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Impact and Process Evaluation of 2016 (PY9) Ameren Illinois Company Residential Energy Efficiency School Kits Program

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1. Executive Summary

This report summarizes the results for the Residential Energy Efficiency School Kits (School Kits) Program for Program Year 9 (PY9). Through this program, Ameren Illinois Company (AIC) distributes kits (containing energy-efficient items) during on-site presentations to fifth- through eighth-grade students. Since PY8, Leidos Engineering has provided oversight on behalf of AIC. Leidos subcontracts with CLEAResult to implement the program and Energy Federation Incorporated (EFI) to compile and deliver kits to schools. AIC seeks to increase sales and awareness of ENERGY STAR®-qualified lighting products through the program, along with other AIC energy efficiency offerings. The School Kits Program provided energy efficiency kits to 7,499 students in PY9 (June 1, 2016 to May 31, 2017).

As shown in Table 1, each kit contained two 13-watt CFLs, two faucet aerators, one shower head and one hot water temperature card thermometer, along with instructional materials explaining how to properly set water heater temperatures. School Kits Program materials also encouraged student participants to complete an activity worksheet with the assistance of their parent or guardian, who then submit a program-administered, web-based student participant survey, to verify the installation of energy-efficient items.

Table 1. PY9 School Kits Products

Product	Quantity Per Kit
13-watt CFL	2
1.0 Gallons Per Minute (GPM) Bath Faucet Aerator	1
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

The implementation plan specified the following two general program objectives:

- Increase awareness of energy efficiency and conservation
- Increase energy efficiency for targeted students and their families through simple home energy efficiency tools and measures

More specifically, the filed PY9 energy goals, which are based on distributing 5,000 kits, are 366 net MWh and 48,298 net therms. AIC estimated program savings based on the default assumptions in the Illinois Statewide Technical Reference Manual (IL-TRM) V5.0. However the program implementer determined that the budget supported a 7,500-kit goal in PY7 and PY8, and staff agreed to maintain the increased goal in PY9. The program implementer assumed energy savings of 60.13 annual net kWh and 6.07 annual net therms per kit, for a combined 7,500-kit net savings goal of 451 MWh and 45,509 therms. AIC and the program implementer did not set demand reduction goals.

Program Impacts

Table 2 summarizes the PY9 School Kits Program's net energy and demand savings of 741 MWh, 0.126 MW, and 16,411 therms. Although the program implementer exceeded the program's filed MWh goal, it fell short of the filed therms savings goal. Total MWh savings were higher and therm savings were lower due to differences resulting from estimated compared to actual electric water heating saturation rates. While AIC and the program implementer used the IL-TRM V5.0 default water heater fuel saturation rates of 16% electric and 84% natural gas, the evaluation team applied ex ante and ex post fuel saturations of 55% electric and 45%

natural gas based on the PY9 program implementer participant survey results. To determine gross savings and net realization rates, the evaluation team applied deemed per-unit gross savings inputs set forth in the IL-TRM V5.0, in combination with the following:

- PY9 School Kits Program non-CFL measure installation rates and water heater fuel saturations (derived from the implementer-administered web-based student participant survey results) for program measures
- Application of the Stakeholder Advisory Group's (SAG's) approved net-to-gross ratio (NTGR) for this program
- Additionally, for PY9,[1] the evaluation team included net savings for delayed CFL installations attributed to the PY7 and PY8 School Kits Programs.

As a result, the program achieved the gross and net savings shown in Table 2. Realization rates less than 100% are mainly due to ex ante installation rates being higher than ex post installation rates for all measures other than CFLs.

Table 2. PY9 Net School Kits Program Impacts

Savings Type	Ex Ante Gross*	Realization Rate	Ex Post Gross	NTGR	Initial PY9 Ex Post Net	PY7 Ex Post CFL Net Savings Realized in PY9	PY8 Ex Post CFL Net Savings Realized in PY9	PY9 Ex Post Net
Energy Savings (MWh)								
Total MWh	907	72%	681	0.97	657	46	39	741
Demand Savings (MW)								
Total MW	0.183	64%	0.121	1.00	0.120	0.005	0.001	0.126
Energy Savings (therms)								
Total therms	22,434	67%	15,784	1.04	16,411	0	0	16,411

* Ex ante savings are based on IL-TRM V5 with actual water heater saturations (55% electric)

Key Findings and Recommendations

The PY9 School Kits Program delivered 7,499 kits to students, one short of its 7,500-kit goal. Of the 71 participating schools, the implementer successfully recruited 32 new schools in PY9, the program's fourth year. Most teachers completing the implementer's teacher survey expressed interest in participating in the program in the future. AIC, Leidos, and CLEAResult program staff coordinated planning and implementation efforts, frequently communicating throughout the program year. During the evaluation team's process review, utility and implementation staff reported that they were highly satisfied with PY9 program performance. Stakeholders also reported that operations ran smoothly, without significant issues.

[1] Delayed 13-watt installations by PY7 and PY8 School Kits Program participants, estimated as installed during the PY9 program year (in accordance with IL-TRM V3.0 (PY7) and IL-TRM V4.0 (PY8)), were credited to the final PY9 School Kits Program net impacts.

Based on this research, the evaluation team provides the following key findings and recommendations:

- **Key Finding #1:** The implementer-administered, web-based student participant survey response rate decreased from 33% in PY8 to 23% in PY9. This remains lower than the 55% response rate for PY6, though consistent with the 23% in PY7. Student response rates typically depend on teachers' encouragement levels and associated completion requirements. As student survey data directly informs program impacts (e.g., installation rates and water heater saturations), it is important to encourage increased response rates to capture more accurate savings calculations.
  - **Recommendation:** Consider revising incentives for student survey completions. Instead of providing incentives to teachers or schools with the best response rates, provide incentives to individual teachers whose classroom (i.e., students) meet a minimum response rate. For teachers who have participated in the past, consider offering incentives for improved response rates. A tiered incentive—$20 for returning any surveys, $50 for returning 50% of a classroom's surveys, and $100 for returning 80% of a classroom's surveys—may also increase response rates. The tiered incentive as described would increase the incentive budget from $500 to $1820, based on the PY9 results; however, presuming even higher response rates, we recommend an even higher incentive budget.
  - **Recommendation:** Program staff could revise delivery tactics to increase response rates (e.g., e-mailing teachers directly to remind them to complete the student survey activity or encouraging teachers to consider using the activity worksheet and installations as homework assignments).
- **Key Finding #2:** As recommended in the PY8 evaluation report, the program implementer worked with the evaluation team to update the parent[2] letter and the parent postcards to obtain permission to collect additional information useful in assessing program free-ridership. AIC and the implementer also coordinated a second edit to the postcard, which included a chance for households to win a gift card for responding to request for contact information, and web link to the free-ridership survey to encourage parents to take the survey on their own. However, household response rates remained low, and AIC, Leidos, CLEAResult, and the evaluation team revised the process in time for the launch of the transition period program offering. This time, the team eliminated the parent postcard, only providing a web link to the survey in the parent letter, and adjusted the gift card drawing to be awarded to teachers whose classrooms have the strongest response rates.
  - **Recommendation:** Monitor the process for obtaining household survey responses to ensure the evaluation team reaches its quota (n=70) for desired confidence and precision levels. If the response rate remains low, consider reinstating the postcard into the kit to increase visibility, or consider adjusting the program's activity sheet and student participant online survey to collect the additional NTGR information.

[2] For the remainder of this report, "parent" will refer to either "parent" or "guardian."

Key Finding #3: Realization rates less than 100% for non-CFL measures are due to ex ante installation rates being higher than ex post installation rates. The non-CFL ex-ante savings calculations produced by the implementer used installation rates derived from the PY7 participant survey and reported in the PY7 School Kits report. The evaluation team used results from the PY9 implementer-administered, web-based student participant survey to estimate installation rates for non-CFL items.

- **Recommendation:** Calculate future ex ante savings using the PY9 ex post installation rates presented in this report.

2. Evaluation Approach

The PY9 assessment of the School Kits Program included process and impact analyses.

2.1 Research Objectives

The PY9 School Kits Program impact evaluation sought to provide estimates of the program's gross and net electricity savings. Specifically, the evaluation team researched the following impact questions:

- How many kits did the program distribute?
- What installation rate did each measure achieve?
- What are the estimated gross energy and demand impacts of the program?
- What are the estimated net energy and demand impacts of the program?

A process evaluation, exploring how the program performed in its third year, researched the following process-related questions:

- What, if any, implementation challenges occurred in PY9?
- Did the program operate effectively?
- How did staff market the program?
- What participation challenges existed for school-based customers?
- What program changes could improve program effectiveness?

2.2 Evaluation Tasks

Table 3 summarizes PY9 evaluation activities conducted for the School Kits Program.

Table 3. PY9 School Kits Program Evaluation Methods

Activity	PY9 Process	PY9 Impact	Forward Looking	Details
Program Staff In-Depth Interviews	✓			Interviewed three program and implementation staff to gain insights into the program's design and delivery
Review of Program Materials and Data	✓			Reviewed implementation plan, program marketing materials, and kit instructional materials
Impact Analysis: Database Analysis	✓	✓	✓	Summarized database information to determine participation, key program statistics, and savings
Review of Implementer's Student Participant Survey Instrument	✓	✓	✓	Reviewed implementer-administered web-based student participant survey instrument for data needs to assess installation rates and water heater fuel saturation rates
Parent Postcard for Future Participating Household Survey			✓	Requested permission through parent postcard to survey student households to assess the program's process and future program years' NTGRs

2.2.1 Program Staff In-Depth Interviews

The evaluation team conducted three interviews with AIC and with the program staff responsible for managing, marketing, and delivering the program. As shown in Table 4, the team interviewed program staff to assess program design, implementation, communications, and strengths and weaknesses.

