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Impact and Process Evaluation of 2014 (PY7) Ameren Illinois Company Commercial & Industrial Standard Efficiency Program

Final

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CADMUS

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1. Executive Summary

This report presents the results of Opinion Dynamics' evaluation of the Ameren Illinois Company (AIC) Commercial and Industrial (C&I) Standard Program for electric and gas energy efficiency (referred to as the Business Program). It covers the program's performance in program year 7 (PY7), which ran from June 1, 2014, through May 31, 2015. According to the PY7 Implementation Plan, AIC expected savings from this program to account for 35% of the overall portfolio electric savings and 16% of overall portfolio therm savings (including both residential and commercial programs). The Standard Program's savings come from the core incentive offering, an online store where customers can buy energy-efficient products at reduced prices, the Green Nozzle initiative, and a midstream lighting incentive program introduced in PY7.

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

Below we present the key findings of the PY7 evaluation.

1.1 Impact Results

Our participant verification activities showed that AIC is accurately tracking the measures installed. As shown in Table 1, the electric and gas gross realization rates for all program components are close to 100%. As outlined in the evaluation plan, the team applied net-to-gross ratios (NTGRs) developed in PY4 and PY5 to the program's components in developing estimates of net savings. Table 1 also provides the PY7 Standard Program gross and net impacts. The PY7 Standard Program achieved 62,828 MWh in net electric savings and 1,368,915 therms in net gas savings. This level of savings enabled the program to meet its internal PY7 electric goals and greatly exceed its internal gas goals.

Table 1. Standard Program Impact Summary

Savings Category	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Core Program	78,415	100.0%	78,383	0.79	62,167
Online Store	732	100.5%	736	0.83	611
Instant Incentive	38	100.0%	38	1.00	38
Green Nozzle	14	100.0%	14	0.92	13
Total MWh Savings	**79,198**	**100.0%**	**79,170**	**0.79**	**62,828**
Demand Savings (kW)					
Core Program	11,887	99.9%	11,879	0.79	9,350
Online Store	154	102.8%	159	0.83	132
Instant Incentive	9	100.0%	9	1.00	9
Green Nozzle	0	N/A	0	N/A	N/A
Total kW Savings	**12,050**	**100.0%**	**12,047**	**0.79**	**9,490**
Gas Savings (Therms)					
Core Program	1,523,095	100.0%	1,522,965	0.90	1,364,961
Online Store	0	N/A	0	N/A	N/A
Instant Incentive	0	N/A	0	N/A	N/A
Green Nozzle	4,443	100.0%	4,443	0.89	3,954
Total Therm Savings	**1,527,538**	**100.0%**	**1,527,408**	**0.90**	**1,368,915**

1.2 Process Results

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

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

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

concerns. PY7 continued this trend, with 94% of participants reporting overall satisfaction[1] with the program and all defined program areas examined in our evaluation receiving high marks from participants. Consistently performing at this level has likely helped ensure that participants continue to return to the program year after year.

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

- **Continue to target non-participating customers.** Our non-participant research found that a substantial number of AIC customers are still unaware of the Business Program, and that those who are aware are often unfamiliar with the specifics of the program. While reaching every customer will prove to be impossible, there does appear to be a significant number of both large and small AIC customers who have not participated in the program and offer savings opportunities. Our research shows that barriers to installing energy efficient equipment can decrease in magnitude among those familiar with the Business Program, which supports the need to continue to conduct outreach and education to non-participating customers. AIC should continue to market to non-participants using the methods preferred by non-participants, specifically through direct mail and email.

- **Incorporate all TRM updates and ensure consistency across similar measures in program tracking databases.** AIC continues to achieve a gross realization rate of nearly 100% for the program, although we did find minor discrepancies in the database including a TRM update that was not applied correctly and waste heat factors that were not consistently applied to a select few lighting projects. While these issues were very minor, we recommend incorporating all TRM updates and applying the correct measure assumptions consistently across all measures to ensure AIC continues achieving high realization rates moving forward.

[1] A score of 7, 8, 9, or 10 on a scale of 0 to 10, where 0 means "not at all satisfied" and 10 means "very satisfied".

2. Introduction

This report presents the results of Opinion Dynamics' performance evaluation of the Ameren Illinois Company (AIC) Commercial and Industrial (C&I) Standard Program during its seventh program year (PY7). The Standard Program is one of three in AIC's C&I portfolio (referred to as the Business Program), which also includes the Custom and the Retro-Commissioning programs. PY7 ran from June 1, 2014 through May 31, 2015.

To support our evaluation, we reviewed program materials and program tracking data and interviewed program administrators and implementation staff. To support both our impact and process analysis, we also conducted computer-aided telephone interviews (CATI) with customers who participated in the Core Program as well as customers who have never participated in any part of the AIC Business Program.

2.1 Program Description

The Standard Program offers AIC business customers fixed incentives for the installation of specific energy efficiency measures. The Core Program covers lighting, variable frequency drives (VFDs), HVAC equipment (heating, ventilation and air conditioning), refrigeration/grocery equipment, commercial kitchen equipment, steam traps, and other measures.

Additionally, the Standard Program includes an online store that is available to all electric business customers. The online store offers a variety of energy-saving lighting products, including compact fluorescent lights (CFLs), LEDs, and occupancy sensors, as well as smart power strips. The program also continued its Green Nozzle initiative in PY7, but on a smaller scale than in previous years. Through this initiative, AIC offers free efficient water nozzles to its gas customers and its customers in the food service sector who use electric or natural gas water heating. The goal of this effort is to replace inefficient nozzles with low-flow nozzles to reduce energy use associated with water heating. Finally, in PY7, the program introduced a pilot midstream lighting program providing incentives to lighting distributors to help increase the market share of efficient lighting products.

2.2 Research Objectives

The objective of the PY7 Standard Program evaluation was to estimate the gross and net energy and demand impacts. We also assessed program changes made in PY7 to improve the program participation process. The PY7 impact evaluation sought to answer the following questions:

1. What are the estimated gross energy and demand impacts from this program?
2. What are the estimated net energy and demand impacts from this program?
3. What is the level of participant free-ridership and spillover (for prospective application)?
4. What is the level of non-participant spillover (for prospective application)?

The evaluation team also explored a number of process-related research questions to understand program participation, design, and implementation. The research focused on PY7 program processes but also examined changes made from PY6 to PY7, participant and non-participant characteristics, and broader lighting distributor trends.

1. Program Participation
    a. What were the characteristics of participating customers? How many projects were completed? By how many different customers? What types of projects?
    b. Did customer participation meet expectations? If not, how different was it and why?
2. Program Design and Implementation
    a. Did the program as implemented change compared to PY6? If so, how, why, and was this an advantageous change?
    b. What implementation challenges occurred in PY7, and how were they overcome?
    c. What changes could the program make to improve the customer experience and generate greater energy savings?
3. Participant Experience and Satisfaction
    a. How satisfied were participating customers with different aspects of their participation in the program?
    b. How did participants become aware of the program?
4. Non-Participant Awareness and Barriers
    a. What was the level of program awareness and familiarity among key sectors targeted by the program?
    b. What was the level of knowledge of and attitude toward energy efficiency among non-participants?
    c. What were the barriers preventing customers from participating in the program?
5. Lighting Distributor Trends
    a. What was the availability of T-12 linear fluorescent bulbs through local lighting distributors?
    b. Were lighting distributors familiar with the AIC Business Program?
    c. Did the program affect their sales and stocking practices of high efficiency lighting?

3. Evaluation Methods

The assessment of AIC's C&I Standard Program in PY7 consisted of an evaluation of program gross and net impacts and a program process assessment. We applied the most recently estimated NTGR from PY4 (for motors, HVAC, and specialty equipment) and PY5 (for lighting and steam traps) since the program's implementation and NTGR have remained consistent over the past three program years. Table 2 summarizes the PY7 evaluation activities conducted for the Standard Program's assessment.

Table 2. PY7 Standard Program Evaluation Activities

Activity	PY7 Process	PY7 Impact	Forward Looking	Details
Program Staff In-Depth Interviews	✓			Provides insight into program design and processes.
Participant Survey	✓	✓	✓	Gathers data on program processes and verifies installation of equipment Gathers data for estimation of NTGR.
Non-Participant Survey		✓	✓	Gathers data to assess non-participant spillover and potential barriers to participation.
Lighting Distributor Interviews	✓			Provides insight into current availability of T12 bulbs, familiarity with AIC programs, effect of the programs on sales and stocking, and market trends (reported separately).
Staffing Grant Participant Interviews	✓	✓	✓	Support the development of NTGRs for these participants to be applied retroactively
Engineering Review		✓		Estimates gross impacts through review of the program tracking database and verification of Illinois Statewide TRM deemed values.
Net Impact Analysis		✓	✓	Estimates net impacts using PY4 and PY5 NTGR values and interviews with Staffing Grant participants and applies to both the gas and electric savings. Estimates NTGRs to be applied prospectively in PY9.

3.1 Data Collection

The following activities informed the PY7 Standard Program evaluation.

3.1.1 Program Staff Interviews

The evaluation team conducted three in-depth interviews: one with program database staff, one with program marketing staff, and one with Leidos, the main program implementer. The interviews focused on program performance in PY7, Business Program-wide changes, and changes to the C&I Standard Program between PY6 and PY7.

3.1.2 Program Materials and Data Review

We conducted a comprehensive review of all program materials, including the program's implementation plan, incentive applications, and extracts from the program tracking database. We received an initial extract in April 2015 for use in evaluation planning and early survey sampling, a second extract in July 2015 for use in survey sampling, and a final version in September 2015 for use in impact analysis.

3.1.3 Core Program Participant Telephone Survey

The evaluation team conducted telephone interviews with customers who participated in the Core Program in PY7. These interviews focused on installation verification, satisfaction with program processes, and attribution (freeridership and spillover). We selected the sample of Core participant projects from the July 16, 2015 extract of the Amplify database we received.

As in previous program years, we sampled by project contact, rather than by project, because many customers completed more than one project in PY7. These customers generally submitted the same contact name for each of the different projects. To reduce respondent burden and to facilitate question wording, we asked each contact about only one project. The evaluation team formed a sample frame of 842 unique customer contacts for the Standard survey.[2]

If a contact had more than one project with the same end use (e.g., HVAC), we typically chose one of their projects at random. The only exceptions were contacts who installed multiple lighting projects; in these cases, we asked the contact about the lighting project with the largest savings. If a contact had projects with different end uses (including lighting), we asked about the rarest type of non-lighting project. For example, if the program database contained only five steam trap projects compared to 20 HVAC projects, steam traps were prioritized. This approach was intended to ensure that our sample would include a sufficient number of non-lighting projects, since lighting continued to be the predominant end use in PY7.

Based on the volume of lighting projects completed through the Standard Program, we divided the sample frame into lighting and non-lighting components and stratified the lighting sample frame to identify the largest projects based on savings. In particular, we stratified the sample of lighting projects as follows: projects with savings up to 25,000 kWh, those with savings between 25,001 and 150,000 kWh, and those with savings greater than 150,001 kWh. We performed this stratification using the Dalenius-Hodges method[3] to determine strata boundaries, and the Neyman allocation[4] to determine the optimal allocation of the available interviews to the strata.

The purpose of stratifying the sample of lighting projects in particular is to ensure that the sample will achieve the targeted level of confidence and precision (a confidence level of 90% and a precision level of 10%) with the smallest sample possible. To increase the chances of achieving this level of

[2] The evaluation team also removed any participants who received a staffing grant in PY7, completed a Retro-Commissioning project, or also completed a CLIP (Competitive Large Incentive Program) project. Given the limited sample sizes for efforts to evaluate these other programs, we chose to attempt to interview these participants as part of efforts related to their respective programs.

[3] Dalenius, T., and Hodges, J.L., Jr., Minimum variance stratification. Journal of the American Statistical Association, 54: 88-101, 1959.

[4] Neyman, J.(1934) "On the two different aspects of the representative method: The method of stratified sampling and the method of purposive selection", Journal of the Royal Statistical Society, 97 (4), 557–625.

confidence and precision for lighting projects, we attempted a census of the projects with the most savings and a random sample of the smaller projects. Table 3 below shows the stratification approach and completed number of lighting surveys.

Due to the relatively small number of contacts, we conducted a census attempt of non-lighting projects. Table 4 below presents the population values, sample frame information, and completed survey information for the Core Standard Program.

Table 3. Sample Design for Standard Lighting

Stratum	kWh Savings Range	Projects[a]	Target Interviews	Completed Interviews
Small Lighting	0-25,000	489	12	13
Medium Lighting	25,001-150,000	414	44	44
Large Lighting	150,001 – 1,000,000	63	Census attempt	13
Total		**966**		**70**

[a] These figures reflect the population in Amplify as of July 16, 2015. It includes projects with a status of "Approved", "Check Sent" or "Sent to Check Processor." As a result, project counts differ from the final data presented later in this report.

