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Ameren Illinois Company Electric & Gas Residential, and Commercial and Industrial Energy Efficiency Portfolios – PY7 Summary Evaluation Report

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1. Executive Summary

This report presents the evaluation results from the seventh program year (PY7) of the Ameren Illinois Company (AIC) portfolio of commercial and industrial (C&I) and residential energy efficiency programs,¹ which ran from June 1, 2014 through May 31, 2015. In this document, we provide the integrated portfolio results for PY7, as well as the detailed findings for each program as appendices.

During PY7, AIC offered three programs for C&I customers and nine programs for residential customers. The portfolio of residential and C&I programs included the following:

- Residential
 - Lighting
 - Heating and Cooling (HVAC)
 - Home Energy Reports (Behavioral Modification)²
 - Appliance Recycling
 - Multifamily In-Unit³
 - Home Efficiency Program – Standard (HEP-S)
 - Home Efficiency Program – Income Qualified (HEP-IQ)
 - ENERGY STAR® New Homes (ES New Homes)
 - School Kits
- Commercial and Industrial (C&I)
 - Standard
 - Custom
 - Retro-Commissioning (RCx)

The subsequent sections of this report present high-level findings from the evaluation of the PY7 programs. We also provide context around AIC's portfolio savings goals and resources, as well as an overview of the evaluation approaches employed.

¹ For simplicity, this report refers to the period of study as PY7. However, the June 2014 to May 2015 program year is composed of Electric Program Year 7 (EPY7) and Gas Program Year 4 (GPY4).

² AIC offers the gas portion of the Behavioral Modification Program while the Illinois Power Agency (IPA) offers the electric portion of the program. This evaluation plan contains information pertaining to evaluation of gas impacts of the Behavioral Modification program, covered under Section 8-104.

³ In addition to the AIC Multifamily Program, the IPA offers a Multifamily Program focused on common areas and major measures.

1.1 Overall Portfolio Results

At the portfolio level, the AIC programs exceeded their filed savings goals for PY7 achieving 275,565 net MWh and 6,515,201 net therms.⁴ As Table 1 illustrates, the net realization rates for the entire portfolio are 141% for MWh and 143% for therms. Table 2 and Table 3 present ex ante gross, ex post gross, and ex post net savings for each program. For additional detail regarding PY7 savings, including lifetime savings, program costs, and participation, see Appendix A.

Program performance as measured against the filed program goals was extremely strong in many cases in both the residential and C&I sector. In particular, the performance of the Residential Lighting Program was a large driver of PY7 electric savings, achieving 31% of the planned portfolio goal as compared to the planned 11%. The C&I Custom Program also performed much better than expected against both electric and gas goals – on the electric side, the C&I Custom Program achieved savings equaling 44% of the portfolio electric goal and 48% of the portfolio gas goal (compared to the planned 17% and 20% respectively).

Table 1. AIC PY7 Portfolio Ex Post Net Impacts Compared to Planned Net Impacts

Program	Planned Impacts ^a		Ex Post Net Impacts		Realization Rate ^b	
	MWh	Therms	MWh	Therms	MWh	Therms
Residential Portfolio						
Lighting	22,426	-	61,326	-	2.73	-
Behavioral Modification	21,688	1,337,500	33,194	1,754,669	1.53	1.31
Appliance Recycling	4,476	-	4,693	-	1.05	-
HVAC	5,314	-	5,062	-	0.95	-
Multifamily	6,232	118,961	8,306	239,163	1.33	2.01
HEP-S	5,018	814,804	3,075	429,412	0.61	0.53
HEP-IQ	1,194	219,987	873	210,250	0.73	0.96
ENERGY STAR New Homes	791	25,663	457	51,376	0.58	2.00
School Kits	366	48,298	532	63,726	1.45	1.32
<i>Residential Total</i>	<i>67,503</i>	<i>2,565,214</i>	<i>117,519</i>	<i>2,748,596</i>	<i>1.74</i>	<i>1.07</i>
Commercial Portfolio						
Standard	60,073	950,625	62,828	1,368,915	1.05	1.44
Custom	33,108	891,260	87,017	2,185,563	2.63	2.45
Retro-Commissioning	17,075	133,681	8,201	212,127	0.48	1.59
Large C&I	18,199	-	-	-	-	-
<i>Commercial Total^c</i>	<i>128,455</i>	<i>1,975,567</i>	<i>158,046</i>	<i>3,766,605</i>	<i>1.23</i>	<i>1.91</i>
AIC Portfolio Total	195,958	4,540,780	275,565	6,515,201	1.41	1.43

^a Source: AIC Compliance Filing, p. 7-8, Docket 13-0498 (Filed January 28, 2014). [Accessed: <https://www.icc.illinois.gov/downloads/public/edocket/367603.pdf>]

^b The realization rate = ex post net impacts ÷ planned impacts.

^c Note that the total may not equal the sum of the values in the column due to rounding.

⁴ AIC's goals are at the portfolio level. The utility does not have to meet program-specific goals.

Table 2. AIC PY7 Portfolio MWh Savings Results

Program	Ex Ante Gross MWh	Gross Realization Rate ^a	Ex Post Gross MWh	NTGR ^b	Ex Post Net MWh
Residential Portfolio					
Lighting	74,412	1.62	120,274	0.51	61,326
Behavioral Modification	33,194	1.00	33,194	1.00	33,194
Appliance Recycling	8,219	1.00	8,222	0.57	4,693
HVAC	7,193	1.00	7,176	0.71	5,062
Multifamily	9,453	0.98	9,232	0.90	8,306
HEP-S	3,446	0.99	3,419	0.90	3,075
HEP-IQ	881	0.99	873	1.00	873
ENERGY STAR New Homes	732	0.78	571	0.80	457
School Kits	653	0.90	591	0.90	532
<i>Residential Total</i>	<i>138,183</i>	<i>1.33</i>	<i>183,552</i>	<i>0.64</i>	<i>117,519</i>
Commercial Portfolio					
Standard	79,198	1.00	79,170	0.79	62,828
Custom	122,424	0.93	114,021	0.76	87,017
Retro-Commissioning	10,175	0.84	8,543	0.96	8,201
<i>Commercial Total</i>	<i>211,797</i>	<i>0.95</i>	<i>201,734</i>	<i>0.78</i>	<i>158,046</i>
AIC Portfolio Total	349,980	1.10	385,286	0.72	275,565

^a The ratio of ex post gross energy savings to ex ante gross energy savings.

^b Please note that these NTGRs are program-level, and may differ from SAG-approved values applied at the end-use level.

Table 3. AIC PY7 Portfolio Therm Savings Results

Program	Ex Ante Gross Therms	Gross Realization Rate ^a	Ex Post Gross Therms	NTGR ^b	Ex Post Net Therms
Residential Portfolio					
Behavioral Modification	1,754,669	1.00	1,754,669	1.00	1,754,669
Multifamily	318,372	0.89	282,248	0.85	239,163
HEP-S	494,797	1.06	524,885	0.82	429,412
HEP-IQ	179,940	1.17	210,250	1.00	210,250
ENERGY STAR New Homes	52,120	1.23	64,220	0.80	51,376
School Kits	86,910	0.76	65,619	0.97	63,726
<i>Residential Total</i>	<i>2,886,808</i>	<i>1.01</i>	<i>2,901,891</i>	<i>0.95</i>	<i>2,748,596</i>
Commercial Portfolio					
Standard	1,527,538	1.00	1,527,408	0.90	1,368,915
Custom	1,937,083	1.51	2,930,082	0.75	2,185,563
Retro-Commissioning	226,171	0.99	223,292	0.95	212,127
<i>Commercial Total</i>	<i>3,690,792</i>	<i>1.27</i>	<i>4,680,782</i>	<i>0.80</i>	<i>3,766,605</i>
AIC Portfolio Total	6,577,600	1.15	7,582,673	0.86	6,515,201

^a The ratio of ex post gross energy savings to ex ante gross energy savings.

^b Please note that these NTGRs are program-level, and may differ from SAG-approved values applied at the end-use level.

2. Overview of the AIC Portfolio

The PY7 AIC portfolio had energy savings goals of approximately 196 GWh and 4.5 million therms. Note that AIC’s goals are at the portfolio level and to increase the likelihood of achieving the portfolio goals, AIC has the ability to shift resources across all programs.

Table 3 presents the AIC energy goals by program.

Table 3. AIC PY7 Portfolio Planned Savings by Program^a

Program	TRC	MWh	Therms
Residential Portfolio			
Residential Lighting	2.5	22,426	-
Behavioral Modification	1.3	21,688	1,337,500
Appliance Recycling	1.1	4,476	-
HVAC	1.2	5,314	-
Multifamily	2.0	6,232	118,961
HEP-S	1.2	5,018	814,804
HEP-IQ	1.2	1,194	219,987
ENERGY STAR New Homes	1.3	791	25,663
School Kits	1.4	366	48,298
<i>Residential Total</i>	<i>1.5</i>	<i>67,503</i>	<i>2,565,214</i>
Commercial Portfolio			
Standard	3.2	60,073	950,625
Custom	4.1	33,108	891,260
Retro-Commissioning	2.1	17,075	133,681
Large C&I	5.6	18,199	-
<i>Commercial Total</i>	<i>3.8</i>	<i>128,455</i>	<i>1,975,567</i>
AIC Portfolio Total	2.3	195,958	4,540,780

^a Note that while AIC has required electricity and gas savings goals, there is no statutory requirement for demand goals.

AIC’s planned costs for the PY7 portfolio totaled just under \$45 million. Table 4 provides the costs by program.

Table 4. AIC PY7 Portfolio Planned Costs by Program^a

Program	PY7 Planned Program Cost (\$ Millions)
Residential Portfolio	
Residential Lighting	\$6,351,096
Behavioral Modification	\$656,259
Appliance Recycling	\$1,583,161
HVAC	\$3,186,470
Multifamily	\$1,061,851
HEP-S	\$4,064,512
HEP-IQ	\$966,933
ENERGY STAR New Homes	\$655,381
School Kits	\$115,375
<i>Residential Total</i>	<i>\$18,641,038</i>
Commercial Portfolio	
Standard	\$10,504,921
Custom	\$7,137,404
Retro-Commissioning	\$1,882,077
<i>Commercial Total</i>	<i>\$19,524,402</i>
Other Costs	
AIC Portfolio Admin Costs	\$1,921,679
AIC EM&V Costs	\$1,340,706
AIC Education Costs	\$960,839
AIC Marketing Costs	\$960,839
Emerging Technologies	\$1,340,706
AIC Portfolio Total	\$44,690,209

^a Source: AIC Compliance Filing, p. 7-8, Docket 13-0498 (Filed January 28, 2014).

[Accessed: <https://www.icc.illinois.gov/downloads/public/edocket/367603.pdf>]

3. Evaluation Approach

The PY7 evaluation plan served as the foundation for the evaluation activities conducted. The evaluation approach included both program- and non-program-specific activities, including efforts to support the Illinois Statewide Technical Reference Manual for Energy Efficiency (IL-TRM) process. The team implemented all aspects of the evaluation plan for PY7. Table 5 provides a summary of the evaluation activities performed by the team. Detailed information about the data collection activities and analyses performed for each program is included in Appendix B.

