Memorandum

Business Cross-Cutting Evaluation

To: Fernando Morales, AIC and Jennifer Morris, ICC Staff
From: Opinion Dynamics Evaluation Team
Date: June 24, 2019
Re: AIC Business Program Cross-Cutting Evaluation Activities: Non-Participant Survey Results

1. Introduction

This memo presents results from a non-participant survey with eligible Ameren Illinois Company (AIC) business customers, which was completed as part of the Cross-Cutting Business Program evaluation activity during the 2018-2021 evaluation cycle. The non-participant survey focused on assessing non-participant spillover (NPSO) resulting from the Business Program and also explored barriers to energy efficiency.

2. Data Collection

The evaluation team conducted telephone interviews with business customers who have not participated in any AIC energy efficiency programs since 2015.

We developed the non-participant survey sample based on a data file provided by AIC containing 241,816 business accounts from all rate classes that had never participated in the Business Program. During preparation of the eligible population, we removed a large number of accounts for a number of reasons. These dropped accounts are summarized in Table 1 and are described below:

- Non-Retrofittable Sites: Lighting-only accounts (DS-5), cellphone towers, billboards, smart meters and other non-retrofittable sites

- AIC Facilities: AIC facilities

- Ineligible Rate Codes: Accounts with residential electric or gas rate codes (DS-1 or GDS-1)

- Missing Rate Codes: Accounts with missing electric or gas rate codes we were unable to classify

Table 1. Summary of Accounts Removed from Eligible Population

Drop Reason	Accounts	Percent of Initial Records
Non-Retrofittable Sites	50,609	21%
AIC Facilities	12,795	5%
Ineligible Rate Codes	32	<1%
Missing Rate Codes	150	<1%
Total	63,586	26.30%

After dropping 63,586 accounts, a total of 178,230 eligible accounts remained.

Using machine learning and intelligent pattern matching, we then aggregated the remaining accounts into an eligible population at the business-premise level.[1] Since multiple accounts often correspond to one business-premise – for example, for customers with separate electric and gas accounts – the 178,230 accounts of interest correspond to a final count of 110,195 unique business-premises.

From this population, we selected a simple random sample of customers, removed duplicate phone numbers, and removed accounts with missing contact information to arrive at our sample selected for interviewing.

Table 2. Completed Non-Participant Survey Points

Eligible Population	Initial Sample Selected for Interviewing	Completed Survey
110,195	7,454	201

Survey Dispositions and Response Rate

We fielded the survey of Business Program non-participants from January 10 to February 21, 2019. Table 3 provides the final survey dispositions and response rate.

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

Table 3. Non-Participant Survey Dispositions

Disposition	N
Complete interview (I)	201
Eligible incomplete interview (N)	19
Survey-ineligible business (X1)	127
Not an eligible business (X2)	1,151
Business with undetermined survey eligibility (U1)	4,758
Undetermined if eligible business (U2)	1,198
Estimated proportion of cases of unknown survey eligibility that are eligible (e1)	63%
Estimated proportion of cases of unknown business eligibility that are eligible (e2)	82%
Response rate (RR3)[2]	5.2%

3.   Detailed Findings

3.1   Process Findings

This section presents process findings from the non-participant survey. Key topics explored in the survey included program awareness, barriers to participation, facility information, and firmographics.

Awareness

Non-participants have moderate levels of general awareness of AIC-sponsored business energy efficiency programs. Nearly two-thirds (65%) of non-participants are generally aware that AIC offers energy efficiency programs, incentives and information to help their commercial, industrial and public sector customers make energy efficiency improvements at their facilities. When asked about the Business Program specifically, nearly half of non-participants (42%) are aware of the Business Program by name (without it being described to them), an additional 7% are aware of the program once it is described to them. This level of awareness of the Business Program once it was described (49%) is a slight decrease from the PY7 research (55%). Figure 1 presents non-participant awareness of the program.

