Opinion Dynamics

Boston | Headquarters

617 492 1400 tel
617 497 7944 fax
800 966 1254 toll free

1000 Winter St
Waltham, MA 02451

Impact and Process Evaluation of the 2016 Illinois Power Agency Small Business Cooler Savings Program

Final

November 17, 2017

CADMUS

NAVIGANT

MichaelsEnergy

Opinion Dynamics

Contributors

Hannah Howard
Managing Director, Opinion Dynamics

Chelsea Petrenko
Managing Consultant, Opinion Dynamics

Dan Hudgins
Senior Consultant, Opinion Dynamics

Matt Drury
Director, Engineering, Opinion Dynamics

Opinion Dynamics

Table of Contents

Opinion Dynamics

Table of Tables

Table of Figures

1. Executive Summary

This report presents results from the evaluation of the Illinois Power Agency (IPA) Small Business Cooler Savings Program (formerly the Small Business Refrigeration Program) for Program Year 9 (PY9), which was implemented by Staples Energy from June 1, 2016 to May 31, 2017. The program provides direct install refrigeration and freezer measures to small business customers in Ameren Illinois Company (AIC)'s DS-2 rate class. Program participants receive a free energy assessment, a report with recommended refrigeration improvements, and incentives for installing program measures. The program targets independent grocers, bars and restaurants, convenience stores, and liquor stores that have refrigerators and freezers for food and beverages, as well as refrigerated cases for other food or beverage items.

The PY9 Small Business Cooler Savings Program functioned similarly to PY8 in terms of design and delivery, but a few changes were made such as increasing incentive levels, adding new measures, and removing under-performing measures. Over the course of PY9, 346 eligible customers completed 379 projects through the program and achieved 5,214 MWh in ex post net energy savings which represents 64% of the program goal (8,205 MWh). Program implementation staff attributed the savings short fall to low program ally participation.

The evaluation of the PY9 Small Business Cooler Savings Program involved both process and impact assessments. However, given Illinois' passage of the Future Energy Jobs Bill (SB 2814), which brings an end to IPA funding of energy efficiency programs after PY9, the evaluation team conducted a limited process evaluation, which included a review of program-tracking data and program materials, and interviews with program administrators and implementation staff. Our impact evaluation research efforts involved applying savings algorithms and assumptions from the Illinois Statewide Technical Reference Manual for Energy Efficiency (IL-TRM), and the application of Illinois Stakeholder Advisory Group (SAG)-approved net-to-gross ratios (NTGR).

Program Impacts

Table 1 summarizes the electric energy and demand savings from the PY9 Small Business Cooler Savings Program. The program achieved ex ante gross savings of 5,306 MWh and ex post gross savings of 6,062 MWh, which resulted in a 114% gross realization rate. The evaluation team then applied the SAG-approved NTGR of 0.86 to the ex post gross impacts to estimate the ex post net impacts of 5,214 MWh for energy savings and 0.35 MW for demand savings.

Table 1. PY9 Small Business Cooler Savings Program Net Impacts

	Ex Ante Gross	Realization Rate	Ex Post Gross	NTGR	Ex Post Net
Energy Savings (MWh)					
Total MWh	5,306	114%	6,062	0.86	5,214
Demand Savings (MW)					
Total MW	N/A[a]	N/A	0.41	0.86	0.35

[a] The program did not report ex ante gross demand savings.

Key Findings and Recommendations

In PY9, despite the high realization rate of 114%, the Small Business Cooler Savings Program fell short of its energy savings goal. Program staff attribute this shortfall to low program ally participation in the program, which ultimately led to lower customer participation than needed to meet the program goal. The following are the supporting findings and recommendations based on the PY9 evaluation:

- **Key Finding #1: A small number of program allies actively participated in the program**. The number of program allies supporting the program decreased slightly from 15 in PY8 to 14 in PY9, and a majority of the PY9 projects (55%) were completed by three program allies. Consistent with the program's PY8 findings, program staff continued to experience difficulty recruiting allies with refrigeration and mechanical backgrounds given that they are generally not familiar with utility-sponsored energy efficiency programs and tend to be more interested in providing service-related work such as maintenance and repairs. Furthermore, registered lighting program allies that engaged with the Cooler Savings Program were often drawn to work on other IPA small business programs.