Table 5. PY7 Evaluation Activities and Type of Assessment

Evaluation Activity	Residential									Commercial		
	Lighting	Behavioral Modification	ARP	HVAC	Multifamily	HEP-S	HEP-IQ	ES New Homes	School Kits	Standard	Custom	RCx
Program Material & Data Review	✓ All programs											
Program Manager and Implementer Interviews	✓ All programs											
Market Actor Interviews ^a			✓	✓	✓	✓	✓	✓		✓	✓	✓
Participant Survey		✓			✓					✓	✓	✓
Non-Participant Survey		✓			✓					✓	✓	✓
Predictive & Multilevel Modeling		✓				✓						
Market Assessment and Characterization					✓			✓				
Ex Post Gross Impact Analysis												
Application of the IL-TRM	✓		✓	✓	✓	✓	✓		✓	✓		
M&V Site Visits											✓	✓
Billing Analysis		✓										
REM/Rate Simulation								✓				
Ex Post Net Impact Analysis												
Application of SAG Approved NTGR	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Retrospective Application of Researched NTGR ^b										✓	✓	
Performed NTGR Research for Prospective Use	✓ Residential non-participant spillover									✓		

^a Program allies, retailers, or other market actors.

^b Applied offering-specific researched NTGR for Competitive Large Incentive Project (CLIP) Custom projects. Applied project-specific researched NTGR for projects associated with a Staffing Grant in certain cases.

In addition to the activities outlined above, the evaluation team conducted a number of non-program-specific activities. We provide an overview of each activity below.

- **IL-TRM Efforts.** Throughout PY7, the evaluation team reviewed documents and measure protocols submitted to the Stakeholder Advisory Group (SAG) by the Vermont Energy Investment Corporation (VEIC), and, as necessary, provided comments. In addition, we participated in a NTG Methodology Working Group tasked with developing protocols for NTG research across the utilities.

- **Coordination with Illinois Utilities.** As part of the evaluation planning process and as needed throughout the program year, the evaluation team consulted with their counterparts supporting evaluation efforts for other utilities in the state. These discussions helped to identify similarities and differences in approach, as well as to inform ongoing discussions of the NTGR framework and its application.
- **Cost-Effectiveness Analysis.** The team is preparing model inputs of evaluated program savings as determined through the evaluation effort for AIC. As needed, the team will also audit AIC's cost-effectiveness analysis based on this year's program results. This may include a review of AIC's assumptions for avoided costs, discount rates, measure cost information, administrative costs, and other relevant data.

4. Program-Level Results

4.1 Residential Lighting

AIC's Residential Lighting Program (hereafter "Residential Lighting Program") has as its aim the eventual transformation of the residential lighting market in AIC territory. The objective of the program is to increase residential customers' awareness and use of ENERGY STAR® (ES) lighting products by providing discounts and by undertaking marketing and outreach efforts at participating retailers, community events, and on the AIC website. The discounts offered by the program and its retail and manufacturing partners bring the cost of ES lighting closer to that of less-efficient options. They encourage customers who are reluctant to pay full price for ES lighting to choose energy-efficient over standard lighting. During its seven years, the program has discounted 21,127,632 energy efficient light bulbs and fixtures.

Opinion Dynamics evaluated the Residential Lighting Program during PY7. The PY7 program included providing discounts for the Standard CFL Retail Program and the Web Store Program, which sells standard CFLs, specialty CFLs, and LEDs.⁵ In addition, the Illinois Power Agency (IPA) offered discounts for the Specialty CFL Retail Program. Results from the IPA portion of the program are provided in a separate report. The program is implemented by Leidos and its subcontractors CLEAResult (formerly Conservation Services Group [CSG]) and Energy Federation, Incorporated (EFI).

These findings focus solely on the Standard CFL Retail Program and the Web Store Program, hereafter referred to as "the Residential Lighting Program." The expected savings from this program represent 12% of AIC's portfolio of electric savings and 0% of portfolio therm savings (including residential and commercial customers).

Program Impacts

The Residential Lighting Program sold 3,672,388 bulbs in PY7. This is slightly fewer bulbs than were sold in PY6 (3,809,406 total bulbs).⁶ Standard CFLs comprised almost all of the PY7 program sales (99.9%). LEDs (less than 1% of program sales) were not a focus of the program and were only sold through the on-line store. The Web store sold less than 1% of all bulbs sold through the program (Table 6).

⁵ Throughout this report, we use the program definition of standard versus specialty CFLs. A standard CFL is a spiral bulb that does not have any special functions. A specialty CFL has glass covering the spiral, can be dimmed, can function as a 3-way bulb, or has other special functions.

⁶ Reported PY6 sales are only standard CFLs sold through retail locations and web store sales. The IPA Residential Lighting program sold an additional 403,952 specialty CFLs in PY7. When looking at bulb sales through both the AIC and IPA programs, the vast majority of bulbs sold were standard CFLs (90%).

Table 6. Bulb Sales by Type and Sales Channel

Bulb Type	Markdown	Web Store	Total
Standard CFL	3,671,293	282	3,671,575
Specialty CFL	NA	333	333
LED	NA	480	480
Total	3,671,293	1,095	3,672,388

The carryover savings method outlined in the IL-TRM V3.0⁷ spreads program savings across the three years customers take to install all of the bulbs they purchase. As a result, PY7 savings come from bulbs customers *installed* in PY7 but which they may have *purchased* in PY5, PY6, or PY7. Because AIC funded all sales in PY5 and PY6, the evaluation team counted all carryover savings from these years within the Standard Lighting Program Evaluation. As shown in Table 7, the program achieved a net energy impact of 61,326 MWh and a net demand impact of 7.02 MW.

Table 7. PY7 Lighting Program Impact Summary

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	74,412	1.62	120,274	0.47 ^a , 0.83 ^b	61,326
Demand Savings (MW)					
Total MW	8.87	1.68	14.93	0.47 ^a , 0.83 ^b	7.54

^a NTGR = 0.47 for PY6 and PY7 purchases installed in PY7.

^b NTGR = 0.83 for PY5 purchases installed in PY7.

Ex post savings are different from ex ante savings due to the following methodological reasons:

- The program savings method uses an In-Service-Rate (ISR) of 1.00 for specialty bulbs sold through the online store, which assumes that 100% of bulbs purchased in PY7 are also installed in PY7. As recommended by the IL-TRM V3.0, we applied ISR values over three years: an ISR at or above 72.2% in the first year, and the remaining bulb installations distributed over the next two years. PY7 ex post gross savings also include savings from a portion of the PY5 and PY6 sales that, according to the TRM savings method, were not installed until PY7. Combined across these two components, both ex post gross energy savings (kWh) and ex post gross demand savings (kW) are 0.2% higher than ex ante gross savings due to the application of the carry over savings method.
- The program savings method uses different hours of use (HOU) than the IL-TRM V3.0 recommends. We applied the IL-TRM V3.0 HOU values for standard and LED bulbs. TRM HOU values for these bulb types are higher than those used in the programs savings method. As a result, ex post gross energy savings (MWh) and demand savings (MW) are 9.6% higher than ex ante gross savings.

⁷ Illinois Energy Efficiency Stakeholder Advisory Group. 2014 [February 24, 2014]. Illinois Statewide Technical Reference Manual for Energy Efficiency. *Version 3.0, Effective June 1, 2014*. 675 pp. Retrieved from <https://www.icc.illinois.gov/Electricity/programs/TRM.aspx>.

- The program database misclassified several bulbs, resulting in different base wattages for a small portion of bulbs (less than 0.02% of bulbs sold). Combined, ex post gross savings are about .01% higher than ex ante gross savings for both energy (MWh) and demand (MW).
- The program tracking data applied slightly different waste-heat values than the IL-TRM V3.0 recommends. As a result, ex post gross demand savings (MWh) are 0.7% higher and demand savings are 1.3% higher than ex ante gross savings.
- The program savings method uses different summer peak coincidence factors than the IL-TRM V3.0 recommends. Our evaluation team applied the TRM-recommended values to the evaluated demand savings. As a result, ex post gross demand savings (MW) are 23.8% lower than ex ante gross savings.
- The program savings methods do not account for in-store bulbs sold to non-AIC customers, nor for demand savings for either standard bulbs or specialty bulbs sold to non-AIC customers. We applied an overall leakage rate of 10.2%, which accounts for AIC-discounted bulbs sold to non-AIC customers as well as bulbs discounted by other utilities but purchased by AIC customers. As a result, ex post gross energy (kWh) is 0.9% higher than ex ante savings and demand (kW) savings are 10.2% higher than ex ante savings.

Key Findings and Recommendations

The Residential Lighting Program ran smoothly in PY7, and the program met its bulb sales goals. A program objective this year was to address the geographic challenges of reaching as many AIC customers as possible. Because AIC territory is large (est. 45,000 square miles) and predominantly rural, many customers live in areas where national big box chain stores are not prominent. To better reach these customers, program administrators increased the program's presence in retail channels that are more often available in rural communities, which includes farm stores, independent grocery stores, and small hardware stores. In PY7, these retailer types sold 297,922 program-discounted CFLs, which accounted for 13% of all program sales in PY7 compared to 3% in PY6.

The Residential Lighting Program's key marketing tactic in PY7 was placing point-of-purchase (POP) sales materials at participating retail stores. Program administrators worked with manufacturers and retail chains to develop store-specific materials designed to enhance consumer awareness of the AIC discount. To better show customers the value of per-product program savings, certain stores helped to develop POP materials that prominently compared program-incentivized prices with regular retail prices.

The program also uses its website⁸ as a marketing tool. In addition to providing an online store for discounted bulbs, the website is intended to increase customer awareness of the retail program. In particular, website materials list the schedule for lighting demonstrations held at participating retailers. The website also provides a zip code-based store search tool that enables customers to identify program stores near their home.

The program employs seven field representatives and assigns each the responsibility for specific stores across AIC territory. Field representatives visit participating retailers on a regular basis to ensure that retail staff properly display products and promotional materials, provide retailer training, and conduct customer

⁸ Website: <http://www.actonenergy.com/for-my-home/find-energy-efficient-products>

demonstrations and promotions. Field representatives held 92 in-store lighting demonstrations to promote the program and educate customers about CFLs.

In addition to territory responsibilities, a senior field representative also performs field leadership duties, including staff development and QA/QC auditing. Through in-store checkups, the objective of the QA/QC process is to ensure that field representatives are correctly implementing key program processes. When needed, the senior field representative provides suggestions to improve the program implementation process. Overall, each representative earned an average composite score above 92% out of 100% across each five-store review cycle indicating that field staff are implementing the program correctly.

Within this context, we make the following recommendations for program improvement.

- **Continue working to add additional farm store locations in rural AIC communities, with some refinements.** Experience in PY7 suggested farm stores are important retail locations for rural customers. By increasing the number of farm stores enrolled in the program, the program can enhance rural customer access to discounted bulbs. Continuing these efforts could help the program continue progress towards its goal of reaching all AIC customers. Recognizing that the program faces multiple needs, to reach many customers cost-effectively and with minimized risk of leakage it may help the program to study ways that the program can optimize its store enrollment decisions. Such an analysis would likely consider bulb sales per customer by location.
- **Increase program use of website and web store in meeting program goals and reducing leakage.** Although the web store contributed a relatively small share of total PY7 sales, it remains a valuable marketing and outreach tool. Continued online presence not only provides customers with direct retail opportunities, but also channels customers to retail locations near their homes. The website could be used for additional leverage in limiting leakage near territory borders and in reaching rural customers. For example, by shifting to an all-online program with targeted marketing and outreach in areas with relatively low customer density the program could better limit the sale of discounted bulbs to AIC customers.

4.2 Residential Home Energy Reports (Behavioral Modification)

AIC administers the Behavioral Modification Program as a part of its residential portfolio. AIC developed the program to reduce its residential customers' energy consumption; Leidos and Opower implement the program. Launched in August 2010, the program seeks to:

- Reduce energy consumption by encouraging energy-efficient behaviors.
- Boost customer engagement and education by helping customers understand energy efficiency and how to save energy in their homes.
- Educate customers about no-cost and low-cost energy-saving measures and behaviors.

In PY7, the program offered two treatment types: a hard copy home energy report (HER) mailed to the customer's home, and an online portal that customers can access to view the same report along with additional information. Below we present the key findings from the PY7 Behavioral Modification Program evaluation.