While awareness of the Business Program is moderate among non-participants, those aware of the program are not particularly familiar with the program details. Only 8% of non-participants said that they are very familiar with the program, while over a third (39%) of non-participants say they are not very familiar or not at all familiar with the program (Figure 1). This indicates substantial opportunity for AIC to educate non-participating businesses about the Business Program and further familiarize those who are already aware of AIC's offerings.

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[2] Please see Appendix A for response rate calculation.

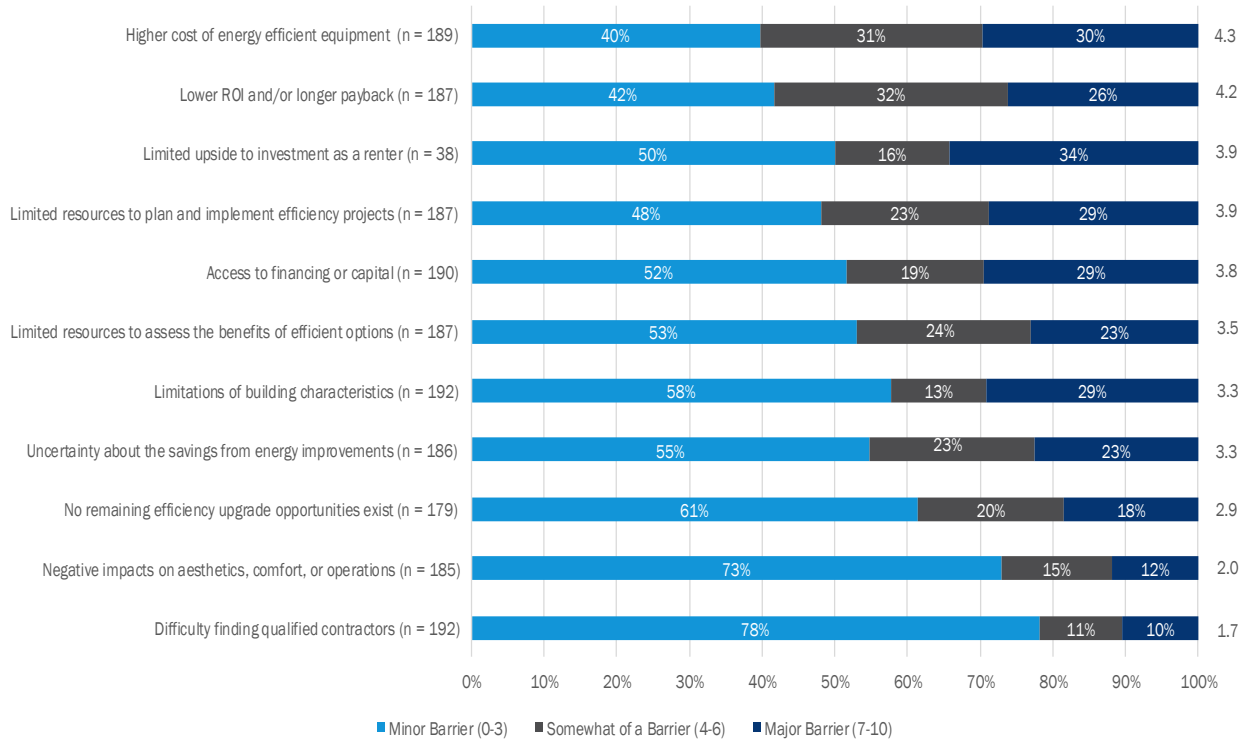Figure 1. Overall Non-Participant Familiarity with Business Program
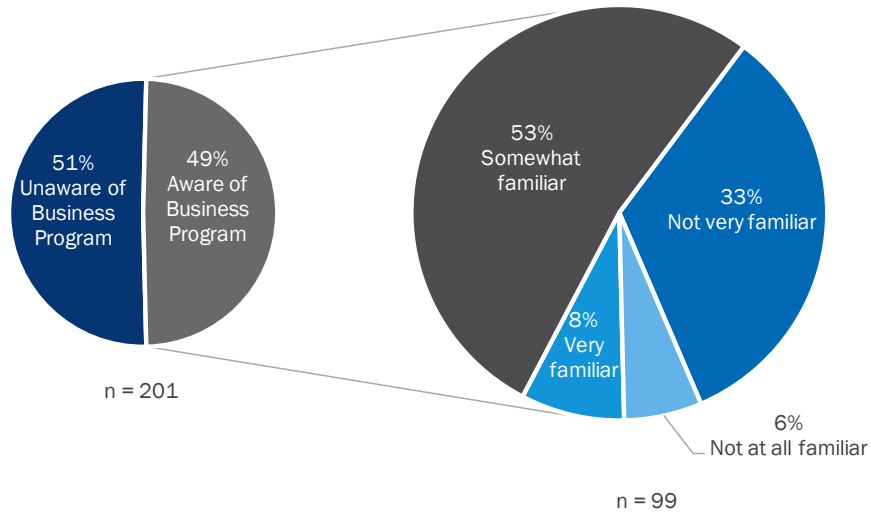
Barriers to Energy Efficient Actions

