

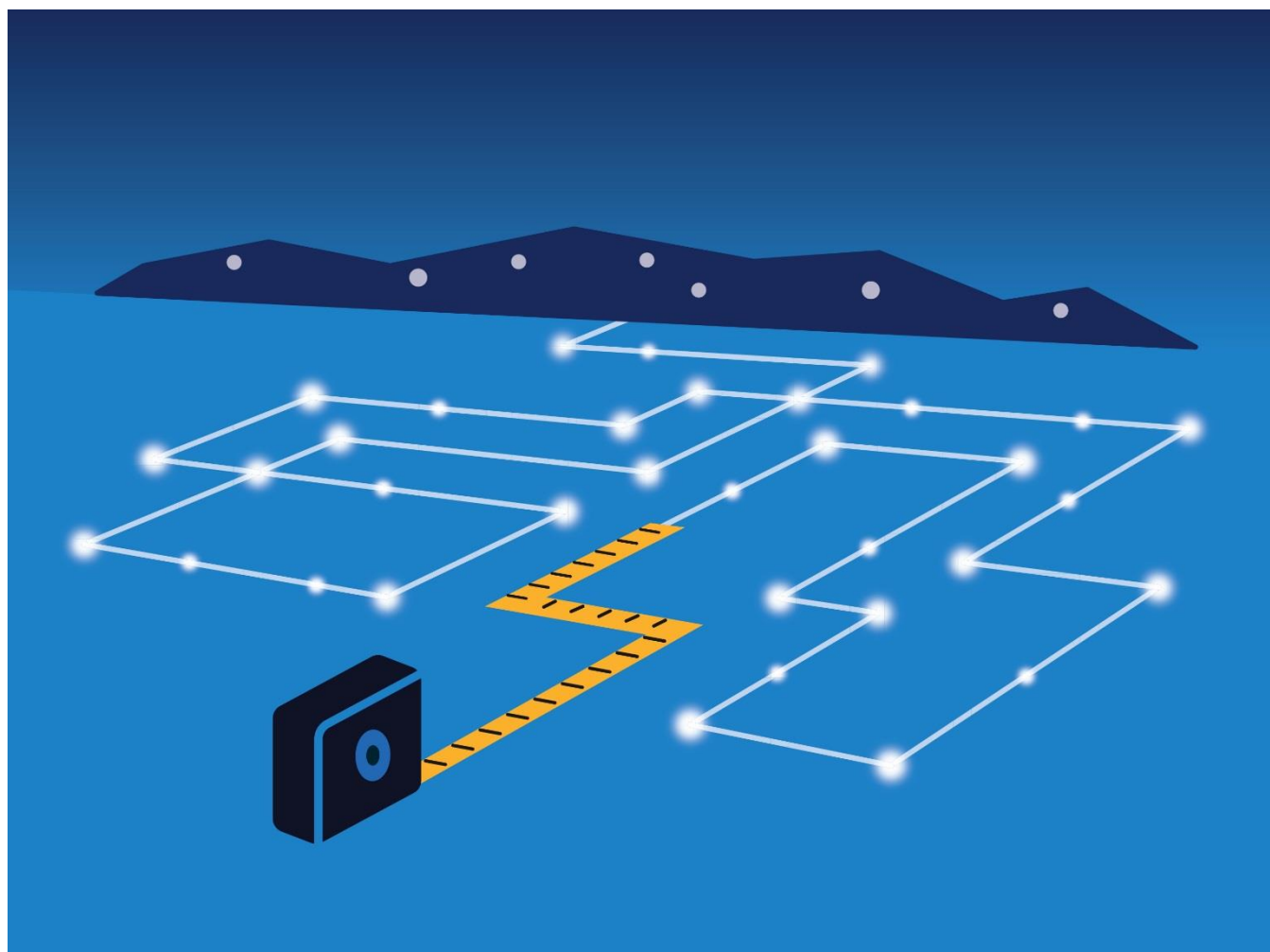


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# Impact and Process Evaluation of 2015 (PY8) Ameren Illinois Company Commercial & Industrial Custom Efficiency Program

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CADMUS

NAVIGANT



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# 1. Executive Summary

This report presents results from the evaluation of the eighth program year (PY8) of the Ameren Illinois Company (AIC) Commercial and Industrial (C&I) Custom Program for electric and gas energy efficiency. In PY8 (June 1, 2015–May 31, 2016), AIC expected the Custom Program to account for 45% of the overall portfolio electric savings and 13% of portfolio therm savings.<sup>1</sup> Savings from the Custom Program come from the core Custom Program, the Competitive Large Incentive Project (CLIP) offering, and New Construction Lighting.<sup>2</sup> The Custom Program also provides several special program offerings (Staffing Grants, Feasibility Studies, Strategic Energy Management, and the Metering and Monitoring Pilot) but the program does not claim direct savings for these offerings.

To support the process evaluation, we interviewed Staffing Grant, Competitive Large Incentive Project (CLIP) incentive recipients and participants in the Metering & Monitoring Pilot, as well as Energy Advisors<sup>3</sup>, program allies, and program staff. We also reviewed program implementation and marketing materials. Impact evaluation research efforts included on-site visits to verify custom equipment performance and interviews with recipients of CLIP incentives and Staffing Grants. Additionally, the evaluation team conducted computer-aided telephone interviews (CATI) with PY8 participants of the Custom Program to support both the impact and process analyses. Below, we present the key findings from the PY8 evaluation.

## 1.1 Impact Results

Overall, the Custom Program performed well in PY8. As shown in Table 1 below, the program achieved 109,884 MWh in ex post gross electric savings and 948,719 therms in ex post gross gas savings.<sup>4</sup> The program achieved realization rates of close to 100% in PY8, which is an improvement from PY7.

Table 1 also provides the PY8 Custom Program ex post net impacts. As outlined in the evaluation plan, the team estimated net savings by applying Illinois Stakeholder Advisory Group (SAG)-approved net-to-gross ratios (NTGRs) to ex post gross savings for all of the program's components, except those performed by CLIP and Staffing Grant participants, for which we developed project-specific NTGRs. The Custom Program achieved 89,456 MWh in net electric savings and 807,973 therms in net gas savings in PY8. This level of savings enabled the program to exceed both its PY8 electric and gas goals.<sup>5</sup>

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<sup>1</sup> Based on the PY8 Implementation Plan.

<sup>2</sup> While AIC processes small-scale new construction projects through the Standard Program, lighting and large-scale HVAC projects are processed through the Electric Custom Program. New construction lighting projects falling under the New Construction Lighting offering and large-scale HVAC projects in new construction are included in the Custom incentive offering.

<sup>3</sup> The AIC Business Program has seven regional Energy Advisors who market and support energy efficiency projects to AIC commercial and industrial customers. The Energy Advisors help customers identify and address opportunities for energy efficiency through participation in the Standard, Custom, and Retro-Commissioning programs.

<sup>4</sup> “Ex post” refers to the estimated impact found by the evaluation team.

<sup>5</sup> Note that while AIC sets savings targets for each program year, programs ultimately aim to achieve a single goal for the 3-year Plan 3 period.

Table 1. Custom Program Impact Summary

Savings	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR <sup>a</sup>	Ex Post Net
<b>Energy Savings (MWh)</b>					
Total MWh	111,289	99%	109,884	0.813	89,456
<b>Demand Savings (MW)</b>					
Total MW	12.5	97%	12.1	0.814	9.8
<b>Gas Savings (Therms)</b>					
Total Therms	806,747	118%	948,719	0.852	807,973

<sup>a</sup> Blended NTGR based on SAG-approved NTGR values (0.751 for electric and 0.830 for gas) for all Custom Program projects except those completed through the CLIP and Staffing Grant initiatives, for which a project-specific NTGR was applied retrospectively to PY8 CLIP and Staffing Grant projects based on PY8 research.

While the program realized somewhat lower MWh and therm savings in PY8 compared to PY7, this is largely due to the unusually high level of savings claimed in PY7 and a certain level of year-to-year variation can be expected due to the large, unique projects characteristic of a Custom C&I program.

## 1.2 Process Results

Now in its eighth year, the program's structure and implementation has remained relatively stable with several changes to special offerings and some small adjustments to the general electric and gas programs. Satisfaction with the program remains very high, with participant survey respondents providing an average overall program satisfaction rating of 8.7 on a scale of 0 to 10, with 0 meaning very dissatisfied and 10 meaning very satisfied. Interviews with participants of the CLIP, Staffing Grant, and Metering and Monitoring offerings provided similarly high levels of satisfaction with all elements of program participation.

In an effort to meet its savings and participation goals as well as to ensure positive participant experience, AIC continues to fine tune the program. The program has expanded its offerings in recent years to better serve different types of customers and to facilitate consistent levels of participation and savings over time.

## 1.3 Conclusions and Recommendations

Our research found that PY8 was another successful year for the Custom Program, in terms of achieved savings, participant satisfaction, and program implementation. Below we highlight some general conclusions and recommendations from our research.

- **Finding #1.** The program achieved ex ante to ex post gross realization rates of close to 100% in PY8, which is an improvement from PY7. The majority of significant adjustments to ex ante gross savings were made to small, not large, projects. In order to maintain high realization rates in the future, we recommend the following:
  - **Recommendation #1.** The program may consider an additional incentive or rebate for ensuring controls are properly commissioned. This can help ensure that controls are not left to be set by customers without the expertise needed to properly commission the system.
  - **Recommendation #2.** Whenever possible, we suggest utilizing kW metering for any pre- or post-project measurement and verification (M&V) completed. This will reduce any instances of

incorrectly assumed power factors. In the event that kW cannot be directly metered, the program should obtain careful measurements of the power factor during the site visit. Additionally, when using measured amp data, the loading of the metered motor must be examined so that power factors can be adjusted if the motor is under lower loading conditions.

- **Recommendation #3.** We recommend reviewing the gas usage of the entire facility carefully to separate out any constant loads from space heating loads. This will ensure that the proper loads are utilized in space heating calculations for boiler efficiency projects.
- **Finding #2.** Participants learn about the Custom Program in a variety of ways, including through contractors, AIC key account executives, or through direct marketing such as emails or bill inserts. Both Energy Advisors and program participants noted how opportunities may be lost if marketing efforts do not reach the right audience or marketing materials do not reach decision makers.
- **Recommendation #4.** The program should continue to diversify its marketing and outreach efforts to ensure that it is reaching all types of businesses and the decision makers within those businesses.
- **Finding #3.** All participants of the metering and monitoring pilot expressed high satisfaction with the pilot and expressed interest in seeing the program expanded. Participants would like to see the program expanded so that they can add more sub-meters and further isolate savings opportunities, or expand their metering and monitoring program to other facilities within their organizations.
- **Recommendation #5.** The metering and monitoring pilot offers an opportunity for repeat participants to identify new savings opportunities as the most obvious improvements may have already been made. AIC could consider providing a bonus incentive for analytic software as a component of the pilot as one method of helping to maximize potential savings.
- **Finding #4.** The Business Program offers a variety of initiatives and, as a result, some participants noted difficulty coordinating between the different offerings. For example, one Staffing Grant participant had to first receive confirmation of the Staffing Grant funds before they could pursue other Business Program offerings for the same projects, which led to some uncertainty about the project's funding and timing.
- **Recommendation #6.** To the extent possible, the program should be aware of common crossover points within the Custom Program and other Business programs and provide guidance to customers participating in multiple offerings to ensure smooth participation as well as to maximize savings.
- **Finding #5.** While not a major source of dissatisfaction, both participants and Energy Advisors suggested that the application process could be further streamlined.
- **Recommendation #7.** Suggestions to improve the application process included the ability for customers to pre-populate parts of the online application so that it does not need to be entered repeatedly for multiple applications and increasing the speed of the review process.



## 2. Introduction

This report presents results from the evaluation of the eighth program year (PY8) of the Ameren Illinois Company (AIC) Commercial and Industrial (C&I) Custom Program. The Custom Program is one of three programs within the AIC C&I portfolio, which also includes the Standard and Retro-Commissioning Programs. PY8 operated from June 1, 2015 through May 31, 2016.

The PY8 evaluation of the Custom Program involved both impact and process assessments. To support the process evaluation, we interviewed Staffing Grant, Competitive Large Incentive Project (CLIP) incentive recipients and participants in the Metering & Monitoring Pilot, as well as Energy Advisors, program allies, and program staff. We also reviewed program implementation and marketing materials. Impact evaluation research efforts included on-site visits to verify custom equipment performance and interviews with recipients of CLIP incentives and Staffing Grants. Additionally, the evaluation team conducted computer-aided telephone interviews (CATI) with PY8 participants of the Custom Program to support both the impact and process analyses.

### 2.1 Program Description

The C&I Custom Program offers incentives to AIC business customers to encourage the installation of energy efficient measures not covered through the Standard Program. Business customers often represent the highest potential for energy savings, but these savings often derive from highly specialized equipment designed for particular industries or types of facilities. The availability of this program allows customers to propose additional measures and tailor projects to their facility and equipment needs. Custom incentives are available for electric measures, such as lighting, compressed air, energy management systems (EMS), and industrial process measures, among others. The program also offers gas measures, including heat recovery, process heat, and improvements to steam systems.

Additionally, several specialized sub-programs are included in the Custom C&I Program:

- The CLIP initiative offers customers the opportunity to request the amount of incentive needed to complete large energy efficiency projects with total savings greater than 300,000 kWh and/or 30,000 therms. The payback period must be less than 10 years. Multiple technologies (such as lighting, variable-frequency drives [VFDs], compressed air, HVAC, and process improvements) are included.
- The Staffing Grant initiative provides customers with funding to help address energy efficiency project staffing needs. Launched in PY4, the program distributes funds based on the predicted savings that will be achieved by the grant recipients. Sixteen Staffing Grants were issued in PY8.
- The New Construction Lighting program offers additional incentives for lighting measures in new construction projects.<sup>6</sup> Also launched in PY4, New Construction Lighting incentives supported 65 projects in PY8, an increase from 45 in PY7.
- The Feasibility Study offering, also launched in PY4, helps participants define project costs and energy savings opportunities, primarily targeting manufacturing/industrial facilities with compressed air

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<sup>6</sup> AIC processes most New Construction projects through the Standard Program, but includes lighting projects in the New Construction Lighting initiative in the Custom Program. Additionally, large-scale new construction HVAC projects fall under the Custom Program.

systems. Incentives cover up to 50% of the study cost, with an incentive cap of \$10,000 or 25% of the annual estimated savings identified in the study. Three Custom projects received these incentives in PY8.