Table 4. Program Staff Interviews

Company	Number of Staff Interviewed
AIC	1
CLEAResult	1
Leidos	1

2.2.2 Review of Program Materials and Data

The evaluation team reviewed the following program data:

- Program database
- Implementer's web-based student participant survey results
- Program collateral
- Implementation plan[3]

2.2.3 Database Analysis

The evaluation team reviewed the program-tracking database to determine participation levels and installation rates.

2.2.4 Parent Postcard for Participating Household Survey

To capture data relevant for estimating the program's future NTGR, the evaluation team developed a follow-up household survey to assess the program participation process, free-ridership, and spillover using TRM V6.0 protocols. The process-related issues examined include participant awareness, decision-making, and satisfaction.

The evaluation team planned to conduct a telephone survey with PY8 and PY9 participating student households as part of the PY9 evaluation. To collect appropriate contact data for this survey effort, the evaluation team worked with the program implementer to develop a parent contact postcard for distribution along with the PY9 energy efficiency kits. The postcard requested participating parents' contact information and permission to contact these participants for follow-up research. As of the end of 2016, this approach did not achieve the needed responses. Beginning in January 2017, we revised the postcard to include a web link for parents to participate directly in the follow-up research online. Due to the limited parent response to date, the team anticipates completing the survey research in January 2018, after the close of the 2017 fall

[3] Program Year Nine Implementation Plan, revised July 8, 2016. Page 90, "School Kits Program."

semester, provided a sufficient sample is available. The team will submit the resulting NTGR as part of the 2019 NTGR recommendations process.

The evaluation team will attempt to reach the quota (n=70) through this revised method. The team will monitor the follow-up online survey response rate during the transition period and will be prepared to explore other options if the team determines it is insufficient.

2.2.5 Impact Analysis

Gross Impacts

To estimate gross electric savings values for program measures, the evaluation team used the program-tracking database to verify the reported distribution of kits and to apply the IL-TRM V5.0 deemed per-unit gross savings inputs, in combination with the implementer-administered, web-based student participant survey results for installation rates and water heater fuel saturation. The team used home-type information from the 2013 AIC Energy Efficiency Market Potential Assessment[4] to estimate single- and multi-family weighted averages for ex post gross per-unit savings parameters, in conjunction with parameter values prescribed for single- and multi-family participants in the IL TRM V5.0.[5] To estimate electric energy savings associated with the program, the evaluation team applied a 55% electric water heater saturation rate (based on the implementer-administered, web-based student participant survey data) to verified installations of energy kit measures.[6] Table 5 lists the ex post gross electric savings.

Table 5. PY9 School Kits Program Ex Post Gross Electric Savings—Per Unit Installed

Measure	Gross kWh	Gross kW
13-watt CFL	26.8	0.0027
1.0 GPM Bath Faucet Aerator	18.2	0.0255
2.0 GPM Kitchen Faucet Aerator	132.4	0.0322
1.75 GPM High-Efficiency Shower Head	175.2	0.0190
Hot Water Temperature Card Thermometer	81.6	0.0093

The evaluation team applied a gas water heating saturation of 45% (based on the implementer-administered, web-based student participant survey data) to verified installations to estimate gas energy savings associated with the program (shown in Table 6). We used IL-TRM V5.0 deemed per-unit gross savings inputs for program measures to calculate the gross per-unit gas savings shown in Table 6.

[4] Ameren Illinois Company. *Energy Efficiency Market Potential Assessment*. Report Number 1404. Volume 2: Market Research. June 10, 2013. Available online: http://ilsagfiles.org/SAG_files/Potential_Studies/Ameren/Appendix%204_AIC%20DSM%20Potential%20Study%202013%20Volume%202%20Market%20Research.docx

[5] Note that 79% of customers live in single-family homes and 21% live in multi-family homes. The IL TRM V5.0 reports the average number of people per household in single-family homes as 2.56 and the average number of people in multi-family homes as 2.10. The evaluation team used this information to create a weighted average of 2.46 people per household. Mathematically, this is expressed as ((79%*2.56) + (21%*2.10)) = 2.46.

[6] The Ameren Illinois Energy Efficiency Market Potential Assessment found 19% of single family homes and 49% of multifamily units use electric water heating. Available online: https://www.illinois.gov/sites/ipa/Documents/AppendixB-4vol1-5AmerenPotentialStudy.pdf.

Table 6. PY9 School Kits Ex Post Gross Gas Savings—Per Unit Installed

Measure	Gross Therms
1.0 GPM Bath Faucet Aerator	0.8
2.0 GPM Kitchen Faucet Aerator	5.9
1.75 GPM High-Efficiency Shower Head	8.0
Hot Water Temperature Card Thermometer	3.7

Net Impacts

The evaluation team applied NTGRs (approved by SAG) to PY9 program savings. Table 7 summarizes NTGRs used in the net impact analysis. Applying the NTGRs to the School Kits Program resulted in an overall savings-weighted PY9 School Kits Program NTGR of 0.97 for kWh, 1.00 for kW, and 1.04 for therms.

Table 7. SAG-Approved PY9 School Kits Program NTGRs

Measure Type	Electric NTGR	Gas NTGR
CFLs	0.83	—
Faucet Aerators	1.04	1.04
Shower Heads	1.05	1.05
Hot Water Temperature Card Thermometers	1.00	1.00
Program-Level Energy Savings Weighted NTGR	0.97	1.04
Program-Level Demand Savings Weighted NTGR	1.00	N/A

Table 8 lists ex post per-unit gross savings values, SAG-approved NTGRs and ex post net electric savings values. With the exception of the 13-watt CFL, measure-level ex post per-unit net savings are equal to or greater than the ex post per-unit gross savings.

Table 8. PY9 School Kits Program Ex Post Net Electric Savings—Per Unit Installed

Measure	Gross kWh	Gross kW	NTGR	Net kWh	Net kW
13-watt CFL	26.8	0.0027	0.83	22.3	0.002
1.0 GPM Bath Faucet Aerator	18.2	0.0255	1.04	18.9	0.027
2.0 GPM Kitchen Faucet Aerator	132.4	0.0322	1.04	137.7	0.034
1.75 GPM High-Efficiency Shower Head	175.2	0.0190	1.05	184.0	0.020
Hot Water Temperature Card Thermometer	81.6	0.0093	1.00	81.6	0.009

Table 9 lists ex post per-unit gross savings values, SAG-approved NTGRs and ex post per-unit net gas savings values. Ex post per-unit net gas savings are equal to or greater than the ex post per-unit gross gas savings for every gas measure installation.

Table 9. PY9 School Kits Ex Post Net Gas Savings—Per Unit Installed

Measure	Gross therms	NTGR	Net therms
1.0 GPM Bath Faucet Aerator	0.8	1.04	0.8
2.0 GPM Kitchen Faucet Aerator	5.9	1.04	6.1
1.75 GPM High-Efficiency Shower Head	7.8	1.05	8.1
Hot Water Temperature Card Thermometer	3.6	1.00	3.6

2.3 Sources and Mitigation of Error

Table 10 summarizes the possible sources of error associated with the data collection and analysis conducted for the School Kits Program. A detailed discussion of each item follows.

Table 10. Possible Error Sources

Research Task	Survey Error		Non-Survey Error
	Sampling Error	Non-Sampling Survey Error	
Student Participant Surveys[a]	N/A – Census attempt	Nonresponse bias	N/A
Gross Impact Calculations	N/A	N/A	Data processing error
Net Impact Calculations	N/A	N/A	Data processing error

[a] Survey designed and data collected by the implementer, not the evaluator.

Throughout the PY9 evaluation planning and implementation process, the evaluation team took a number of steps to mitigate potential error sources. To minimize data processing errors, different team members reviewed all calculations to verify their accuracy.

Survey Error

- **Implementer-Administered, Web-Based Student Participant Survey:** In fielding surveys to school-based participants, the implementer attempted a census; therefore, no sampling errors occurred. However, the 23% survey response rate means that there is the potential for nonresponse bias. The implementer conducted the surveys, and the evaluation team did not have information about the extent of this potential bias or how the implementer attempted to mitigate it.

Non-Survey Error

- **Gross Impact Calculations:** The evaluation team applied deemed per-unit savings values to participant data in the tracking database to calculate gross impacts. To minimize data processing errors, the team had different team members review all calculations to verify their accuracy.
- **Net Impact Calculations:** The evaluation team applied the deemed NTGRs (shown in Table 7) to estimate the program's net impacts. To minimize data processing errors, the team had different team members review all calculations to verify their accuracy.

3. Detailed Evaluation Findings

3.1 Program Description

The School Kits Program provides in-class energy education presentations to fifth- through eighth-grade students. EFI assembles and sends energy efficiency kits to these students' schools, and CLEAResult (the program implementer) distributes the kits at the start of each presentation. The kits include energy-saving measures that students are asked to take home and install with their families.

CLEAResult recruited schools primarily through direct-mail outreach and conference presentations. The program design sought to provide a positive experience for participating school administrators and teachers by offering a program that was easy to schedule and receive. In addition, the program implementer designed the presentation to be informative yet enjoyable for the students. The presentation and kit materials also provided opportunities to increase customer awareness of other AIC energy efficiency programs.

In PY9, the School Kits Program provided education and materials to 7,499 students from 71 different schools (32 newly recruited schools and 39 schools that participated in previous program years). According to the program implementer's tracking database, the number of kits distributed to each school ranged from 7 to 480.

