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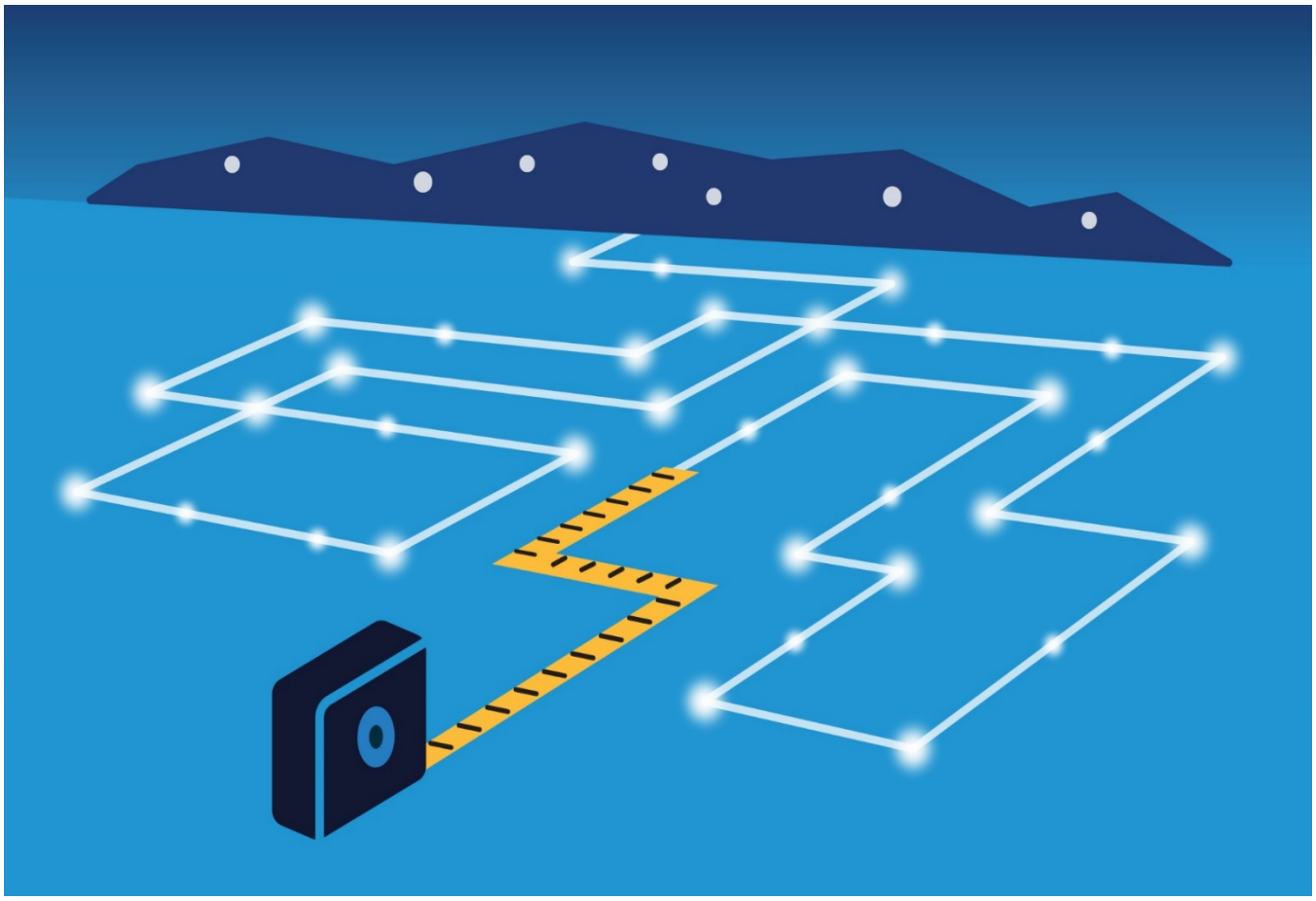

Process and Impact Evaluation of the 2014 (PY7) Ameren Illinois Company HVAC Program

Final

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Table of Contents

Table of Tables

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Table of Figures

1. Executive Summary

In Program Year 7 (PY7), the Ameren Illinois Company (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). PY7 includes all incentives processed from June 1, 2014, to May 31, 2015.

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. 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 CSG 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 1 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 Illinois Statewide TRM Version 3.0 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 net-to-gross ratios (NTGR) agreed upon by the Stakeholder Advisory Group (SAG).

Table 1. PY7 Net HVAC Program Impacts

	Ex Ante Gross	Gross Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	7,193	100%	7,176	0.71	5,062
Demand Savings (MW)					
Total MW	3.58	81%	2.91	0.70	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 (Section 4 provides detailed conclusions and recommendations):

- **Finding 1:** The significant changes made to the HVAC program for (and during) PY7 created challenges for program staff and, according to CSG, 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, CSG, 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 CSG/Leidos should consider increasing incentives for higher tier equipment.

2. Evaluation Approach

This report presents the Program Year 7 (PY7) impact and process evaluation findings for AIC's Residential Heating and Cooling Program (HVAC Program). To support the impact and process evaluations, we conducted a review of program materials, interviewed program staff, and interviewed distributors within AIC's service territory. To support the impact evaluation, we reviewed the tracking database and applied the Illinois Statewide Technical Reference Manual for Energy Efficiency Version 3.0. Net impacts applied net-to-gross ratios (NTGR) agreed upon by the Stakeholder Advisory Group (SAG).

2.1 Research Objectives

For the PY7 evaluation, the evaluation team conducted data gathering and analysis activities to answer the following impact questions about the HVAC Program:

- What are the estimated gross energy and demand impacts from this program?
- What are the estimated net energy and demand impacts from this program?

In addition, the team answered the following process-related questions:

- Did program implementation change compared to PY6? If so, how, why, and was this change advantageous?
- Did customer participation meet expectations? If not, how and why was it different from expectations?
- What were participants' characteristics? How many HVAC units were installed and at what SEER levels? What percentage was Early Replacement (ER) vs. Time of Sale (TOS)? Did these ratios change from PY6?
- What was the most effective way for AIC to collaborate with distributors? How interested are distributors in partnering with the HVAC Program to promote its rebates? What changes can AIC make to better serve distributors in promoting the HVAC Program?
- Were the HVAC Program's operational and delivery processes adequately documented? Were program materials sufficiently up to date to reflect program changes for PY7?
- What incremental costs were associated with high-efficiency HVAC equipment?

2.2 Evaluation Tasks

Table 2 summarizes tasks that the evaluation team conducted to address PY7 researchable questions.

Table 2. Summary of HVAC Evaluation Activities for PY7

Activity	PY7 Impact	PY7 Process	Forward Looking	Details
In-Depth Program Staff Interviews		✓	✓	Interviewed AIC, CSG, and Leidos managers to understand goals, progress to date, program changes from PY6 and over the PY7 period, successes and challenges, and future goals.
Program Data Review	✓	✓		Reviewed program-tracking data to ensure collection of appropriate data and to verify savings.
Distributor Interviews		✓	✓	Interviewed 10 distributors to gather information on industry trends, program awareness, opportunities to participate more directly with AIC, and different efficiencies of equipment as a percent of sales over time.
Incremental SEER Analysis	✓		✓	Analyzed incremental costs for different SEER levels regarding ASHP and CAC equipment, using invoice data and brief contractor interviews to gather baseline cost information.

We summarize each of these activities in detail below.

2.2.1 Program Staff Interviews

These interviews sought to gain information about the program's design and implementation as well as processes and performance over the PY7 period. The team also inquired about data tracking and customer outreach related to the program. As part of this task, the evaluation team interviewed a member of the AIC program team as well as a representative from the program implementer (Leidos) and two implementation subcontractor staff (CSG).

Table 3. Staff Interviews Completed

	AIC Staff	Leidos Staff	CSG Staff	Total
Interviews Completed	1	1	2	4
Date Completed	July 1, 2015	July 2, 2015	June 30, 2015	

2.2.2 Review of Program Materials and Data

The evaluation team reviewed program materials to assess their effectiveness in achieving specific objectives of each type of material. Materials reviewed included the following:

- Program application forms
- Program staff communications
- The PY7 implementation plan
- The residential marketing plan

For each type of review, the evaluation team assessed the documents' overall adequacy, clarity, comprehensiveness, and (where appropriate) the visual and messaging elements.