- The Metering and Monitoring initiative, initiated in PY6, promotes customers' ability to review and curtail their energy use using sub-meters and software. The pilot allowed participants to submit their own plan for identifying energy savings opportunities by implementing energy monitoring software. The incentive is structured in two components. The first component provides an incentive of up to 50% of the cost of the metering equipment and software, up to \$10,000. The second component is performance-based and provides an incentive based on the annual energy savings generated by Custom or Standard projects identified and implemented through the Metering and Monitoring plan.<sup>7</sup> This pilot serves as the basis for the Strategic Energy Management (SEM) Pilot, which launched in PY8 and expects its first projects to complete in PY9.

## 2.2 Research Objectives

This evaluation addresses the program's performance in PY8, which began in June 2015 and ended in May 2016. The primary objective of the PY8 Custom Program evaluation is to provide estimates of gross and net electric and gas savings associated with the program. In particular, the PY8 impact evaluation answers the following questions:

1. What were the estimated gross energy and demand impacts from this program?
2. What were the estimated net energy and demand impacts from this program?
3. What were the levels of free-ridership and spillover among Staffing Grant and CLIP program participants (for application in PY8)?
4. What was the level of participant free-ridership and spillover for the core offering (for prospective application in PY10)?

The evaluation team also investigated several of the Custom Program's special initiatives and program components, including CLIP, Staffing Grants, and the Metering & Monitoring Pilot. We explored a number of process-related research questions outlined below.

5. 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 (for the program overall and for its components) meet expectations? If not, how different was it and why?
  - c. How can the program increase participation in the Metering & Monitoring Pilot? Can the program leverage successful processes in other initiatives, such as Feasibility Studies, to improve the pilot's participation level?
6. Program Design and Implementation

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<sup>7</sup> The performance incentive is calculated at a rate of \$0.01/kWh or \$0.20/therm and is capped at \$10,000.

- a. Did the program's implementation change from PY7? If so, how and why and was this an advantageous change?
  - b. Did the program experience any implementation challenges in PY8? If so, what were they and how were they overcome?
  - c. What changes could the program make to improve the customer experience and generate greater energy savings?
7. Participant Experience and Satisfaction
- a. How did participants become aware of the program and its components?
  - b. Were participants in the special initiatives (CLIP, Staffing Grants, and the Metering & Monitoring Pilot) satisfied with their experiences? What aspects of program design or implementation could AIC change to improve program effectiveness and participant satisfaction?
  - c. What barriers to participation existed for these special initiatives? How is the program seeking to overcome them?

## 2.3 Evaluation Tasks

The PY8 assessment of the AIC C&I Custom Program included both process and impact analyses. For most projects, we applied Illinois Stakeholder Advisory Group (SAG)-approved NTGRs (0.751 for electric and 0.830 for gas). For Staffing Grant and CLIP projects, we determined the NTGR based on research through interviews and surveys with PY8 participants and applied it retrospectively to the applicable PY8 projects.

**Table 2. PY8 Custom Program Evaluation Methods**

Activity	PY8 Process	PY8 Impact	Forward Looking	Details
Program and Implementation Staff Interviews <sup>a</sup>	✓			Explored changes made since PY7, gathered information about program marketing, implementation—with a focus on special initiatives including CLIP, staffing grants, and the metering and monitoring program.
Review Utility Data and Program Materials <sup>a</sup>	✓			Gathered information about program implementation and performance.
Energy Advisor Interviews <sup>b</sup>	✓			Gathered information about energy advisors' perceptions of customer interest in the program, interactions with customers, program processes for coordination between the Energy Advisors and Key Account Executives, success bringing projects into the program, and suggestions for program improvement.
Program Ally Interviews <sup>b</sup>	✓			Investigated program participation processes, trade ally satisfaction and their perception of customer satisfaction, barriers to participation, and impacts of program participation on trade ally business and practices.
Core Custom Participant Survey	✓	✓	✓	Collected information to update the NTGR and explored satisfaction, program processes, and areas for program improvement.

Activity	PY8 Process	PY8 Impact	Forward Looking	Details
Staffing Grant Participant Interviews <sup>a</sup>	✓	✓	✓	Supported the development of NTGRs for these participants to be applied retrospectively and gathered process information.
CLIP Participant Interviews	✓	✓	✓	Gathered NTGR information for each project, investigated ways that CLIP participants' projects differ from other Custom Program projects, and explored satisfaction, program processes, and areas for program improvement.
Metering and Monitoring Pilot Participant Interviews	✓			Explored ways to increase participation in this pilot by examining how successful processes in other initiatives, such as Feasibility Studies, may be leveraged and if any energy savings have occurred as a direct outcome of the Metering & Monitoring Pilot.
Site Visits		✓		Collected data to inform measure verification and gross impacts.
Net Impact Analysis		✓	✓	Estimated net impacts using deemed NTGR values from PY5 and PY6 for electric and gas, respectively. Estimated net impacts using PY8 NTGR values and interviews with CLIP and Staffing Grant participants and applied to both the gas and electric savings.

<sup>a</sup> Conducted in conjunction with the Standard and Retro-Commissioning Programs

<sup>b</sup> Conducted in conjunction with the Standard Program

The following activities informed the PY8 evaluation of the Custom Program.

### 2.3.1 Program Staff Interviews

As part of the evaluation of the Custom Program, the evaluation team conducted three in-depth interviews: two with the key program operations staff at Leidos, the program implementer, and one with program marketing staff at Leidos. The interviews focused on program performance in PY8, Business Program-wide changes, and changes to the Custom Program since PY7, as well as anticipated future developments and changes.

### 2.3.2 Review of Program Materials and Data

We conducted a comprehensive review of all program materials and tracking data including the program's implementation plan, applications, and extracts from the program tracking database. We received extracts from the program-tracking database in April 2016 for evaluation planning and survey sampling. Additionally, we received updated data in May 2016 and July 2016 as well as the finalized PY8 database (in August 2016).

### 2.3.3 Energy Advisor Interviews

We conducted in-depth interviews with all seven of the Energy Advisors active in PY8. The interviews focused on their roles and responsibilities, program processes, program outreach and customer interactions, customer understanding of the marketplace, and the opportunities for program improvement. This activity was conducted in tandem with the Standard Program evaluation.

## 2.3.4 Program Ally Interviews

To help inform AIC's PY9 planning, we interviewed 16 Business Program allies in November and December 2015. These interviews were conducted early in the program year to provide more real-time feedback to the program. The interviews investigated program participation processes, program ally satisfaction and their perceptions of customer satisfaction, barriers to participation, and the impacts of program participation on program ally business and practices. We also explored changes in the program including the move away from program ally bonuses and the introduction of instant incentives for lighting and any resulting confusion in the marketplace. This activity was conducted in tandem with the Standard Program evaluation. A stand-alone findings memo was delivered to AIC in February 2016; for convenience, we have embedded a copy of that memo as an appendix to this report.

## 2.3.5 Core Custom Participant Surveys

We conducted a telephone survey with 36 PY8 Custom Program participants to assess program processes and collect data for development of an updated NTGR. We attempted a census of all PY6 Custom Program participants who completed a Custom gas or electric project in PY8.

The sample frame is based on projects listed in the July 2016 Amplify data extract with a status of "check sent" or "sent to check processor."<sup>8</sup> We removed duplicate contact names from the sample where a single person was involved in more than one project, as well as contacts who completed CLIP, Staffing Grant, or Metering and Monitoring projects and would be called as part of those efforts. In cases when a participant had multiple projects, we asked the contact about one randomly selected project to reduce respondent burden.

The following table presents the sample frame values and completed survey information for the Custom Program in PY8. Overall, we completed surveys with participants responsible for 35% of kWh savings and 14% of therm savings in the sample frame and 11% of the total kWh savings and 10% of the total therm savings of all PY8 Custom Program projects finalized at the time of the sample.

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<sup>8</sup> Notably, 13 projects that ultimately appeared in the final PY8 tracking data were not included in the sample frame because they did not show a completed application status (i.e., "check sent" or "sent check to processor") at the time of the survey fielding. These projects accounted for large shares of total overall savings: 45% of ex ante kWh savings and 76% of ex ante therm savings. The evaluation team included one of these projects, a very large gas project comprising 31% of ex ante therm savings, in the gross impact analysis, but we were unaware of the other projects until after the survey was fielded.

**Table 3. Completed Custom Participant Survey Points**

Core Custom Program Participants	Unique Customers	Associated Projects	Ex Ante kWh Savings	Ex Ante kW Savings	Ex Ante Therm Savings
Population <sup>a</sup>	105	193	74,597	8.4	520,147
Sample frame	99	99	25,272	3.0	374,651
Completed Surveys	36	36	8,905	1.1	53,003

<sup>a</sup> The total number of Core Custom projects and savings listed reflects the population in Amplify as of July 20, 2016. This includes projects with a status of “check sent” or “sent to check processor.”

### Survey Disposition and Response Rate

The table below shows the final survey dispositions of the telephone numbers in the PY8 sample. Appendix C shows the formula used to calculate response rates using the disposition categories shown in the table.

**Table 4. Custom Program PY8 Participant Survey Dispositions**

Category Key	Disposition	Total
I	Complete	36
N	Eligible Incomplete Interview	3
X1	Survey-Ineligible Business	0
U1	Wrong number	8
X2	No answer/busy	9
U2	Refusal/terminate/not available	43
e1	Estimated proportion of cases of unknown survey eligibility that are eligible	100%
e2	Estimated proportion of cases of unknown properties eligibility that are eligible	91%
Total Participants in Sample		99

The following table provides the response and cooperation rates. We calculated the survey response rate using the standards and formulas set forth by the American Association for Public Opinion Research (AAPOR).<sup>9</sup>

**Table 5. Custom Program Survey Response and Cooperation Rates**

AAPOR Rate	Percentage
Response Rate	40%
Cooperation Rate	71%

### 2.3.6 Staffing Grant Participant Interviews

We conducted in-depth interviews with Staffing Grants recipients during August and September 2016. These interviews focused on collecting data on free-ridership and spillover, in addition to information about barriers

<sup>9</sup> *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, AAPOR, 2011. [http://www.aapor.org/AAPORKentico/AAPOR\\_Main/media/MainSiteFiles/StandardDefinitions2011\\_1.pdf](http://www.aapor.org/AAPORKentico/AAPOR_Main/media/MainSiteFiles/StandardDefinitions2011_1.pdf).

to project completion. Although this report contains discussion of the methodology and findings of this research, staffing grants can apply to Custom, Prescriptive, or Retro-commissioning projects. The team attempted a census of Staffing Grants participants, as shown in the table below.

**Table 6. Completed Staffing Grants Interviews**

Interviewees	Population of Grant Recipients <sup>a</sup>		Completed Interviews	
	Unique Recipients	Associated Projects	Unique Recipients	Associated Projects
Grant Recipients	12	16	6	8

<sup>a</sup> The total number of Core Custom projects listed reflects the population in Amplify as of July 20, 2016. This includes projects with a status of “check sent” or “sent to check processor.”

Overall, the team spoke with six customers with eight projects associated with staffing grants. The eight projects were comprised of four Standard lighting projects, one Standard steam trap project, three Retro-commissioning projects, but no Custom projects. Given that we made a census attempt, there is no sampling error or precision estimate associated with our NTGR findings. The team assigned the NTGR developed through the interview process to projects completed by the interviewed Staffing Grants participants if the NTGR based on interview findings was higher than the deemed NTGR for the applicable program (e.g., Custom, Prescriptive, or Retro-commissioning). It is important to note that this adjustment was made only to relevant Staffing Grants projects and that the average NTGR resulting from these efforts was not extrapolated to the entire participant population of Staffing Grant projects.

### 2.3.7 CLIP Participant Interviews

We conducted interviews with four CLIP participants, representing seven of the ten CLIP projects completed in PY8. We used the interviews to gather quantitative data to support the PY8 NTG analysis of CLIP projects. The NTG analysis method and results are discussed in Appendix E. In addition, the survey included questions to support a process analysis. Specifically, we explored participant satisfaction with the CLIP offering, recommendations for improvement, and how early completion bonuses may or may not have impacted PY8 CLIP projects. As seen in Table 7 below, we completed interviews representing 82% of PY8 CLIP electric savings and 100% of natural gas savings.

**Table 7. Completed CLIP Interviews**

	Population	Completed Interviews	Share of Population
Participants	7	4	57%
Projects	10	7	70%
Ex Ante MW	4.0	3.2	78%
Ex Ante MWh	36,692	30,192	82%
Ex Ante Therms	167,277	167,277	100%

<sup>a</sup> The total number of Core Custom projects and savings listed reflects the population in Amplify as of July 20, 2016. This includes projects with a status of “check sent” or “sent to check processor.”

### 2.3.8 Metering and Monitoring Pilot Participant Interviews

We interviewed a total of five Metering and Monitoring Pilot Offering participants between August 29 and September 16, 2016. The purpose of these interviews was to gather information about participants’ experience with the initiative and to better understand how participants used their metering and monitoring equipment. We asked additional questions to determine how the offering can be improved if it expands beyond



a pilot in future program years. Because this offering was a pilot, there were only eight individual participants who completed a total of 10 projects through the offering. Therefore, we attempted a census of all Metering and Monitoring Offering participants.

### 2.3.9 Site Visit Sampling

Adjustments to claimed (ex ante gross) energy and demand impacts associated with the Custom Program were determined based on site audits and metering measurement and verification (M&V) of a sample of PY8 projects as well as a detailed engineering desk reviews of the projects discussed below. We used these site visits and related analyses to develop a sample-based realization rate that was applied to the population of projects.

We selected the sample of PY8 projects for these activities in two waves, drawing from data included in two separate extracts from the Amplify tracking system taken on May 3, 2016 and July 20, 2016. We drew each sample from the entire population of Custom projects tracked as complete as of that date, including CLIP and New Construction Lighting projects, and projects related to Staffing Grants.<sup>10</sup>

The evaluation team selected a sample of projects for engineering review and metered site verification in two waves. Projects were selected independently by fuel type to satisfy random sampling requirements. The sample included 25 projects chosen for a review of electric savings and 14 projects chosen for a review of gas savings. In two instances, this resulted in the same project being selected for both the electric and gas savings review. We also selected one additional project which was responsible for 31% of the total therm savings as a certainty stratum project. In total, we conducted 40 distinct reviews across 38 projects. Overall, the 40 reviews conducted account for 72% of ex ante kWh savings and 97% of ex ante gas savings in the sample frame (40% of the programs' total PY8 ex ante kWh savings and 54% of ex ante gas savings).<sup>11</sup>

We chose the sample using a stratified random sample design targeting 10% relative precision at 90% confidence. For the stratification, we used the Dalenius-Hodges method to determine strata boundaries and the Neyman allocation to determine the optimal allocation of the available projects to the strata. We also drew the sample in two waves to ensure a sufficient percentage of the savings from the program was assessed and to allow the team to complete the M&V in time to meet reporting deadlines.<sup>12</sup>

Table 8 and Table 9 show the sample of projects with electric savings and gas savings, respectively, selected in both waves.

