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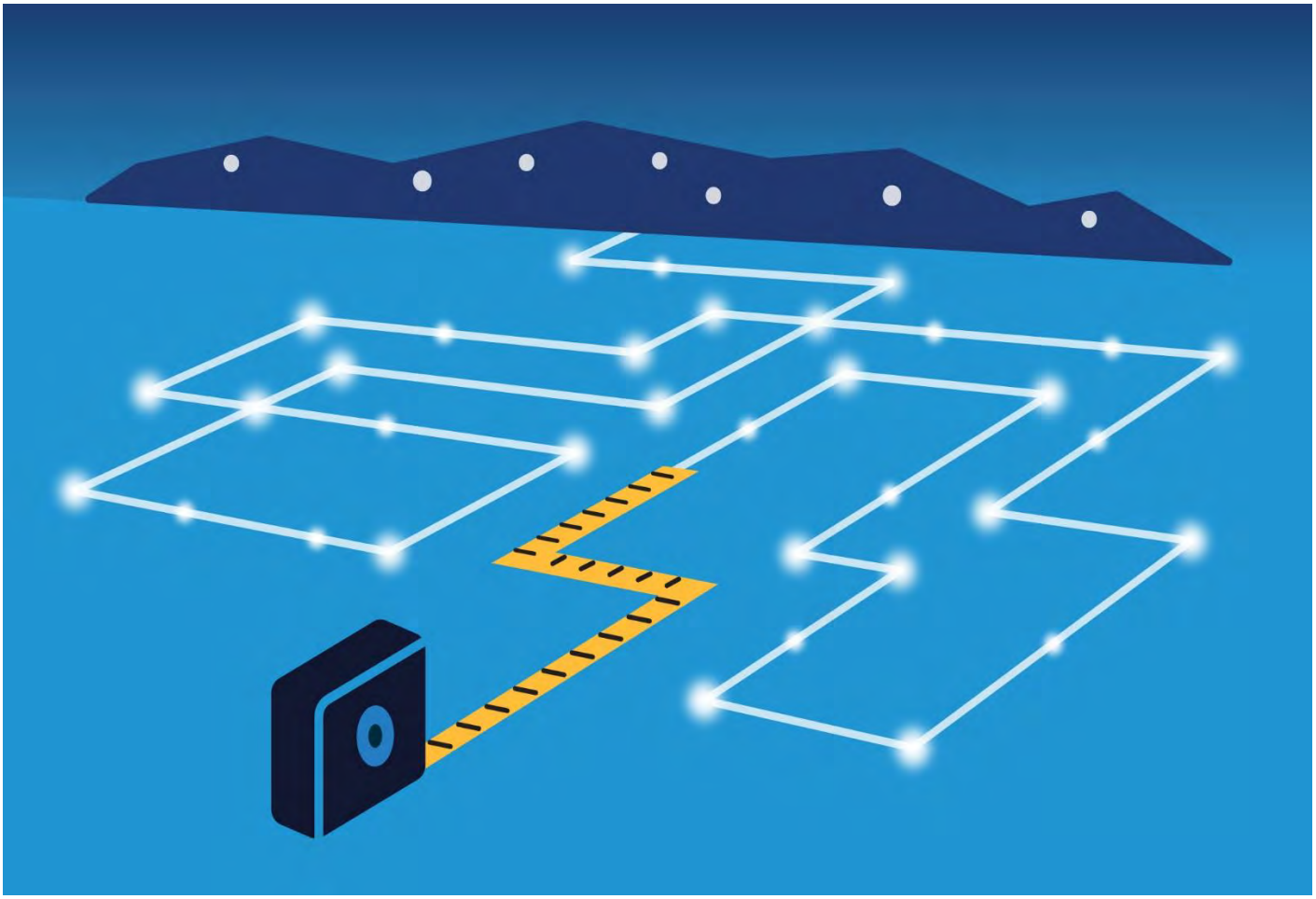

Process and Impact Evaluation of the 2013 (PY6) Ameren Illinois Company HVAC Program

Final

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1. Executive Summary

In Program Year 6 (PY6), the Ameren Illinois Company (AIC) Residential Heating and Cooling Program (HVAC Program) offered customer incentives for purchases of high-efficiency furnaces, brushless/electronically commutated motors (ECMs), boilers, air-source heat pumps (ASHPs), ground-source heat pumps (GSHPs), and central air conditioners (CACs). All equipment requires installation by an AIC HVAC-registered program ally. Incentive levels varied according to equipment types and baseline efficiency levels. AIC offered the same incentive levels as those offered in PY5 to maintain consistency across the 2 years. Conservation Services Group (CSG) implemented the HVAC Program for AIC in PY6.,

AIC expected this program to produce 7% of the overall PY6 portfolio's electric savings and 30% of the overall PY6 portfolio's therm savings. According to the AIC HVAC program manager and evaluation results, the program exceeded its PY6 MWh savings goals of 4,978 MWh by about 47% and its demand and gas savings goals of 2.6 MW and 712,610 therms by about 70%.

This report addresses AIC's PY6 HVAC research questions regarding program performance for the period from June 1, 2013 through May 31, 2014. To support this study, the evaluation team conducted the following:

- AIC and implementer program manager interviews
- A participant customer survey
- A customer choice survey for investigating the optimal mix of incentive amounts and seasonal energy-efficiency ratio (SEER) levels to encourage customer participation
- Distributor interviews to explore how the program affected local business
- An active registered (AR) contractor survey
- A savings analysis based on a review of the tracking data
- Free-ridership and spillover analysis based on the customer survey
- A database analysis of SEER vs. free-rider trends over the last 4 years (includes only PY3, PY4, and PY6)

1.1 High-Level Impact Results

The evaluation team's assessment of the HVAC Program indicated that program tracking accurately captured the number of program participants and program-installed measures. Detailed tracking information in the database included information on unit types, sizes, efficiencies, and measure installation locations. These served as inputs to savings algorithms in the Illinois Statewide Technical Reference Manual (TRM) for Energy Efficiency Version 2.0 (June 7, 2013).

The evaluation team reported ex ante savings by summing results from the tracking database and calculated ex post savings for every installed measure in accordance with the Statewide TRM Version 2.0.

Through telephone interviews with participating customers, the evaluation team verified participation, equipment purchased, and efficiency levels reported in the database. One respondent (approximately 0.5% of the sample) reported that he had purchased a SEER 14.5–14.9 air conditioner, while the tracking database indicated that the customer purchased an ECM. This revision slightly affected the verification rates shown in

Table 1. We also verified that measures identified as early replacement (ER) met the maximum SEER and annual fuel utilization efficiency (AFUE) criteria specified in the Statewide TRM Version 2.0.

Table 1. Summary of PY6 Verification Results

Measure	Participation	Surveyed Participants	Verified Participants	Verification Rate
Electric Measures				
CAC/ASHP ER < 16	2,405	40	40	100%
CAC/ASHP ER 16+	1,976	44	44	100%
CAC/ASHP RB* < 16	1,026	44	45	102%
CAC/ASHP RB 16+	1,140	40	40	100%
ECM	4,149	36	35	97%
GSHP	219	N/A	N/A	100%
Subtotal	**10,915**	**204**	**204**	
Gas Measures				
Gas Furnace ER	4,124	N/A	N/A	100%
Gas Boiler ER	2,062	N/A	N/A	100%
Gas Furnace RB	4,124	N/A	N/A	100%
Gas Boiler RB	2,062	N/A	N/A	100%
Subtotal	**12,372**			
Total	**23,287**	**204**	**204**	**100%**

* Replaced on burnout.

Table 2 provides ex ante and ex post per-unit savings by measure type.

Table 2. Summary of Database Analysis Results

	Ex Ante Annual Per-Unit Gross Savings			Ex Post Annual Per-Unit Gross Savings			Per-Unit Annual Gross Realization Rate*		
Measure	kW	kWh	Therms	kW	kWh	Therms	kW	kWh	Therms
CAC	0.303	307	–	0.298	333	–	98.4%	108.4%	–
CAC ER	1.261	1,259	–	1.311	1,304	–	103.9%	103.6%	–
ASHP	0.370	1,523	–	0.273	1,286	–	73.8%	84.5%	–
ASHP ER	1.271	6,395	–	1.281	5,529	–	100.8%	86.5%	–
GSHP	0.596	3,828	–	1.048	5,319	–	176.0%	139.0%	–
ECM	0.302	710	–	0.288	715	–	95.3%	100.7%	–
Gas Furnace	–	–	138	–	–	134	–	–	97.1%
Gas Furnace ER	–	–	347	–	–	357	–	–	103.1%
Gas Boiler	–	–	162	–	–	174	–	–	107.6%
Gas Boiler ER	–	–	588	–	–	579	–	–	98.5%

* 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.

Ex post per-unit savings fell within 10% of ex ante estimates for most measures, with the differences mainly resulting from differences in the installed efficiency value used to calculate ex ante and ex post savings for

each rebated measure. Specifically, AIC used the same efficiency value, the minimum value, to determine ex ante savings for all rebated measures from each efficiency category (e.g., gas furnace ≥ 97% AFUE), while the evaluation team estimated ex post savings using TRM algorithms and the actual efficiency values for each rebated measure as reported in the program-tracking database. For example, incentivized furnaces in the ≥ 97% AFUE furnace category could install higher-efficiency units than the minimum 97 AFUE requirement, yielding higher savings in the ex post calculations. The TRM algorithms require measure-specific input values for system efficiency, system size, and climate zone. ASHP realization rates fell below 100% due to the actual mix of locations, size, and efficiencies yielding different savings than the assumed ex ante value.

The net-to-gross ratio (NTGR) framework provided in the Illinois Commerce Commission (ICC) Order for Docket 10-0568 stipulates a deemed NTGR value derived from PY3 evaluation results for all electric and gas measures offered through the program: 0.59 for electric measures (e.g., ASHPs, CACs, ECMs, and GSHPs), 0.77 for gas furnaces, and 0.79 for gas boilers (including spillover). Consistent with the calculation of ex ante net savings, the evaluation team used these values to calculate ex post net savings.

Table 3 shows PY6 program net savings impacts.

Table 3. PY6 HVAC Program First-Year Net Savings Impacts

Measure	NTGR	Ex Ante Net Savings			Ex Post Net Savings		
		kW	MWh	Therms	kW	MWh	Therms
Electric Measures							
CACs/ASHPs	0.59	3,779	4,954	N/A	3,640	4,862	N/A
ECM Fans	0.59	740	1,738	N/A	705	1,750	N/A
GSHPs	0.59	77	495	N/A	135	687	N/A
Subtotal	**0.59**	**4,596**	**7,187**	**N/A**	**4,480**	**7,299**	**N/A**
Gas Measures							
Gas Furnaces	0.77	N/A	N/A	1,156,317	N/A	N/A	1,158,088
Gas Boilers	0.79	N/A	N/A	29,243	N/A	N/A	28,858
Subtotal	**0.77**	**N/A**	**N/A**	**1,185,560**	**N/A**	**N/A**	**1,186,946**
Total Program		**4,596**	**7,187**	**1,185,560**	**4,480**	**7,299**	**1,186,946**
				Net Realization Rate*	0.97	1.02	1.00

* Net realization rate = ex post net savings ÷ ex ante net savings.

1.2 High-Level Process Results

Based on the evaluation tasks, the evaluation team determined that AIC and CSG implemented the HVAC Program effectively. Participation and evaluated savings exceeded their targets, which surpassed those achieved in PY5. Customer and contractor satisfaction with the program was high. While the program achieved its goals, it could probably continue to increase participation by:

- Increasing outreach to and actively coordinating with distributors
- Offering more convenient training to both active and non-active contractors
- Minimizing design changes
- Increasing incentives for SEER 16 and above equipment

Opportunities exist for CSG to improve verification procedures, trade ally outreach, and training and reporting activities.

During PY6, AIC exceeded its program goals for gas and electric measure savings and for processed applications. AIC and CSG program managers attributed many of these achievements to contractors being more familiar with the program, as neither equipment nor incentive levels changed from PY5 to PY6. In PY5, contractors had expressed dissatisfaction with the number of program changes from PY4.

The evaluation team's analysis of customer cooling choices under different incentive and efficiency scenarios indicated that revising some incentive offerings might improve participation or lower program costs.

1.3 Conclusions and Recommendations

The evaluation team offers a summary of our recommendations for AIC's consideration. (We present a comprehensive list of conclusions and recommendations in Section 4.4.)

- **Recommendation 1:** When introducing PY7 design changes, AIC should update all materials and remove or take down old materials and website information. Through CSG/Leidos, AIC should aggressively reach out to contractors and distributors to communicate program changes clearly and to provide a contact point for these stakeholders to ask questions or obtain more information.
- **Recommendation 2:** AIC/CSG should consider joint meetings, outreach activities, and training with both distributors and contractors to ensure consistent presentation of program messaging, requirements, and offerings; allow for cross-fertilization of ideas and networking; and distribute updated program documentation and training schedules.
- **Recommendation 3:** CSG/Leidos should increase the number of training offerings, presented in a greater number of locations; provide sufficient advance notice; or adopt a regular schedule that does not change each year.
- **Recommendation 4:** CSG/Leidos should hire a second regional account representative as planned (filling the open position) to ensure that CSG can effectively cover the north and south AIC service territories in terms of supporting distributors and contractors.
- **Recommendation 5:** CSG may want to develop case studies or collect testimonials to include in marketing materials or contractor training.
- **Recommendation 6:** CSG should develop strategies for retaining registered contractors and for recruiting new contractors. It may prove beneficial to refresh marketing materials, perhaps with the input of distributors, making the materials more attractive to contractors. AIC and CSG may wish to explore co-marketing with contractors and consider marketing to smaller firms, which are more present in the non-active (those that have signed up but not actually participated) than the active registered contractor group.
- **Recommendation 7:** Because ER equipment drives higher savings, AIC and CSG should develop a simple tracking report that collects information needed to monitor ER vs. RB trends and other program indicators that track where AIC achieves higher savings. This could take the form of a dashboard that CSG updates monthly.
- **Recommendation 8:** If cost-effectiveness and budget allow, consider eliminating the lowest SEER incentives and increasing the higher SEER incentives.

- **Recommendation 9:** AIC should continue to improve verification, quality assurance/quality control (QA/QC) protocols, data collection, and tracking, and should be encouraged to implement the remaining recommendations from last year's evaluation.
- **Recommendation 10:** CSG/Leidos (formerly SAIC) and AIC should expand outreach to distributors and develop new ways to engage them.
- **Recommendation 11:** AIC and CSG/Leidos should continue to improve materials, ensure consistency in messaging, remove old materials where possible (e.g., old website information), and provide distributors and other trade allies with new materials to hand out to contractors.
- **Recommendation 12:** Through training, AIC and CSG/Leidos should reinforce that field teams distribute marketing materials to trade allies with guidance on how to promote the measures using these materials.

2. Introduction

This report presents the PY6 impact and process evaluation findings for Ameren Illinois Company's (AIC) Residential Heating and Cooling Program (HVAC Program). AIC began offering HVAC incentives in June 2009 and has modified the incentive amounts and equipment requirements over the last 5 years. The equipment requirements and incentive amounts changed as the market shifted to higher seasonal energy-efficiency ratio (SEER) requirements and, at times, lower incentives. Conservation Services Group (CSG) has implemented the program since 2009, working closely with AIC program managers to accomplish the following:

- Track and report progress
- Support and train contractors
- Offer recommendations to improve program performance and to respond to evaluation recommendations

This section describes the program and presents the research objectives. Section 3 presents the evaluation methods, and Section 4 presents the findings, conclusions, and recommendations for the impact and process evaluations.

2.1 Program Description

The HVAC Program offers incentives for purchases of high-efficiency furnaces, boilers, air-source heat pumps (ASHPs), ground-source heat pumps (GSHPs), and central air conditioners (CACs) installed by an HVAC-registered program ally. Applicable federal equipment standards serve as baseline efficiency conditions for new heating and cooling systems replaced on burnout (RB). For early replacement (ER) measures, the 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.

Incentive levels vary according to equipment type and efficiency level of existing equipment. AIC customers receive an incentive for installation of new equipment (replacing either a working unit [ER] or a unit that is either non-working or new construction [RB]); 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 otherwise install. The program also includes an ER incentive, aimed at customers with operating but inefficient equipment. Through this offering, the program encourages customers to retire equipment for newer, more-efficient units.

AIC introduced the ER incentive for furnaces and boilers in PY5 (with incentives previously available only for electric equipment), increased overall incentives, and added additional incentive tiers to its offerings. In PY6, AIC did not make changes to the equipment, incentives, or SEER requirements.

The HVAC Program implementation model still accurately reflects current program implementation steps and actors. 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 or AFUE level. In PY6, AIC offered six different incentives, depending on SEER level of new equipment and the condition of replaced equipment, as shown in Table 4.

Contractors must enter into a participation agreement that outlines responsibilities for AIC, the program implementer, and the contractor. Through CSG, the program offers sales and marketing training to registered trade allies. CSG sends e-blasts to active registered (AR) contractors regarding upcoming training seminars (once they schedule the seminars). To become a registered program ally, contractors must submit insurance documentation, proof of worker's compensation, and W-9 forms.[1] Contractors need not take the training to participate.

Table 4. Changes in Incentive Levels from PY3, PY4 and PY5/PY6

Measure	Details	PY3	PY4	PY5/PY6	Change
ASHPs					
ASHP SEER 14.5–14.9	New efficient equipment replacing > SEER 10	$110	$150	$150	$0
	ER of SEER 10 or less	$400	$400	$450	$50
ASHP SEER 15.0–15.9* (No 15.0 baseline in PY4)	New efficient equipment replacing > SEER 10	$110	$150	$200	$50
	ER of SEER 10 or less	$400	$400	$500	$100
ASHP SEER 16+	New efficient equipment replacing > SEER 10	$200	$200	$300	$100
	ER of SEER 10 or less	$600	$600	$600	$0
GSHPs					
GSHP	Installing a new GSHP	$600	$600	$600	$0
CACs					
CAC SEER 14.5–14.9	New efficient equipment replacing > SEER 10	$100	$100	$150	$50
	ER of SEER 10 or less	$250	$250	$450	$200
CAC SEER 15.0–15.9* (No 15.0 baseline in PY4)	New efficient equipment replacing > SEER 10	$100	$100	$200	$100
	ER of SEER 10 or less	$250	$250	$500	$250
CAC SEER 16+	New efficient equipment replacing > SEER 10	$125	$125	$300	$175
	ER of SEER 10 or less	$350	$350	$600	$250
Gas Furnaces					
Gas Furnace 92% AFUE	New efficient equipment replacement	$125	$125	Not offered	Not offered
Gas Furnace ≥ 95% AFUE	New efficient equipment replacement	$200	$200	$200	$0
	ER	Not offered	Not offered	$400	$400
Gas Furnace ≥ 97% AFUE	New efficient equipment replacement	$200	$200	$300	$100
	ER	Not offered	Not offered	$500	$500

[1] The State of Illinois does not require licensing of HVAC contractors.

Measure	Details	PY3	PY4	PY5/PY6	Change
Electronically Commutated Motors (ECMs)					
Brushless ECM Furnace	New furnace equipped w/brushless DC motor	Not offered	Not offered	$80	$80
Gas Boilers					
Gas Boiler ≥ 90% AFUE	New efficient equipment replacement	$500	$500	$400	−$100
	ER	Not offered	Not offered	$800	$800
Gas Boiler ≥ 95% AFUE	New efficient equipment replacement	$500	$500	$500	$0
	ER	Not offered	Not offered	$1,000	$1,000

* These row categories were included for PY4 to provide a separate row for the new PY5 incentive.

CSG and AIC market the program to customers, primarily through bill inserts and direct mailings, along with some radio and print media. AIC divides its territory into north and south regions, and CSG assigns one account representative to each region to support contractors and distributors. CSG also reaches out to and supports registered contractors by providing training, hosting informational meetings, and participating in regional trade shows to increase visibility.

2.2 Research Objectives

The evaluation team's investigation focused on addressing the impact and process researchable questions discussed below, as presented in the evaluation plan.

Impact Evaluation Questions

- What are the estimated gross energy and demand impacts from this program?
- What are the estimated net energy and demand impacts from this program?
- What is the estimated net-to-gross ratio (NTGR)?

Process Evaluation Questions

Program Participation

- What are the participant characteristics? How many HVAC units did contractors install? At what SEER levels? What percent were ER vs. RB? Have ratios changed since last year?
- Does customer participation meet expectations? If not, how and why does it differ from expectations?
- Does contractor participation meet expectations? How many new contractors joined the program? How many became inactive?

Program Design and Implementation

- As implemented, has the program changed compared to PY5? If it has, were these changes advantageous?

- How does program incentive and customer knowledge affect customers' choices of equipment efficiency levels?
- What might serve as a better combination of incentive and SEER levels to increase customer participation and program savings?
- Are participating contractors taking advantage of new training and educational opportunities? Among those participating, do program resources prove useful?

Participant Experience and Satisfaction

- How satisfied are customers with the program? Are they likely to recommend the program to friends or family? Are customers aware of other AIC programs?
- How satisfied are contractors with the program processes?
- How does the program affect HVAC contractor and distributor businesses?

Opportunities for Program Improvement

- What could AIC or CSG do to improve customers' experiences and generate greater energy savings?
- What could AIC or CSG do to improve contractors' experiences and increase contractor activity?

3. Evaluation Methods

Table 5 presents the tasks the evaluation team conducted to address the HVAC PY6 evaluation researchable questions.

Table 5. Summary of Evaluation Activities for PY6

Activity	PY6 Impact	PY6 Process	Forward Looking	Details
In-Depth Program Staff Interviews		✓	✓	Interviewed AIC and CSG managers to understand goals, progress to date, program changes from PY5, successes, challenges, and future plans.
Program Data Review	✓	✓		Reviewed program-tracking data to ensure collection of appropriate data and to verify savings.
Registered Active Contractor Survey	✓	✓	✓	Surveyed 74 contractors to assess spillover, reasons for participation, program satisfaction, and the program's influence on the market.
Distributor Interviews		✓	✓	Interviewed 11 distributors to gather information on industry trends, program awareness, and market transformation.
Participant Customer Survey	✓	✓	✓	Surveyed 204 participants to verify installation, assess program satisfaction, and assess NTGR. Stratified surveys to attain a representative sample across CACs, heat pumps, and furnaces.
Customer Choice Survey		✓	✓	Surveyed 108 participant and 93 nonparticipant customers to determine the optimal combinations of incentives and SEER levels for program participation.
SEER and Free-Ridership Analysis	✓	✓	✓	Analyzed the last 5 years of customer surveys to explore the relationship between SEER levels and free-ridership.

3.1 Data Collection

The following activities informed the PY6 evaluation of the HVAC Program:

- AIC and CSG (implementer) program staff interviews
- A program data review
- An AR contractor phone survey
- Distributor interviews
- Participant customer phone surveys
- Customer choice surveys (participant and nonparticipant)
- A SEER vs. free-rider analysis (for PY3, PY5, and PY6)

3.1.1 Program Staff Interviews

The evaluation team conducted interviews with AIC's program manager and CSG's HVAC implementation manager (as shown in Table 6). These interviews sought to:

- Achieve a better understanding of program goals
- Explore how AIC and CSG managed the program on a daily basis
- Identify challenges
- Discuss how any changes in implementation may have affected program performance

The evaluation team also inquired about data tracking and customer outreach related to this program.

Table 6. Staff Interviews Completed

	AIC Staff	CSG Staff	Total
Interviews Completed	1	1	2
Date Completed	June 12–13, 2014	June 6, 2014	

3.1.2 Review of Program Data

The evaluation team did not conduct a program materials review in PY6, but did review the program-tracking database for completeness and assessed participation rates and energy-savings assumptions to complete the savings analysis.

3.1.3 Active Registered Contractor Survey

The evaluation team used telephone surveys to assess contractor satisfaction, program experience, and suggestions for improvements, and to identify distributors' names. AR contractors submitted a minimum of one incentive during the previous 12 months. This survey also served to gather distributor contact information. The team compared the results from the AR contractor survey with the results from the non-active registered (NAR) contractor survey, conducted in PY5.

Sample Design

To obtain feedback from contractors spanning high to low participation levels, the evaluation team developed four sample strata, representing different levels of incentive activity. As shown in Table 7, this split the 428 AR contractors into four even quartiles, based on the number of HVAC units contractors installed in PY6.

Table 7. Completed AR Contractor Surveys

Segment	Installations in PY6	Population	Quota	Completed
Top Quartile (Q1)	29–280	107	18	19
Mid-Upper Quartile (Q2)	10–28	107	18	18
Mid-Lower Quartile (Q3)	3–10	107	18	19
Bottom Quartile (Q4)	1–3	107	18	18
Total	–	**428**	**72**	**74**

Survey Disposition and Response Rate

From March 18 through April 14, 2014, the evaluation team fielded the survey with HVAC contractors. Table 8 provides the final survey dispositions.

Table 8. HVAC Contractor Survey Dispositions

Disposition	N
Completed Interviews (I)	74
Partial Interviews (P)	1
Eligible Non-Interviews	120
Refusal (R)	44
No Contact Achieved (NC)	76
Not Eligible (e)	12
Ineligible	1
Wrong Number	11
Unknown Eligibility Non-Interview (U)	219
Not Available	51
Scheduled/Not Completed	10
Company Interviewed	4
Callback	82
Answering Machine	72
Total Numbers	**426**

Table 9 provides the response and cooperation rates. **Error! Reference source not found.**C provides information on the methodology used to calculate response rates for telephone surveys.

Table 9. HVAC Contractor Survey Response and Cooperation Rates

AAPOR Rate	Percent
Response Rate	18%
Cooperation Rate	60%

Weighting

Because the sample population represented an even distribution of the total population, the evaluation team did not need to weight the results prior to analysis.

3.1.4 HVAC Distributor Interviews

The distributor interviews sought to investigate the following:

- The current program's effect on distributor HVAC purchasing and stocking decisions
- How their businesses might be different without the program
- Their views on 18 SEER incentive options

Sample Design

The evaluation team collected distributor contact information from surveyed contractors and from the CSG program manager.[2] The CSG program manager's list included individual distributor contact names, whereas most surveyed contractors could provide only the distributor company's name. Because the evaluation team would likely achieve better results using a contact name, and because CSG's list identified distributors by AIC regions (north and south), the study used the CSG list to obtain the targeted 10 completes. Prior to developing a random sample for each region, the evaluation team removed duplicates, identified unique companies and contacts, and verified complete information for each unique individual/distributor combination.

As shown in Table 10, the effort achieved 11 completed surveys: 5 from the north and 6 from the south.

Table 10. Completed Distributor Interviews

Distributor Sample*	Quota	Completed	Response Rate
22	10	11	50%

* CSG provided a list of 63 distributors. The interview team removed 26 numbers without contact names, 3 people who were no longer with the company, and 1 incorrect number. If multiple people worked with the same company, the team removed the company upon completing one interview from that company (11). The team used a final sample of 22 people to achieve 11 completes.

Survey Disposition and Response Rate

The evaluation team conducted distributor interviews from July 28, 2014 to August 11, 2014. The team used all available valid phone numbers to complete five interviews from the north region and five from the south. Our target was to achieve at least one call with a representative from each company. Once the evaluation team had interviewed one person from a specific company, we moved to the next as-yet-unrepresented company to finalize the list of completes. The final number of completes (11) included one additional interview for a "call back" for the southern group. Table 11 provides the final survey dispositions.

Table 11. Distributor Interviews Disposition

Disposition	N
Completed Interviews (I)	11
Partial Interviews (P)	0
Eligible Non-Interviews	9
Refusal (R)	1
No Contact Achieved (NC)	8
Not Eligible (e)	14
Ineligible	2
Company interviewed	11
Wrong Number	1
Unknown Eligibility Non-Interview (U)	3
No Longer with Company	3

[2] Note that there are no official participating distributors and therefore no firmographic data available to characterize participating distributors. The list we obtained from the AIC program manager is a list of those distributors he met with to encourage them to promote the program and find out how AIC could better support the distributors in doing so.

Call Blocking/Busy Signal	0
Total Numbers	**37**

Table 12 provides the response and cooperation rates. **Error! Reference source not found.**C provides information on the methodology used to calculate response rates for telephone surveys.

Table 12. HVAC Distributor Interview Response and Cooperation Rates

AAPOR Rate	Percent
Response Rate	47%
Cooperation Rate	97%

3.1.5 Participant Customer Survey

In August 2014, the evaluation team surveyed 204 PY6 customers by phone. This survey addressed impact and process investigation areas. For the impact evaluation, the survey asked about measure attribution, and verified program participation and equipment installed. For the process evaluation, the survey asked customers about where they first heard of the program, how they made purchasing decisions, whether they made other energy efficiency investments, how satisfied they were with the program, and their experiences with the contractors.

Sample Design

Since HVAC gas equipment incentives will not be offered in PY7 the evaluation team used the survey to gather information from only electric customers. To obtain sufficient data at each SEER level, the evaluation team used CSG tracking data to compile a stratified random sample of 195 residential customers, divided into five strata. The sample strata differentiated between customers choosing above and below 16 SEER and those who chose ER vs. RB, as shown in Table 13. We designed the strata to achieve results that provide 90% confidence with ±6% precision at the program level, but that also ensure representation across each stratum and report results with 90% confidence and ±13% precision at the stratum level.

Table 13. Participant Customer Population (Electric Measures Only) and Survey Sample

Strata	Electric Customer Population	Quota	Completed Surveys
CAC/ASHP ER < 16	2,405	40	40
CAC/ASHP ER 16+	1,976	40	44
CAC/ASHP RB < 16	1,026	40	45
CAC/ASHP RB 16+	1,140	40	40
ECM	4,149	35	35
Total	**10,696**	**195**	**204**

Survey Disposition and Response Rate

Between August 18 and September 9, 2014, the evaluation team conducted participant customer surveys. Table 14 provides the final survey disposition.