The evaluation team reviewed the program database to examine its completeness and to evaluate savings. The team also included an invoice review to evaluate incremental cost of CAC and ASHP systems at different SEER levels (included in Appendix B).

2.2.3 Distributor Interviews

Distributor interviews sought to investigate the following:

- Distributor program awareness
- The current program's effect on customer purchasing decisions
- Incremental costs of high-efficiency equipment
- The potential for increased relationships between distributors and AIC, CSG, and Leidos
- Distributors' views on 18+ SEER incentive options

Sample Design and Response

CSG's program manager provided the evaluation team with a list of 27 distributors, broken into northern and southern regions. The list included individual distributor contact names and region. Using this list, the team isolated and contacted distributors in Illinois.

The evaluation team conducted distributor interviews during September 2015. As shown in Table 4, the effort achieved 10 completed surveys: five from the northern region and five from the southern region.

Table 4. Completed Distributor Interviews

Distributor Sample[a]	Target	Completed	Response Rate
27	10	10	37%

[a] CSG provided a list of distributors in contact with the program and selling equipment in AIC's service territory.

The evaluation team conducted distributor interviews from September 4 to 28. Of the distributors interviewed, 50% were also interviewed for the PY6 evaluation; the other half had not previously participated in an interview for the HVAC program evaluation.

2.2.4 SEER Incremental Cost Analysis and Database Review

The evaluation team used invoices collected from AIC program participants, along with information collected from participant contractors, to identify the incremental costs associated with purchase and installation of different SEER level ASHP and CAC systems. The team reviewed 170 invoices to determine installation cost of CAC and ASHP equipment. The team randomly sampled and then reviewed invoices to collect cost information for 17 ASHPs and 17 CACs for each integral[1] SEER value from 14.5 SEER to 18.9 SEER equipment. Nine contractors identified in these same invoices provided cost information on SEER 13 equipment, which initially served as the baseline for the analysis. The Cadmus team scheduled short interviews with 10 contractors, nine of which could provide usable data on baseline prices. Cadmus later updated the findings with data collected from pricing data provided by three of the distributors interviewed for the process evaluation.

[1] Seventeen invoices for SEER 14.5-14.9, 17 invoices for 15.0-15.9, etc. for both CACs and ASHPs.

Appendix B provides findings from this analysis.

The team also randomly sampled 70 projects from the HVAC program and requested invoices for each sampled project to verify accuracy of tracking data recorded in the database. The team also used the invoices sampled for the incremental cost analysis to verify accuracy of tracking data.

2.2.5 Impact Analysis Approach Methods

Gross Impact Analysis Approach

For PY7, the evaluation team determined gross impacts by using the program tracking database and the appropriate savings algorithm, as specified in the Illinois Statewide Technical Resource Manual (TRM) V3.0. Table 5 shows parameters used to determine savings for CACs, heat pumps, and furnace blower motors (the ECMs).

Table 5. Parameters used to Determine Gross Energy and Demand Savings

Parameter	ECM Value	ASHP Value	CAC Value	Data Source
$FLH_{cooling}$	Location 1-5	Location 1-5	Location 1-5	Zip code from tracking data to determine the county (location). Use the county in Table 3.8 of the TRM to determine cooling climate zone (1-5).
$Capacity_{cooling}$		Equipment Nameplate	Equipment Nameplate	Tracking database.
$SEER_{base}$		ER:[a] Varies	ER:[a] Actual or 10 if unknown	If ASHP replacing ASHP: 9.12. If ASHP replacing CAC: 8.6. If ASHP with no cooling: 0 (negative savings).
		TOS:[b] 13	TOS:[b] 13	TRM (federal standard).
$SEER_{ee}$		Equipment Nameplate	Equipment Nameplate	Tracking database.
$FLH_{heating}$		Location 1-5	Location 1-5	Zip code from tracking data to determine the county (location). Use county in Table 3.7 in TRM to determine heating climate zone (1-5).
$Capacity_{heating}$		Equipment Nameplate	N/A	Tracking database.
$HSPF_{base}$		ER: [a] Varies	N/A	If replacing ASHP: 5.44 (TRM). If replacing electric heat: 3.41 (TRM). Actual reported (Tracking database).
		TOS:[b] 7.7	N/A	TRM (federal standard).
$HSPF_{ee}$		Equipment Nameplate	Equipment Nameplate	Tracking database.
EER_{base}		ER [a]: Varies	ER [a]: Actual or 9.2 if unknown	If ASHP replacing ASHP: 8.55. If ASHP replacing CAC: 8.15. If ASHP with no cooling: 0 (negative savings). Or algorithm (see below).
		TOS[b]: 11.2	TOS[b]: 11.2	TRM (federal standard).

Parameter	ECM Value	ASHP Value	CAC Value	Data Source
EER_{ee}		Equipment Nameplate	Equipment Nameplate	Tracking database.
CF_{pjm}	46.6%	46.6%	46.6%	TRM.
CF_{peak}	68%	72%	68%	TRM.
ECM Heating Savings	418 kWh			Deemed (TRM).
ECM Cooling Savings	With AC: 263 kWh No AC: 175 kWh Unknown: 241 kWh			Tracking database data field showing whether AC is present.
ECM Shoulder Savings	51 kWh			Deemed (TRM).
ECM Demand Savings	$\frac{ECM\ Cooling\ Savings}{FLH_{cooling}} \times CF$			FLH from zip code in tracking database.

[a] ER

[b] Time of sale

The team followed the TRM algorithms to determine savings, with one exception. For ER measures, the TRM recommends using the known or estimated SEER and EER ratings of existing equipment. The tracking database included SEER values of existing equipment, but it did not include EER values. If the EER is unknown, the TRM recommends using 9.2 EER for an air conditioner that replaces an existing, operating air conditioner. When the known SEER was less than 9.2, but the EER was not known, the evaluation team did not use the recommended 9.2 EER value as SEER should be equivalent to or greater than EER. Instead, the team calculated EER using the following algorithm:

$$EER = -0.02 \times SEER^2 + 1.12 \times SEER$$

As the TRM uses this algorithm for air source heat pumps, the evaluation team adopted it for CACs.

The TRM recommends using different full-load hour (FLH) values in the energy savings algorithm for five different locations (as shown in Table 6). The TRM includes two tables (TRM V3.0 Table 3.7 and 3.8) that list every county and its climate zone. The tracking database includes an address and zip code for every measure installation but does not include the county or climate zone information. To determine the climate zone for each measure reported, the evaluation team determined the Illinois county using the zip code in the tracking database. Applying Table 3.7 and Table 3.8 in the TRM, the team then looked up the county's climate zone for every measure installation.

Table 6. FLH Values from TRM

Climate Zone (City Based Upon)	Single-Family FLH Cooling	FLH Heating
1 (Rockford)	512	1,969
2 (Chicago)	570	1,840
3 (Springfield)	730	1,754
4 (Belleville)	1,035	1,266
5 (Marion)	903	1,288
Weighted Average	629	1,821

Net Impact Analysis Approach

Using the NTGR framework and values agreed upon by the SAG, the evaluation team estimated net savings using the NTGR values in Table 7.

Table 7. NTGR Values by Measure Group

Measure Type	Freeridership	Participant Spillover	Non- Participant Spillover	Overall NTGR Value
<SEER 16 CAC/ASHP	57.0%	0.1%	22.0%	**65.1%**
SEER 16+ CAC/ASHP	50.0%	0.1%	22.0%	**72.1%**
<SEER 16 CAC/ASHP (ER)	69.0%	0.1%	22.0%	**53.1%**
SEER 16+ CAC/ASHP (ER)	44.0%	0.1%	22.0%	**78.1%**
Brushless Motors	56.0%	0.1%	22.0%	**66.1%**

2.2.6 Net-To-Gross

To estimate net savings for PY7, the evaluation team multiplied the NTGR (as specified above) to gross savings for five measure groups.

2.3 Sources and Mitigation of Error

Table 8 provides a summary of possible sources of error associated with research tasks conducted for the HVAC Program. We discuss each item in detail below.

Table 8. Possible Sources of Error

Research Task	Survey Errors		Non-Survey Errors
	Sampling Errors	Non-Sampling Errors	
Distributor Interviews	• Yes	• Non-Response	• N/A
Impact Analysis	• N/A	• N/A	• Analysis errors

The evaluation team took a number of steps to mitigate potential sources of error throughout the planning and implementation of the PY7 evaluation.