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<sup>10</sup> Projects with no direct savings, such as feasibility studies and the metering and monitoring pilot, were not included in the population from which we drew the sample.

<sup>11</sup> Ex ante savings are estimates of savings in the utility tracking system or what the utility believed they had saved prior to the evaluation. Note that the sum of electric savings includes only savings from the sample of electric projects and does not include electric savings from the sample of projects with gas savings.

<sup>12</sup> Notably, 13 projects that ultimately appeared in the final PY8 tracking data were not included in the sample frame because they did not show a completed application status (i.e., "check sent" or "sent check to processor") at the time of the survey fielding. These projects accounted for large shares of total overall savings: 45% of ex ante kWh savings and 76% of ex ante therm savings. The program implementer identified one of these projects, a very large gas project comprising 31% of ex ante therm savings, during the sampling process and we included this project in the site visit sampling as the certainty stratum project. We were unaware of the other projects until after the site visits were conducted.



**Table 8. Two-Wave Custom Site Visit Sampling Approach for Projects with Electric Savings**

Sampling Stratum	kWh Savings Range	Population of Projects <sup>a</sup>		Site Visits Completed	
		Count	Ex Ante MWh Savings	Count	Ex Ante MWh Savings
Wave 1					
1	468-150,000	117	3,986	4	88
2	150,001-450,000	27	10,550	6	3,047
3	450,001-7,000,000	8	22,745	7	20,892
Wave 2					
1	35,000–1,000,000	23	4,443	3	314
2	1,000,001–10,771,178	5	20,066	5	20,066
Total		180	61,789	25	44,407

<sup>a</sup> Given that we selected the samples prior to the finalization of the PY8 program-tracking data, the total number of projects does not match the final Amplify extract and the project counts presented elsewhere in the report.

**Table 9. Two-Wave Custom Site Visit Sampling Approach for Projects with Gas Savings**

Sampling Stratum	Therm Savings Range	Population of Projects <sup>a</sup>		Site Visits Completed	
		Count	Ex Ante Therm Savings	Count	Ex Ante Therm Savings
Wave 1					
1	270–4,050	22	12,833	2	1,053
2	15,001-40,749	8	135,509	8	135,509
Wave 2					
1	270–4,050	1	325	1	325
2	15,001–34,839	3	47,506	3	47,506
Certainty Stratum		1	250,000	1	250,000
Total		35	446,173	15	434,393

<sup>a</sup> Given that we selected the samples prior to the finalization of the PY8 program-tracking data, the total number of projects does not match the final Amplify extract and the project counts presented elsewhere in the report.

Our sample design achieved relative precision of  $\pm 2.8\%$  at the 90% confidence level for kWh savings and  $\pm 0.4\%$  relative precision for therm savings.<sup>13</sup> We calculated precision for our gross impact results by pooling the results from both waves of site visits.<sup>14</sup>

<sup>13</sup> Note that these precision estimates calculated only account for the projects in the sample frame at the time of the sampling effort. It does not include 12 projects that ultimately appeared in the final PY8 tracking data but did not show a completed application status (i.e., “check sent” or “sent check to processor”) at the time of the sampling and therefore had no chance to be sampled. These projects accounted for large shares of total overall savings: 45% of ex ante kWh savings and 45% of ex ante therm savings. Including these projects in the sample frame would have likely changed the projects selected for site visits and therefore may have also resulted in a different realization rate and relative precision for the sample.

<sup>14</sup> The error bound of the total savings is estimated by calculating the square root of the sum of the squared error bounds of each wave. These calculations are consistent with California Evaluation Framework.

To estimate the program's ex post savings, the evaluation team used the ratio adjustment method<sup>15</sup>. As described in Figure 1, we calculated the gross realization rate based on the on-site sample and then applied this ratio to adjust the ex ante savings for the population of all PY8 projects (N=203).

**Figure 1. Ratio Adjustment Algorithm**

$$I_{EP} = \frac{I_{EPS}}{I_{EAS}} * I_{EA}$$

where:

$I_{EP}$  = the ex post<sup>16</sup> population energy and demand impacts  
 $I_{EA}$  = the ex ante population energy and demand impacts  
 $I_{EPS}$  = the ex post sample energy and demand impacts  
 $I_{EAS}$  = the ex ante sample energy and demand impacts

To calculate relative precision, the team first determined the variance in the sample and then calculated the standard error and confidence interval. Figure 2 shows the equations used.

**Figure 2. Equations for Calculating Precision for Custom Site Visits**

$$\text{Stratified Ratio Estimator} = \frac{\sum_{i=1}^n w_i y_i}{\sum_{i=1}^n w_i x_i} \quad \text{Equation 1}$$

$$\text{Standard Error} = \frac{1}{\hat{X}} \sqrt{\sum_{i=1}^n w_i (w_i - 1) e_i^2} \quad \text{Equation 2}$$

$$90\% \text{ Confidence Interval} = 1.645 * \text{Standard Error} \quad \text{Equation 3}$$

$$\text{Relative Precision} = \frac{\text{Confidence Interval}}{\text{Stratified Ratio Estimator}} \quad \text{Equation 4}$$

where:

$w$  = case weights for each stratum  $h$  ( $N_h/n_h$ )  
 $y$  = ex post savings  
 $x$  = ex ante savings  
 $e = y_i - b x_i$   
 $\hat{X} = \sum w_i x_i$

<sup>15</sup> Cochran, William G. *Sampling Techniques*. 1977. New York: John Wiley & Sons.

### 2.3.10 Gross Impact Analysis

The gross impact analysis of the Custom Program involved engineering review, data logging, engineering modeling, database and document verification, and on-site verification to determine ex post gross impacts. Overall, the evaluation team reviewed a sample of 40 Custom Program projects.<sup>17</sup> For these projects, the team performed a desk review to compare the inputs provided in the application to the assumptions used in the ex ante analysis, verify consistency in savings estimates throughout the project file, and provide insight into the validity of the ex ante energy savings. Additionally, the team completed site visits at the sampled projects to provide increased accuracy in the gross impact results.

Projects fell into one of several categories: lighting, compressed air, boiler/furnace, energy management systems (EMS)/controls, variable frequency drives (VFDs), pumps/fans, and miscellaneous. The following provides additional details about the evaluation team's methodology and assumptions by project category.

- **Lighting:** Lighting projects accounted for six of the 38 projects verified through site visits. The lighting projects reviewed by the evaluation team involved efficient lighting systems for industrial and storage buildings. For retrofit projects, the evaluation team compared the proposed system to the existing system to determine ex post savings. For new construction projects, the evaluation team compared the proposed system to a baseline lighting power density based on the space type.<sup>18</sup>

If the details about the original fixture and bulb type were unavailable, the team calculated the ex post savings using the wattages supplied by the customer, vendor, or typical fixture wattage values. The team considered the energy consumption of the ballast, as well as the bulb, to estimate savings.

The evaluation team verified the quantity of lights by inspection during the site visit and also obtained the hours of operation from the customer during the visit. The team did not meter lighting systems that operated under fixed schedules or that ran continuously all year. However, the team installed data loggers on three of the six projects to verify hours of operation.

- **Compressed Air:** Compressed air projects accounted for eight of the 38 projects verified through site visits. The compressed air systems involved replacing older air compressors with more efficient systems, newer VFD-controlled compressors, or automation systems to operate systems more efficiently. The ex post savings compared the original system to the proposed system for all of the projects evaluated. The team obtained the details of the original and proposed systems from the documentation available, as well as information collected during the site visits. The customer was able to provide trended or recorded data for three of the eight sites. Additionally, the team was able to install loggers to measure compressor power use at two additional sites.

We used metered or customer supplied operational data from these installations to determine typical loading and peak load conditions and then compared this information to the baseline system as described by the customer and project documentation. This ensured consistent loading profiles were used in both the baseline and energy efficient scenarios.

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<sup>17</sup> As described above, please note that we selected 38 projects for a review of savings for a single fuel type (electric or gas) only, and 2 projects were independently sampled for both electric and gas review, resulting in a total of 40 observations across 38 projects.

<sup>18</sup> Based on the applicable International Energy Conservation Code in place at the time of the project's initiation.

- **Boiler/Furnace:** The boiler and furnace projects accounted for six of the 38 projects verified through site visits. Projects in this category involved the installation of efficient furnaces or boilers. During the site visit, the evaluation team verified the installation of the efficient furnace or boiler, and interviewed the customer regarding the temperature setpoints and boiler operation. Additionally, we used billing data to inform ex post savings calculations for three of the six projects.
- **Energy Management Systems (EMS)/Controls:** EMS/controls projects accounted for nine of the 38 projects verified through site visits. All nine of these projects involved installing control systems which managed a majority of the HVAC systems at the customer facilities. These systems included energy savings for improved scheduling, temperature setbacks, outdoor air reset controls, and installing new pressure or temperature sensors.

The team verified these projects through customer interviews and site visits. The team used a combination of billing data, and readouts from the EMS to inform ex post estimates for these nine projects.

- **VFD:** There was one VFD project verified through site visits. This project involved the installation of two VFDs on large, 1500 hp process fans. The team verified this project by completing a site visit and interviewing the customer regarding the previous operation of the fans without the VFDs, as well as discussing current and expected future operation of the fans. The customer also supplied additional metered data that was collected after the ex ante analysis was completed. This additional data was combined with the data collected during the ex ante analysis when the team determined the ex post savings for this project.
- **Pumps/Fans:** Pumps and fans accounted for four of the 38 projects verified through site visits. These pump and fan projects involved the installation of new impellers or motors on industrial pumps. During the site visits, the customer was interviewed regarding the operation of the pumps prior to the retrofits, as well as the current and expected future operation of the pump systems. Additionally, during the site visits the customer was able to provide updated trended information for three of the four projects. The last project the customer indicated that no operational changes were made or planned since the project was completed, and confirmed the ex ante data was typical.
- **Miscellaneous:** The team classified the remaining four projects as “miscellaneous.” Many of these projects required project-specific calculations. Projects in the miscellaneous category consisted of the following:
  - Replacement of new bean flake rollers that improve the throughput energy consumption of the facility.
  - A new water side free cooling system was installed at a hospital that allows the customer to use free cooling during the winter months instead of running one of their chillers.
  - A new regenerative thermal oxidizer was installed at an industrial facility.
  - A new hot waste heat recovery system was installed to recover heat from the customer’s compressors and pre-heat the facilities make-up water.

### 2.3.11 Net Impact Analysis

After estimating gross impacts, the evaluation team applied the SAG-approved NTGRs of 0.751 and 0.83 for electric and gas projects, respectively, except those performed by Staffing Grant and CLIP participants. The

NTGR values are based on self-reported information from the PY5 (electric) and PY6 (gas) participant telephone surveys that quantified the percentage of gross impacts for rebated projects, as well as participant spillover.

In addition, the team utilized findings from interviews with Staffing Grant and CLIP participants to develop the NTGR for Custom Program projects implemented by these participants. The following sections outlines the methodology used to develop the retrospective NTGRs.

**Table 10. C&I Custom Program PY8 NTGRs**

Project Description	Electric NTGR	Gas NTGR
Core Offering	0.751	0.830
CLIP Projects	PY8 research for retrospective application	
Staffing Grant Projects		

The evaluation team also conducted new NTGR research with Custom Program participants for prospective application in PY10.

#### CLIP NTGR

The evaluation team conducted research with CLIP participants to estimate a NTGR specific to the CLIP program. We applied this NTGR to all PY8 CLIP projects. Consistent with NTGR research conducted for other Business Program evaluations, we based the NTGR on self-reported information from a CATI survey that quantifies the percentage of the gross program impacts that can reliably be attributed to the program. We used the same battery of free-ridership and spillover questions and methodology as the Custom Program's NTG research. The detailed methodology and results for the CLIP NTGR are described in Appendix E.

#### Staffing Grant NTGR

We conducted research with Staffing Grant participants to estimate the influence of the grant on its associated projects. While this research was conducted as part of the Custom Program evaluation, Staffing Grants could be used on any AIC Business Program project. As shown in Table 11, we interviewed participants accounting for 8 of the 16 projects associated with Staffing Grants<sup>19</sup>; five of these projects went through the Standard Program, three were retro-commissioning projects, and none were Custom projects. Based on the

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<sup>19</sup> Sixteen projects were associated with Staffing Grants in the AMPlify database as of July 29, 2016, the date on which we finalized our sample for these interviews. The final PY8 program database includes 20 projects associated with Staffing Grants.

methodology described in Appendix F, we adjusted the NTGR of one Standard project as a result of these interviews.<sup>20</sup>

**Table 11. Completed Staffing Grant Interviews**

Program	Projects	Completed Interviews	Adjusted PY8 NTGR
Standard	8	5	1
Retro-Commissioning	5	3	0
Custom	3	0	0
<b>Total</b>	<b>16</b>	<b>8</b>	<b>1</b>

## 2.4 Sources and Mitigation of Error

Table 12 provides a summary of possible sources of error associated with data collection conducted for the Custom Program. We discuss each item in detail below.

**Table 12. Possible Sources of Error**

Research Task	Survey Error		Non-Survey Error
	Sampling Error	Non-Sampling Error	
Staffing Grant, CLIP, and Metering and Monitoring Interviews	N/A, census attempt	Measurement error Non-response and self-selection bias Data processing error	N/A
Custom Participant Surveys	N/A, census attempt	Measurement error Non-response and self-selection bias Data processing error	N/A
Site Visits	Yes	Measurement error	Analysis Error
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 PY8 evaluation.

### Survey Error

#### ■ Sampling Error

- **Site Visits:** The evaluation team completed site visits for 40 of 193 Custom projects, drawing two waves of stratified samples separately for projects claiming electric and gas savings. For gross

<sup>20</sup> This adjustment is reflected in the PY8 Standard report.

impact results, at the 90% confidence level, we achieved a relative precision of 2.7% for kW savings, 2.8% for kWh savings, and 0.4% for therm savings.

## ■ 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 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 shortened the survey as needed.