Table 14. Participant Customer Survey Disposition

Disposition	N
Completed Interviews (I)	204
Partial Interviews (P)	2
Eligible Non-Interviews	1,255
Refusal (R)	478
No Contact Achieved (NC)	738
Break-Off	39
Not Eligible (e)	340
Ineligible	11
Recently Interviewed	6
Wrong Number/Disconnected	284
Fax Line	16
Business/Residential Phone	23
Unknown Eligibility Non-Interview (U)	182
No Answer	161
Call Blocking/Busy Signal	19
Language Barrier	2
Total Numbers	**1,983**

Table 15 provides the response and cooperation rates. **Error! Reference source not found.** provides information on the methodology used to calculate response rates for telephone surveys.

Table 15. HVAC Participant Survey Response and Cooperation Rates

AAPOR Rate	Percent
Response Rate	13%
Cooperation Rate	28%

Weighting

Because the sample strata proportions differ from those in the general population, the evaluation team weighted final responses to reflect the proportion found in the participant population. This meant that, during analysis, the team could apply a weight to each response, based on the strata, so that the weighted percentage of responses for each stratum reflected the total population rather than the sample, as shown in Table 16.

Table 16. Participant Customer Survey—Weights Calculation

Strata	% Total Population	% Target Population	Weights
CAC/ASHP ER < 16	22.5%	21.6%	1.0193
CAC/ASHP ER 16+	18.5%	20.6%	0.9422
CAC/ASHP RB < 16	9.6%	19.6%	0.4892
CAC/ASHP RB 16+	10.7%	21.1%	0.4942
ECM	38.8%	17.2%	2.2609
Total	**100.0%**	**100.0%**	–

3.1.6 Customer Choice Survey

For the PY6 evaluation, AIC sought to assess the appropriateness of customer incentive levels and SEER-level tiers. To determine this, the evaluation team conducted an online willingness-to-pay survey of participant and nonparticipant customers. The survey presented customers with a variety of incentive and equipment SEER-level combinations for either CACs or ASHPs. The survey provided customers with information about incremental costs, annual cost savings, and available incentives for four different efficient SEER levels (14.5, 16, 17, and 18) and, for each efficient SEER-level option, asked them to choose whether they would be more likely to purchase the baseline option (SEER 13) or the efficient option. We developed the online survey so that the starting efficient option and available incentive were randomly set. Based on the customer's responses to each question, we asked additional questions concerning the same efficient SEER level, but with the incentive systematically increasing or decreasing until the customer's choice changed from the initial value. For example, if the starting response was the efficient option, the next question reduced the incentive to see if the customer would switch back to the base option. The lowest incentive level in which that respondent chose the efficient option is the "optimum" incentive for that customer. Due to the question content complexity, the evaluation team and AIC agreed that it would prove easier for customers to weigh the options if they could see rather than hear the combinations offered.

Sample Design

During implementation of the participant customer survey, the evaluation team recruited participant customers for the choice survey. The team also recruited nonparticipant customers randomly from the AIC customer database, screening them for home ownership and ownership of a CAC or heat pump. We report results separately for participants and nonparticipants. In total, the evaluation team obtained 108 participant and 93 nonparticipant completed surveys, as shown in Table 17.[3] We designed the sample to achieve precision of ±10% at 90% confidence for each of CAC participants and nonparticipants and to achieve ±15% at 90% confidence for heat pump participants.[4]

Table 17. Completed Customer Choice Surveys

Segment	Customer Population	Quota	Completed Surveys	Precision at 90% Confidence
CAC Participants	5,861	70	70	10%
CAC Nonparticipants*	> 500,000	70	82	9%
Heat Pump Participants	686	30	38	15%
Heat Pump Nonparticipants*	> 50,000	30	11	25%
Total		**200**	**201**	

* The eligible population equals homeowners with an existing CAC or heat pump. Because the exact number is unknown, these represent only estimates.

[3] The team did not include ECM customers as most customers do not shop uniquely for ECMs, but contractors offer this upgrade during maintenance or equipment replacement.

[4] Since heat pump participants and nonparticipants are less prevalent, we recommended lower precision levels to manage the allotted budget.

Survey Disposition and Response Rate

Table 18 summarizes survey response rates from those recruited for the online survey.

Table 18. Customer Choice Survey Dispositions

Segment	Online Survey Invites Sent	Online Surveys Started	Online Surveys Completed	Response Rate
Participants	309	109	108	35%
Nonparticipants	142	97	93	65%
Total		**206**	**201**	

The evaluation team did not weight the customer choice survey results, given that the study reports results separately by segment and that the eligible nonparticipant population is unknown. The report includes the combined results only for information purposes, and they do not represent a weighted population estimate.

3.1.7 SEER vs. Free-Ridership Analysis

The evaluation team explored whether a relationship existed between past free-ridership and SEER levels by combining all PY5 and PY6 data, and analyzing for patterns and relationships.[5] By plotting SEER vs. free-ridership and calculating the correlation coefficient for these data, the team could attempt to assess the following:

- Whether customers selecting higher SEER equipment would more likely be free-riders (or vice versa)
- How incentive levels might affect the free-ridership percentage at each SEER level

The evaluation team also investigated the relationship between free-ridership, SEER level, and ER vs. RB over this time, seeking to determine whether customers replacing equipment ahead of time proved more likely to be free-riders or to choose higher SEER equipment.

These analyses provided further insights into the customer choice survey analysis and contributed to the evaluation team's final SEER-level and incentive amount recommendations.

3.2 Analytical Methods

3.2.1 Gross Impacts

The evaluation team determined ex post impacts by a thorough review of the program database, the Statewide TRM Version 2.0 (June 7, 2013) algorithms and assumptions, and other resources (as applicable).[6] The team performed individual savings calculations for each measure type using data provided in the program database. The process included multiple steps, including the revisions to the database and the assumptions described below.

[5] The evaluation team combined only PY5 and PY6 data as these program years offered identical incentives and measures.

[6] The evaluation team conducted online searches for specific HVAC models to verify efficiency levels.

3.2.2 Net Impacts

As specified by the NTGR framework described in the Illinois Commerce Commission (ICC) Order for Docket 10-0568, the evaluation team estimated net savings using NTGRs of 0.59 for electric measures (ASHPs, CACs, GSHPs, and ECMs), 0.77 for gas furnaces, and 0.79 for gas boilers. These values are derived from the results of the survey of program participants completed as part of the PY3 evaluation.[7]

3.2.3 Net-to-Gross Ratios

To estimate net savings for PY6, the evaluation team applied the NTGR from AIC's filing for this program (as specified above). The PY6 evaluation effort included the development of updated NTGRs for use in future evaluations. Appendix B provides a detailed methodology and analysis.

3.2.4 Customer Choice Survey

The customer choice survey, described in Section 3.1.6, used the SEER levels, incentive range, and incentive increment amounts provided in Table 19 as the key variables for comparing all other efficiency levels to SEER 13 as the baseline standard. We also provided information on expected purchase prices and annual operating costs. We reviewed the possible scenarios with AIC and ICC to ensure that they were realistic potential offerings. Because the survey is asking customers about theoretical scenarios, we did not attempt to correlate answers with the actual product purchased by program participants, as we do not have information regarding the choices contractors offered to these customers at the time of program participation.

Table 19. Choice Survey Incentive Ranges and Increments by SEER Level

SEER	Incentive (Low)	Incentive (High)	Increment1	Increment2
13	$0	$0	$0	
14.5	$0	$500	$100	$50
16	$0	$1,000	$200	$100
17	$0	$1,400	$200	$100
18	$0	$1,600	$200	$100

The evaluation team analyzed the survey responses based on the respondent type, incentive level, and SEER level. For each respondent type, the team calculated an average overall incentive level and an average non-zero incentive level, at which respondents reported that they would purchase SEER 14.5, SEER 16, SEER 17, and SEER 18 units (the survey asked all respondents about all SEER levels). The team also calculated the cumulative increase in participants' willingness to purchase equipment at each SEER level and the incentive level corresponding to the largest increase in participation per incentive dollar.

[7] PY3 NTGR estimates for all measures included spillover.

3.3 Sources and Mitigation of Error

Table 20 summarizes possible error sources associated with data collection conducted for the HVAC Program. A detailed discussion of each item follows.

Table 20. Possible Sources of Error

Analytical Task	Survey Errors		Non-Survey Errors
	Sampling Errors	Non-Sampling Survey Errors	
Participant Customer, Contractors, and Distributor Surveys	• Yes	• Measurement errors • Non-response and self-selection bias • Data processing errors • External validity	• N/A
Gross Impact Calculations	• N/A	• N/A	• Analysis errors
Net Impact Calculations	• Yes	• Same as participant survey	• Analysis errors

Throughout the planning and implementation of the PY6 evaluation, the evaluation team took a number of steps to mitigate potential error sources, as discussed below by type of data collection.

Survey Errors

- Sampling Errors
  - **Customer and Contractor Surveys:** The evaluation team designed the survey samples to achieve a maximum error of ±10% with 90% confidence. Table 21 presents the sample size, population, and error associated with each survey.

Table 21. Summary of Survey Sampling Results and Error

Survey	Population	Sample	Precision (Error) at 90% Confidence
Electric Participant Customer*	10,696	204	±6%
CAC Customer Choice – Participants	5,861	70	10%
CAC Customer Choice – Nonparticipants	> 500,000	82	9%
Heat Pump Customer Choice – Participants	686	38	15%
Heat Pump Customer Choice – Nonparticipants	> 50,000	11	25%
AR Contractors	428	74	±8.7%
Distributors	~30	11	N/A – Census Attempted

- does not include GSHP customers

- Non-Sampling Errors
  - **Measurement Errors:** The evaluation team used multiple strategies to address the validity and reliability of quantitative data. The team relied on its experience to create questions that measured, at face value, the idea or construct the question intended to measure. The team

reviewed all questions to preclude asking double-barreled questions (i.e., questions that ask about two subjects but that have only one response) or loaded questions (i.e., questions slanted one way or another). The effort also ensured the overall logical flow of questions, designed to reduce confusion and increase response reliability.

Experienced members of the evaluation team, along with AIC and ICC staff, reviewed all survey instruments. In addition, to determine if question wording remained clear, the team pretested each survey instrument and performed real-time monitoring to clarify questions or improve the question order if responses indicated misunderstanding or confusion. The pretests also allowed the team to determine whether the length of the survey was reasonable, to reduce respondents' survey fatigue.

- Non-Response Bias: As the surveys achieved a response rate below 100%, the evaluation team had to consider the potential for non-response bias, mitigating this bias by contacting each subject in the sample at least eight times or until receiving a hard refusal and by calling at different times of the day, as appropriate. In addition, we checked for the availability of firmographic or demographic data for the populations surveyed, but found that AIC does not collect information that would enable the team to assess whether evidence of non-response bias exists. We did, however, segment the customer participant population by equipment type and, for contractors, by number of rebates processed to ensure representativeness.

- Data Processing Errors: The evaluation team addressed processing errors through interviewer training and quality checks of completed survey data. Opinion Dynamics interviewers went through rigorous training before interviews began. Interviewers received a general overview of the research goals and the intent of each survey instrument. Evaluation analysts reviewed and assisted in coding survey responses. The team also conducted continuous, random monitoring of all telephone interviews and validation of at least 10% of every interviewer's work.

- External Validity: The evaluation team addressed external validity (the ability to generalize any findings to the population of interest) through development of an appropriate research design.

Non-Survey Errors

- Sampling Errors
  - Net Impact Calculations: The net impact calculations relied on the customer participant surveys and are subject to the sampling errors described above.
- Analysis Errors
  - Gross Impact Calculations: The evaluation team applied Statewide TRM Version 2.0 calculations to participant data in the tracking database to calculate gross impacts. To minimize analysis errors, senior team staff peer-reviewed all calculations to verify team members' accuracy.
  - Net Impact Calculations: The evaluation team applied the prospective deemed NTGR to estimate the program's net impacts. To minimize analysis errors, senior team staff reviewed and verified all calculations.

4. Evaluation Findings

4.1 Program Description and Participation

4.1.1 Program Description

The AIC HVAC Program offers incentives for the purchase of high-efficiency furnace, boiler, ASHP, GSHP, or CAC equipment, installed by an HVAC-registered program ally. Incentive levels vary according to equipment types and efficiency levels of existing equipment. AIC customers receive an incentive for installation of new equipment; this appears as a line-item deduction on contractors' installation invoices. Through these incentives, AIC strives to persuade customers to purchase higher-efficiency equipment than they would otherwise install. The program includes an ER incentive, aimed at customers with operating but inefficient equipment. According to the Statewide TRM Version 2.0, to be considered ER, a unit must be functioning and have a SEER ≤ 10. Further, the term "functioning" means the unit is fully operational: providing sufficient space conditioning (i.e., heat exchanger, compressors, pumps work effectively) and/or the cost of repair is under 20% of the new baseline replacement cost. Through this offering, the program encourages customers to retire equipment for newer, more-efficient units. In PY6, AIC offered six different incentives, depending on SEER level of new equipment and the condition of the replaced equipment (see Table 4).

Contractors must enter into a participation agreement, which outlines AIC, program implementer, and contractor responsibilities. Through CSG, the program offers sales and marketing training to registered trade allies. CSG sends out e-blasts to AR contractors once CSG schedules the upcoming training seminars.

Program Participation

In PY6, the program exceeded the internal targets (as shown in Table 22). For PY6, the program sought an energy-savings target of 4.9 GWh, a demand-savings target of 2.6 MW, and an applications target of 6,725.

Table 22. Reported Program Targets and Percentage Achieved

Tracked Indicator	Targets	Results	Achieved as a % of Goal
Gas measures (savings)	712,610 therms	1,186,946 therms*	167%
Electric measures (savings)	4,978 MWh 2.6 MW	7,250 MWh* 4.5 MW*	147% MWh 173% MW
Applications (number)	6,725	9,888**	147%

* Ex post net evaluated savings as calculated by the evaluation team.
** Number of applications reported by CSG during the process interviews, prior to the program's year-end.

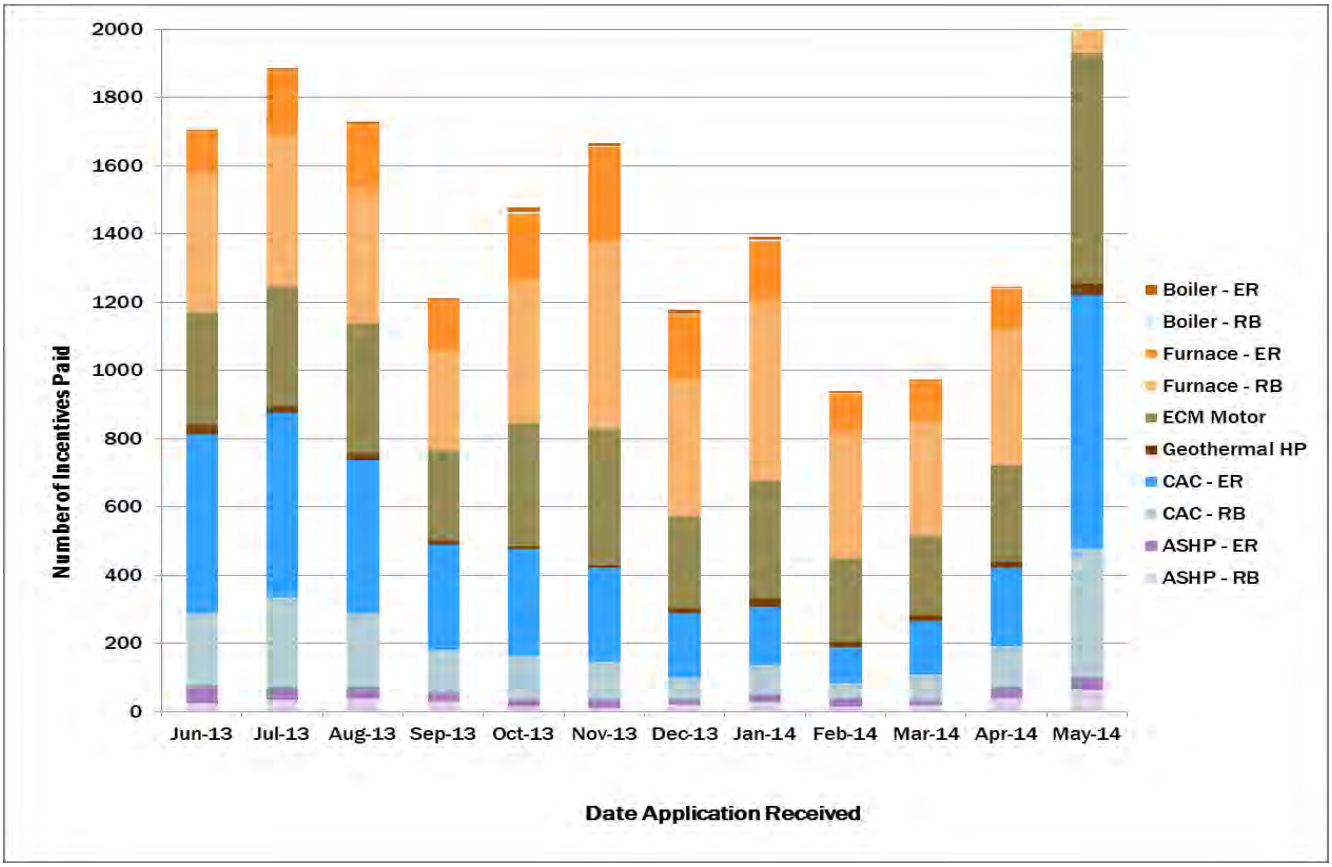
In PY6, program participation increased by 48% over PY5 levels, as shown in Table 23. Compared to PY5, AIC achieved notable increases across all measures, except for GSHPs (a measure AIC plans to discontinue in PY7). ECM fans increased in popularity, with participants more than doubling in PY6. Installation of CAC and ASHP measures increased by 49% over PY5.

Table 23. Program Participation (Unique Participants) PY5 vs. PY6

Measure Type	Program Participation (N) PY5	Program Participation (N) PY6	Percent Change
Gas Furnace Installations (95/97 AFUE)	5,869	7,526	28%
Gas Boilers	61	84	38%
CAC/ASHPs	4,408	6,547	49%
ECM Fans	1,943	4,149	114%
GSHPs	228	219	−4%
Total	**12,509**	**18,525**	**48%**
Source: PY5 data are from the PY5 Evaluation Report; PY6 data are from AIC's end-of-year database.			

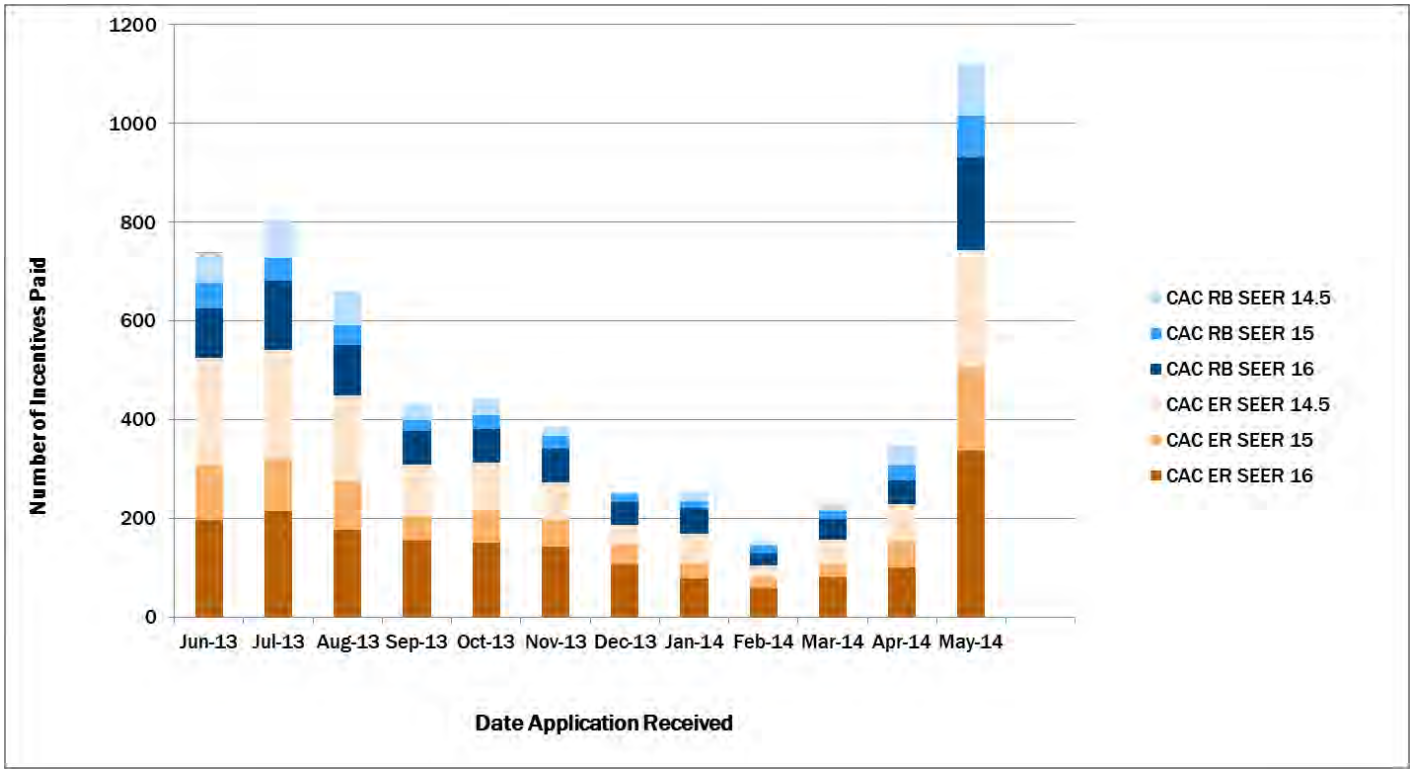
Figure 1 shows that there were three peak periods for monthly distributions of measures over the program year: June to August 2013, October to November 2013 and May 2014. ECMs, RB furnaces, and ER CAC equipment dominated the PY6 mix.

Figure 1. PY6 Monthly Participation—All Measures



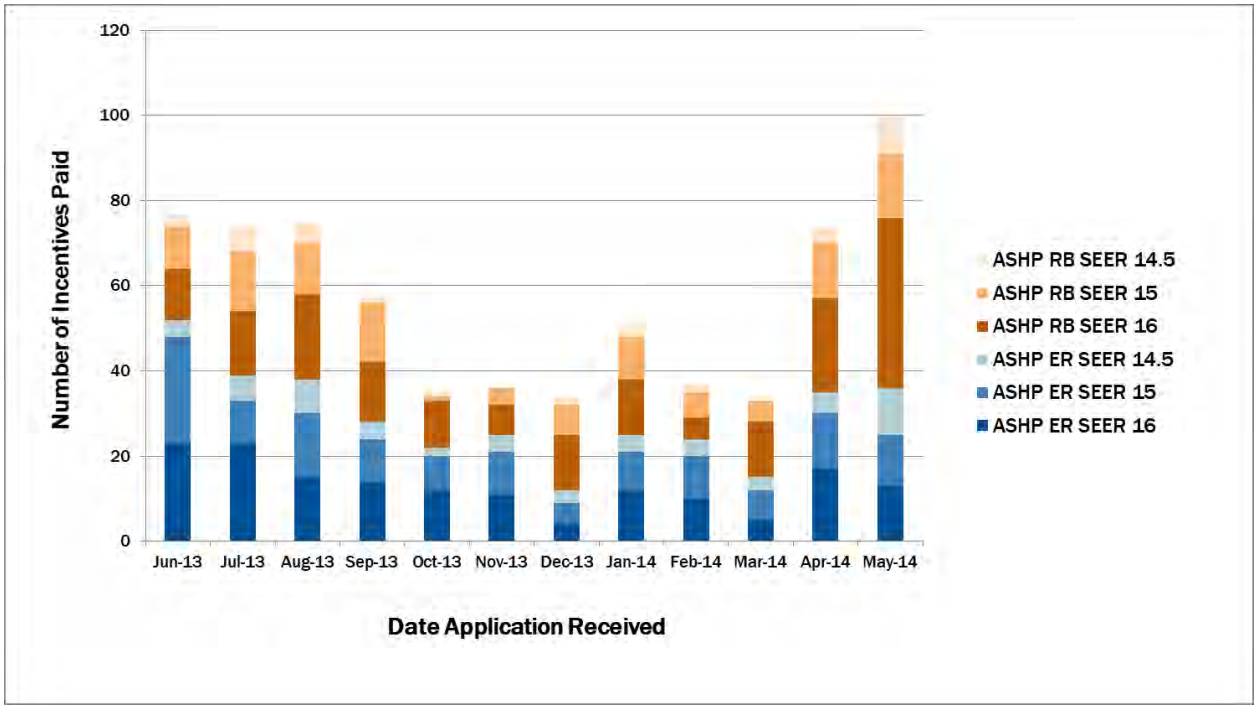
As shown in Figure 2 and Figure 3, ER measures dominated the electric equipment mix. SEER 16 equipment dominated both the ER and RB electric equipment. Participating customers were more likely to purchase CACs in May, followed by June, July, and August (Figure 2).

Figure 2. PY6 Monthly Participation—CAC by SEER Level



For ASHPs, customers were more likely to purchase RB equipment in April and May and ER equipment in June and July (as shown in Figure 3), suggesting that planned replacements were more likely to occur in the summer.

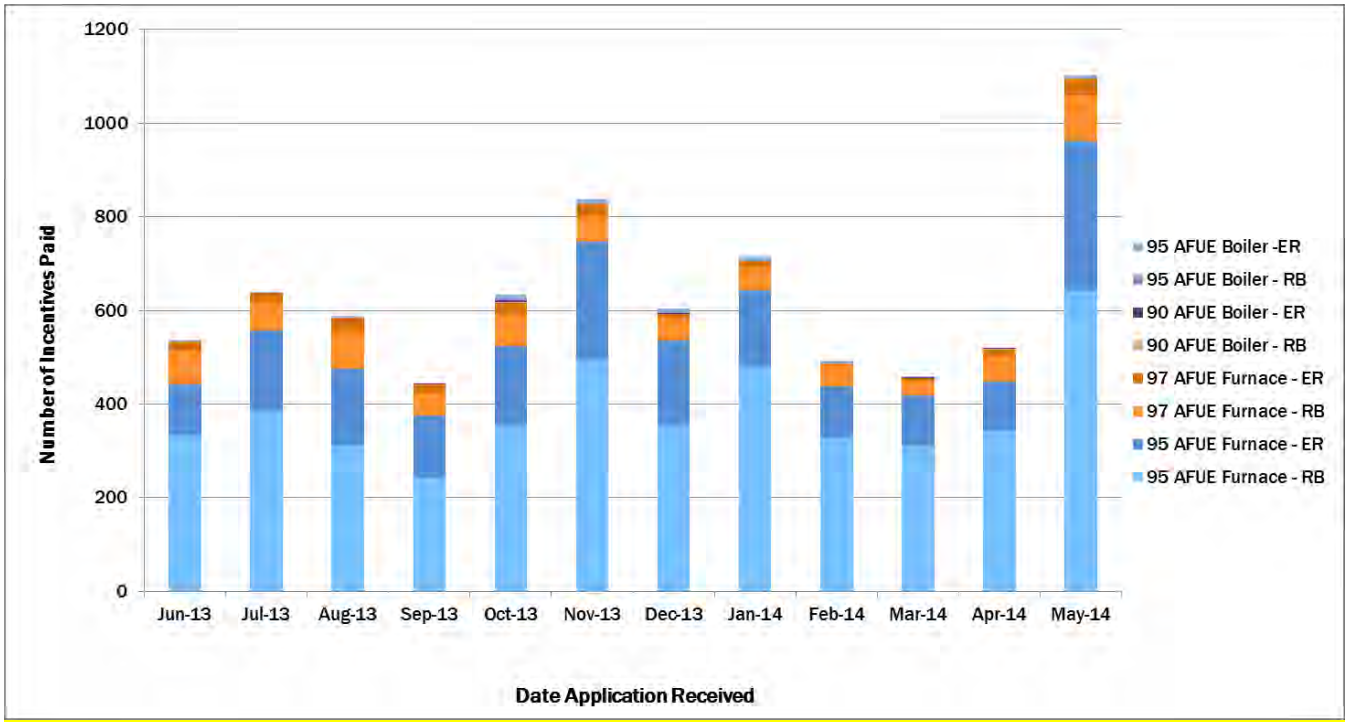
Figure 3. PY6 Monthly Participation—ASHP by SEER level



AIC staff reported planning to remove all gas measures from the program in PY7 due to stakeholder impact resulting from lower cost-effectiveness due to lower avoided costs. In PY6, however, the lower AFUE furnaces appeared to be popular with participants while boilers made up only 1.1% of the total mix of gas equipment (as shown in Figure 4). RB ≤ 95 AFUE furnaces dominated the mix of gas-fired heating equipment (61%), followed by ER ≤ 95 AFUE furnaces (26%). Gas measures made up more than 50% of the total PY6 measures (as seen in Table 24).[8]

[8] Not including GSHPs and ECMs.

Figure 4. PY6 Monthly Participation—Gas Measures by AFUE



As shown in Table 24, on average, the ratio of ER equipment increased significantly over time for the gas measures, but dropped slightly for the electric measures, following a trend in electric equipment seen since PY3. While gas measures did not increase as much as CACs and fans (see Table 23), the percent of ER equipment nearly tripled.