The survey described eleven common barriers to energy efficient actions and asked non-participants to rate how significant each barrier is to them. Figure 2 displays how non-participants rate each of the eleven common barriers we investigated. Non-participants cited the higher cost of energy efficient equipment (30%), limited resources to plan and implement efficiency projects (29%), access to financing or capital (29%), and limitations of building characteristics (29%) as major barriers. Notably, non-renters view access to financing or capital as more of a barrier compared to renters (mean ratings of 4.1 and 2.8, respectively).[3] About a third of non-participants who were renters (34%) cited limited upside to investment as a renter as a major barrier.

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[3] The difference in means was significant at the 90% confidence level.

Figure 2. Magnitude of Importance of Common Energy Efficiency Barriers

Barrier	Minor Barrier (0-3)	Somewhat of a Barrier (4-6)	Major Barrier (7-10)	Mean
Higher cost of energy efficient equipment (n = 189)	40%	31%	30%	4.3
Lower ROI and/or longer payback (n = 187)	42%	32%	26%	4.2
Limited upside to investment as a renter (n = 38)	50%	16%	34%	3.9
Limited resources to plan and implement efficiency projects (n = 187)	48%	23%	29%	3.9
Access to financing or capital (n = 190)	52%	19%	29%	3.8
Limited resources to assess the benefits of efficient options (n = 187)	53%	24%	23%	3.5
Limitations of building characteristics (n = 192)	58%	13%	29%	3.3
Uncertainty about the savings from energy improvements (n = 186)	55%	23%	23%	3.3
No remaining efficiency upgrade opportunities exist (n = 179)	61%	20%	18%	2.9
Negative impacts on aesthetics, comfort, or operations (n = 185)	73%	15%	12%	2.0
Difficulty finding qualified contractors (n = 192)	78%	11%	10%	1.7

■ Minor Barrier (0-3) ■ Somewhat of a Barrier (4-6) ■ Major Barrier (7-10)

[1]Note that the barrier, "limited upside to investment as a renter", was only asked of renters.

Facility Information

More than half of non-participants (61%) have facilities between 1,000 and 5,000 square feet in size. Non-participant facilities are generally several decades old. Close to three-quarters (70%) of non-participant facilities are 30 or more years old, and the mean age of non-participant facilities is approximately 51 years old.

We asked non-participants about 1) the types of energy using equipment they have in their facility, 2) what they have replaced or upgraded within the past two years, and 3) what they are likely[4] to replace or upgrade within the next 12 months. Table 4 presents a summary of non-participant responses.

A majority of non-participating facilities have heating (89%), water heating (77%), and cooling equipment (75%). The penetration of energy management systems is the lowest at 3%. Over half of all survey respondents (54%) reported having replaced or upgraded some type of equipment within the past two years. More than one-quarter (25%) of all respondents considered themselves likely to replace some type of energy-using equipment in their facility in the next 12 months. Among non-participants who have a given equipment type, lighting equipment was the most commonly replaced or upgraded equipment in the past two years (34%), and the most likely to be replaced in the next 12 months (17%).