3.2 Process Findings

3.2.1 Program Operations

AIC contracted with Leidos and CLEAResult to deliver the program and to achieve the program's energy savings goals. There were two changes to the programs' staff: CLEAResult hired two new presenters in PY9 to replace the program presenter who retired in PY8, and Leidos' program lead transitioned from the role of portfolio support into managing this program's operations. AIC, Leidos, and CLEAResult staff were pleased with the staff transitions and with general program operations. Leidos managed the program's implementation team and provided reporting to AIC on program activities. CLEAResult:

- Developed the State Board of Education-approved presentation and activity sheet
- Recruited schools
- Scheduled the school presentations
- Notified its subcontractor (EFI) of the schedule and of the number of kits needed at the schools in time for the presentations
- Presented the program to fifth- through eighth-grade classrooms within the schools

EFI assembled and mailed the AIC-branded kits and marketing materials directly to schools approximately two weeks before scheduled presentations.

3.2.2 Program Goals

In addition to the energy savings achieved through the kit, the program encouraged students to take home lessons that they learned from the presentations to educate their families. The kit included an activity worksheet designed to engage parents in the kit installation process and inform them of additional energy efficiency program opportunities available through AIC. Parents and students completed household and measure installation information on the activity sheet, and students entered this information into the Leidos-administered web-based student participant survey.

During the interviews, program and implementation staff stated that the program's original goals included distributing at least 5,000 kits. The program implementer determined that the budget supported a 7,500-kit goal in PY7, and staff agreed to maintain the increased goal in PY9. In total, the program distributed 7,499 kits in PY9, one kit short of the 7,500-kit goal. Interviewees reported completing all activities without exceeding the program budget.

3.2.3 Marketing and Outreach

The School Kits Program used direct-mail outreach and participation in local conferences to market the program and to recruit schools within AIC's dual-fuel (electric and gas) service territory. Implementation staff reported that a school occasionally could be located within AIC's electric-only service territory, but its students' addresses primarily fell within the dual-fuel territory. CLEAResult coordinated school participation, focusing on a specific grade in each school, to prevent students from participating in the program in more than one program year.

Marketing at teacher- and school-focused conferences and annual meetings drew participants into the program. CLEAResult displayed materials and program kits during reading and science conferences. The program raffled gift baskets to collect contact information for recruitment, but implementation staff commonly enrolled teachers on site.

CLEAResult sent mass mailings to schools a few times a year, focusing the marketing campaign on middle and junior high schools, and then on elementary schools. Through this method, the program targeted teachers who participated in past years, rural schools, and those who indicated their interest in participating in future school years.

The primary program marketing challenge arose from the large size of AIC's service territory and the rural areas within that territory. In rural areas, the program implementer considered how many children attending the school likely lived within AIC's service territory. Because many AIC rural service areas are also near other cooperative utilities' jurisdictions, school attendees might not be AIC customers. Implementers used school zip codes to assess the likelihood that students were AIC customers.

Once the program recruited teachers, the implementer communicated via a primary contact within the school to determine and confirm presentation dates, kit deliveries, and student and teacher survey completions.

3.2.4 The Program Presentation

CLEAResult's presenters arrived at the school at least 40 minutes ahead of schedule to set up. This allowed the presenters to meet with the principal and to gather kits that EFI had previously shipped to the school. The implementer typically conducted three or four presentations at a school during a day. Though the presentation followed a PowerPoint slide deck, it included items that children could see and touch, such as a lighted panel showing meter readings of various bulb types' energy use.

Students received an activity worksheet to review during the presentation. The implementer described the importance of energy conservation and pointed out that much of the energy produced is derived from non-renewable, limited, and polluting sources. The implementer presented each item in the kit, detailing lighting and water heating energy usage, along with the expected energy savings potential from installing the kit's measures. The presenter encouraged students to learn more about energy efficiency, visit the program website ActOnEnergy.com, and to take action in their homes, starting with the items provided in the energy efficiency kit.

The implementer advised students to work with a parent to install the measures, complete the activity sheet, and complete a postcard that requests the parent's permission to opt in to follow-up program research. All schools that received kits between April 2016 and May 2017 received the parent contact postcards. The evaluation team intended to target a sample of 70 completed PY8 and PY9 participating student household surveys to achieve the 90/10 level of confidence and precision. Postcard response rates were low in late PY8 and early PY9; the evaluation team received 37 postcards between April and November 2016 and met with AIC and Leidos staff in December 2016 to discuss ways to increase response rates to the parent contact postcard. Following this discussion, the evaluation team revised the postcard to include a link to a web-based survey and incorporated a drawing for a chance for parents to win a $250 gift card. Although responses increased during the second half of PY9, in total, the evaluation team received 104 postcards, of which 46 households agreed to a follow-up telephone survey. In addition, nine households completed the follow-up online survey.

In June 2017, the evaluation team, Leidos, and AIC staff discussed additional methods to increase response rates for future research and came up with two revisions. First, the team streamlined the survey process to only offer the survey online, thereby simplifying the postcard messaging and call to action. Rather than offering a $250 drawing to parents, the team revised the drawing to be offered to teachers. The evaluation team added fields in the follow-up online survey for the household to indicate their child's teacher and school name for entry into the drawing. A teacher's chance of winning increases each time a parent completes a follow-up online survey. The team also assisted the implementer with this new approach by revising the instructions included in the program's teacher and parent letters, and developing educator and parent e-mail templates for program staff and teacher use.

3.2.5 School and Customer Participation

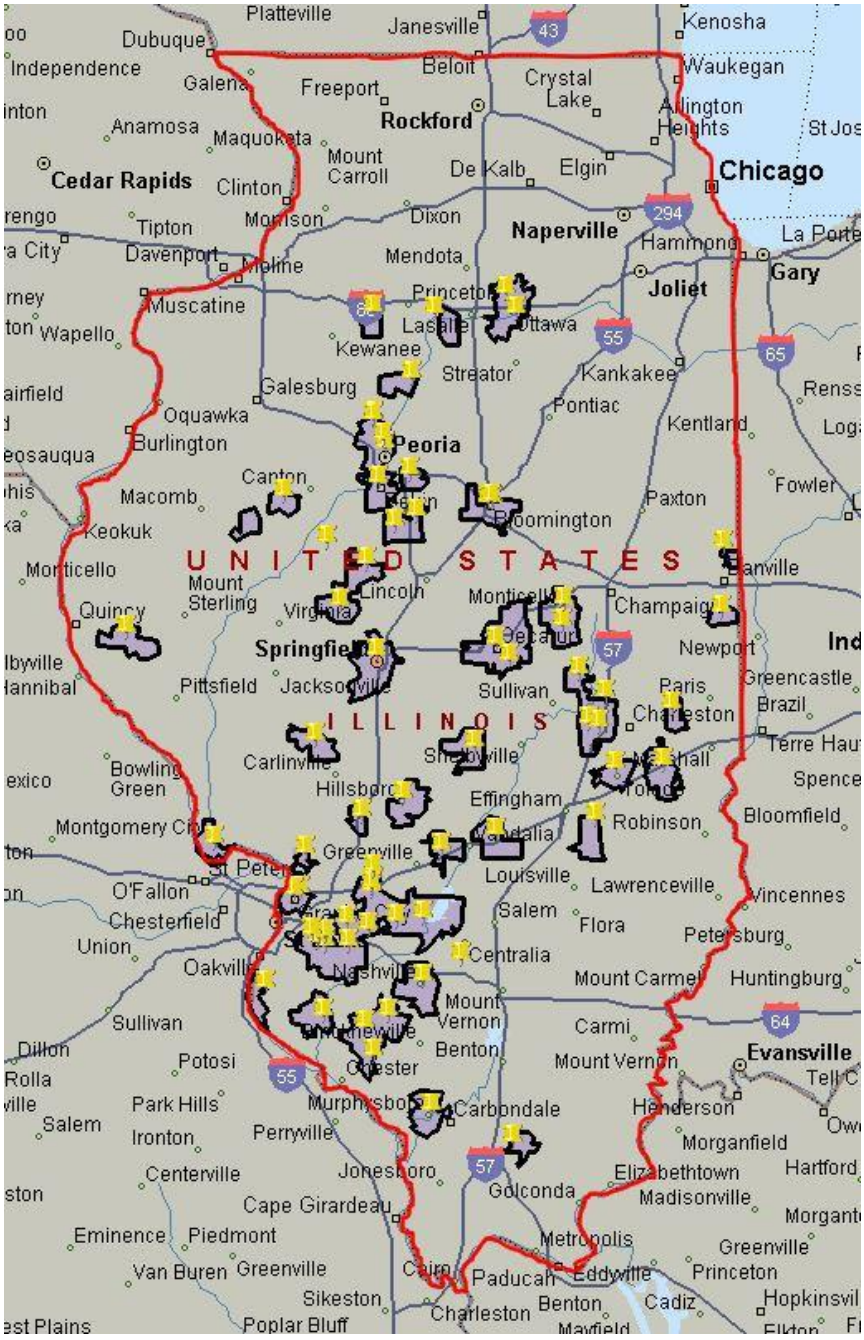
Implementation staff reported satisfaction with the PY9 participation levels, and program staff were pleased with having covered much of AIC's service territory and reaching schools that had not participated in the past year or two. The implementer expressed some concern with meeting its goals within the shorter transition period timeframe. The implementer also noted that because most of the program's recruitment occurs early in the program year, it may experience some difficulties staying with its reduced budget.

In PY9, the program implementer reported performing 213 presentations in 71 schools (out of approximately 250 eligible schools within AIC's service territory),[7] presenting at the school locations shown in Figure 1.[8]

[7] The implementer listed one school—Shepherd Middle School, Ottawa—two times in its report, for a total of 72 schools. This is likely because the implementer scheduled presentations on two separate dates. In total, the evaluation team identified 71 schools with different addresses as having had participated in the program during PY9.