Table 4. Completed Core Program Interviews

End Use	Population[a]				Sample Frame			Completed Interviews		
	Projects	Contacts	Ex Ante MWh Savings	Ex Ante Therm Savings	Contacts	Ex Ante MWh Savings	Ex Ante Therm Savings	Contacts	Ex Ante MWh Savings	Ex Ante Therm Savings
Standard Lighting	966	668	48,342	0	638	33,490	0	70	7,121	0
Specialty Equipment	106	87	1,038	4,555	84	703	2,020	21	243	2,020
HVAC	81	64	1,737	41,751	57	747	38,989	20	422	15,140
Steam Trap	38	35	0	1,437,129	28	0	557,145	9	0	185,358
Variable Frequency Drives	37	31	21,359	0	27	16,800	0	10	5,014	0
Leak Survey	9	9	3,524	0	8	3,373	0	5	1,210	0
Total	**1,237**	**867[b]**	**75,999**	**1,483,435**	**842**	**55,113**	**598,154**	**135**	**14,010**	**202,518**

[a] The total number of projects listed reflects the population in Amplify as of July 16, 2015. This includes projects with a status of "Approved," "Check Sent," or "Sent to Check Processor." As a result, project counts and savings differ from the final data presented later in this report.

[b] This number is not equal to the total within this column due to the fact that some contacts have more than one end-use. 867 is the number of unique contacts.

We used the survey to gather data to support the estimation of NTGRs for all Core Program project types. This sample design provided statistically valid NTGR results at the 90% confidence level with 3.2% relative precision for the Standard Program lighting projects weighted by ex post gross kWh savings. For all other project types, we attempted a census, and therefore there is no sampling error associated with the NTGR results.

Survey Dispositions and Response Rate

We fielded the survey of Core Program participants from September 10 to September 24, 2015. Table 5 provides the final survey dispositions.

Table 5. Core Program Survey Dispositions

Disposition	N
Completed Interviews (I)	135
Partial Interviews (P)	3
Eligible Non-Interviews	316
Refusal (R)	*35*
Mid-interview terminate (R)	*23*
Respondent never available (NC)	*186*
Answering device (NC)	*67*
Language problem (NC)	*5*
Not Eligible (e)	41
Duplicate number	*3*
Fax/data line	*5*
Non-working/disconnect	*11*
Wrong number	*8*
No eligible respondent	*14*
Unknown Eligibility Non-Interview (U)	347
Not dialed/worked	*338*
No answer	*9*
Total Participants in Sample	**842**

The following table provides the response and cooperation rates (Table 6). Appendix B provides information on the methodology used to calculate response rates for telephone surveys.

Table 6. Core Program Survey Response and Cooperation Rates

AAPOR Rate	Percentage
Response Rate #3	17%
Cooperation Rate #1	69%

The team assessed the potential for non-response bias by comparing the attributes of survey respondents to those of customers who did not respond to the survey. We found no evidence to suggest that non-respondents differed significantly from respondents in terms of number of projects, project savings, or type of business (see Section 3.3 for additional information on potential sources of error).

Weighting

The team developed survey weights and applied them for the process analysis. These weights reflect that we did not survey strata in proportion to their representation in the population, as described above. For each stratum, we estimated a survey weight by dividing the stratum's share of the overall population by its share of survey responses. Table 7 presents the calculated survey weights.

Table 7. Survey Weights for Core Program Participant Survey

Project Type	Sample Frame		Completes		Weight
	Total Part.	% Part[a]	Total Part.	% Part[a]	
Small Lighting	325	39%	13	10%	4.0083
Medium Lighting	274	33%	44	33%	0.9984
Large Lighting	39	5%	13	10%	0.4810
Non-Lighting	204	24%	65	48%	0.5032
Total	**842**	**100%**	**135**	**100%**	

[a] Columns may not sum to 100% due to rounding. Weights are calculated on the exact, unrounded share.

Information on weighting for the net-to-gross analysis can be found in Appendix C.

3.1.4 Non-Participant Telephone Survey

The evaluation team also conducted telephone interviews with business customers who have not participated in any AIC energy efficiency programs since their inception. This survey asked about the customers' knowledge of and attitudes toward energy efficiency, the benefits of and barriers to energy efficiency, program awareness, as well as the customers' installed equipment and retro-commissioning history to estimate non-participant spillover.

We developed the non-participant survey sample based on a data file provided by AIC containing 266,095 business accounts from all rate classes that had never participated in the Business Program.

During preparation of the eligible population, we removed a large number of accounts from the initial data file for a number of reasons. These dropped accounts are summarized in Table 8 and are described below:

- **Non-Retrofittable Sites:** Lighting-only accounts (DS-5), cellphone towers, billboards, smart meters and other non-retrofittable sites
- **Public/Municipal Sites:** Public or municipal sites that would be eligible for DCEO programs
- **AIC Facilities:** AIC facilities
- **Ineligible Rate Codes:** Accounts with residential electric or gas rate codes (DS-1 or GDS-1)
- **Missing Rate Codes:** Accounts with missing electric or gas rate codes we were unable to classify

Table 8. Summary of Accounts Removed from Eligible Population

Drop Reason	Accounts	Percent of Total
Non-Retrofittable Sites	37,951	14.3%
Public/Municipal Sites	36,749	13.8%
AIC Facilities	3,399	1.3%
Ineligible Rate Codes	2,574	1.0%
Missing Rate Codes	738	0.3%
Total	**81,411**	**30.60%**

After dropping 81,411 accounts, a total of 184,684 accounts remained.

Using machine learning and intelligent pattern matching[5], we then aggregated the remaining accounts into an eligible population at the premise level. Multiple accounts often correspond to one premise – for example, for customers with separate electric and gas accounts, so the 184,684 accounts of interest correspond to a final count of 114,824 unique premises. We grouped these premises by account type (gas, electric, or combo) and size (determined by rate code) for sampling purposes. Table 9 below presents our non-participant eligible population at the premise level.

Table 9. Non-Participant Eligible Population

Size	Customer Type	Population	Percent of Total
Small Customers[a]	Electric-Only	60,549	53%
	Gas-Only	9,988	9%
	Combo	43,160	38%
Large Customers[b]	Electric-Only	393	<1%
	Gas-Only	235	<1%
	Combo	499	<1%
Total		**114,824**	**100%**

[a] Premises with rate codes DS-2, DS-3A, GDS-2, and GDS-3.

[b] Premises with rate codes DS-3B, DS-4, GDS-4, GDS-5. If a premise had multiple rate codes, any one rate code being in the "large" group resulted in that premise's categorization as large.

We used this sampling approach in order to ensure sufficient coverage of large customers, who represent a particular area of interest for AIC due to their energy savings potential. In addition, a simple random sampling approach would have resulted in nearly all survey completions with small customers, resulting in a very small sample size for our non-participant spillover estimate for large customers.

From this population, we selected all large customers and a simple random sample of small customers, de-duped by phone number, and removed accounts with missing contact information to arrive at our sample

[5] For development of this sample, Opinion Dynamics used internally developed programs that identified unique business premises at the business and premise level and matched accounts from the AIC database to the premises based on similarities in business name, phone number, address, and other available criteria for each account. AIC provided a premise ID that represents unique locations, but we define a business premise as a unique location-business combination (e.g., an mixed commercial building with three separate businesses may have one unique premise ID in AIC's database, but is defined as three separate premises for the purpose of this analysis). Given the size of this database, hand-review of every defined premise was not feasible. However, we pulled subsamples of the data to review for errors and refined matching criteria several times to develop the most accurate match.

selected for interviewing. We set initial quotas to provide an equal number of small and large completes and represent customer types equally within each size group.

Table 10. Completed Non-Participant Survey Points

Size	Customer Type	Eligible Population	Initial Sample Selected for Interviewing	Initial Quota	Completed Survey
Small Customers[a]	Electric-Only	60,549	2,798	51	51
	Gas-Only	9,988	483	9	9
	Combo	43,160	2,176	40	40
Large Customers[b]	Electric-Only	393	293	34	10
	Gas-Only	235	159	18	7
	Combo	499	409	48	12
Total		**114,824**	**6,318**	**200**	**129**

[a] Premises with rate codes DS-2, DS-3A, GDS-2, and GDS-3.

[b] Premises with rate codes DS-3B, DS-4, GDS-4, GDS-5. If a premise had multiple rate codes, any one rate code being in the "large" group resulted in that premise's categorization as large.

Survey Dispositions and Response Rate

We fielded the survey of Business Program non-participants from October 8 to November 11, 2015. Table 11 provides the final survey dispositions.

Table 11. Non-Participant Survey Dispositions

Disposition	N
Completed Interviews (I)	129
Partial Interviews (P)	0
Eligible Non-Interviews	3,240
Refusal (R)	*669*
Mid-Interview terminate (R)	*58*
Respondent never available (NC)	*1,738*
Answering device (NC)	*769*
Language Problem (NC)	*6*
Not Eligible (e)	1,020
Duplicate number	*13*
Fax/data line	*59*
Non-working/disconnect	*565*
Wrong number	*64*
No eligible respondent	*147*
Residential number	*171*
Quota filled	*1*
Unknown Eligibility Non-Interview (U)	1,929
Not dialed or worked	*833*
Always busy	*38*
No answer	*1,044*
Call blocking	*14*
Total Contacts in Sample	**6,318**

The following table provides the response and cooperation rates (Table 12). Appendix B provides information on the methodology used to calculate response rates for telephone surveys.

Table 12. Non-Participant Survey Response and Cooperation Rates

AAPOR Rate	Percentage
Response Rate #3	3%
Cooperation Rate #1	15%

The evaluation team assessed the potential for non-response bias by comparing survey respondents to those who did not respond to the survey. We found no evidence to suggest that non-respondents differed significantly from respondents.

Weighting

The evaluation team developed survey weights and applied them for the process analysis. These weights reflect that we did not survey strata in proportion to their representation in the population, as described above. For each stratum, we estimated a survey weight by dividing the stratum's share of the overall population by its share of survey responses. Table 13 presents the calculated survey weights.

Table 13. Survey Weights for Non-Participant Survey

Size	Customer Type	Population		Completes		Weight
		Total	%	Total	%	
Small Customers	Electric-Only	60,549	53%	51	53%	1.33
	Gas-Only	9,988	9%	9	9%	1.25
	Combo	43,160	38%	40	38%	1.21
Large Customers	Electric-Only	393	<1%	10	<1%	0.04
	Gas-Only	235	<1%	7	<1%	0.04
	Combo	499	<1%	12	<1%	0.05
Total		114,824	100%	129	100%	

Information on weighting for the net-to-gross analysis can be found in Appendix C.

3.1.5 Lighting Distributor Interviews

The evaluation team conducted in-depth interviews with 10 lighting distributors in AIC's service territory. We chose the distributors based on a list of active distributors provided by Leidos. These interviews provided insight into the availability of T12 linear fluorescent bulbs in the region and explored distributor familiarity with the AIC Business Program, the effect of the programs on distributors' sales and stocking practices, and trends in the market.

3.2 Analytical Methods

3.2.1 Gross Impacts

To develop our list of PY7 projects, we started with the full application database and filtered on program year 7, the applicable program name (e.g., standard lighting), and application status (paid). This gave us our verified list of projects for which we calculated savings. To estimate PY7 ex post gross savings, we used the Illinois Statewide Technical Reference Manual (IL-TRM) version 3.0 and engineering review. The following table summarizes the approach used for each component of the Standard Program.

Table 14. Standard Program Gross Impact Methods by Component

Program Component	Application of IL-TRM Savings Values	Engineering Review
Core Program	✓	✓
Online Store	✓	
Instant Incentive	✓	
Green Nozzle	✓	

The following sections provide additional details about each of the methods employed.

Core Program

To determine gross impacts associated with the Core Program, we reviewed the program tracking database and verified the correct application of the IL-TRM version 3.0. To conduct the engineering review we:

1. Verified measures in the Amplify application database with the individual measure-specific databases in Amplify.
2. Used algorithms and values from the IL-TRM version 3.0 to estimate ex post savings as applicable.
3. Reviewed spreadsheets from the program implementer that calculate ex ante savings and compared the calculated values in the spreadsheets with the IL-TRM algorithms.
4. Reviewed participant telephone survey data, but did not make any adjustments to database values based on the survey.

Online Store

The evaluation team used two methods to verify the gross impacts of the online store. First, we reviewed the algorithms provided by the implementer and compared them to the IL-TRM methodology. Second, we performed an ex post analysis using the same algorithms with data from the program-tracking database.

Instant Incentive

The evaluation team verified savings for instant incentive measures by reviewing savings calculations performed by the implementer. We did not perform any additional analysis as the Instant Incentive program accounted for less than 0.1% of the Standard Program energy savings.

Green Nozzle

The team verified participation in the Green Nozzle initiative by examining the program-tracking database to ensure customer eligibility and program year. We then calculated gross impacts based on the IL-TRM.

3.2.2 Net Impacts

The evaluation team applied NTGRs approved by the Illinois Stakeholder Advisory Group (SAG) to PY7 program savings. Table 15 summarizes the NTGRs used in the net impact analysis. Applying the NTGRs to the Core Program measures listed below resulted in an overall, savings-weighted, PY7 Core Program NTGR of 0.79 for kWh, 0.78 for kW, and 0.89 for therms.