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

Table 4. Presence of Equipment and Replacement Status

Equipment Type	Share of Non-Participants Who Have Equipment (n=201)	Among Non-Participants Who Have Equipment	
		Replaced/Upgraded Within the Past Two Years	Likely to Replace /Upgrade in the Next Year
Lighting Equipment	100%	34%	17%
Heating Equipment	89%	21%	5%
Water Heating Equipment	77%	23%	7%
Cooling Equipment	75%	21%	9%
Refrigeration Equipment	48%	17%	6%
Compressed Air Equipment	35%	13%	4%
Kitchen Equipment	34%	16%	4%
Motors or Drives	32%	13%	8%
Energy Management Systems (EMS)	2%	0%	0%
Retro-commissioning	N/A	4%	5%

We also asked non-participants about the fuel types they use for space heating and water heating. As seen in Figure 3, natural gas is the dominant fuel type for space heating (61%). Only 22% of non-participants use electricity for space heating while nearly twice as many (42%) use electricity for water heating.

Figure 3. Non-Participant Space and Water Heating Fuel Types
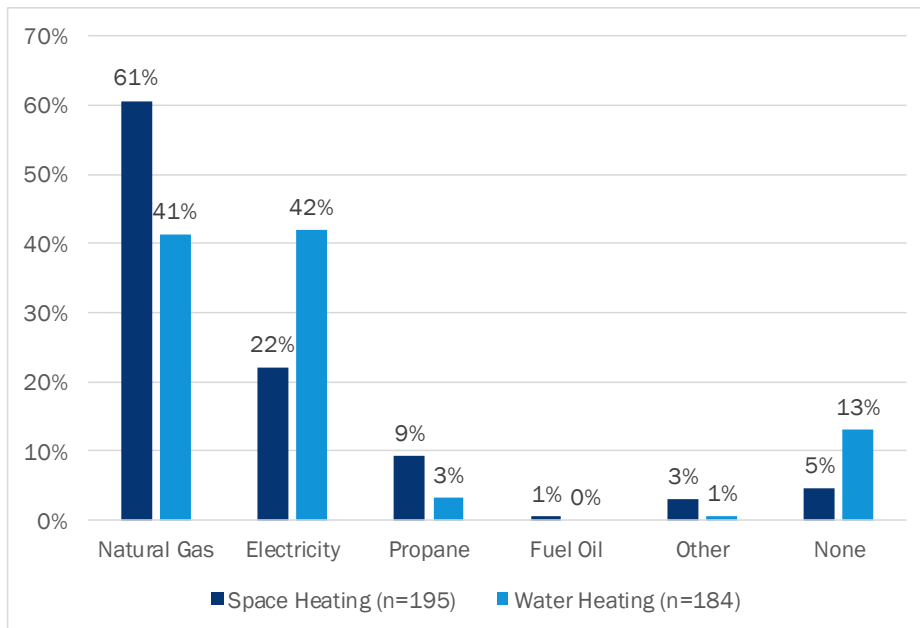
Respondent Firmographics

A majority of survey respondents reported owning their facility (77%), with 68% owning and occupying their facility and 9% leasing the facility to someone else. Only 23% reported renting their facility. Of those who rent, 48% are responsible for making decisions about the type of energy using equipment to install while 43% identified the owner as the key decision-maker.

Over half of survey respondents (55%) reported retail, warehousing/distribution, or office as the primary use of their facility (29%, 14% and 12%, respectively). Figure 4 shows the breakout of self-reported facility types among respondents.