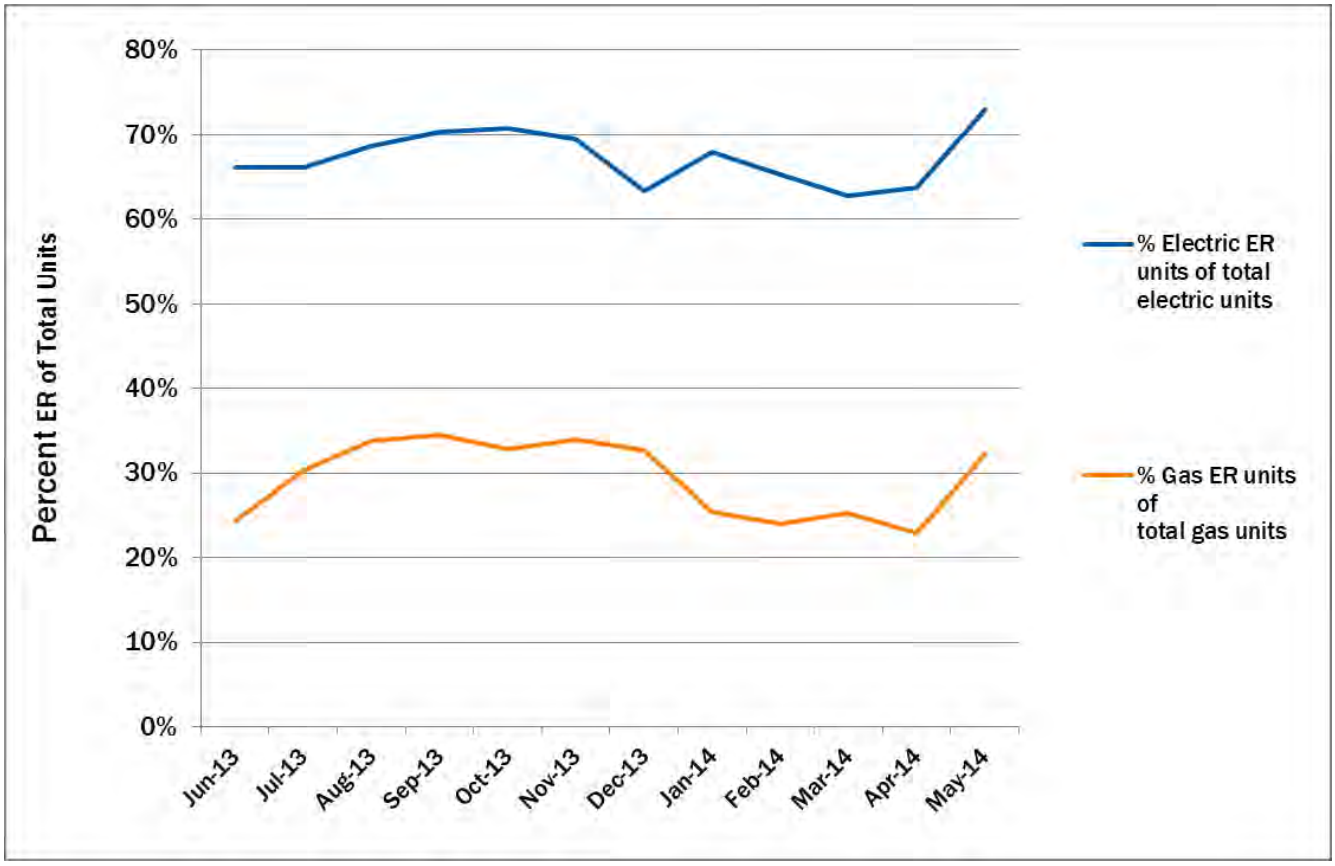
Table 24. Program Participation and Ratio of ER to Total Measures PY3–PY6*

Measure Type	PY3	PY4	PY5	PY6
CAC/ASHP	11,939	4,502	4,408	6,547
% ER	82%	74%	69%	67%
Gas	8,995	5,610	5,930	7,610
% ER	N/A	N/A	11%**	30%
Total	**20,934**	**10,112**	**10,338**	**14,157**

* As this table focuses on measures with ER incentives, it does not include measures without ER options (GSHP, ECMs, and Visa Incentives).
** AIC introduced gas ER measures in November, averaging 20% from November 2012 to May 2013.

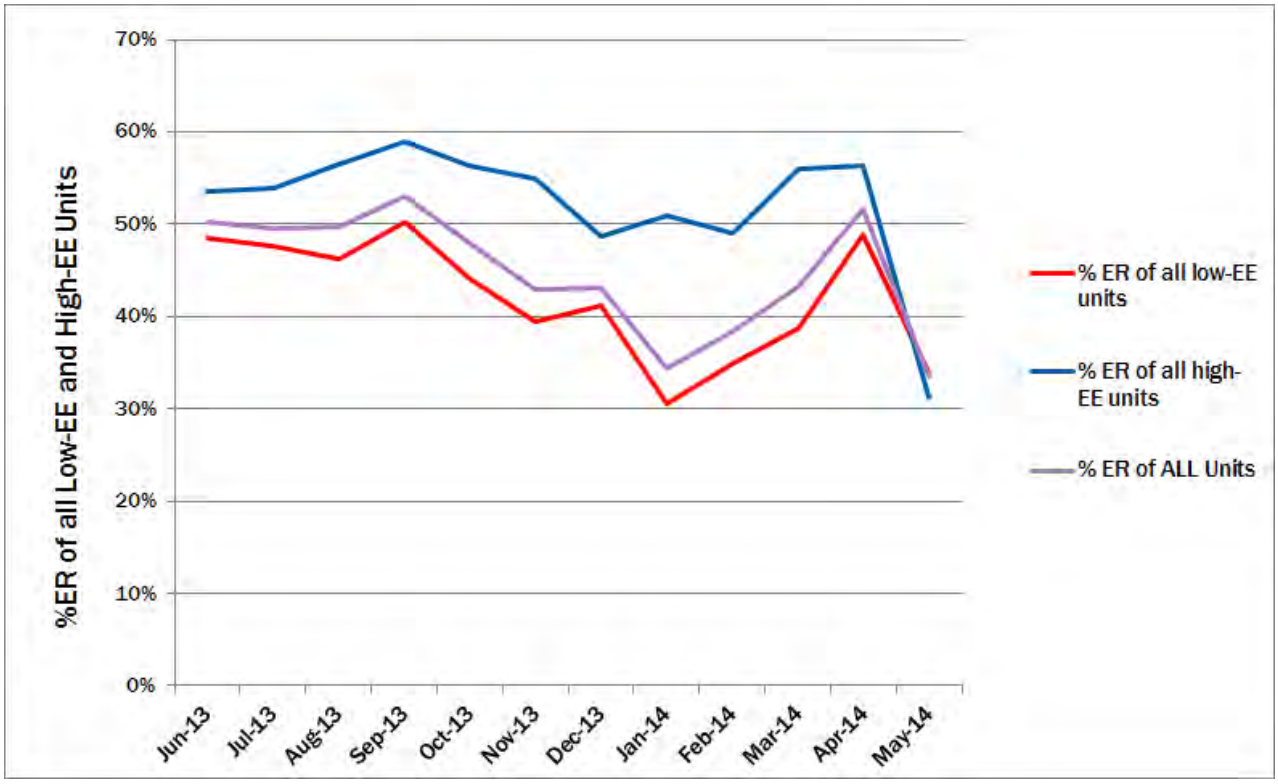
On average, a greater number of electric than gas customers chose to replace their equipment prior to burnout: 67% compared to 30%, respectively. Figure 5 shows that more customers chose ER measures from July to October than during the rest of the year and that, for gas units, this continued into November. By the end of PY6, the course appears to change for both gas and electric measures, but this may result from an application-processing artifact at the end of the year: As contractors knew AIC would discontinue the gas incentives, they may have encouraged customers to make these investments prior to losing the incentive.

Figure 5. Monthly Trend in Percent Early Replacement of Electric and Gas Measures



While a larger percent of all participating customers (electric and gas combined) overall chose lower EE units, a higher percentage of participants who replaced their units early chose high-efficiency units than did the customers who replaced units on burnout. The blue line(top line) in Figure 6 shows the percent of ER customers in the high EE group (55% on average) and the red line shows the percent of ER customers in the low EE group (44% on average). The early replacement of low-efficiency equipment drops from September to January, a trend that is not as clear for the high-efficiency units. The gas units seem to drive this pattern more than the electric units; which suggest that gas customers replacing on burnout during the heating season are more price sensitive than those who make planned replacements. The difference between December to April and July to October or November is 10% points for the gas equipment and 5% for the electric equipment.

Figure 6. Monthly Trend in Percent Early Replacement of Existing Units with Low Energy-Efficiency vs. High Energy-Efficiency Measures



4.2 Process Assessment

The evaluation team analyzed program data and used information gathered from stakeholder interviews and surveys to:

- Understand program processes
- Assess program performance
- Identify improvement opportunities

The team then used this information to address the research questions set forth earlier in Section 2.2.

Data gathered from the participant survey aided the evaluation team in assessing how customers learned of the program, their satisfaction with the program, and what choices they might make when offered a different set of incentives.

Data gathered from the contractor survey provided insights into AR contractors' views of the program, participant decision making, and contractor views of incentive levels. Information collected from HVAC distributor interviews helped the team understand their knowledge of the HVAC Program, their potential role in promoting higher SEER equipment, and their assessment of market changes over the last 5 years.

The data collected also allowed the evaluation team to identify opportunities for improving program performance by examining areas of stakeholder and customer discontent.

4.2.1 Program Participation

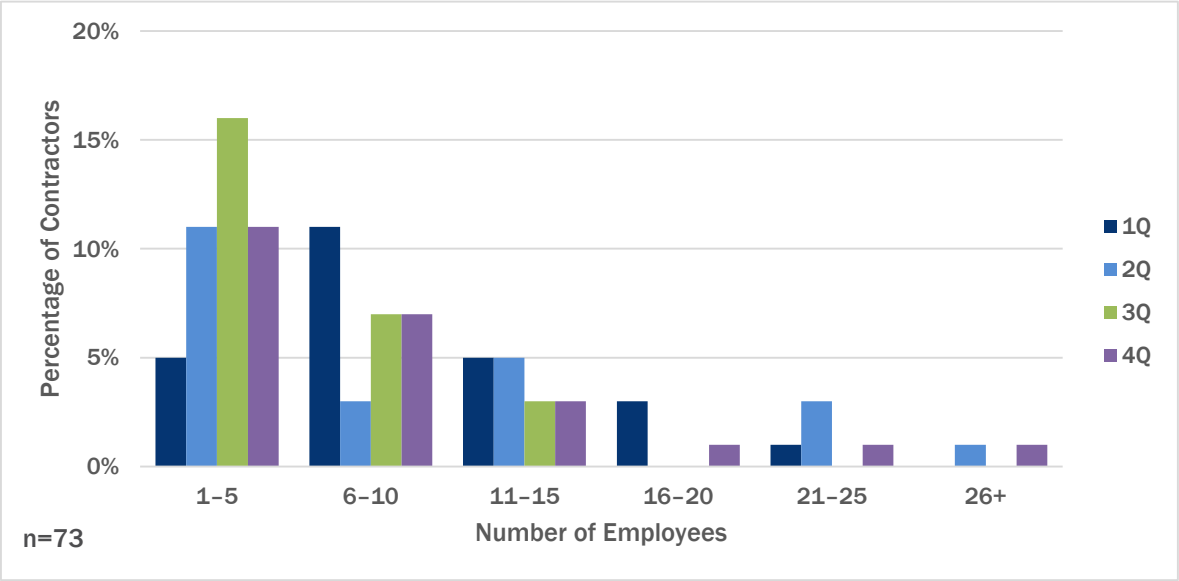
What Are Participation Characteristics?

Customer and contractor surveys included demographic and firmographic questions, designed to identify types of customers and contractors participating in the program. Asking questions similar to those used in PY5 allowed comparisons of results, which revealed some differences. In PY5, the team interviewed only NAR contractors. The team compared PY5 and PY6 contractor responses to see if major firmographic differences occurred between NAR and AR contractors.

Contractors

Though the total number of active contractors remained about the same in PY5 and PY6, the number of applications submitted increased. Ninety-two percent of all contractors responded that their company only had one location. At their location, 71% of all contractors reported having 10 or fewer employees—a finding that was split relatively evenly among all activity levels, as shown in Figure 7.[9]

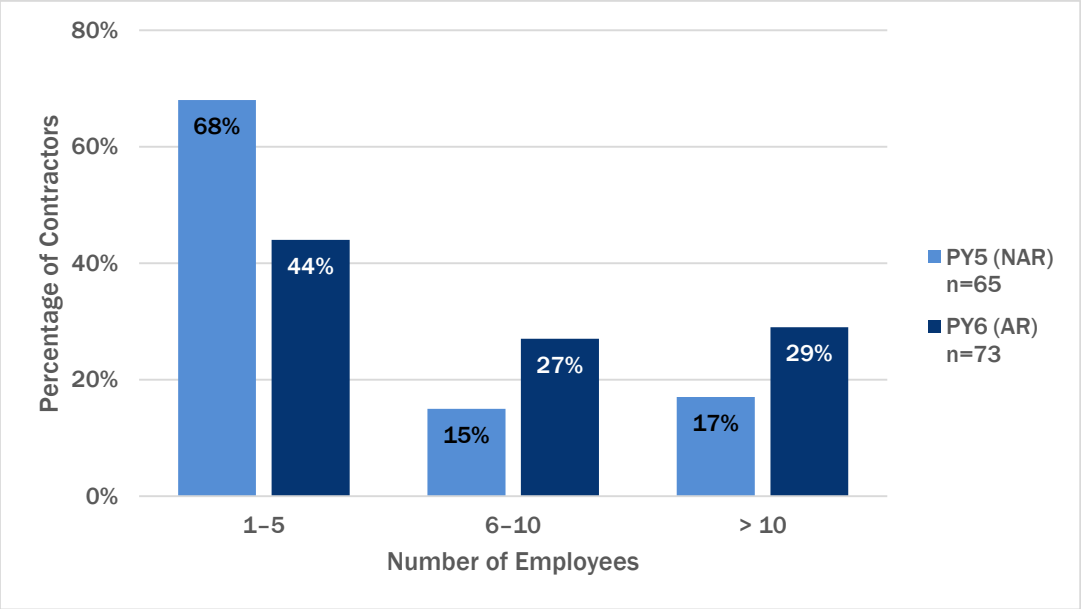
Figure 7. Number of Employees Who Work at Contractors' Location



As shown in Figure 8, AR contractors surveyed generally had a greater number of employees than NAR contractors surveyed for PY5. On average, the NAR contractors surveyed in PY5 had about 6.8 employees in their firm, whereas the AR contractors surveyed in PY6 had about 9 employees. Nearly 30% more NAR contractors than AR contractors had five or fewer employees, and nearly twice as many AR contractors than NAR contractors had six or more employees.

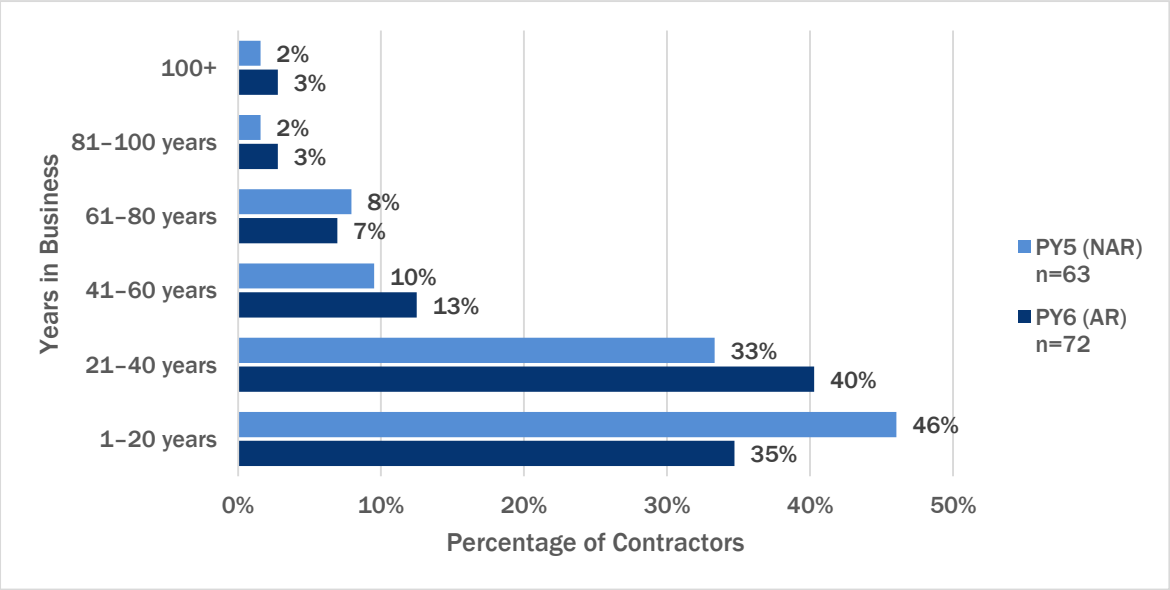
[9] The evaluation team segmented contractors into quartiles, based on activity level (e.g., number of incentives submitted, per Table 7).

Figure 8. PY5 (NAR) Contractors vs. PY6 (AR) Contractor Employee Numbers



As shown in Figure 9, most AR contractors surveyed had operated in AIC's service territory for 40 years or less: 26% had been in business for more than 40 years and 66% had been in business more than 20 years. More NAR contractors (PY5 data) had been in business between 1 and 20 years (46% compared to 35% for AR contractors).

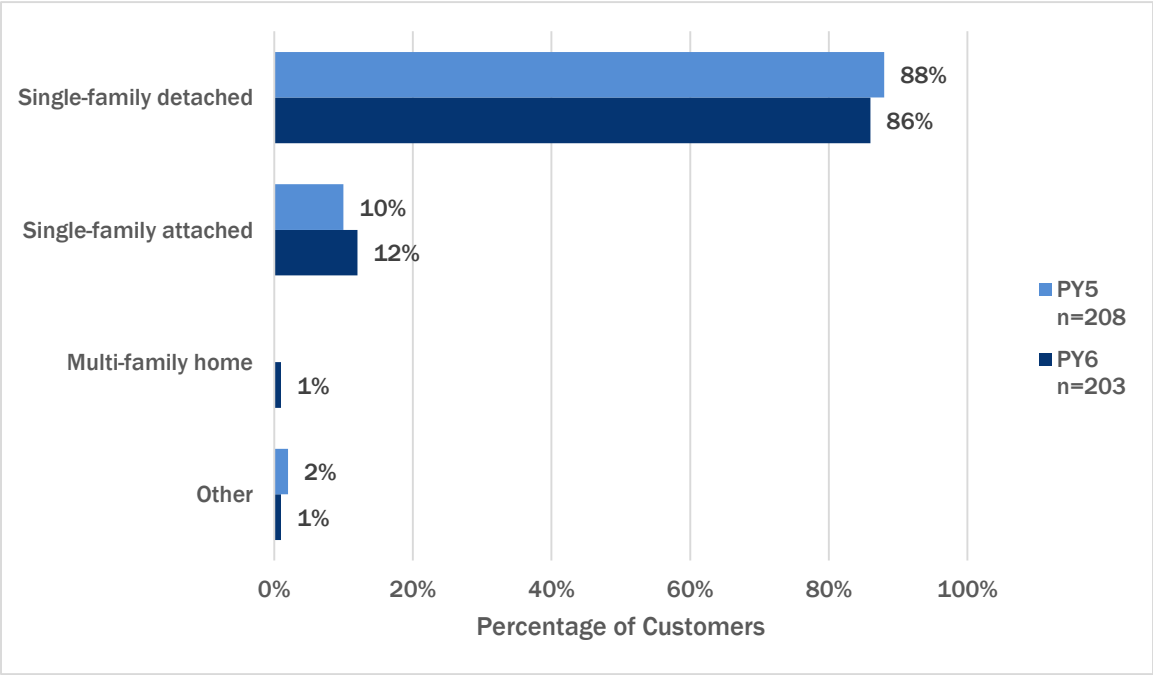
Figure 9. How Long Contractors' Companies Have Been in Business in Illinois



Customers

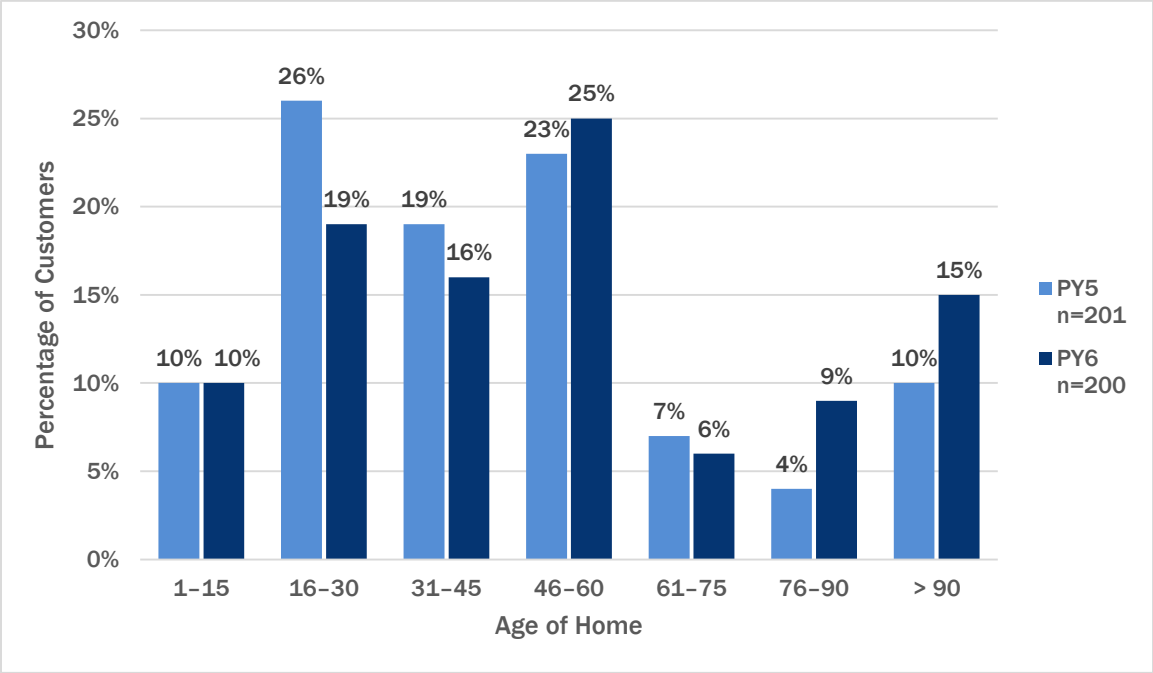
As shown in Figure 10, PY6 participating customers reported living in housing types similar to those in PY5. The majority of PY6 customers (86%) reported living in single-family, detached homes.

Figure 10. Customer Housing Types



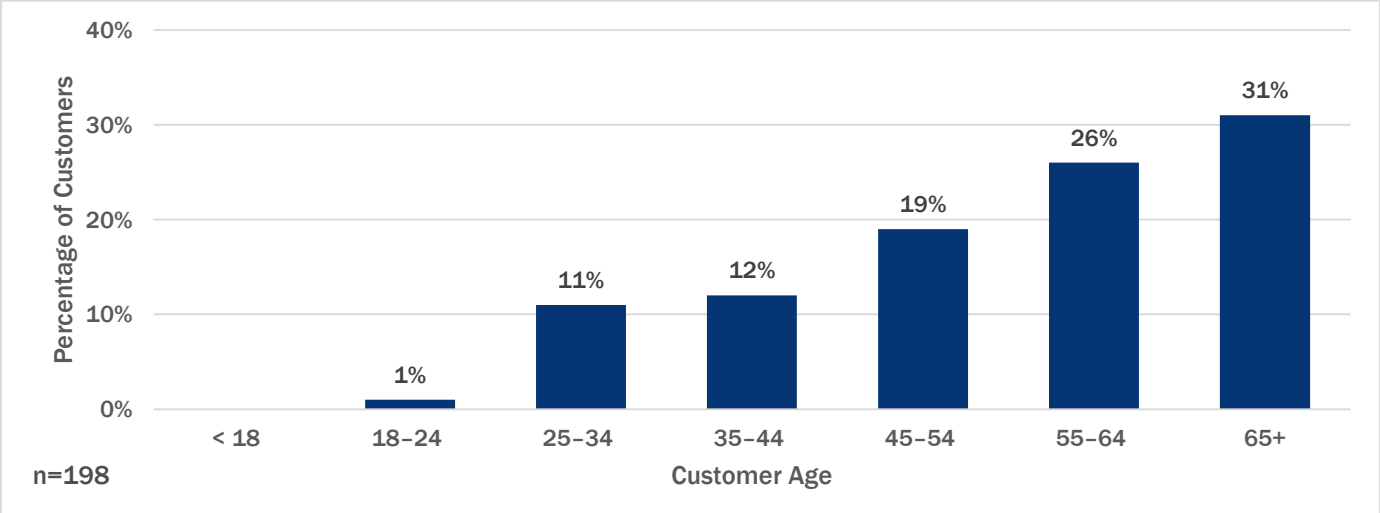
As shown in Figure 11, PY6 saw slightly older approximate ages of customer homes than in PY5, with 30% more than 60 years old in PY6 (compared to 21% in PY5). For PY6, 99% of all customers owned their homes, very close to PY5 when 98% owned their homes.

Figure 11. Approximate Age of Customer Housing



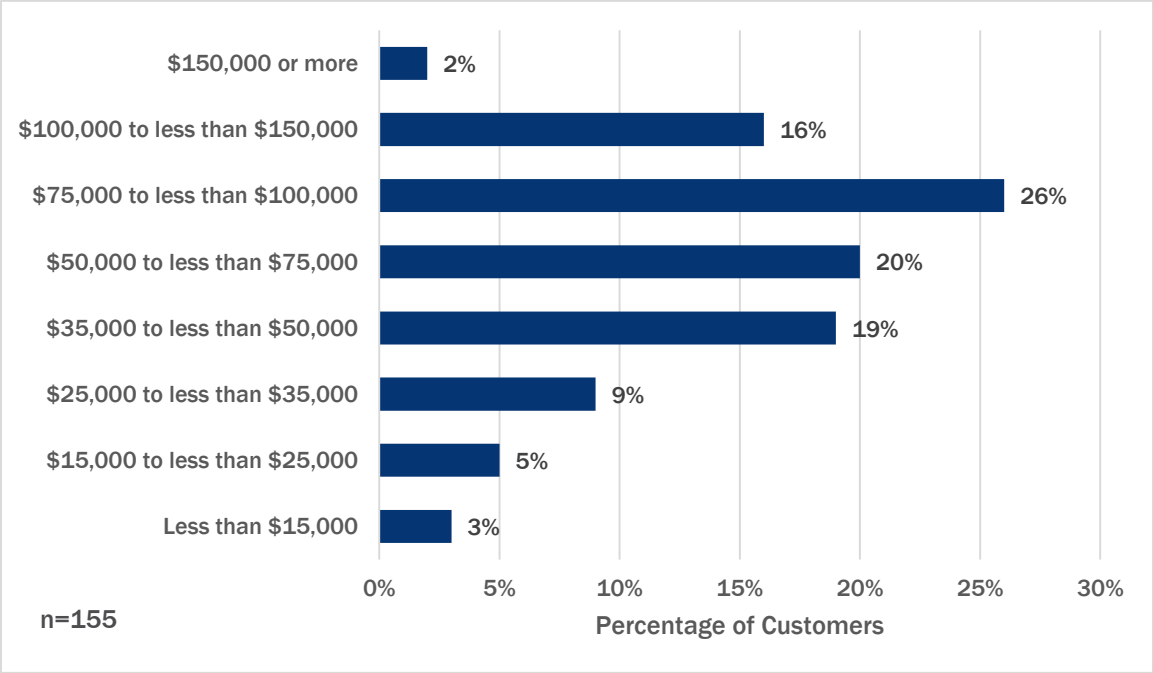
As shown in Figure 12, 57% of participating customers in PY6 described their age as over 55, with only 1% of customers under age 25.

Figure 12. Participating Customers Self-Reported Age



As shown in Figure 13, the majority of participating customers (65%) earned between $35,000 and $100,000.

Figure 13. Participating Customers' Self-Reported Annual Household Income



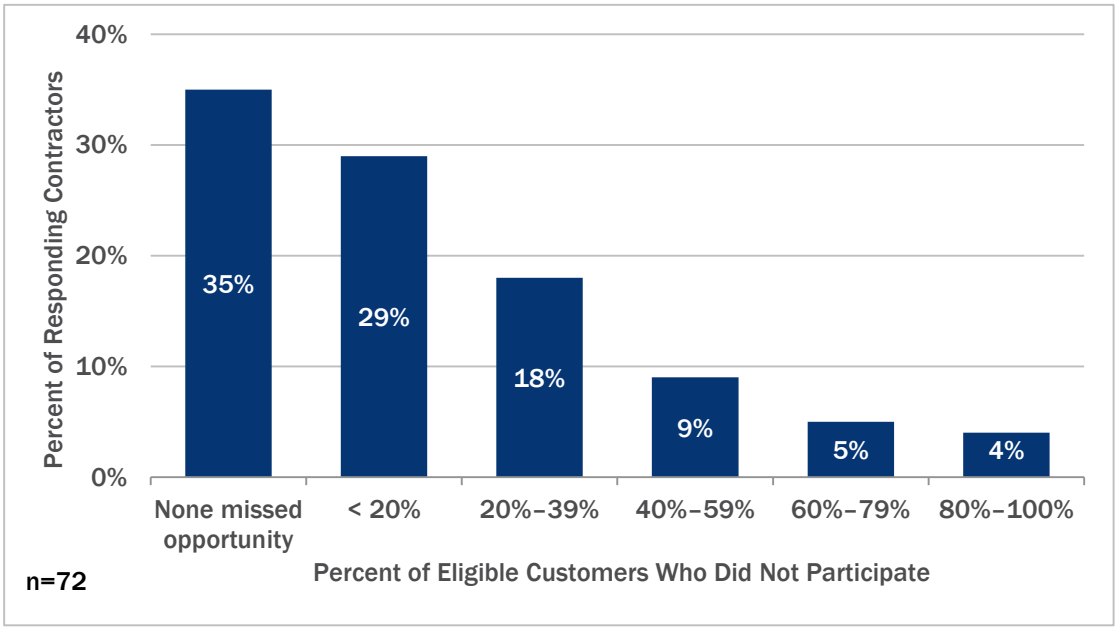
Did Customer Participation Meet Expectations?