Table 15. SAG Approved PY7 NTGRs

Measure Type	Electric NTGR	Gas NTGR	NTGR Source
Lighting	78.0%	N/A	PY5 Evaluation
HVAC	44.3%	80.0%	PY4 Evaluation
Motor/Variable Frequency Drive	81.3%	N/A	PY4 Evaluation
Steam Traps	N/A	90.0%	PY5 Evaluation
Specialty	83.3%	90.0%	PY4 Evaluation
Leak Survey and Repair	100.0%	N/A	Evaluation team assumption
Online Store	83.0%	N/A	PY4 Evaluation
Green Nozzle	92.0%	89.0%	PY4 Evaluation
Instant Incentives	100.0%	N/A	Evaluation team assumption

3.3 Sources and Mitigation of Error

Table 16 provides a summary of possible sources of error associated with the data collection conducted for the Standard Program. We discuss each item in detail below.

Table 16. Possible Sources of Error

Research Task	Survey Error		Non-Survey Error
	Sampling Error	Non-Sampling Error	
Participant Survey	• Yes	• Measurement error • Non-response and self-selection bias • Data processing error • Sample frame error	• N/A
Non-Participant Survey	• Yes	• Measurement error • Non-response and self-selection bias • Data processing error • Sample frame error	• N/A
Gross Impact Calculations	• N/A	• N/A	• Analysis error
Net Impact Calculations	• N/A	• N/A	• Analysis Error

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

Survey Error

- **Sampling Error**
  - **Participant Survey.** The evaluation team designed the telephone survey sample to achieve 90% confidence and 10% relative precision. We surveyed 135 customers out of a population of 842. For net impact results, at the 90% confidence level, we achieved a relative precision of 3.2% for the Standard Program lighting projects on a kWh savings basis. For all other project types, we attempted a census, and therefore there is no sampling error associated with the NTGR results. For process results, at the 90% confidence level, we achieved a precision of 6.5% assuming a

coefficient of variation of 0.50. The achieved precision of each survey question depends on the variance of the responses to each question.

- **Non-Participant Survey.** The evaluation team designed the telephone survey sample to achieve 90% confidence and 10% relative precision. We surveyed 129 customers out of a population of 114,824. For process results, at the 90% confidence level we achieved a precision of 7.2% assuming a coefficient of variation of 0.50. The actual precision of each survey question depends on the variance of the responses to each question.

- **Non-Sampling Error**

  - **Measurement Error**. The validity and reliability of survey data were addressed through multiple strategies. First, we relied on the evaluation team's experience to create questions that align with of the idea or construct that they were intended to measure (i.e., face value validity). We reviewed the questions to ensure that we did not ask double-barreled questions (i.e., questions that ask about two subjects, but allow only one response) or loaded questions (i.e., questions that are slanted one way or the other). We also checked the overall logical flow of the questions to avoid confusing respondents, which would decrease reliability.

    All survey instruments were reviewed by key members of the evaluation team and by AIC and ICC Staff. To determine whether question wording was clear and unambiguous, we pre-tested each survey instrument, monitored the telephone interviews, and reviewed the pre-test survey data. We also used the pre-tests to assess whether the length of the survey was reasonable, and we shortened the survey as needed.

  - **Non-Response and Self-Selection Bias – Participant Survey**. Because the response rate for the participant survey was 17%, there is the potential for non-response bias. We attempted to mitigate possible bias by contacting each prospective respondent in the sample at least eight times at different times of day, as appropriate, until we received a firm refusal or filled our quota. To assess whether evidence of non-response bias exists, we compared survey respondents to the population based on business type, number of projects, and project savings. We found no evidence to suggest that non-respondents differed significantly from respondents.

  - **Non-Response and Self-Selection Bias – Non-Participant Survey**. The potential for non-response bias is significantly higher for the non-participant survey, which achieved a response rate of only 3%. We attempted to increase response rates and therefore mitigate non-response bias by contacting each prospective respondent in the sample at least eight times at different times of day, as appropriate, until we received a firm refusal or filled our quota. In addition, we left voicemails and provided a $10 VISA gift card as an incentive to complete the survey. Team members used all available data at their disposal, including secondary data, to assess whether evidence of non-response bias exists, but very little information was available for comparison. We found no evidence to suggest that non-respondents differed significantly from respondents.

  - **Data Processing Error.** The team addressed processing error by training interviewers and checking the quality and consistency of completed survey data. Before they began interviewing, Opinion Dynamics interviewers underwent rigorous training that included a general overview of the research goals and the intent of the survey instrument. Through survey monitoring, members of the evaluation team also provided guidance on proper coding of survey responses. We also carried out continuous, random monitoring of all telephone interviews.

- **Sample Frame Error.** We addressed external validity (the ability to generalize any findings to the population of interest) through the development of the sample frame. During data collection, the evaluation team managed the sample to minimize self-selection bias (i.e., we allowed for multiple attempts at different times of day and exhausted one part of the sample before to moving on to the next).

Non-Survey Error

- **Analysis Error**
  - **Gross Impact Calculations.** We applied the IL-TRM calculations to the participant data in the tracking database to calculate gross impacts. To minimize data analysis error, a separate team member reviewed all calculations were reviewed by to verify their accuracy.
  - **Net Impact Calculations.** We applied deemed NTGRs to estimated gross impacts to derive the program's net impacts. To minimize analytical errors, all calculations were reviewed by a separate team member to verify their accuracy.

4. Detailed Findings

4.1 Process Findings

The evaluation team's process-related research focused mainly on program awareness, program experience, and barriers to participation; the research also considered how any changes in program implementation between PY6 and PY7 might have affected these areas. Our results are based on 1) in-depth interviews with program staff, 2) a review of program data, and 3) a quantitative survey of program participants.

4.1.1 Program Description and Participation

The Standard Program offers AIC business customers fixed incentives for installing specific energy efficiency measures. Incentives are delivered through four offerings:

- **Core Program.** The Core Program covers lighting, variable frequency drives (VFDs), HVAC (heating, ventilation and air conditioning) equipment, refrigeration/grocery equipment, commercial kitchen equipment, steam traps, and other measures.
- **Online Store.** The Standard Program operates an online store that offers all electric business customers a variety of energy-saving products, including CFLs, LEDs, occupancy sensors, and smart power strips.
- **Green Nozzle Initiative.** The Standard Program also includes the Green Nozzle initiative, which offers free low-flow pre-rinse nozzles to all AIC gas customers, as well as customers in the food service sector who use electric water heating. The limited participation in the initiative during PY7 reflects AIC's decision in PY5 to place less emphasis on participation in this effort. As a result, participation has continued to decrease, with very few nozzles distributed in PY7.
- **Instant Incentives.** In PY7, the program introduced a pilot midstream lighting program providing incentives to lighting distributors to help increase the market share of efficient lighting products. The Instant Incentives program offers incentives covering a variety of standard and specialty CFLs and LEDs.

The Core Program is responsible for 99% of the Standard Program's ex ante gross MWh savings, and 99.7% of the Standard Program's ex ante gross therm savings. Table 17 displays the contributions of each Standard Program component to the Program's overall savings.

Table 17. Summary of Standard Program Components

End Use	*Ex Ante* Gross Electric Savings		*Ex Ante* Gross Gas Savings	
	MWh[a]	%	Therms[a]	%
Core Program	78,415	99%	1,523,095	>99%
OS - Online Store	732	1%	0	0%
II - Instant Incentive	38	<1%	0	0%
GN - Green Nozzles	14	<1%	4,443	<1%
Total	**79,198**		**1,527,538**	

[a] Totals may not sum due to rounding.

Core Program Participation

The vast majority of projects completed through the Core Program in PY7 (95%) have associated electric savings, while 6% have gas savings and only 3% have both. Lighting projects accounted for around two-thirds of electric savings (63%), and steam traps contributed 96% of gas savings. Over three-quarters of PY7 projects (78%) included lighting measures.

Table 18 summarizes the Core Program projects completed in PY7 by end use. The distribution of projects and savings by end use is consistent with that seen in recent program years.

Table 18. Summary of Core Program Participation by End-Use

End Use	Projects		*Ex Ante* Gross Electric Savings		*Ex Ante* Gross Gas Savings	
	#	%	MWh[A]	%	Therms	%
Standard Lighting	984	78%	49,530	63%	0	0%
Specialty Equipment	109	9%	1,051	1%	4,555	<1%
Standard HVAC	84	7%	1,745	2%	57,212	4%
Steam Trap Repair/Replacement	39	3%	0	0%	1,461,328	96%
Variable Frequency Drives	38	3%	22,341	28%	0	0%
Leak Survey and Repair	10	1%	3,746	5%	0	0%
Total	**1,264**		**78,415**		**1,523,095**	

[a] Columns may not sum to 100% due to rounding.

Participation in the Standard Program increased in PY7 from PY6 (Table 19). Gross electric savings increased from 64,604 MWh in PY6 to 78,415 MWh in PY7. Therm savings increased by more than 50% in PY7 from PY6. The program met its PY7 electric goals and substantially exceeded its gas goals. As noted during program manager interviews and the evaluation team's data review, a single project contributed roughly half of these gas savings.

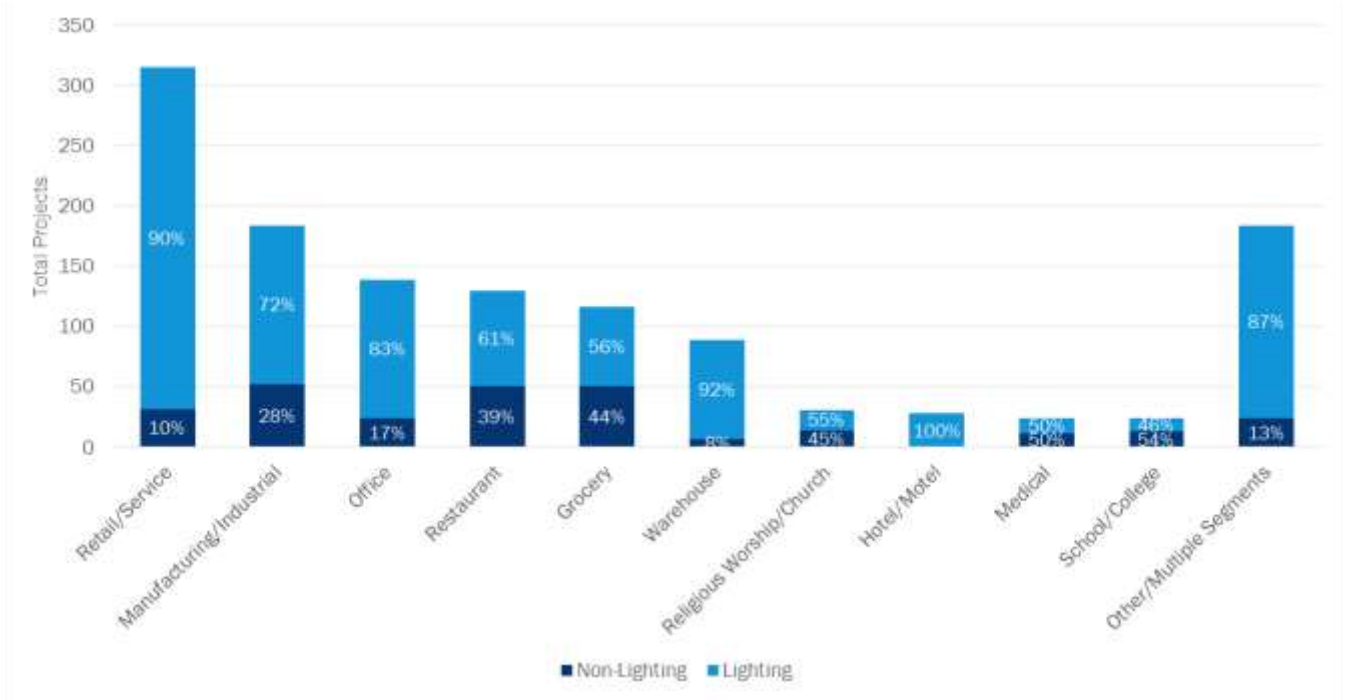
Table 19. Historical Program Participation

Program Year	Projects	Ex Ante Gross Electric Savings	Ex Ante Gross Gas Savings
	#	MWh	Therms
PY4	1,560	70,621	507,492
PY5	1,297	98,774	2,040,085
PY6	910	64,604	975,046
PY7	1,264	78,415	1,523,095

Core Participant Characteristics and Program Uptake

According to the program tracking database, most PY7 core projects were completed in retail/service facilities (25%). Other major facility types represented were manufacturing/industrial facilities (15%) and offices (11%). Lighting projects accounted for 78% of total PY7 Core Standard Program projects and represent the majority of projects installed at most facility types. The ratio of lighting projects to non-lighting projects was highest for hotels, warehouses and retail/service facilities - over 90% of projects at each facility type were lighting projects. Only medical and school/college facilities installed more non-lighting projects than lighting projects. Figure 1. shows the breakdown of projects by facility and project type.

Figure 1. PY7 Projects by Facility and Project Type



More than 800 unique companies participated in the program during PY7. Approximately 80% completed only one project. Only a very small number of companies (just over 2% of those participating) completed more than four projects, but this group completed 18% of the projects submitted to the program in PY7. This group of companies completing more than four projects spanned a range of sectors, with multiple companies in the retail sector (32%), grocery and manufacturing sectors (16% each), and restaurant sector (12%).