Figure 4. Facility Types of Survey Respondents

n = 201
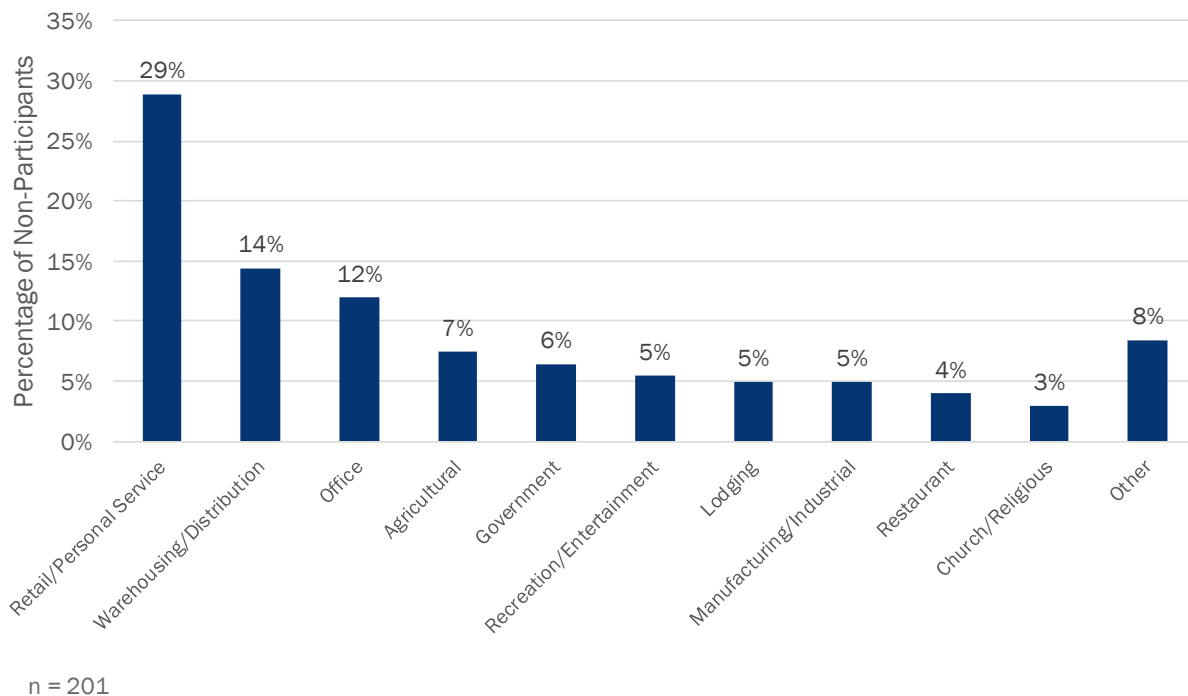
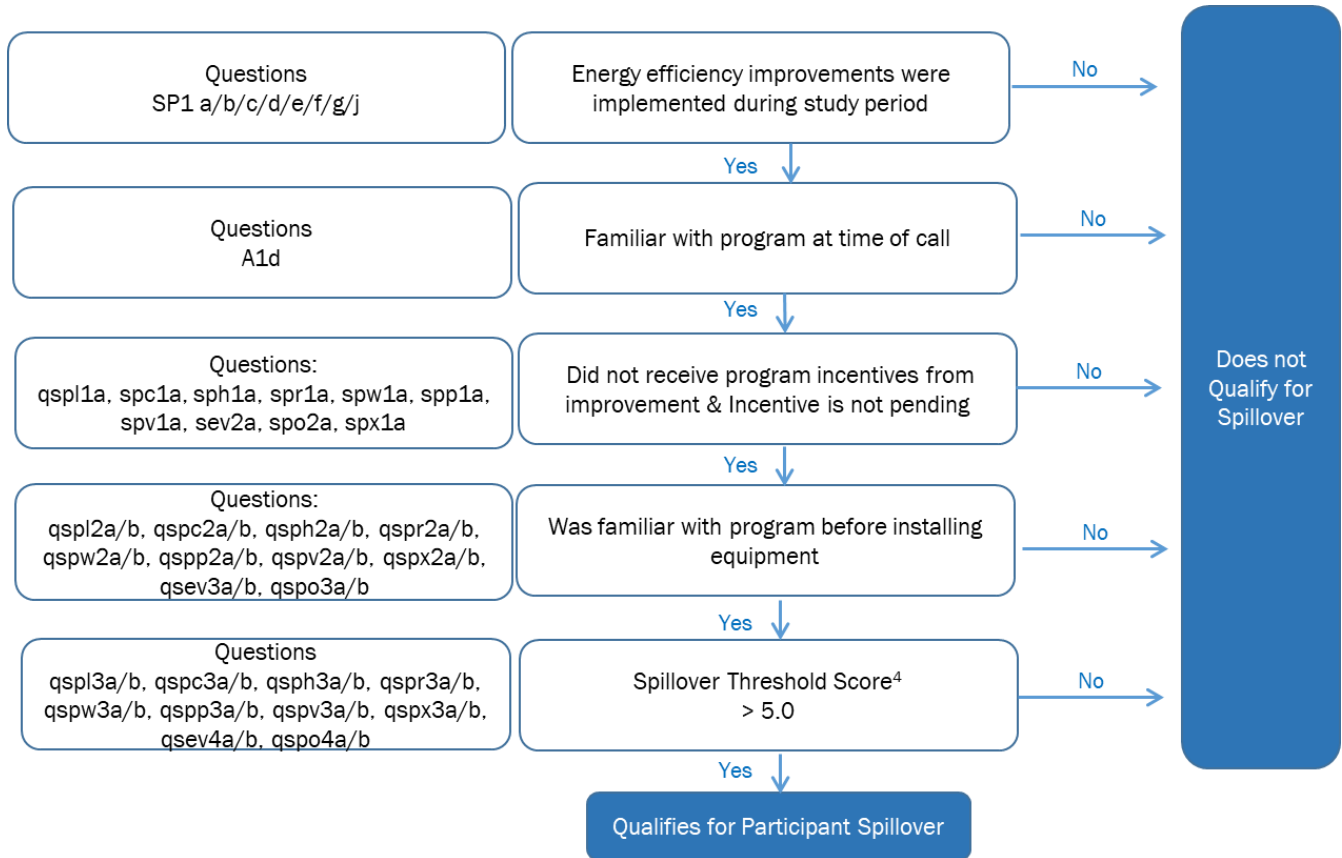## 3.2   Non-Participant Spillover (NPSO) Results