[8] Source: CLEAResult's report to Leidos. File name: "Student Energy Education Kit Program Year End 2016-2017.pdf."

Figure 1. PY9 School Presentation Distribution



In its PY8 evaluation report, the evaluation team recommended AIC develop participation targets to extend the program's reach to new schools. The evaluation team also suggested the implementer conduct targeted outreach to rural school administrators to reach underserved regions within the territory. The implementer said that finding and retaining new schools, particularly in rural areas, is a consistent challenge, but that it followed this recommendation by increasing its direct outreach to rural administrators. The implementer reported it was extremely successful in re-engaging schools that had participated before PY8 and in recruiting new schools in PY9.

The evaluation team reviewed the list of participating schools from PY6 through PY9. The team found of the 71 schools CLEAResult recruited in PY9, 32 (44%) had not previously participated in the program, 23 (33%) had participated in one previous program year (PY6-PY8), nine (13%) had participated in two previous program years, and seven schools (10%) have participated since the program began in PY6. Of the schools that participated in previous program years, nine (23%) did not participate in PY8 but re-engaged with the program in PY9.

To determine whether the program is reaching rural areas of the service territory, the evaluation team also assessed the city population for each participating school. The evaluation team found that 49 of the 71 participating schools (69%), and 23 of the 32 schools (72%) new to the program in PY9, are located in a city with a population under 10,000.[9]

Program presenters and participating teachers encouraged students to install the kit's contents and to complete the activity sheet with a parent after taking their kits home. Using information collected from the activity sheet, students completed the implementer-administered, web-based student participant survey in the classroom. The two schools with the highest response rates to the implementer's online student survey received $250 gift cards from the program for their efforts. These two schools each had 41 and 52 participating students, compared to an average of 104 students per participating school.[10]

Program staff also encouraged the school's primary contact to complete an online satisfaction survey, and 35 of the 71 schools submitted responses to the implementer's teacher survey. All respondents (100%, n=35) reported that the kits arrived on time, and 97% found the presentations relevant. The majority of respondents (91%, n=35) provided contact information to participate in the program in PY9.[11]

3.2.6 Implementer's Student Participant Survey

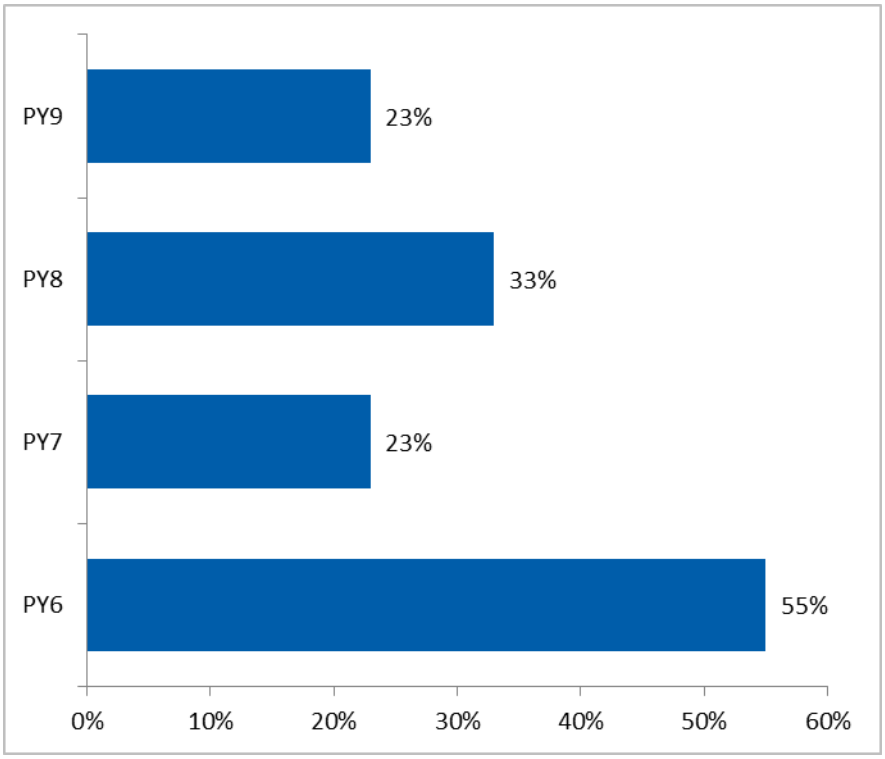
The evaluation team analyzed data from the implementer-administered web-based student participant surveys to assess installation rates, applying the installation rates to program participation totals to estimate program savings for PY9. In total, 1,706 of 7,499 (23%) reported participants in the school-based program returned surveys. The response rate for the PY9 participant surveys dropped from the 33% PY8 response rate, while the survey's availability or incentives offered did not appear to change. Response rates from PY6 through PY9 are shown in Figure 2.

[9] Source: U.S. Census estimates for 2016: https://www.census.gov/data/tables/2016/demo/popest/total-cities-and-towns.html

[10] According to CLEAResult's Year End PY9 report, the two winning schools achieved 95% and 100% survey response rates.

[11] Source: CLEAResult's report to Leidos. File name: "Student Energy Education Kit Program Year End 2016-2017.pdf."

Figure 2. AIC Student Survey Response Rate by Program Year



As part of the PY8 evaluation, the evaluation team recommended that AIC encourage increased response rates using several tactics:

- Revise incentives for student survey completions, from offering incentives to schools with the highest response rates to teachers who achieve the highest or improved response rates
- Collect the contact information for all participating teachers, rather than communicating with a single point of contact within each school
- Suggest to teachers they use the activity sheet and corresponding survey as a homework assignment

The implementer said that that it typically awards a gift card to the winning teacher, who then has the option to turn it over to the school. It also attempts to collect contact information for any participating teacher. The implementer said it did not make changes to the rules around the incentive because the timing of this recommendation did not align with the revisions to PY9 program materials, but it was open to considering these changes in future program operations. The implementer said it follows up with teachers on multiple occasions, but it did not take any specific actions to encourage teachers to require students to complete the activity sheet and survey.

3.2.7 Communications and Cooperation

The implementation team used a number of processes to ensure ongoing and effective communication. First, CLEAResult implementation staff held meetings with program partners (Leidos, EFI, and, on occasion, AIC) every two weeks to review issues, goals, progress, and upcoming events. CLEAResult and Leidos provided AIC with monthly reports of program activity regarding presentations, kit delivery, student and teacher survey

responses, and budget goals. Finally, CLEAResult management regularly met with the presenters to ensure consistent delivery and an efficient travel schedule. All interviewees reported that these scheduled meetings worked well in updating everyone on activities and promptly resolving any issues.

EFI and CLEAResult also had communication protocols and program checks in place to ensure that they delivered the correct number of kits to schools on time. Importantly, the presenter always brought a few extra kits to the school, in case the number of students changed since scheduling the presentation.

Program staff identified consistent planning and implementation communications as the reasons for their successful working relationships. AIC and Leidos staff reported a thorough understanding of program activities, and they expressed satisfaction with the involvement level afforded them. Implementation staff also noted the program's checklist for teachers (which included standardized e-mail communications) as an effective element in conveying the program's process and expectations.

3.3 Impact Assessment

3.3.1 Gross Impacts

The evaluation team used results from the implementer-administered, web-based student participant survey to estimate installation rates for kit items, except for the CFL measures (which, as discussed, used the prescribed value in IL-TRM V5.0). Table 11 lists reported ex ante and evaluated ex post installation rates[12] for each kit measure used in the electric and gas savings calculations. The ex-ante savings calculations produced by the implementer used installation rates derived from the PY7 participant survey and reported in the PY7 School Kits report.

Table 11. PY9 School Kits Program Installation Rates

Measure	Reported Ex Ante Installation Rate	Evaluated Ex Post Installation Rate
13-watt CFL	61%	61%
1.0 GPM Bath Faucet Aerator	41%	28%
2.0 GPM Kitchen Faucet Aerator	43%	29%
1.75 GPM High-Efficiency Shower Head	46%	28%
Hot Water Temperature Card Thermometer	23%	16%

Gross Electric Impacts

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

[12] Rates developed from the implementer-administered web-based student participant survey, collected as part of the PY9 School Kits Program evaluation.

Table 12. PY9 School 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
13-watt CFL	25.2	26.8	0.003	0.003
1.0 GPM Bath Faucet Aerator	17.0	18.2	0.007	0.025
2.0 GPM Kitchen Faucet Aerator	137.6	132.4	0.058	0.032
1.75 GPM High-Efficiency Shower Head	171.6	175.2	0.018	0.019
Hot Water Temperature Card Thermometer	81.6	81.6	0.009	0.009

Based on reported program participation and ex post savings values, the program achieved total gross electric savings of 681 MWh and demand savings of 0.121 MW. Table 13 shows ex ante and ex post gross electric and demand impacts. For non-CFL measures, realization rates less than 100% are mainly due to ex ante installation rates being higher than ex post installation rates.

Table 13. PY9 School Kits Program Ex Ante and Ex Post Gross Electric Impacts

Measure	Reported Ex Ante Installation Rate	Ex Ante Gross Impacts		Reported Measures[a]	Evaluated Installation Rate[b]	Verified Measures[c]	Ex Post Gross Impacts		Gross Realization Rate[d]	
		MWh	MW				MWh	MW	MWh	MW
13-watt CFL	61%	231	0.025	14,998	61%	9,149	245	0.024	106%	99%
1.0 GPM Bath Faucet Aerator	41%	29	0.012	4,124	28%	1,155	21	0.029	73%	242%
2.0 GPM Kitchen Faucet Aerator	43%	244	0.103	4,124	29%	1,196	158	0.039	65%	37%
1.75 GPM High-Efficiency Shower Head	46%	326	0.034	4,124	28%	1,155	202	0.022	62%	65%
Hot Water Temperature Card Thermometer	23%	77	0.009	4,124	16%	660	54	0.006	70%	70%
Total*	**49%**	**907**	**0.183**	**31,496**	**42%**	**13,314**	**681**	**0.121**	**75%**	**66%**

* Totals may not sum due to rounding.