The Behavioral Modification Program reached about a third of AIC's approximately one million residential customers in PY7. Just under 320,000 participants received reports in PY7 (including both dual fuel and gas only customers), the majority of whom are in their fourth year with the program. PY7 introduced 100,796 new

participating residential customers in the form of Expansion Cohort 5 and Expansion Cohort 6 (see Table 8 and Table 9).

Program Impacts

In PY7, the program achieved adjusted net savings of 33,194 MWh and 1,754,669 therms (see Table 8 and Table 9). Adjusted net savings remove the energy savings that resulted from customer participation in other AIC programs.

Table 8. PY7 Behavioral Modification Program Electric Impact Summary

Cohort Name	Adjusted Net Savings (% per HH)	Adjusted Net kWh Savings (per HH)	Number of Customers Treated in PY7	Adjusted Net MWh Program Savings
Original Cohort	1.70%	199.0	37,243	7,410
Expansion Cohort 1	1.64%	214.6	56,788	12,189
Expansion Cohort 2	0.59%	57.9	85,893	4,975
Expansion Cohort 4	1.25%	212.8	25,506	5,429
Expansion Cohort 5	0.66%	50.7	62,996	3,192
Expansion Cohort 6	NA	NA	NA	NA
Total MWh^a	NA	125.3	268,426	33,194

^a Totals may not be exact, due to rounding.

Note: We did not calculate savings for Expansion Cohort 6 because insufficient (only one month) billing data is available.

Note: Number of customers treated in PY7 include customers who received at least one report in PY7.

Table 9. PY7 Behavioral Modification Program Gas Impact Summary

Cohort Name	Adjusted Net Savings (% per HH)	Adjusted Net Therm Savings (per HH)	Number of Customers Treated in PY7	Adjusted Net Therm Program Savings
Original Cohort	0.84%	8.8	37,243	326,486
Expansion Cohort 1	0.78%	9.8	56,788	553,906
Expansion Cohort 2	0.36%	3.6	85,893	308,592
Expansion Cohort 3	1.65%	13.9	13,621	189,279
Expansion Cohort 4	0.72%	5.7	25,506	145,498
Expansion Cohort 5	0.43%	3.7	62,996	230,907
Expansion Cohort 6	NA	NA	NA	NA
Total Therms^a	NA	5.9	282,047	1,754,669

^a Totals may not be exact, due to rounding.

Note: We did not calculate savings for Expansion Cohort 6 because insufficient (only one month) billing data is available.

Note: Number of customers treated in PY7 include customers who received at least one report in PY7.

Key Findings and Recommendations

The Behavioral Modification Program is achieving its stated goals to reduce energy consumption and educate customers about energy savings measures and behaviors. In PY7, the Behavioral Modification Program added two additional cohorts, made substantial changes to program operations (both in terms of administration and implementation), and achieved energy savings reductions across all cohorts.

One of the most notable results in PY7 was a decrease in energy savings from PY6 across most cohorts, likely due to a reduction in the total number of reports delivered to customers. However, we continue to find that participants, when compared to control group respondents, more frequently indicate that they have learned new ways to save energy in their homes and have read their utility bills to understand their home’s energy use in the past 12 months. This result shows that the program is achieving its goal of boosting customer engagement and education by helping participants to understand energy efficiency and save energy in their homes. The following recommendations for the program are based on the findings of our program evaluation:

- **Key Finding #1:** Behavioral Modification Program participants achieved 125 kWh and 5.88 therms per household per year. We calculated these values by dividing the total adjusted net program savings for the evaluated period by the total number of program participants for electricity and gas, respectively.
- **Recommendation:** For future program planning and goal setting, AIC might consider using the average savings estimates for kWh and therms over the evaluated period. Theoretically, AIC could multiply these averages by the planned number of future participants and produce estimates of the next program year’s anticipated electricity and gas savings. However, AIC should consider refining these values, using a predictive model, based on the baseline consumption of the new expansion cohort because the average savings estimates presented above do not account for key differences across cohorts by baseline consumption, fuel mix, and other demographic and household factors.

- **Key Finding #2:** High baseline consumption predicts high savings, but some high users can be persistent negative savers.
 - **Recommendation:** AIC should continue targeting future cohorts with the high consumption but stop, modify, or customize reports for participants who have significant increases in usage despite receiving home energy reports. Our multilevel modeling found that customers with significantly negative savings after receiving reports rarely improve to positive savings while continuing to receive the standard home energy report. Incorporating an experimental design into this effort is a simple and low-cost way to confirm that any differences in savings that result are attributable to the predictive model. If this recommendation is implemented, design the implementation effort to ensure the ability to assess the impacts associated with increases and decreases of report delivery (e.g., an experimental design).
- **Key Finding #3:** Reduction in reports may have contributed to lower energy savings reductions in PY7. Across all cohorts, with the exception of the gas only cohort (Expansion Cohort 3), energy savings declined when compared to PY6 (for both original and weather adjusted model results).
 - **Recommendation:** Consider the value of the cost reductions associated with fewer reports compared to higher energy savings with more frequent reports. It may be worthwhile to identify those customers who yield the highest savings and continue to send reports at a higher frequency, while reducing reports for negative or moderate savers. Tailoring report frequency could also involve a review of current summer average daily consumption to identify those customers with relatively higher savings potential. Further, it may be beneficial to understand the impacts of delivering less costly eHERs more frequently than paper HERs.⁹ If this recommendation is implemented, design the implementation effort to ensure the ability to assess the impacts associated with increases and decreases of report delivery (e.g., an experimental design).
- **Key Finding #4:** Survey results indicate that participants demonstrate higher understanding of their energy usage, but do not demonstrate increased uptake in energy efficiency actions and in some cases lower satisfaction with AIC overall. In particular, participants who have been in the program for a longer period of time may be less satisfied with energy reports. Those who received many reports may be experiencing ‘report fatigue’ and those joining the Aclara web-portal could be receiving conflicting messages. Either could be contributing to low satisfaction with AIC.
 - **Recommendation:** The Target Rank campaign was designed to provide tailored messaging to high baseline users who were dissatisfied with the report (particularly the normative comparisons). We recommend that AIC continue to identify opportunities to engage existing customers with the report, particularly as they may develop ‘report-fatigue’. Further, customers may be exposed to multiple and conflicting behavioral messaging (both HER and Aclara web-portal); future research efforts should seek to identify customers with each type of negative experience, toward understanding what the sources of dissatisfaction are.

4.3 Residential Appliance Recycling

The AIC Appliance Recycling Program (ARP) offers free recycling of refrigerators, freezers, and room air conditioners for residential and small commercial customers. AIC expected ARP—now in its seventh year of

⁹ This would cover only those customers who have an email address on record.

operation—to achieve approximately 5% of the electric savings for AIC’s overall residential portfolio in PY7 Leidos manages the program and oversees its advertising. Appliance Recycling Centers of America (ARCA), serving as a subcontractor, primarily markets and implements the program. This includes scheduling, pick up, and recycling as well as customer service.

Program Impacts

Table 10 summarizes the net electricity and demand savings from the PY7 ARP, which saved 4,693 MWh and 0.58 MW. The program achieved high gross and net realization rates as a result of the evaluation team’s application of the IL-TRM V3.0 algorithm to estimate savings along with the Stakeholder Advisory Group (SAG)-approved net-to-gross ratios (NTGR) for this program: the PY4 NTGR of 62% for freezers, the PY5 NTGR of 56% for refrigerators, and the PY5 Commonwealth Edison’s (ComEd) evaluation determination of 50% for room air conditioners.

Table 10. PY7 Appliance Recycling Program Impact Summary

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	8,219	1.00	8,222	0.57	4,693
Demand Savings (MW)					
Total MW	1.00	1.01	1.01	0.57	0.58

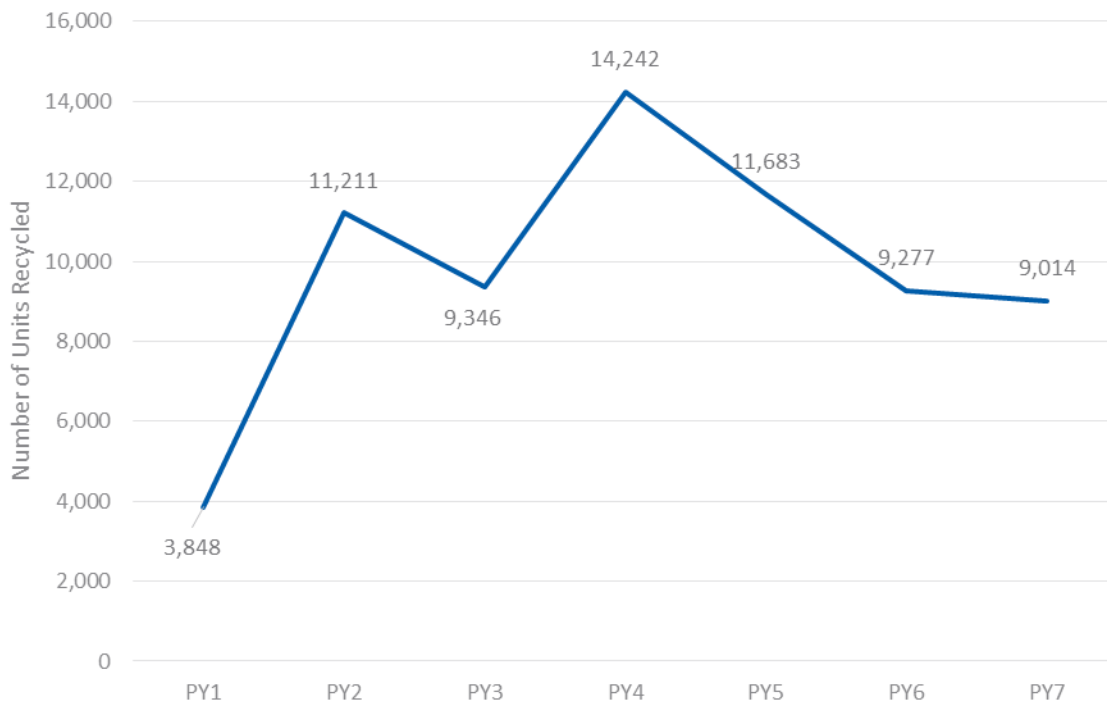
Note: As ex ante estimates were not provided in the tracking database, PY6 values were used for comparison.

Note: Ex post determined by applying NTGR and verified participation.

Program Participation

The program recycled 9,014 appliances in PY7, a decrease of 3% compared to PY6 (Figure 1). While the overall trend in decreasing participation continued from the program’s peak year of PY4, the number of recycled refrigerators and room air conditioners increased slightly over PY6.

Figure 1. Total Units Recycled by Program Year



Key Findings and Recommendations

The program exceeded its participation and energy savings goals in PY7 and maintained participation levels close to those in PY6. Based on the team’s PY7 evaluation activities, we present below the key findings and recommendations for the program:

- **Key Finding #1:** The current marketing plan appears sufficient to sustain participation and stop the decline observed in the prior two years. This was sufficient to meet program goals. However, if AIC is interested in increasing savings achieved by the ARP, it appears unlikely that AIC will be able to significantly increase ARP participation without expending significant effort. Focusing marketing efforts on increasing savings—rather than on increasing participation—may become an important factor in the ARP’s ability to meet future savings goals.
- **Recommendation:** In addition to general awareness marketing campaigns, AIC could consider increasing marketing strategies to target households with long-term active accounts, toward the goal of identifying homes with older units (on average). Older units produce higher-than-average savings, especially if manufactured before the early 1990s appliance efficiency standards. Combined with program implementers’ information on appliance ages in different regions of the service territory, such a targeted marketing strategy could yield higher per-unit savings by

increasing the proportion of older appliances recycled through the program. For example, a recent ARP study¹⁰ found that by targeting homes with accounts active for 10 years or more, the average age of appliances recycled through the program increased by 27% and gross per-unit savings increased by 19%.