4.1.2 Program Design and Implementation

Based on the participant survey and on interviews with program staff, the Standard Program generally continued to function smoothly and effectively in PY7. Although the program is relatively mature and its implementation has remained stable, AIC did implement some changes to the program in PY7 which are described below.

Implementation Changes

The structure of the AIC C&I Program in PY7 remained generally consistent with the previous program year. The program implementer, Leidos, implemented some internal changes to refine the roles and responsibilities of their staff. A new project management organization reduced the administrative responsibilities of field staff, allowing them to focus more on customer outreach and communication. Some additional efficiencies were created across the portfolio: for example, marketing staff reported that some staff cross-cut between the commercial and residential portfolios. Despite this organizational shift, program offerings and delivery

remained largely the same as they were in PY6. As a whole, the C&I Program continued to operate smoothly and was able to effectively attract program participants and meet savings goals.

Projects in PY7 benefited from increased flexibility in timelines. Program staff cited the program's recently incorporated three-year cycle as the primary source of the improvement. By allowing participants to complete projects approved in PY7 after the end of the program year, customers received the time they needed and implementers gained the option of funding projects that may not have fit into the PY7 budget.

AIC introduced several new pilot programs across the portfolio in PY7. Specifically in regards to the Standard Program, the program introduced the midstream lighting pilot described earlier.

In PY7, AIC fully launched the new online lighting application, AMPMagic, which had been previously piloted at the end of PY5 before put on hold during PY6. The new tool connects directly to the program tracking database, Amplify, which helps standardize and automate the application process for program allies. This in turn streamlines the approval process for these projects, allowing reviewers to shift their focus towards more complex project proposals.

Marketing and Outreach

Overview of Marketing Strategy

According to our interviews with program marketing staff, AIC and Leidos maintained overall marketing objectives that were similar to past years. The PY7 Standard Program began its year by processing a number of applications that were deferred from PY6 to PY7. This early start meant that the program began achieving savings ahead of schedule, and allowed program managers to approach marketing and outreach from a less reactive standpoint than in years past. This change in timing had several benefits. First, marketing staff were able to spend more time proactively expanding program awareness among community organizations, chambers of commerce, and other groups not typically contacted in prior years. Second, with a less urgent need to recruit projects in order to reach program goals, program staff could target the recruitment approach in a way that better managed budget constraints. Specifically, staff had the flexibility to target their messaging and recruitment efforts to more cost-effective measure types including leak survey and steam trap projects.

Marketing staff identified three changes to program implementation in PY7 that helped boost program effectiveness: increased engagement with existing program allies, hosting large customer lunch-and-learn events, and expanding digital advertising. These changes are discussed below.

In terms of program allies, the program emphasized engagement with current allies over recruiting new program allies. The shift also included an increased focus on larger program allies. The program plans to continue to engage with and focus on active allies moving forward, including periodic program follow-up with allies and enhanced co-branding efforts. To support these efforts, the program launched a new trade ally portal on the AIC website. The portal is available to program allies and is a central place for the program to communicate program news and updates to all program allies. The portal is password-protected and houses training information, videos with program information, and co-branding information.

The program also added large customer lunch-and-learn events in PY7. These events were held in locations with a high concentration of large AIC customers. Organizers motivated large customer attendance by having program Energy Advisors and AIC Key Account Executives conduct targeted customer outreach prior to the events. The lunch-and-learns provided a presentation on the Business Program and attempted to match up customers with program Energy Advisors to motivate program participation. According to marketing staff, these events have been well attended and will be continued moving forward.

Lastly, the program expanded its digital advertising efforts. For example, the program added Facebook advertising, which ties into overarching corporate marketing campaigns and uses videos with testimonials from previous program participants. The program also optimized its website for mobile devices– previously, the program website was not easily navigable via smartphone.

Participant Exposure to Marketing Efforts

PY7 participants recall a variety of marketing and outreach efforts. They most frequently cite program allies (73%), bill inserts (47%), email (42%), and the AIC website (36%) as sources of information about the program, consistent with the program's marketing strategies.

More than three-quarters of program participants (76%) find the marketing materials useful[6] in providing information about the program, with 41% of participants reporting that the materials were very useful. Almost all participants who completed non-lighting projects (93%) say the marketing materials they saw were useful, and 71% of lighting project participants report the same. This indicates that the program is doing an excellent job providing customers with valuable information, especially for less common measure types and projects. Only a small portion of customers indicate any level of dissatisfaction with marketing materials.

To understand the sources from which customers draw information about energy efficiency and identify any gaps in the program's marketing strategy, we asked participants where they typically look for information about how to save energy (Table 20). The most common response is the Internet (59%), followed by AIC (35%) and contractors or vendors (14%). Participants do not typically look to major channels of information that AIC does not actively employ in marketing the program. This indicates that the program continues to have a well-developed marketing strategy that matches the needs of its participants.

Table 20. Core Program Participant Sources of Information (Multiple Responses)

Customer Information Sources	Percentage of Participants (n=135)
Internet	59%
AIC/utility	35%
Contractor or vendor	14%
Coworkers/Internal resource	1%
Other	5%
Don't know	2%

We asked participants who did not explicitly mention AIC (un-aided) whether they consider the company a resource for energy efficiency information. Once prompted, a large majority of this group (92%) note that they do consider AIC a resource. Combined with those participants who indicate (without prompting) that they look to AIC for energy efficiency information, a total of 95% of participants say they would look to AIC as a source for information about energy efficiency. This number is consistent with results from past years and indicates that AIC remains a trusted source to its customers.

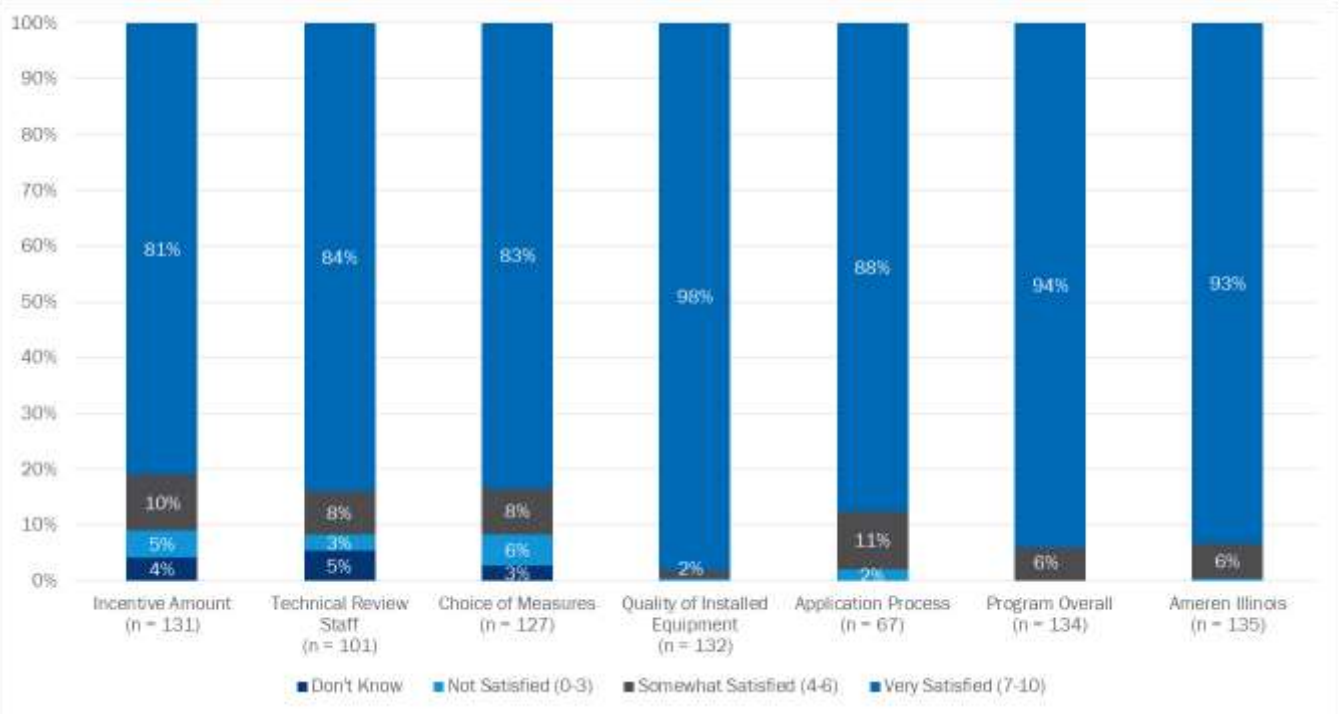
[6] Either "very useful" or "somewhat useful" on a four-point scale ranging from 1 ("very useful") to 4 ("not at all useful").

4.1.3 Participant Experience and Satisfaction

Participant Satisfaction

The vast majority of participants (94%) are satisfied[7] with the Core Program. Similarly, 93% of participants said they are satisfied with AIC. As shown in Figure 2, participants generally rate all program elements favorably. As in prior years, we note very few meaningful differences in satisfaction scores across participant size and participant project type (lighting and non-lighting). Large participants generally report slightly lower satisfaction with program elements, but overall satisfaction scores are still quite high among this group.

Figure 2. Participant Satisfaction with Standard Program Components



Note: Questions are based on a 10-point scale where 0 is "very dissatisfied" and 10 is "very satisfied."

The program's mean satisfaction rating of 8.1 for the application process indicates that participants are generally satisfied with the program's application process. The program simplified the application process in PY5, and while this satisfaction rating is significantly lower than the rating of 8.8 in PY6, the relatively high scores indicate the program has done a good job maintaining participant satisfaction with the applications.

Less than half of participants (46%) offer recommendations for program improvement. The suggestions which participants do offer are typical for C&I energy efficiency programs, including requests for higher incentives or incentives for additional measures (50%) and suggestions to streamline the application process (19%).

We also asked program participants if they planned to participate in the program again. Sixty-nine percent said they plan to participate in future years, while only 11% say they would not. Among those who do not plan

[7] A score of 7, 8, 9, or 10 on a scale of 0 to 10, where 0 means very dissatisfied and 10 means very satisfied.

to participate, the primary reasons are that participants either do not foresee a need for the incentivized equipment or have already upgraded all of their eligible equipment.

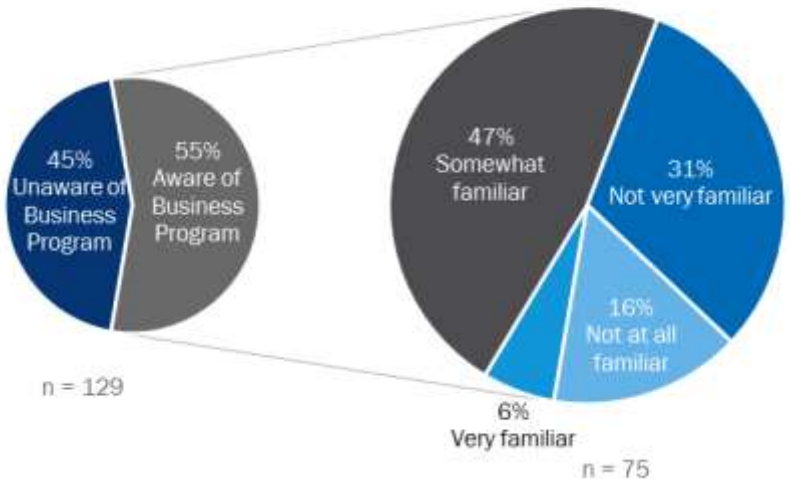
4.1.4 Non-Participant Awareness and Barriers

Awareness

We found that non-participants had moderate levels of general awareness of AIC-sponsored business energy efficiency programs. More than two-thirds (69%) of non-participants are aware that AIC offers energy efficiency programs to its business customers. Nearly half of non-participants (49%) are aware of the Business Program specifically without it being described to them, and an additional 6% report being aware of the program once it is described to them. This (55%) is a significant increase from the 41% of non-participants who reported awareness of the Business Program once it was described to them in our PY5 research. Figure 3 presents non-participant awareness of the program.

While awareness of the Business Program is moderate among non-participants, those aware of the program are not particularly familiar with the program details. Only 6% of non-participants indicate that they are very familiar with the program, while close to half (47%) of non-participants say they are not very familiar or not at all familiar with the program (Figure 3).

Figure 3. Overall Non-Participant Familiarity with Business Program



Note: Figure *n*s are unweighted. Percentages are based on weighted results.

More than a quarter (28%) of large non-participants report being very familiar with the program, significantly more than small non-participants.

Among those non-participants aware of the program, bill inserts were the most common source (39%) of program awareness. The sources of awareness cited by non-participants aligned well with the outreach strategies identified by program staff.

Table 21. Non-Participant First Source of Awareness of Business Program

Customer Information Sources	Percentage of Non-Participants[a] (n=75)
Bill insert	39%
Word of mouth	11%
Direct outreach from AIC	11%
AIC email	8%
Other	20%
Don't know	13%

[a] Totals do not sum to 100% due to rounding.

Non-participants most commonly cite direct mail (60%) and email (35%) as the best forms of outreach to inform them about AIC program offerings.

While the general awareness of AIC's business offerings has increased since PY5, there is clearly a significant opportunity to further educate and familiarize potential future participants with the Business Program even among those non-participants aware of AIC's offerings.