[a] Based on the implementer-administered, web-based student participant survey data, the evaluation team assumed that 55% of total, verified water-saving measures were installed in homes with electric water heating.

[b] Reported percentages are rounded from their true values.

[c] Differences between reported measures and verified measures resulted from the application of installation rates derived from the implementer-administered web-based student participant survey effort and the IL-TRM V5.0.

[d] Realization rates differing from 100% resulted from differences between ex ante and ex post installation rates and per-unit savings: gross realization rate equals ex post gross savings divided by ex ante gross savings.

The evaluation team received ex ante gross electric savings estimates from the implementer and compared them to the 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. The discrepancies for each program measure are addressed in the following descriptions:

- **CFLs:** The ex ante 13-watt CFL per-unit savings estimate of 25.2 kWh was slightly lower than the ex post per-unit savings estimate of 26.8 kWh, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit kWh savings estimate results from the implementer assuming 12.9% of homes had electric resistance heat and claimed an electric heating penalty, while the evaluation team followed IL-TRM V5.0'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.

- **Bath Faucet Aerators:** The ex ante bath faucet aerator per-unit savings estimate of 17.0 kWh is lower than the ex post per-unit savings estimate of 18.2 kWh, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit savings estimate results from the implementer using a single-family bath faucets per household value of 2.83, while the evaluation team use the 79% single-family / 21% multi-family customer population distribution from the 2013 *Market Potential Assessment*[13] to calculate a weighted average bathroom faucets per household value of 2.55.

  The ex ante bath faucet aerator per-unit demand savings estimate of 0.0027 kW is lower than the ex post per-unit savings estimate of 0.0255 kW, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit savings estimate results from the implementer using an "unknown" location single-family average recovery hours per faucet use value of 52 from IL TRM V5.0, while the evaluation team used the 79% single-family / 21% multi-family customer population distribution in conjunction with the SF/MF bathroom-specific average recovery hours per faucet use values to calculate a weighted average value of 16.

  The lower overall ex post gross savings is a result of differences in installation rates used for ex post and ex ante gross savings. Ex ante savings used an in-service rate (ISR) of 41%,[14] while the evaluation team used the bath faucet aerator-specific ISR of 28%, calculated from the implementer-administered, web-based student participant survey, in accordance with the PY9 AIC Evaluation Plan.

- **Kitchen Faucet Aerators:** The ex ante kitchen faucet aerator per-unit savings estimate of 137.6 kWh is higher than the ex post per-unit savings estimate of 132.4 kWh, calculated in accordance with the IL-TRM V5.0. The higher ex ante per unit savings estimate results from the implementer using a people per household value of 2.56, while the evaluation team use the 79% single-family / 21% multi-family customer population distribution from the 2013 *Market Potential Assessment* to calculate a weighted average people per household value of 2.46.

  The ex ante bath faucet aerator per-unit demand savings estimate of 0.0582 kW is higher than the ex post per-unit savings estimate of 0.0322 kW, calculated in accordance with the IL-TRM V5.0. The higher ex ante per unit demand savings estimate results from the implementer using an "unknown" location single-family average recovery hours per faucet use value of 52 from IL TRM V5.0, while the evaluation team used the 79% single-family / 21% multi-family customer population distribution in

[13] EnerNOC Utility Solutions Consulting. *Ameren Illinois Energy Efficiency Market Potential Assessment. Report Number 1404. Volume 2: Market Research.* June 10, 2013. Available online: http://ilsagfiles.org/SAG_files/Potential_Studies/Ameren/Appendix%204_AIC%20DSM%20Potential%20Study%202013%20Volume%202%20Market%20Research.docx

[14] PY7 School Kits Participant Survey results.

conjunction with the SF/MF kitchen-specific average recovery hours per faucet use values to calculate a weighted average value of 90.

The lower overall ex post gross savings is also result of differences in installation rates used for ex post and ex ante gross savings. Ex ante savings used an ISR of 43%,[15] while the evaluation team used the bath faucet aerator-specific ISR of 29%, calculated from the implementer-administered, web-based student participant survey, in accordance with the PY9 AIC Evaluation Plan.

- **Shower Heads:** The ex ante shower head per-unit savings estimate of 171.6 kWh is lower than the ex post per-unit savings estimate of 175.2 kWh, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit savings estimate results from the implementer using a single-family showers per household value of 1.79, while the evaluation team use the 79% single-family / 21% multi-family customer population distribution from the 2013 *Market Potential Assessment*[16] to calculate a weighted average showers per household value of 1.69.

  The ex ante showerhead per-unit demand savings estimate of 0.0179 kW is lower than the ex post per-unit savings estimate of 0.0190 kW, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit savings estimate results from the implementer using single-family location average recovery hours per faucet use value of 266 from IL TRM V5.0, while the evaluation team used the 79% single-family / 21% multi-family customer population distribution in conjunction with the SF/MF specific average recovery hours per faucet use values in IL-TRM V5.0 to calculate a weighted average value of 256.

  The lower overall ex post gross savings is a result of differences in installation rates used for ex post and ex ante gross savings. Ex ante savings used an ISR of 46%,[17] while the evaluation team used the bath faucet aerator-specific ISR of 28%, calculated from the implementer-administered, web-based student participant survey, in accordance with the PY9 AIC Evaluation Plan.

- **Hot Water Temperature Card Thermometers:** The team found no issues with ex ante water heater temperature card thermometer per-unit calculations.

  The lower overall ex post gross savings is a result of differences in installation rates used for ex post and ex ante gross savings. Ex ante savings used an ISR of 23%,[18] while the evaluation team used the bath faucet aerator-specific ISR of 16%, calculated from the implementer-administered, web-based student participant survey, in accordance with the PY9 AIC Evaluation Plan.

In addition to gross savings achieved from measure installations in PY9, the evaluation team calculated gross savings from delayed CFL installations, per the IL-TRM V5.0. In particular, the IL-TRM V5.0 assumed consumers would install 86% of kit CFLs within three years. Table 14 shows savings from bulbs provided to participants in PY9 and realized in PY9, as well those to be applied to June 1 2017 through May 31, of 2019 while considering the change in program periods that begins starting June 1, 2017.

[15] PY7 School Kits Participant Survey results.

[16] EnerNOC Utility Solutions Consulting. *Ameren Illinois Energy Efficiency Market Potential Assessment. Report Number 1404. Volume 2: Market Research.* June 10, 2013. Available online: http://ilsagfiles.org/SAG_files/Potential_Studies/Ameren/Appendix%204_AIC%20DSM%20Potential%20Study%202013%20Volume%202%20Market%20Research.docx

[17] PY7 School Kits Participant Survey results.

[18] PY7 School Kits Participant Survey results.

Table 14. Yearly Gross Impact of PY9 Residential Lighting Measures by Assumed Installation Year

Measure	Energy (MWh)			Demand (MW)		
	PY9	Future Year 1	Future Year 2	PY9	Future Year 1	Future Year 2
13-watt CFL	245	52	44	0.024	0.005	0.004
Total	**245**	**52**	**44**	**0.024**	**0.005**	**0.004**

The evaluation team will include future savings in corresponding future evaluation reports.

The evaluation team credited the PY9 School Kits Program with the PY7 School Kits Program's 54 MWh gross energy savings and 0.006 MW gross demand savings derived from delayed CFL installations realized in PY9.[19] The evaluation team applied these savings (as described in the Net Impacts section) by multiplying the gross savings by the PY7 School Kits CFL-specific NTGR of 0.85 to arrive at 53 MWh net energy savings and 0.005 MW net demand savings for PY7 delayed CFL installations realized in PY9.

The evaluation team credited the PY9 School Kits Program with the PY8 School Kits Program's 47 MWh gross energy savings and 0.005 MW gross demand savings derived from delayed CFL installations realized in PY9.[20] The evaluation team applied these savings (as described in the Net Impacts section) by multiplying the gross savings by the PY8 School Kits CFL-specific NTGR of 0.83 to arrive at 39 MWh net energy savings and 0.004 MW net demand savings for PY8 delayed CFL installations realized in PY9.

Gross Gas Impacts

Table 15 lists the reported ex ante and evaluated ex post per-unit gas savings. The difference between ex ante and ex post per-unit gross savings is relatively small.

Table 15. PY9 School 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	0.9	0.8
2.0 GPM Kitchen Faucet Aerator	5.6	5.9
1.75 GPM High-Efficiency Shower Head	7.3	7.8
Hot Water Temperature Card Thermometer	3.5	3.6

To estimate gas savings associated with the program, the evaluation team applied a 55% gas water heater saturation rate (based on the implementer-administered, web-based student participant survey data) to verified installations of energy kit measures. 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 team used those to calculate the ex ante gross population therm savings shown in Table 16.

[19] Delayed 13-watt installations by PY7 School Kits Program participants, estimated as installed during PY9 (in accordance with IL--TRM V3.0), were credited to the final PY9 School Kits Program net impacts.

[20] Delayed 13-watt installations by PY8 School Kits Program participants, estimated as installed during PY9 (in accordance with IL--TRM V4.0), were credited to the final PY9 School Kits Program net impacts.

Based on verified program participation, the School Kits Program achieved total gross gas energy savings of 15,784 therms. Table 16 shows ex ante and ex post gross gas impacts. Realization rates less than 100% are due to ex ante installation rates being higher than ex post installation rates.