To minimize data collection error during site visits, the evaluation team used trained engineers and technicians familiar with the equipment covered by the Custom Program and the methods used to calculate the gross impacts.

- **Non-Response and Self-Selection Bias:** Although the response rate for the interviews with CLIP, Core Custom, and Staffing Grant participants was high, there is still some potential for non-response bias. We attempted to mitigate possible bias by contacting each prospective respondent in the sample at least eight times via phone and email over several months. To assess whether evidence of non-response bias exists, we compared respondents to the population based on project types and savings. 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.

## Non-Survey Error

### ■ Analysis Error

- **Gross Impact Calculations:** We determined gross impacts using data collected during site visits, engineering algorithms, and modeling. To minimize data analysis errors, the evaluation team had all calculations reviewed by a separate team member to verify that calculations were performed accurately.
- **Net Impact Calculations:** For Staffing Grant and CLIP participants, the evaluation team had all calculations reviewed by a separate team member to verify that all NTGR calculations were performed accurately.

### 3. Detailed Evaluation Findings

#### 3.1 Process Findings

Opinion Dynamics conducted a process evaluation of the C&I Custom Program using multiple sources, including review of program materials and records, interviews with program staff, surveys of program participants, and interviews with Energy Advisors and Program Allies. Additionally, the evaluation team performed a targeted process evaluation of three Custom Program special offerings in PY8: the Competitive Large Incentive Project (CLIP) initiative, the Staffing Grants initiative, and the Metering & Monitoring initiative. We completed interviews with participants of each of these initiatives and included questions about project scope, participant expectations, program awareness and satisfaction, internal decision-making processes, and barriers to participation. The results of these research efforts are presented below.

##### 3.1.1 Program Description and Participation

The C&I Custom Program offers incentives to AIC business customers for energy efficiency projects involving equipment not covered through the C&I Standard Program. The availability of this program allows customers to propose additional measures and tailor projects to the specific needs of their facilities. It also provides an avenue for piloting new measures prior to incorporating them into the Standard Program. Custom incentives are available for a variety of electric measures including lighting, compressed air, and energy management systems and for gas measures such as heat recovery and steam system improvements.

The Custom Program also provides several special program offerings: the CLIP initiative, Staffing Grants, Feasibility Studies, Strategic Energy Management, and the Metering and Monitoring Pilot. As in prior years, the PY8 Custom Program serves as the channel for the submission of New Construction Lighting projects.

#### Program Participation

Overall, the Custom Program approved 236 unique projects for completion in PY8. This represents an increase from 171 projects completed in PY7 and 160 in PY6. Of these projects, 108 are special program offerings, including 65 New Construction Lighting projects and 10 CLIP projects. Table 13 lists these offerings along with their PY8 participation, the number of unique participants associated with each offering, and claimed savings.

**Table 13. Custom Program Offering Participation in PY8**

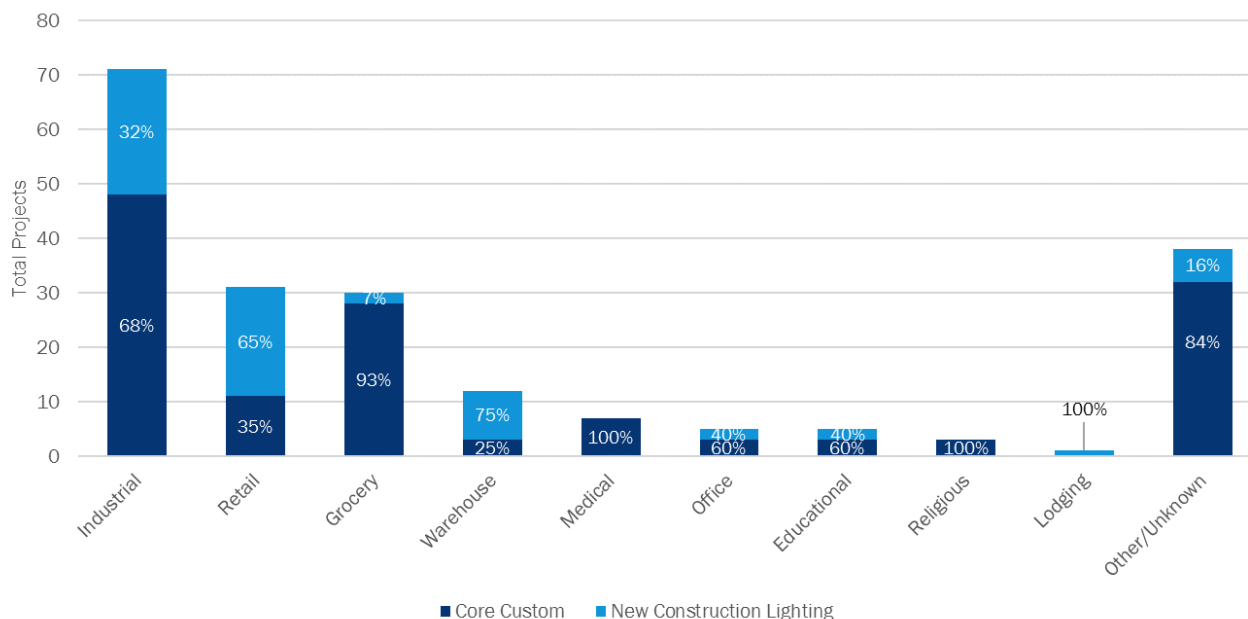
Offering	Total Projects/ Grants	Unique Customers <sup>a</sup>	Gross Ex Ante Savings		
			MWh	MW	Therms
Custom Incentive	128	51	65,648	7.4	639,473
New Construction Lighting	65	52	8,948	1.1	0
CLIP	10	7	36,692	4.0	167,274
Staffing Grants	16	12	—	—	—
Metering and Monitoring Pilot	8	6	—	—	—
Strategic Energy Management	6	6	—	—	—
Feasibility Studies	3	3	—	—	—
<b>Total</b>	<b>236</b>	<b>116</b>	<b>111,289</b>	<b>12.5</b>	<b>806,747</b>

<sup>a</sup> Column does not sum to total because some unique customers participated in more than one offering.



Figure 3 below shows the number of PY8 Custom Program projects completed by business type and segmented by Core Custom participants and New Construction Lighting participants. Core Custom projects include general Custom Incentive projects and CLIP offering projects.

**Figure 3. PY8 Custom Program Projects Completed by Business Type (N=203)**



Note: Core Custom projects include Custom Incentive (128) and CLIP (10) projects.

Analysis of the program tracking data shows the highest percentage of Custom projects (35%) were completed in businesses from the industrial segment. Projects in the retail and grocery segments also represented large shares of participants. New Construction Lighting projects accounted for approximately one-third (32%) of all PY8 projects. These New Construction Lighting projects were completed mostly in the industrial and retail segments.

### 3.1.2 Program Design and Implementation

The structure of the AIC C&I programs in PY8 changed only slightly from PY7 as the program repositioned managers within the technical review group to better balance workloads. Overall, program operation was consistent with PY7, with the largest changes occurring with the program's marketing strategy.

#### Implementation Changes

- The incentive rate for non-lighting measures was reduced from \$0.07/kWh to \$0.06/kWh. According to program staff, overall program participation was lower for the Custom Program relative to other Ameren C&I programs and neighboring utilities, but it is hard to attribute this directly to the change in the program incentive.
- The number of IPA programs targeted at commercial customers has increased since PY7. This has created some confusion for C&I customers who need to decide which program to choose from among several different options.

## Marketing and Outreach

The Business Program's marketing strategy for PY8 was focused on building upon past success and refining specific aspects of the marketing program in order to optimize marketing techniques for each program. Overall, the marketing program takes a layered approach in that they aim to provide the customer with basic information at the first engagement. The program then provides customers with more detailed information as the customer takes further actions.

Program staff made digital media marketing a priority for PY8. In PY7, the program began using reactive advertising platforms for use with social media and smartphones. In line with broader optimization goals, the marketing team worked to refine these marketing techniques with the goal of encouraging customers to download and fill out a program application rather than just visiting the website. Part of this process included syncing vendor websites with the Instant Incentives website so that customers could easily navigate between the sites.

The program employed several new marketing strategies in PY8 primarily focused on the Online Store, Instant Incentives measures, and Custom gas measures. Program staff also felt that these targeted programs were also the biggest areas of marketing success. In January 2016, the program developed a Custom gas bonus measure targeted specifically at projects for larger customers and marketed this incentive through direct mail and email. This bonus was aimed at projects that could be completed in the second half of PY8 and this incentive served to generate some additional savings during this period. The Instant Incentive and Online Store marketing efforts were tied together as the online store directed customers to the Instant Incentives web page. In addition, the marketing team ran specific promotions through the online store, such as free CFL giveaways and instant lighting discounts at the point of sale. The marketing team brought back webinars providing educational material on specific measures. These webinars targeted specific measures of interest such as Custom gas measures and proved to be effective in generating customer interest in these targeted measures.

Marketing efforts for the CLIP initiative were similar to PY7 with a primary reliance on direct mail and email communications as well as updating website content to allow customers to have improved access to CLIP program materials. Program staff report that the program had a lot of early success with the Staffing Grant in PY8 so much of PY8 marketing efforts were actually geared towards producing projects for PY9 and the program is moving towards targeting larger DS2 customers as opposed to just DS3/4 and GDS3/4 customers.

Program staff state that the marketing team continues to reach out to industry associations and program allies for assistance with marketing efforts. Allies are given the opportunity to go to sales trainings and kept up to date about program activities. In PY8, Ameren began providing program allies with co-branded marketing materials with AIC's logo and the ally's logo. The program staff received a lot of positive feedback about the co-branded marketing material and felt that this approach helped to improve Ameren's ties with the allies.

According to the participant survey, marketing through program allies was the most effective way of reaching Custom Program participants as 85% of participants responded that they had discussed the program with a contractor or program ally (Table 14). The marketing staff's focus on marketing Custom measures through direct mail and email appeared to be effective as 74% of survey participants recalled receiving information about the program in an email. Ameren Illinois' mass media efforts did not focus on Custom participants, and therefore channels such as print ads (32%), billboards (26%) and radio commercials (21%) were less commonly recalled by respondents.

**Table 14. Marketing Channels and Participant Reach**

Have you ever....?	Percentage (n=34)
Discussed the program with a contractor or program ally	85%
Received information about the program in an email	74%
Discussed the program with an Ameren Illinois Key Account Executive	53%
Attended an event where the program was discussed	44%
Seen information about the program on the Ameren Illinois website	44%
Received information about the program in a monthly utility bill	35%
Seen a printed ad in a publication	32%
Seen a program billboard	26%
Heard a radio commercial for the program	21%

### 3.1.3 Participant Experience and Satisfaction

#### Application Process

Survey respondents report high levels of satisfaction with the Custom Program application process: 95% of respondents feel that the application forms clearly explained the program requirements and how to participate. Most participants (56%) filled out the application for the program themselves, of which 63% filled out an online application and 37% filled out a paper application.

The primary motivations reported by respondents for completing their Custom project were to replace old or outdated equipment (33%) and reduce energy costs (31%) (Table 15).

**Table 15. Participant Motivation for Installing Custom Project (Multiple Response)**

Why did you decide to install the custom equipment?	Percentage (n=36)
To replace old or outdated equipment	33%
To reduce energy costs	31%
To reduce energy use/power outages	19%
As part of a planned remodeling, build-out, or expansion	8%
To improve the product quality	8%
To improve equipment performance	6%
To meet corporate goals or mandates	3%
Other	28%

#### Overall Satisfaction

Overall, participants are very satisfied with the Custom program. As shown in Table 16, participants rate their satisfaction level for all program components as at least a 7.7 on a scale of 0 to 10, with 0 meaning “very dissatisfied” and 10 meaning “very satisfied”. Satisfaction was highest for the quality of installed measures (9.2/10) and lowest for the application process (7.7/10).

**Table 16. Participant Satisfaction with Program Components**

How would you rate your satisfaction with?	Average Rating <sup>a</sup> (n=34)
The quality of installed measures	9.2
The program's technical review staff	8.6
The incentive amount	8.2
The choice of measures offered by the program	8.2
The application process (n=19)	7.7
The energy efficiency business program overall	8.7
Ameren Illinois overall	8.6

<sup>a</sup> Ratings are on a scale of 0 to 10, with 0 meaning “very dissatisfied” and 10 meaning “very satisfied.”

The vast majority of respondents (88%) plan to participate in the program in the future and 6% said they might participate again, while only 6% said they wouldn’t participate in the future. Most respondents (53%) had no recommendations for improving the program. Respondents who did have recommendations suggested improving the visibility of the program and increasing the incentive amounts.

## CLIP

We completed interviews with four out of the seven participants in the PY8 CLIP offering. These four participants represent seven out of the ten PY8 CLIP projects. Most commonly, respondents held positions in their company’s facilities management divisions (3/4). Participants represented the manufacturing, food production, health services, and education sectors. Three of the four respondents have participated in an Ameren Illinois Energy Efficiency for Business program previously.

Overall, respondents provided positive feedback on the CLIP offering, including the program incentive, program staff, and the participation process. Three of the four learned of the CLIP offering from program staff, while one participant learned of the offering through a program ally. All respondents relied on both outside contractors or vendors to help with the choice of the installed equipment as well as outside consultants to assist in project planning or design, but most participants identified Ameren Illinois staff and Energy Advisors as the most influential in their decisions to pursue a CLIP incentive. All respondents indicated their interactions with program staff were very positive. One respondent indicated that their company’s Energy Advisor was extremely influential in facilitating participation in the CLIP offering as well as identifying the potential for the CLIP project ultimately implemented. This respondent commented:

*“Ameren has really helped me out quite a bit along the way of learning a lot about new projects, telling me all of the incentives that are out there and it helps me make decision of plans for the future”*

All respondents described a competitive internal company review process for capital projects which emphasizes financial criteria such as payback. Therefore, the offering’s financial incentive can influence this process by lowering the upfront investment required by participants, which helps move the project through the review process at a corporate level. As one respondent commented:

*“[T]he incentive coming in allowed me to in a sense lower that...cost to get it so now I have a different payback period and that is what was very influential in order to move forward on...getting this project done”*

Although only three respondents indicated their company uses a strict payback cut-off point, the program’s financial incentive pushed the project into an acceptable payback range for five of the seven projects.

Consistent with this outlook, the most common barrier to energy efficiency projects respondents mentioned was upfront cost (3/4).