As shown in Table 22, the HVAC Program exceeded its PY6 targets in terms of therms, MW and MWh, and number of applications. With more than a million therms in savings, the program exceeded all previous year's annual savings. According to the CSG program manager, the program has been so successful that AIC expressed concerns about its ability to keep up with applications while remaining within budget. CSG attributed this success to AIC not making programmatic changes and contractors becoming comfortable with the program's components and processes.

Despite the program's success in exceeding its goals, some contractors believe a number of customers purchasing new equipment did not take advantage of incentives, and the team asked contractors to provide their views on why this would happen.

Figure 14 shown contractors' estimates of eligible customers not taking advantage of the AIC incentive. The *x*-axis presents their estimate of the percent of eligible customers not participating, broken into six categories of equal percentage range. The *y*-axis presents the percent of contractors responding for each of these categories.

Figure 14. Contractor Estimate of Eligible Customers Who Did Not Take Advantage of AIC Incentive



Thirty-five percent (25) of contractors surveyed indicated that all of their customers took advantage of heating and cooling incentives for which they were eligible. Thirty-six percent of contractors reported that at least 20% of their eligible customers did not take advantage of the incentives. Nine percent of contractors reported that more than 60% of their customers did not receive the incentives for which they were eligible. Four percent of contractors said more than 80% of their customers did not take advantage of the incentive.

These findings indicate that, even with incentives, some customers still chose lower-efficiency equipment not eligible for incentives.

For contractors who said that not all of their customers took advantage of the incentive, surveys asked why they thought customers declined participation. The majority (81%) of the 47 responding contractors cited primarily cost-related issues, with rental property (9%) and "other" (11%) making up the remaining responses.

Table 25 displays a sample of the most relevant verbatim contractor responses regarding why eligible customers did not participate.[10]

[10] Edited for clarity and grammar.

Table 25. Contractor Views on Why Eligible Customers Did Not Participate (20 out of 47)

Cost Considerations	Insufficient Incentive/ Incremental Cost	Unaffordable	Rental Property	Other
They were trying to spend as little as possible.	$280 dollars doesn't cover much of the difference when they already have an 80% furnace.	Can't afford it.	Because they were rentals and they don't have the pay the utility bill, they don't care how bad it is.	Not well educated on it.
They are looking for the bottom-line price.	The rebates are too low, so it's not worth it to go to the higher SEER. When the SEER value goes up, these units are out of the ballpark for most customers.	Cost; they don't have money or are fixed income.	Most of the time, the landlords.	I think they want a quick fix on the existing system, not energy efficiency.
They are concerned about the initial cost, the bottom-line cost.	The cost of the actual unit before the discount. We broke it down, and it's not worth it; the customer would pay twice as much.	Low financial means, so they can't afford the requirements.	Rental unit or people that are planning to move.	I think just solicitation or something. Feeling they are being solicited for something.
Just usually financial. They are cheap.	The amount of the rebate does not cover the upgrade.	Financial status they have, what I can offer them.	Rental property.	Because a lot of them are liquid petroleum gas customers.

Did Contractor Participation Meet Expectations?

Both AR and NAR contractors increased participation slightly during PY6, with a larger increase seen in the NAR group, indicating that efforts to re-engage contractors had paid off. CSG reported signing up 70 new contractors and re-engaging 40–50 NAR contractors, for 520 AR and 400 NAR contractors (920 registered contractors in total) in PY6. In PY5, program staff reported 873 registered contractors, with 517 active, suggesting that the number of NAR contractors increased during PY6. Comparing PY5 to PY4 reveals a much larger increase of AR contractors and a decrease of NAR contractors. Nevertheless, CSG and AIC staff reported satisfaction with the contractors' participation and engagement levels.

Table 26. Contractor Participation in PY4, PY5, and PY6

Contractor Group	PY4	PY5	PY6	PY5 vs. PY4	PY6 vs. PY5
Active	400	517	520	29%	1%
Non-Active	411	356	400	−13%	12%
Total	**811**	**873**	**920**	**8%**	**5%**

Were Purchasers of Higher SEER Equipment More or Less Likely to Be Free-Riders?

Using data from PY3, PY5, and PY6, the evaluation team investigated the relationship between free-ridership, incentive levels, and SEER levels.[11] We compared free-ridership results for each SEER level incented through

[11] Analysis did not include PY4 data as the team did not calculate free-ridership from survey results during that evaluation year, instead applying the previous year's results to determine net savings.

the program. Due to the same program equipment and incentive levels offered between PY5 and PY6, the team could directly compare these results. As PY3 saw lower incentive levels and no ER incentives for gas equipment, the team could not compare these results directly to those from PY5 or PY6. For all 3 years, free-ridership averaged around 50%–60% at the program level, and differences between free-ridership across SEER levels did not differ in a statistically significant manner.[12] In PY6, average free-ridership was higher for higher-SEER equipment, whereas average PY5 free-ridership was higher for lower-SEER equipment, as shown in Figure 15 and Figure 16. Sample sizes proved too small to compare specific SEER-level categories from PY3 to PY5 and PY6 to determine whether free-ridership differences occurred because of different incentive levels. In general, the evaluation team did not see clear patterns emerge.

Figure 15. PY6 Average SEER vs. Average Free-Ridership for Surveyed Participants in PY3, PY5, and PY6

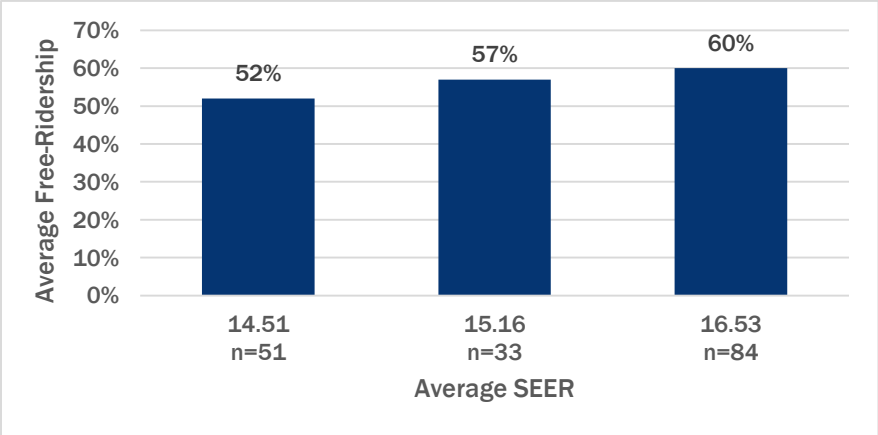
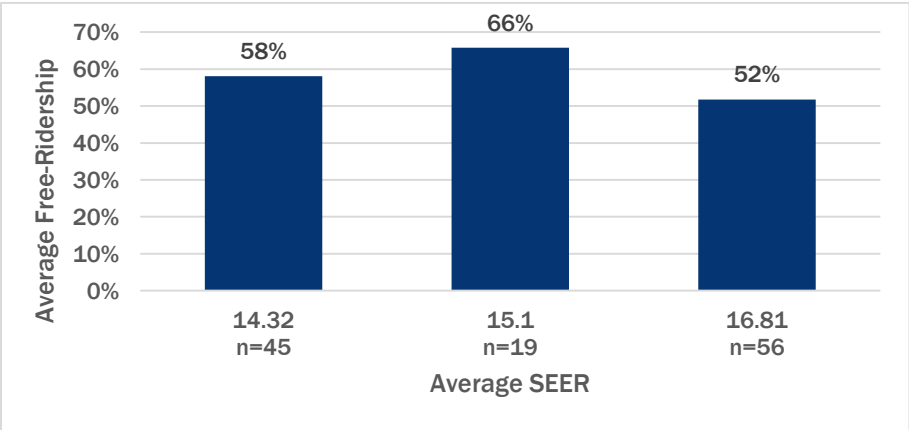
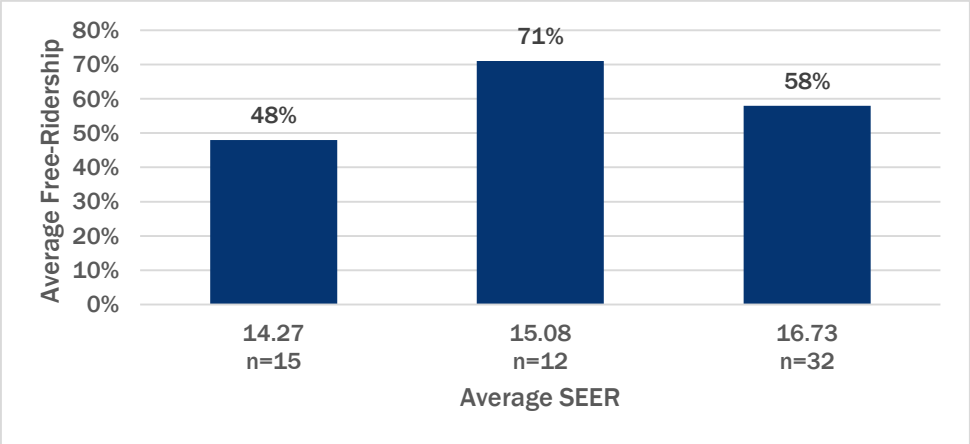


Figure 16. PY5 Average SEER vs. Average Free-Ridership



[12] The evaluation team performed an analysis of variance (ANOVA) to test whether statistically significant differences occurred in mean free-ridership scores between SEER levels for PY3, PY5, and PY6. For all 3 years, ANOVAs showed no statistically significant relationships between SEER levels and free-ridership (F and P = 1.38 and 0.2605 for PY3, 0.82 and 0.4428 for PY5, and 0.51 and 0.6031 for PY6).

Figure 17. PY3 Average SEER vs. Average Free-Ridership



4.2.2 Program Design and Implementation

The AIC HVAC Program experienced significant changes from PY4 to PY5. As noted by program staff interviewed during the PY5 evaluation, AIC chose not to introduce design changes in PY6 due to contractor confusion from the preceding period. The CSG program manager reported that program consistency from PY5 to PY6 proved to be a key factor to the program's success in PY6.

Did Program Implementation Change?

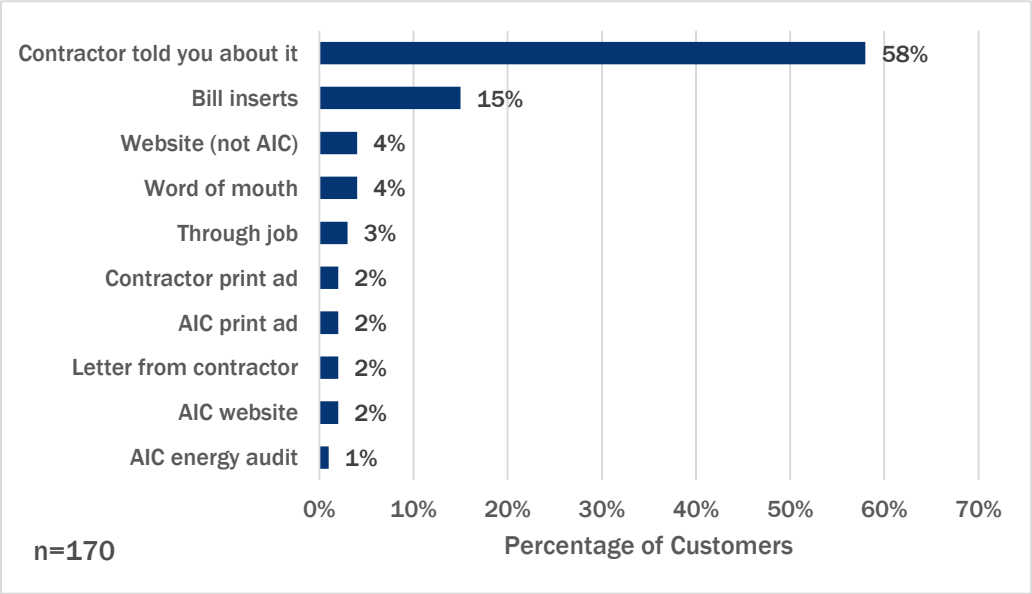
In PY6, AIC and CSG experienced HVAC Program staff changes. For CSG, these changes affected the program's visibility. During the last year, CSG replaced its marketing manager, and CSG staff indicated that positive improvements occurred in communication and a proactive marketing strategy.

CSG also lost its southern account manager (who left the company in March 2014). Since then, there is only one CSG account manager handling its north and south regions. At least two distributors interviewed noted reduced communication resulting from this staff change, with CSG outreach efforts decreasing. The CSG program manager reported wanting to fill the second account manager position and bring in a third person to work directly with distributors, but the budget did not support those staff increases. At AIC, the HVAC Program transferred to a new manager in August 2013.

How Did Customers Find Out about the Program?

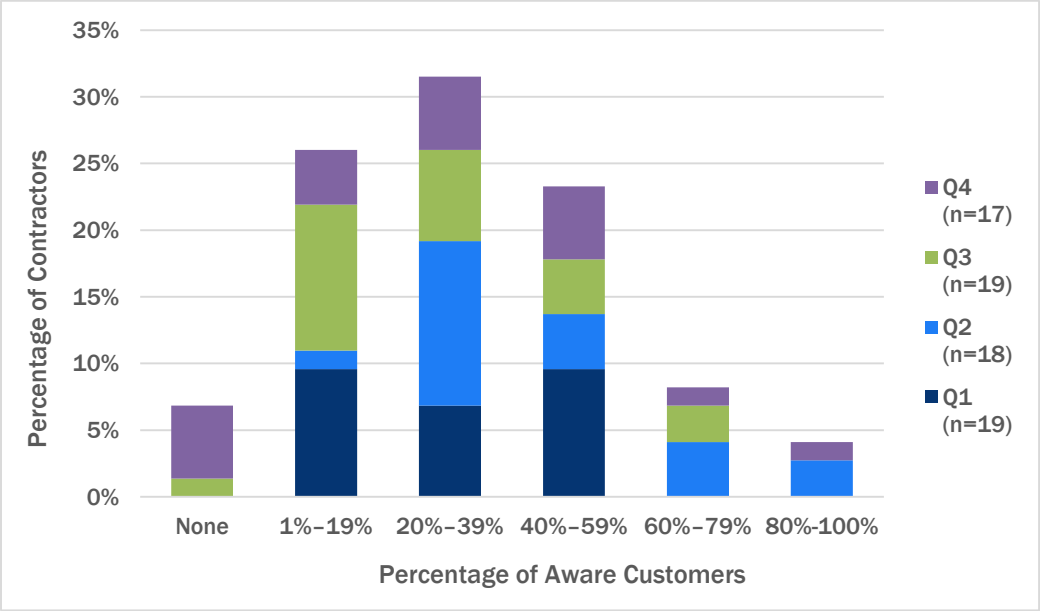
As shown in Figure 18, the majority of customers (60%) learned about the program through a contractor, either directly (58%) or through a letter or advertisement (2%)—representing a reduction in the number of customers in PY4 (83%) and PY5 (75%). The number of customers learning of the program through AIC bill inserts increased from 8% in PY5 to 15% in PY6.

Figure 18. How Customers First Learned about the Program (Customer Process Survey)



From the contractors' perspective, most (64%) thought fewer than 40% of their customers were aware of the program prior to engaging the contractor. In contrast, only 4% of contractors (in the second and fourth quartiles of number of rebates paid) reported that 80% or more of their customers had prior knowledge of the program, as shown in Figure 19.

Figure 19. Contractors' Assessment of Prior Customers' Awareness of HVAC Program by Activity Level Quartile



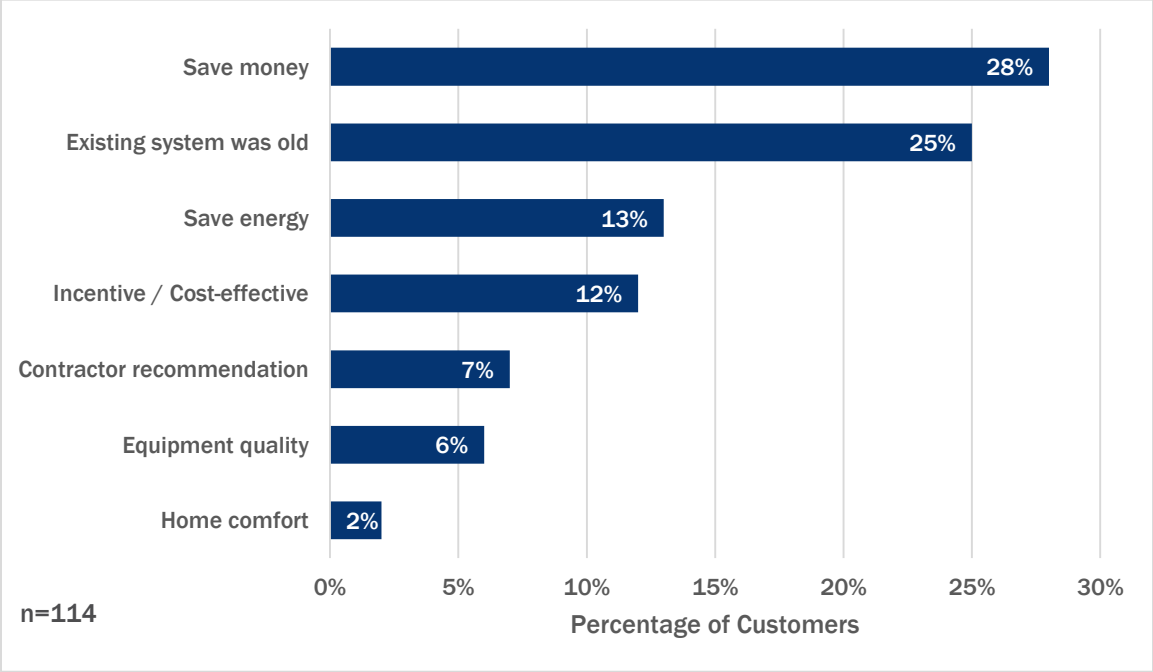
All 19 high-activity contractors (Q1) reported fewer than 60% of their customers previously knew of the program, while 9 lower-activity contractors (Q2, Q3, and Q4) thought that more than 60% of their customers

knew of the program prior to the contractor telling them about it. This suggests higher-activity contractors appear to be proactively educating their customers about the program in comparison to lower-activity contractors who appear to participate in response to customer requests.

How Did the Program Incentives and Customer Knowledge Affect Customer Choice?

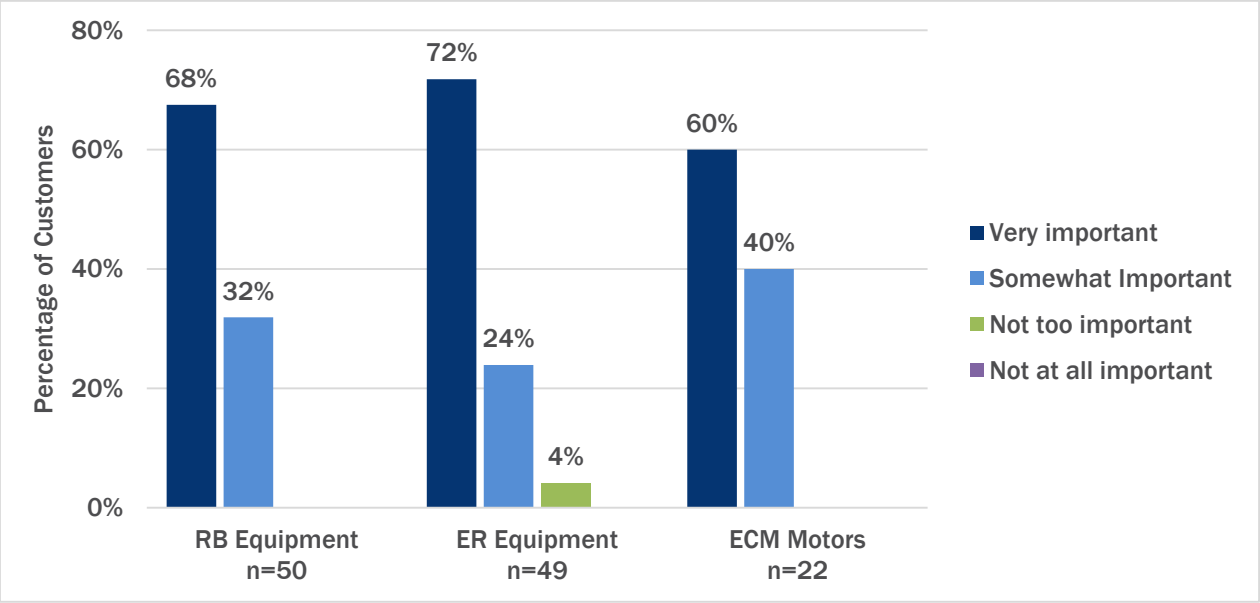
The evaluation team asked customers and contractors about elements influencing customers' purchasing decisions. Most customers indicated that the primary reason they chose their equipment was to save money (28%) or to replace aging equipment (25%). Customers also made decisions based on saving energy (13%) and on the incentive (12%). Contractors' recommendations served as the main influencing factor for 7% of customers, as shown in Figure 20.

Figure 20. Customers' Primary Reasons for Choosing Their Equipment



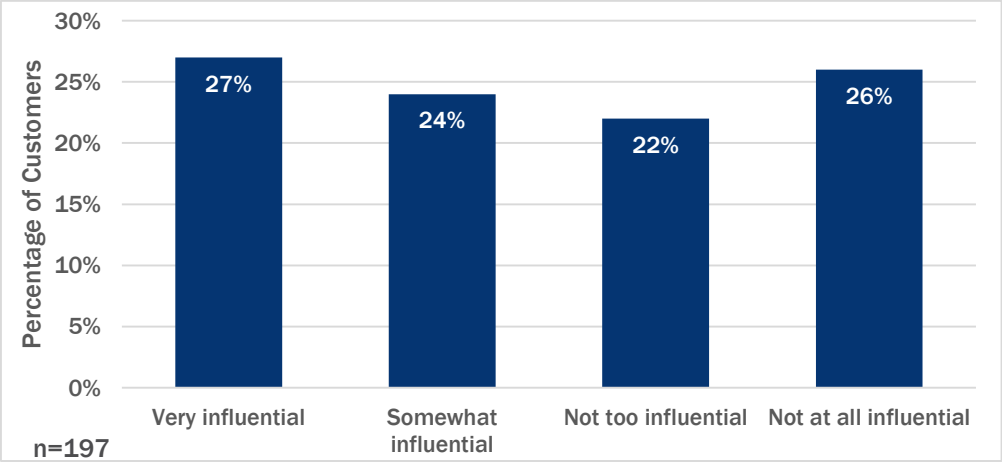
The evaluation team also examined the importance of contractors' recommendations on which unit customers purchased. While few customers said contractors' recommendations served as the primary reason they purchased a qualifying program unit, most customers said the contractor's recommendation proved very important. Only a small number of customers participating in ER equipment purchases considered a contractor's recommendation not at all important in their decision making, as shown in Figure 21.

Figure 21. Customer Response on Level of Contractor Influence on Purchase Decision



When directly asked to discuss the program incentive's influence on their purchasing decisions, customer responses split fairly evenly across all four influence levels.

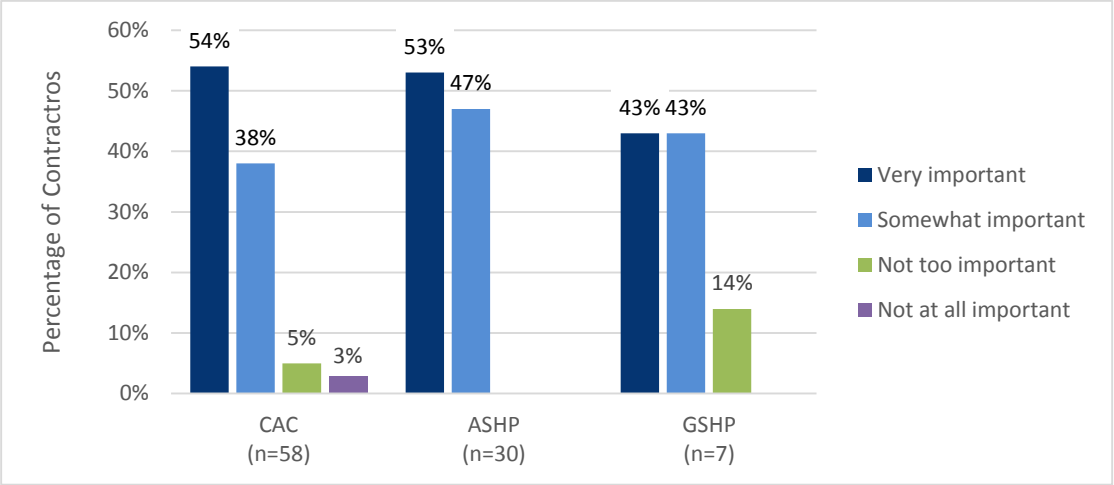
Figure 22. Incentive Influence on Customer Purchasing Decisions



Contractor Feedback on Customer Decision-Making Influences

As shown in Figure 23, contractors considered the incentive program very helpful in driving sales. For contractors installing ASHPs for their customers, 100% considered the AIC discount very important (53%) or somewhat important (47%) in encouraging customers to purchase higher-tier equipment. Contractors found the program somewhat less helpful in encouraging purchases of GSHP equipment (with 86% rating it very or somewhat important).

Figure 23. Contractor Estimate of Importance of the AIC Discount in Customer Decision

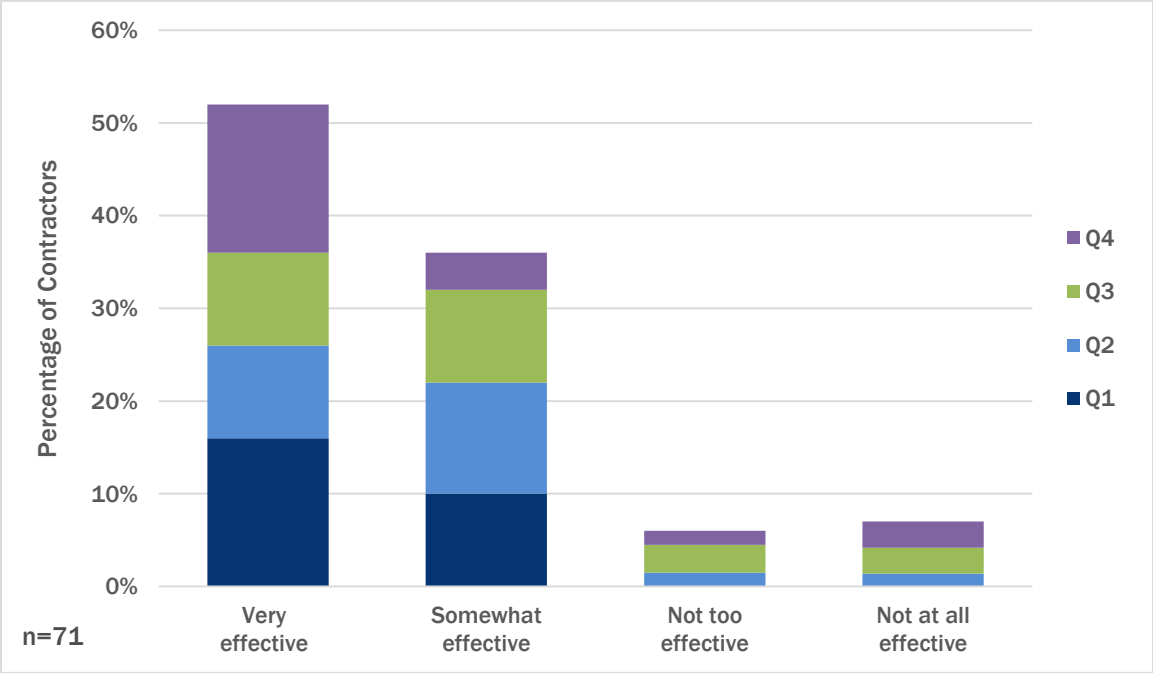


Contractor Feedback on Current Tier System

The evaluation team investigated the current tier system, gathering responses from contractors and customers. Eighty-seven percent (62) of contractors considered the multitier approach very effective (51%) or somewhat effective (36%) at attracting customer participation. All contractors in the highest activity quartile considered the tiered structure very effective (61%) or somewhat effective (39%). The majority of the three lower activity quartiles of contractors[13] (quartiles 2,3, and 4) also considered the tiered structure effective, although a few (9 out of 71 contractors) reported it not too effective (6%) or not at all effective (7%), as shown in Figure 24.

[13] Second-quartile contractors submitted 10–28 incentive applications, third-quartile submitted 3–10, and fourth-quartile submitted 1–3.

Figure 24. How Effective Has the Tier Structure Been? (Contractor Survey)



The evaluation team asked the nine contractors who reported that the tier structure was ineffective to explain their responses. Five contractors' responses implied that the incentives did not cover enough incremental costs to move customers to purchase units at the highest tier levels.