Survey Errors

- **Sampling Errors**
  - The evaluation team called 23 of the total population of 27 distributors to achieve our goal of 10 responses. This resulted in a sampling error of +- 7% at 90% confidence.
- **Non-Sampling Errors**
  - **Non-Response:** While the response rate for the interviews is moderately high at 37%, there is the potential for non-response bias. The team attempted to mitigate possible bias by calling on different days of the week, as well as at different times of the day.

Gross Impact Calculations

- **Data Invoice Review:** The evaluation team reviewed 85 CAC invoices and 85 ASHP invoices from the incremental costs analysis and an additional 70 invoices randomly sampled from all HVAC projects to compare parameter values recorded in the tracking database (e.g., SEER, tons, location) to the values in the invoices. We used this review to confirm the accuracy of the tracking data and to make adjustments if necessary.
- **Tracking Data Review:** If a parameter value in the tracking database fell outside the expected range of values, the team corrected the value. For example, if the capacity value was 360,000 BTUs (equivalent to a 30-ton system), the team confirmed the value should have been 36,000 BTUs by looking up the capacity using the AHRI certificate number. The team then corrected erroneous values.
- **Data Processing Error**: To calculate gross impacts, the team applied the TRM calculations to participant data in the tracking database. Then, to minimize data processing errors, the team had all calculations reviewed by a company senior staff peer reviewer, verifying that the team member accurately performed the calculations.

Net Impact Calculations

- **Data Processing Error**: The evaluation team applied the prospective deemed NTGR to estimate program net impacts. To minimize data processing error, the team had a senior staff member review and verify all calculations.

3. Evaluation Findings

3.1 Program Description

AIC began offering HVAC incentives in June 2009. Over the last six years, AIC has modified the incentive amounts and equipment requirements, changing as the federal standards for equipment efficiency changed, adding and removing gas equipment incentives, and revising heat pump and central air conditioning incentives. Conservation Services Group (CSG) implemented the program since 2009.[2] In PY7, Leidos joined the team in the role of program implementer, keeping CSG on board as an implementation subcontractor. These two implementation partners work closely with AIC program managers to track and report program progress, support and train contractors, and offer suggestions to improve program performance and to respond to evaluation recommendations.

The HVAC Program offers incentives for purchases of high-efficiency air-source heat pumps (ASHPs), central air conditioners (CACs), and electronically commutated motors (ECMs), installed by an HVAC Program-registered trade ally. Applicable federal equipment standards serve as baseline efficiency conditions for new heating and cooling systems at time of sale (TOS)[3]. For early replacement (ER) measures, existing system efficiency serves as the baseline. Program requirements include sizing specifications, efficiency standards, and other features, such as a matching indoor and outdoor coil requirement for new air conditioning equipment.

To be considered ER, a unit being replaced must function and have a SEER ≤ 10. The term "functioning" means the unit operates, providing sufficient space conditioning (i.e., heat exchanger, compressors, pumps work effectively) and/or repair costs under 20% of the new baseline replacement cost. Through this offering, the program encourages customers to retire equipment for newer, more-efficient units. In PY7, AIC offered three different incentives, depending on the SEER level of new equipment and the condition of replaced equipment (see Table 9).

Originally, CSG recommended removal of all lower-tier equipment (SEER 14.5–14.9 and SEER 15–15.9) from the program offering in PY7 to focus program funds on driving customers to SEER 16 and higher equipment. However, due to uncertainty regarding cost-effectiveness calculations for SEER 16 CAC offerings (whether SEER 16 CACs were cost-effective), AIC decided to incent lower-tier CAC incentives in November 2014. AIC discontinued its incentives for HVAC gas measures in PY7, with the exception of ECMs, and eliminated rebates for ground source heat pumps (GSHP).

Incentive levels vary according to equipment types and efficiency levels. AIC customers receive an incentive for installation of new equipment (replacing a working unit [ER] or a non-working or new construction unit [TOS]); the incentive appears as a line-item deduction on contractors' installation invoices. By offering these incentives, AIC seeks to persuade customers to purchase higher-efficiency equipment than they might install otherwise.

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[2] CLEAResult purchased the assets of CSG in April of 2015.

[3] The TRM definition of TOS: A program in which the customer is incented to purchase or install higher efficiency equipment than if the program had not existed. This may include retail rebate (coupon) programs, upstream buydown programs, online store programs or contractor-based programs as examples.

AIC has not changed the participation process since its presentation in the PY4 evaluation report's annex, passing the incentive through registered contractor trade allies that offer residential customers a line-item discount equal to the incentive's value on purchases of high-efficiency equipment. Contractors install the higher-efficiency equipment, include the discount amount on the receipt, and submit invoices with incentive applications to CSG. AIC reimburses contractors based on a set price per SEER level. In PY7, AIC offered three different incentives, depending on SEER level of new equipment and the condition of replaced equipment, as shown in Table 9 (below). Overall, incentives for CAC and ASHP equipment decreased, while the ECM incentive increased over PY6 levels.

Program managers market the program to customers primarily through bill inserts and direct mailings, along with some radio and print media. CSG divides the AIC account territory into northern and southern regions, and assigns one account representative to each region to provide outreach and program support to contractors and distributors. CSG also reaches out to and supports registered contractors by providing training seminars.

Table 9. Changes in Incentive Levels from PY3 to PY7

Measure	Details	PY3	PY4	PY5/PY6	PY7	PY6-PY7 Change
ASHPs						
ASHP SEER 14.5–14.9	New efficient equipment replacing > SEER 10	$110	$150	$150	Not Offered	N/A
	ER of SEER 10 or less	$400	$400	$450	Not Offered	N/A
ASHP SEER 15.0–15.9[a] (No 15.0 baseline in PY4)	New efficient equipment replacing > SEER 10	$110	$150	$200	Not Offered	N/A
	ER of SEER 10 or less	$400	$400	$500	Not Offered	N/A
ASHP SEER 16+	New efficient equipment replacing > SEER 10	$200	$200	$300	$200	-$100
	ER of SEER 10 or less	$600	$600	$600	$500	-$100
GSHPs						
GSHP	Installing a new GSHP	$600	$600	$600	Not Offered	N/A
CACs[a]						
CAC SEER 14.5–14.9	New efficient equipment replacing > SEER 10	$100	$100	$150	$100	-$50
	ER of SEER 10 or less	$250	$250	$450	$400	-$50
CAC SEER 15.0–15.9*	New efficient equipment replacing > SEER 10	$100	$100	$200	$150	-$50
	ER of SEER 10 or less	$250	$250	$500	$450	-$50
CAC SEER 16+	New efficient equipment replacing > SEER 10	$125	$125	$300	$200	-$100
	ER of SEER 10 or less	$350	$350	$600	$500	-$100
Gas Furnaces						
Gas Furnace 92% AFUE	New efficient equipment replacement	$125	$125	Not Offered	Not Offered	N/A
Gas Furnace ≥ 95% AFUE	New efficient equipment replacement	$200	$200	$200	Not Offered	N/A
	ER	Not Offered	Not Offered	$400	Not Offered	N/A
Gas Furnace ≥ 97% AFUE	New efficient equipment replacement	$200	$200	$300	Not Offered	N/A
	ER	Not Offered	Not Offered	$500	Not Offered	N/A
ECMs						

Measure	Details	PY3	PY4	PY5/PY6	PY7	PY6-PY7 Change
Brushless ECM Furnace	New furnace equipped w/brushless DC motor	Not Offered	Not Offered	$80	$200	$120
Gas Boilers						
Gas Boiler ≥ 90% AFUE	New efficient equipment replacement	$500	$500	$400	Not Offered	N/A
	ER	Not Offered	Not Offered	$800	Not Offered	N/A
Gas Boiler ≥ 95% AFUE	New efficient equipment replacement	$500	$500	$500	Not Offered	N/A
	ER	Not Offered	Not Offered	$1,000	Not Offered	N/A

[a] CAC lower tier incentives were reintroduced midway through the PY7 period.

Contractors must enter into a participation agreement, which outlines all stakeholder responsibilities. Through CSG, the program offers sales and marketing training to registered trade allies. CSG sends out e-blasts to active and registered (AR) contractors upon scheduling the training seminars.

3.2 Program Design and Implementation

The HVAC Program experienced significant changes from PY6 to PY7, as well as within the PY7 period. For the PY6 evaluation, the evaluation team found minimal change from PY5 to PY6, but plans were underway to adjust program offerings in PY7 due to stakeholder input during the Plan docket. The team discussed PY7 program design changes and adjustments through interviews with AIC, Leidos, and CSG program staff.