- **Key Finding # 2:** The assumption that appliances younger than 10-years are re-sellable and those older are not, is still the most applicable criteria for use in freeridership calculations for small, local retailers. Smaller, local retailers that sell used appliances indicated some non-working units and many units older than 10 years may be sellable on the used appliance market (however some working units younger than 10 years may not be sellable). Retailers suggested that overall condition and potential repair costs also determine secondary market salability. These criteria, however, prove much more challenging to assess at pickup than using an “age” criteria.
- **Recommendation 2:** Given the challenge of identifying objective criteria to assess appliances that would sell in the secondary market, continue using the 10-year age cutoff as a reasonable estimate of an appliance’s secondary market viability.

4.4 Residential Heating and Cooling (HVAC)

In PY7, the AIC Residential Heating and Cooling Program (HVAC Program) offered customer incentives for purchases of brushless/electronically commutated motors (ECMs), air-source heat pumps (ASHPs), and central air conditioners (CACs).

The AIC HVAC Program registered program allies performed all equipment installations. Incentive levels varied according to equipment types and baseline efficiency levels. In PY7, AIC no longer offered incentives for gas furnaces, gas boilers, and ground-source heat pumps through the HVAC Program. Additionally, AIC introduced Leidos as the HVAC program implementer. CLEAResult (formerly Conservation Services Group [CSG]) continued to work with the program as an implementation subcontractor, under Leidos’ management.

Based on the evaluation activities, the evaluation team determined that AIC, Leidos, and CLEAResult implemented the HVAC Program effectively. This was despite changes to program implementation and offerings, a slow start in implementing the PY7 program changes, and the reintroduction of 14.5–15.99 SEER CAC equipment at the end of 2014. Leidos reported that with three companies (who do not have shared calendars or other ways to check each-other’s schedules), communication and turnaround could be slow, particularly while Leidos was settling into their new role.

Program Impacts

Table 11 summarizes the net electricity and demand savings from the PY7 HVAC Program, which includes 5,062 MWh and 2.0 MW. The evaluation team followed the IL-TRM V3.0 protocol and used reported equipment information to calculate unique savings values of every measure reported. The gross realization rates are not 100% because the reported ex ante savings are deemed for each measure type. Ex post results are based upon actual equipment sizes and local climate zones of the participants. The evaluation team determined net savings by applying measure-specific NTGRs agreed upon by the SAG.

¹⁰ Navigant Consulting Inc. 2012 EM&V Report for the Appliance Recycling Program. October 2013. Accessed December 12, 2014. <http://dms.psc.sc.gov/pdf/matters/EF1A5FFD-155D-141F-239A7CB4C326E7B7.pdf>

Table 11. PY7 HVAC Program Impact Summary

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	7,193	1.00	7,176	0.71	5,062
Demand Savings (MW)					
Total MW	3.58	0.81	2.91	0.7	2.03

Program Participation

AIC achieved participation of 6,248 measures through the PY7 HVAC Program, achieving 101% of the 6,168 target.

Key Findings and Recommendations

The evaluation team offers the following summary of conclusions and recommendations for AIC’s consideration:

- **Finding 1:** The significant changes made to the HVAC Program for (and during) PY7 created challenges for program staff and, according to CLEARResult, negatively impacted contractors.
 - Provide early communication and training across multiple mediums prior to rolling out program changes. This should help contractors feel confident moving into new program years.
- **Finding 2:** The program experienced delays in getting approval and publishing documents for the PY7 program changes. There are opportunities to improve the process of finalizing and distributing program materials.
 - To the extent possible, program staff should communicate program changes to trade allies well in advance and through multiple channels. Program staff should also plan ahead to streamline creation and dissemination of program documents.
 - AIC, CLEARResult, and Leidos should continue to improve materials, ensure consistency in messaging, remove old materials where possible, and provide distributors and other trade allies with new materials to hand out to contractors.
- **Finding 3:** Distributors noted contractors being hesitant to push for higher efficiency equipment, perhaps due to insufficient knowledge of sales techniques.
 - Increasing sales training to contractors would provide assistance in learning how to promote the benefits of efficient equipment to customers.
- **Finding 4:** Distributors represent an untapped resource for contractor outreach and dissemination of program information.
 - AIC should include distributors in all training sessions, outreach to contractors, and marketing efforts.
- **Finding 5:** Distributors expressed mixed opinions about the current mix of measures and incentives. While 100% of distributors felt AIC’s rebates were important in moving customers towards higher-SEER

units, 80% felt incentive levels were too low to effectively drive customers to higher-efficiency equipment.

- If budget and cost effectiveness allows, AIC and CLEAResult /Leidos should consider increasing incentives for higher tier equipment.

4.5 Residential Multifamily In-Unit

The AIC Multifamily Program was implemented in PY7 by implementation contractors Leidos and CLEAResult (formerly Conservation Services Group [CSG]). During PY7, multifamily program offerings in AIC service territory were split between the AIC Multifamily Program and another multifamily program sponsored by the Illinois Power Agency (IPA). While there was no change in program offerings from the customer perspective, the AIC Multifamily Program focused largely on implementing in-unit and common area direct installation projects while the IPA Multifamily Program completed the majority of major measure projects.¹¹

Measures offered through the direct installation component of the program include in-unit CFLs, faucet aerators, low-flow showerheads, programmable thermostats and common area lighting upgrades. Major measures (also referred to as shell measures) include air sealing and insulation. Program delivery also differs somewhat by program component. In general, the program implementer conducts outreach and recruitment of participants for the direct installation component of the program whereas for shell measures, program allies are responsible for generating leads and bringing customers into the program.

Aside from the addition of and coordination with the IPA Multifamily Program offering, the PY7 AIC Multifamily Program functioned much the same as in prior program years. Overall, AIC expected the program to contribute 2.4% of the overall PY7 portfolio's electric savings and 2.2% of the portfolio's gas savings.

Below we present the key findings from the PY7 Multifamily Program evaluation.

Impact Results

Table 12 summarizes the net electricity, demand and gas savings from the PY7 Multifamily Program, which are 8,306 MWh, 1.72 MW and 239,163 therms. The evaluation team verified all program measures through a database review process, and applied the same NTGRs as the implementation team. As such, differences between ex ante and ex post gross savings calculations are generally driven by variances in savings for lighting, programmable thermostats and low-flow showerheads, which account for between 14% and 46% of program savings.

¹¹ The evaluation team provides results from the evaluation of the IPA Multifamily Program in a separate report.

Table 12. PY7 Multifamily Program Impact Summary

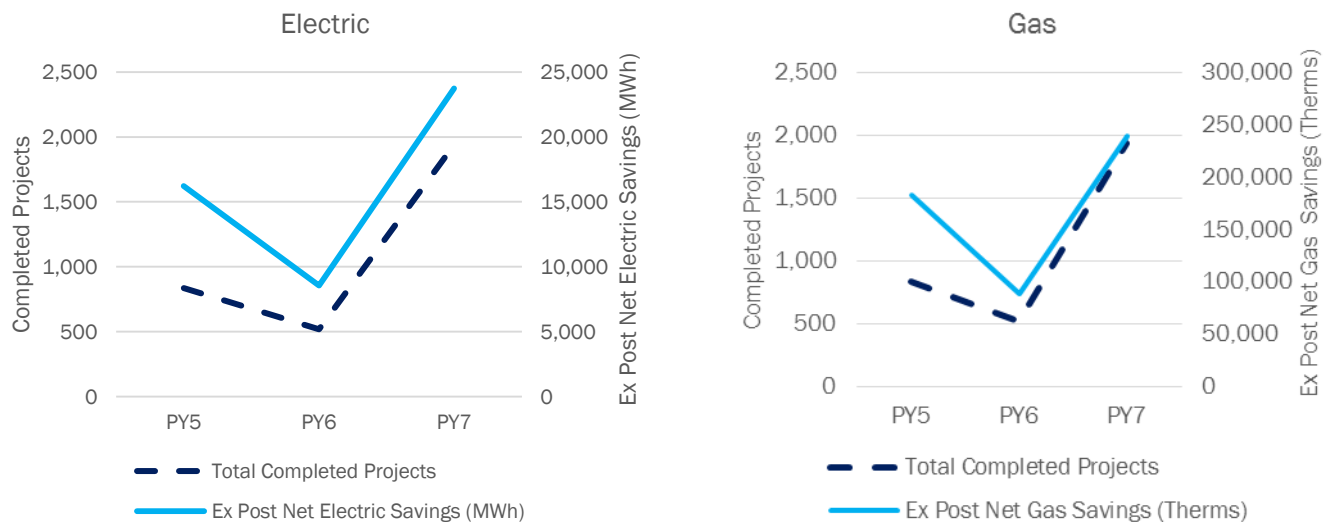
	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR ^a	Ex Post Net
Energy Savings (MWh)					
Total MWh	9,453	0.98	9,232	0.90	8,306
Demand Savings (MW)					
Total MW	1.63	1.15	1.88	0.91	1.72
Energy Savings (Therms)					
Total Therms	318,372	0.89	282,248	0.85	239,163

^a The NTGRs presented here are program-level values developed based on SAG-approved measure-level NTGRs.

Program Participation

Program staff achieved the PY7 AIC Multifamily Program savings presented above through implementation of 997 projects with 189 property managers/owners (128 participating in the AIC program alone and 61 participating in both AIC and IPA programs). When considered in conjunction with activity in the electric-only IPA Multifamily Program, a dramatic increase in savings for this sector is evident.

Figure 2. AIC and IPA Multifamily Program Activity from PY5 – PY7



Note: The IPA Multifamily Program began in PY7.

Conclusions and Recommendations

While program design changed somewhat given the movement of most major measures projects to the IPA Multifamily Program, the AIC Multifamily Program generally operated smoothly and effectively in PY7. As noted in detail below, research with participating customers and program allies points to high levels of satisfaction, while discussions with non-participants and a review of secondary data provide insight on how the program can identify decision-makers and target properties going forward.

The following are the key findings and recommendations from the PY7 evaluation.

- **Key Finding #1:** Participating property managers are highly satisfied with the program and those with additional properties are likely to participate in the future. Contractors also appear to be happy with the program, noting that communications between program staff and trade allies have improved over time.
 - **Recommendation:** The ownership and management of multifamily properties appears to be highly concentrated, meaning a relatively small percentage of property management firms oversee a high percentage of all multifamily buildings. As a result, it is imperative to ensure that current participants have positive program experiences. A consistent commitment to QA/QC and a timely resolution of outstanding issues/problems should continue to be used to ensure current participants continue to participate in the future.
- **Key Finding #2:** The vast majority of participating property managers are aware of all three program components (i.e., in-unit direct install, common area direct install, major measures), suggesting that all parties involved in the multifamily program are doing a good job making sure participating property managers are aware of ALL program possibilities. About one-half of nonparticipating property managers are aware of the program.
 - **Recommendation:** Continue to emphasize that all parties involved in the multifamily program promote all three program components. Awareness of the various program components, among participating property managers, appears to be high. Therefore, the future goal is to maintain present awareness levels by continuing to focus on cross-component marketing.
 - **Recommendation:** Additional outreach, across multiple communication channels, may be needed to increase awareness among nonparticipating property managers. Industry events and associations, including associated publications, may be a good way of reaching these individuals. Outreach should also include contractors and equipment manufacturers as both groups are common sources of information for nonparticipating property managers. Communications should emphasize the program's ability to help property managers reduce operating costs.
- **Key Finding #3:** Building owners plays a critical role in approving building and efficiency upgrades and are particularly motivated to reduce building operating costs.
 - **Recommendation:** It is important to develop strategies to engage building owners, as the central decision maker, in conversations about potential energy efficiency projects. Associated with this, property managers should be provided with information that will support them in pitching energy efficiency upgrades to building owners.