Respondents stated that they are very satisfied with most aspects of the CLIP offering. Those familiar with the application process (2/4) rated it a 9 or 10 on a scale from 0 to 10, where 0 corresponds to “very dissatisfied” and 10 corresponds to “very satisfied”. All respondents rated both the time to receive the CLIP incentive and the Energy Efficiency for Business program overall a nine or ten on the same scale. Respondents exhibited slightly more mixed satisfaction regarding the program’s financial incentive. Most commonly, respondents rated the incentive level highly, with the incentive level for four of the seven projects receiving a rating of seven out of ten and two projects receiving a rating of nine out of ten.<sup>21</sup> Notably, one project received a rating of five out of ten for the incentive level. All respondents we asked indicate a high likelihood of repeat participation.

Three of the four respondents reported awareness and receipt of one of the CLIP offering’s tiered early completion bonuses. All of these respondents noted that project planning and timing was influenced by the bonuses but no respondents indicated their project’s scope was impacted in any way. Only one respondent described the bonus deadlines as difficult to meet.

While none of the respondents experienced difficulties with the CLIP participation processes, they did provide recommendations for improving the CLIP offering in the future. One respondent recommended more outreach to large business customers regarding the CLIP offering, expressing displeasure that a third party consultant, not Ameren Illinois, informed them of the offering. However, the third party consultant was a trade ally of the program. Although the respondent was very pleased with the trade ally’s performance, in both recognizing the opportunity for their project and the CLIP offering, the respondent was left unaware of their trade ally’s direct connection to the program. Other recommendations included a faster review process and a more thorough explanation of the CLIP offering’s internal review process and tiered incentive award calculations.

## Energy Advisor Interviews

In addition to dedicated program marketing, technical review, and call center staff, the Ameren Business Program has seven regional Energy Advisors who market and support energy efficiency projects to AIC commercial and industrial customers. The Energy Advisors help customers identify and address opportunities for energy efficiency through participation in the Standard, Custom, and Retro-Commissioning programs. As part of our evaluation, we interviewed the seven Energy Advisors active in the Ameren Business Program during PY8.

AIC’s service territory is divided into seven geographic territories, each the responsibility of an Energy Advisor and containing about the same number of AIC business customers. The Energy Advisors reported no issues with the size of their geographical areas or their customer responsibilities, and generally felt the program was staffed at appropriate levels. Some of the Energy Advisors mentioned that the distribution of types of customers in each Energy Advisor’s territory can influence the types of projects that are completed in a program year. For example, if a large gas customer that regularly implements energy efficiency projects is present in an Energy Advisor’s territory, that Energy Advisor will typically have an advantage in meeting gas savings goals for the year. Despite these differences in the companies within each Energy Advisor’s territory, the Energy Advisors thought the distribution of territories was fair and equitable.

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<sup>21</sup> Respondents provided project-specific satisfaction ratings for the program’s financial incentive.

The Energy Advisors were very positive about their role and about the operation and structure of the Ameren Business program as a whole. All felt their job has well-defined with reasonable responsibilities, and they agreed the Energy Advisor team operated smoothly. Energy Advisors felt that the Ameren Business Program had the right staff levels as well. The sections below provide more insight into the Energy Advisors' role, experiences, and recommendations.

### Program Mechanics & Coordination

In addition to regularly scheduled communication and meetings, Energy Advisors reported frequent informal communications with other Energy Advisors. When they encountered unfamiliar technical issues, the Energy Advisors reported frequently reaching out to their colleagues who might be more skilled in that area, as several Energy Advisors have specific technology expertise and some serve as technical reviewers.

The numerous goals set for Energy Advisors include personal goals and program-wide goals, such as goals for savings and for contacts with potential customers, for all seven combined. The Energy Advisors felt that goals were thoughtfully set and achievable, and they generally reported being able to meet them in PY8.

The Energy Advisors also reported good working relationships and substantial coordination with AIC Key Account Executives (KAEs) during PY8. KAEs have their own energy efficiency goals to meet, so there is substantial motivation for KAEs and Energy Advisors to help large customers, managed by the KAEs, complete projects through the program. Energy Advisors also cited the well-developed relationships between KAEs and large customers as beneficial in helping convert more efficiency opportunities into projects. The Energy Advisors reported that a key goal for KAEs in PY8 was scheduling site visits with customers. Several Energy Advisors cited this goal as particularly useful because it allowed Energy Advisors to visit customers alongside KAEs. These visits and joint efforts led to new customer relationships by introducing Energy Advisors to key decision makers at customer firms. The joint visits also led to enhancements to existing customer relationships.

Energy Advisors reported good working relationships with other Ameren personnel such as marketing and outreach staff and the AIC call center. Energy Advisors believe the AIC call center is effective at channeling information and leads to the Energy Advisors so that they can promptly reach out to potential customers and provide them with information on AIC's energy efficiency offerings.

### Customer Relationship and Project Acquisition

Energy Advisors believe they are successful in helping the Business Program achieve its goals and gain new participants. They identified a number of different strategies for acquiring projects depending on the types of potential customers with which they interact, customer location, and customer size. For smaller businesses or customers that may not have participated in the program before, Energy Advisors use several strategies, including cold calls, email campaigns, site visits, and responses to requests received by the AIC call center. Energy Advisors reported that they often will schedule visits to smaller customers at the same time as larger customers, or keep a list of customers in the area of larger customers so that they can conduct drop-in visits to smaller customers' when they are on a scheduled visit to a larger customer. When Energy Advisors make contact with participants and potential participants, either through a site visit or other communication, they try to understand the customer's needs and interest in program offerings, and also provide them with program information.

For larger customers and prior program participants, Energy Advisors leverage their knowledge of the customer, their facility, and their past participation in the program, if any, in order to identify opportunities for energy efficiency improvements. Energy Advisors indicated that tracking customers over time is beneficial. For



example, during a project, an Energy Advisor might notice a system that will need replacement in future years and note this information. Advisors regularly review their notes and information on customers in their territories, seeking to identify opportunities that may have arisen since their last contact with the customer. Energy Advisors reported that they continue to target past program participants and have used functions within Amplify to assist with targeted outreach to this segment.

We conducted interviews with Energy Advisors shortly after they had training on the new Lightning platform in Amplify. Energy Advisors reported that they were still learning the new Lightning platform, but that Amplify as a whole was a useful tool for a variety of tasks including slicing customer lists according to size, area, and other parameters. Energy Advisors reported that they use Amplify to filter customer segments in their territory, review the past participation of a customer, and analyze where they may have opportunities for additional program participation. Energy Advisors were generally pleased with Amplify's functionality and had adapted it effectively to their daily operations. Some Energy Advisors made suggestions for improvements and additional functions for Amplify, including additional Trade Ally search and filtering functions and better ways to flag project types, specifically Custom projects, among past participants.

### Marketing, Barriers to Participation, and Customer Understanding of the Marketplace

Several Energy Advisors discussed the marketing of AIC's programs to business customers and how that process has evolved through time. One consistent point was that past participants are often a good group to target for additional marketing efforts. When asked what program components are typically marketed to past participants, several Energy Advisors noted that past participants often have already performed lighting work at their facilities and they, therefore, try to promote deeper energy saving measures offered by the program. Some of the Energy Advisors noted, however, that depending on when a customer implemented a lighting project, they may be seeking to make additional energy efficient lighting improvements as technology has advanced significantly in recent years.

Energy Advisors believe that both the level and type of marketing performed by the program was effective. Some Energy Advisors noted issues with reaching the correct decision maker for certain customer segments, particularly at national chains where the local staff at a facility are typically not the decision makers for the that facility's energy efficient equipment purchases.

All Energy Advisors noted that the Business Symposium is a very effective marketing tool that brings in a large number of past and potential future participants at the start of the program year and is a great way to kick off the program year. In particular, Energy Advisors noted that the bonuses offered to Symposium attendees are a key to driving early participation in the program year. Several Energy Advisors also cited the 9/6/3 Early Participation bonus as an effective way to drive program participation and spread the participation out throughout the year, as well as to create additional incentives for early participation.

Some of the Energy Advisors noted challenges and obstacles to customer participation in PY8. One Energy Advisor noted that for many customers, energy efficiency projects must take a secondary role compared to production at a facility. Several Energy Advisors noted that capital limitations and return on investment are both frequent issues for customers when they consider an energy efficient project. Energy Advisors gave mixed commentary on customers' awareness of Ameren's programs. Some Energy Advisors said that customer understanding of the program was strong in PY8, especially compared to earlier years in the program, and especially among larger customers. However, a subset of Energy Advisors noted that among their smaller customers the program may not be well known and more work is required to reach those customers. One Energy Advisor noted that some customers do not know that they have contributed to the funds that are available through AIC's incentives.

Energy Advisors reported that they interact with program allies approximately every week, typically when program allies reach out to the Energy Advisors. These interactions sometimes are focused around customer-specific questions, or questions about applications. Approximately half of the Energy Advisors suggested that more could be done to improve the relationship between program allies, Energy Advisors, and the program in general. One of the suggestions made by Energy Advisors was to increase program ally knowledge of the details of the program, as well as encouraging program allies to seek to maximize opportunities for customers to participate in AIC's programs. Energy Advisors noted that program allies are a key way to bring in new customers to the program, and therefore it is important that program allies consistently have the most up to date information about the program. One suggested way to keep program allies informed was to host brown bag or breakfast meetings periodically throughout the program year to discuss program benefits, offerings, and changes.

When asked about potential customer confusion due to multiple energy efficiency programs operating concurrently in Illinois, five of the seven Energy Advisors said there was some confusion among their customers. The Energy Advisors noted that the main area of confusion was among smaller customers who were confused about whether they should participate through the small business offerings or through Standard business pathways. Energy Advisors said they typically will redirect customers to the appropriate program if they are confused about program offerings.

### Areas for Improvement

Energy Advisors had several comments and thoughts on areas where the program could improve. Several comments focused on the pipeline of projects throughout the year. Some Energy Advisors noted that there can be a rush of customers seeking to complete projects either early or at the end of the program year. Energy Advisors thought this could be smoothed out over the course of the program year by making some program changes. One such change would be allowing customers to pre-register projects they are interested in completing so that Energy Advisors could reach out to them over the course of the year. Several Energy Advisors also suggested that the applications could be further streamlined, including allowing customers to enter information into the application system once so that it does not need to be entered repeatedly if the customer completes multiple applications.

Some Energy Advisors also noted that a challenge in PY8 was related to the maturity of the Business program. Because lighting is an easy entry point for many participants, the Energy Advisors have tried to move customers towards deeper savings measures and to also have them consider other lighting projects if they were early adopters of efficient lighting. Two Energy Advisors noted that the program should continuously monitor and re-evaluate its offerings as the market evolves and new technologies are introduced so that the program can offer incentives on the latest equipment to customers.

### Staffing Grants

We completed interviews with six of the twelve staffing grant recipients. Two of the six participants completed two projects and the other four completed only one project each. While the population of project types completed with the assistance of the Staffing Grants included steam trap repair and replacement, retro-commissioning, Custom projects, and standard lighting for business projects, we were unable to complete interviews with any participants that used Staffing Grants on Custom Program projects.

Each of the interviewed participants reported that their company and facility energy efficiency project decision making process primarily relies on payback period and return on investment. Several Staffing Grant recipients explained that energy efficiency projects are compared against other capital projects to determine which are most cost effective, typically using a payback period of one to two years.



None of the interviewed participants reported hiring additional employees as a result of the Staffing Grant funds. Only one of the six respondents said that they had reassigned internal staff to support the implementation of energy efficiency projects after receiving Staffing Grant funds. The other five used the funds to hire external consultants and contractors to help with the projects and to improve the overall financial outlook for the projects. The additional funding made it easier for grant recipients to justify the use of limited capital resources on the selected projects as compared to other projects they considered at their facilities.

Respondents reported learning about the Staffing Grant offering in a variety of ways. Two participants reported that they first learned of the Staffing Grant offering by attending the Business Symposia. One of the two noted that the Staffing Grant was not presented in detail at those events and that could be an area for improvement. One respondent became aware of the offering while researching funding sources for energy efficiency projects, and was generally aware of AIC's offerings from past experience. Two respondents reported that they heard of the Staffing Grant through direct contacts from Ameren staff, such as their Energy Advisors. One respondent said that a contractor initially told him about the Ameren offerings. One recipient told us that they first learned of the AIC Business Program and the Staffing Grant from bill inserts detailing the programs. This recipient noted that if it were not for the decision maker opening the mail that day and seeing the bill insert, they would not have learned about the program and would likely not have completed the energy efficiency project. We heard a similar sentiment from several Energy Advisors when asked if they thought marketing efforts reached the right audience. Some noted that they did not think all marketing materials reached decision makers.

All six of the interviewed participants reported that they received help from program staff when filling out applications for the Staffing Grant. This support ranged from answering questions to assistance with filling out program documentation. Several participants reported that the timing of the Staffing Grant made it difficult for them to take advantage of the opportunity: they did not have enough lead time to identify projects and make decisions about applying for the Staffing Grant before the applications were due to AIC. These participants suggested that having longer lead times, or other ways to better anticipate and align project and funding cycles, would help them participate to a greater degree. One participant noted that the timing of Staffing Grant deadlines was difficult in relation to other Business Program incentives. They had to first receive confirmation of the Staffing Grant funds before they could pursue other Business Program offerings for the same projects, which led to some uncertainty about the overall project funding and whether it could be completed.

Staffing Grant participants recommended several areas in which AIC could improve the Staffing Grant offering. Some participants suggested that AIC could provide additional value by helping to identify projects that might be viable candidates for Staffing Grants. One participant also suggested that AIC could assist potential Staffing Grant participants with technical reviews of projects to help them move beyond relatively simple lighting projects towards more advanced measures and deeper energy savings. One Staffing Grant recipient noted that the program could do more to market directly to smaller businesses who otherwise may not hear about AIC's energy efficiency offerings.

Overall, respondents report high satisfaction with all phases of the Staffing Grant process. Using a scale of 0 to 10 where 0 is "very dissatisfied" and 10 is "very satisfied," participants provided mean satisfaction ratings for the application process, the final review process, and the grant award process of 7.8, 9.5, and 8.0, respectively. Notably, one respondent reported very low levels of satisfaction with the application process and the grant award process, bringing down the average ratings. This respondent noted that the application is overly complicated and difficult to complete, with multiple deadlines that are difficult to meet. This grant recipient also noted that they often must decide at the beginning of the year what projects to work on and dedicate staff time to developing without any assurance of receiving the grant money.