Methodology

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

Calculation of non-participant spillover involves four steps: (1) identify energy efficiency improvements that qualify as NPSO; (2) estimate annual NPSO savings for all survey respondents; (3) extrapolate respondent-level NPSO to the population; and (4) develop the NPSO ratio (for future application).

Figure 5 summarizes the criteria used to identify cases of spillover, based on non-participant phone survey responses and callbacks.

Figure 5. Criteria for NPSO Eligibility

Questions SP1 a/b/c/d/e/f/g/j	Energy efficiency improvements were implemented during study period	No →
Questions A1d	Familiar with program at time of call	No →
Questions: qspl1a, spc1a, sph1a, spr1a, spw1a, spp1a, spv1a, sev2a, spo2a, spx1a	Did not receive program incentives from improvement & Incentive is not pending	No →
Questions: qspl2a/b, qspc2a/b, qsph2a/b, qspr2a/b, qspw2a/b, qspp2a/b, qspv2a/b, qspx2a/b, qsev3a/b, qspo3a/b	Was familiar with program before installing equipment	No →
Questions qspl3a/b, qspc3a/b, qsph3a/b, qspr3a/b, qspw3a/b, qspp3a/b, qspv3a/b, qspx3a/b, qsev4a/b, qspo4a/b	Spillover Threshold Score[4] > 5.0	No →

(Yes paths flow downward; No paths lead to) **Does not Qualify for Spillover**

(Final Yes) **Qualifies for Participant Spillover**

The following questions were used to calculate the spillover threshold score:

- **Measure Attribution Score 1:** On a scale of 0 to 10 where 0 is "not at all influential" and 10 is "very influential", how much influence did your knowledge of the incentives and information Ameren Illinois offers have on your decision to make the <MEASURE> improvements?