Program Materials

The evaluation team reviewed program documents provided by the client, seeking to establish the presence and determined the clarity of document elements relative to their specific use.

This review included both application forms (one including lower tier CAC and the other not). The program updated the forms, upon reintroducing lower-tier CAC measures, to a fillable PDF format, including fields for physical and mailing addresses and check boxes to gather information on how customers heard about the program. The forms include all necessary fields, and which are easy to fill in. For PY7, which reintroduced lower-tier CACs, the program began requiring reservation numbers for ER units (these had always been required to confirm the working condition of a replaced unit) and TOS units (to track incentives paid for cost-ineffective units). As of May 1, 2015, the program returned to requiring reservations only for ER measures.

The evaluation team also reviewed the program's notification message regarding the PY7 launch (see Table 10). The e-mail communication included the location of new program forms and applications, described the program changes, and provided an action plan for handling the backlog of applications submitted using the PY6 application forms. This included links to two webinar sessions for trade allies, offering the opportunity to learn more about PY7 offerings and to participate in Q&A. The message also included contact information for North and South Territory account managers. Program staff noted the change in implementation structure and the number of program design changes for PY7 delayed finalizing PY7 program documents. As such, CSG was unable to send the notification e-mail to trade allies until August 2014.

Table 10. Program Update Communication Review

Key Features	Status
Presence of an official notification.	✓
Updated documents provided	✓
Includes description of key program changes.	✓
Contact information for key staff	✓
Prompt delivery to audience	×
Opportunities for Q/A	✓

Key: ✓ = present; x = not present

The PY7 implementation plan presented sufficient information regarding the changing roles and responsibilities surrounding Leidos' addition to the team, program goals and budgets, and the transition to using AMPLIFY (which would automatically generate reports). While the plan provided an organizational chart and description of positions, it did not present contact information for key staff.

Table 11. Implementation Plan Review

Key Features	Status
Identify changes in program implementation.	✓
Program staff roles clearly defined	✓
Other stakeholder roles clearly defined	✓
Program processes defined step-by-step	✓
EM&V protocols included	✓
Program staff contact information	×
All acronyms defined	✓

Key: ✓ = present; x = not present

The PY7 marketing plan in place set forth relevant information on critical success factors, key customer segmentation, and marketing strategies for the different initiatives. The plan also contained an organizational chart of AIC's marketing team. In addition, the plan listed key program messages, its target audience, and marketing channels used for residential programs. The plan discussed initiatives designed specifically for the HVAC program (e.g., initiative and timing), targeting residential customers and trade allies. Flyers specifically associated with the HVAC program included eligibility requirements, incentive levels, contact information, and a definition of SEER.

Table 12. Marketing Material Review

Key Features	Status
Presence of a marketing plan.	✓
Supporting documents provided (Website, brochures, etc.).	✓
Do supporting documents clearly describe the program and benefits?	✓
Presence of a network to promote the program through targeted outreach.	✓
Clearly defined marketing roles.	✓/×

Key: ✓ = present; ✓/x = partially present

The plan did not include a budget breakdown by sector and marketing channel, key staff contacts, or how marketing roles and responsibility broke down between AIC and its partners. Additionally, Leidos discussed moving away from the ActOnEnergy brand, using it only for the website. This was intended to create more brand awareness for AIC (since customers did not connect ActOnEnergy with AIC in previous program years), improve corporate satisfaction, and (eventually) ensure that all applications and forms would be branded primarily to AIC. The PY7 forms included names and logos for both entities.

3.2.1 PY7 Program Changes

For PY7, AIC discontinued its incentives for gas furnace measures, geothermal heat pumps, and lower-tier equipment offerings for electric ASHP systems (and planned to include CAC). AIC dropped the gas-saving measures due to stakeholder input during the Plan 3 docket. AIC dropped the other measures to incent the most cost-effective measures and to drive customers towards increasingly efficient equipment.

According to program staff interviewed, CSG recommended that AIC remove lower-tier incentives in PY7 and only offer CAC and ASHP incentives for 16 SEER and greater. However, the cost-effectiveness calculations indicated that SEER 16 CAC measures may not be cost-effective. Leidos intended to include lower-tier CAC measures by September 2014 to mitigate any potential cost effectiveness issues, but approval for this effort was delayed due to the time required to create and publish new forms and gain approval for the change and for final documents. Thus, HVAC program staff effectively incented SEER 14.5 to 15.99 CAC incentives in November 2014.

In PY7, Leidos Engineering (formerly SAIC) came on board as program implementer. CSG reported to Leidos through weekly meetings, and Leidos provided a weekly update to AIC. AIC reported a definite improvement in responsiveness and accountability over PY6, which respondents attributed to Leidos strengthening communication between program staff at AIC and CSG. CSG continues to take the lead on managing trade ally relationships and running day-to-day program activities.

Data management also changed in PY7. During the program year, Leidos began entering HVAC program information from PY1 to PY7 into its data tracking system, AMPLIFY, a Salesforce-based application. This data entry continued in PY8. Upon completion, staff will be able to enter invoice details into a single repository, from which AIC can query and extract participation information. For PY7, CSG continued to maintain its system and tracking information (which was then uploaded into AMPLIFY). Data collection did not change in PY7 as Leidos was working to integrate existing information into its system, and staff expected the system would fully launch in July 2015.

In April of 2015, AIC also made on-bill financing (OBF) available to customers purchasing a range of energy-efficient measures, including the HVAC measures. The evaluation team reviewed OBF separately.

3.2.2 Opportunities to Include Distributors

The evaluation team also investigated opportunities to improve the program by more fully integrating distributors as program trade allies. In PY6, AIC considered this option, but other considerations took precedence during PY7 (e.g., the introduction of Leidos, and the CAC cost-effectiveness concerns).

Most interviewed distributors embraced the idea of becoming an official partner with AIC in marketing the program and promoting higher-tier equipment. All but one distributor expressed interest in working in partnership with AIC to promote more energy-efficient equipment. Respondents indicated they felt the program helped make them money, and they would be happy to participate in efforts to increase sales of higher-SEER equipment.

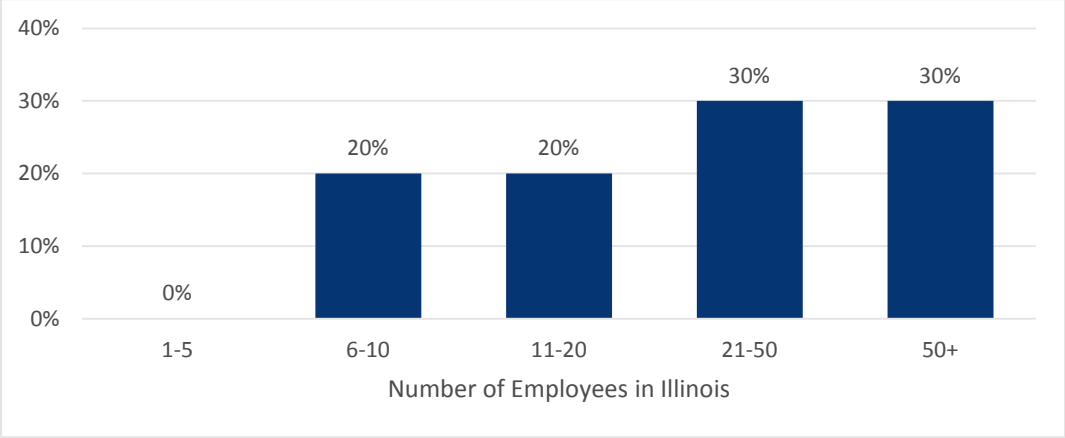
As to AIC actions to help distributors more fully participate in promoting energy-efficient equipment through the HVAC program, interviewees provided the following feedback:

- The program could include more of the equipment stocked by distributors who partner with AIC.
- The program should include a database of distributors in its service territory and should update distributors about program offerings as AIC does with contractors.
- AIC should work with distributors' marketing teams, providing 8.5" x 11" forms and training to use the forms to accurately sell program offerings. Training should include ways to contact AIC for more information.
- Provide marketing information, readily understandable to laypeople, that distributors can pass along to contractors and venders that they work with.
- Provide sales training to contractors regarding ways to promote higher-tier equipment and explain its benefits.