4.6 Residential Home Efficiency Program – Standard

4.6.1 Program Description

The Home Efficiency Program – Standard (Home Efficiency Standard Program)¹² is a home energy diagnostic and retrofit program that offers customers a home audit, direct install measures, and incentives for additional

¹² This program was known as the Home Performance with ENERGY STAR (HPwES) Program in past program years.

energy efficiency opportunities. The program also educates homeowners on cost-effective energy-savings strategies that they can apply throughout their home.

Previously the program had included the Electric Space Heating Pilot (ESHP), but in PY7, this pilot moved to the IPA All-Electric Homes Program. CLEAResult (formerly Conservation Services Group [CSG]) implements the Home Efficiency Standard Program, reporting to Leidos who manages all of AIC’s commercial and residential programs.

The expected savings from this program is 2.5% of the overall PY7 portfolio of electric savings and 17.9% of therm savings (including both residential and commercial).¹³ Per the Program Implementation Plan, CLEAResult estimated they would perform 2,100 audits, with 1,500 homes receiving retrofits.

For PY7, the evaluation team conducted a process and impact evaluation of the Home Efficiency Standard Program. We also developed a predictive model to help determine the relative influence of various customer- and community-level demographic factors on predicting the likelihood of customer conversions from audits to retrofits.

Program Impacts

The Home Efficiency Standard Program reached 2,601 participants in PY7, providing net savings of 3,075 MWh, 1.6 MW and 429,412 therms. While the program performed well in PY7, PY6 performance exceeded PY7 electric savings. The PY6 program achieved net savings of 3,882 MWh, 1.9 MW and 411,594 therms. Table 13 summarizes the impacts for the Home Efficiency Standard Program in PY7.

Table 13. PY7 Home Efficiency Standard Program Impact Summary

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR ^a	Ex Post Net
Energy Savings (MWh)					
Total MWh	3,446	0.99	3,419	0.90	3,075
Demand Savings (MW)					
Total MW	1.73	1.05	1.82	0.88	1.61
Energy Savings (Therms)					
Total Therms	494,797	1.06	524,885	0.82	429,412

^a The NTGR are estimated at a measure level but are shown in aggregate for the program here.

The Home Efficiency Standard Program achieved gross PY7 realization rates of 99% kWh, 105% for kW and 106% for therms. This variance in net realization rates can be attributed to differences in input values for ex ante (calculated by the implementation team) and ex post (calculated by the evaluation team) savings algorithms for air sealing, lighting, and insulation measures. Specifically, the evaluation team based values for cooling degree days (CDDs), heating degree days (HDDs), and full load cooling hours on the location of each participating home while the program tracking system applied values for Springfield to all homes, regardless of location. Ex ante and ex post savings estimates also differ with respect to baseline assumptions for heating and cooling equipment and rim joist insulation. We provide a detailed explanation of all differences in the full report for this program.

¹³ Note that the percentage of expected savings here and through the plan is calculated based on Ameren Illinois Order 13-0498, dated January 28, 2014.

Process Results

The program underwent several changes in PY7 including Leidos joining the implementation team on the management side, with CLEAResult remaining the customer-facing implementer. The program also made several design changes to help facilitate participation. The program added a new channel for program participation: allowing trade allies to sell program work directly to customers. The program also re-introduced On-Bill Financing (OBF) as a program offering.

Surveys revealed that the trade allies are generally satisfied with the program overall and believe that the program has had a positive impact on their business (notably, allowing them to provide a program with high customer demand, developing/building their relationship with AIC, and improving customer satisfaction). The program has good recognition among trade allies and they feel very knowledgeable of program components – in part, due to the training they have received from CLEAResult. Allowing trade allies to market the program directly seems to have been a positive change. Trade allies report that direct mailers, word of mouth, pre-existing relationships, and using one's own marketing was most effective in directly promoting the program. Trade allies also reported that the Home Efficiency Standard Program has directly impacted their business practices as a whole: adding/training more skilled employees (BPI certification) to their organization and devoting more business resources to the work that the Home Efficiency Standard Program brings to their companies.

Although interviews with program staff revealed that very few (if any) trade allies took advantage of OBF (likely due to the delayed start), more than half of the trade allies surveyed reported completing jobs that used OBF and that OBF helps them sell work to customers. Trade allies, however, did encounter some challenges with the program. They report that the program paperwork and general administration are tedious and require streamlining and that payment for services takes too long. These challenges lead some trade allies to complete qualifying jobs outside of the program. Furthermore, the primary reason for trade allies discontinuing their participation in the Home Efficiency Standard Program was that it was too time consuming (the same concern expressed by current program participants). Despite changes made in the program to expand incentive offerings and include OBF, these trade allies report that they are highly unlikely to participate in the program in the future due to the administrative burden.

Predictive Analysis

The predictive model shows that the most important variables predicting customer conversion from an audit to measure installation are (1) living in areas where neighbors had previously participated in the Home Efficiency Standard Program, (2) higher number of adults in the household, (3) geographic location, and (4) higher number of years of residence at their current address. In addition, the lower proportion of mobile homes, and the higher proportion of people with a graduate or professional degree were also important. The model shows that there may be a reinforcing effect: customers in areas where other customers have received audits and measure installations through the program are actually more likely to convert from audit to measure installation.

Key Findings and Recommendations

Based on the process and impact evaluation findings, the following are some recommendations for the Home Efficiency Standard Program:

- **Streamline program paperwork and administration.** The trade ally survey revealed that filling out paperwork is not only time-consuming but also has prevented some contractors from running all of their qualified projects through the program (if the customer needs a quick project turnaround, for example).

Reducing this administrative burden on trade allies would help make the program more attractive, and increase satisfaction with the program.

- Part of this streamlining should include looking for opportunities to reduce the amount of time it takes to pay trade allies. The trade ally survey revealed that extended lead-times on payments can discourage and limit program participation.
- **Leverage Trade Allies for program marketing.** Historically, the Home Efficiency Standard Program has seen growth in both PY5 and PY6 without making any major changes to marketing tactics or program implementation. Based on trade ally feedback, direct mailers and program material handouts are the most relevant marketing tactics. As such, it would be beneficial to work with trade allies to establish additional marketing materials.
- **Update program tracking database to include a flag for projects using OBF.** Given that OBF is likely to be a key program component to facilitate participation, it would be useful to track usage of OBF within the tracking database. This could allow future evaluation efforts to better understand the impact and extent to which OBF affects the Home Efficiency Standard Program. This is especially true given the discrepancy between program staff observations and trade allies' self-reported frequency of use of OBF.
- **The predictive model indicates that among customers who have had an audit, those with the highest propensity to install measures tend to be in areas where others have had audits and measures installed, have more adults in the household, have lived in their homes longer, and have professional and graduate degrees.** Another key predictor variable pertains to whether customers live in areas with fewer mobile homes. The model shows that there may be a reinforcing effect: customers in areas where other customers have received audits and measure installations through the program are actually more likely to convert from audit to measure installation.
 - As such, the program may get higher conversion rates by targeting specific areas where others have had audits and measures installed.
 - In addition, the program may want to target customers who have lived in their homes for longer, have more adults in the household, and have more people with graduate or professional degrees.
- **Update program tracking savings assumptions to reflect the ex post values used in this evaluation.** Per our ex post savings calculations, the evaluation team identified several discrepancies in savings assumptions between the ex ante and ex post savings calculations. To increase the accuracy of tracked savings and the realization rates, we recommend that the Home Efficiency Standard Program adopt the ex post assumptions and savings calculations used by the evaluation team.
- **Update ex ante savings algorithms for rim joist and crawlspace insulation.** Through discussions with the implementer, we learned that supply vents are installed in below grade spaces, thus turning this space into a semi-conditioned area. However, ex ante and ex post calculations currently apply CDDs and HDDs for unconditioned space. We recommend modifying the algorithm to use unconditioned basement CDDs and HDDs for pre-existing conditions, and using conditioned basement CDDs and HDDs for post conditions.

4.7 Residential Home Efficiency Program – Income Qualified

The Home Efficiency Program – Income Qualified (Income Qualified Program)¹⁴ is a home energy diagnostic and whole-house retrofit program that began as a pilot in PY3 and is in its fourth year of implementation. The target market for the Income Qualified Program is existing homes heated by a fuel source (electricity or natural gas) provided by AIC and owned by customers with a household income between 150% and 300% of federal poverty guidelines for household size.

The Income Qualified Program was implemented in PY7 by CLEAResult (formerly Conservation Services Group [CSG]), reporting to Leidos who manages all of AIC’s commercial and residential programs.

The expected savings from this program is 0.5% of the overall PY7 portfolio of electric savings and 4.2% of PY7 portfolio therm savings (including both residential and commercial).¹⁵ Per the Program Implementation Plan, CLEAResult estimated they would perform 735 home audits in PY7, with 439 homes receiving retrofits.

For PY7, the evaluation team conducted a process and impact evaluation of the Income Qualified Program.

Program Impacts

The Income Qualified Program reached 352 participants in PY7, providing net savings of 873 MWh, 0.52 MW and 210,250 therms. PY7 performance exceeded PY6 where the program achieved net savings of 617 MWh, 0.53 MW and 173,380 therms. Table 14 summarizes the net impacts for the Income Qualified program.

Table 14. PY7 Income Qualified Program Impact Summary

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	881	0.99	873	1.00	873
Demand Savings (MW)					
Total MW	0.57	0.92	0.52	1.00	0.52
Energy Savings (Therms)					
Total Therms	179,940	1.17	210,250	1.00	210,250

The Income Qualified Program achieved gross PY7 realization rates of 99% for kWh, 92% for kW and 117% for therm. The variance in net realization rates is due to differences in input values for ex ante (calculated by the implementation team) and ex post (calculated by the evaluation team) savings algorithms for air sealing and insulation measures. Specifically, the evaluation team based values for cooling degree days (CDDs), heating degree days (HDDs), and full-load cooling hours on the location of each participating home while the program tracking system applied values for Springfield to all homes, regardless of location. Ex ante and ex post savings estimates also differ with respect to baseline assumptions for heating and cooling equipment and rim joist insulation. We provide a detailed explanation of all differences in the full report for this program.

¹⁴ This program was previously referred to as the Moderate Income Program.

¹⁵ Note that the percentage of expected savings here and throughout the plan is calculated based on AIC Plan 3 Compliance Filing from Docket 13-0498, dated January 28, 2014.

Process Results

The program underwent several changes in PY7 including Leidos joining the implementation team on the management side, with CLEAResult remaining the customer-facing implementer. The program also made several design changes to help facilitate participation. The program added a new channel for program participation: allowing trade allies to sell program work directly to customers. The program also expanded the group of potential program participants by lowering the qualifying financial threshold (from a household income of 200%-300% of federal poverty guidelines to 150%-300%).

Surveys revealed that trade allies are generally satisfied with the program and believe that it has had a positive impact on their business (notably, increases in revenue and customer satisfaction). The program has good recognition among trade allies and they feel very knowledgeable of program components – in part, due to the training they have received from CLEAResult. Allowing trade allies to market the program directly seems to have been a positive change. In addition, almost every trade ally reported using the program's On-Bill Financing (OBF) offering and reported that it makes selling work to customers much easier. Finally, trade allies reported that the Income Qualified Program has directly resulted in their adding/training more skilled employees (BPI certification) to their organization. Despite overall positive marks, trade allies did encounter some challenges with the program. They report that the program paperwork and general administration are tedious and require streamlining and that payment for services takes too long. These challenges lead some trade allies to complete qualifying jobs outside of the program.