Table 16. PY9 School Kits Program Ex Ante and Ex Post Gross Gas Impacts

Measure	Reported Ex Ante Installation Rate	Ex Ante Gross Impacts (therms)	Reported Measures[a]	Evaluated Installation Rate	Verified Measures[b]	Ex Post Gross Impacts (therms)	Gross Realization Rate[c]
1.0 GPM Bath Faucet Aerator	41%	1,181	3,375	28%	945	762	65%
2.0 GPM Kitchen Faucet Aerator	43%	8,133	3,375	29%	979	5,744	71%
1.75 GPM High-Efficiency Shower Head	46%	11,406	3,375	28%	945	7,333	64%
Hot Water Temperature Card Thermometer	23%	2,714	3,375	16%	540	1,946	72%
Total*	**38%**	**23,434**	**13,498**	**25%**	**3,408**	**15,784**	**67%**

* Totals may not sum due to rounding.
[a] Based on the implementer-administered web-based student participant survey data, the evaluation team assumed 50% of total verified water-saving measures were installed in homes with gas water heating.
[b] Difference between reported measures and verified measures resulted from the application of installation rates derived from the implementer-administered web-based student participant survey effort and the IL-TRM V5.0.
[c] Realization rates other than 100% resulted from differences between ex ante and ex post installation rates and per-unit savings. Reported results have been rounded. Gross realization rate equals ex post gross savings divided by 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 ex ante and ex post gross per-unit savings assumptions and installation rates. Discrepancies for each program measure are addressed in the following descriptions:

- **Bath Faucet Aerators:** The ex ante bath faucet aerator per-unit savings estimate of 0.9 therms is slightly higher than the ex post per-unit savings estimate of 0.8 therms, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit savings estimate partially results from implementer using a single-family bath faucets per household value of 2.83, while the evaluation team use the 79% single-family / 21% multi-family customer population distribution from the 2013 *Market Potential Assessment*[21] to calculate a weighted average bathroom faucets per household value of 2.55.

  The higher ex ante per unit savings estimate also results from the implementer using a "unknown" aerator-specific energy per gallon of hot water supplied by gas value of 0.00394, while the evaluation team used the 79% single-family / 21% multi-family customer population distribution from the 2013 *Market Potential Assessment* in conjunction with the SF/MF specific energy per gallon of hot water supplied by gas values in IL-TRM V5.0 to calculate a weighted average energy per gallon of hot water supplied by gas value of 0.00357.

[21] EnerNOC Utility Solutions Consulting. *Ameren Illinois Energy Efficiency Market Potential Assessment. Report Number 1404. Volume 2: Market Research.* June 10, 2013. Available online: http://ilsagfiles.org/SAG_files/Potential_Studies/Ameren/Appendix%204_AIC%20DSM%20Potential%20Study%202013%20Volume%202%20Market%20Research.docx

The lower overall ex post gross savings is a result of differences in installation rates used for ex post and ex ante gross savings. Ex ante savings used an ISR of 41%,[22] while the evaluation team used the bath faucet aerator-specific ISR of 28%, calculated from the implementer-administered, web-based student participant survey, in accordance with the PY9 AIC Evaluation Plan.

- **Kitchen Faucet Aerators:** The ex ante kitchen faucet aerator per-unit savings estimate of 5.6 therms is lower than the ex post per-unit savings estimate of 5.9 therms, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit savings estimate results from the implementer using a "unknown" aerator-specific energy per gallon of hot water supplied by gas value of 0.00394, while the evaluation team used the 79% single-family / 21% multi-family customer population distribution from the 2013 *Market Potential Assessment* in conjunction with the SF/MF specific energy per gallon of hot water supplied by gas values in IL-TRM V5.0 to calculate a weighted average energy per gallon of hot water supplied by gas value of 0.00429.

  The lower overall ex post gross savings is also a result of differences in installation rates used for ex post and ex ante gross savings. Ex ante savings used an ISR of 43%,[23] while the evaluation team used the kitchen faucet aerator-specific ISR of 29%, calculated from the implementer-administered, web-based student participant survey, in accordance with the PY9 AIC Evaluation Plan.

- **Shower Heads:** The ex ante shower head per-unit savings estimate of 7.3 therms is lower than the ex post per-unit savings estimate of 7.8 therms, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit savings estimate results from the implementer using a single-family showers per household value of 1.79, while the evaluation team use the 79% single-family / 21% multi-family customer population distribution from the 2013 *Market Potential Assessment*[24] to calculate a weighted average showers per household value of 1.69.

  The lower overall ex post gross savings is a result of differences in installation rates used for ex post and ex ante gross savings. Ex ante savings used an ISR of 46%,[25] while the evaluation team used the shower head-specific ISR of 28%, calculated from the implementer-administered web-based student participant survey, in accordance with the PY9 AIC Evaluation Plan.

- **Hot Water Temperature Card Thermometers:** The ex ante hot water temperature card thermometer per-unit savings estimate of 3.5 therms is lower than the ex post per-unit savings estimate of 3.6 therms, calculated in accordance with the IL-TRM V5.0. The lower ex ante per unit savings estimate results from the implementer using a single-family recovery efficiency of gas hot water heater value of 0.78, while the evaluation team used the 79% single-family / 21% multi-family customer population distribution from the 2013 *Market Potential Assessment* in conjunction with the SF/MF specific recovery efficiency of the gas hot water heater value in IL-TRM V5.0 to calculate a weighted average recovery efficiency of gas hot water heater value of 0.76.

  The lower overall ex post gross savings is a result of differences in installation rates used for ex post and ex ante gross savings. Ex ante savings used an ISR of 23%,[26] while the evaluation team used the

[22] PY7 School Kits Participant Survey results.

[23] PY7 School Kits Participant Survey results.

[24] EnerNOC Utility Solutions Consulting. *Ameren Illinois Energy Efficiency Market Potential Assessment. Report Number 1404. Volume 2: Market Research.* June 10, 2013. Available online: http://ilsagfiles.org/SAG_files/Potential_Studies/Ameren/Appendix%204_AIC%20DSM%20Potential%20Study%202013%20Volume%202%20Market%20Research.docx

[25] PY7 School Kits Participant Survey results.

[26] PY7 School Kits Participant Survey results.

hot water temperature card thermometer-specific ISR of 16%, calculated from the implementer-administered web-based student participant survey, in accordance with the PY9 AIC Evaluation Plan.

3.3.2 Net Impacts

The evaluation team used SAG-approved NTGRs to estimate net program savings.

Net Electric Impacts

The program achieved total net electric and demand savings of 657 MWh and 0.120 MW, respectively, based on the following: verified program participation, IL-TRM V5.0 deemed per-unit gross savings inputs, installation rates in accordance with the PY9 AIC Evaluation Plan, and SAG-approved NTGRs. Table 17 shows net electric savings results by measure. Additionally, the evaluation team included the PY7 and PY8 School Kits Program net CFL savings, realized in PY9, which brought the totals to 741 MWh and 0.129 MW.[27]

Table 17. PY9 School Kits Program Total 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 Net Savings Realized in PY9 (MWh)	PY7 Ex Post Net Savings Realized in PY9 (MW)	PY8 Ex Post Net Savings Realized in PY9 (MWh)	PY8 Ex Post Net Savings Realized in PY9(MW)	PY9 Ex Post Savings (MWh)	PY9 Ex Post Savings (MW)
13-watt CFL	192	0.020	204	0.020	46	0.005	39	0.004	267	0.026
1.0 GPM Bath Faucet Aerator	30	0.013	22	0.031	0	0	0	0	22	0.031
2.0 GPM Kitchen Faucet Aerator	254	0.107	165	0.040	0	0	0	0	165	0.040
1.75 GPM High-Efficiency Shower Head	342	0.036	212	0.023	0	0	0	0	212	0.023
Hot Water Temperature Card Thermometer	77	0.009	54	0.006	0	0	0	0	54	0.006
Total*	**895**	**0.185**	**657**	**0.120**	**46**	**0.005**	**39**	**0.004**	**741**	**0.129**
Net Realization Rate[a]			73%	65%					**83%**	**70%**

* Totals may not sum due to rounding.
[a] Net realization rate equals ex post net savings divided by ex ante net savings

Table 18 shows the gross and net savings associated with CFLs distributed in PY9 and installed in PY9 as well as the gross and net savings associated with CFLs distributed in PY7 and PY8, but installed during PY9.

[27] Delayed 13-watt installations by PY7 and PY8 School Kits Program participants, estimated to have been installed during the PY9 program year, have been credited to final PY9 School Kits Program net impacts.

Table 18. PY8 School Kits Program Total Savings Claimed for CFL Measures by Program Year

Program Year	Reported CFLs Distributed	First Year Installation Rate	Second Year Installation Rate	Third Year Installation Rate	CFLs Installed in PY9	Ex Post Gross Per-Unit kWh	Ex Post Gross Per-Unit kW	Ex Post Gross Impacts kWh	Ex Post Gross Impacts kWh	NTGR	Ex Post Net Impacts kWh	Ex Post Net Impacts kW
PY9	14,998	61%	-	-	9,149	26.8	0.0027	245,442	24	0.83	203,717	20
PY8	15,078	-	13%	-	1,960	24.0	0.0023	47,034	5	0.83	39,038	4
PY7	15,294	-	-	11%	1,682	29.7	0.0031	49,916	6	0.85	42,429	5
Total								**342,392**	**35**	**0.83**	**285,184**	**29**

The program achieved total net gas savings of 16,411 therms, based on verified program participation, IL-TRM V5.0 deemed per-unit gross savings inputs, installation rates calculated in accordance with the PY9 AIC Evaluation Plan, and SAG-approved NTGRs. Table 19 shows net gas savings results by measure.