Eight distributors included in the interviews regularly contacted 25 to 300 contractors from their office locations. The other two distributors worked regularly with a notably higher number of contractors (over 1,500). Thus, partnerships with distributors could provide a way to contact a high number of contractors.

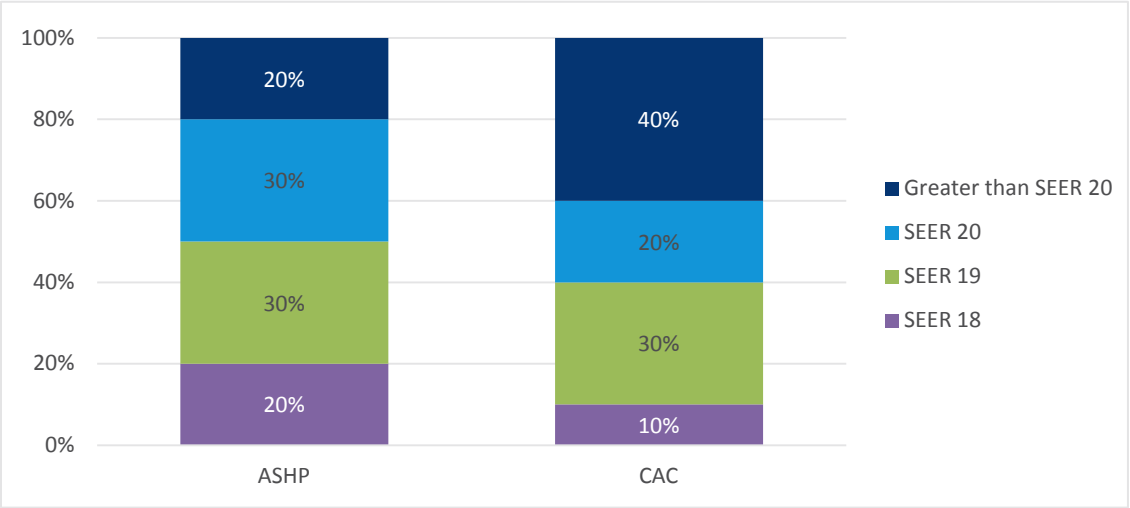
As shown in Figure 1, all distributors had staff of at least six people in the state of Illinois.

Figure 1. Staff Levels at Distributor Offices (n=10)



All distributors reported offering equipment of at least SEER 18, though more commonly reporting they offered equipment of SEER 20 or greater for CAC equipment than for ASHP equipment. Figure 2 shows the highest SEER equipment distributors reported selling.

Figure 2. Highest SEER Levels of Equipment Sold by Distributors (n=10)



CAC equipment represented a greater percentage of sales than ASHP equipment. As a percentage of annual sales, distributors reported an average of 36% of sales were for CAC equipment and 18% for ASHP equipment.

The evaluation team also investigated distributors' perceptions regarding the viability of offering incentives for CAC and ASHP equipment rated higher than SEER 16. Six out of 10 distributors thought sufficient customer interest justified adding incentives for higher SEER equipment; four said no, noting that incremental costs above SEER 16 were prohibitive without extremely high incentives—which was unlikely to occur. Even distributors that said enough customer interest existed noted the incentive would, at a minimum, need to be $800 to drive customers to SEER 18, with most distributors suggesting values of up to $2,800 (most suggestions ranged from $1,000 to $2,000).

Distributors reported that, while they saw opportunities to become involved in contractor training (and, for AIC, to make improvements in training) and to improve disseminating information on program changes, they felt AIC and its partners generally promoted the program well

3.3 Program Participation and Participant Characteristics

PY7 Participation

In PY7, the program exceeded its internal target for measures incented. As shown in Table 13, the program achieved its target for measures implemented at 101% of its target, despite falling below the target for the number of applications.

Table 13. Reported Program Targets and Percentage Achieved

Tracked Indicator	Targets	Results	Achieved as a % of Goal
Projects (number of measures)	6,168	6,248	101%
Applications (number)	6,051	4,223	70%

[a] *Ex post* net evaluated savings, as calculated by the evaluation team.
[b] Number of applications reported by CSG, including applications for multiple incentives.

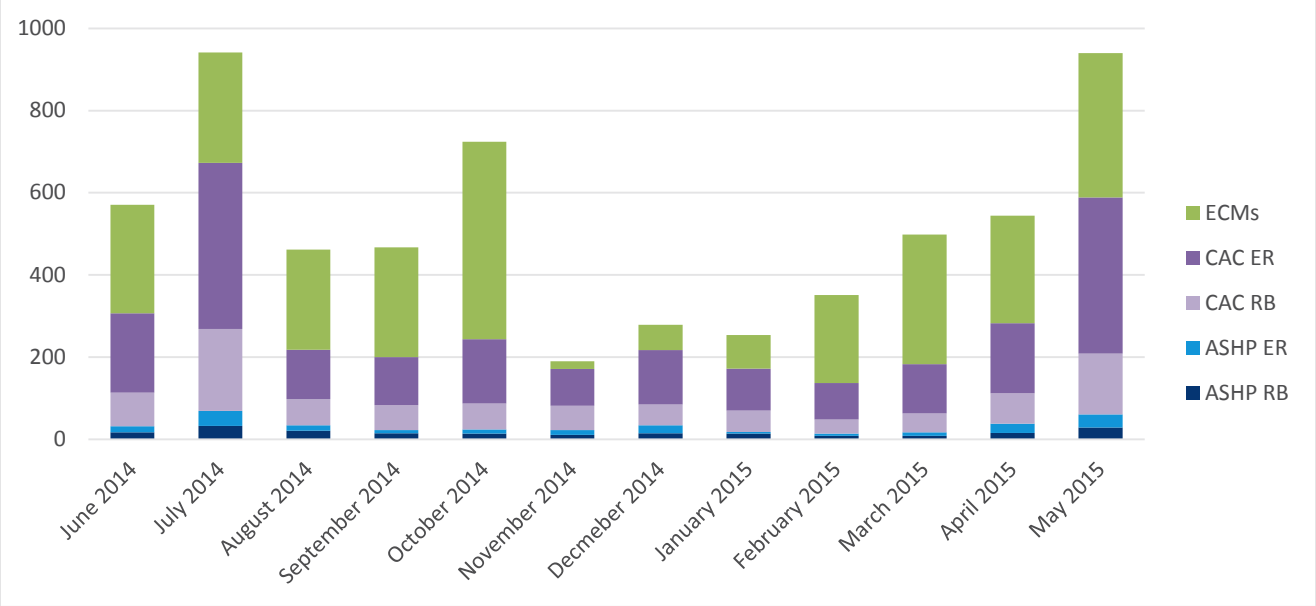
In PY7, program participation for CAC, ASHP, and ECM measures decreased. As shown in Table 14, the decrease in participation proved most notable for CAC/ASHP measures (perhaps due to lower incentive levels), where participation halved. Participation in the ECM measure declined by 33%, despite an increase in the incentive value. In PY6, participants were able to claim two incentives for a single furnace installation if the furnace included an ECM fan (and the furnace was at least 95% AFUE rated). Because of the loss of gas measure incentives, while the ECM incentive increased, the total possible incentive for a furnace installation decreased (by between $80 and $380 depending on measure installed). In PY6, where incentive levels and measures offered did not change, participation for CAC/ASHP measures increased by 49% over PY5, and ECM participants increased by 114%.

Table 14. Program Participation (Unique Participants) PY5 to PY7

Measure Type	Program Participation (N) PY5	Program Participation (N) PY6	Program Participation (N) PY7	Percent Change
CAC/ASHPs	4,408	6,547	3,303	-50%
ECM Fans	1,943	4,149	2,765	-33%
Total	**6,351**	**10,696**	**6,068**	**-43%**

As shown in Figure 3, program measures experienced two peak months over the PY7 period: July 2014 and May 2015. A smaller peak occurred in October 2014. The evaluation team observed a similar pattern in PY6. For electric measures, sales of ER CAC measures dominated during all months. ECM sales peaked in
October 2014. When interviewed, program staff reported that the addition of OBF seemed to have some impact of sales during PY7, but that they had not yet analyzed the data to evaluate the extent of its impact. Thus, speculation on its effect on HVAC participation was not included in this report.

Figure 3. Monthly Participation for PY7 Measures[a]



[a] Only PY7 measures included; though gas measures and geothermal heats pumps from PY6 and approved early in PY7 are counted in overall savings calculations, they are not displayed here.