- **Measure Attribution Score 2:** If you had NOT known about the incentives and information Ameren Illinois offers, would you still have made the <MEASURE> improvements? Please use a scale of 0 to 10, where 0 means you "definitely WOULD NOT have made this improvement" and 10 means "definitely WOULD have made this improvement".

- **Consistency Check:** (If the responses to the two questions above were inconsistent) In your own words, can you explain HOW your knowledge of the program influenced the decisions you made in terms of the cooling improvements that you made in the past two years.

Provided that the open-ended responses do not contradict influence of the program, spillover is considered to be attributable to the program if the average of the Measure Attribution Score 1 and (10-Measure Attribution Score 2) exceeds 5.0. If the average is greater than 5.0, 100% of the measure energy savings referenced in the question are considered to be NPSO. If the average is not greater than 5.0, none of the measure energy savings are considered to be NPSO.

We then conducted an engineering analysis to determine the savings associated with each measure identified as spillover and summed the measure-specific estimates to develop total respondent-level spillover. Given that the survey captured non-spillover over the past two years, we divided this value by 2 to develop an annual respondent-level NPSO value.

We extrapolated respondent level NPSO to the population by multiplying the respondent level NPSO value by the case weight (Calculated as the eligible population at the premise level divided by the number of customers surveyed).[5]

To develop the NPSO rate, we divided the population-level NPSO value by the PY2018 Portfolio Ex Post Gross Impacts (both in kWh). This approach allows us to express NPSO as a percentage of ex post gross program savings and facilitates future application of the NPSO estimate. Equation 1 presents the equation used to calculate the NPSO rate.

Equation 1. Non-Participant Spillover Rate

$$Annual\ Portfolio\ NPSO\ Rate = \frac{Annual\ Population-level\ NPSO}{PY2018\ Portfolio\ Ex\ Post\ Gross\ Impacts}$$

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[5] Note that we explored the need to weight survey results by customer size by rate code when extrapolating savings to the population but chose not to because the representation of customer size among survey respondents was similar to the population.

Results

Analysis of survey responses found that of the 201 non-participants interviewed, only one met the criteria for spillover. This respondent installed energy efficient LED lighting at their facility.