Key Findings and Recommendations

Based on the process and impact evaluation findings, the following are some recommendations for the Income Qualified Program:

- **Streamline program paperwork and administration.** The trade ally survey revealed that filling out paperwork is not only time-consuming but also has prevented some contractors from running all of their qualified projects through the program (if the customer needs a quick project turnaround, for example). Reducing this administrative burden on trade allies would help make the program more attractive, and increase satisfaction with the program.
 - Part of this streamlining should include looking for opportunities to reduce the amount of time it takes to pay trade allies. The trade ally survey revealed that extended lead-times on payments can discourage and limit program participation.
- **Leverage trade allies for program marketing.** Historically, the Income Qualified Program has seen growth (in both PY5 and PY6) without making any major changes to marketing tactics or program implementation. Based on trade ally feedback, direct mailers and program material handouts are the most relevant marketing tactics. As such, it would be beneficial to work with trade allies to establish additional marketing materials for these marketing tactics.
- **Update program-tracking database to include a flag for projects using OBF.** Given that OBF is a key program component, it would be useful to track usage of OBF within the tracking database. This could allow future evaluation efforts to better understand the impact and extent to which OBF affects the Income Qualified Program.
- **Update program tracking savings assumptions to reflect the ex post values used in this evaluation.** Per our ex post savings calculations, the evaluation team identified several discrepancies in savings assumptions between the ex ante and ex post savings calculations. To increase the accuracy of tracked

savings, we recommend that the Income Qualified Program adopt the ex post assumptions and savings calculations used by the evaluation team.

- **Update ex ante savings algorithms for rim joist, basement wall, and crawlspace insulation.** Through discussions with the implementer, we learned that supply vents are installed in below grade spaces, thus turning this space into a semi-conditioned area. However, ex ante and ex post calculations currently apply CDDs and HDDs for unconditioned space. We recommend modifying the algorithm to use unconditioned basement CDDs and HDDs for pre-existing conditions, and using conditioned basement CDDs and HDDs for post conditions.

4.8 Residential ENERGY STAR® New Homes

The AIC ENERGY STAR® New Homes Program, implemented by CLEAResult (formerly Conservation Services Group [CSG]), offers builders training, technical information, marketing materials, and incentives for the construction of eligible homes. Specifically, the program offers incentives for single family homes and multifamily duplexes that meet the ENERGY STAR 3.0 standards or that achieve a Home Energy Rating System (HERS) index of 65 or lower (a lower HERS index indicates a more efficient home). Builders constructing single-family homes and duplexes heated with any fuel provided by AIC are eligible for program incentives. Participating builders must hire a HERS rater to verify savings achieved through energy-efficient practices and equipment. In most cases, the rater also provides technical assistance and program application processing throughout the building process.

In PY7, the evaluation team conducted in-depth interviews with program staff, HERS raters, and building inspection departments; reviewed REM/Rate models (REM/Rate is a building modeling software that calculates heating, cooling, hot water, lighting, and appliance energy loads for new and existing homes); assessed the program's market share; and analyzed the tracking database. Based upon AIC's PY7 implementation plan, the expected savings from this program are 0.4% of the overall PY7 portfolio electric savings and 0.5% of PY7 portfolio natural gas savings.

Program Impacts

Table 15 summarizes the net electricity and demand savings from the PY7 ENERGY STAR New Homes program, which includes 457 MWh and 0.13 MW along with net gas savings of 51,376 therms. Differences between the ex post gross and ex ante results exist because program staff calculated the ex ante gross savings based on expected characteristics of participating homes. The evaluation team, however, calculated ex post gross savings using REM/Rate simulations for a sample of 70 participant homes using local code and federal minimum standards as the baseline for each home. The evaluation team did not receive the specific data used by the program implementer to calculate ex ante gross savings. The evaluation team assumes that because program staff developed the ex ante savings inputs before participating homes were constructed, the exact characteristics of participant homes likely differ from the characteristics initially expected by program staff. The evaluation team applied the NTGR agreed upon by the SAG.

Table 15. PY7 ENERGY STAR New Homes Program Impact Summary

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	732	0.78	571	0.80	457
Demand Savings (MW)					
Total MW	0.188	0.87	0.163	0.80	0.130
Energy Savings (Therms)					
Total Therms	52,120	1.23	64,220	0.80	51,376

Note: Realization rate = ex post gross savings ÷ ex ante gross savings.

Program Participation

The program significantly exceeded its target, achieving 130% of goal: 72 participating builders completed 547 homes for program incentives in PY7. This represents an 81% increase over homes completed in PY6. Further, program-eligible homes accounted for approximately 12% of all new single-family homes built within AIC’s service territory.

Key Findings and Recommendations

After two transitional years in PY5 and PY6, designed to allow builders a gradual transition to ENERGY STAR 3.0 and the 2012 Illinois energy code, AIC increased the energy efficiency requirement in PY7 by lowering the maximum allowable HERS score. Even so, the program experienced significant growth in PY7, which is likely due to a combination of program maturity and improvement in the central Illinois new construction market.

While the HERS raters interviewed were generally satisfied with the program, they did recommend improvements to program communication.

As a follow up to PY6 research on the 2012 Illinois energy code and to gather more comprehensive data about the baseline code (by jurisdiction) in AIC’s territory, the evaluation team conducted additional interviews with building code officials in jurisdictions with program homes. According to these interviews, there was more widespread enforcement of the 2012 code in PY7 than in PY6.

Based on the PY7 evaluation, the evaluation team offers the following key findings and recommendations:

- **Key Finding #1:** Raters reported inadequate communication with program staff. While program staff reported that monthly communication with raters helped them better manage the project pipeline, all but one rater expressed dissatisfaction with the level of communication received through the program.
 - **Recommendation:** Establish regular communication with raters who can then communicate project status (i.e., application received, approved, denied, or more information needed) to builders. If the relational database is not robust enough to generate monthly status reports to raters, send monthly e-mails to raters communicating project status. Furthermore, establish proactive response protocols whereby program staff confirms receipt of applications and notifies raters immediately if the information is incomplete.
- **Key Finding #2:** The availability of qualified HVAC contractors has limited the ability of builders to use the ENERGY STAR option.

- **Recommendation:** Offer special trainings on ENERGY STAR to HVAC contractors to help increase the pool of qualified contractors.
- **Key Finding #3:** While the program achieved total combined gas and electricity energy reductions, program homes achieved more gas savings and less electric savings than expected.
 - **Recommendation:** Assess the cost-effectiveness of the relative savings. If electricity savings provide higher relative benefits, AIC could require certain mandatory electric energy savings measures on the program homes (note that this may reduce participation in the program). Modify the incentive structure to provide additional incentives for electric energy savings measures. Conduct outreach and education with builders and HERS raters to highlight benefits of energy-efficient cooling, lighting, and appliances. Since the program is currently participation limited, optimizing the cost effectiveness of those participants by adjusting requirements could improve the program’s net benefits.

4.9 School Kits

The Residential Energy Efficiency School Kits (School Kits) Program was included as part of AIC’s portfolio of energy efficiency programs beginning in PY7. Through this program in PY7, AIC distributes kits containing energy efficient items during on-site presentations to fifth through eighth grade students. The program goal is to increase sales and awareness of ENERGY STAR-qualified lighting products along with other AIC energy efficiency offerings that reduce energy consumption. The School Kits Program provided energy efficiency kits to 7,647 students in PY7.

The kits contained CFLs, faucet aerators and showerheads along with instruction materials about how to properly set water heater temperature (Table 16). The School Kits Program materials also asked participants to complete an online survey to verify installation of energy-efficient items.

Table 16. PY7 School Kits Products

Product	Quantity per Kit
EcoSave 13-watt CFL	2
1.0 GPM Bath Faucet Aerator	1
2.0 GPM Dual Kitchen Faucet Aerator	1
1.75 GPM Chrome High Efficiency Showerhead	1
Hot Water Temperature Card Thermometer	1
Instructional Materials	N/A

AIC implementation plans assumed electricity savings of 245 annual net kWh per kit.¹⁶ The plan specified program objectives that included:

- Increased awareness of AIC’s energy efficiency offerings,

¹⁶ Ameren Illinois Company. Program Year Seven Implementation Plan, November 14, 2014. Appendix D- PY7 Measures, Page 120.

- Increased knowledge of energy issues, and
- Increased energy efficiency for targeted students and their families.

Impact Results

Table 17 summarizes the net electricity and demand savings from the PY7 School Kits Program, which includes 532 MWh, 0.078 MW and 63,726 therms. To determine gross savings and net realization rates, the evaluation team applied the IL-TRM V3.0 deemed per-unit gross savings values for program measures and the SAG’s approved NTGR for this program.

Table 17. PY7 School Kits Program Impact Summary

	Ex Ante Gross	Realization Rate ^a	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	653	0.90	591	0.90	532
Demand Savings (MW)					
Total MW	0.082	1.03	0.085	0.93	0.078
Energy Savings (Therms)					
Total Therms	86,910	0.76	65,619	0.97	63,726

^a Realization rates different from 1.0 are due to differences between the ex ante and ex post per unit savings.

Process Results

Through the evaluation team’s process review, utility and implementation staff expressed high satisfaction with how the program performed in PY7. Implementers indicate that the program has been successful and they have no plans to make program changes for PY8. Further, the program team was able to meet the kit-distribution goals on time and within budget. Implementers report that operations are running smoothly with no significant issues.

Conclusions and Recommendations

The PY7 School Kits Program delivered 7,647 kits to students. In its second year, the program continued to establish relationships with schools to secure future participation and improve marketing methods to increase participation from additional schools. Although the utility and implementation staff are satisfied with the program, the evaluation team has identified the following recommendations for future program years.

- **Conclusion #1:** The participant survey response rate dropped from 55% in PY6 to 23% in PY7. While we found no obvious reason for this change, student response rates typically depend on the amount of teacher encouragement or requirement for completion. Teachers may perceive that chances of having the “highest” participation and winning the \$250 gift card are slim. Furthermore, the evaluation team is concerned that the survey data may not be representative of the entire program population due to the low response rate.
- **Recommendation:** AIC and the program implementers may want to consider offering every teacher an incentive or eligibility for a drawing based on a threshold proportion of surveys received. Another option is to add an incentive to the students and families such as a chance to win a gift card or a token gift in exchange for completing the survey.

- **Conclusion #2:** The evaluation team used results from the implementer’s participant surveys as input to the program savings calculations. In the PY6 evaluation, we recommended modifications to the tracking system. These changes were not made for PY7 since the evaluation was completed mid-year. As such, we provide these same recommendations below:
- **Recommendation:** Consider having the survey reviewed by a third-party evaluator to ensure that the participant survey responses provide the data needed to best estimate program savings. Alternatively, consider making the following modifications to the online survey instrument:
 - Capture installation rate for each CFL wattage if more than one wattage of bulb is included in the kit in future program years¹⁷
 - Determine if participants adjusted water heater temperatures up or down
 - Determine fuel saturation for all participants
 - Collect number of people per household
 - Determine single-family or multifamily residence
 - Determine number of bathroom faucets and showerheads per household
 - Remove inconsistencies that occurred and were reported in PY6 and occurred again in PY7. For example, School Kits survey data indicating CFL installations included these responses: “Yes,” “No,” “0,” “1,” and “2.”

4.10 C&I Standard

The AIC C&I Standard Program (Standard Program) provides incentives to support the installation of prescriptive energy efficient measures for business customers. Savings come from the core incentive offering, an online store where customers can buy energy-efficient products at reduced prices, the Green Nozzle initiative, and a midstream lighting incentive program introduced in PY7.

According to the PY7 Implementation Plan, AIC expected savings from this program to account for 35% of the overall portfolio electric savings and 16% of overall portfolio therm savings (including both residential and commercial programs).