Customer Participation

In PY7, the HVAC Program exceeded its targeted number of measure installations. The implementation staff interviews, AIC, Leidos, and CSG expressed satisfaction with installation levels.

CSG staff noted that several non-program related factors helped the program succeed in PY7:

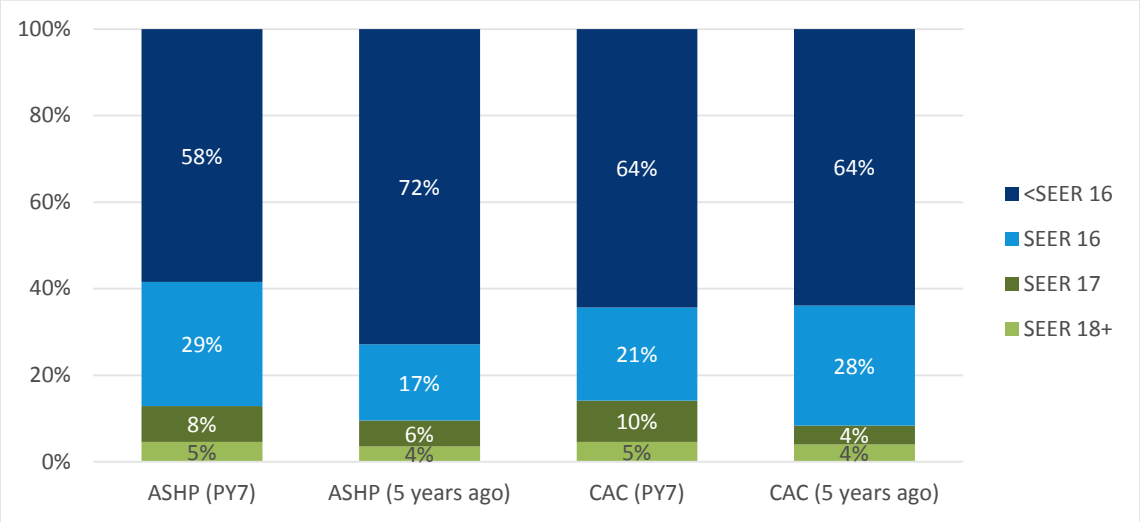
- **The economy's improvement**; CSG felt the economy's gradual improvement had reached a point (by the end of PY7) that affected customers' spending habits.
- **The addition of on-bill financing (OBF).** Rolled out in late April 2015, OBF provided a boost towards the end of the program year. Program staff reported the OBF option increased participation; the results are described in a separate evaluation.[4]

As shown in

Table 14, participation in PY7 measure types declined from PY6.

The evaluation team also discussed the past five years of market sales trends with distributors. We asked distributors to report what percentage of their sales make up different SEER levels. Figure 4 shows the average breakdown of sales for each equipment type in PY7 compared to 5 years ago.

Figure 4. Percent of Sales by SEER Level (Distributor interviews, averaged responses)



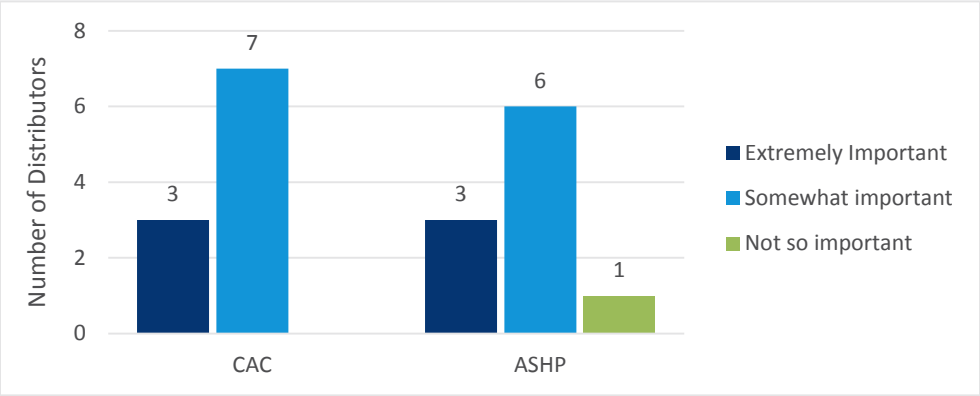
Distributors noted that at least 85% of sales were 16 SEER and below during both PY7 and five years ago. Distributors discussed that, while changing federal standards, utility rebates, and manufacturer rebates contributed to selling higher-tier equipment in PY7, the loss of federal tax credits available in 2009 and 2010 negatively impacted sales of higher-tier equipment.

[4] http://www.icc.illinois.gov/docket/files.aspx?no=11-0689&docId=230270

As Figure 4 displays, there were improvements in SEER 16 sales for ASHP over the five-year period, moving from 17% to 29% of sales. For SEER 17+ ASHPs, sales increased from 10% to 13%. For CACs, SEER 17+ sales as a percent of total increased from 8% to 15%.

Regarding the impacts of AIC's rebates, three of 10 distributors found the rebates to be extremely important in driving customer sales to higher-SEER units for CAC systems, with seven of 10 finding them somewhat important (as shown in Figure 5). Results were similar for ASHP with three of 10 finding the rebates to be extremely important and six of 10 finding them to be somewhat important. This distributor indicated that for ASHP the lower-tier incentives, which AIC discontinued, were more influential than the 16 SEER incentive.

Figure 5. Importance of AIC Incentives in Moving Customers to Higher-SEER Units



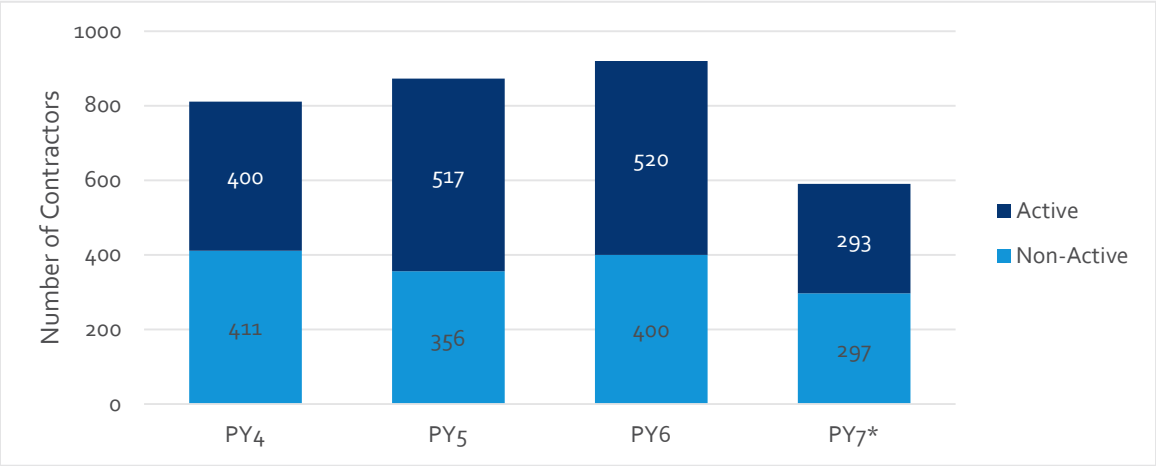
Contractor Participation

AIC reported 590 registered contractors for the HVAC program, 293 of which were active registered (AR) contractors. Previously, CSG defined AR contractors as those submitting a project application within the previous 12 months. For PY7, CSG defined AR contractors as those who participated in the current or previous program year (PY6 or PY7), by submitting a project application. If contractors continued to submit applications for other AIC programs, CSG considered them active. For PY8, the definition for active has changed to include those who attended a training session within the program year.

As shown in Figure 6, active contractor participation declined from PY6 to PY7 by 44%, with a substantial decline in the number of Non-Active Registered (NAR) contractors (NAR contractors declined by 26%) as well. Despite the participating contractor decline, CSG reported that outreach had been sufficient to meet program goals. For PY7, CSG sought to nurture existing relationships to minimize losses from program changes. CSG reported that many trade allies were unhappy about the program discontinuing its gas measure incentives.

CSG also noted that trade allies responded negatively to the number and impact of program changes made for PY7 (i.e., loss of gas measures, lower-tier measures). CSG reported that once contractors become familiar with a program, they integrate it into their sales process. Making any changes to these normal processes can negatively affect their participation. They noted, based on feedback from trade allies, that contractors found the changes throughout the year to be a rollercoaster.