  - **Recommendation:** In the short term, program implementers should target allies with experience working in utility-sponsored programs such as lighting allies rather than allies with a refrigeration or mechanical background. In the long term, program implementers should conduct outreach to refrigeration and mechanical contractors to increase program awareness and interest in these trade areas. Additionally, program implementers should continue to provide hands-on training to help allies from different trade backgrounds learn how to install refrigeration measures properly for future programs.

  - **Recommendation:** To increase program ally participation in this type of offering, program implementers should generate leads and provide them to program allies. Program implementers should consider using neighborhood sweeps as a primary outreach method as this was reported by PY9 program staff to be the most effective technique in generating leads.

- Key Finding #2: **Program-tracking data does not include comprehensive installation location information for LED cold case lighting and electronically commutated motors (ECMs) installed in freezers and coolers**. The IL-TRM provides different savings assumptions for LED cold case lighting and ECM measures based on installation location (e.g., freezer or cooler). While the program collected space type information, the data was not available for all projects and was not used to inform the ex ante analysis.

  - **Recommendation:** To ensure consistency across all measures and minimize discrepancies, implementers should provide the space type information collected and use the data to inform savings calculations for future programs.

- Key Finding #3: **Program-tracking data does not include information on facility type for pre-rinse spray valves.**

  - **Recommendation:** In order to apply the most accurate IL-TRM default values and minimize discrepancies for future programs, implementers should classify facilities that receive pre-rinse spray valves as either small, quick-service restaurants or medium-sized, casual dining restaurants.

2. Evaluation Approach

The evaluation of PY9 IPA Small Business Cooler Savings Program involved both process and impact assessments. The specific research objectives and evaluation activities conducted are outlined below.

2.1 Research Objectives

This evaluation addresses program performance in PY9 and the overall objective of the evaluation is to provide estimates of gross and net electric savings associated with the program. As such, the PY9 impact evaluation answers the following questions:

- What were the estimated gross electric and demand impacts from this program?
- What were the estimated net electric and demand impacts from this program?

Given that this is the last year of the Small Business Cooler Savings Program, the evaluation team conducted a limited process assessment to answer the following questions:

- Program Participation
  - What were the characteristics of participating customers? How many projects were completed? By how many different customers? What types of projects?
  - Did customer participation meet expectations? If not, how different was it and why?
- Program Design and Implementation
  - Was the program implemented as planned? If not, what changes were made, and why?
  - What, if any, implementation challenges occurred in PY9, and how were they overcome?

2.2 Evaluation Tasks

Table 2 summarizes the PY9 evaluation activities conducted for the Small Business Cooler Savings Program.

Table 2. PY9 Evaluation Activities

Activity	PY9 Process	PY9 Impact	Forward Looking	Details
Program Staff Interviews	✓			Explored changes made since PY8 and gathered information about program marketing and implementation.
Program Materials Review	✓	✓		Conducted comprehensive review of all program materials and tracking database to document program design and changes.
Impact Analysis		✓		Calculated gross and net impacts using the IL-TRM V5.0, IL-TRM V6.0, and SAG-approved NTGR values for PY9.

2.2.1 Program Staff Interviews

The evaluation team completed three in-depth interviews with AIC program staff, Leidos (IPA Oversight), and Staples Energy (implementation staff) in June 2017. These interviews explored implementation changes, program performance, program participation, and marketing and outreach during PY9.

2.2.2 Program Materials Review

The evaluation team conducted a comprehensive review of all tracking data and program materials, including the program implementation plan, program marketing materials, and the PY9 program-tracking database.

2.2.3 Impact Analysis

The evaluation team used the IL-TRM V5.0 and IL-TRM V6.0 to calculate ex post gross savings associated with the measures installed through the program. The evaluation team applied IL-TRM V5.0 algorithms and assumptions for all program measures except for combined evaporator fan control and ECM measures. For these measures, the IL-TRM V6.0 was used because the IL-TRM V5.0 did not provide guidance on how to claim savings for a combined evaporator fan control and ECM measure, but this was addressed in V6.0.

For net impacts, the evaluation team applied the SAG-approved NTGR of 0.86 to gross savings.