## Metering and Monitoring Pilot

The evaluation team interviewed five participants of the Metering and Monitoring Pilot Offering. All respondents in the Metering and Monitoring pilot installed some combination of meters or sub-meters to measure equipment energy use. These participants also installed software which allowed them to save and view the data gathered by the monitoring equipment. One respondent installed analytics software, which provides analyses and interpretations of the monitoring data to allow the participant to more quickly identify potential equipment issues and savings opportunities. Each respondent reporting having specific goals in mind for the monitoring equipment and meters installed through the program, which resulted in the meters being utilized in a variety of ways.

Overall, participants had a positive experience with both the application process and their equipment supplier. A few participants noted that they needed to reach out to their Ameren Illinois Energy Advisor with questions while they were filling out the application.

## Participant Characteristics

Metering and Monitoring Pilot Offering participants were primarily from the healthcare sector (5/8) with a few participants from the manufacturing and education sectors. Most respondents reported learning about the program through their Ameren Energy Advisor, emails from AIC, or through the Business Program Symposium. Overall, participants' decisions to participate in the program were primarily motivated by a desire to gather baseline data to prove out future savings, track equipment performance, and maintain the safety and reliability of equipment. In addition, participants were motivated to participate in the program by the size of the incentive offered by the Business Program. Participants frequently said that the incentive made purchasing a metering and monitoring system justifiable for their organization from a budget standpoint when it had not been previously.

## Metering and Monitoring Implementation

Prior to participating in the Metering and Monitoring Pilot Offering, three of the five respondents had some form of energy monitoring strategy in place. These three respondents monitored their energy usage by either using their building automation system to monitor usage or monitoring usage by reviewing energy bills. Those participants previously reliant on reviewing bills to track energy usage noted that this strategy did not allow them to isolate issues with specific equipment or buildings. In order to address this issue, most participants installed sub-meters or combinations of single meters and sub-meters through the program to monitor energy usage in a more granular manner.

Participants installed the metering and monitoring components on a variety of equipment types, including chillers, breakers, HVAC systems, motors, and sub-panels, and used the metering and monitoring components to optimize the use of their equipment in a variety of different ways. Some respondents used their metering and monitoring systems to optimize the scheduling of their equipment to run the equipment in the most efficient way possible. Others used the system to identify equipment that needed maintenance or repair. No respondents stated that they had used their metering and monitoring system to identify equipment that needed replacing, but most stated that they planned to use their system for this purpose in the future.

## Benefits and Barriers

Participants found the largest benefit of their metering and monitoring systems to be the ability to use the systems to better understand their equipment performance and identify troubleshooting opportunities. Facility energy managers felt that this data also helped them to educate other employees, stewards, and occupants of their facilities about energy management and energy savings opportunities. Participants recognized that a second large benefit of the equipment was the ability to gather baseline data to prove out energy savings, especially in concert with the Strategic Energy Management (SEM) program. Participants plan to use this baseline data to qualify for future incentives. Organizations in the medical sector expressed an added safety benefit to installing metering and monitoring systems, because they were able to better understand, predict, and troubleshoot equipment failures. These facilities depend on reliable equipment to provide stable care to their patients. Several participants felt that they were able to save money through the savings opportunities identified with their metering and monitoring systems, which lead to further investment in their facilities or new efficient equipment.

The facilities managers interviewed identified two main barriers to program implementation. First, participants without an analytics component to their system found it difficult to find time to sit down and make sense of the data output from their metering and monitoring system. Similarly, many respondents had yet to apply for the performance component of the incentive, because of the time required to go through the data to fill out the incentive application. The participant that did install analytics software did not report the same challenges with data management and found that their software made the data easy to share, report, and analyze. The second identified challenge was that installing the metering and monitoring system often required all the equipment in a facility to be shut off. This was often difficult to schedule for facilities like hospitals and manufacturing facilities that rely on this equipment for their core functions.

## 3.2 Impact Assessment

For the Custom Program, we verified program participation and gross impacts through site visits with a sample of participating customers. The site-specific measurement and verification led to the development of a gross realization rate that was applied to the population of all projects in the program.

### Site-Specific Results

Table 17 presents the results of the gross savings analysis for the 38 Custom Program sites in our sample.<sup>22</sup> Realization rates for individual projects ranged from 11% to 216% for electric and 7% to 122% for gas. Across both fuel types, the realization rate of only 45% of sampled projects fell within  $\pm 20\%$  of the project's ex ante estimate.<sup>23</sup>

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<sup>22</sup> Detailed site visit reports from 10 of the largest Custom Program projects are included in Appendix G.

<sup>23</sup> Although site visit data includes both electric and gas savings where available, only the savings and realization rates associated with the fuel type for which the project was sampled are used for analysis of overall program results.

Table 17. PY8 Gross Impact Realization Rate Results for the Custom Program Sample

Project ID	Sample			Ex Ante Savings			Ex Post Savings			Realization Rate		
	Fuel Type	Wave	Stratum	kW	kWh	Therm	kW	kWh	Therm	kW	kWh	Therm
700021	Electric	1	3	590	4,240,078	0	452	3,245,402	0	77%	77%	N/A
700418	Electric	1	3	142	1,063,296	0	146	1,246,695	0	103%	117%	N/A
700659	Electric	1	1	7	42,682	0	1	13,014	0	12%	30%	N/A
700696	Gas	1	2	-13	-60,314	40,749	-11	-48,367	23,696	83%	80%	58%
700773	Gas	1	2	52	529,329	19,408	7	58,974	0	13%	11%	0%
701170	Electric	1	3	164	1,433,398	0	164	1,433,398	0	100%	100%	N/A
800008	Gas	2	Certainty	0	0	250,000	0	0	304,947	N/A	N/A	122%
800026	Electric	1	3	763	6,683,947	0	768	6,727,252	0	101%	101%	N/A
800033	Electric	1	3	563	4,797,293	0	575	4,897,575	0	102%	102%	N/A
800040	Electric	1	2	49	551,997	0	41	376,047	0	84%	68%	N/A
800053	Electric	2	2	181	1,517,097	0	181	1,517,097	0	100%	100%	N/A
800059	Gas	2	2	0	0	34,839	0	0	52,054	N/A	N/A	149%
800070	Electric	2	2	561	4,917,561	0	646	5,659,299	0	115%	115%	N/A
800071	Electric	2	2	1,230	10,771,178	0	1,230	10,771,178	0	100%	100%	N/A
800073	Electric	1	3	248	1,858,538	0	258	2,257,496	0	104%	121%	N/A
800114	Gas	1	1	0	20,808	370	0	4,721	0	N/A	23%	0%
800121	Electric	1	1	0	20,738	433	0	26,870	433	N/A	130%	100%
800127	Electric	1	2	66	578,160	0	68	545,809	0	103%	94%	N/A
800207	Gas	1	2	0	0	11,069	0	0	8,214	N/A	N/A	74%
800223	Electric	1	2	66	688,609	0	66	750,080	0	100%	109%	N/A
800264	Gas	1	1	0	30,608	683	0	40,908	244	N/A	134%	36%
800291	Electric	1	3	93	815,644	0	72	626,590	0	77%	77%	N/A
800377	Electric	1	1	2	12,539	0	2	15,913	0	120%	127%	N/A
800397	Gas	1	2	0	0	21,982	0	0	9,443	N/A	N/A	43%
800546	Gas	1	2	0	0	5,920	0	0	3,881	N/A	N/A	66%

Project ID	Sample			Ex Ante Savings			Ex Post Savings			Realization Rate		
	Fuel Type	Wave	Stratum	kW	kWh	Therm	kW	kWh	Therm	kW	kWh	Therm
800575	Electric	2	2	193	1,692,730	0	64.4	655,820	0	33%	39%	N/A
800592	Electric	2	2	115	1,167,422	0	115.0	1,167,422	0	100%	100%	N/A
800596	Gas	2	2	0	0	6,658	0	0	8,701	N/A	N/A	131%
800597	Electric	2	1	28	187,137	0	31	247,761	0	113%	132%	N/A
800622	Electric	1	2	48	580,521	0	49	444,934	0	103%	77%	N/A
800715	Dual	1	E2/G2	52	456,854	18,140	53	467,692	18,140	102%	102%	100%
800793	Electric	2	1	14	70,306	0	13	62,566	0	90%	89%	N/A
800879	Gas	1	2	0	0	5,138	0	0	5,138	N/A	N/A	100%
800904	Electric	1	2	34	190,667	0	30	184,193	0	90%	97%	N/A
800926	Gas	1	2	0	0	13,104	0	0	945	N/A	N/A	7%
800962	Electric	1	1	1	12,190	0	3	26,331	0	216%	216%	N/A
801387	Gas	2	1	0	0	325	0	0	111	N/A	N/A	34%
900015	Dual	2	E1/G2	7	56,627	6,009	7	57,970	6,009	102%	102%	100%
Total				5,255	44,927,639	434,826	5,030	43,480,637	441,956	97% (weighted)	98% (weighted)	118% (weighted)

Note: Although site visit data includes both electric and gas savings where available, only the savings and realization rates associated with the fuel type for which the project was sampled are used for analysis of overall program results.

Table 18 presents the electric savings results of the gross savings analysis for the 38 Custom Program sites in our sample by technology category.

**Table 18. Custom Program Site Visit Results: Electric and Demand Impacts**

Technology	Quantity	kW Savings			kWh Savings		
		Ex Ante	Ex Post	Realization Rate	Ex Ante	Ex Post	Realization Rate
Compressed Air	8	1,901	1,757	92%	16,739,255	2,419,094	99%
Pumps/Fans	4	1,554	1,635	105%	13,670,602	14,279,695	105%
VFDs	1	590	452	77%	4,240,078	3,245,402	77%
Lighting Retrofit	3	347	354	102%	2,737,814	3,191,769	117%
EMS/Controls	9	111	67	60%	1,114,965	657,135	59%
New Construction Lighting	3	36	34	94%	242,358	276,688	114%
Boiler/Furnace	6	-11	-8	N/A	-48,124	-22,036	N/A
Miscellaneous	4	727	738	102%	6,230,691	6,330,973	102%
<b>Total</b>	<b>38</b>	<b>5,255</b>	<b>5,030</b>	<b>97% (weighted)</b>	<b>44,927,639</b>	<b>43,480,637</b>	<b>98% (weighted)</b>

Note: Although site visit data includes both electric and gas savings where available, only the savings and realization rates associated with the fuel type for which the project was sampled are used for analysis of overall program results.

Below we highlight the major differences between ex ante and ex post savings estimates:

- The high realization rate for lighting projects was due to one large project. The ex ante savings for this project were based on a conservative estimate of 7,500 hours per year. During the onsite visit, the customer confirmed that the facility operates 24/7, and the hours of operation were revised to 8,760 hours per year in the ex post analysis. Additionally, there were additional savings as the customer had added 30 fewer fixtures than originally assumed.
- The low realization rate for EMS/Controls measures was driven by one large project. The evaluated savings for this project were lower than the ex ante estimate due to poor commissioning of the new building controls. During the site visit at this facility, the customer stated they did not have a great understanding of the new controls system, or how the controls contractor had set things up to work after the project completion. For example, the system was supposed to be scheduled to be off during the weekends, but was found to be scheduled consistently seven days per week. Additionally, the heating temperature setpoint was higher than expected, the cooling temperature was lower than expected, and the setbacks were less than expected.
- The low realization rate for the VFD project was due to two main adjustments to this project. The first is that the measured power factor of the system was found to be 0.75 instead of the 0.8 that was assumed in the ex ante calculations. The second reason is that additional post-installation operational data was included in the ex post analysis. The customer provided an additional nine days of metered data, where the system was generally operating at a higher power. The customer indicated they often operate similar to the operation during both periods. This extra data increased the post-installation usage, and therefore reduced the savings.

Table 19 presents the natural gas savings results of the gross savings analysis for the Custom Program gas projects in our sample by technology category. Note that some of the projects listed in Table 18 also appear in Table 19 because they achieved both electricity and gas savings. Overall, there was more variation in the

realization rates for technologies with gas savings compared with the electric savings. Among gas measure categories, variation was similar with the exception of the miscellaneous category.

**Table 19. Custom Program Site Visit Results: Gas Impacts**

Technology	Quantity	Therm Savings		
		Ex Ante	Ex Post	Realization Rate
EMS/Controls	9	91,677.9	90,719.6	99%
Boiler/Furnace	6	71,166.4	36,846.4	52%
Miscellaneous	4	271,981.6	314,389.9	116%
<b>Total</b>	<b>19</b>	<b>434,826</b>	<b>441,956</b>	<b>118% (weighted)</b>

The evaluation team made the following adjustments as part of the gross impact analysis:

- The low realization rate for the boiler and furnace measure group is due a baseline adjustment made to one project. This customer had two boilers at their facility, one which served the steam load and the other which served the space heating load. Only the space heating boiler was part of the project. However, the ex ante analysis assumed that the gas savings were attributable to the entire facility usage. This overestimated the baseline usage of the system. Removing the steam boiler from the baseline reduced the savings.
- Natural gas savings in the “miscellaneous” category was increased due to removing a correction factor that was applied to the ex ante savings estimate of a thermal oxidizer project. The correction factor was applied by the program implementer to be conservative. However, during the onsite visit, the evaluation team determined the uncorrected savings were reasonable and appropriate. This increase was slightly offset by a waste heat recovery water heating project where the flow rate of water heated was less than assumed. According to the data collected during the site visit, the actual flow rate of water is approximately 3 GPM instead of the 5 GPM assumed in the ex ante analysis.

## Overall Program Results

Table 20 below presents the overall Custom Program realization rates, based on the site visit results detailed above. These results reflect the pooled results from a two-wave sample design and are not the simple average of the two waves. The relative precision of the electric savings is 2.8% for kWh and 2.7% for kW. For gas projects, the relative precision is 0.4%.<sup>24</sup>

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<sup>24</sup> Note that these precision estimates calculated only account for the projects in the sample frame at the time of the gross impact analysis sampling effort (July 20, 2016). It does not include 12 projects that ultimately appeared in the final PY8 tracking data but did not show a completed application status (i.e., “check sent” or “sent check to processor”) at the time of the sampling and therefore had no chance to be sampled. These projects accounted for large shares of total overall savings: 45% of ex ante kWh savings and 45% of ex ante therm savings. Including these projects in the sample frame would have likely changed the projects selected for site visits and therefore may have also resulted in a different realization rate and relative precision for the sample.