Figure 6. Contractor Participation from PY4 to PY7

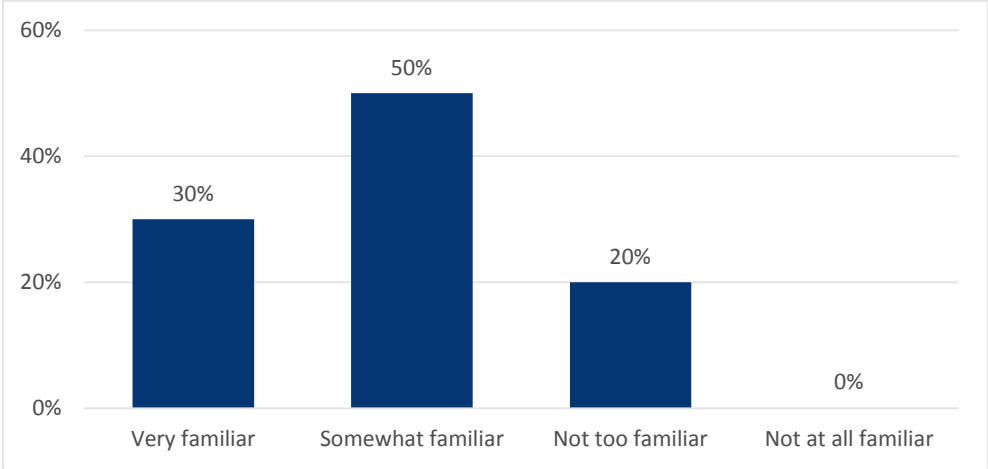


*Counts based on HVAC Ally List provided by AIC.

Distributor Program Awareness

The evaluation team also asked distributors about program awareness. As shown in Figure 7, eight of the 10 distributors interviewed indicated that they were very or somewhat familiar with the program. The other two distributors reported that they were not too familiar with the program.

Figure 7. Distributor Program Awareness (n=10)



More than half of distributors (six out of 10) reported they learned about the program through a participating program contractor. Others learned about the program through coworkers, a flier or direct mail from AIC, another distributor, or directly from an AIC representative.

Eight of the 10 distributors noted that they would prefer to receive information from AIC via e-mail.

3.4 Impact Evaluation

3.4.1 Gross Impacts

The evaluation team used tracking data and algorithms in the Statewide Technical Resource Manual (TRM) to determine gross savings for the HVAC Program. Detailed tracking information in the database included information such as unit type, size, efficiency, and measure installation locations. These served as inputs to savings algorithms in the TRM Version 3.0, effective June 2014. The team's review of the HVAC Program tracking data indicated that the information necessary for calculating savings was complete.

The evaluation team reported *ex ante* savings by summarizing results from the tracking database. The team calculated *ex post* savings for every installed measure, in accordance with the TRM Version 3.0.

The team reviewed 240 invoices to verify *ex ante* savings estimates and found four discrepancies. Program staff incorrectly categorized two systems into a higher efficiency measure group (e.g., 15.5 SEER actual efficiency categorized in the 16+ SEER measure group). Similarly, program staff incorrectly categorized two systems into a lower efficiency measure group. Recalculating savings with updated parameters and new savings values offset and resulted in a 100% verification rate for all HVAC Program measures.

Table 15 shows annual *ex ante* and *ex post* electric savings for TOS CACs, ER CACs, TOS ASHPs, ER ASHPs, and ECM furnace fan measure categories. The evaluation team combined measures in these categories to coincide with the SAG NTG measure categories. Although energy realization rates varied from 91% to 117%, the overall gross energy realization rate was very nearly 100%. Demand savings realization rates varied from 74% to 112% and the overall gross demand realization rate was 81%. Table 15 shows the gross *ex ante* and *ex post* energy and demand savings as well as the realization rates, by measure and system type.

Table 15. Gross Ex Ante and Ex Post Energy and Demand Impacts and Gross Realization Rates, by Measure and System Type

Measure	*Ex Ante* Annual Gross Savings		*Ex Post* Annual Gross Savings		Gross Realization Rate[a]	
	kW	kWh	kW	kWh	kW	kWh
CAC TOS	269	294,808	213	336,694	79.0%	114.2%
CAC ER	2,400	2,639,983	1,780	2,624,612	74.2%	99.4%
ASHP TOS	84	466,441	94	543,573	111.8%	116.5%
ASHP ER	196	1,785,665	176	1,621,798	89.9%	90.8%
ECM	633	2,006,460	651	2,049,284	102.9%	102.1%
Total	**3,583**	**7,193,357**	**2,914**	**7,175,962**	**81.3%**	**99.8%**

[a] Gross realization rate = *ex post* gross savings ÷ *ex ante* gross savings. The evaluation team calculated the realization rate before rounding *ex post* and *ex ante* values.

Table 16 summarizes results from the evaluation team's energy savings analysis, showing the measure counts, *ex ante* savings, *ex post* savings, and gross realization rates for each measure type. The tables below do not show the *ex ante* verification rate determined from the tracking database review because the team found a verification rate of 100%.

Table 16. Measure Level Counts, Gross Ex Ante and Ex Post Energy Savings (kWh) and Gross Realization Rates, by Measure Type

Measure Type	Count of Reported Measures	*Ex Ante* Annual Gross Savings	*Ex Post* Annual Gross Savings	Gross Realization Rate
ASHP 14.5-14.9 SEER	9	8,828	6,077	68.8%
ASHP 15.0-15.9 SEER	15	18,182	11,947	65.7%
ASHP 16+ SEER	178	305,466	269,840	88.3%
ASHP ER 14.5-14.9 SEER - Replaces ASHP	18	94,460	89,624	94.9%
ASHP ER 14.5-14.9 SEER - Replaces Resistance	1	12,321	11,313	91.8%
ASHP ER 15.0-15.9 SEER - Replaces ASHP	16	87,664	80,056	91.3%
ASHP ER 15.0-15.9 SEER - Replaces Resistance	1	12,552	11,557	92.1%
ASHP ER 16+ SEER - Replaces ASHP	50	299,150	290,406	97.1%
ASHP ER 16+ SEER - Replaces Resistance	98	1,279,517	1,138,843	89.0%
CAC 14.5-14.9 SEER	124	24,205	25,352	104.7%
CAC 15.0-15.9 SEER	139	34,972	39,520	113.0%
CAC 16+ SEER	666	235,631	271,821	115.4%
CAC ER 14.5-14.9 SEER	377	437,509	434,616	99.3%
CAC ER 15.0-15.9 SEER	301	366,287	385,456	105.2%
CAC ER 16+ SEER	1,392	1,836,187	1,804,541	98.3%
ECM - Brushless Motor - with Furnace	2,828	2,006,460	2,049,284	102.1%
GSHP 18.5 EER 3.7 COP	35	133,966	255,709	190.9%
Grand Total	**6,248**	**7,193,357**	**7,175,962**	**99.8%**

Ex post energy savings values differ from *ex ante* values because the evaluation team estimated savings for every reported measure by following the TRM V3.0 methodology. The energy realization rates varied because the evaluation team used specific parameter values for each installation, such as location (to determine the FLH value), precise system size, and efficiency to calculate annual *ex post* energy savings.

Table 17 summarizes results from the evaluation team's demand savings analysis, showing the measure types, measure counts, *ex ante* savings, *ex post* savings, and gross realization rates.