Table 19. PY9 Total Program Net Gas Savings by Measure

Measure	Ex Ante Net Savings (therms)	Ex Post Net Savings (therms)
1.0 GPM Bath Faucet Aerator	1,228	792
2.0 GPM Kitchen Faucet Aerator	8,458	5,973
1.75 GPM High-Efficiency Shower Head	11,976	7,699
Hot Water Temperature Card Thermometer	2,714	1,946
Total*	**24,376**	**16,411**
Net Realization Rate[a]		**67%**

* Totals may not sum due to rounding.
[a] Net realization rate equals ex post net savings divided by ex ante net savings.

4. Conclusions and Recommendations

The PY9 School Kits Program delivered 7,499 kits to students, one short of its 7,500-kit goal. Of the 71 participating schools, the implementer successfully recruited 32 new schools in PY9, the program's fourth year. Most teachers completing the implementer's teacher survey expressed interest in participating in the program in the future. AIC, Leidos, and CLEAResult program staff coordinated planning and implementation efforts, frequently communicating throughout the program year. During the evaluation team's process review, utility and implementation staff reported that they were highly satisfied with PY9 program performance. Stakeholders also reported that operations ran smoothly, without significant issues.

Based on this research, the evaluation team provides the following key findings and recommendations:

- **Key Finding #1:** The implementer-administered web-based student participant survey response rate decreased from 33% in PY8 to 23% in PY9. This remains lower than the 55% response rate for PY6, though consistent with the 23% in PY7. Student response rates typically depend on teachers' encouragement levels and associated completion requirements. As student survey data directly informs program impacts (e.g., installation rates and water heater saturations), it is important to encourage increased response rates to capture more-accurate savings calculations.
  - **Recommendation:** Consider revising incentives for student survey completions. Instead of providing incentives to teachers or schools with the best response rates, provide incentives to individual teachers whose classroom (i.e., students) meet a minimum response rate. For teachers who have participated in the past, consider offering incentives for improved response rates. A tiered incentive—$20 for returning any surveys, $50 for returning 50% of a classroom's surveys, and $100 for returning 80% of a classroom's surveys—may also increase response rates. The tiered incentive as described would increase the incentive budget from $500 to $1820, based on the PY9 results; however, presuming even higher response rates, we recommend an even higher incentive budget.
  - **Recommendation:** Program staff could revise delivery tactics to increase response rates (e.g., e-mailing teachers directly to remind them to complete the student survey activity or encouraging teachers to consider using the activity worksheet and installations as homework assignments).
- **Key Finding #2:** As recommended in the PY8 evaluation report, the program implementer worked with the evaluation team to update the parent letter and the parent postcards to obtain permission to collect additional information useful in assessing program free-ridership. AIC and the implementer also coordinated a second edit to the postcard, which included a chance for households to win a gift card for responding to request for contact information, and web link to the free-ridership survey to encourage parents to take the survey on their own. However, household response rates remained low, and AIC, Leidos, CLEAResult, and the evaluation team revised the process in time for the launch of the transition period offering. This time, the team eliminated the parent postcard, only providing a web link to the survey in the parent letter, and adjusted the gift card drawing to be awarded to teachers whose classrooms have the strongest response rates.
  - **Recommendation:** Monitor the process for obtaining household survey responses to ensure the evaluation team reaches its quota (n=70) for desired confidence and precision levels. If the response rate remains low, consider reinstating the postcard into the kit to increase visibility, or consider adjusting the program's activity sheet and student participant online survey to collect the additional NTGR information.

Key Finding #3: Realization rates less than 100% for non-CFL measures are due to ex ante installation rates being higher than ex post installation rates. The non-CFL ex-ante savings calculations produced by the implementer used installation rates derived from the PY7 participant survey and reported in the PY7 School Kits report. The evaluation team used results from the PY9 implementer-administered web-based student participant survey to estimate installation rates for non-CFL measures.

- **Recommendation:** Calculate future ex ante savings using the PY9 ex post installation rates presented in this report.

Appendix A. School Kits Program Assumptions and Algorithms

Compact Fluorescent Lights

The evaluation team used the following equations from the IL-TRM V5.0 to estimate energy and demand savings for CFLs.

Equation 1. ENERGY STAR CFL Energy Algorithm

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

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 20 list the assumptions the evaluation team used to estimate ex post savings for the 13-watt CFL measure.

Table 20. Ex Post Assumptions for ENERGY STAR CFL

Parameter	Value	Units	Notes/Reference
$Watts_{base}$	43	watts	Base watts incandescent equivalent (IL-TRM V5.0)
$Watts_{EE}$	13	watts	Actual wattage of CFL installed
1,000	1,000	W/kW	Conversion factor
ISR	61%	N/A	Installation rate (IL-TRM V5.0) – School Kits. Evaluation team applied the 61% ISR to reported measures distributed and did not apply any ISR to the per-unit savings values reported in the evaluation report.
Hours	847	Hours	IL-TRM V5.0 – Unknown installation location
WHFe	Single Family: 1.06 Multifamily: 1.04	N/A	Waste heat factor (WHF) for energy (IL TRM V5.0). The evaluation team used single family/multifamily values in conjunction with the 79% single family/21% multifamily customer population distribution from the 2013 Market Potential Assessment[a] to calculate a weighted average waste heat factor for energy of 1.056.
WHFd	Single Family: 1.11 Multifamily: 1.07	N/A	WHF for demand (IL TRM V5.0). The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average waste heat factor for demand of 1.102.
CF	8.1%	N/A	Summer peak coincidence factor (IL-TRM V5.0).

[a] EnerNOC Utility Solutions Consulting. *Ameren Illinois Energy Efficiency Market Potential Assessment. Report Number 1404. Volume 2: Market Research.* June 10, 2013. Available online: http://ilsagfiles.org/SAG_files/Potential_Studies/Ameren/Appendix%204_AIC%20DSM%20Potential%20Study%202013%20Volume%202%20Market%20Research.docx

Lighting Measures Heating Penalty

The evaluation team determined heating penalties for different heating fuel types using the algorithms below. Based on the agreement between the Illinois Commerce Commission and AIC, the team did not include heating penalties in the ex post energy savings but will include this in the data for the PY9 cost-effectiveness analysis. The team followed the IL TRM V5.0 direction and assumed that all homes are heated by natural gas (since information on the heating fuel of customers' homes is not available). Thus, we calculated only a natural gas–heating penalty.

Equation 3. Electric Heating Penalty Algorithm

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

Equation 4. Natural Gas Heating Penalty Algorithm

$$\Delta therms = \left(\left(\frac{Watts_{base} - Watts_{EE}}{1{,}000}\right) \times ISR \times Hours \times HF \times 0.03412\right) \div nHeat$$

Where:

WattsBase = Wattage of existing equipment (see Table 20)

WattsEE = Wattage of installed CFLs (see Table 20)

ISR = In-service rate, or the percentage of units rebated that get installed (see Table 20)

Hours = Annual operating hours (see Table 20)

HF = Heating factor (= 0.49)

ηHeat = Efficiency of heating equipment (see Table 21)

Table 23 shows the deemed efficiency of heating equipment values from IL TRM V5.0.

Table 21. PY9 School Kit Program ηHeat for Lighting Heating Penalties

Measure	ηHeat	Units
Heat Pump (Before 2006)	2.00	COP
Heat Pump (2006–2014)	2.26	COP
Heat Pump (2015 and Beyond)	2.40	COP
Electric Resistance	1.00	COP
Natural Gas Heating	0.70	AFUE

COP = Coefficient of performance
AFUE = Annual fuel utilization efficiency

Table 22 summarizes heating penalties for the program lighting measures by heating equipment type.

Table 22. PY9 School Kit Program Per-Measure Heating Fuel Penalties for CFL Lighting

Heating Equipment	Measure	ΔkWh	Δtherms
Electric Resistance Heating	13-Watt CFL	0	N/A
Natural Gas Heating	13-Watt CFL	N/A	-0.61

Bathroom and Kitchen Faucet Aerators

The evaluation team used the following equations from the IL-TRM V5.0 to estimate energy and demand savings for faucet aerators.

Equation 5. 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 6. 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 7. Faucet Aerator Demand Algorithm

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

Table 23 provides assumptions used to estimate ex post savings for bathroom faucet aerators.

Table 23. Ex Post Assumptions for Bathroom Faucet Aerators

Parameter	Value	Units	Notes/Reference
%ElectricDHW	100%	N/A	In accordance with the PY9 Evaluation Plan, we used the PY9 implementer-administered web-based student participant survey data to estimate an electric and gas water heater saturation rates. 55% of program measures were installed in residences with electric water heating and 45% 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 V5.0)
GPM_{low}	0.94	gal/min	Low case flow (IL-TRM V5.0)
L_{base}	1.6	min/day	Base case use length (IL-TRM V5.0)
L_{low}	1.6	min/day	Low case use length (IL-TRM V5.0)
Household	Single family: 2.56 Multifamily: 2.10	# of people	Average number of people per household (IL TRM V5.0). The evaluation team used single family/multifamily values in conjunction with the 79% single family/21% multifamily customer population distribution from the 2013 *Market Potential Assessment* to calculate a weighted average people per household value of 2.46.