The PY7 evaluation of the Standard Program included impact and process assessments. We reviewed program materials and program-tracking data; interviewed program administrators and implementation staff, and conducted other research. Our quantitative research included a survey of customers who participated in the core program, as well as a survey of non-participating customers. Below we present the key findings of the PY7 evaluation.

Impact Results

Our participant verification activities showed that AIC is accurately tracking the measures installed. As shown in Table 18, the electric and gas gross realization rates for all program components are close to 100%. As

¹⁷ The PY7 kit included only 13-watt CFLs.

outlined in the evaluation plan, the team applied NTGRs developed in PY4 and PY5 to the program’s components in developing estimates of net savings. Table 18 also provides the PY7 Standard Program gross and net impacts. The PY7 Standard Program achieved 62,828 MWh in net electric savings and 1,368,915 therms in net gas savings. This level of savings enabled the program to meet its internal PY7 electric goals and greatly exceed its internal gas goals.

Table 18. PY7 C&I Standard Program Impact Summary

Savings Category	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Core Program	78,415	1.000	78,383	0.79	62,167
Online Store	732	1.005	736	0.83	611
Instant Incentive	38	1.000	38	1.00	38
Green Nozzle	14	1.000	14	0.92	13
Total MWh Savings	79,198	1.000	79,170	0.79	62,828
Demand Savings (kW)					
Core Program	11,887	0.999	11,879	0.79	9,350
Online Store	154	1.028	159	0.83	132
Instant Incentive	9	1.000	9	1.00	9
Green Nozzle	0	N/A	0	N/A	N/A
Total kW Savings	12,050	1.000	12,047	0.79	9,490
Energy Savings (Therms)					
Core Program	1,523,095	1.000	1,522,965	0.90	1,364,961
Online Store	0	N/A	0	N/A	N/A
Instant Incentive	0	N/A	0	N/A	N/A
Green Nozzle	4,443	1.000	4,443	0.89	3,954
Total Therm Savings	1,527,538	1.000	1,527,408	0.90	1,368,915

Process Results

AIC successfully implemented the Standard Program in PY7 and met both its electric and gas savings goals. The program saw increased participation in PY7 from the previous year, measured by both projects and total energy savings. Participation in the program followed similar patterns as in past years; lighting projects represented around three-quarters of all projects completed through the program, and the Core Program represented the vast majority of all Standard Program savings.

The program did make some minor changes in PY7, including new project management organization and the introduction of a midstream pilot program aimed at increasing the market share of efficient lighting products.

- Our impact evaluation found a gross realization rate of nearly 100% for the program, indicating that the program is tracking its savings and projects carefully
- Program stakeholders with whom we spoke as part of this evaluation (staff and participants) reported no major barriers to participation or problems with program processes
 - AIC continued to receive overwhelmingly positive customer feedback on the program. Since its inception, the program has seen high levels of participant satisfaction in nearly all program areas—

from program paperwork, to processing incentives, to addressing customer questions and concerns. PY7 continued this trend, with 94% of participants reporting overall satisfaction¹⁸ with the program and all defined program areas examined in our evaluation receiving high marks from participants. Consistently performing at this level has likely helped ensure that participants continue to return to the program year after year.

Based on our research, we provide the following recommendations for the program:

- **Continue to target non-participating customers.** Our non-participant research found that a substantial number of AIC customers are still unaware of the Business Program, and that those who are aware are often unfamiliar with the specifics of the program. While reaching every customer will prove to be impossible, there does appear to be a significant number of both large and small AIC customers who have not participated in the program and offer savings opportunities. Our research shows that barriers to installing energy efficient equipment can decrease in magnitude among those familiar with the Business Program, which supports the need to continue to conduct outreach and education to non-participating customers. AIC should continue to market to non-participants using the methods preferred by non-participants, specifically through direct mail and email.
- **Incorporate all IL-TRM updates and ensure consistency across similar measures in program tracking databases.** AIC continues to achieve a gross realization rate of nearly 100% for the program, although we did find minor discrepancies in the database including a TRM update that was not applied correctly and waste heat factors that were not consistently applied to a select few lighting projects. While these issues were very minor, we recommend incorporating all TRM updates and applying the correct measure assumptions consistently across all measures to ensure AIC continues achieving high realization rates moving forward.

4.11 C&I Custom

The C&I Custom Program (Custom Program) provides incentives for energy efficient measures that fall outside of the scope of the Standard Program. In PY7, AIC expected the Custom Program to account for 15% of the overall portfolio electric savings and 22% of portfolio therm savings.¹⁹ Savings from the Custom Program come from the general Custom Program, the Competitive Large Incentive Project (CLIP), the Staffing Grant initiative, and New Construction Lighting.²⁰

The PY7 evaluation of the Custom Program involved both impact and process assessments. To support the process evaluation, we interviewed Staffing Grant and CLIP participants, spoke with program staff, and reviewed implementation and marketing materials. Our impact evaluation research efforts included interviews with recipients of Staffing Grants and CLIP incentives and site visits to a stratified sample of locations that had incentivized custom equipment installed. We also conducted non-participant research to inform process

¹⁸ A score of 7, 8, 9, or 10 on a scale of 0 to 10, where 0 means “not at all satisfied” and 10 means “very satisfied”.

¹⁹ Based on the Program Year Seven Implementation Plan, November 14, 2014.

²⁰ While AIC processes most new construction projects through the Standard Program, lighting and HVAC projects are processed through the Electric Custom Program. New construction lighting projects falling under the New Construction Lighting offering and large-scale HVAC projects in new construction are included in the Custom incentive offering.

findings and non-participant spillover for the overall Business Program. Below, we present the key findings from the PY7 evaluation.

Impact Results

Overall, the PY7 Custom Program performed well. As shown in Table 19 below, the program achieved 87,017 MWh in net electric savings and 2,185,563 therms in net gas savings. This level of savings enabled the program to exceed its PY7 electric and gas goals.

Table 19. PY7 C&I Custom Program Impact Summary

Savings Category	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR ^a	Ex Post Net
Energy Savings (MWh)					
Total MWh	122,424	0.93	114,021	0.763	87,017
Demand Savings (kW)					
Total MW	13	0.80	11	0.763	8
Energy Savings (Therms)					
Total Therms	1,937,083	1.51	2,930,082	0.746	2,185,563

^a Blended NTGR based on PY5 NTGR values (0.75 for electric and 0.74 for gas) for all Custom Program projects except those completed through the CLIP and Staffing Grant initiatives, for which a retrospective NTGR was applied based on PY7 research.

Process Results

In PY7, the Custom Program completed another highly successful year in terms of its performance against participation and savings goals. Now in its seventh year, the program’s structure and implementation has remained relatively stable with several changes to special offerings and some small adjustments to the general electric and gas programs.

Conclusions and Recommendations

Interviews with participants in two special offerings, CLIP and Staffing Grant, revealed positive feedback for both programs. Participants in these programs also offered a few suggestions based on their experiences. Based on their feedback, our review of materials from PY7, and our engineering analyses, we make the following recommendations for the program:

- AIC may consider providing support for potential Staffing Grant recipients to help them identify projects that might be viable candidates for future Staffing Grants as well as to provide technical review of projects to help participants move beyond relatively simple lighting projects to more advanced measures and deeper energy savings.
- For CLIP projects, where the savings are large but potentially variable, the program may consider establishing a protocol for participants to reclaim the initially proposed incentive amount if the program staff’s preliminary savings estimates are eventually shown by the ex post evaluation to be overly conservative. One option for this may be for the program to award the rebates in two phases such that the participants receive a portion of the rebate upfront and the remaining share prorated as necessary depending on the evaluated savings.
- We found high levels of variation in the realization rates for the Custom Program projects we sampled and for the program overall. Only 41% of the projects we sampled had realization rates that fell within

±20% of the project's ex ante estimate with individual realization rates ranging from 3% to 746%. Such large differences between ex ante and ex post savings estimates may make it hard for the program to plan with a high degree of certainty. AIC may consider implementing the following suggestions to improve realization rates in future years.

- We recommend that vendor calculations go through a rigorous technical review, including a review of model files where applicable. Savings estimates for several projects were completed by vendors in PY7, and errors or misclassifications occasionally resulted in realization rates outside of acceptable bounds. Scrutinizing these calculations thoroughly at the beginning will help minimize the degree to which this occurs.
- Post inspections could help improve some operational adjustments and likely would have captured several of the issues identified during evaluator site visits. Improperly installed equipment or incorrect operational specifications (e.g., occupancy sensors not working properly or incorrectly specified hours of use) could have been identified with a post inspection.
- The program may consider giving special attention to projects predicting exceptionally large savings relative to the customer's bill. If savings are estimated to be more than 10% of the customer's bill, we recommend reviewing the project with increased scrutiny. While real cases do exist of savings above this threshold, they are very rare and should be thoroughly vetted. If the program is unsure the savings will be achieved, waiting for some billed data to become available may also help confirm the level of savings. This would require delaying finalizing the incentive amount (and associated payment) and may have other implications that need to be considered as well, but for significant projects it would likely help improve the realization rate.
- AIC may consider reviewing Custom project EM&V results and follow up with projects that may benefit from retrocommissioning, especially those that received lower than expected realization rates and experienced control issues.

4.12 C&I Retro-Commissioning

The AIC Commercial and Industrial (C&I) Retro-Commissioning (RCx) Program helps AIC business customers evaluate their existing mechanical equipment, energy management, and industrial compressed air systems to identify no-cost and low-cost efficiency measures to optimize energy systems. Customers contract with pre-approved Retro-Commissioning Service Providers (RSPs) to perform an energy survey, resulting in a written report detailing the savings opportunities. Following verified implementation of measures with a payback of less than 12 months, AIC pays an incentive that covers 50%–80% of the energy survey cost, based on the project type. A further implementation incentive is paid to the customer based on the energy saved, and a bonus is paid to the RSP based on timely measure implementation and energy saved. For PY7, AIC planned to garner 8% of portfolio electric energy savings and 3% of portfolio therm savings from this program.

A secondary goal of the RCx Program is the identification of retrofit and capital improvement projects. Through identification and information from the RCx Program, additional projects may be channeled to the Standard and Custom incentive programs offered by AIC. AIC offers an additional bonus to customers who complete a Custom project within a year of having completed a retro-commissioning study.

The PY7 evaluation includes gross impact results plus an evaluation of program processes. Our quantitative impact research included engineering reviews of a stratified random sample of retro-commissioning projects plus on-site inspection and verification of measures.

The process evaluation reviewed program materials and program-tracking data, and interviewed program administrators, service providers, and customers. Additionally, the evaluation team surveyed non-participating customers in an attempt to determine the major barriers to retro-commissioning. According to a collaborative agreement, this evaluation applies the NTGR found through PY4 research to PY7 results. AIC will apply the current NTGR research values in future years, giving AIC opportunity to adapt, as needed.

Below we present the key findings of the PY7 evaluation.

Impact Results

Table 20 summarizes reported and verified program participation by the different program components. A total of 16 projects were completed in the PY7 program, a decrease from a total of 26 in PY6. Among the 16 projects, there were 15 unique customers with one customer completing two compressed air projects. Two participants saved both electricity and gas – both healthcare facilities. All others were industrial customers saving only electricity. Six customers took steps to begin participation in the program with initial assessments to determine retro-commissioning feasibility, and AIC paid the RSP a small incentive, referred to as a “stipend,” for this task. Since stipend costs occurred in PY7, they will be included in program cost-benefit analysis, although there are no projects or impacts associated with these sites in PY7.²¹

Table 20. PY7 C&I Retro-Commissioning Program Participation Summary

Program Component	Unique Customers	Unique Projects ^a	Ex Ante Gross Electric Savings		Ex Ante Gross Gas Savings	
			MWh	%	Therms	%
Compressed Air	13	14	7,488	74%	0	0%
Industrial Refrigeration	0	0	0	0%	0	0%
Large Facility	2	2	2,687	26%	226,171	100%
Healthcare	2	2	2,687	26%	226,171	100%
Commercial	0	0	0	0%	0	0%
Grocery	0	0	0	0%	0	0%
Total	15	16	10,175	100%	226,171	100%

^a This project count reflects all projects with savings in PY7, which does not include seven healthcare studies (six unique customers) that were completed in PY7 and received a stipend.