Barriers to Energy Efficient Actions

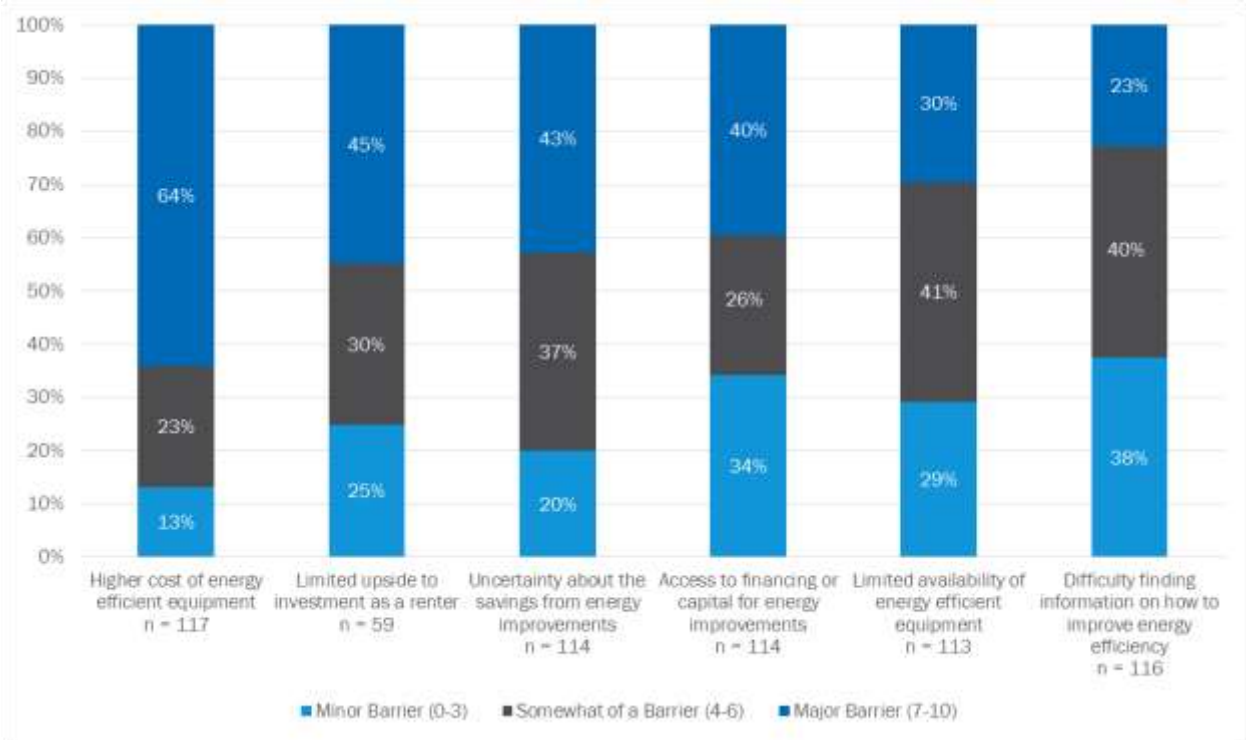
We asked non-participants to identify, unaided, the primary barriers they see to making energy efficient improvements at their facilities. Unsurprisingly, financial factors dominate. More than half of non-participants report the higher cost of energy efficient equipment as a barrier, and 12% report access to financing or capital as a barrier. Thirteen percent of non-participants say they do not see any barriers to making improvements.

Table 22. Non-Participant Barriers to Energy Efficient Improvements (Multiple Responses)

Barriers to Energy Efficiency	Percentage of Non-Participants (n = 129)
Higher cost of energy efficient equipment	51%
Access to financing or capital	12%
Other barriers	34%
Don't see any barriers	13%
Don't know	6%

We also described six common barriers to energy efficient actions and asked non-participants to rate how significant each barrier is to them. Figure 4 displays how non-participants rate each of the six common barriers we investigated. The higher cost of energy efficient equipment was the only option scored as a major barrier by more than half of non-participants. More than 40% of non-participants also cited uncertainty about the savings from energy efficient improvements and access to financing or capital as major barriers. Nearly half of non-participants who were renters (45%) also cited limited upside to investment as a renter as a major barrier. On average, non-participants who are at least somewhat familiar with the Business Program rate the higher cost of energy efficient equipment as a less of a barrier compared to those less familiar with the Business Program. This indicates that awareness of and familiarity with the Business Program can help ease some of these concerns.

Figure 4. Magnitude of Importance of Common Energy Efficiency Barriers



Facility Information

Non-participant facilities are generally several decades old. Over half (55%) of non-participant facilities are 30 or more years old, and the mean age of non-participant facilities is approximately 47 years old.

Most non-participants (71%) report being at least somewhat familiar with ways to save money by using energy more efficiently. We asked this group of non-participants to rate the energy efficiency level of their facility. Nearly all (97%) of non-participants rated their facility a four or above on a scale of zero to ten, where zero is "not at all efficient" and ten is "extremely efficient." Close to half (42%) of non-participants rated their facility a seven or better.

However, most non-participants (84%) report that their facility has never had an energy audit or consultation to assess its energy efficiency. A significantly higher percentage of large non-participant facilities (21%) have had an energy audit as compared to small non-participant facilities (12%), but the frequency is still quite low.

We asked non-participants to tell us what types of energy using equipment they have in their facility. The penetration of most equipment types does not vary substantially between large and small non-participants. However, significantly larger shares of large non-participating customers have motors/drives, electric motors on pumps and fans, compressed air equipment, and energy management systems at their facilities than small non-participants. It is not surprising that these end uses are more common among larger customers as these equipment types either tend to draw large amounts of energy or manage large energy using systems, as in the case of energy management systems.

Table 23. Non-Participant Equipment Type Penetration

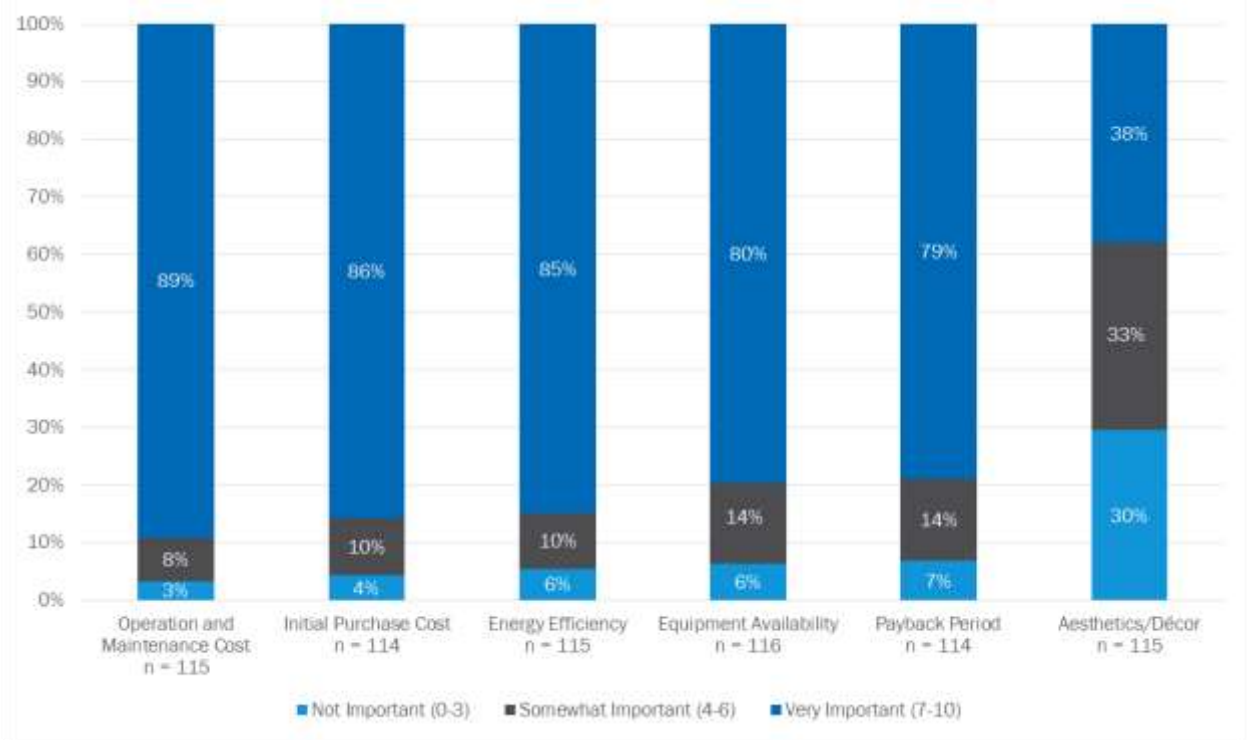
Equipment Type	Percentage of Non-Participants with Equipment Type	
	Small (n=100)	Large (n=29)
Heating Equipment	90%	86%
Water Heating Equipment	77%	79%
Cooling Equipment	76%	78%
Refrigeration Equipment	54%	52%
Compressed Air Equipment	45%	65%
Kitchen Equipment	36%	45%
Motors or Drives	36%	96%
Electric Motors on Pumps or Fans	31%	90%
Commercial or Industrial Refrigeration Equipment	12%	21%
Energy Management System	2%	15%

More than one-quarter (29%) of non-participants say they are likely[8] to replace some type of energy-using equipment in their facility in the next 12 months. Non-participants are most likely to replace lighting in their facility in the next 12 months, with 19% of non-participants reporting that they are likely to do so.

When thinking about purchasing energy using equipment, non-participants rate most factors related to cost, including energy efficiency, as very important in their decision. Figure 5 shows non-participant ratings of the importance of various factors in their decision-making when purchasing energy-using equipment.

[8] A rating of 7 or higher on a scale of 0 to 10, where 0 is "not at all likely" and 10 is "extremely likely."

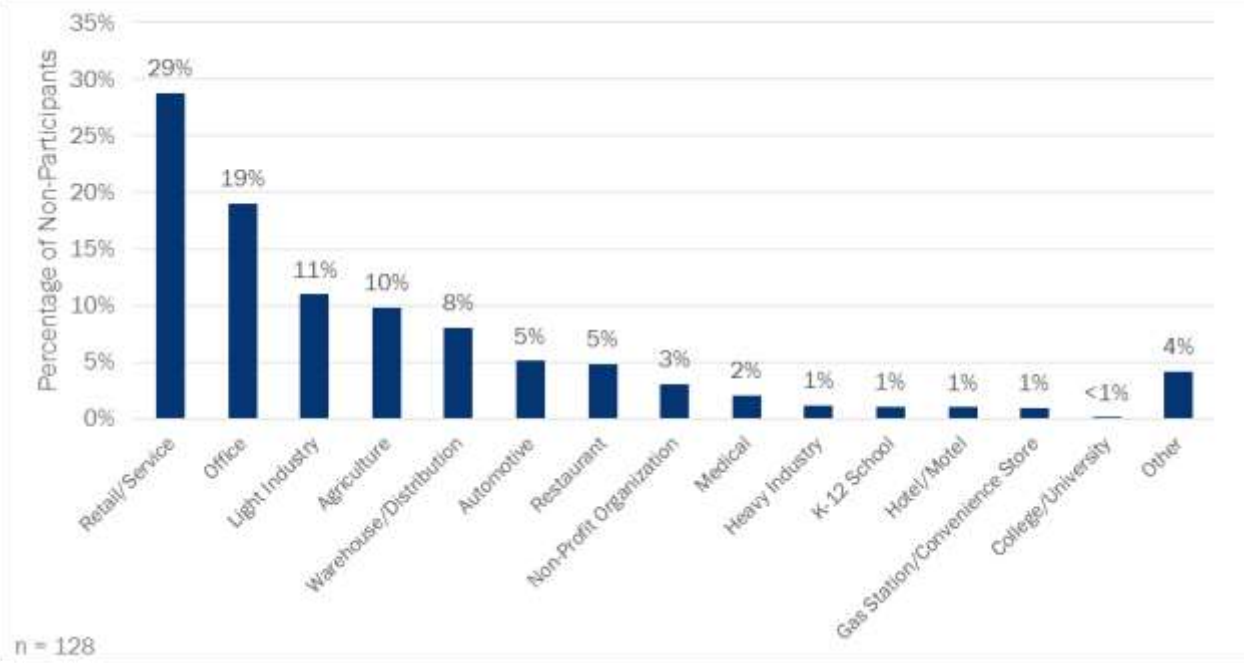
Figure 5. Importance of Specific Factors in Purchasing Energy-Using Equipment



Firmographics

By self-reported business type, non-participants are dominated by retail and office facilities, together making up nearly half of all non-participants (29% and 19%, respectively). Figure 6 shows the breakout of self-reported facility types among non-participants.

Figure 6. Non-Participant Facility Types



At a high level, these facility types are fairly comparable to facility types that participated in the program in PY7. The most notable difference between non-participant self-reported facility types and facility types participating in the program in PY7 are that offices appear to be represented in the non-participant population more than in participating facility types.

