTRUCTIONS

[2] 13W CFLs, [1] 20W CFL, [1] 23W CFL:
Replace incandescent bulbs with the CFLs in your kit. 60W bulbs can be replaced with 13W CFLs, 75W bulbs can be replaced with 20W CFLs and 100W bulbs with 23W CFLs. Please do not wait until the incandescent bulbs burn out. Replace them now and start saving today.

[1] 1.75 gpm* showerhead:
Remove the old showerhead by turning it counter-clockwise. Apply the thread seal tape and screw on the new showerhead by turning it clockwise and hand tighten. Handle with care to avoid cross-threading.

[1] 2.0 gpm* kitchen swivel aerator, [2] 1.0 gpm* bath faucet aerator:
Remove the old faucet head by turning it counter-clockwise. Apply the thread seal tape and screw on the new faucet aerator by turning it clockwise and hand tighten. Handle with care to avoid cross-threading.

[1] Water temperature card:
Follow the instructions provided on the card. You will typically find instructions for adjusting your water temperature on your water heater. (U.S. Department of Energy recommended water heater temperature setting is 120°F).

[1] Roll of thread seal tape:
Follow the thread seal tape instructions provided in the kit for proper application.

*gpm - gallons per minute, indicates maximum water flow rate.

CONGRATULATIONS! You have been selected to participate in an energy efficiency program offered by Ameren Illinois.

We want to help you start saving energy and money, so we've assembled a Home Starter Kit to give you energy-saving tools. This kit will help you save up to \$50 a year on your energy bill and it's **FREE** to you!

THIS KIT CONTAINS THESE ENERGY EFFICIENT PRODUCTS

Compact Fluorescent Light Bulbs (CFLs):
These bulbs use up to 75% less energy than standard bulbs and can last up to 10 times longer.

Showerheads and Faucet Aerators:
These devices reduce water flow, saving hot water and energy. Typically, these showerheads and aerators use 20-40% less water compared to standard fixtures.

Temperature Card:
Allows for safe calibration of recommended hot water settings to save energy.



FOR MORE INFORMATION
Visit our website at ActOnEnergy.com
or call **1.866.838.6918**.

LET'S GET STARTED
Just install the energy efficient products contained in this kit to begin saving. Installation instructions can be found on the back of this pamphlet.

Figure 3. Home Starter Kit Insert, Side B

Ameren Illinois Energy Efficiency Programs FOR YOUR HOME

The award-winning Ameren Illinois Energy Efficiency Program can help you save energy and money. Discover financial incentives available to help you reduce your energy costs and become more energy-efficient at ActOnEnergy.com.

Lighting

Discounts are available at participating retailers when you make the switch to compact fluorescent light bulbs (CFLs) that use up to 75% less energy than conventional incandescent lighting.

Heating and Cooling

You can save hundreds of dollars upgrading your heating and cooling system by working with local registered Program Allies.

Home Efficiency Program

Qualify for discounts by making a number of recommended improvements, including air sealing, insulation, and installing programmable thermostats.

Appliance Recycling

Get a \$50 reward for recycling your refrigerator or freezer for energy savings of up to \$100 a year.

New Homes

With your ENERGY STAR® new home, you'll enjoy reduced energy costs, better comfort and higher resale value by working with local builders and HERS raters.

Multifamily Properties

Get free and discounted energy-saving products for your properties of three or more rental units.

FOR MORE INFORMATION
Visit our website at ActOnEnergy.com
or call **1.866.838.6918**.

Appendix D. Cost-Effectiveness Inputs

Heating Penalty

Efficient lighting products generate less waste heat compared to baseline lighting products. When customers replace baseline products with more -efficient lighting, they must use more space heating to compensate for “lost” heat from lighting. The heating penalty represents this increased gas usage for space heating¹⁵—a figure used in analyzing program cost-effectiveness.

Heating Penalty Results

In addition to the gross gas-heating penalty from measure installations in PY8, the evaluation team calculated the gross gas-heating penalty from delayed CFL installations, per the IL-TRM V4.0. In particular, IL-TRM V4.0 assumed that consumers would install 93% of kit CFLs within 3 years. Table 25 shows the gross gas-heating penalty resulting from efficient lighting installations provided to participants in PY8 and realized in PY8 and, given later installations, in PY9 and PY10.

Table 25. Yearly Gross Heating Penalty Impact of Lighting Measures by Assumed Installation Year

Measure	Heating Penalty (therms)		
	PY8	PY9	PY10
14-Watt CFL	-14,591	-3,095	-2,653
20-Watt CFL	-8,302	-1,761	-1,509
23-Watt CFL	-12,327	-2,615	-2,241
Total	-35,219	-7,471	-6,403

Table 26 shows the net gas impacts for cost-effectiveness inputs.

Table 26. Net Gas Impacts

Measure	Net Gas Impacts (Therms)		
	PY8	PY9	PY10
14-Watt CFL	-14,591	-3,095	-2,653
20-Watt CFL	-8,302	-1,761	-1,509
23-Watt CFL	-12,327	-2,615	-2,241
1.0 GPM Bath Faucet Aerator	679	*	*
2.0 GPM Kitchen Faucet Aerator	3,222	*	*
1.75 GPM High-Efficiency Shower Head	7,834	*	*
Hot Water Temperature Card Thermometer	956	*	*
Total	-22,529	-7,471	-6,403

* To be determined in future evaluations

¹⁵ The evaluation team followed IL-TRM V4.0's direction, assuming all homes used gas heating, given the missing information on heating fuels in customers' homes. Thus, this study calculated only a gas-heating penalty.

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