2.3 Sources and Mitigation of Error

Table 3 provides a summary of possible sources of error associated with research tasks conducted for the Small Business Cooler Savings Program. The sources of error are outlined below.

Table 3. Possible Sources of Error

Research Task	Survey Errors		Non-Survey Errors
	Sampling Errors	Non-Sampling Errors	
Impact Analysis	N/A	N/A	Analysis errors

Non-Survey Errors

- **Analysis Errors**
  - **Impact Analysis:** The evaluation team applied IL-TRM assumptions and algorithms to the participant data in the tracking database to calculate gross impacts and applied the SAG-approved NTGR to calculate net impacts. To minimize analysis error, the evaluation team had all calculations reviewed by a separate team member to verify that calculations were performed accurately.

3. Detailed Evaluation Findings

The following section of the report provides detailed findings related to program processes and program impacts.

3.1 Program Design and Implementation

The Small Business Cooler Savings Program was first launched as the Small Business Refrigeration Program in PY8.[1] The program is implemented by Staples Energy and provides direct install refrigeration and freezer measures to small business customers in AIC's DS-2 rate class. The program targets independent grocers, bars and restaurants, convenience stores, and liquor stores that have refrigerators and freezers for food and beverages, as well as refrigerated cases for other food or beverage items.

The participation process begins with a free energy assessment conducted by a trained program ally. Allies use Energy Snapshot, an iPad assessment tool, to gather information about the business and identify potential opportunities for installing energy-efficient refrigeration equipment. After the assessment is complete, the customer receives a report that includes a list of recommended measures. If a customer chooses to complete a project, the program pays incentives that cover some or all of the measure installation costs.

As in PY8, the program relied on a network of trained program allies to market the program, conduct assessments, and install incentivized measures. In PY9, the Small Business Cooler Savings Program recruited 17 program allies to help deliver the program and 14 allies completed at least one project. Of the 14 active program allies, half were new to the program in PY9.

There were several changes to measure offerings and incentive levels in PY9. The main changes include:

- Increasing incentives for ECMs, anti-sweat heater controls, LED cold case lighting (per light), and pre-rinse spray valves
- Adding new measures, including walk-in cooler strip curtains, LED open case light (refrigerator and freezer case), and a combined evaporator fan control and ECM measure
- Removing underperforming measures such as ENERGY STAR freezers and refrigerators, cold case occupancy sensors, economizers, evaporator fan controls, and non-refrigerated snack machine timers

Consistent with PY8, Staples Energy relied on a team of five Energy Advisors (EAs) to conduct customer outreach, manage and train program allies, and perform QA/QC inspections. Program staff conducted a formal in-person kick-off training near the beginning of PY9 to teach program allies about program delivery, incentives and payment structure, customer service, and onsite assessments. Additionally, program staff conducted several hands-on training sessions to teach allies on how to properly install refrigeration measures. Over the course of PY9, the team of EAs completed 162 QA/QC inspections including 6 pre-inspections and 156 on-site verification visits. Program staff also reported that EAs took on the additional role of lead generation in PY9 to help program allies increase customer enrollment.

[1] The program was first launched as the Small Business Refrigeration Program in PY8. Based on the interview with Staples Energy, the program name was changed to help alleviate market confusion, as in some instances refrigeration measures are viewed as HVAC upgrades instead of refrigerated cooler and case upgrades.

The program continued to use Energy Snapshot as the core data entry system and Vault as the main tracking database. According to program staff, the main improvement made to Energy Snapshot was the ability for program allies to enter data through a website rather than just an iPad. Program staff felt that the data-tracking system functioned effectively as they received positive feedback from the program allies.

Program marketing and outreach efforts in PY9 remained largely consistent with PY8, and leveraged a wide range of marketing strategies and tactics to broaden customer and trade ally awareness of the program and its benefits. The program continued to rely on program allies and Staple Energy's EAs to reach and educate customers about program offerings. In addition, the program conducted neighborhood sweeps and targeted mailings, emails, and calls to potential DS-2 customers including PY8 participants who completed assessments, but did not move forward with projects. Program staff were satisfied with the level of marketing and outreach and believed neighborhood sweeps were the most effective form of marketing.