4.1.5 Lighting Distributor Trends

As part of the PY7 Standard Program evaluation, the evaluation team conducted in-depth interviews with 10 lighting distributors in AIC's service territory. These interviews provided insight into the availability of T12 linear fluorescent bulbs in the region and explored distributor familiarity with AIC's C&I energy efficiency programs, the effect of the programs on their sales and stocking practices, and trends in the market. Key findings include:

- Distributors report that T12s are now comprising a dramatically smaller share of the bulbs they sell to contractors relative to two years ago. Distributors expect this trend to continue in the next two years.
- Surveyed distributors reported that few customers are asking for T12s.
- When customers ask for T12s, all of the distributors stated that they recommend other, more efficient lighting options.
- Distributors reported that their customers are generally aware of the Business Program and related incentives.

The evaluation team presented AIC with detailed findings of this research in a standalone memo.

4.2 Impact Assessment

The following sections provide measure verification rates, in addition to gross and net impacts for PY7.

4.2.1 Gross Impacts

Our impact analysis yielded ex post gross electric and gas energy savings and peak electric demand savings. Total gross energy and demand impacts for the PY7 Standard Program are shown in Table 24.

Table 24. Standard Program Gross Impact Summary

Savings Category	Ex Ante Gross	Realization Rate	Ex Post Gross
Energy Savings (MWh)			
Core Program	78,415	100.0%	78,383
Online Store	732	100.5%	736
Instant Incentive	38	100.0%	38
Green Nozzle	14	100.0%	14
Total MWh	**79,198**	**100.0%**	**79,170**
Demand Savings (kW)			
Core Program	11,887	99.9%	11,879
Online Store	154	102.8%	159
Instant Incentive	9	100.0%	9
Green Nozzle	0	N/A	0
Total kW	**12,050**	**100.0%**	**12,047**
Gas Savings (Therms)			
Core Program	1,523,095	100.0%	1,522,965
Online Store	0	N/A	0
Instant Incentive	0	N/A	0
Green Nozzle	4,443	100.0%	4,443
Total Therms	**1,527,538**	**100.0%**	**1,527,408**

Core Standard Program

AIC customers installed nearly 3,500 individual measures through the Core Program in PY7 as part of 1,466 unique projects (Table 25). As in previous years, the majority of projects consisted of lighting installations, followed by specialty equipment and HVAC projects.

Table 25. PY7 Standard Core Program Verification Results

Measure Type	Program-Tracking Measure Count	Verified Measure Count	Verification Rate
Lighting	2,974	2,974	100%
Specialty Equipment	204	204	100%
HVAC	153	153	100%
Steam Traps	86	86	100%
Variable Frequency Drives	49	49	100%
Leak Survey and Repair	10	10	100%
Total	**3,476**	**3,476**	**100%**

Note: The number of measures consists of the sum of the number of measure types per project and does not reflect the quantity of bulbs or fixtures installed.

Our impact analysis activities for the Standard Program yielded ex post gross electric savings, gas savings, and peak demand savings that are each approximately equal to the respective ex ante estimate (Table 26).

Table 26. PY7 Standard Core Gross Impacts

Measure Type	Verified Measures	Ex Ante Gross Savings			Ex Post Gross Savings			Realization Rate		
		kW	MWh	Therm	kW	MWh	Therm	kW	MWh	Therm
Lighting	2,974	7,479	49,530	0	7,478	49,528	0	100%	100%	N/A
Specialty Equipment	204	133	1,051	4,555	127	1,048	4,555	96%	100%	100%
HVAC	153	408	1,746	57,212	410	1,744	57,080	100%	100%	100%
Steam Traps	86	0	0	1,461,328	0	0	1,461,330	N/A	N/A	100%
Variable Frequency Drives	49	3,397	22,341	0	3,394	22,316	0	100%	100%	N/A
Leak Survey and Repair	10	470	3,746	0	470	3,746	0	100%	100%	N/A
Total	**3,476**	**11,887**	**78,415**	**1,523,095**	**11,879**	**78,383**	**1,522,965**	**99.9%**	**100.0%**	**100.0%**

We describe the engineering review approach and outline the small discrepancies found for each measure type below.

The engineering review of measures examined two issues:

1) Correct implementation of the prescribed savings algorithms from the IL-TRM version 3.0.

2) Estimation of savings for measures that did not have prescribed savings algorithms.

Projects with IL-TRM prescriptive savings measures were checked against supporting documentation from the implementer outlining their application of the IL-TRM to the Business Program measures. The implementer provided supporting documentation to the evaluation team as a set of spreadsheets covering Standard Program end uses. The spreadsheets reproduced the IL-TRM algorithms and inputs used to generate per-unit savings. The first step in the review process confirmed that each IL-TRM spreadsheet completely and correctly estimated measure savings. The spreadsheets were easy to follow and only minor discrepancies were identified, as described below. The second review step confirmed the proper use of IL-TRM values in the tracking system to report ex ante savings. This check examined whether the unit savings in the tracking system

matched the spreadsheet for the measure under review, based on parameter and custom input values such as building type, fixture wattages, equipment capacities, and baseline or operating characteristics.

We made adjustments to the ex ante savings estimate if the project data or calculation approach was found to contain an error, or an unsupported assumption was judged inconsistent with standard engineering practices and judgment.

The engineering review resulted in savings adjustments for the following end-uses:

- **Lighting**
  - Six records out of 2,974 (0.2%) appear to not apply energy waste heat factor and nine records (0.3%) appear to not apply a demand waste heat factor to ex ante savings for conditioned spaces[9]. Due to the presence of cooling, waste heat factors were applied for ex post savings.
  - Two occupancy sensor records (measure code BPL72) applied an energy savings factor of 0.53 to ex ante savings, but 0.53 should not apply to BPL72 according to the implementer's updated worksheets. We revised the energy savings factor to 0.30 per the implementer's updated worksheets and the IL-TRM.

We reviewed 26 potential updates to projects based on the telephone survey to determine whether the results of the phone survey were more accurate than the information provided in the database. This included reviewing whether a participant completed a project, whether the number of fixtures changed following installation, and/or whether a lighting project was installed in a cooled or uncooled space. For example, if a participant indicated in the phone survey that they did not install the project, we reviewed the project documentation in Amplify to confirm whether the project was completed using invoices and other project files. Additionally, if there was a discrepancy with whether a space was cooled/uncooled between the telephone survey and the program database, we investigated the facilities in Google Earth to obtain additional information on the site with regard to the presence of cooling. Following a review of the 26 projects, and in light of our past experience with the quality of this implementer's database, we determined that the program-tracking database was more accurate than the survey data in these instances, and thus did not make any additional adjustments to the database based on the telephone survey. Table 27 summarizes the findings of the adjusted projects described above, including the five projects where we adjusted waste heat factors and two occupancy sensor records.

[9] While we cannot confirm exactly what assumptions were used to determine ex ante savings, our ex post savings for these six records are all off by the appropriate waste heat factor, leading us to believe that is causing the difference.

Table 27. Lighting Gross Impacts Adjustments

Project Number	Impact on Savings (Increase v. Decrease)	kWh Change	Explanation
700128	↑	275	Added energy waste heat factor to account for cooled space.
700203	↑	292	Added energy waste heat factor to account for cooled space.
700201	↑	5,194	Added energy waste heat factor to account for cooled space.
700252	↑	421	Added energy waste heat factor to account for cooled space.
700253	↑	421	Added energy waste heat factor to account for cooled space.
700321	↓	-7,865	Adjusted energy savings factor down.
701338	↓	-936	Adjusted energy savings factor down.
Total	↓	**-2,198**	

- **Specialty Equipment**
  - Specialty equipment includes refrigeration and food service equipment. For the reach-in cooler/freezer measure, ex ante savings use the average savings from the TRM between freezers/coolers. Ex post savings apply the actual savings based on whether the equipment is a cooler or freezer. This discrepancy caused the difference in demand (kW) realization rate for specialty equipment and also minor differences in energy (kWh) that are too small to impact the overall energy realization rate.
- **HVAC**
  - For BPH7 (gas furnace with air conditioning) we found slight discrepancies with six out of 31 records for demand savings from the efficient fan. In these cases, the ex ante calculations estimated coincidence factor and hours of use using the Miscellaneous space type rather than the actual space type from the database. For other records of similar space types, ex ante calculations correctly apply the coincidence factor and hours of use, so it is not clear why these six records used the Miscellaneous space type. For therm savings, we found slight discrepancies with nine out of 31 records, including eight where the ex ante calculations used an outdated equivalent full load hour (EFLH) value rather than the updated values[10] and one record that was using the incorrect city (Springfield rather than Belleville) to look up the EFLH. These discrepancies had little influence on the overall realization rates, as they were relatively minor.

Online Store

We verified program participation as described in the Section 3.2.1 by examining the online store product data for product eligibility and time of sale or disbursement, with 100% verification (Table 28).

[10] The IL TRM V3 provides updated EFLH values compared to IL TRM V2.

Table 28. Online Store Verification Results

Measure Type	Program Tracking Measures	Verified Measures	Verification Rate
CFL Spiral	2,014	2,014	100%
LED Lights	998	998	100%
LED Exit Sign	308	308	100%
Motion Sensor	171	171	100%
CFL Floodlight	159	159	100%
CFL Globe	108	108	100%
T8 Ballast	95	95	100%
Power Strip	15	15	100%
T8 Lamps	15	15	100%
Vending Control	1	1	100%
Grand Total	**3,884**	**3,884**	**100%**

We calculated ex post gross savings nearly identical to ex ante gross savings for the online store purchases, resulting in realization rates of 100% or higher. Table 29 summarizes the online store gross impacts.

Table 29. Online Store Gross Impacts

Measure Type	Verified Measures	Ex Ante Gross		Ex Post Gross		Realization Rate	
		kW	MWh	kW	MWh	kW	MWh
Online Store Purchases	3,884	154	732	159	736	102.8%	100.5%

Ex post demand (kW) savings from the online store are slightly higher than ex ante savings because ex ante savings did not apply a coincidence factor of 1.0 for exit signs, even though exit signs operate full hours throughout the year. Ex ante calculations applied coincidence factors lower than 1.0, consistent with other lighting measures based on the building type. Ex post applied a coincidence factor of 1.0 for these measures, resulting in the slight increase relative to ex ante totals. Ex post energy (MWh) savings are slightly higher than ex ante estimates because of differences in baseline wattages used in the two estimates for 22 out of the 408 records (5%). Ex post analysis used the implementer worksheets to look up the baseline wattages, but for these 22 projects, baseline wattage assumptions in the worksheets differed slightly from the baseline wattage assumptions recorded in the ex ante calculations.

Instant Incentive Measures

The evaluation team verified the number of measures and ex ante savings for the Instant Incentive program through a review of a spreadsheet supplied by the implementer. We confirmed that the implementer used the correct TRM methodology so we did not adjust the ex ante savings. As such, ex ante and ex post impacts are identical.

Table 30. Instant Incentive Gross Impacts

Measure Type	Verified Measures	Ex Ante Gross		Ex Post Gross		Realization Rate	
		kW	MWh	kW	MWh	kW	MWh
Instant Incentive	8	9	38	9	38	100.0%	100.0%

Green Nozzle

The evaluation team verified the number of measures and ex ante savings for the Green Nozzle initiative through a review of a spreadsheet supplied by the implementer. We confirmed that the implementer used the correct TRM algorithms to estimate savings. Therefore, we did not adjust the number of installed measures or ex ante savings for the initiative. As such, ex ante and ex post impacts are identical (Table 31).

Table 31. Green Nozzle Gross Impacts

Measure Type	Verified Measures	Ex Ante Gross			Ex Post Gross			Realization Rate		
		kW	MWh	Therm	kW	MWh	Therm	kW	MWh	Therm
Green Nozzle	15	0	14	4,443	0	14	4,443	N/A	100%	100%

4.2.2 Net Impacts

We used NTGRs approved by the Illinois SAG to determine net impacts for the PY7 Standard Program. These NTGRs are presented in detail in Table 15. Using these NTGRs, we calculated net impacts for the PY7 Standard Core Program measures (Table 32). Total net energy and demand impacts for the PY7 Standard Program are 62,828 MWh, 9.5 MW, and 1,368,915 therms.

Table 32. PY7 Standard Core Program Gross and Net Impacts

Savings Category	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)			
Core Program	78,383	0.79	62,167
Online Store	736	0.83	611
Instant Incentive	38	1.00	38
Green Nozzle	14	0.92	13
Total MWh	**79,170**	**0.79**	**62,828**
Demand Savings (kW)			
Core Program	11,879	0.79	9,350
Online Store	159	0.83	132
Instant Incentive	9	1.00	9
Green Nozzle	0	N/A	N/A
Total kW	**12,047**	**0.79**	**9,490**
Gas Savings (Therms)			
Core Program	1,522,965	0.90	1,364,961
Online Store	0	N/A	N/A
Instant Incentive	0	N/A	N/A
Green Nozzle	4,443	0.89	3,954
Total Therms	**1,527,408**	**0.90**	**1,368,915**

4.3 Conclusions and Recommendations

AIC successfully implemented the Standard Program in PY7 and met both its electric and gas savings goals. The program saw increased participation in PY7 from the previous year, measured by both projects and total savings. Participation in the program followed similar patterns as in past years; lighting projects represented

around three-quarters of all projects completed through the program, and the Core Program represented the vast majority of all Standard Program savings.