Table 20. Custom Program Gross Impacts

Program	Projects	Ex Ante Gross			Ex Post Gross			Realization Rate		
		MW	MWh	Therm	MW	MWh	Therm	MW	MWh	Therm
Custom	203	12.5	111,289	806,747	12.1	109,884	948,719	97%	99%	118%

### 3.2.1 Net Impacts

As described in the methodology section, the team applied the SAG-approved NTGR values<sup>25</sup> to Custom Program gross impacts to determine PY8 net impacts for all Custom Program projects except those completed through the CLIP and Staffing Grant initiatives. Including the retrospective NTGR of these projects resulted in a slight increase in the overall NTGR compared to the deemed values.<sup>26</sup>

- Based on interviews with participants representing seven CLIP projects, we developed NTGR values of 0.944 for electric savings and 0.934 for gas savings and applied these retrospectively to all PY8 CLIP projects. We developed an MBTU-weighted NTGR of 0.934 applicable to both electric and gas savings. We then applied a CLIP-specific PY7 participant spillover rate of 0% and a non-participant spillover rate of 1% for electric and 0% for gas savings based on the PY5 non-participant spillover analysis.
- Because no Staffing Grant participants we interviewed had associated Custom projects, we did not adjust any Custom project NTGRs based on the Staffing Grant offering.

Table 21 presents the PY8 net impacts for the Custom Program based on the CLIP and Staffing Grants results and the application of SAG-approved NTGRs.

Table 21. Custom Program Net Impacts

Savings Category	Ex Post Gross	Effective NTGR	Ex Post Net
Energy Savings (MWh)	109,884	0.813	89,456
Demand Savings (MW)	12.1	0.814	9.8
Gas Savings (Therms)	948,719	0.852	807,973

<sup>25</sup> We applied a NTGR of 0.751 for electric savings, based on PY5 research, and 0.830 for gas savings, based on the PY6 research.

<sup>26</sup> The increase in NTGR was the difference between the deemed rate and the effective rate (i.e., 0.062 for MWh, 0.063 for MW, and 0.022 for therms).



## 4. Conclusions and Recommendations

Our research found that PY8 was another successful year for the Custom Program, in terms of achieved savings, participant satisfaction, and program implementation. Below we highlight some general conclusions and recommendations from our research.

- **Finding #1** The program achieved ex ante to ex post gross realization rates of close to 100% in PY8, which is an improvement from PY7. The majority of significant adjustments to ex ante gross savings were made to small, not large, projects. In order to maintain high realization rates in the future, we recommend the following:
  - **Recommendation #1.** The program may consider an additional incentive or rebate for ensuring controls are properly commissioned. This can help ensure that controls are not left to be set by customers without the expertise needed to properly commission the system.
  - **Recommendation #2.** Whenever possible, we suggest utilizing kW metering for any pre- or post-project measurement and verification (M&V) completed. This will reduce any instances of incorrectly assumed power factors. In the event that kW cannot be directly metered, the program should obtain careful measurements of the power factor during the site visit. Additionally, when using measured amp data, the loading of the metered motor must be examined so that power factors can be adjusted if the motor is under lower loading conditions.
  - **Recommendation #3.** We recommend reviewing the gas usage of the entire facility carefully to separate out any constant loads from space heating loads. This will ensure that the proper loads are utilized in space heating calculations for boiler efficiency projects.
- **Finding #2.** Participants learn about the Custom Program in a variety of ways, including through contractors, AIC key account executives, or through direct marketing such as emails or bill inserts. Both Energy Advisors and program participants noted how opportunities may be lost if marketing efforts do not reach the right audience or marketing materials do not reach decision makers.
  - **Recommendation #4.** The program should continue to diversify its marketing and outreach efforts to ensure that it is reaching all types of businesses and the decision makers within those businesses.
- **Finding #3.** All participants of the metering and monitoring pilot expressed high satisfaction with the pilot and expressed interest in seeing the program expanded. Participants would like to see the program expanded so that they can add more sub-meters and further isolate savings opportunities, or expand their metering and monitoring program to other facilities within their organizations.
  - **Recommendation #5.** The metering and monitoring pilot offers an opportunity for repeat participants to identify new savings opportunities as the most obvious improvements may have already been made. AIC could consider providing a bonus incentive for analytic software as a component of the pilot as one method of helping to maximize potential savings.
- **Finding #4.** The Business Program offers a variety of initiatives and, as a result, some participants noted difficulty coordinating between the different offerings. For example, one Staffing Grant participant had to first receive confirmation of the Staffing Grant funds before they could pursue other Business Program offerings for the same projects, which led to some uncertainty about the project's funding and timing.

- **Recommendation #6.** To the extent possible, the program should be aware of common crossover points within the Custom Program and other Business programs and provide guidance to customers participating in multiple offerings to ensure smooth participation as well as to maximize savings.
- **Finding #5.** While not a major source of dissatisfaction, both participants and Energy Advisors suggested that the application process could be further streamlined.
- **Recommendation #7.** Suggestions to improve the application process included the ability for customers to pre-populate parts of the online application so that it does not need to be entered repeatedly for multiple applications and increasing the speed of the review process.

## Appendix A. Data Collection Instruments

We provide each of the data collection instruments below, as well as in a separate PDF document.



Ameren PY8 C&I  
Custom Participant :



Ameren CI PY8 CLIP  
Interview Guide\_FIN



Ameren CI Custom  
Metering and Monit



Ameren PY8 CI  
Staffing Grant Inten

## Appendix B. Program Ally Research Memo

For convenience, the previously delivered program ally research memo is embedded below and provided as a separate PDF document.



AIC PY8 Program  
Ally Research Memo

## Appendix C. Survey Response Rate Methodology

The survey response rate (RR) is the number of completed interviews divided by the total number of potentially eligible respondents. We calculated RR3 using the standards and formulas set forth by the AAPOR.<sup>27</sup> The formulas used to calculate RR3 are presented below.

### Equation 1. Formula for Response Rate 3

$$RR3 = \frac{I}{(I + N + e1(U1 + e2 * U2))}$$

Where:

$$e1 = \frac{(I + N)}{(I + N + X1)}$$

$$e2 = \frac{(I + N + X1 + U1)}{(I + N + X1 + U1 + X2)}$$

**Table 22. Custom Program PY8 Participant Survey Dispositions**

Category Key	Disposition
I	Complete
N	Eligible Incomplete Interview
X1	Survey-Ineligible Business
U1	Wrong number
X2	No answer/busy
U2	Refusal/terminate/not available
e1	Estimated proportion of cases of unknown survey eligibility that are eligible
e2	Estimated proportion of cases of unknown properties eligibility that are eligible

<sup>27</sup> *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](http://www.aapor.org/AM/Template.cfm?Section=Standard_Definitions2&Template=/CM/ContentDisplay.cfm&ContentID=3156).

## Appendix D. Custom Participant NTG Results

In PY8, the evaluation team conducted research with participants to update the Custom Program's net-to-gross-ratios (NTGRs) for application in PY10. Consistent with prior program years, we developed the NTGRs using self-reported information from computer-assisted telephone interviewing (CATI) surveys with program participants. We used participant survey data to develop estimates of free-ridership (FR) and participant spillover (PSO). We incorporated our estimate of non-participant spillover (NPSO) from our PY7 research.

### Key Findings

Table 23 presents the results of our PY8 NTG analysis for application in PY10.

**Table 23. Updated Custom NTGRs from PY8 Research**

Offering	Free-Ridership	Participant Spillover	Non-Participant Spillover <sup>a</sup>	NTGR (1-FR+PSO+NPSO)
Custom - Electric	0.178	0.00	0.00	0.822
Custom - Gas	0.061	0.00	0.00	0.939

<sup>a</sup> From PY7 research

### 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 but were influenced by it.

The formula to calculate the NTGR is:

$$\text{NTGR} = 1 - \text{FR} + \text{PSO} + \text{NPSO}$$

The Illinois Evaluation Teams have worked 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 NTG Methods attachment to the Illinois TRM,<sup>28</sup> all NTG data collection and analysis activities for program types covered by the attachment that began after June 1, 2016 must conform to the statewide NTG methods. This evaluation conforms with these requirements.

<sup>28</sup> Illinois Statewide Technical Reference Manual for Energy Efficiency: Attachment A – Illinois Statewide Net-to-Gross Methodologies. February 8, 2016.

# Free-Ridership

## Methodology

Free-riders are program participants who would have installed the same energy-efficiency measure(s) or taken the same energy saving actions without program support. Free-ridership estimates are based on a series of questions that explore the influence of the program on participants’ purchasing decisions as well as actions the participant likely would have taken had the program not been available.

As prescribed by the Core Non-Residential Protocol in the NTG Methods attachment, we implemented six specifications of the free-ridership algorithm for Custom projects included in the participant survey.<sup>29</sup> 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 higher 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 algorithms, their variations, and the timing adjustment are described below.

- 1. **Influence of Program Components (PC).** This score is based on a series of 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 include items such as the availability of the incentive, recommendations from market actors, and previous program experience. Non-program components considered include standard industry practice, recommendations from a project design consultant, and corporate policy. Table 24 summarizes the program and non-program components included in the algorithm.

Table 24. Components and Assignments by Offering

Type	Component
Program factor	Program incentive
	AIC feasibility study (if applicable)
	Previous experience with the program
	Recommendation from program staff
	Information from program marketing materials
	Endorsement or recommendation from Key Account Executive (if applicable)
Non-program factor	Recommendation from project planning or design consultant
	Standard practice in business or industry
	Corporate policy or guidelines

<sup>29</sup> In this appendix, we present results from all six specifications of free-ridership for the Custom offering (both versions of Algorithm 1 through Algorithm 3), select one algorithm as our choice to calculate program free-ridership, and justify our choice of algorithm.



Type	Component
Either depending on follow-up	Previous experience with equipment
	Payback on investment
Either depending on factor	Other factors
Either depending on if vendor was a program ally	Recommendation from vendor

We estimate the Program Components score in two different ways, referred to as “Program Components FR Score A” and “Program Components FR Score B.” Program Components FR score A is based on ratings for program factors only. The free-ridership score is calculated as:

#### Equation 2. Program Components FR Score A

$$PCS_A = 1 - \left( \frac{PF_{max}}{10} \right)$$

Greater importance of the program components means a 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 FR score A would be 0 because PFmax (in equation 1) would be 10 (i.e., the maximum score across all program factors)

Program Components FR score B is based on ratings for both program and non-program factors. The free-ridership score is calculated as:

#### Equation 3. Program Components FR Score B

$$PCS_B = 1 - \left( \frac{PF_{max}}{PF_{max} + NPF_{max}} \right)$$

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 (a program factor) and corporate policy (a non-program factor) as 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 are 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.

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:

$$\text{No-Program Score} = \text{Likelihood to Install Same Equipment} / 10$$

A greater likelihood of installing the exact same energy efficient equipment 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 calculated in three ways in accordance with the NTG Methods attachment and incorporates information from one or two survey questions. The first question elicits: (1) whether 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. The second question asks the respondent to provide a likelihood, on a 0 to 10 point numeric scale, of implementing the same measure within 12 months of when it was actually implemented.

The three timing adjustments are referred to as Timing Adjustment 1, Timing Adjustment 2, and Timing Adjustment 3.

#### *Timing Adjustment 1*

Timing Adjustment 1 uses only the first question. In this adjustment, later purchases without the program means a 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. Timing Adjustment 1 is calculated as follows:

$$\text{Timing Adjustment 1} = 1 - (\text{Number of Months Expedited} - 6) / 18^{30}$$

Timing Adjustment 1 is used in Approaches 1A and 1B. It is applied multiplicatively to the No-Program FR score.

#### *Timing Adjustment 2*

Timing Adjustment 2 uses both timing adjustment questions. In this adjustment, later purchases without the program means a lower level of free-ridership, but the likelihood of implementing without the program is also taken into account. Like Timing Adjustment 1, this adjustment is calculated on a 0 to 1 scale, and 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. Timing Adjustment 2 is calculated as follows:

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<sup>30</sup> Please note that the NTG Methods attachment prescribes a divisor of 42 and a “number of months expedited” that can range up to 48 months. In these implementations of the algorithm, we allow “number of months expedited” to range up to only 24 months and adjust the divisor appropriately in order to provide responses that are more realistic for the type of purchase (lighting products) captured in this assessment.

$$\text{Timing Adjustment 2} = 1 - ((\text{Number of Months Expedited} - 6) / 18^{31}) * ((10 - \text{Likelihood of Implementing within One Year}) / 10)$$

Timing Adjustment 2 is used in Approaches 2A and 2B. It is applied multiplicatively to the average of the Program Components, Program Influence, and No-Program scores.

### Timing Adjustment 3

Timing Adjustment 3 uses only the second timing adjustment question. In this adjustment, decreased likelihood of implementing the project within one year without the program means a lower level of free-ridership. This adjustment is calculated on a 0 to 1 scale. Timing Adjustment 3 is calculated as follows:

$$\text{Timing Adjustment 3} = \text{Likelihood of Implementing within One Year} / 10$$

Timing Adjustment 3 is used in Approaches 3A and 3B and is averaged with the No-Program FR Score. If the average is greater than the No-Program FR score, the Timing Adjustment is discarded. If the average is smaller than the No-Program FR score, the average is used in place of the No-Program FR score.

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

- **Approach 1A:** (Program Components FR Score A + Program Influence Score + [No-Program Score \* Timing Adjustment 1]) / 3
- **Approach 1B:** (Program Components FR Score B + Program Influence Score + [No-Program Score \* Timing Adjustment 1]) / 3
- **Approach 2A:** (Program Components FR Score A + Program Influence Score + No-Program Score) / 3 \* Timing Adjustment 2
- **Approach 2B:** (Program Components FR Score + Program Influence Score + No-Program Score) / 3 \* Timing Adjustment 2
- **Approach 3A:** ((Program Components FR Score + Program Influence Score) / 2 + (MINIMUM((No-Program Score + Timing Adjustment 3) / 2, No-Program Score)) / 3
- **Approach 3B:** ((Program Components FR Score + Program Influence Score) / 2 + (MINIMUM((No-Program Score + Timing Adjustment 3) / 2, No-Program Score)) / 3

In each specification, one of the two variants of the Program Components Score, the Program Influence Score, and No-Program score are combined with a timing adjustment. Table 25 below summarizes the differences between the six free-ridership specifications.

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<sup>31</sup> Please note that the NTG Methods attachment prescribes a divisor of 42 and a “number of months expedited” that can range up to 48 months. In these implementations of the algorithm, we allow “number of months expedited” to range up to only 24 months and adjust the divisor appropriately in order to provide responses that are more realistic for the type of purchase (lighting products) captured in this assessment.