Table 17. Measure Level Counts, Gross Ex Ante and Ex Post Demand Savings (kW) and Realization Rates, by Measure Type

Measure Type	Count of Reported Measures	*Ex Ante* Annual Gross Savings	*Ex Post* Annual Gross Savings	Gross Realization Rate
ASHP 14.5-14.9 SEER	9	1.4	1.4	95.3%
ASHP 15.0-15.9 SEER	15	3.5	3.3	95.3%
ASHP 16+ SEER	178	58.6	42.4	72.5%
ASHP ER 14.5-14.9 SEER - Replaces ASHP	18	15.8	16.0	101.4%
ASHP ER 14.5-14.9 SEER -	1	1.0	0.7	63.4%

Measure Type	Count of Reported Measures	*Ex Ante* Annual Gross Savings	*Ex Post* Annual Gross Savings	Gross Realization Rate
Replaces Resistance				
ASHP ER 15.0-15.9 SEER - Replaces ASHP	16	14.8	14.5	97.9%
ASHP ER 15.0-15.9 SEER - Replaces Resistance	1	1.1	1.2	107.9%
ASHP ER 16+ SEER - Replaces ASHP	50	50.3	51.5	102.3%
ASHP ER 16+ SEER - Replaces Resistance	98	113.1	92.5	81.8%
CAC 14.5-14.9 SEER	124	21.2	17.4	81.9%
CAC 15.0-15.9 SEER	139	28.9	28.1	97.3%
CAC 16+ SEER	666	219.1	167.3	76.4%
CAC ER 14.5-14.9 SEER	377	379.6	289.0	76.1%
CAC ER 15.0-15.9 SEER	301	309.6	263.0	85.0%
CAC ER 16+ SEER	1,392	1,710.8	1,227.6	71.8%
ECM - Brushless Motor - with Furnace	2,828	633.0	651.3	102.9%
GSHP 18.5 EER 3.7 COP	35	20.8	47.1	226.6%
Grand Total	**6,248**	**3,583**	**2,914**	**81.3%**

Ex post savings values differ from *ex ante* values because the evaluation team estimated savings for every reported measure by following the TRM V3.0 methodology. The demand realization rates varied because the evaluation team used specific parameter values for each installation, such as location (to determine the FLH value), precise system size, and efficiency to calculate annual *ex post* demand savings. The annual *ex ante* demand savings are based on deemed values for each measure type. The 16+ SEER early replacement CAC measure contributed nearly 50% of the total *ex ante* demand savings. The evaluation team calculated a relatively low realization rate (72%) for this measure group primarily because average system size (2.5 tons) was about 20% smaller than expected. The deemed savings estimates for all ASHP and CAC measures are based on a 3-ton system size.

3.4.2 Net Impacts

Table 18 shows program net *ex ante* and *ex post* savings, determined by applying the NTGR values agreed to by SAG.

Table 18. Net Ex Ante and Ex Post Annual Savings, by Measure Type

Measure Type	NTGR	*Ex Ante* Annual Net Savings		*Ex Post* Annual Net Savings	
		kW	kWh	kW	kWh
<SEER 16 CAC/ASHP	65.1%	36	56,113	33	53,965
SEER 16+ CAC/ASHP	72.1%	201	390,136	151	390,538
<SEER 16 CAC/HP (ER)	53.1%	383	536,729	310	537,702
SEER 16+ CAC/HP (ER)	78.1%	1,480	2,771,608	1,108	2,725,299
Brushless Motors	66.1%	418	1,326,242	431	1,354,577

Measure Type	NTGR	*Ex Ante* Annual Net Savings		*Ex Post* Annual Net Savings	
		kW	kWh	kW	kWh
Total		**2,518**	**5,080,828**	**2,033**	**5,062,081**
			Net Realization Rate[a]	69.8%	70.5%

[a] Net realization rate = *ex post* annual net savings ÷ *ex post* annual gross savings. The total ex post annual gross savings value is in Table 16. The evaluation team calculated the realization rate before rounding *ex post* and *ex ante* values.

4. Conclusions and Recommendations

Conclusion 1: Overall, PY7 HVAC program participation and performance met expectations. However, changes made to program offerings and implementation highlighted some challenges associated with adjusting the program. Addressing these could smooth the transition between program years. Program staff at all organizations cited hurdles faced throughout the year, including delays in getting from approval to publication of documents, to making decisions about appropriate incentive levels. Overall, staff were able to work together to resolve these issues. Understanding and addressing these issues in the future should ease the transition across program years.

- Recommendation 1. When program changes are necessary, provide early communication across multiple mediums along with training prior to rolling out changes to contractors so they feel comfortable moving into new program years. As noted in the PY6 evaluation, an understanding of program details is paramount to contractors feeling confident in promoting the program.
- Recommendation 2: Plan for an appropriate amount of time to both create and disseminate program documents upon approval of program changes. AIC staff noted that there were delays in getting PY7 forms updated and disseminated in the first months of PY7. Streamlining the transition, by ensuring timely approval and publishing of forms, could help control budgets ensuring that only measures from the current program year are incentivized (minimize overlap of previous year incentives).
- Recommendation 3: Evaluate the effects from a change in the chain of command after one year with Leidos in the program implementer role. With the addition of Leidos, the program team adjusted roles and responsibilities of AIC, Leidos, and CSG based on the perceived strengths and capabilities of each organization. The evaluation team suggests that, after having a year to settle into the new partnerships, this may be an effective time to review the progress of this reallocation and to ensure allocation of roles and responsibilities are clearly defined and implemented.

Conclusion 2: Distributors expressed mixed opinions about the current array 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 HVAC equipment for at least one equipment type (one specified that the incentive was too low just for ASHP). Respondents submitted mixed opinions regarding the viability of offering incentives for equipment above SEER 16 (e.g., SEER 18 or SEER 20 rebates), given the substantial incremental cost increase above SEER 16. This feedback is consistent with the evaluation team's research in PY6 (see PY6 Report) where we determined that at efficiency levels of 16 or above, larger incentives would be necessary to drive participation. Consistent with the PY6 analysis recommendations, AIC eliminated <SEER 16 ASHP rebates, but kept a nominal <SEER 16 CAC rebate. While the program saw a drop in overall participation, due to these changes in <SEER 16 rebates, based on our PY6 analysis <SEER 16 ASHP participants were more likely to be freeriders.

- Recommendation 1: If budget and cost effectiveness allows, AIC and CSG/Leidos should consider increasing incentives for higher tier equipment as described in the PY6 evaluation report.[5]

Conclusion 3: While a contractor survey was not conducted for PY7, feedback from distributors indicated many contractors continued to experience difficulty in knowing how to (or being willing to) push higher-SEER equipment over baseline equipment. Materials and training sessions provided to contractors should focus on marketing and selling techniques.

- Recommendation 1: AIC and CSG/Leidos should continue to improve materials, ensuring consistency in messaging, removing old materials where possible (e.g., old website information), and providing distributors and other trade allies with new materials to disseminate to contractors. Training sessions and materials should include selling points and techniques for encouraging customers to move to equipment options that are more efficient.

Conclusion 4: While distributors' ability to drive participation remains unknown, they could serve as a valuable and low-cost resource for increasing program awareness and disseminating marketing materials to contractors.

- Recommendation 1: The evaluation team recommends involving distributors in the program as a resource for disseminating information to contractors. Inviting distributors to join trade ally training and webinar events would ensure they remain aware of the program and can pass along information to their contractor networks. Other opportunities to involve distributors may include helping to develop information on how to sell high-efficiency equipment benefits and co-marketing efforts.

- Recommendation 2: Distributors should be included in all training sessions and marketing efforts for at least two reasons. First, they could serve as a resource to AR and NAR contractors, assisting in promoting higher-tier equipment. Second, they offer a potential path toward market transformation through non-program contractors (e.g., they could provide case studies from the program or promotional information to their contractor partners).

[5] PY6 evaluation report located here: http://ilsagfiles.org/SAG_files/Evaluation_Documents/Ameren/AIU%20Evaluation%20Reports%20EPY6/AIC_PY6_HVAC_Report_FINAL_2015-03-12.pdf

A. Appendix—Data Collection Instruments

AIC PY7 HVAC Staff Interview Guide.doc

AIC PY7 HVAC Distributor Guide FI

B. ECM Natural Gas Impacts

According to the TRM Version 3.0, installation of an ECM in a home will increase the heating load due to reduced waste heat. Table 19 shows total gross *ex ante* and *ex post* therm savings attributable to ECM installations.

Table 19. Summary of Database Analysis Results—Therm Savings[a]

Measure	# ECM Fans Installed in Gas Furnaces	*Ex Ante* Annual Gross Savings	*Ex Post* Per-Unit Gross Savings	*Ex Post* Annual Gross Savings	Annual Gross Realization Rate
ECM	2,828	0	-14.3	-40,333*	N/A

[a] Negative savings represents an increase in therm consumption due to ECM installation

Table 20 shows ECM net *ex ante* and *ex post* savings, determined by applying the NTGR value agreed to by SAG.

Table 20. Net Ex Ante and Ex Post Annual Savings

Measure Type	NTGR	*Ex Ante*	*Ex Post*
		Annual Net Savings	Annual Net Savings
		Therms	Therms
ECM	66.1%	-	(26,660)
Total		**-**	**(26,660)** [a]

[a] Negative savings due to reduced waste heat from this measure (See Table 19)

C. Appendix—Incremental Cost Findings

Forthcoming based on discussion within the Technical Advisory Committee (TAC).

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