Table 27. Responses from Contractors Who Considered Tier Structure Not Too or Not at All Effective

Q2 Contractors	Q3 Contractors	Q4 Contractors
It didn't help more than the old program.	I think it's the fact that the incentive helps them to move up, but they will not make a decision on $100 dollars.	Ameren had a better gig when they had an electric rate; now that they removed the rate, people don't want to talk about it.
When anything gets about 16 SEER, it takes almost 10 years to pay for the difference.	The cost of the high-efficiency equipment is much higher than the rebate.	The rebate portion, to the customer it doesn't make up the difference in cost; people want to save cost.
	Because people don't have that kind of money. That's our opinion because we live in a rural area.	Everybody is moving from electricity to gas.
	We are just a smaller company; I don't have opportunity to sell on large scale.	

What Might Be a Better Combination of Incentive and SEER Level to Increase Customer Participation?

According to AIC's Plan Three filing docket, AIC intends to increase efficiency requirements for electric equipment and remove all gas equipment incentives in PY7. AIC also is considering offering an incentive for SEER 18+ equipment. To investigate the opportunities to improve program performance by adjusting the combination of incentives and SEER offerings, the evaluation team asked customers, contractors, and

distributors to share their views regarding incentives AIC would need to move customers to choose higher-SEER-level equipment. The team also gathered data from other utilities offering similar equipment in an effort to benchmark AIC's offerings. Results follow from the customer choice survey, the contractor survey, the distributor interviews, and the benchmarking research on this subject.

Customer Willingness to Pay at Different SEER Levels

The online willingness-to-pay survey, conducted for HVAC Program participants and nonparticipants (customers with an existing CAC or heat pump who did not participate in the program), asked respondents to choose between the baseline and efficient CAC or heat pump options under different incentive-offering scenarios for RB equipment. The evaluation team provided customers with information about incremental costs, annual cost savings, and possible incentives, and asked them to choose whether they would be more likely to purchase the baseline option or the efficient option.

For each segment surveyed (e.g., participant air conditioners, nonparticipant air conditioners, and participant heat pumps), the evaluation team assessed the following: the average incentive needed to convert participants from purchasing a baseline efficient unit to a more-efficient option; the percentage of customers reportedly purchasing higher-efficiency units without an incentive; the average incentive price for those customers reporting a non-zero incentive; and incentives resulting in the largest participation increase. Table 28 presents the results.

Table 28. Choice Survey Results

Indicator	CAC – Participants (n=70)	CAC – Nonparticipants (n=82)	Heat Pump – Participants (n=38)	CAC Combined* (n=152)	Heat Pump Combined** (n=49)	All Combined** (n=201)
Average Incentive Needed to Choose EE						
SEER 14.5	$40	$70	$38	$56	$41	$53
SEER 16	$129	$187	$84	$161	$124	$152
SEER 17	$274	$351	$205	$316	$251	$300
SEER 18	$387	$510	$271	$454	$323	$422
Percent Choosing EE without Incentive						
SEER 14.5	74%	57%	92%	65%	91%	71%
SEER 16	64%	50%	68%	56%	63%	58%
SEER 17	43%	35%	55%	39%	52%	42%
SEER 18	32%	27%	54%	29%	46%	33%
Average of Non-Zero Incentive Needed to Choose EE						
SEER 14.5	$150	$168	$290	$162	$286	$176
SEER 16	$367	$373	$267	$371	$339	$364
SEER 17	$485	$543	$459	$518	$513	$517
SEER 18	$556	$697	$542	$634	$574	$618
Largest Participation Increase per Incentive Level						
SEER 14.5	$100	$100	$200	$100	$250	$100
SEER 16	$300	$400	$100	$400	$100	$400
SEER 17	$400	$700	$500	$500	$500	$500
SEER 18	$700	$600	$700	$600	$800	$600

* Not weighted due to unknown population size of eligible nonparticipants.
* We do not report HP nonparticipants individually, due to the small n.

For each surveyed segment, the evaluation team plotted the cumulative frequency of respondents' choices for each SEER level. Figure 25 to Figure 30 show the incentive amounts on the curves resulting in the largest participation increase per incentive dollar.

Figure 25. Incentive Levels Encouraging Higher SEER Purchases—CAC Participants (n=70)

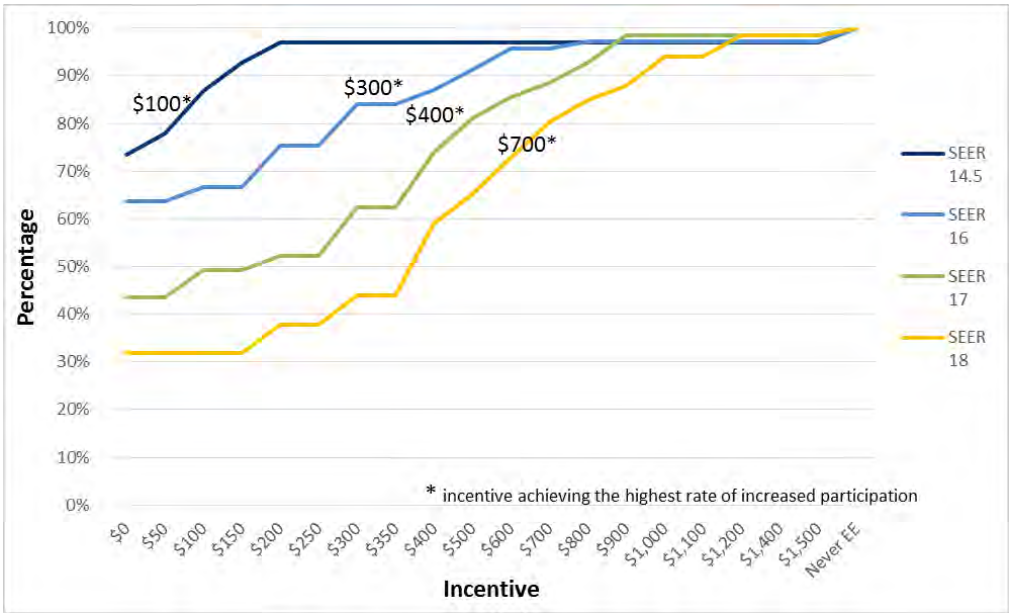


Figure 26. Incentive Levels Encouraging Higher SEER Purchases—CAC Nonparticipants (n=82)

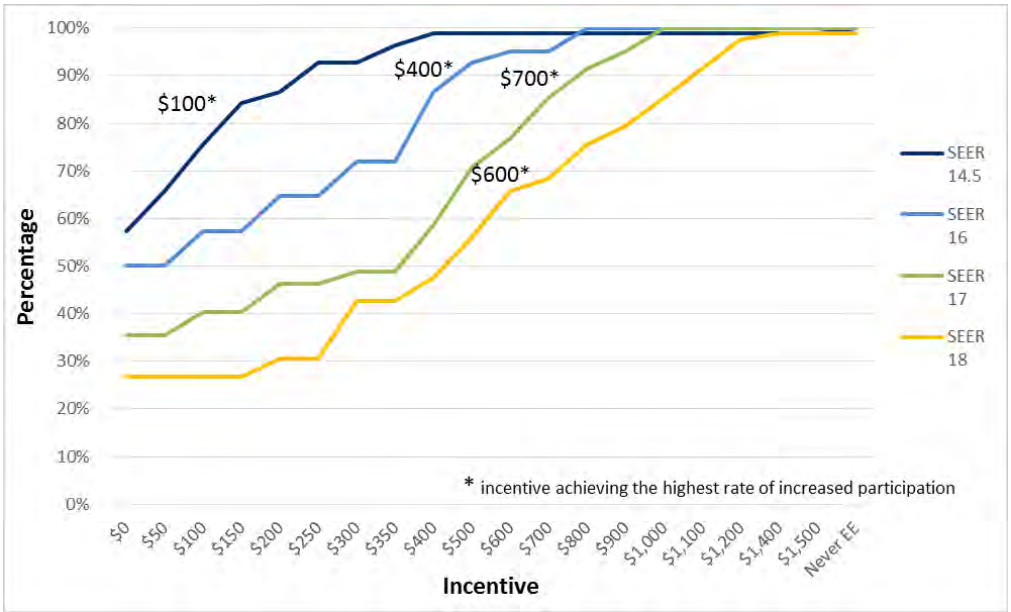


Figure 27. Incentive Levels Encouraging Higher SEER Purchases—ASHP Participants (n=38)

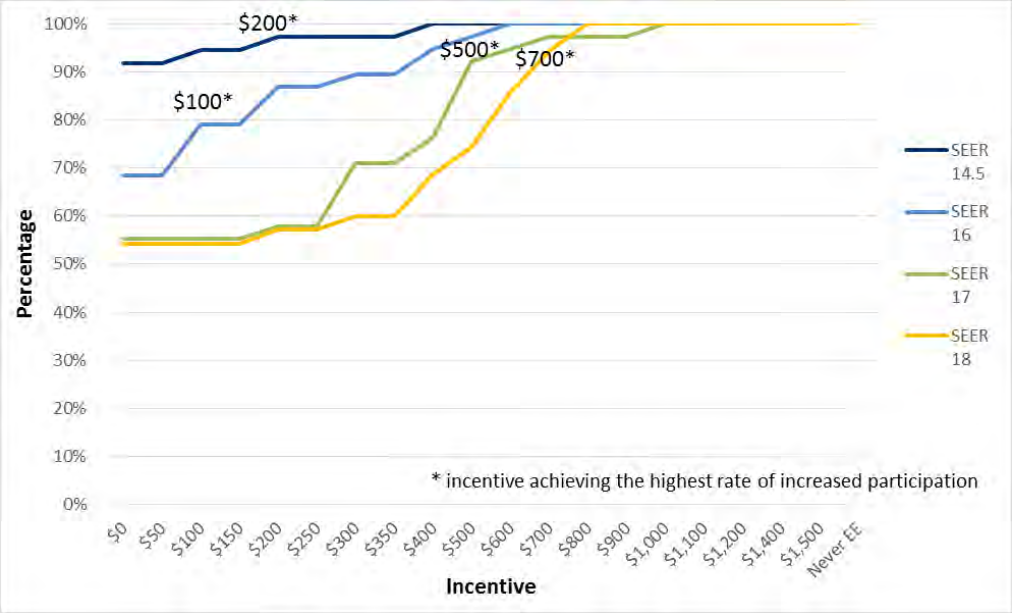
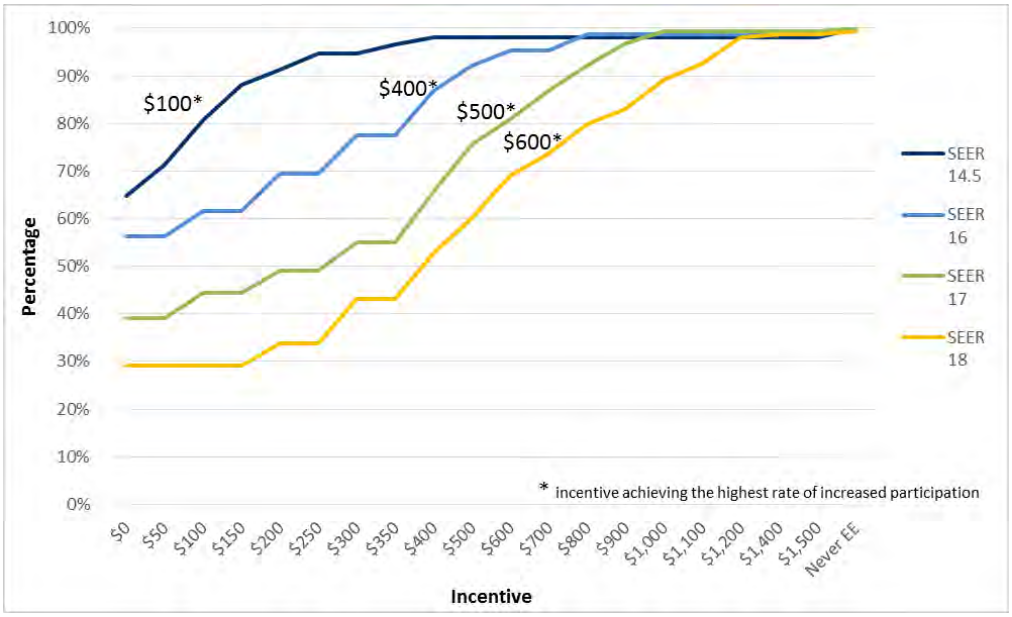
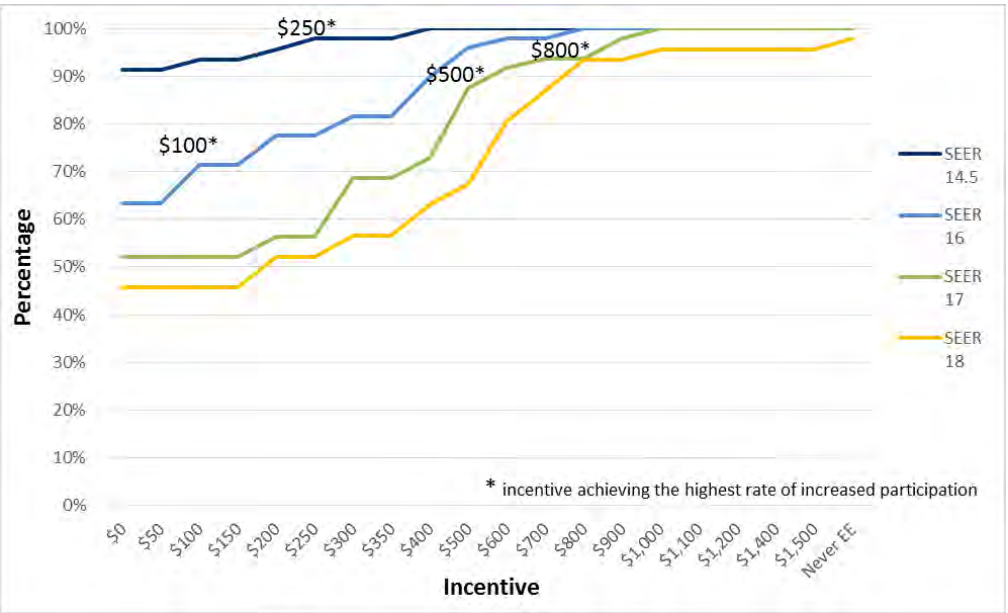


Figure 28. Incentive Levels Encouraging Higher SEER Purchases—CAC Combined (n=152)*



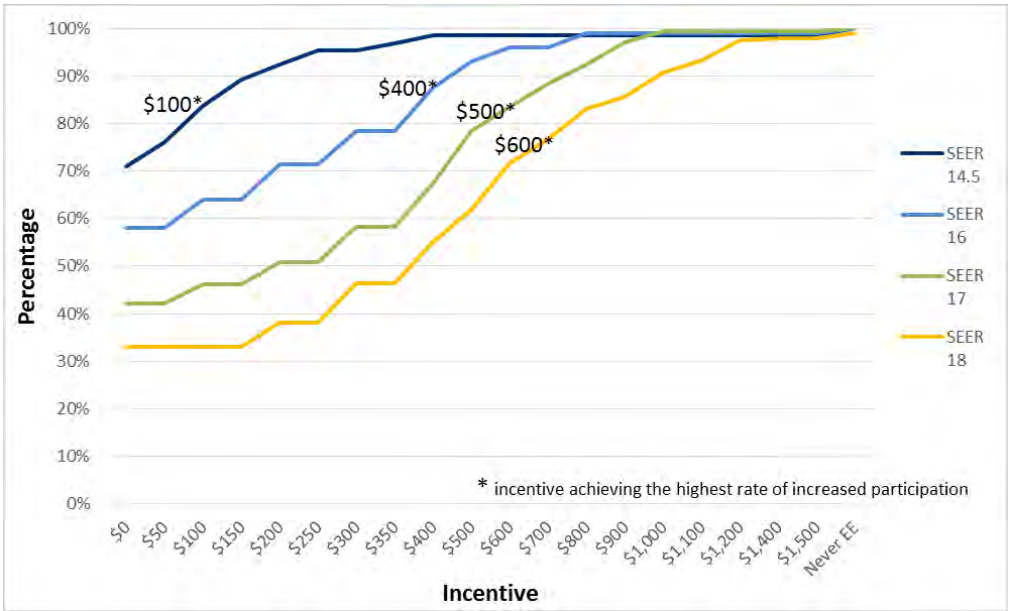
* Not weighted.

Figure 29. Incentive Levels Encouraging Higher SEER Purchases—ASHP Combined (n=49)*



* Not weighted.

Figure 30. Incentive Levels Encouraging Higher SEER Purchases—All Respondents (n=201)*



* Not weighted.

Heat pump participants appeared to require slightly lower incentive levels to purchase the energy-efficient options than did the other groups. CAC participants, who already participated at relatively low incentive levels, required lower incentives than nonparticipants.

Notably, 92% of participating heat pump customers indicated that they would purchase a 14.5 SEER unit without an incentive, compared to 74% of CAC participants, indicating levels higher than free-ridership scores (62% for combined heat pumps and CACs at SEER < 16; see Appendix B). Consequently, not all of these customers may follow through with the purchases. The current $150 incentive for air conditioners appears to result in the highest increase in participation per incentive dollar for participants (increasing above the starting level of 74%) and only slightly higher ($168) for nonparticipants.

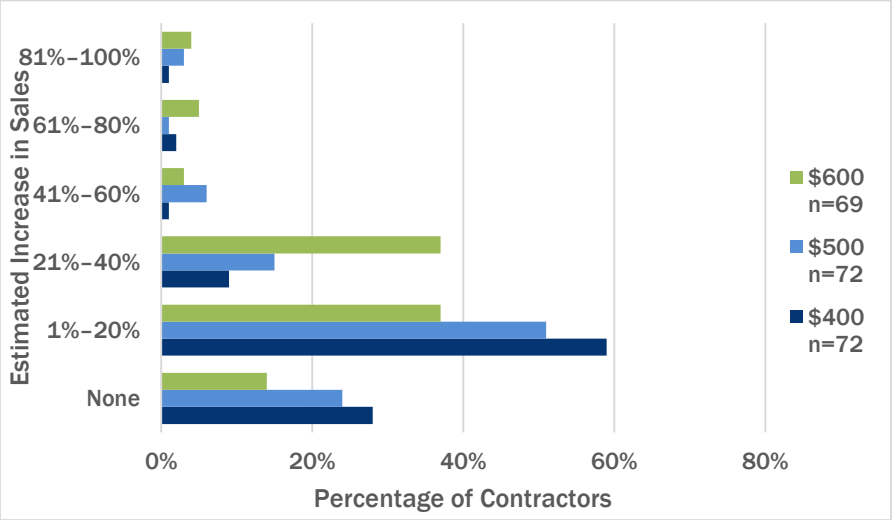
At SEER 16, heat pump participants proved more willing to purchase efficient models with lower incentives than did CAC participants. A $100 incentive provided the highest participation increase per incentive dollar for SEER 16 heat pumps, as did $300 for participant CACs ($400 nonparticipant CACs). SEER 17 required higher incentive levels—around $500—resulting in the greatest participation increase.

The majority of respondents identified meaningful incentives for SEER 18 units ranging from $500 and $700, with the highest increase in participation per incentive dollar occurring at $700 for both heat pump and air conditioner participants.

Contractor Feedback

The evaluation team asked contractors to estimate the potential sales increase in SEER 18 equipment occurring if AIC offered a $400, $500, or $600 incentive. As shown in Figure 31, approximately one-quarter of the group thought a $400 and $500 incentive would not produce an effect, and nearly 60% thought an increase from 1% to 20% would occur at $400. At the $600 level, 37% of contractors estimated sales would increase from 21% to 40%. An equal number said it would increase sales by 1% to 20%.

Figure 31. Estimated Increase in SEER 18 Sales at Different Incentive Levels (Contractor Survey)



Of the five contractors who said that none of these incentive levels would result in increased sales, the evaluation team asked how high the incentive would need to be to generate customer interest. Four contractors suggested the following incentives: $800 (1), $1,000 (1), and $1,500 (2).

HVAC Distributor Feedback

Eight of 11 distributors provided their views on incentive levels that would generate increased sales of SEER 18 CAC and ASHP equipment. Responses ranged from $600 to $1,500.

Table 29. Distributors' Suggested Incentive Levels for SEER 18 Equipment*

Suggested Incentive	Expected Increase in Sales
Enough to offset at least 60% of the additional cost: $250–$300 more [than the $300 incentive, so $600]	–
Incentive would need to be in $700–$800 range	20%–25%
Probably pushing $800–$1,000	30%–40%
$800–$1,000	15%–20%
$800–$1,000	10%–15% at least, maybe
At least $1,000	At least 20%
Up to $1,000 for the premium SEER rating	–
At least $1,500	Only a 10%–15% increase

* Each row represents an individual distributor.

Distributors most commonly (three) recommended an incentive between $800 and $1,000. Distributors said this would lead to increased sales of SEER 18 equipment of 10%–40%, with average expectations of a 20% increase—notably pessimistic estimates compared to the customer choice survey results, which indicated an $800 incentive would increase sales by 50% or more.

Benchmarking against Other Utilities

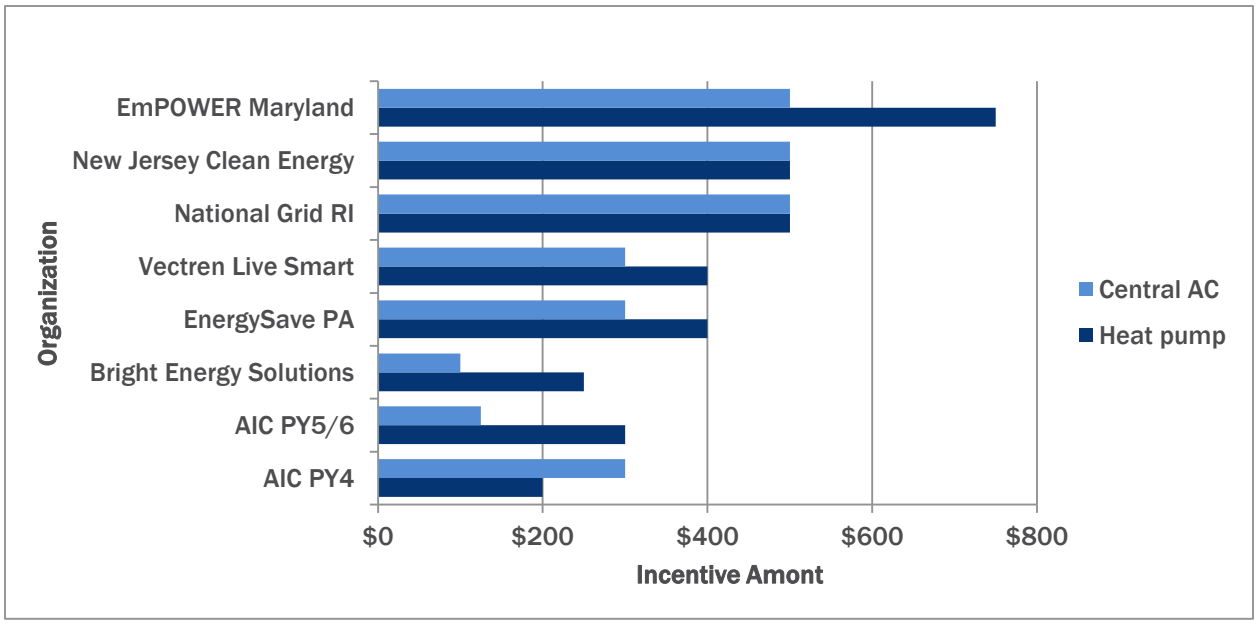
The evaluation team compared AIC's incentive levels with other utilities around the country. While in some cases, AIC offered incentives within the range of some utilities, AIC's current and proposed incentives for 18 SEER equipment fell within the lower end of the spectrum, as shown in **Error! Reference source not found.**. Figure 32 presents utility rebate values offered for RB heat pumps and CACs (few utilities currently offer 18 SEER rebates).

Table 30. Benchmarking Rebate Levels for HVAC Program Measures
(Not Including Early Replacement, If Offered)

Utility HVAC Program	Heat Pump SEER 16+	Heat Pump SEER 18+	CAC 16+	CAC 18+	ECM
AIC H&C PY4 (IL)	$200	–	$125	–	–
AIC H&C PY 5/6 (IL)	$300	–	$300	–	$80
EmPOWER Maryland (MD)	$750	$1,250	$500	$1,000	$100
EnergySave (PA)	$400	–	$300	–	$100
Coleman Instant Rebates*†	$300	$600	$300	$600	–
York*	$250	$400	$250	$400	–
Rhode Island Res Heating & Cooling Program, National Grid (RI)	$500	–	$500	–	$100
Vectren Live Smart (IN, OH)	$300-$400	–	$300	–	$60
Focus on Energy (WI)	$300	–	–	–	$125
New Jersey COOLAdvantage (NJ)	$500	–	$500	–	–
Bright Energy Solutions (MN, IA, ND, SD)	$250	$350	$100	$225	–

* Manufacturer rebate.
† Program ended December 31, 2013.

Figure 32. Heat Pump and CAC Utility Incentive Levels for RB SEER 16+



Interviewed distributors generally recommended 18 SEER incentive levels higher than those currently available from manufacturers and Bright Energy Solutions,[14] but close to incentives recently introduced by the EmPOWER Maryland utilities (as represented by EmPOWER MD rebates, shown in **Error! Reference source not found.**).

AIC currently offers incentive levels for RB heat pump and CAC SEER 16 equipment lower than the benchmarked average ($400 for heat pump, $344 for CAC) for comparable measures, as presented in **Error! Reference source not found.**, but they fall within the range of five utility HVAC programs ($250 to $300), as shown in Figure 32.

The evaluation team identified a selection of utilities offering ER incentives for HVAC equipment. For ER measures, AIC offered low incentives compared to other utilities offering similar incentives. Only Dayton Power & Light had a lower ER CAC incentive. These utilities offer an average ER incentive of is $975 (heat pump) and $858 (CAC), as shown in Table 31.

Table 31. Early Replacement HVAC Program Incentives

Utility (State)	HP SEER 16+	CAC 16+
AIC PY6 (IL)	$600	$600
COOL SMART (MA)	$1,000	$1,000
Dayton Power & Light (OH)	$600	$300
Cape Light Compact (MA)	$1,000	$1,000
Tucson Electric Power (AZ)	$850	$850
Gulf Power (FL)	$1,000	$1,000

[14] A group of Missouri utilities offering incentives through a centralized program.

PSEGLI Cool Homes (NY)	$1,400	$1,000

Are Contractors Taking Advantage of Training Opportunities? Do Contractors Find Them Useful?

CSG provides training, brochures, and marketing materials to support participating HVAC contractors. Training, offered only to active contractors, informs contractors how to use the program, offers marketing tips, and encourages use of industry best practices and North American Technician Excellence (NATE) certification.[15]

In PY6, CSG provided four classes on HVAC-proactive sales training for AR contractors, with training sessions focusing on:

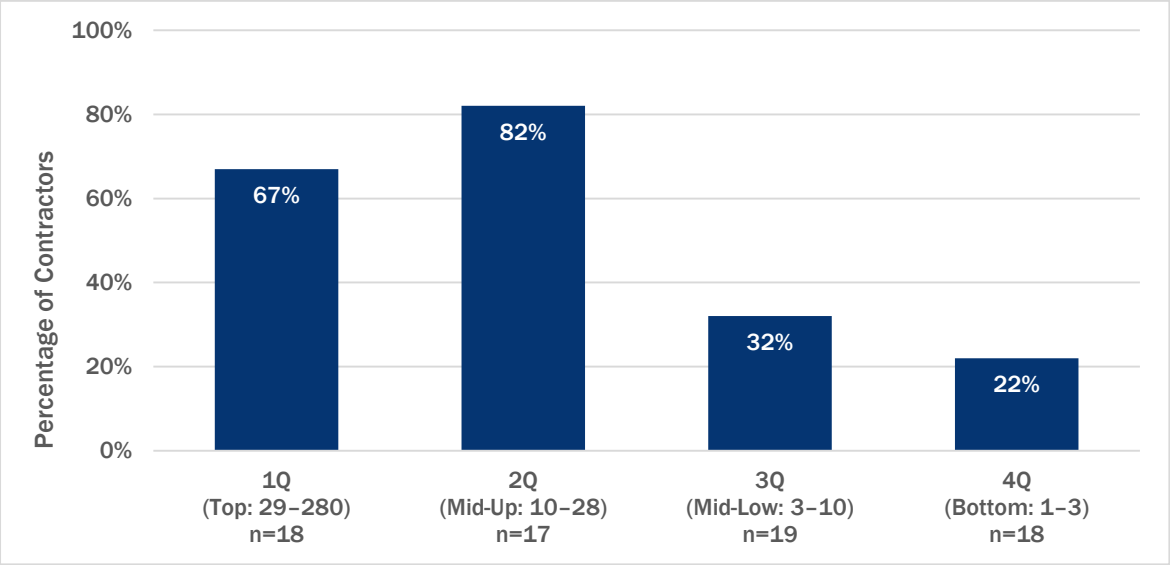
- How to present the HVAC Program to customers
- How to interact with customers and answer their questions
- How to improve sales tactics through understanding body language and applying direct-selling best practices

Nearly 150 individuals participated; CSG provided convenient access to as many contractors as possible by holding each training event in a different location.

Fifty percent of surveyed contractors said that someone at their company received training from AIC or CSG. Many more contractors in the upper quartiles of activity said that they received training (67% and 82% for 1Q and 2Q, respectively) than those in the lower quartiles (32% and 22% for 3Q and 4Q), respectively (see Figure 33). The evaluation team, however, could not causally attribute this relationship (i.e., trained contractors may be more likely to be active or active contractors may be more likely to take advantage of training).