Parameter	Value	Units	Notes/Reference
365.25	365.25	Average days in a year	Days in a year, on average (IL-TRM V5.0)
DF	90%	Percent	Drain factor (IL-TRM V5.0) – 'Bath'
FPH	Single Family: 2.83 Multifamily: 1.50	Faucets per household	Bath faucets per household (IL TRM V5.0). The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average for bathroom faucets per household value of 2.55.
EPG_electric	0.0795	kWh/gal	Energy per gallon of hot water supplied by electricity (IL-TRM V5.0) – Bath
EPG_gas	Single Family: 0.00341 Multifamily: 0.00397	Therm/gal	Energy per gallon of hot water supplied by gas (IL-TRM V5.0) Bath. The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average energy per gallon of hot water supplied by natural gas value of 0.00353.
ISR	28%	N/A	Evaluation team applied the 28% ISR calculated from the PY9 implementer-administered web-based student participant survey data, in accordance with the PY9 School 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	Single Family: 14 Multifamily: 22	Hours/Year	Annual electric water heating recovery hours for faucet use per faucet (IL TRM V5.0 "Bathroom"). The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average recovery hours per faucet value of 16.
CF	0.022	N/A	Coincidence Factor for electric load reduction (IL-TRM V5.0)

Table 24 provides assumptions used to estimate ex post savings for kitchen faucet aerators.

Table 24. Ex Post Assumptions for Kitchen Faucet Aerators

Parameter	Value	Units	Notes/Reference
%ElectricDHW	100%	N/A	In accordance with the PY9 Evaluation Plan, we used the PY9 implementer-administered web-based student participant survey data to estimate an electric and gas water heater saturation rates. 55% of program measures were installed in residences with electric water heating and 45% 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 V5.0)
GPM_{low}	0.94	gal/min	Low case flow (IL-TRM V5.0)
L_{base}	4.5	min/day	Base case use length (IL-TRM V5.0)
L_{low}	4.5	min/day	Low case use length (IL-TRM V5.0)
Household	Single family: 2.56 Multifamily: 2.10	# of people	Average number of people per household (IL TRM V5.0). The evaluation team used single family/multifamily values in conjunction with the 79% single family/21% multifamily customer population distribution from the 2013 *Market Potential Assessment* to calculate a weighted average people per household value of 2.46.

Parameter	Value	Units	Notes/Reference
365.25	365.25	Average days in a year	Days in a year, on average (IL-TRM V5.0)
DF	75%	Percent	Drain factor (IL-TRM V5.0) – 'Bath'
FPH	1.0	Kitchen faucets per household	Kitchen faucets per household (IL-TRM V5.0).
EPG_electric	0.0969	kWh/gal	Energy per gallon of hot water supplied by electricity (IL-TRM V5.0) – 'Kitchen'
EPG_gas	Single Family: 0.00415 Multifamily: 0.00484	Therm/gal	Energy per gallon of hot water supplied by natural gas (IL TRM V5.0 "Kitchen"). The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average energy per gallon of hot water supplied by natural gas value of 0.00429.
ISR	29%	N/A	Evaluation team applied the 29% ISR calculated from the PY9 implementer-administered web-based student participant survey data, in accordance with the PY9 School 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	Single Family: 94 Multifamily: 77	Hours/Year	Annual electric water heating recovery hours for faucet use per faucet (IL TRM V5.0 "Kitchen"). The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average recovery hours per faucet value of 90.
CF	0.022	N/A	Coincidence Factor for electric load reduction (IL-TRM V5.0)

Shower Heads

The evaluation team used the following equations from the IL-TRM V5.0 to estimate energy and demand savings for shower heads.

Equation 8. 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 9. 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 10. Shower Head Demand Algorithm

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

Table 25 provides assumptions used to estimate ex post savings for shower heads.

Table 25. Ex Post Assumptions for Shower Heads

Parameter	Value	Units	Notes/Reference
%ElectricDHW	100%	N/A	In accordance with the PY9 Evaluation Plan, we used the PY9 implementer-administered web-based student participant survey data to estimate an electric and gas water heater saturation rates. 55% of program measures were installed in residences with electric water heating and 45% 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}	2.35	gal/min	Base case flow (IL-TRM V5.0)
GPM_{low}	1.75	gal/min	Actual case flow
L_{base}	7.8	min/day	Base case use length (IL-TRM V5.0)
L_{low}	7.8	min/day	Low case use length (IL-TRM V5.0)
Household	Single family: 2.56 Multifamily: 2.10	# of people	Average number of people per household (IL TRM V5.0). The evaluation team used single family/multifamily values in conjunction with the 79% single family/21% multifamily customer population distribution from the 2013 *Market Potential Assessment* to calculate a weighted average people per household value of 2.46.
SPCD	0.6	Showers per capita per day	Showers per capita per day (IL-TRM V5.0)
365.25	365.25	Average days in a year	Days in a year, on average (IL-TRM V5.0)
SPH	Single family: 1.79 Multifamily: 1.30	Shower Heads per household	Shower heads per household (IL TRM V5.0). The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average shower heads per household value of 1.69.
EPG_electric	0.117	kWh/gal	Energy per gallon of hot water supplied by electricity (IL-TRM V5.0)
EPG_gas	Single Family: 0.00501 Multifamily: 0.00583	Therm/gal	Energy per gallon of hot water supplied by natural gas (IL TRM V5.0). The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average energy per gallon of hot water supplied by natural gas value of 0.00518.
ISR	28%	N/A	Evaluation team applied the 28% ISR calculated from the PY9 implementer-administered web-based student participant survey data, in accordance with the PY8 School 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	Single Family: 266 Multifamily: 218	Hours/Year	Annual electric water heating recovery hours for shower head use (IL TRM V5.0 “EE Kits”). The evaluation team used the 79% single family/21% multifamily customer population distribution to calculate a weighted average recovery hours per faucet value of 256.
CF	0.0278	N/A	Coincidence Factor for electric load reduction (IL-TRM V5.0)

Hot Water Temperature Card Thermometer

The evaluation team used the following equations from the IL-TRM V5.0 to estimate energy and demand savings for hot water temperature card thermometers.

Equation 11. Hot Water Temperature Card Thermometer Electric Energy Algorithm

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

Equation 12. Hot Water Temperature Card Thermometer Gas Energy Algorithm

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

Equation 13. Hot Water Temperature Card Thermometer Demand Algorithm

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

Table 26 provides assumptions used to estimate ex post savings for hot water temperature card thermometers.

Table 26. Ex Post Assumptions for Hot Water Temperature Card Thermometers

Parameter	Value	Units	Notes/Reference
%ElectricDHW	100%	N/A	In accordance with the PY9 Evaluation Plan, we used the PY9 implementer-administered web-based student participant survey data to estimate an electric and gas water heater saturation rates. 55% of program measures were installed in residences with electric water heating and 45% 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 V5.0)
A	24.99	Square Feet	Surface area of storage tank (IL-TRM V5.0)
T_{pre}	135	Degrees °F	Deemed hot water set point prior to adjustment (IL-TRM V5.0)
T_{post}	120	Degrees °F	Deemed new hot water set point (IL-TRM V5.0)
Hours	8,766	Hours	Number of hours in a year
3412	3412	N/A	Conversion from Btu to kWh (IL-TRM V5.0)
RE_electric	0.98	kWh/gal	Recovery efficiency of electric hot water heater (IL-TRM V5.0)
RE_gas	Single Family: 0.78 Multifamily: 0.67	Therm/gal	Recovery efficiency of gas water heater (IL-TRM V5.0). The evaluation team used single family/multifamily values in conjunction with the 79% single family/21% multifamily customer population distribution from the 2013 *Market Potential Assessment* to calculate a weighted average recovery efficient of gas water heater value of 0.757.

Parameter	Value	Units	Notes/Reference
ISR	16%	N/A	Evaluation team applied the 16% ISR calculated from the PY9 implementer-administered web-based student participant survey data, in accordance with the PY9 School 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 V5.0)

Appendix B. Cost-Effectiveness Inputs

Heating Penalty

Efficient-lighting products generate less waste heat than 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 heating,[28] a figure used in analyzing program cost-effectiveness.

Heating Penalty Results

In addition to the gross gas-heating penalty from measure installations in PY9, the evaluation team calculated the gross gas-heating penalty from delayed CFL installations, per the IL-TRM V5.0. In particular, the IL-TRM V5.0 assumed consumers would install 86% of kit CFLs within three years. Table 27 shows the gross gas-heating penalty resulting from efficient lighting installations provided to participants in PY9 and realized in PY9, as well those in future years, given later installations.

Table 27. Yearly Gross Heating Penalty Impact of Lighting Measures by Assumed Installation Year

Measure	Heating Penalty (therms)		
	PY9	Future Year 1	Future Year 2
13-Watt CFL	-5,552	-1,183	-1,001
Total	**-5,552**	**-1,183**	**-1,001**

The evaluation team will include the future year heating penalty in future evaluation reports. Table 28 shows the gross gas impacts for cost-effectiveness inputs.

Table 28. Gross Gas Impacts

Measure	Gross Gas Impacts (Therms)		
	PY9	Future Year 1	Future Year 2
13-watt CFL	-5,552	-1,183	-1,001
1.0 GPM Bath Faucet Aerator	762	—	—
2.0 GPM Kitchen Faucet Aerator	5,744	—	—
1.75 GPM High-Efficiency Shower Head	7,333	—	—
Hot Water Temperature Card Thermometer	1,946	—	—
Total	**11,802**	**-982**	**-831**

[28] The evaluation team followed IL-TRM V5.0'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.

Table 29 shows the net gas impacts for cost-effectiveness inputs.

Table 29. Net Gas Impacts

Measure	Gross Gas Impacts (Therms)		
	PY9	Future Year 1	Future Year 2
13-watt CFL	-4,608	-982	-831
1.0 GPM Bath Faucet Aerator	792	—	—
2.0 GPM Kitchen Faucet Aerator	5,973	—	—
1.75 GPM High-Efficiency Shower Head	7,699	—	—
Hot Water Temperature Card Thermometer	1,946	—	—
Total	**11,802**	**-982**	**-831**

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