The evaluation team performed an engineering review of 11 of the 16 projects (including both healthcare projects with gas savings) to obtain gross realization rates for the program savings. The evaluation team modified the program ex ante gross savings for several reasons, although ultimately the gross realization rates were relatively high (84% for MWh savings, 83% for MW savings, and 99% for therm savings).

The evaluation team applied NTGRs approved by the Illinois SAG to the gross savings estimates to calculate program net impacts. Table 21 summarizes PY7 gross and net impacts.

²¹ The customers may choose to implement study-recommended measures in PY8 or later.

Table 21. PY7 C&I Retro-Commissioning Program Impact Summary

Savings Category	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	10,175	0.84	8,543	0.96	8,201
Demand Savings (kW)					
Total MW	0.97	0.83	0.8	0.96	0.77
Energy Savings (Therms)					
Total Therms	226,171	0.99	223,292	0.95	212,127

Process Results

The RCx Program’s Compressed Air offering is a well-developed and smoothly operating component of the program – program staff referred to it as “vibrant” in our interviews with them. While the potential for compressed air projects are limited – per the program implementation plan, the program has likely reached upwards of 70% of the target market – many of these customers can participate in the program multiple times and we see evidence that this has already begun to happen as the program matures. Participant and RSP satisfaction with the Compressed Air offering is high, and while the program as a whole saw a decrease in projects and savings in PY7 (compared to previous program years), PY7 actually saw more completed Compressed Air projects than PY6.

The other components of the program are not nearly as mature or stable. The Large Facilities (previously Healthcare and Commercial Facilities) offering saw only two completed projects with savings in PY7, both in healthcare facilities. Seven stipend healthcare projects were completed in PY7 that could lead to savings in PY8, but no projects were completed in the commercial or grocery segments.

The Industrial Refrigeration offering saw zero completed projects in PY7, which program staff attribute predominantly to the largest RSP pulling out of the program after PY6. Program staff tell us that they are actively pursuing additional RSPs for this component of the program.

Recommendations for Program Improvement

Based on our research, we provide the following recommendations for the program:

- **Focus on developing a larger and more engaged RSP cohort for non-Compressed Air offerings.** The RCx Program is driven by its participating RSPs, and its success depends in large part on having an engaged and effective group of RSPs to develop and complete retro-commissioning projects. The Compressed Air offering has several active RSPs, but in PY7 the Large Facility offering had only one active RSP and the Industrial Refrigeration offering had none. While more RSPs were active in previous program years, outside of Compressed Air, the program has never had a robust group of RSPs. Developing this group should be the top priority for program staff – given how program outreach and marketing generally operates, the most effective way to motivate additional participation in the Retro-Commissioning Program will be to bring more RSPs into the fold.
- **Increase program staff marketing effort.** In tandem with the above recommendation, we recommend increasing non-RSP dependent marketing efforts. Information from the program’s implementation plan and our process evaluation activities indicate that, while the market penetration of the RCx Program is relatively high, there are still potential projects remaining in the market, especially in non-Compressed Air segments.

However, the program's reliance on RSPs for marketing means that customers who are not actively reached by participating RSPs are often unlikely to enter the program. While RSPs generally report being satisfied with program marketing support, if the program wishes to develop additional business in market segments where it does not currently have activity, additional outreach from program staff will be essential. We recommend increased marketing activity by program Energy Advisors (which has already likely begun in PY8 according to our program manager interviews) and Ameren Key Account Executives, who are the staff likely to have the detailed understanding of customer facilities required to understand if a customer is an ideal candidate for retro-commissioning.

- **Work to more clearly define and explain the retro-commissioning proposition to customers and RSPs.** Based on results of our participant interviews, non-participant survey, and RSP interviews, the evaluation team feels that the retro-commissioning proposition is not fully understood by the market, and that market actors and customers have an inconsistent understanding of what retro-commissioning is. Clearly defining what retro-commissioning is will aid customer understanding of the program and help to ensure consistency across RSPs.
- **Require RSPs to better document baseline conditions.** This could be aided by encouraging RSPs to use more-transparent calculations, like spreadsheets, and/or by requiring the submission of electronic versions of calculations and simulations to ensure that evaluators understand how the RSPs obtain ex ante results. It would also be useful for the program to require more pre-implementation documentation of as-found conditions to confirm the baselines used in calculations. For example, if the report claims a fan runs continuously, inclusion of a graph or screenshot of a week of operating data or a control schedule would allow for easier baseline verification.
 - Consider issuing template calculators for common measures.
 - If hourly simulations are used to determine ex ante savings, an executable version of the model should be submitted so that the evaluation team can verify that recommended measures constitute the only changes in the model.
- **Improve documentation of post-installation inspections.** Document most measures with data or representational verification (photos, graphs, etc). Clearly annotate which measures the verification is supposed to show. Sometimes one screenshot can verify multiple measures. Some measures are hard to represent in this manner and others may not seem worth the effort. A savings magnitude threshold (gross kWh or % of project savings) might be used to prioritize effort.
 - If additional post-installation trend data are available for compressed air projects, they should be included in verification documentation.
- **Correct errors in compressed air savings calculations.** Correcting for inappropriate use of average compressor efficiency rather than marginal efficiency, assumptions of year-round operation without any down-time and accurately accounting for plant air pressure in savings estimates will produce more accurate ex ante savings estimates, resulting in higher realization rates for the program.
- **Encourage implementation of more savings and measures in addition to leak repair.** For example, require implementation of bundled measures that meet a payback threshold – 12 months for example - in order to receive the study subsidy incentive.
- **Implement a stronger review regimen through the Implementation Contractor.** Positively confirm operating hours, plant pressures, production pressures and compressor part-load performance.

Appendix A. PY7 Detailed Ex Post Savings Results

The following table provides detailed ex post savings results by program. We also provide an Excel version following the table.

AIC PY7 Programs	Realization Rate	Verified Ex Post Gross			Deemed / Used	Verified Ex Post Net					Actual	Evaluation Estimate (Where Available)	Participation		Weighted Average Measure Life
	Energy Savings (Ex Ante Gross / Ex Post Gross)	First Year Annual Energy Savings	First Year Peak Demand Savings	Lifetime Savings	Net-to-Gross Ratio	First Year Annual Savings	First Year Peak Demand Savings	Lifetime Savings	First Year Cost per First Year Annual Savings	First Year Cost per Lifetime Savings	Program Costs	Net-to-Gross Ratio	# Units	Units Definition	Years
	%	MWh / Therms	MW	MWh / Therms	%	MWh / Therms	MW	MWh / Therms	\$/MWh or \$/Therms	\$/MWh or \$/Therms	\$	%			
Residential Programs															
Residential Lighting (Electric)	162%	120,274	14.93	559,092	51%	61,326	7.54	285,073	\$ 102.07	\$ 21.96	\$ 6,259,343	No PY7 research	3,672,388	Bulbs	4.6
Behavior Modification (Electric)	N/A	N/A	N/A	N/A	N/A	33,194	-	33,194	\$ 31.60	\$ 31.60	\$ 1,049,030	N/A	268,426	Customers treated	1.0
Behavior Modification (Gas)	N/A	N/A	N/A	N/A	N/A	1,754,669	-	1,754,669	\$ 0.60	\$ 0.60	\$ 1,047,039	N/A	282,047	Customers treated	1.0
Appliance Recycling (Electric)	100%	8,222	1.01	65,751	57%	4,693	0.58	37,530	\$ 302.58	\$ 37.84	\$ 1,420,025	No PY7 research	9,014	Participants	8.0
HVAC (Electric)	100%	7,176	2.91	133,266	71%	5,062	2.03	94,009	\$ 545.07	\$ 29.35	\$ 2,759,202	No PY7 research	6,248	Program measures	18.6
Multifamily (Electric)	98%	9,232	1.88	72,946	90%	8,306	1.72	65,629	\$ 258.57	\$ 32.72	\$ 2,147,653	No PY7 research	997	Projects	7.9
Multifamily (Gas)	89%	282,248	-	4,231,927	85%	239,163	-	3,585,926	\$ 4.41	\$ 0.29	\$ 1,053,852	No PY7 research	997	Projects	15.0
HEP-S (Electric)	99%	3,419	1.82	51,837	90%	3,075	1.61	46,633	\$ 1,012.09	\$ 66.75	\$ 3,112,620	No PY7 research	2,601	Participants	15.2
HEP-S (Gas)	106%	524,885	-	9,786,410	82%	429,412	-	8,006,329	\$ 4.01	\$ 0.22	\$ 1,722,312	No PY7 research	2,601	Participants	18.6
HEP-IQ (Electric)	99%	873	0.52	12,564	100%	873	0.52	12,564	\$ 3,712.65	\$ 258.03	\$ 3,241,860	No PY7 research	352	Participants	14.4
HEP-IQ (Gas)	117%	210,250	-	3,332,433	100%	210,250	-	3,332,433	\$ 5.99	\$ 0.38	\$ 1,259,928	No PY7 research	352	Participants	15.8
ES New Homes (Electric)	78%	571	0.16	16,559	80%	457	0.13	13,253	\$ 1,457.93	\$ 50.27	\$ 666,272	No PY7 research	547	Participants	29.0
ES New Homes (Gas)	123%	64,220	-	1,862,380	80%	51,376	-	1,489,904	\$ 7.93	\$ 0.27	\$ 407,249	No PY7 research	547	Participants	29.0
School Kits (Electric)	91%	591	0.09	4,185	90%	532	0.08	3,767	\$ 222.46	\$ 31.41	\$ 118,351	No PY7 research	45,882	Program measures	7.1
School Kits (Gas)	76%	65,619	-	511,382	97%	63,726	-	496,629	\$ 2.11	\$ 0.27	\$ 134,779	No PY7 research	45,882	Program measures	7.8
Business Programs															
Standard (Electric)	100%	79,170	12.05	890,464	79%	62,828	9.49	706,658	\$ 139.93	\$ 12.44	\$ 8,791,602	Varies by measure	1,385	Projects	11.2
Standard (Gas)	100%	1,527,408	-	9,858,558	90%	1,368,915	-	8,835,575	\$ 0.99	\$ 0.15	\$ 1,348,967	Varies by measure	88	Projects	6.5
Custom (Electric)	93%	114,021	10.70	1,464,321	76%	87,017	8.20	1,117,520	\$ 95.69	\$ 7.45	\$ 8,326,913	No PY7 research	139	Projects	12.8
Custom (Gas)	151%	2,930,082	-	38,091,066	75%	2,185,563	-	28,412,319	\$ 1.02	\$ 0.08	\$ 2,235,749	No PY7 research	29	Projects	13.0
Retro-Commissioning (Electric)	84%	8,543	0.80	42,715	96%	8,201	0.77	41,005	\$ 78.29	\$ 15.66	\$ 642,066	No PY7 research	16	Projects	5.0
Retro-Commissioning (Gas)	99%	223,292	-	1,116,460	95%	212,127	-	1,060,635	\$ 2.00	\$ 0.40	\$ 423,874	No PY7 research	2	Projects	5.0



Appendix A_PY7
Detailed Ex Post Sav

Appendix B. PY7 Program Evaluation Reports

The program-specific reports are provided as separate appendices.

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