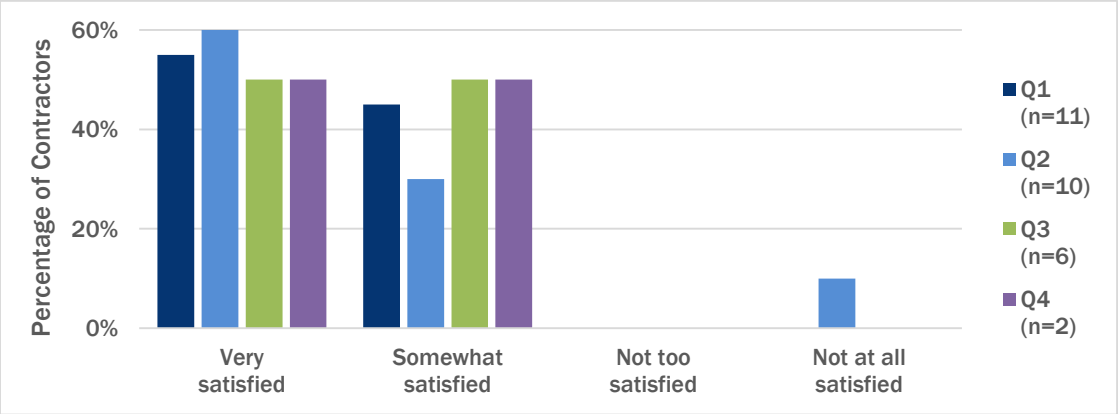
[15] NATE is the nation's largest nonprofit certification organization for HVAC and refrigeration technicians. A technician certification organization, NATE is governed, owned, operated, developed, and supported by the heating, ventilation, air-conditioning and refrigeration (HVACR) industry. Additional information is available online at: http://www.natex.org/site/299/About-NATE.

Figure 33. Contractors Who Reported Having Received Training from AIC or CSG



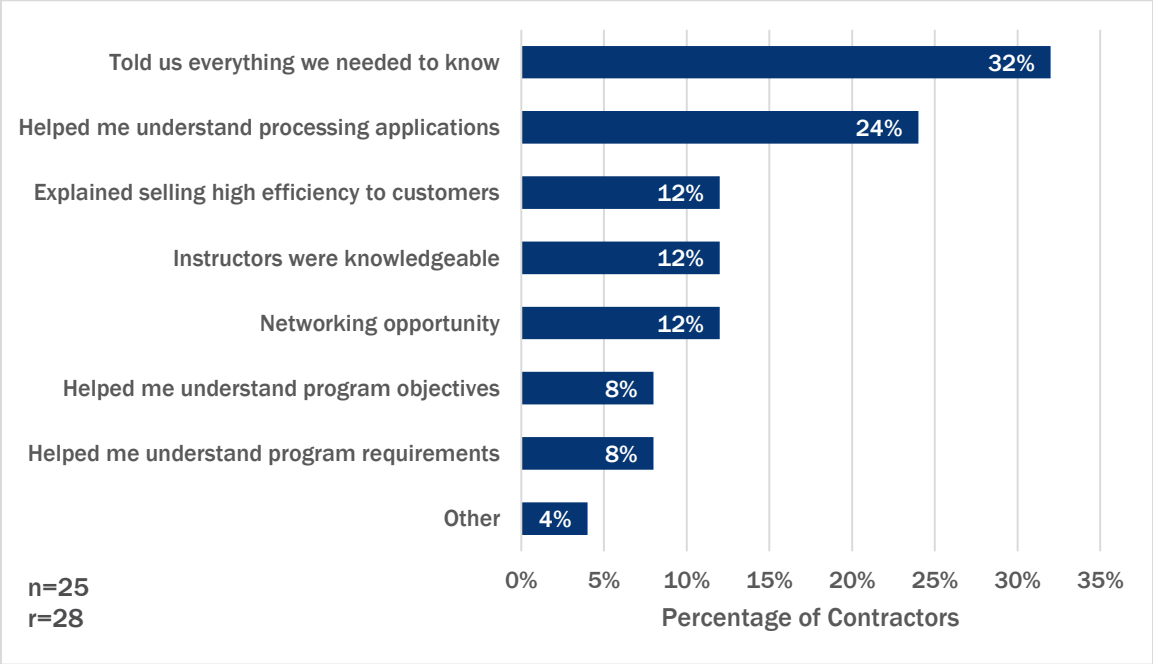
All but one of the 29 contractors who personally attended the training were very satisfied (55%) or somewhat satisfied (41%) with the training. Figure 34 shows the distribution of satisfaction across the quartiles.

Figure 34. Contractor Satisfaction with Training Provided by AIC



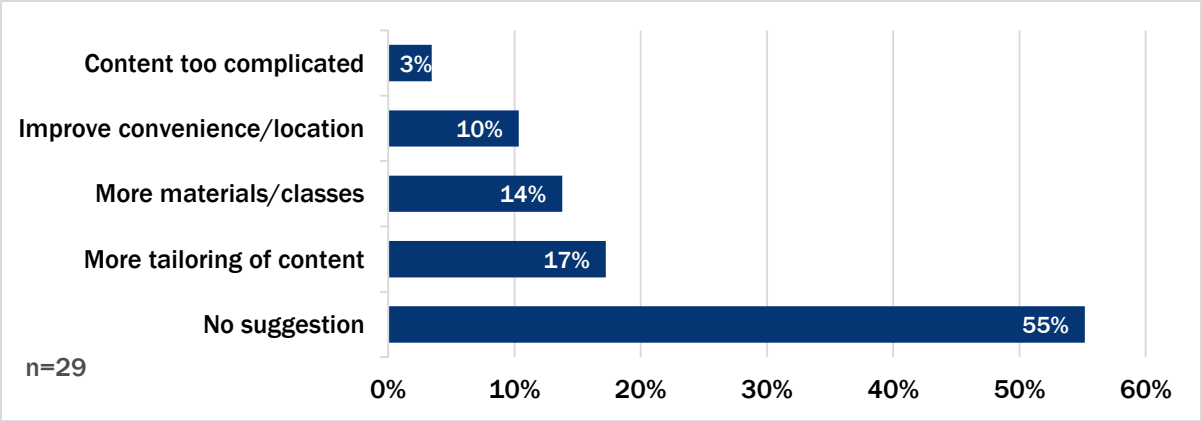
The evaluation team collected verbatim responses regarding what respondents found useful about the training and what CSG could do to make improvements. The team grouped the verbatim responses into the categories shown in Figure 35 and Figure 36. On the positive side, most contractors considered the training very informative, complete, and well presented.

Figure 35. Contractors Views on What Was Useful about the Training[16]



Most contractors (16) responding to the question about improvements (29 total responses) could not offer suggestions (as shown in Figure 36), but 13 provided answers grouped into the categories below.

Figure 36. Contractors' Views on How CSG Could Improve Training*



* Twenty-nine contractors said that they attended the training.

A few contractors offered specific suggestions to improve the training, with several asking if CSG could offer more convenient class locations. They also suggested allowing more time for group work during training sessions and thought that trainers should present subject matter for field personnel and office personnel separately. Table 32 presents 5 of the 13 verbatim comments forming the basis for the presented data.

[16] We allowed contractors to select more than one response when describing what they liked about the training. n = the number of contractors who responded to the question; r = the number of responses provided by all the contractors.

Table 32. Contractors' Responses on Suggestions to Improve Training

Verbatim Comments (5 of 13)
Continued training updates from corporate would be very helpful, instead of: "Here's the training, Good luck!"
[The instructors should] distinguish between contractors.
Make sure [AIC] has the current incentives available at the time of the training.
They made it more complicated that it should have been.
It should have been a little slower and more thorough.

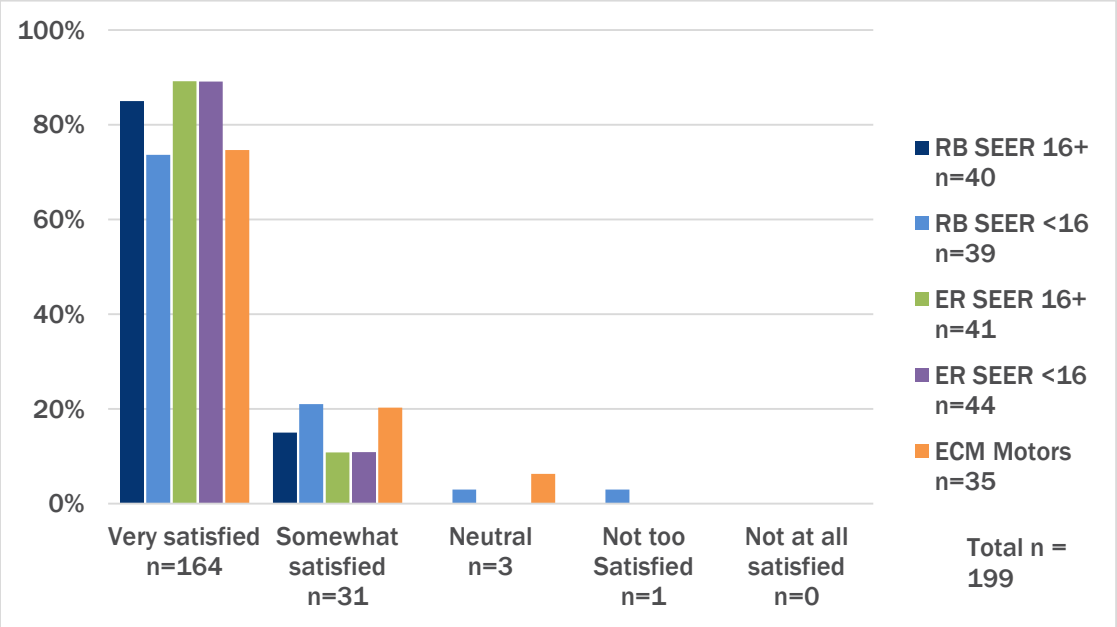
4.2.3 Participant Experience and Satisfaction

Evaluation team surveys sought to assess contractor and customer satisfaction, and then compared these results to those from other utility's HVAC programs across the country.

How Satisfied Are Customers with the Program?

A large majority (70%–90%) of PY6 customers in all measure categories reported high satisfaction levels with the HVAC Program in all surveyed categories, as shown in Figure 37. Overall, 82% of surveyed participants reported being very satisfied with the program. Only 2% of respondents indicated a neutral or less-than-satisfying experience. Customers purchasing at different SEER levels or different times (ER vs. RB) showed no significant differences in satisfaction levels.

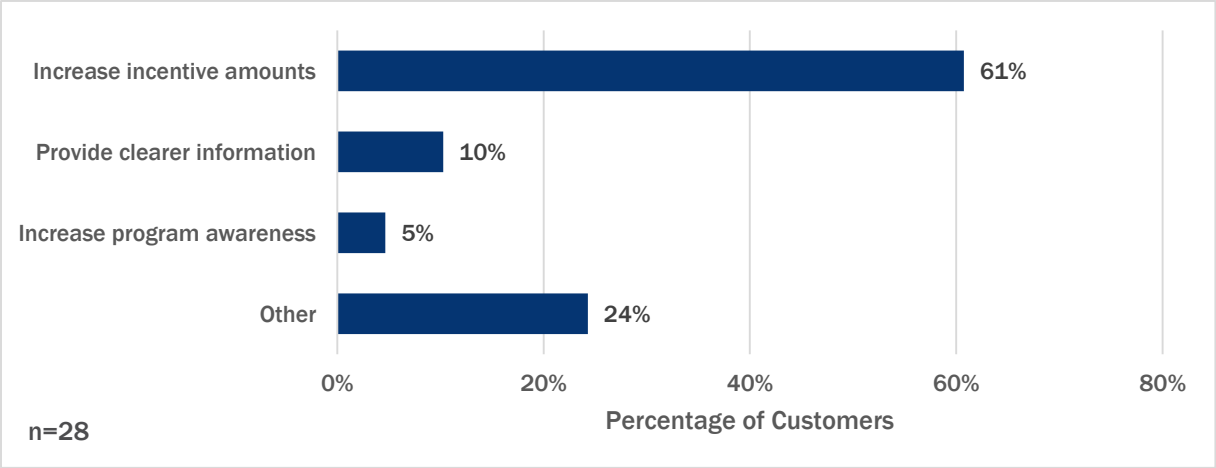
Figure 37. Customer Satisfaction with the HVAC Program



Some customers (28) offered reasons for being less than very satisfied with the program, such as having difficulty understanding the program or being unsure about savings benefits from higher-tier equipment. Of customers reporting being less than very satisfied with the program, 61% reported that their lower satisfaction resulted from an insufficient incentive amount, and 10% cited receiving unclear information (see Figure 38).

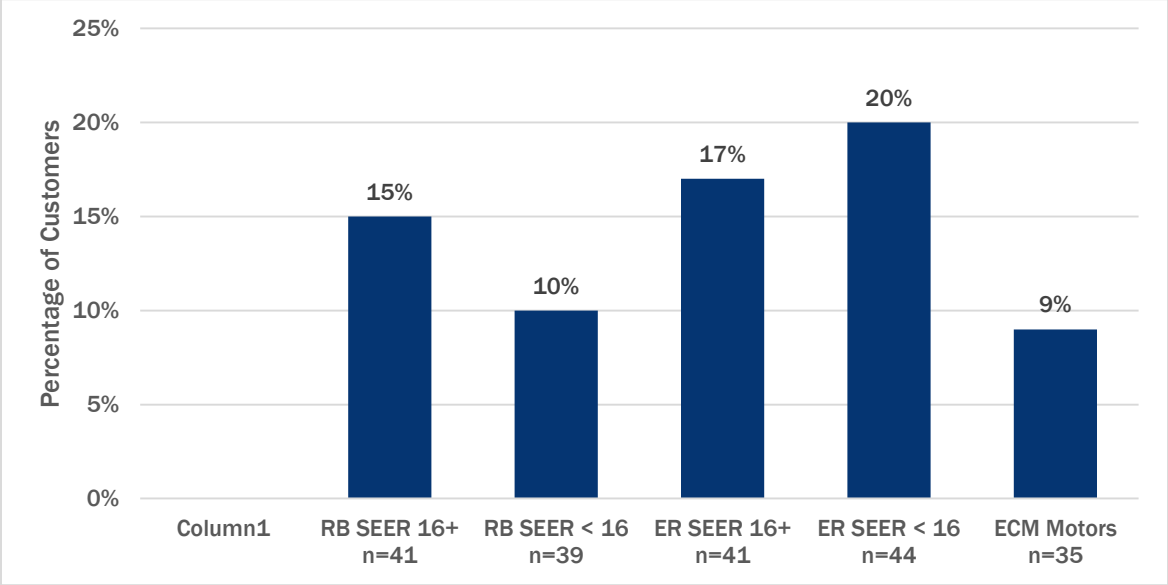
"Other" responses included not having anything else to compare it to, waiting to see how the new equipment worked out, and hoping that the program would do more than provide the incentive received.

Figure 38. Customer Suggestions for Improving Program Satisfaction



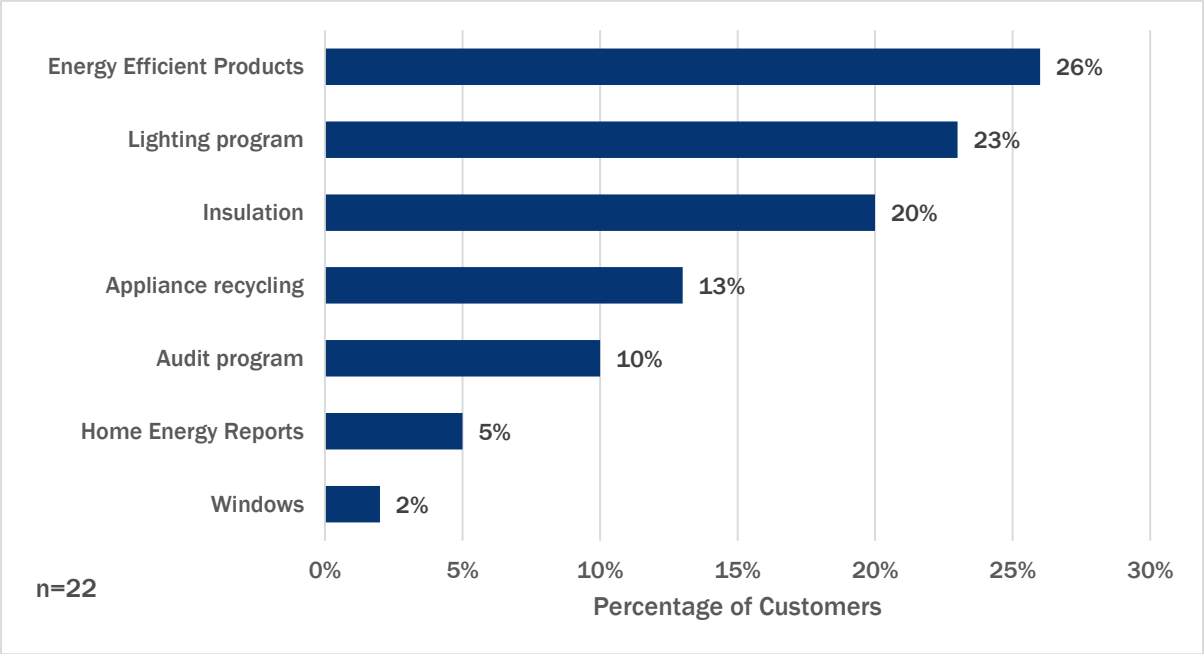
Between 9% and 20% of all customers (14% on average) participated in other AIC programs in addition to the HVAC Program, as shown in Figure 39. A greater number of ER customers participated in other programs (37%) than RB customers (25%).

Figure 39. Customers Who Reported Participating in Other Programs Offered by AIC



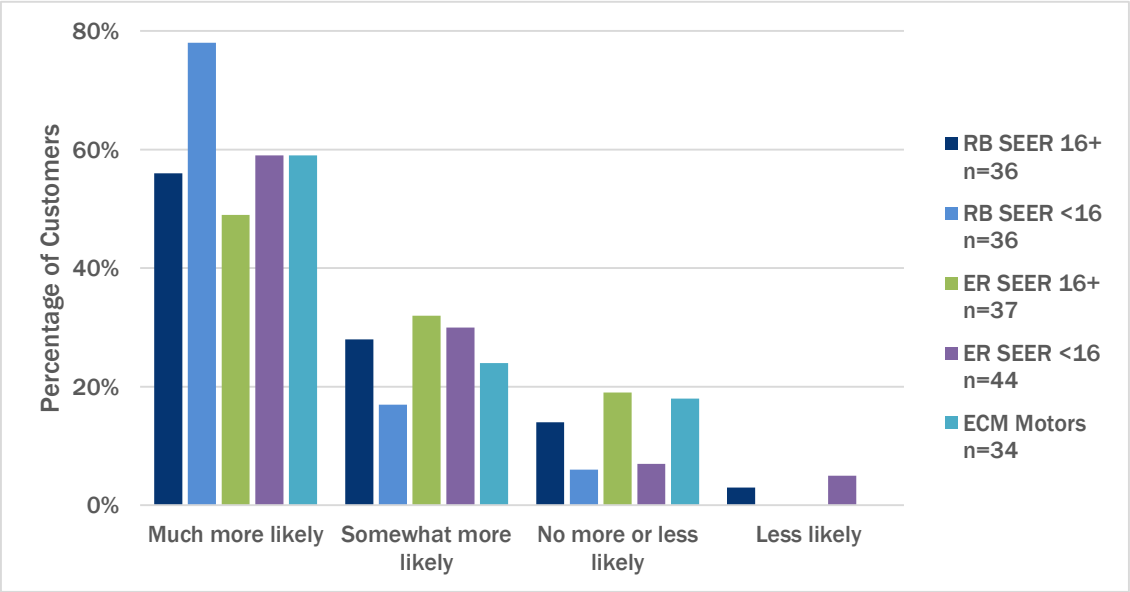
Nearly one-half (49%) of the 22 customers participating in other programs offered by AIC cited the Energy Efficient Products and the Lighting programs, as shown in Figure 40. One customer participated in two other programs.

Figure 40. Other Energy-Efficiency Programs in Which Customers Participated (Multiple Response)



Overall, most (average across all measures = 59%) customers reported that they would be much more likely to participate in another utility energy-efficiency program after having participated in the HVAC Program. Another combined measure average of 26% reported that they would be somewhat more likely to participate, as shown in Figure 41. For the heat pump and CAC equipment, the < 16 SEER equipment customers reported a slightly higher percentage of responses saying that they were much more likely to participate than did 16+ SEER customers.

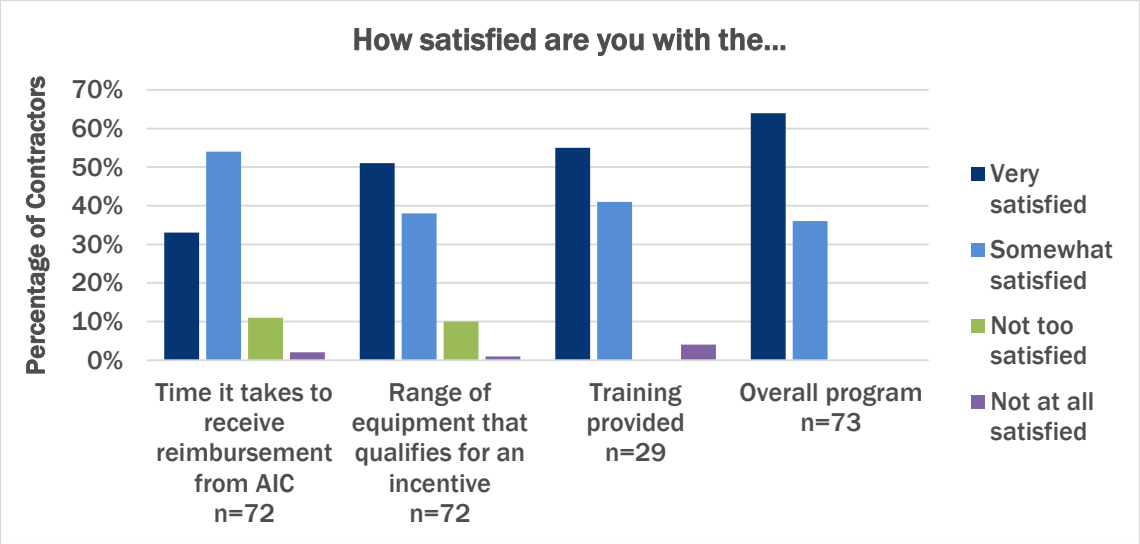
Figure 41. Customer Reported Likelihood of Participating in Another Energy-Efficiency Program



How Satisfied Are Contractors with the Program?

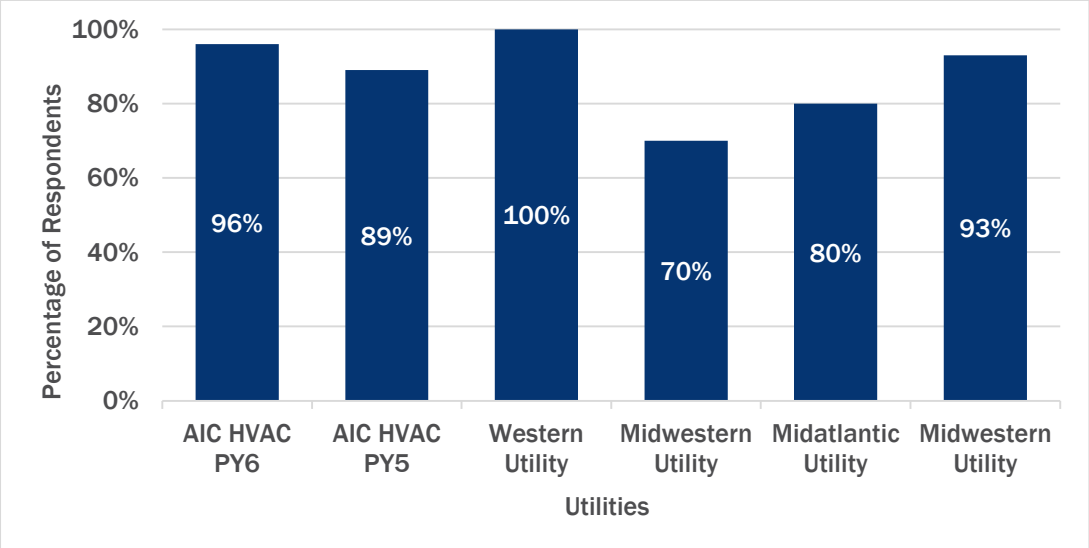
During PY6, 100% of contractors reported, overall, being very satisfied (64%) or somewhat satisfied (36%) with the HVAC Program. The AIC program manager noted, however, that contractors expressed concerns about losing the incentive for the gas measures.

Figure 42. Contractor Satisfaction Ratings



As noted, about 75% of high-activity contractors and 27% of lower-activity contractors took advantage of the program training. Concerning their satisfaction with program training (as shown in Figure 43), 96% of contractors reported being satisfied—a notable increase over PY5. When benchmarked against other utilities, AIC ranked slightly higher than all but one of the utilities reviewed.

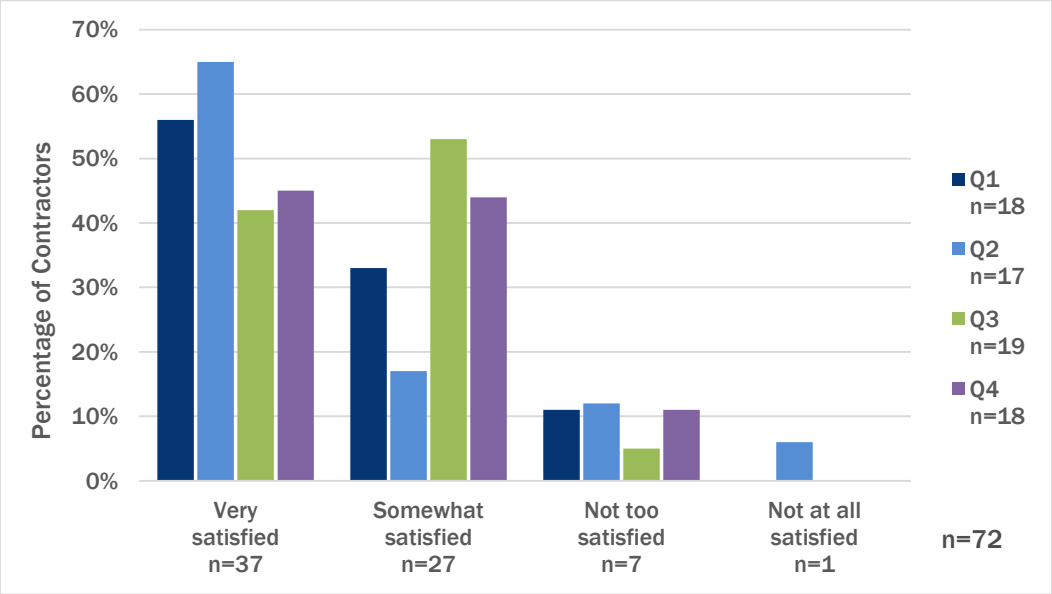
Figure 43. Benchmarking Contractor Satisfaction with HVAC Program Training across Utilities*



* Combining "very satisfied" and "somewhat satisfied" responses.

Overall, 89% of contractors stated being very or somewhat satisfied with the range of equipment qualifying for incentives during the PY6 period. The first two quartiles indicated the highest satisfaction levels, with 56% and 65%, respectively, reporting "very satisfied" (as shown in Figure 44).

Figure 44. Contractor Satisfaction with the Current Range of Equipment



Contractors not too satisfied (10%) or not at all satisfied (1%) thought that the equipment requirements were too strict. Table 33 shows responses from these contractors.

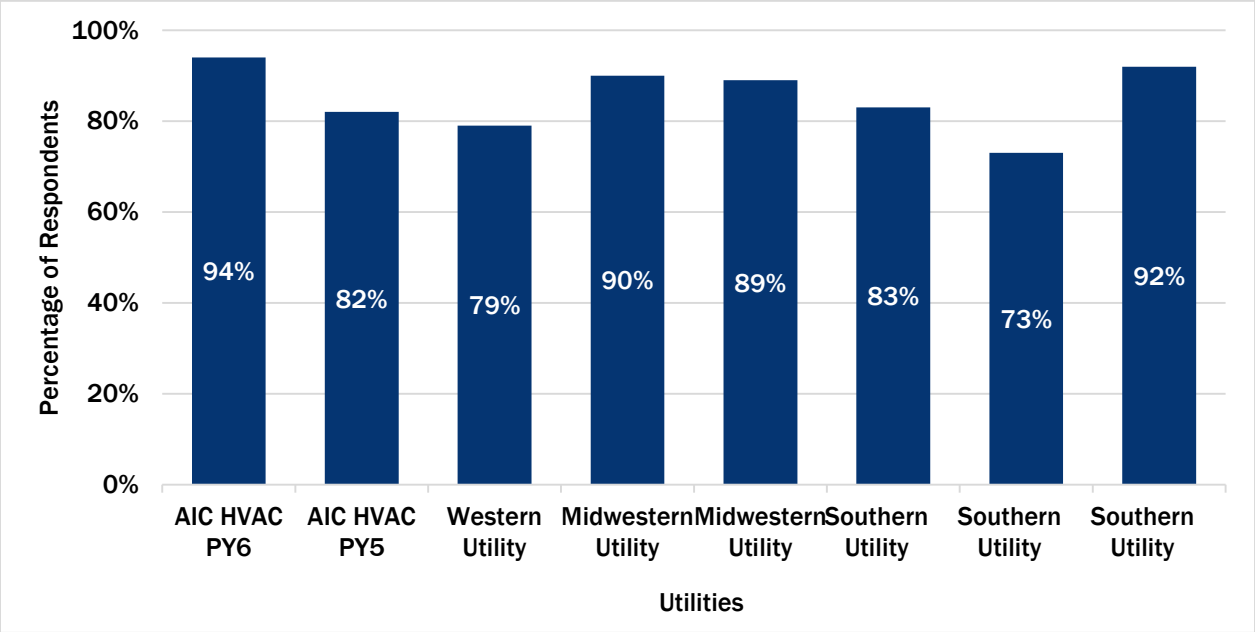
Table 33. Reasons Why Contractors Were Less than Satisfied with the Equipment Requirements

What was less than satisfactory? (n=8)
Boilers have trouble reaching the right efficiency levels; a lot of them don't meet the minimum.
It can be tricky to match up the AHRI [17]to get the systems to work.
It would be nice if it didn't have to be quite as efficient; for example, if it could be a 14 instead of 14.5.
Most people in this area don't have funds or building requirements for the required SEER levels or furnace efficiencies.
Ranges of efficiency for what the manufacturer set.
The air conditioning measures didn't have enough options.
The heat pump rebates and programs.
It's too difficult to reach the efficiency standards with just an air conditioner, or if the trade-in equipment is not working or does not have its serial number.