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

- Our impact evaluation found a gross realization rate of nearly 100% for the program, indicating that the program is tracking its savings and projects carefully.
- Program stakeholders with whom we spoke as part of this evaluation (staff and participants) reported no major barriers to participation or problems with program processes.
  - AIC continued to receive overwhelmingly positive customer feedback on the program. Since its inception, the program has seen high levels of participant satisfaction in nearly all program areas—from program paperwork, to processing incentives, to addressing customer questions and concerns. PY7 continued this trend, with 94% of participants reporting overall satisfaction[11] with the program and all defined program areas examined in our evaluation receiving high marks from participants. Consistently performing at this level has likely helped ensure that participants continue to return to the program year after year.
- Program non-participants with whom we spoke generally cite financial factors, including upfront cost and access to financing, as the primary barriers preventing them from taking energy efficient actions.

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

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

[11] A score of 7, 8, 9, or 10 on a scale of 0 to 10, where 0 means "not at all satisfied" and 10 "means very satisfied".

Appendix A. Data Collection Instruments

PY7 C&I Standard Participant Survey FI

AIC PY7 Non-Participant Sur

Appendix B. Survey Response Rate Methodology

Given that survey response rates are calculated and presented for the Core Program participant survey and Business Program non-participant survey, we present here a definition and explanation of how the rate is calculated. 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).[12] For various reasons, we were unable to determine the eligibility of all sample units through the survey process and so 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 shown in the Survey Disposition tables in the Core Program Participant Telephone Survey and Non-Participant Telephone Survey sections of the report.

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

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

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:

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

[12] *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, AAPOR, 2011. http://www.aapor.org/AM/Template.cfm?Section=Standard_Definitions2&Template=/CM/ContentDisplay.cfm&ContentID=3156.

Appendix C. NTGR Results

In PY7, the evaluation team conducted research with Core Program participants and Business Program non-participants to update the Standard Program's net-to-gross-ratios (NTGRs) and the Business Program's portfolio-wide non-participant spillover rate for application in PY9. Consistent with prior program years, the NTGRs developed in PY7 are based on self-reported information from the participant and non-participant CATI surveys. The participant survey was used to develop estimates of free-ridership (FR) and participant spillover (PSO), while the non-participant survey was used to develop an estimate of non-participant spillover (NPSO).

Key Findings

Table 33 and Table 34 present the results of our PY7 NTG analysis for application in PY9. For electric measures, we found free-ridership rates of 22.3% for lighting measures and 20.1% for non-lighting measures. For gas measures, we found a free-ridership rate of 39.6%. Our spillover analysis found a participant spillover rate of 0.1% for electric measures, and of 0% for gas measures. Our non-participant spillover analysis found a NPSO rate of 0% for both electric and gas programs.

Table 33. Updated Standard Electric NTGRs for PY9

End-Use	Free-Ridership	Spillover	NTGR (1-FR+SO)
Lighting	0.223	0.001	0.78
Non-Lighting	0.201	0.001	0.80
HVAC	*0.444*	*0.001*	*0.56*
Leak Survey	*0.299*	*0.001*	*0.70*
Specialty	*0.152*	*0.001*	*0.85*
VFD	*0.168*	*0.001*	*0.83*

Table 34. Updated Standard Gas NTGRs for PY9

End-Use	Free-Ridership	Spillover	NTGR (1-FR+SO)
Non-Lighting	0.396	0.000	0.60
HVAC	*0.506*	*0.000*	*0.49*
Specialty	*0.325*	*0.000*	*0.68*
Steam Trap	*0.392*	*0.000*	*0.61*

NTGR Background

Net impact evaluation is generally described in terms of determining program attribution. Program attribution accounts for the portion of gross energy savings associated with a program-supported measure or behavior change that would not have been realized in the absence of the program. The program-induced savings, indicated as a net-to-gross ratio (NTGR), is made up of free-ridership (FR) and spillover (SO) and is calculated as (1 – FR + SO). Free-ridership is the portion of the program-achieved verified gross savings that would have been realized absent the program and its interventions. Spillover is generally classified into participant and non-participant spillover. Participant spillover occurs when participants take additional energy-saving actions that are influenced by the program interventions but did not receive program support. Non-participant spillover is the reduction in energy consumption and/or demand by customers who did not participate in the program were influenced by it.

The formula to calculate the NTGR is:

$$NTGR = 1 - FR + PSO + NPSO$$

The Illinois Evaluation Teams are currently working with the Illinois Commerce Commission (ICC) and the Illinois Stakeholder Advisory Group (SAG) to create a standard Illinois Statewide Net-to-Gross approach for use in Illinois energy-efficiency evaluation, measurement, and verification work. Per the draft NTG Methods attachment to the Illinois TRM,[13] all NTG data collection and analysis activities for program types covered by the attachment that start after June 1, 2016 will conform to the statewide NTG methods. While this evaluation is not required to conform to these methods, the evaluation team implemented them, where possible, as discussed in the sections below. This evaluation also conforms with the current requirements specified in the version of the Illinois TRM currently in effect.

Free-Ridership

Methodology

Free riders are program participants who would have implemented the incented energy-efficient measure(s) even without the program. Free-ridership estimates are based on a series of questions that explore the influence of the program in making the energy-efficient installations as well as likely actions had the program not been available.

For all Standard Program projects included in the participant survey, we implemented five specifications of the free-ridership algorithm.[14] Each specification of the algorithm consists of three scores: 1) influence of program components score, 2) overall program influence score, and 3) no-program score (counterfactual), as well as a timing adjustment. Each sub-score serves as a separate estimator of free-ridership and can take on a value of 0 to 1, where a higher score means a lower level of free-ridership. The overall free-ridership score for a project is the average of the three scores, combined with a timing adjustment. Depending on the specification, the timing adjustment is applied to either the no-program score or the preliminary overall FR score (average of the three sub-scores). The free-ridership score for each project thus ranges from 0 (no free ridership) to 1 (100% free ridership).

The three scores included in the algorithm, their variations, and the timing adjustment are described below.

1. **Influence of Program Components (PC)**. This score is based on a series of eleven questions that ask respondents to rate the importance of program and non-program components in their decision to install the energy efficient equipment, using a scale of 0 to 10 (where 0 is "Not at all important" and 10 is "Very important"). Program components considered (if applicable) include the incentive amount, recommendation from program staff, information from program marketing materials, and recommendation from a utility account manager. Non-program components considered (if applicable) include recommendation from a vendor, previous experience with equipment, recommendation from a design or consulting engineer, business standard practice, corporate policy, payback period, and other factors.

[13] Illinois Statewide Technical Reference Manual for Energy Efficiency: Attachment A – Illinois Statewide Net-to-Gross Methodologies DRAFT. October 2, 2015.

[14] In this appendix, we present results from four newly developed algorithms as well as the algorithm used in the previous evaluations of this program, select one algorithm as our choice to calculate program free-ridership, and justify our choice of algorithm.

We estimated this free-ridership score in two different ways. Below, we refer to the two approaches as the "original" approach (as used in previous evaluations of this program) and the "alternate" approach.

The original approach is based on ratings for program factors only. The free-ridership score is calculated as:

$$\text{Program Components FR Score}_{\text{Original}} = 1 - (\text{Maximum Program Factor Rating} / 10)$$

Greater importance of the program components means lower level of free ridership. In this approach, if a respondent rated the program rebate 10 out of 10, the recommendation of program staff 8 out of 10, and the information from program materials 8 out of 10, the final Program Components free-ridership score would be a 0.

The alternate approach is based on ratings for both program and non-program factors. The free-ridership score is calculated as:

$$\text{Program Components FR Score}_{\text{Alternate}} = 1 - (\text{Maximum Program Factor Rating} / (\text{Maximum Program Factor Rating} + \text{Maximum Non-Program Factor Rating}))$$

Greater importance of the program components relative to the importance of non-program components means lower level of free ridership. In this approach, if a respondent rated both the program rebate and business standard practice a 10 out of 10, the final Program Components free-ridership score would be a 0.5.

2. **Program Influence (PI)**. This score is based on a survey question asking the respondent to rate the importance of the program compared to the importance of other factors in their decision to implement the energy-efficient equipment. To do so, respondents were asked to divide 100 points between the program and other, non-program factors. This score is estimated as:

$$\text{Program Influence FR Score} = 1 - (\text{Points Given to Program} / 100)$$

More points allocated to the program means lower level of free ridership. For example, if a respondent gave the program 70 points out of 100, the Program Influence free-ridership score would be 0.30.

In some specifications of the algorithm, this score also incorporates a second survey question, asking if respondents had learned about the program before or after they decided to implement the energy-efficient equipment rather than standard-efficiency equipment. If respondents learned about the program after deciding to install energy-efficient equipment, the points allocated to the program are halved, before going into the equation, as follows:

$$\text{Program Influence FR Score}_{\text{Adjusted}} = 1 - ((\text{Points Given to Program}/2) / 100)$$

For example, using the same scenario as above, if the respondent learned about the program *before* they decided to implement the energy-efficient equipment, their score would remain a 0.30. However, if they learned about the program *after* they decided to implement the energy-efficient equipment, the points score they gave would be divided in half, and the final score would equal 0.65. It should be noted that this adjustment has been used in past FR analyses for this program, but was removed from all versions of the free-ridership algorithm under consideration for future program years.

3. **No-Program Score (NP).** This score is based on the likelihood that the exact same energy efficient equipment would have been installed without the program, using scale of 0 to 10 (where 0 is "Not at all likely" and 10 is "Very likely") and is calculated as follows:

No-Program Score = Likelihood to Install Same Equipment / 10

A greater likelihood of participating without the program means higher level of free ridership. For example, if the participant provides a likelihood rating of 7 to install the same equipment in the absence of the program, their No-Program free-ridership score would be a 0.70.

In some specifications of the algorithm, this score also incorporates a timing adjustment (discussed next) as follows:

$$\text{No-Program Score}_{\text{Adjusted}} = (\text{Likelihood to Install Same Equipment} / 10) * \text{Timing Adjustment}$$

4. **Program Timing Adjustment.** The program timing adjustment is based on two questions: 1) if the installation would have been done at the same time without the program; and 2) if the installation would have been done later, how much later. Later implementation without the program means lower level of free ridership. This adjustment is calculated on a 0 to 1 scale. A timing adjustment of 1 means that there is no evidence the program changed the timeframe in which the project would have been implemented, while a lower value of the timing adjustment means that the program caused the project to be implemented sooner. The timing adjustment provides the program with some credit for accelerating the project by reducing the level of free-ridership. Table 35 provides detail on how participant responses correspond to various timing adjustments.

Table 35. Timing Adjustments

Participant Survey Response	Timing Adjustment
In absence of program, would have completed project…	
within 6 months	1.0
seven months to one year later	0.93
more than one year up to two years	0.71
more than two years up to three years	0.43
more than three years up to four years	0.14
more than four years later	0.14

The timing adjustment is applied in two different ways depending on the algorithm specification. 1) The adjustment is multiplied by the No-Program free-ridership score (as shown above). 2) The adjustment is applied to the average of the program components, program influence, and no-program scores.

This evaluation implemented and analyzed the following five specifications of the free-ridership algorithm.

- **Past Approach:** (Original Program Components Score + Adjusted Program Influence Score + Adjusted No-Program Score) / 3
- **New Approach 1a:** (Original Program Components Score + Program Influence Score + Adjusted No-Program Score) / 3
- **New Approach 1b:** (Alternate Program Components Score + Program Influence Score + Adjusted No-Program Score) / 3
- **New Approach 2a:** (Original Program Components Score + Program Influence Score + No-Program Score) / 3 * Timing Adjustment

- **New Approach 2b:** (Alternate Program Components Score + Program Influence Score + No-Program Score) / 3 * Timing Adjustment

In each specification, one of the two variants of the Program Components Score, the Program Influence Score, and No-Program score are averaged. Under the Previous Approach (i.e., the free-ridership algorithm used in previous program year evaluations of this program) and New Approaches 1a and 1b, the Adjusted No-Program Score is used, i.e., the timing adjustment is applied to the No-Program Score only. Under New Approaches 2a and 2b, the timing adjustment is applied to the average of the three scores.

Table 36 below summarizes the differences between the five free-ridership specifications.

Table 36. Free-Ridership Algorithm Specifications

Free-Ridership Algorithm Specification	Original Program Components Score	Alternate Program Components Score	Program Influence Score	Adjusted Program Influence Score	No-Program Score	Adjusted No-Program Score	Overall Timing Adjustment
Past Approach	✓			✓		✓	
New Approach 1a	✓		✓			✓	
New Approach 1b		✓	✓			✓	
New Approach 2a	✓		✓		✓		✓
New Approach 2b		✓	✓		✓		✓

We used Cronbach's alpha as a tool to help us evaluate the different algorithm specifications.[15] As each of the three scores incorporated into the final free-ridership estimate serves as a separate estimate of free-ridership, we used Cronbach's alpha to examine the internal consistency of the three scores for each specification, working from the basis that a higher degree of internal consistency is desirable for the algorithm. We also calculated confidence bounds around each estimate of free-ridership and compared free-ridership results across algorithms.