Figure 6. Non-Participant Eligibility for Spillover - Results
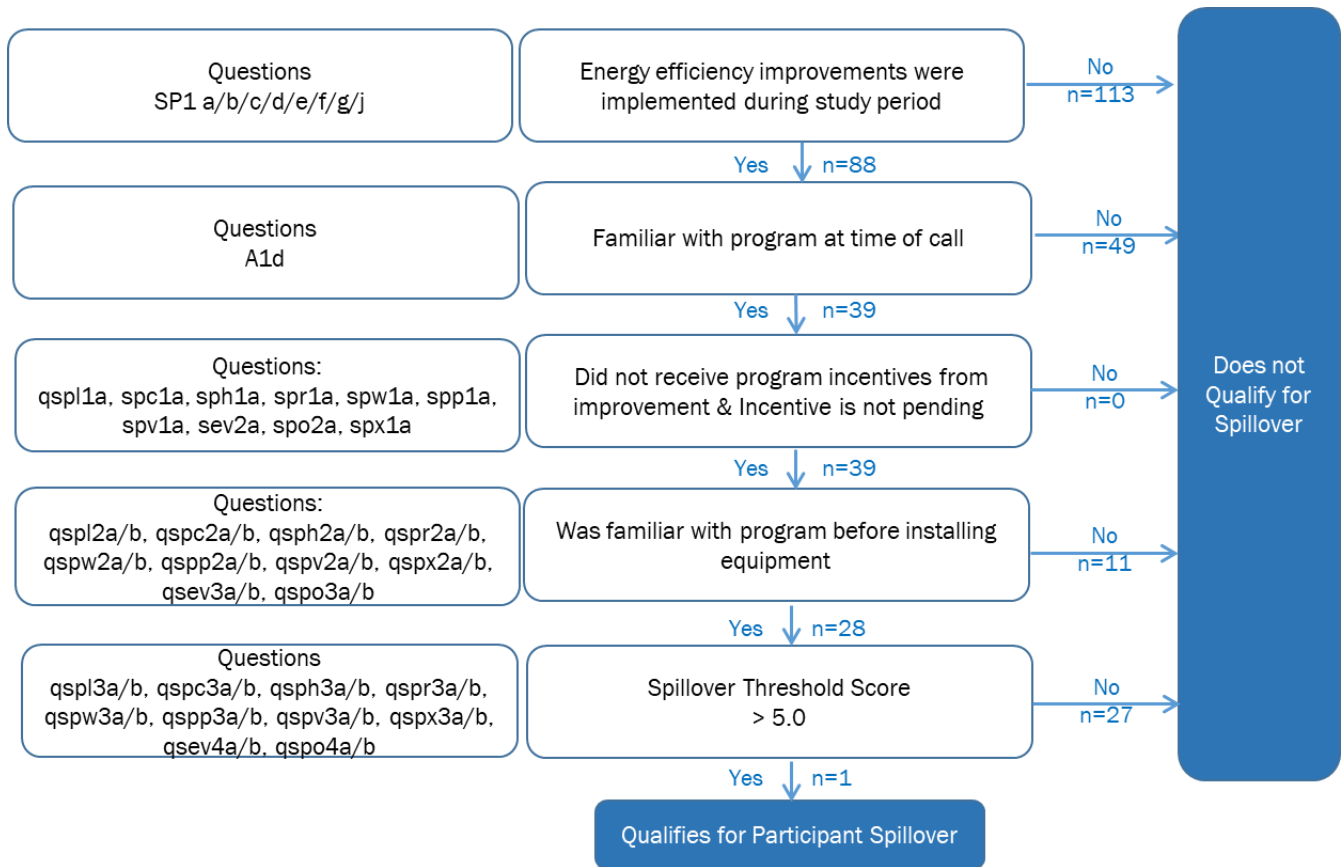
Based on our engineering analysis of the spillover project completed by this one customer, we found total spillover savings of 185 kWh in our sample of 201 respondents. Given that the survey explored NPSO among the eligible non-participant population for the past two years, we divided these savings by 2 to arrive at an annual NPSO value of 92.6 kWh. Finally, we extrapolated these savings to the case weight (Eligible population at Premise Level: 110,195/ Number of customers surveyed: 201) of 548 to arrive at annual population-level NPSO savings of 50,749 kWh. These estimates are presented in Table 5.

Table 5. Non-Program Participant Spillover Measures and Savings

Spillover Measure	NPSO Savings (kWh)
Respondent-level NPSO savings	185.2
Annual respondent-level NPSO savings	92.6
Annual population-level NPSO savings	50,759

We then divided the annual population-level NPSO by the PY2018 Business Portfolio Ex Post Gross Impacts. Our estimated non-participant spillover rate is 0.02%, as shown in Equation 2.

Equation 2. PY2018 Non-Participant Spillover Rate

$$Annual\ Portfolio\ NPSO\ Rate = \frac{Annual\ Population-level\ NPSO}{PY2018\ Portfolio\ Ex\ Post\ Gross\ Impacts} = \frac{50{,}759}{270{,}591{,}322} = 0.02\%$$

It should be noted that the denominator in this equation, PY2018 Business Portfolio Ex Post Gross Impacts, excludes savings from the Streetlighting initiative.[6] As such, any future application of the NPSO rate should also be to Business Portfolio savings *exclusive of the Streetlighting initiative*.

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[6] The Streetlighting initiative targets municipalities who own their own streetlighting. Since these municipalities were not included in the non-participant survey, the NPSO estimate is not applicable to them.

Appendix A. Response Rate Calculation

The response rate was calculated using the AAPOR RR3 calculation:

Equation 3. Response Rate Formula (AAPOR RR3)

$$RR_{(2-level)} = \frac{I}{I + N + e1(U1 + e2 * U2)}$$

where:

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

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

Appendix B.   Data Collection Instrument

AIC 2018
Non-Participant Surve