As shown in Figure 45, AIC contractors reported a significant increase in satisfaction, compared to PY5, regarding marketing materials: a number higher not only relative to PY5, but also when benchmarked against other utilities.

[17] Air-conditioning, Heating and Refrigeration Institute

Figure 45. Utility Contractor Survey Responses to HVAC Program Marketing Materials Satisfaction

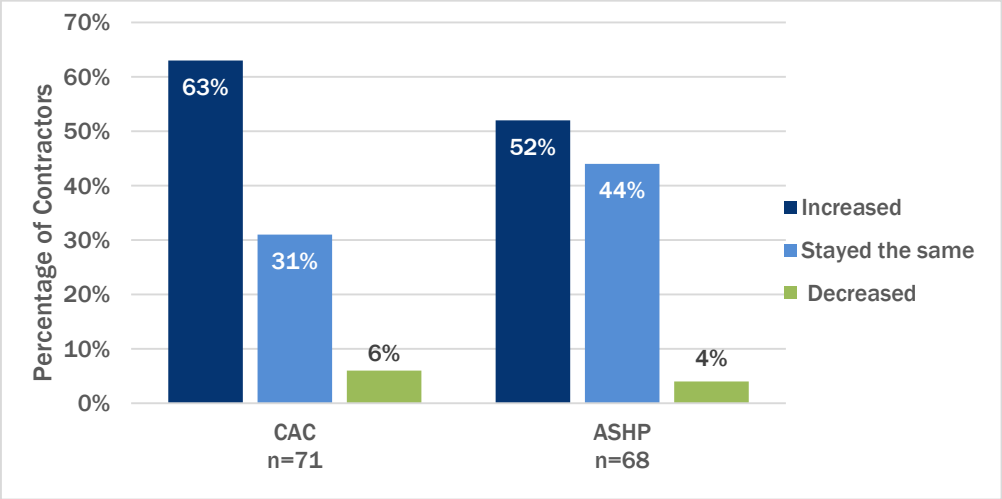


How Has the Program Affected HVAC Contractors and Distributor Businesses?

Contractors

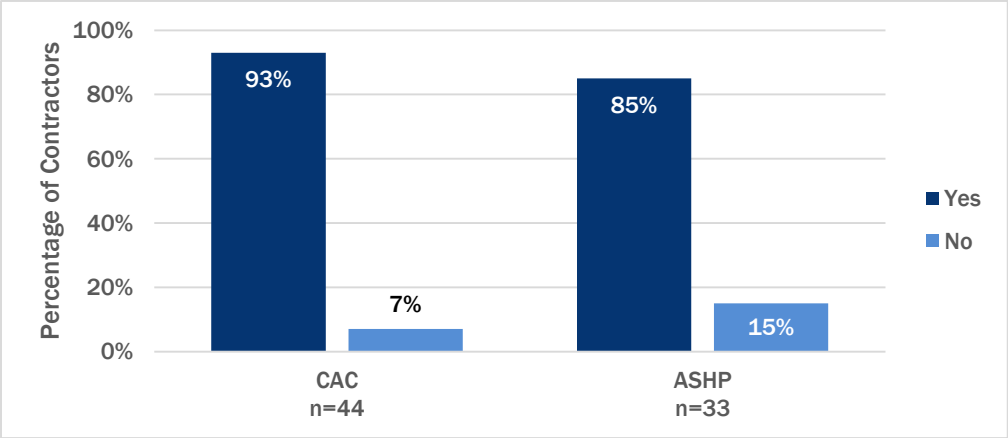
Figure 46 shows that more than one-half of AR contractors believed the availability of ENERGY STAR®-rated equipment increased in their service territory over the past 5 years. This perception proved higher (63%) for CAC equipment than for ASHP equipment (52%). Only 6% (CAC) and 4% (ASHP) of contractors indicated that they saw decreased availability.

Figure 46. Has the Availability of ENERGY STAR Equipment Changed in the Past 5 Years?



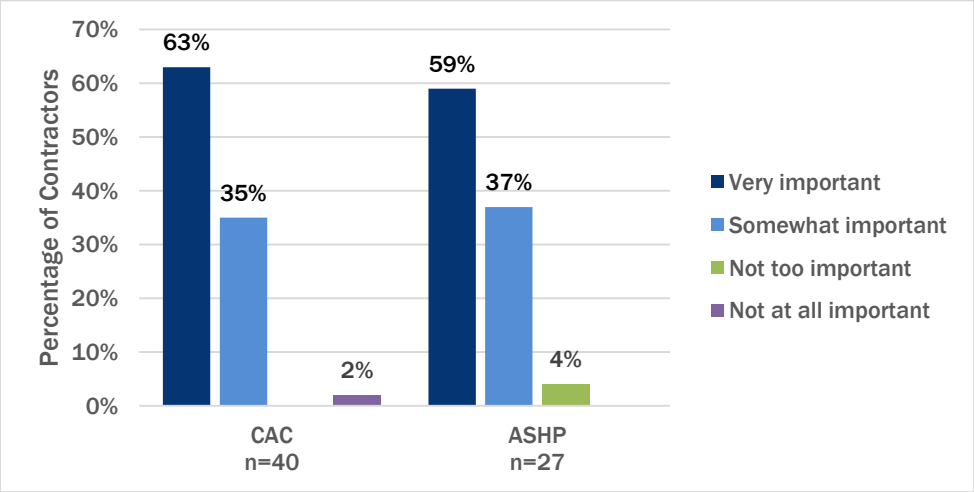
Of contractors perceiving an increase in the availability of ENERGY STAR-rated CAC equipment and who responded to the question (44; Figure 47), 93% (41) indicated that the HVAC Program played a role in that increase. When asked the same question for ASHP equipment, 85% (28 out of 33) considered the program as a factor.

Figure 47. Did the Program Play a Role in That Increase?



Of contractors who believe the program contributed to that increase of ENERGY STAR-rated equipment availability and responding to the question (Figure 48), 63% (25 of 40) thought that the program made a very important contribution to the CAC equipment increase and 59% (16 of 27) thought that the program made a very important contribution to ASHP equipment increase.

Figure 48. How Important Was the HVAC Program in Driving the Increase?

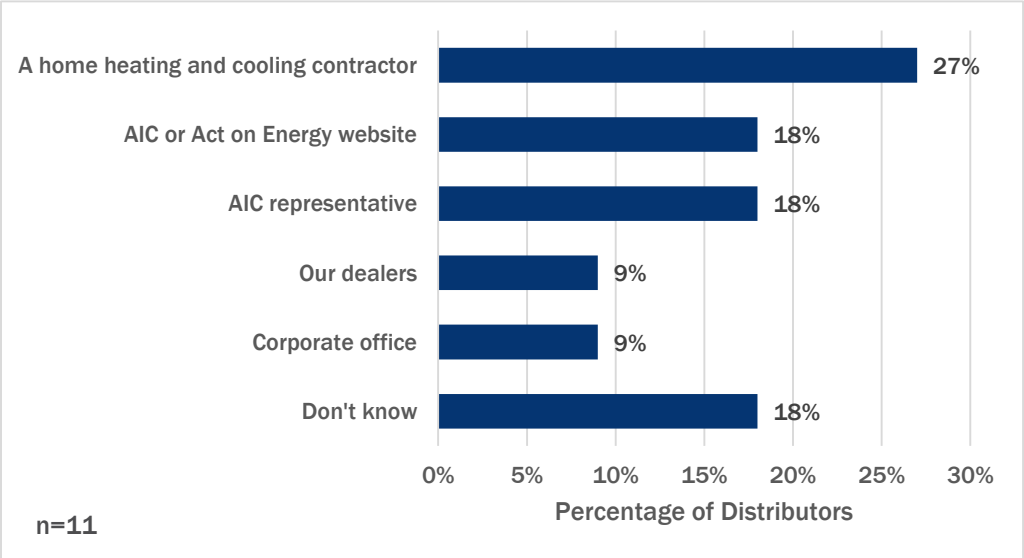


Considering all contractors who responded to the question of increasing or decreasing availability of equipment over the last 5 years, 35% (25 of 71) thought that the HVAC Program was a very important factor leading to an increase in availability of CAC ENERGY STAR-rated equipment. For ASHP equipment, 24% (16 of 68) of the contractors responding to this set of questions thought the HVAC Program was a very important factor.

Distributors

All 11 interviewed distributors reported being very familiar (55%) or somewhat familiar (45%) with the program. The majority of distributors learned about the program through an AIC source (36% website or representative) or through a contractor with whom they had worked (27%), as shown in Figure 49.

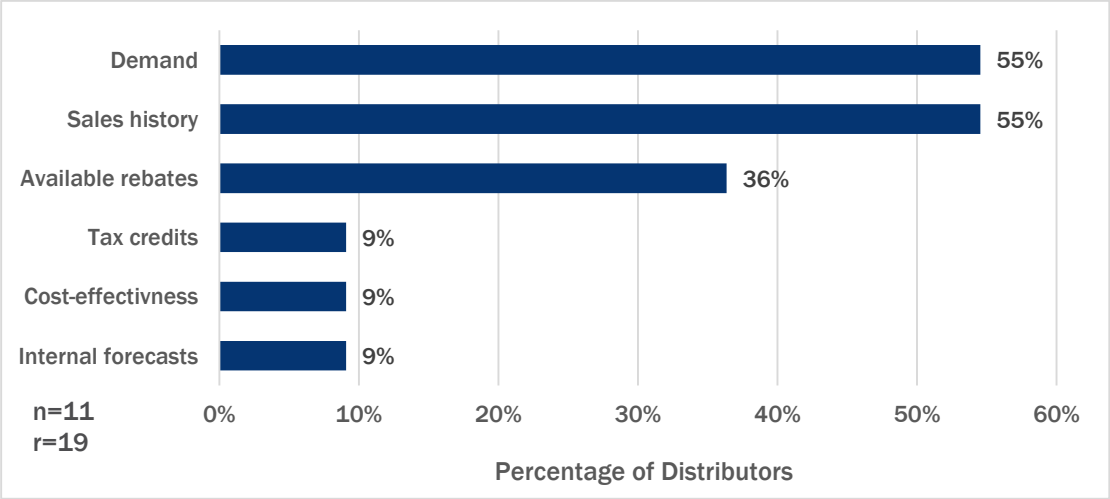
Figure 49. How Distributors Heard about the Program



All 11 distributors identified themselves as stocking distributors, with 2 indicating that they also regularly ordered upon request. All interviewed distributors carried 18 SEER CAC equipment, and 10 said that they stocked 18 SEER ASHP equipment. All distributors said that they had no trouble obtaining high-efficiency equipment; only one said that it sometimes took a little longer to get the right one.

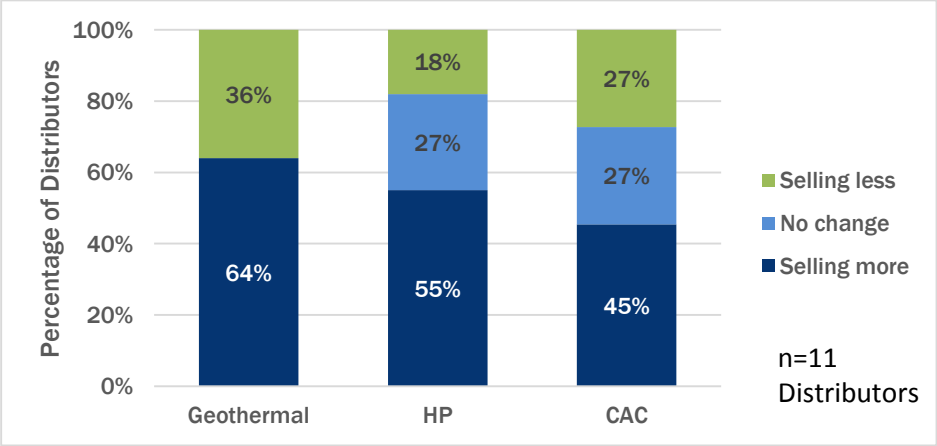
Surveys asked all 11 distributors to indicate how they made stocking decisions for high-efficiency equipment, allowing multiple responses from a specific list of options. The majority of responses pointed to distributor reliance on demand (six responses) and sales history (six responses) to determine the efficiency level to stock, as shown in Figure 50. Distributors also offered that they considered the availability of rebates when making stocking decisions.

Figure 50. Factors Considered When Deciding Efficiency Level to Stock



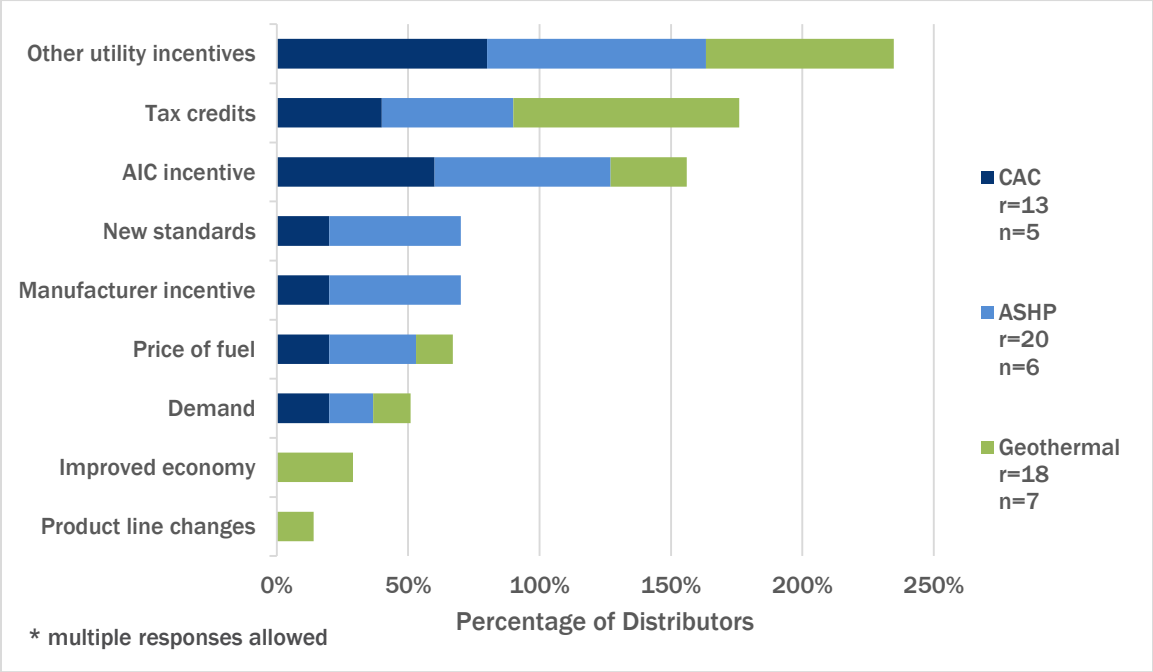
The evaluation team asked distributors to reflect on changes in sales of equipment types over the past 5 years. As shown in Figure 51, the greatest perceived increase in sales over the past 5 years occurred in geothermal equipment (GSHPs). Although distributors reported a greater percent increase in geothermal sales than the percent increase in sales of SEER 16 or higher ASHP and CAC measures, the overall volume of GSHP sales was significantly less than for the ASHP and CAC measures.

Figure 51. Change in Sales Volume of Higher-Tier Equipment over the Past 5 Years



Distributors reported that financial incentives, changing federal standards and fuel prices were the main contributors to the increase in sales of higher-tier equipment over the last five years. Other reasons mentioned by distributors and how these reasons broke out by measure are shown in Figure 52. Distributors linked geothermal sales only to the improved economy and changes in product lines. This suggests, for all three equipment categories, all incentive types played a factor in driving sales of higher-tier equipment. Distributors reported that other utility incentives (including outside of AIC's territory) and tax credits have been more influential in driving sales than ActOnEnergy's HVAC incentives, while contractors think the incentives are very influential. Distributors are likely to have a broader view and better understanding of the market supply chain. A collection of factors influences the market; because utility program rebates are just one of the drivers moving the market, it is impossible to isolate and quantify its influence.

Figure 52. What Caused Increased Sales of High Energy-Efficiency Equipment over the Last 5 Years (Distributor Views)*



4.2.4 Opportunities for Program Improvements

The evaluation team gathered recommendations for program improvements from contractors, distributors, and customers. The team also discussed opportunities to improve program administration with CSG's and AIC's program managers. While program design did not change in PY6, there were numerous changes in PY6 HVAC Program management.

AIC brought on board a second demand-side management program manager, who oversees the HVAC, Multifamily, New Homes, and Behavioral programs. CSG's dedicated HVAC program manager and southern account manager left the company, and CSG replaced its marketing manager. Finally, AIC plans to change the management structure of its implementation contractors. In PY7, CSG will serve as a subcontractor to Leidos, which has managed AIC's commercial programs. Leidos will play a greater role in marketing, data management, and training.

What Could AIC and CSG Do to Improve Program Management?

AIC's new HVAC program manager discussed a number of areas where CSG could improve program administration, but was not moving to do so quickly. Possible changes included:

- Verifying RB as well as ER installations
- Providing more detailed and consistent monthly reports, with a standard set of metrics broken out at the measure level
- Increasing the geographic range of installation verifications, rather than concentrating them around the location of the account manager

- Leveraging field staff to support multiple programs, including breaking down barriers between commercial and residential programs
- Improving the incentive application process by offering flexible submission options (e.g., online applications, paper applications, or letting customers fill them out)
- Using installation dates instead of "application received" dates to track savings more accurately
- Refining the implementation model to register distributors as trade allies and working more closely with them

The HVAC program manager also expressed interest in investigating opportunities to implement several recommendations made during prior evaluations:

- Considering co-marketing of AIC with contractors
- Letting customers send in their own incentive forms to reduce the burden on contractors
- Introducing peer recognition programs
- Offering training to NAR as well as AR contractors
- Considering cross-marketing across programs with similar target markets

What Could AIC Do to Improve the Customer Experience and Generate Greater Savings?

Through a review of customer survey responses, the evaluation team investigated opportunities to improve customer experiences. While 59% of customers reported having been very satisfied with the incentive amounts (Figure 53), several customers discussed concerns regarding overall cost outputs for new HVAC equipment and that the rebate seemed insufficient compared to bottom-line, out-of-pocket expenses incurred. Table 34 lists these verbatim comments.

Figure 53. Customer Satisfaction with Incentive Amounts

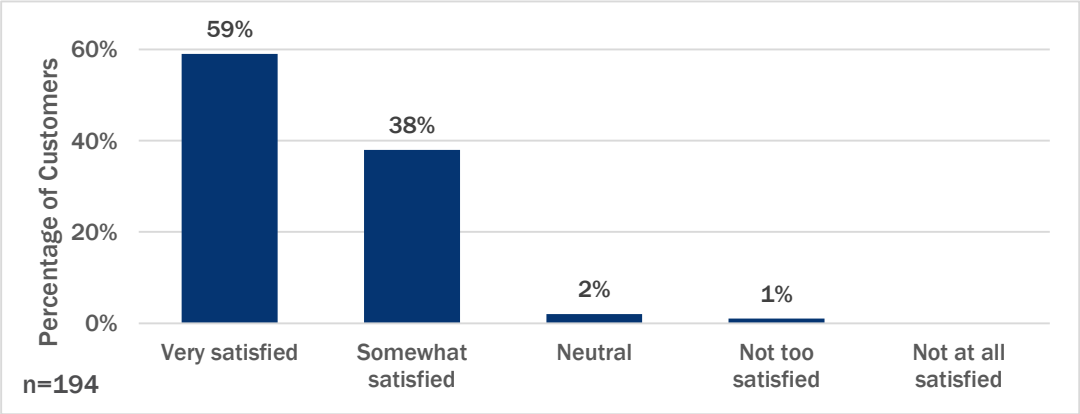


Table 34. Customer Responses for Those Less than Very Satisfied with Incentive Amounts

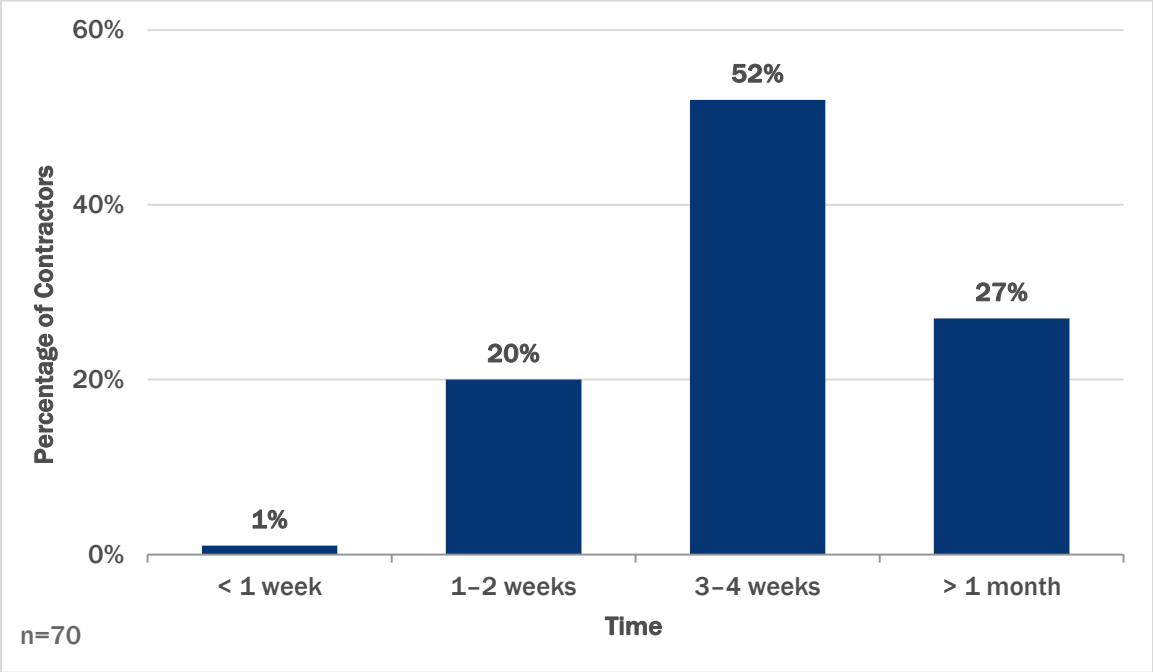
Why were you less than very satisfied? (5 out of total 63 responses)
Just because the overall cost of the unit was quite a bit at the time, and we had to get it because our other air conditioner had quit.
Since we replaced three major items—air conditioner, water heater, and the brushless heater—we felt we should have received a bigger discount.
The percentage of the cost of the new furnace, it didn't make a big difference.
Any amount would have been better when you're spending $10,000.
I would've liked to have a little bit more, it cost us a lot of money!

Customers responding to questions about suggestions to improve program satisfaction overall most commonly sought a higher rebate (61%), as shown in Figure 38 presented earlier, followed by providing clearer information (10%).

What Could AIC Do to Improve Contractor Experience?

The evaluation team asked contractors that reported being less than very satisfied with one or more program aspects (26 out of 72), what AIC could do to remedy the situation. With respect to program design and implementation, contractors recommended more equipment options, better communication, reduced paperwork, and increased training opportunities. In addition, 27% of contractors reported waiting more than a month to receive their reimbursement checks, as shown in Figure 54. Seventy-nine percent of contractors reported it took more than 3 weeks to receive reimbursement from AIC for discounts provided to their customers.

Figure 54. Time to Receive Reimbursement from AIC (Contractor Survey)



Regarding marketing materials, contractors suggested AIC could add more visuals to help explain the content. In addition, contractors suggested that CSG regularly send these visual to contractors, provide electronic copies, and make certain materials are up to date prior to distribution.

How Could AIC Help Distributors Be More Engaged in Promoting the Program?

When asked what AIC could do to help distributors promote high-efficiency equipment, distributors suggested engaging in more outreach to contractors and distributors, making sure all stakeholders remain involved in training and marketing efforts, and expanding program offerings.

Ten of 11 distributors shared their views regarding how AIC could improve the program. Of these, three suggested better training for contractors so that they could better educate customers on the benefits of higher efficiency. Other suggestions included increasing outreach and using different marketing channels. More specifically, distributors suggested using billboards and television advertisements and holding joint, local meetings with distributors and contractors. Some also suggested expanding the incentivized measures. Table 35 presents verbatim responses from distributors.

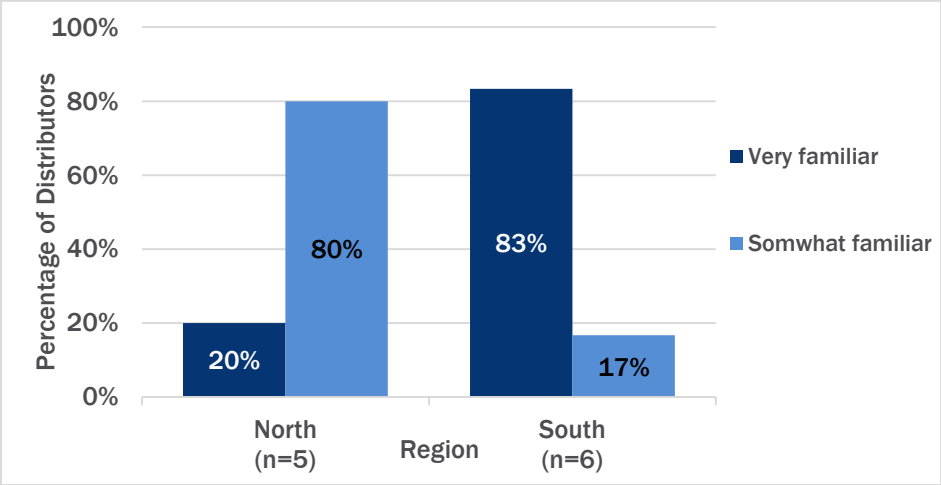
Table 35. Distributor Suggestions—Verbatim Responses*

What can AIC do to help? (n=10)
Best thing to do is make sure I get tagged. I'm an ally. Make sure I'm getting information from Ameren. I promote to dealers, anything I can hand them to sell. We're all making more money.
I really think Ameren is doing a good job. Been to a couple of meetings that they have when they bring out new programs. Contractors are being attracted by Ameren. In other words, all of them know when programs are changing. Doing a good job marketing the program. Unless they wanted to do TV ads or great big giant billboards. Not sure if they are doing that now or not. If they are, I am not seeing it.
I would say more training for contractors. They are good, even in my own experience I have seen literature come through in mail or email. They are good at reaching end consumers. I see that literature come through at my home. Doing good at that end, but try to get contractors involved.
Give you more on variable speeds that are used indoors, those use a lot less energy. Offering more incentives on variable speed indoor units. Going back to 14 SEER and up instead of offering 18 SEER incentive. Any of the marketing materials you have, that's all good. And having meetings like you guys used to have. Breakfast meeting worked out well for contractors. Don't have to have breakfast, but mornings are better.
Have more educational information and incentives.
I just think that working with the wholesaler would help a great deal. We already have relationships with the dealers, so working through wholesalers would do a great deal of good because we already have paths for communication. We have every incentive to promote the program because it helps us get a higher efficiency mix, a better efficiency mix.
Probably more regional-type meetings at some of the distributors. Have contractors and distributors in the same room at the same time getting the same information.
I know they have had some meetings in the area, have people in a hotel and have a meeting. They could send the distributors and manufacturers a flier that we could send out to our dealers.
No, not really besides hold a class to teach contractors how to sell efficiency equipment [to] make them aware of how to figure savings and how to present that to customers.
Certainly raising the rebate would help, educating the end user on the benefits on the higher-SEER units. Seems that our contractors and we don't do as well at educating in general on the benefits of higher-SEER units.

* We made slight edits to verbatim responses to improve comprehension.

A notable difference in program awareness occurred between the northern and southern region distributors, as shown in Figure 55. For the southern region distributors, five out of six reported being very familiar with the program, compared to only one of five distributors in the northern region.

Figure 55. Distributor Familiarity with HVAC Program (n=11)



4.3 Impact Assessment

4.3.1 Gross Impacts

Through phone interviews, the evaluation team verified participation, equipment purchased, and efficiency levels reported in the database. One surveyed customer (representing approximately 0.5% of the sample) reportedly purchased a SEER 14.5–14.9 air conditioner, while the tracking database indicated the product purchased was an ECM. This revision slightly affected the verification rates shown in Table 36. The team asked survey respondents purchasing new heating or cooling equipment whether that equipment replaced working or non-working equipment. Two participants recorded in the database as RB indicated that their past equipment worked. As the surveys did not ask about the existing equipment SEER levels or how much it would cost to repair the unit (meeting the criteria for ER, as specified in the Statewide TRM Version 2.0), the team did not change these two participants from RB to ER.

As part of an AIC quality initiative, which involved sending verification letters to 50 customers, AIC discovered one contractor had forged customer invoices on receipts, creating two invoices—one given to the customer with the correct incentive level and another submitted to AIC with a higher incentive level. AIC addressed this issue directly.