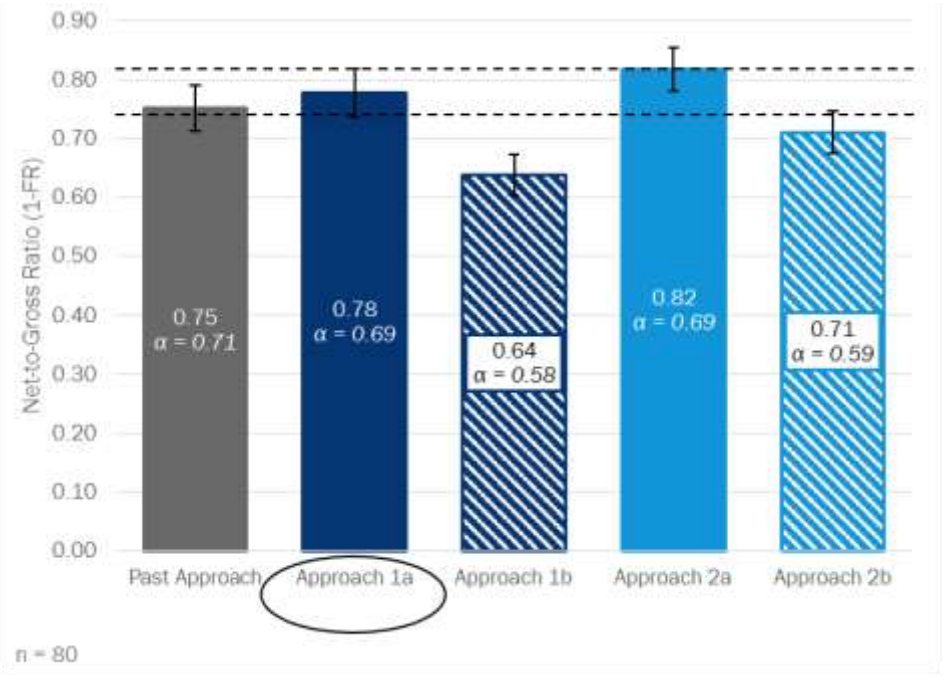
As described in Section 3.1.3, we used a stratified sampling approach in order to maximize the precision of our estimates, given the available sample size. To produce final weighted free-ridership estimates, we developed stratum-level free-ridership values by weighting the responses from each completed interview by the ex post gross savings of the associated project. We then combined the stratum-level free-ridership values by weighting each by the ex post gross savings represented by that stratum.

[15] Cronbach's alpha is a test that examines the consistency of tests that measure the same construct.

Results

Figure 7, Figure 8, and Figure 9 present our estimates of NTGR without SO included (i.e., calculated as 1-FR) for each of the five specifications of the FR algorithm discussed above. The figures also show the associated error bounds[16] and Cronbach's alphas. Separate NTGR and Cronbach's alpha estimates are presented for lighting, electric non-lighting, and gas non-lighting.[17] A higher Cronbach's alpha means an increased internal consistency between the three scores developed. As discussed below, we choose Approach 1a as our specification of choice for this evaluation, and display its error bounds in the below figures.

Figure 7. Lighting NTGR (1-FR), Error Bounds, and Cronbach's Alphas by Approach



[16] It should be noted that for non-lighting end-uses and the largest lighting stratum we examined, we conducted census attempts, and therefore, as conventionally accepted, there is no associated sampling error around our NTGR estimate. However, for purposes of comparative analysis, the evaluation team calculated error bounds around our estimates as if a sampling approach had been used. All error bounds presented are at 90% confidence.

[17] It should be noted that the sample sizes ("n") displayed in the figures represent the number of projects incorporated into our net-to-gross analysis, rather than the sample size for the associated Cronbach's alpha. The estimated Cronbach's alpha is based on the number of unique survey respondents (n = 70 for lighting and n = 65 for non-lighting). We report a pooled Cronbach's alpha for the non-lighting electric and gas NTGRs, as the achieved sample sizes are not sufficient to develop separate estimates for non-lighting electric and gas respondents.

Figure 8. Non-Lighting Electric NTGR (1-FR), Error Bounds, and Cronbach's Alphas by Approach

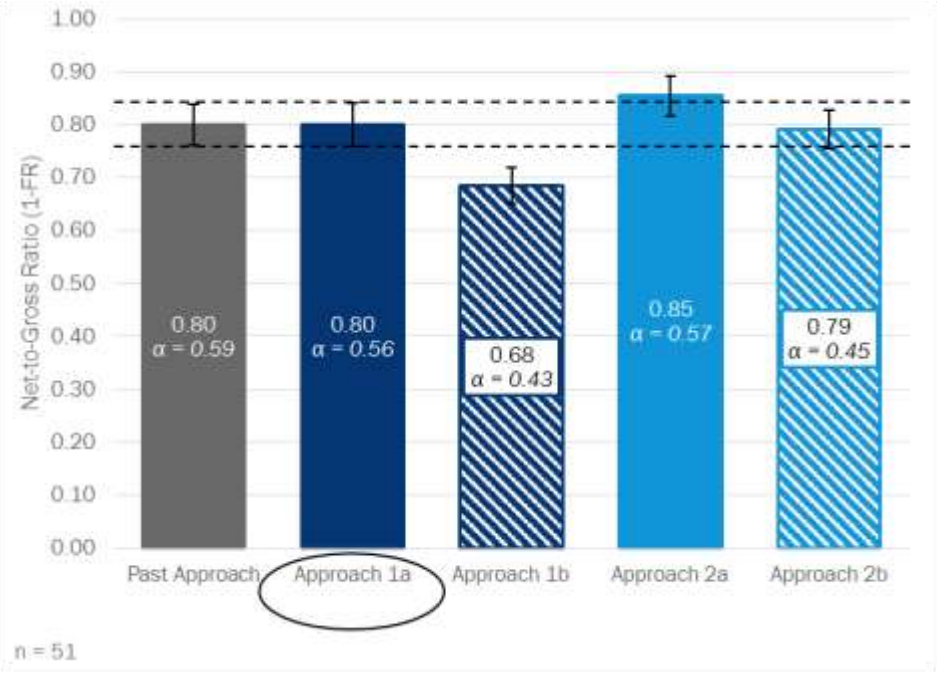
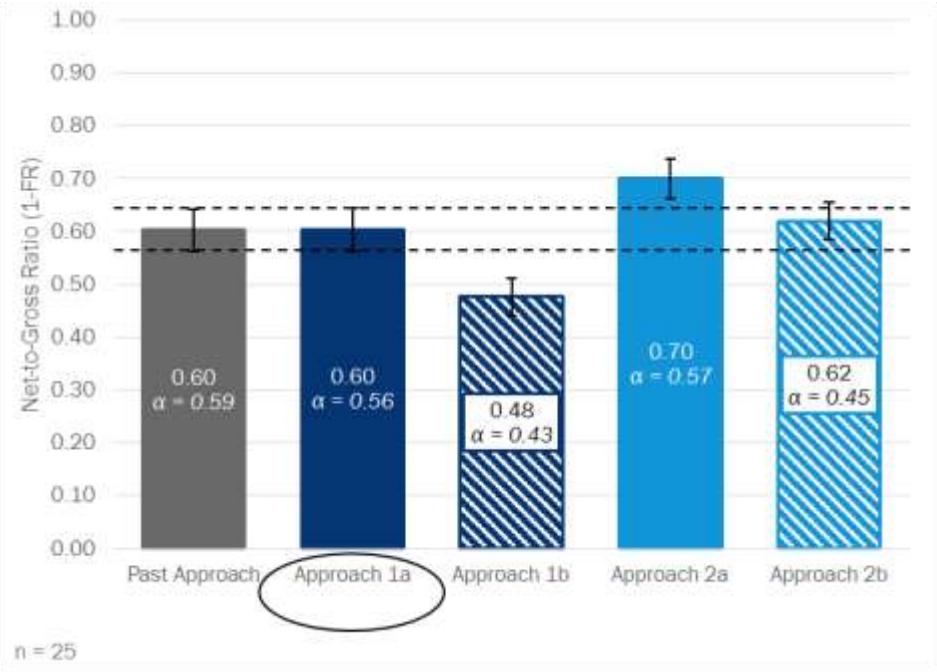


Figure 9. Non-Lighting Gas NTGR (1-FR), Error Bounds, and Cronbach's Alphas by Approach



The figures show that the free-ridership estimates from the multiple algorithm specifications often fall within each other's confidence bounds. The exception is Approach 1b, using the Alternate Program Components Score – its NTGR generally does not fall within the confidence bounds of the other four approaches.

A general rule of thumb is that a Cronbach's alpha of 0.7 or higher indicates an acceptable level of internal consistency. As can be seen, only one of the five specifications of the algorithm meets this threshold, and only for lighting projects. However, two other specifications (Approach 1a and Approach 2a, both using the Original Program Components Score) are close to this threshold. When we examine the scores inside each algorithm specification, we find that the Alternate Program Components Score tends to approach 0.5, regardless of the final free-ridership score, which causes disagreement with the other scores when free-ridership diverges from 0.5.

The evaluation team examined these results and chose Approach 1a (with the Original Program Components Score; circled in the above figures) as the preferred free-ridership approach for this evaluation.[18] We base this decision on (1) the relatively high Cronbach's alpha for this specification and (2) its general similarity to the algorithm used in prior years, which we considered desirable for this evaluation, given that a preferred approach has not been identified by the NTG workgroup. It should be noted that another specification, using a different question to develop a timing adjustment, is under consideration in the current TRM appendix on NTG methods. Due to the timing of this evaluation, this question was not included in the PY7 Standard Program participant survey, and this specification could not be tested. Future NTG analyses will include examination of these additional specifications (if they are still part of the TRM at that time).

Participant Spillover

Methodology

Participant spillover refers to the installation of energy efficient measures by program participants that were influenced by the program but did not receive an incentive. An example of participant spillover is a customer who installed incented equipment in one facility and, as a result of the positive experience, installs additional equipment at another facility but does not request an incentive (outside spillover). In addition, the participant may install additional equipment, without an incentive, at the same facility because of the program (inside spillover).

We examined both inside and outside spillover in projects from lighting and non-lighting end-uses using participant responses to the phone survey and callbacks, as necessary. We conducted an engineering analysis of participant responses to determine the savings associated with measures identified as spillover.

After calculating the spillover savings present in our sample, we use **Error! Reference source not found.** to evelop the program participant spillover rate.

[18] We did not consider the past approach as an option due to its inclusion of an adjustment to the program influence score that has been removed from all specifications of the algorithm under consideration in future years.

Equation 1. Participant Spillover Rate

$$Participant\ Spillover\ Rate = \frac{Total\ Spillover_{Participant\ Sample}}{Total\ Ex\ Post\ Gross\ Program\ Savings_{Participant\ Sample}}$$

Results

We examined both inside and outside participant spillover in projects from lighting and non-lighting end-uses using participant responses to the phone survey. Based on this data, electric spillover was found for two interviewed Standard participants in the AIC service territory.[19] Based on our engineering analysis of the spillover projects completed by these two participants, we found total spillover savings of 11,693 kWh in our sample. These savings are presented in Table 37.

Table 37. Standard Program Participant Spillover Measures and Weighted Savings

Spillover Measure	Total kW	Total kWh	Total Therms
LED lamps	0.911	3,901	0
LED lamps	1.117	7,791	0
Total	**2.028**	**11,693**	**0**

The estimated total spillover for the two participants was 11,693 kWh, while total program gross savings of the overall participant sample equaled 15,119,809 kWh. Our estimated spillover rate is therefore 0.077%, as shown in Equation 2.

Equation 2. PY7 Participant Spillover Rate

$$Participant\ Spillover\ \% = \frac{Total\ participant\ sample\ spillover\ (MWh)}{Total\ participant\ sample\ savings\ (MWh)} = \frac{11{,}693\ kWh}{15{,}119{,}809\ kWh} = 0.077\%$$

Rounded to the third decimal, the level at which we report NTG results, this rate of spillover is 0.1%.

Non-Participant Spillover

Methodology

Non-participant spillover refers to the installation of energy efficient measures by program non-participants that were influenced by the program but did not receive an incentive. An example of non-participant spillover is a customer who installed equipment with the intention of submitting an application for a program incentive and then neglected to submit the paperwork.

To calculate non-participant spillover as a rate, we first identify cases of non-participant spillover using non-participant phone survey responses and callbacks, as necessary. If necessary, we then conduct an engineering analysis of survey responses to determine the savings associated with measures identified as spillover. Finally, we extrapolate these savings to the non-participant population using expansion weights and divide the total population-level spillover savings by the PY7 ex post gross savings of the AIC Business Program. This approach

[19] No gas spillover was found.

allows us to express non-participant spillover as a factor of ex post gross program savings. Equation 3 presents the equation used to calculate the non-participant spillover rate.

Equation 3. Non-Participant Spillover Rate

$$Non\text{-}Participant\ Spillover\ \% = \frac{Total\ Spillover_{Non-Participant\ Population}}{Total\ Ex\ Post\ Gross\ Savings_{Business\ Program}}$$

Results

We examined non-participant spillover using responses to the non-participant telephone survey, and found that none of the interviewed customers took unincented energy efficient actions and attributed them to the Ameren Illinois Business Program. As a result, our non-participant spillover rate is 0%.

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