Table 25. Free-Ridership Algorithm Specifications

Free-Ridership Algorithm Specification	Program Components FR Score	Program Influence Score	No-Program Score	Adjusted No-Program Score	Overall Timing Adjustment
Approach 1A	A	✓		✓	
Approach 1B	B	✓		✓	
Approach 2A	A	✓	✓		✓
Approach 2B	B	✓	✓		✓
Approach 3A	A	✓		✓	
Approach 3B	B	✓		✓	

We used Cronbach's alpha as a tool to help us evaluate the different algorithm specifications.<sup>32</sup> 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 examined and compared free-ridership results across algorithms.

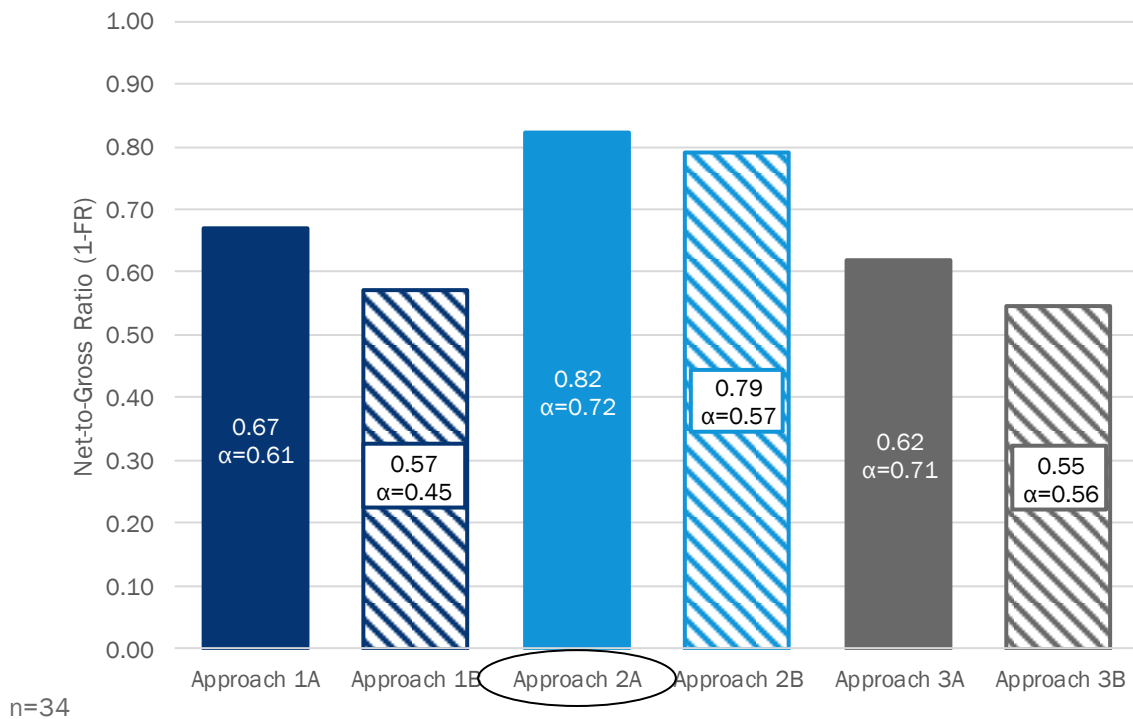
## Results

Figure 4 presents our estimates of electric NTGR for the Custom Program without SO included (i.e., calculated as 1-FR) for each of the six specifications of the FR algorithm discussed above. Figure 5 presents our estimates for gas projects.<sup>33</sup> The figures also show the associated Cronbach's alphas. A higher Cronbach's alpha means an increased internal consistency between the three scores developed. As discussed below, we choose Approach 2A as our specification of choice for this evaluation.

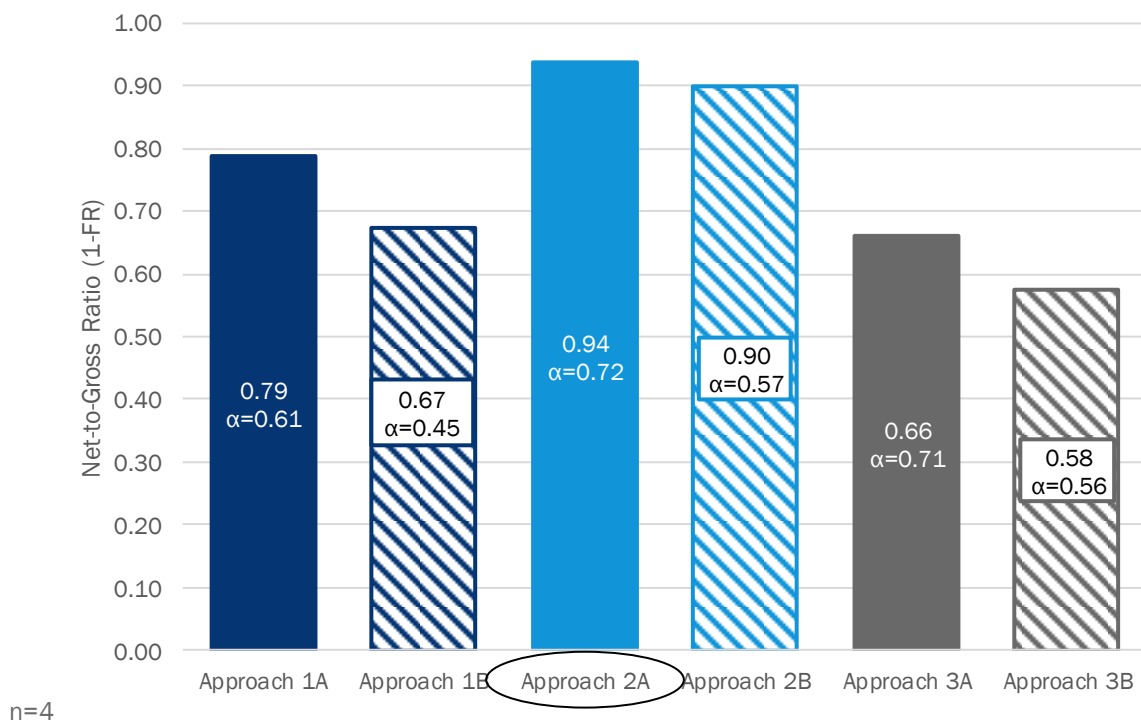
<sup>32</sup> Cronbach's alpha is a test that examines the consistency of tests that measure the same construct.

<sup>33</sup> Note that for gas projects, as in past years, our gas NTGR is based on a small sample size, as there were only a small number of projects available to complete interviews with in PY8.

**Figure 4. Custom Program NTGR (1-FR) and Cronbach's Alphas by Approach**



**Figure 5. Custom Program Gas NTGR (1-FR) and Cronbach's Alphas by Approach**



The evaluation team examined these results and chose Approach 2A (circled in the above figures) as the preferred free-ridership approach for this evaluation of the Custom offering. We took several factors into account in making this decision:

- First, a general rule of thumb is that a Cronbach's alpha of 0.7 or higher indicates an acceptable level of internal consistency.<sup>34</sup> As can be seen, only two of the six specifications of the algorithm meet this threshold – Approach 2A and 3A.
- When we examine the scores inside each algorithm specification, we find that the Program Components FR Score B is generally close to 0.5, regardless of other responses provided (such as responses to questions used to calculate the NP Score, as well as the timing adjustment). As such, we feel that an algorithm incorporating this score is not a reasonable choice for use, since it reduces the correlation among the two components in the NTGR algorithm, thus reducing the reliability of the resulting NTGR.
- Finally, our professional judgement is that Approach 2A's mathematical application of the timing adjustment is the most conceptually valid.

## 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 PSO 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 SO). In addition, the participant may install additional equipment, without an incentive, at the same facility because of the program (inside SO).

We examined both inside and outside spillover in PY8 Custom projects using participant responses to the phone survey.

### Results

We examined both inside and outside participant spillover in PY8 Custom projects using participant responses to the phone survey. We found no cases of participant spillover.

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<sup>34</sup> It should be noted that this threshold is one generally accepted in other disciplines, and may be relatively arbitrary for application in this scenario.

## Appendix E. CLIP NTGR Results

In PY8, the evaluation team conducted research with CLIP participants to estimate a NTGR specific to the CLIP program. Unlike the majority of NTGR research conducted as part of the AIC portfolio evaluation, we applied this NTGR retrospectively to all PY8 CLIP projects. Consistent with NTGR research conducted for other Energy Efficiency for Business Program evaluations, we developed the NTGR based on self-reported information from a CATI survey that quantifies the percentage of the gross program impacts that can reliably be attributed to the program. We relied on the same NTG evaluation framework used in our Custom Participant survey, described in Appendix D above, and for consistency, we calculated the final free-ridership values using the same algorithm used in our Custom Participant NTG analysis (New Approach 2a).

Table 26 presents the results of our PY8 NTG analysis for retrospective application. Due to a small number of CLIP projects included in our analysis, we developed a free-ridership rate applicable to both electric and gas. Our CLIP-specific PY8 spillover analysis found a participant spillover rate of 0%. We also applied the SAG-approved non-participant spillover (NPSO) electric savings rate of 1% and a NPSO gas savings rate of 0%.

We examined both inside and outside participant spillover in projects from lighting and non-lighting end-uses using CLIP participant responses in the phone interviews. Based on this data, we found no participant spillover among CLIP participants, and therefore, our participant spillover rate for CLIP in PY7 is 0%.

**Table 26. CLIP NTGR for PY8 Application**

Program	Free-Ridership		Spillover	Final NTGR
	Fuel-specific weights	MMBTU Weights		
CLIP – Electric	0.95	0.93	0.01	0.94
CLIP - Gas	0.85	0.93	0.00	0.93



## Appendix F. Staffing Grant NTG Methodology

The evaluation team took the following steps to estimate the NTGR per participant that was applied to all of the projects that participants completed as a result of grants.<sup>35</sup>

1. **Application Review:** The team reviewed project documentation, specifically the Staffing Grant application, to assess the stated need for staff resources in order to complete projects. This review served as background for interviews with participating customers.
2. **Interviews:** Analyst staff conducted participant interviews to estimate NTGR. The NTGR consists of two scores: Program Influence Component 1 and Program Influence Component 2. These components were determined as follows:

- **Program Influence Component 1:** This free-ridership score is based a single survey question (N6) that asks respondents to rate the importance of the Staffing Grants on their ability to implement the energy saving projects completed at their facility.<sup>36</sup> To convert this response into the Component 1 score (LI), the team used the following formula:

$$LI = 1 - (N6 \times 0.1)$$

- **Program Influence Component 2:** This free-ridership score is based on two questions: the likelihood that each project would have been completed without the Staffing Grants (N10), and if the project would have been completed at the same time or later (N11).<sup>37</sup> The team asked these two questions for each of the projects that the participant implemented as a result of the grant.

The participant responses to N10 were converted into a value between 0 and 1 based on the following formula:

$$QI = N10 \times 0.1$$

In addition, the team assigned free-ridership values between 0 and 1 for responses to N11 using the following formula:

$$IF N11 = \text{"Never," } T1 = 0$$

$$IF N11 = \text{"Same time," } T1 = 1$$

$$IF N11 = \text{"Within 1 year," } T1 = 0.66$$

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<sup>35</sup> Please note that none of the projects completed by Staffing Grant recipients were submitted through the Custom Program. These adjustments were made within the Standard and Retro-Commissioning programs as needed.

<sup>36</sup> Using a scale from 0 to 10 where 0 is "not at all important" and 10 is "extremely important," how important was the staffing grant to your ability to implement the energy saving projects we mentioned earlier at your facility?

<sup>37</sup> Question N10: Please tell me how likely you would have been to complete the project if the staffing grant had not been available. Please use a likelihood scale from 0 to 10 where 0 is "not at all likely" and 10 is "extremely likely." Question N11: Please also tell me when the project may have occurred if the staffing grant had not been available. Would you say: never, at roughly the same time, within a year, within two years or within three years?

*IF N11 = "Within 2-3 years," T1 = 0.33*

As outlined above, each sub-component score (Quantity and Timing) can take on a value of 0 to 10, where a lower score means a lower level of free-ridership. The overall Component 2 score for a participant is the average of the QI and TI scores.

*Component 2 = Average (QI, TI)*

- **Overall Free-Ridership—Combination of Components 1 and 2:** To calculate an overall program influence score, the evaluation team averaged Component 1 and Component 2. The resulting free-ridership factor for each participant thus ranges from 0 (no free-ridership) to 1 (100% free-ridership).

*FR = Average (Component 1, Component 2)*

- **NTGR Score:** To develop the NTGR score, the team subtracted the free-ridership score from 1 as shown below:

*NTGR = 1 – FR*

- **Spillover:** The team also asked questions to gather information about potential spillover, which would be integrated with the NTGR score as  $NTGR = (1 - FR + SO)$ . To determine the participant-level spillover factor, the team divided the estimated net savings of the measures installed outside of the program (but influenced by the program) by the gross savings the respondent realized through the program.

**Figure 6. Spillover Algorithm**

$$\text{Spillover} = \frac{\text{Respondent Net Energy Savings from Measures Installed outside the Program}}{\text{Respondent Gross Energy Savings from Measures Installed through the Program}}$$

3. **Consistency Check:** The evaluation team included questions in the survey to identify instances in which the interview findings contradicted the data available in the application and developed protocols to reconcile inconsistent findings, if identified. However, the team found that there were no cases in which interview results contradicted the data in the application.
4. **Final NTGR Determination:** As a final step in this process, the evaluation team compared the NTGR developed through the interview process above with the existing SAG-approved (deemed) NTGRs for the various C&I programs.<sup>38</sup> The deemed NTGR values were used as a floor and, if the NTGR developed through the Staffing Grants interview exceeded the deemed value, the team applied the new NTGR to all of the projects completed under the Staffing Grant by that participant in PY8. However, if the newly developed NTGR fell below the deemed value, the team applied the deemed value to each of the participant's Staffing Grant projects. We used the deemed NTGR value as a floor because we are looking to quantify the effect of the Staffing Grant, which provides an incentive above the existing and already researched measure incentives.

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<sup>38</sup> Per the Illinois NTGR Framework, the team generally applied PY6 NTGRs to determine PY8 net impacts, with the exception of Custom electric projects (for which we applied a NTGR based on PY5 research) and CLIP projects (for which the NTGR was based on PY8 research).

## **Appendix G. Site Visit Reports**

We provide the site visit reports in a separate document.

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