Table 36. Summary of PY6 Verification Results

Measure	Participation	Surveyed Participants	Verified Participants	Verification Rate
Electric Measures				
CAC/ASHP ER < 16	2,405	40	40	100%
CAC/ASHP ER 16+	1,976	43	43	100%
CAC/ASHP RB < 16	1,026	44	45	105%
CAC/ASHP RB 16+	1,140	42	42	100%
ECM	4,149	36	35	97%
GSHP	219	N/A	N/A	100%
Subtotal	10,915			

Measure	Participation	Surveyed Participants	Verified Participants	Verification Rate
Gas Measures				
Gas Furnace ER	4,124	N/A	N/A	100%
Gas Boiler ER	2,062	N/A	N/A	100%
Gas Furnace RB	4,124	N/A	N/A	100%
Gas Boiler RB	2,062	N/A	N/A	100%
Subtotal	12,372			
Total	23,287			

The evaluation team used the Statewide TRM Version 2.0 to calculate ex post per-unit savings estimates. Ex post savings varied from ex ante (which assumed the same savings for all sales in a program category) due to the ex post results being based on actual equipment size, efficiency, and location. Table 37 presents these results.

Table 37. Summary Per-Unit Savings Analysis Results

	Ex Ante Annual Per-Unit Gross Savings			Ex Post Annual Per-Unit Gross Savings			Per-Unit Annual Gross Realization Rate*		
Measure	kW	kWh	Therms	kW	kWh	Therms	kW	kWh	Therms
CAC	0.303	307		0.298	333		98.4%	108.4%	
CAC ER	1.261	1,259		1.311	1,304		103.9%	103.6%	
ASHP	0.370	1,523		0.273	1,286		73.8%	84.5%	
ASHP ER	1.271	6,395		1.281	5,529		100.8%	86.5%	
GSHP	0.596	3,828		1.048	5,319		176.0%	139.0%	
ECM	0.302	710		0.288	715		95.3%	100.7%	
Gas Furnace			138			134			97.1%
Gas Furnace ER			347			357			102.9%
Gas Boiler			162			174			107.6%
Gas Boiler ER			588			579			98.5%

* Gross realization rate = ex post gross savings ÷ ex ante gross savings.

Table 38 summarizes the gross savings analysis results, showing the number of program participants by measure types, counts, ex ante and ex post savings, and gross realization rates.

Table 38. Measure Level Counts, Savings, and Realization Rates

Measure Type	Count of Reported Measures	Total Ex Ante Per Unit	Total Ex Post Per Unit	Gross Realization Rate
Electric Measures		kWh	kWh	
ASHP 14.5-14.9 SEER	36	35.3	28.9	82%
ASHP 15.0-15.9 SEER	111	134.5	104.6	78%
ASHP 16+ SEER	186	337.2	294.8	87%
ASHP ER 14.5-14.9 SEER - Replaces ASHP	51	267.6	207.9	78%
ASHP ER 14.5-14.9 SEER - Replaces Resistance	7	86.2	70.2	81%

Measure Type	Count of Reported Measures	Total Ex Ante Per Unit	Total Ex Post Per Unit	Gross Realization Rate
ASHP ER 15.0–15.9 SEER - Replaces ASHP	126	690.4	590.4	86%
ASHP ER 15.0–15.9 SEER - Replaces Resistance	9	113.0	84.7	75%
ASHP ER 16+ SEER - Replaces ASHP	142	863.3	793.9	92%
ASHP ER 16+ SEER - Replaces Resistance	18	236.8	204.4	86%
CAC 14.5–14.9 SEER	488	95.2	104.9	110%
CAC 15.0–15.9 SEER	391	102.6	118.7	116%
CAC 16+ SEER	954	364.4	391.1	107%
CAC ER 14.5–14.9 SEER	1,385	1,607.3	1,608.2	100%
CAC ER 15.0–15.9 SEER	827	1,015.3	1,082.2	107%
CAC ER 16+ SEER	1,816	2,446.7	2,561.1	105%
ECM - Brushless Motor - with Furnace	4,149	2,945.8	2,877.6	98%
GSHP 18.5 EER 3.7 COP	219	838.3	1,164.9	139%
Electric Measures Total	10,915	12,179.9	12,288.6	101%
Gas Measures		Therms	Therms	
Boiler ER 90% AFUE	14	7,919	8,454	107%
Boiler ER 95% AFUE	41	24,407	23,384	96%
Furnace 95% AFUE	4,612	628,062	614,805	98%
Furnace 97% AFUE	698	105,510	97,462	92%
Furnace ER 95% AFUE	1,992	687,479	713,467	104%
Furnace ER 97% AFUE	224	80,660	78,276	97%
Greater than or equal 90% efficient Gas Boiler	12	1,733	2,057	119%
Greater than or equal 95% efficient Gas Boiler	17	2,959	2,992	101%
Gas Measures Total	7,610	1,538,728	1,540,897	100%

4.3.2 Net Impacts

Table 39 shows the program's net impacts after applying the NTGRs specified in the ICC Order for Docket 10-0568.

Table 39. PY6 HVAC Program First-Year Savings Net Impacts

Measure Type	NTGR	Ex Ante Annual Net Savings			Ex Post Annual Net Savings		
		kW	MWh	Therms	kW	MWh	Therms
CAC/ASHP	0.59	3,779	4,954	N/A	3,640	4,862	N/A
ECM Fans	0.59	740	1,738	N/A	705	1,750	N/A
GSHP	0.59	77	495	N/A	135	687	N/A
Gas Furnace	0.77	N/A	N/A	1,156,317	N/A	N/A	1,158,088
Gas Boiler	0.79	N/A	N/A	29,243	N/A	N/A	28,858
	Total Program	4,596	7,186	1,185,561	4,480	7,300	1,186,946
				Net Realization Rate	0.97	1.02	1.00

4.3.3 Inputs for Future Program Planning—Free-Ridership

As part of the PY6 evaluation, the evaluation team performed primary research to develop updated free-ridership estimates for the AIC HVAC Program. This included providing an NTGR estimate based on customer and contractor surveys in PY5. Appendix B presents the detailed methodology and findings for this research. As AIC will discontinue gas measures and geothermal incentives, the research did not include free-ridership for these measures.

Table 40 shows free-ridership by measure type and overall for electric measure types.

Table 40. Electric HVAC Free-Ridership Results by Measure

Measure	Free-Ridership
SEER < 16 CAC/HP (RB)	62%*
SEER 16+ CAC/HP (RB)	58%*
SEER < 16 CAC/HP (ER)	59%*
SEER 16+ CAC/HP (ER)	46%*
Brushless Motors	46%*
Program Total	**51%****

* Estimate is weighted by measure-level ex-post kWh savings.
** Estimate is weighted by the distribution of measure level ex post kWh savings in the population.

4.4 Conclusions and Recommendations

- **Conclusion 1:** Overall, PY6 HVAC Program participation exceeded expectations, and stakeholders expressed enthusiasm about the program. Contractors appreciated that no design changes occurred from PY5, and program staff felt that this contributed to the program's success. A large percentage of customers and contractors expressed satisfaction with the program, and contractors thought that the program strongly influenced customer choice. Distributors also felt that the program helped generate sales of higher-SEER equipment and fostered interest in becoming more actively engaged. Stakeholders thought that AIC could improve the program in the following primary ways, centered on increasing the incentive and outreach.

  - **Recommendation 1:** As contractors prefer fewer changes, AIC should, when introducing PY7 design changes, update all materials and remove or take down old materials and website information. Through CSG/Leidos, AIC should aggressively reach out to contractors and distributors to communicate program changes clearly and to provide a contact point for these stakeholders to ask questions or obtain more information.

  - **Recommendation 2:** AIC/CSG/Leidos should consider joint meetings, outreach activities, and training with both distributors and contractors to achieve consistent presentation of program messaging, requirements and offerings; allow for cross-fertilization of ideas and networking; and distribute updated program documentation and training schedules.

  - **Recommendation 3:** Contractors expressed satisfaction with training, though only 29 (40%) said that they had participated. AIC found the training content excellent, but CSG/Leidos could improve training preparation. Considering contractors' suggestions for improving training, CSG/Leidos

should increase the number of offerings, presented in a greater number of locations; provide sufficient advance notice; or adopt a regular schedule that does not change each year.

- **Recommendation 4:** CSG should hire a second regional account representative as planned (filling the open position), to ensure they can effectively cover the north and south AIC service territories in terms of supporting distributors and contractors.

- **Recommendation 5:** As there were a large number of satisfied customers and contractors, CSG/Leidos may want to develop case studies or collect testimonials to include in marketing materials or contractor training.

- **Conclusion 2:** As with most HVAC programs, contractors serve as the driving force behind AIC's HVAC Program. More participants find out about the program through their contractors than through utility marketing efforts. While CSG reports recruiting new contractors and reactivating old ones, the data suggest a similar number of registered contractors dropped off the "active" list. Utility marketing efforts do not reach as many customers as they could, and contractors still do not seem to use provided marketing materials.

  - **Recommendation 6:** CSG/Leidos should develop strategies for retaining registered contractors and for recruiting new contractors. It may prove beneficial to refresh marketing materials, perhaps with the input of distributors, making the materials more attractive to contractors. AIC and CSG may wish to explore co-marketing with contractors and consider marketing to smaller firms, which are more present in the NAR than the AR group.

  - **Recommendation 7:** Because ER equipment drives higher savings, AIC and CSG/Leidos should develop a simple tracking report that collects information needed to monitor ER vs. RB trends and other program indicators that track where AIC achieves higher savings. This could take the form of a dashboard that CSG updates monthly.

- **Conclusion 3:** AIC's current and proposed incentives may not be sufficient to generate increased sales of higher-SEER equipment, while AIC could discontinue some lower-SEER incentives. Contractors and customers suggest that the rebate should be higher to cover more costs, and the primary reason eligible customers do not participate relates to cost. Regarding higher-SEER equipment, most surveyed contractors believe that, to generate a 20%–40% increase in SEER 18 equipment sales, an incentive of $700 or more may be required. When benchmarked against other utilities, AIC incentives remain on the low side. According to surveyed customers (only asked about RB), the largest increase in energy-efficient purchases of SEER 18 units occurred at incentive levels of $500–$700. Conversely, incentives may not be necessary for SEER 14.5–14.9 ASHPs: 92% of surveyed participating customers indicated that they would purchase that SEER level without an incentive. Customer choice survey results suggested that AIC could achieve the largest increase in participation per incentive dollar with a $100 incentive for the SEER 16 ASHP. For CACs, surveyed customers confirmed that $150 achieved the largest participation increase per incentive dollar for SEER levels under 16, while $400–$500 proved attractive for SEER levels of 16 and 17.

  - **Recommendation 8:** If cost-effectiveness and budget allow, consider revisions to the current incentive structure. We based the revised incentive structure suggested in Table 41 on customer choice survey results that show the largest participation increases per dollar of incentive for RB equipment. AIC could also consider similar incentives with an appropriate adder to cover incremental removal costs for ER measures. For SEER levels 14.5–15.9, AIC could analyze the measure cost-effectiveness using the free-ridership levels of between 62% and 92% predicted by the customer choice survey to assess whether incentives are appropriate for that SEER .

Table 41. Possible Incentive Revisions

Measure (RB)	Existing PY5/PY6	Possible Revision
ASHP SEER 14.5–15.9	$150	$0
ASHP SEER 16–16.9	$200	$100
ASHP SEER 17–17.9	$300	$500
ASHP SEER 18+	$300	$700
CAC SEER 14.5–15.9	$150	$0–$150
CAC SEER 16–16.9	$200	$400
CAC SEER 17–17.9	$300	$500
CAC SEER 18+	$300	$600

- **Conclusion 5:** Staff and contract management changes affecting the HVAC Program at AIC and CSG provide a temporary vacuum as well as an opportunity to improve processing, data management, reporting, equipment verification, and quality assurance/quality control (QA/QC) procedures. AIC has a new dedicated HVAC program manager in place who is looking for improvement opportunities. On the other hand, some distributors have noticed a decline in outreach efforts, possibly due to CSG's loss of its southern account manager.
  - **Recommendation 9:** AIC should continue to improve verification, QA/QC protocols, data collection, and tracking, and should be encouraged to implement the remaining recommendations from last year's evaluation (e.g., letting customers submit, exploring co-marketing opportunities with contractors and marketing across programs, developing peer-recognition programs, and offering training to registered but NAR contractors).
  - **Recommendation 10:** CSG/Leidos and AIC should expand outreach to distributors and develop new ways to engage them.
- **Conclusion 6:** Contractor satisfaction with marketing materials increased substantially in PY6. This suggests that the changes that CSG/AIC made to improve marketing materials and management of marketing efforts has had a positive impact.
  - **Recommendation 11:** AIC and CSG/Leidos should continue to improve materials, ensure consistency in messaging, remove old materials where possible (e.g., old website information), and provide distributors and other trade allies with new materials to hand out to contractors.
  - **Recommendation 12:** Through training, AIC and CSG/Leidos should reinforce that field teams distribute marketing materials to trade allies with guidance on how to promote the measure using these materials.

A. Appendix – Data Collection Instruments

Contractor Survey Instrument:

Ameren PY6 Part Contractor Survey04

Distributor Survey Instrument:

AIC PY6 HVAC Distributor Survey_C

Customer Process Survey Instrument:

AIC PY6 HVAC Part Customer Survey_FIN

Customer Choice Survey Instrument:

Ameren Illinois HVAC Willingness to

B. Appendix – PY6 NTGR Research

Free-Ridership

The evaluation team estimated free-ridership via a participant self-report approach, based on a standard battery of questions defining the following:

- Whether the participant would have purchased the same product without the incentive; and (if so)
- Whether the participant would have purchased the product at the same time.

The evaluation team then applied a free-ridership score, ranging from 0% to 100%, to each participant, based on his or her responses to a set of survey questions. Figure 56 (below) illustrates the free-ridership scoring approach. The team used the following process to determine free-ridership scores:

- Customers received 0% free-rider scores if the following held true:
  - They had no plans to install the measure in the absence of the program's incentives and would not, in the program's absence, have installed the measure within 1 year;
  - They had specific plans to install the measure before learning about the program, but would not have done so without program incentives; or
  - In the absence of the program incentives, they would not have purchased or installed equipment with the same efficiency level.
- Customers received 100% free-rider scores if the following held true:
  - They would have installed the measure at the same time without the program; or
  - They installed the measure before learning about the program.
- Customers received a partial free-ridership score (ranging from 12.5% to 75%) if they already planned to install the measure and the program influenced their decisions (the influence could include the installation's timing or the efficiency of measures installed). Customers received a higher free-ridership percentage if they appeared highly likely to install a measure, but the program had less influence over their decisions.

After translating survey responses into matrix values to determine each participant's free-ridership score, the evaluation team calculated an average free-ridership estimate for the overall program by weighting the gross evaluated program savings of each participant's installed measures.

Table 44 shows the conversion of each raw survey response option into a free-ridership scoring matrix value. Table 45 shows free-ridership score combinations and the scoring legend the team used to categorize customer survey responses.

Figure 56. Free-Ridership Scoring

Free-Ridership Results

Table 42 shows the free-ridership calculation results for the HVAC Program's electric measures. Overall, electric measures in the program averaged a 51% free-ridership rate across all 204 respondents.

Table 42. Free-Ridership Scoring

Measure	n	FR	FR Absolute Precision
< SEER 16 CAC/HP (RB)	40	62%	11%
SEER 16+ CAC/HP (RB)	43	58%	10%
< SEER 16 CAC/HP (ER)	43	59%	12%
SEER 16+ CAC/HP (ER)	42	46%	11%
Brushless Motors	36	46%	13%
Program Total	**204**	**51%**	**5%**

Table 43 shows the following:

- The unique response combinations from electric customers taking part in the HVAC Program participant survey
- The free-ridership score assigned to each combination
- The number of responses

Responses in the table have been converted to "yes," "no," or "partial," depending on the response's relation to free-ridership (with free-ridership score calculations for each measure category based on the distribution of scores within the matrix).

Table 43. Frequency of Free-Ridership Scoring Combinations—Electric Measures

C1. When you first heard about the discount from Ameren, had you already been planning to purchase the (appliance type)?	C2. Had you already ordered, purchased, or installed the (appliance type) BEFORE you heard about the Ameren discount?	C3. Would you have installed the same (appliance type) without the discount (and financing) from Ameren?	C4. Help me understand, would you have installed a different (appliance type) without the Ameren discount (and financing) or would you have installed nothing?	C5. Let me make sure I understand. When you say you would have installed a (appliance type), would you have installed the same one that was just as energy efficient?	C6. Without the Ameren discount (and financing), would you have installed the same (appliance type):	C7. To confirm, when you say you would not have installed the same (appliance type), do you mean you would not have installed a (appliance type) at all?	C8. Again, help me understand. Would you have installed the same type of (appliance type) but it would not have been as energy-efficient?	C9. And, would you have installed the (appliance type)...	FR Score	Frequency
Yes	Yes	x	x	x	x	x	x	x	100%	11
Yes	No	Yes	x	Yes	Yes	x	x	x	100%	58
Yes	No	Yes	x	Yes	Partial	x	x	x	75%	7
Yes	No	Yes	x	Yes	No	x	x	x	0%	3
Yes	No	Yes	x	Partial	Yes	x	x	x	75%	4
Yes	No	Yes	x	Partial	Partial	x	x	x	50%	1
Yes	No	Yes	x	Partial	No	x	x	x	0%	2
Yes	No	Partial	Yes	Yes	Yes	x	x	x	100%	1
Yes	No	Partial	Yes	Partial	Partial	x	x	x	50%	1
Yes	No	Partial	Yes	No	x	x	x	x	0%	1
Yes	No	Partial	Partial	x	x	x	x	x	0%	13
Yes	No	Partial	No	x	x	Yes	Partial	Yes	50%	1
Yes	No	Partial	No	x	x	Yes	No	x	0%	1
Yes	No	No	Yes	Yes	Yes	x	x	x	100%	1
Yes	No	No	Yes	Yes	No	x	x	x	0%	1
Yes	No	No	Yes	Partial	Partial	x	x	x	50%	2
Yes	No	No	Yes	Partial	No	x	x	x	0%	1
Yes	No	No	Yes	No	x	x	x	x	0%	9
Yes	No	No	Partial	x	x	x	x	x	0%	5
Yes	No	No	No	x	x	Yes	Yes	Yes	75%	2
Yes	No	No	No	x	x	Yes	Yes	No	0%	1
Yes	No	No	No	x	x	Yes	No	x	0%	2
Yes	No	No	No	x	x	No	x	x	0%	3
Partial	Yes	x	x	x	x	x	x	x	100%	2
Partial	No	Yes	x	Yes	Yes	x	x	x	75%	2
Partial	No	Yes	x	Partial	Yes	x	x	x	50%	1
Partial	No	Yes	x	No	x	x	x	x	0%	1
Partial	No	Partial	Yes	Partial	Yes	x	x	x	50%	1
Partial	No	Partial	Partial	x	x	x	x	x	0%	2
Partial	No	No	Partial	x	x	x	x	x	0%	1
No	x	Yes	x	Yes	Yes	x	x	x	50%	15
No	x	Yes	x	Yes	Partial	x	x	x	25%	3
No	x	Yes	x	Yes	No	x	x	x	0%	1
No	x	Partial	Yes	Yes	Yes	x	x	x	50%	1
No	x	Partial	Yes	Yes	No	x	x	x	0%	1
No	x	Partial	Partial	x	x	x	x	x	0%	2
No	x	Partial	No	x	x	Partial	Yes	Partial	0%	1
No	x	No	Yes	No	x	x	x	x	0%	3
No	x	No	Partial	x	x	x	x	x	0%	2
Yes	No	x	x	x	x	x	x	x	100%	11
Partial	No	x	x	x	x	x	x	x	75%	4
No	x	x	x	x	x	x	x	x	0%	19

Descriptions of respondents' most common answers to the free-ridership questions, representing 48% (97 out of 204) of total participants interviewed, follow:

- Fifty-eight respondents answered that, when they first heard of the HVAC Program, they already had planned to purchase the measure, and, without the AIC HVAC incentive, they would have purchased the exact same measure on their own. These respondents also indicated they would have installed the measure to the same level of efficiency without the program incentive and would have done so at the same time as they did through the program. As every answer from this respondent group indicated free-ridership, they received a score of 100%.
- Seventeen respondents that would not have purchased equipment to the same efficiency level without the program rebate received a score of 0%.
- Thirteen respondents had already ordered, purchased, or installed the rebated equipment before learning about the Ameren discount and received a score of 100%.
- Nine respondents would not have purchased the equipment within the same year in program rebate's absence and received a score of 0%.

To adjust for the "halo effect," where customers feel obligated to respond in a way reflecting doing "the right thing" even without the program, the team asked customers an open-ended question: "In your own words, please tell me the influence the Ameren Illinois program incentive had on your decision to purchase the [insert measure name]." A qualitative review of these responses (to assess whether systematic bias occurred that could change the results) did not indicate bias.

Figure 57 shows distributions of electric measure respondents by assigned free-ridership score. Approximately 37% of survey respondents received a 0% free-rider score; 1% exhibited low free-ridership levels (25%); 21% showed moderate free-ridership levels (50% and 75%); and 41% showed true free-rider scores (100%).

Figure 57. Overall Distribution of Electric HVAC Free-Ridership Scores

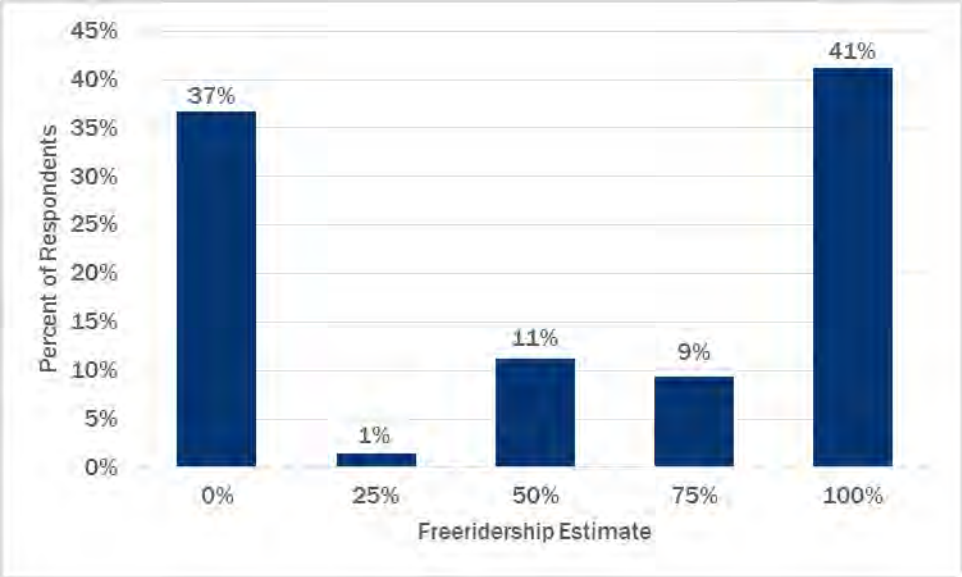


Table 44 lists potential raw survey responses, with the translated free-ridership scoring matrix in parentheses.

Table 44. Raw Survey Responses Translated to Free-Ridership Scoring Matrix Terminology

C1. When you first heard about the discount from Ameren, had you already been planning to purchase the (appliance type)?	C2. Had you already ordered, purchased, or installed the (appliance type) BEFORE you heard about the Ameren discount?	C3. Would you have installed the same (appliance type) without the discount (and financing) from Ameren?	C4. Help me understand, would you have installed a different (appliance type) without the Ameren discount (and financing) or would you have installed nothing?	C5. Let me make sure I understand. When you say you would have installed a (appliance type), would you have installed the same one that was just as energy efficient?	C6. Without the Ameren discount (and financing), would you have installed the same (appliance type):	C7. To confirm, when you say you would not have installed the same (appliance type), do you mean you would not have installed a (appliance type) at all?	C8. Again, help me understand. Would you have installed the same type of (appliance type) but it would not have been as energy-efficient?	C9. And, would you have installed the (appliance type)…
Yes (Yes)	Yes (Yes)	Yes (Yes)	Yes, I would have installed or completed something (Yes)	Yes (Yes)	At the same time (Yes)	Yes (No)	Yes (No)	At the same time (Yes)
No (No)	No (No)	No (No)	No, I would not have installed or completed anything (No)	No (No)	Later within the same year (Partial)	No (Yes)	No (Yes)	Later within the same year (Partial)
Don't Know (Partial)	Don't Know (No)	Don't Know (Partial)	Don't Know (Partial)	Don't Know (Partial)	Within one to two years (No)	Don't Know (Partial)	Don't Know (Partial)	Within one to two years (No)
Refused (Partial)	Refused (No)	Refused (Partial)	Refused (Partial)	Refused (Partial)	More than two years out (No)	Refused (Partial)	Refused (Partial)	More than two years out (No)
					Don't Know (Partial)			Don't Know (Partial)
					Refused (Partial)			Refused (Partial)

Table 45 presents a sample of free-ridership inputs and scores for AIC's HVAC Program participants.

Table 45. Sample of Free-Ridership Scores

C1. When you first heard about the discount from Ameren, had you already been planning to purchase the (appliance type)?	C2. Had you already ordered, purchased, or installed the (appliance type) BEFORE you heard about the Ameren discount?	C3. Would you have installed the same (appliance type) without the discount (and financing) from Ameren?	C4. Help me understand, would you have installed a different (appliance type) without the Ameren discount (and financing) or would you have installed nothing?	C5. Let me make sure I understand. When you say you would have installed a (appliance type), would you have installed the same one that was just as energy efficient?	C6. Without the Ameren discount (and financing), would you have installed the same (appliance type):	C7. To confirm, when you say you would not have installed the same (appliance type), do you mean you would not have installed a (appliance type) at all?	C8. Again, help me understand. Would you have installed the same type of (appliance type) but it would not have been as energy-efficient?	C9. And, would you have installed the (appliance type)...	FR Score
Yes	Yes	x	x	x	x	x	x	x	100%
Yes	No	Yes	x	Yes	Yes	x	x	x	100%
Yes	No	Yes	x	Yes	Partial	x	x	x	75%
Yes	No	Yes	x	Yes	No	x	x	x	0%
Yes	No	Yes	x	Partial	Yes	x	x	x	75%
Yes	No	Yes	x	Partial	Partial	x	x	x	50%
Yes	No	Yes	x	Partial	No	x	x	x	0%
Yes	No	Yes	x	No	x	x	x	x	0%
Yes	No	Partial	Yes	Yes	Yes	x	x	x	100%
Yes	No	Partial	Yes	Yes	Partial	x	x	x	75%
Yes	No	Partial	Yes	Yes	No	x	x	x	0%
Yes	No	Partial	Yes	Partial	Yes	x	x	x	75%
Yes	No	Partial	Yes	Partial	Partial	x	x	x	50%
Yes	No	Partial	Yes	Partial	No	x	x	x	0%
Yes	No	Partial	Yes	No	x	x	x	x	0%
Yes	No	Partial	Partial	x	x	x	x	x	0%
Yes	No	Partial	No	x	x	Yes	Yes	Yes	75%
Yes	No	Partial	No	x	x	Yes	Yes	Partial	50%
Yes	No	Partial	No	x	x	Yes	Yes	No	0%
Yes	No	Partial	No	x	x	Yes	Partial	Yes	50%
Yes	No	Partial	No	x	x	Yes	Partial	Partial	25%
Yes	No	Partial	No	x	x	Yes	Partial	No	0%
Yes	No	Partial	No	x	x	Yes	No	x	0%
Yes	No	Partial	No	x	x	Partial	Yes	Yes	50%
Yes	No	Partial	No	x	x	Partial	Yes	Partial	25%
Yes	No	Partial	No	x	x	Partial	Yes	No	0%
Yes	No	Partial	No	x	x	Partial	Partial	Yes	25%
Yes	No	Partial	No	x	x	Partial	Partial	Partial	12.5%
Yes	No	Partial	No	x	x	Partial	Partial	No	0%
Yes	No	Partial	No	x	x	Partial	No	x	0%
Yes	No	Partial	No	x	x	No	x	x	0%
Yes	No	No	Yes	Yes	Yes	x	x	x	100%
Yes	No	No	Yes	Yes	Partial	x	x	x	75%
Yes	No	No	Yes	Yes	No	x	x	x	0%
Yes	No	No	Yes	Partial	Yes	x	x	x	75%
Yes	No	No	Yes	Partial	Partial	x	x	x	50%

C. Appendix – Survey Response Rate Methodology

We present a definition and explanation of how we calculate the rate below. The survey response rate is the number of completed interviews divided by the total number of potentially eligible respondents in the sample. We calculated the response rate using the standards and formulas set forth by the American Association for Public Opinion Research (AAPOR).[18] For various reasons, we were unable to determine the eligibility of all sample units through the survey process and chose to use AAPOR Response Rate 3 (RR3). RR3 includes an estimate of eligibility for these unknown sample units. The formulas used to calculate RR3 are presented below. The definitions of the letters used in the formulas are displayed in the Survey Disposition tables in Section 3.1.

$$E = (I + R + NC) / (I + R + NC + e)$$

$$RR3 = I / ((I + R + NC) + (E * U))$$

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

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

The approach to calculating response rates differs slightly for Internet-based surveys. In these instances, the survey response rate is the number of completed surveys divided by the total number of potentially eligible respondents in the sample. The quality of the email list is a key factor in determining the eligibility of participants who do not respond to the email but also do not bounce back. This calculation assumes a high-quality list in which all respondents are eligible except those who reply with an accepted reason why they are not eligible (e.g., employee of client).

[18] *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, AAPOR, 2011. http://www.aapor.org/AAPORKentico/Communications/AAPOR-Journals/Standard-Definitions.aspx.

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