3.2 Program Performance and Participation

3.2.1 Program Performance

Over the course of PY9, 346 eligible customers completed 379 projects through the PY9 Small Business Cooler Savings Program. As seen in Table 4, the program achieved 5,214 MWh in ex post net energy savings which accounted for 64% of its goal.

Table 4. PY9 Program Performance against Energy Savings Goal

Metric	MWh
Goal	8,205
Ex Post Net Savings	5,214
% of Goal	64%

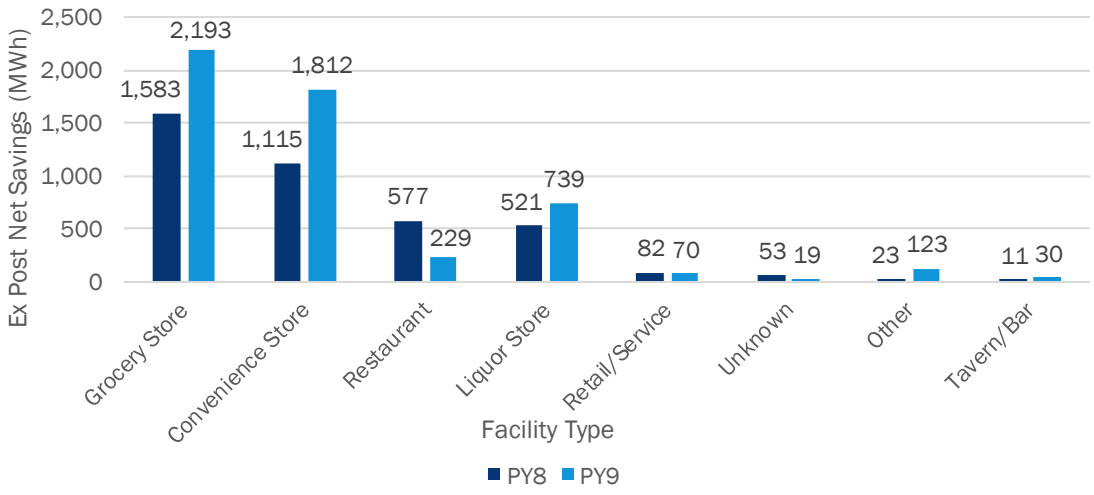
Table 5 provides a high-level comparison of various program performance and participation metrics in PY8 and PY9. The program reduced its savings goal by 47%, from 15,346 MWh in PY8 to 8,205 in PY9. Ex post net energy savings increased by 32% from PY8 to 5,214 MWh in PY9 due to increased number of program participants, projects, and installed measures. However, the project conversion rate (percentage of assessments that turned into project installations) decreased very slightly by 0.6% from PY8 to PY9. Despite the large increase in projects, the number of program allies who completed projects decreased slightly in PY9.

Table 5. Small Business Cooler Savings Program Performance and Participation by Program Year

Metric	PY8	PY9	% Change
PY Savings Goal (MWh)	15,346	8,205	-46.5%
Ex Post Net Savings (MWh)	3,965	5,214	+31.5%
Program Participants	287	346	+20.6%
Assessments Completed	453	596	+31.6%
Projects Completed	289	379	+31.1%
Conversion Rate	64.0%	63.6%	-0.6%
Measures Installed	7,126	13,712	+92.4%
Program Allies	15	14	-6.7%

Figure 1 compares the ex post net electric energy savings between PY8 and PY9 by facility type. Similar to PY8, grocery and convenient stores continued to be the largest contributors to the program's overall energy savings and collectively accounted for 77% of the total ex post net energy savings in PY9. Energy savings increased in PY9 for most facility types with the exception of restaurant, retail/service, and unknown facility types. Most notably, ex post net energy savings for restaurants decreased by 60% from 577 MWh in PY8 to 229 MWh in PY9.

Figure 1. Distribution of Ex Post Net Energy Savings by Program Year and Facility Type



Consistent with the decrease in ex post net energy savings for restaurants, conversions among restaurants decreased substantially from 79% in PY8 to 49% in PY9 (Table 6). In contrast, program allies had more success with converting liquor stores, which accounted for the highest conversion rate (78%). As noted earlier, the overall program conversion rate decreased slightly from 64% in PY8 to 63.6% in PY9.

Table 6. Conversion Rates by Program Year and Facility Type

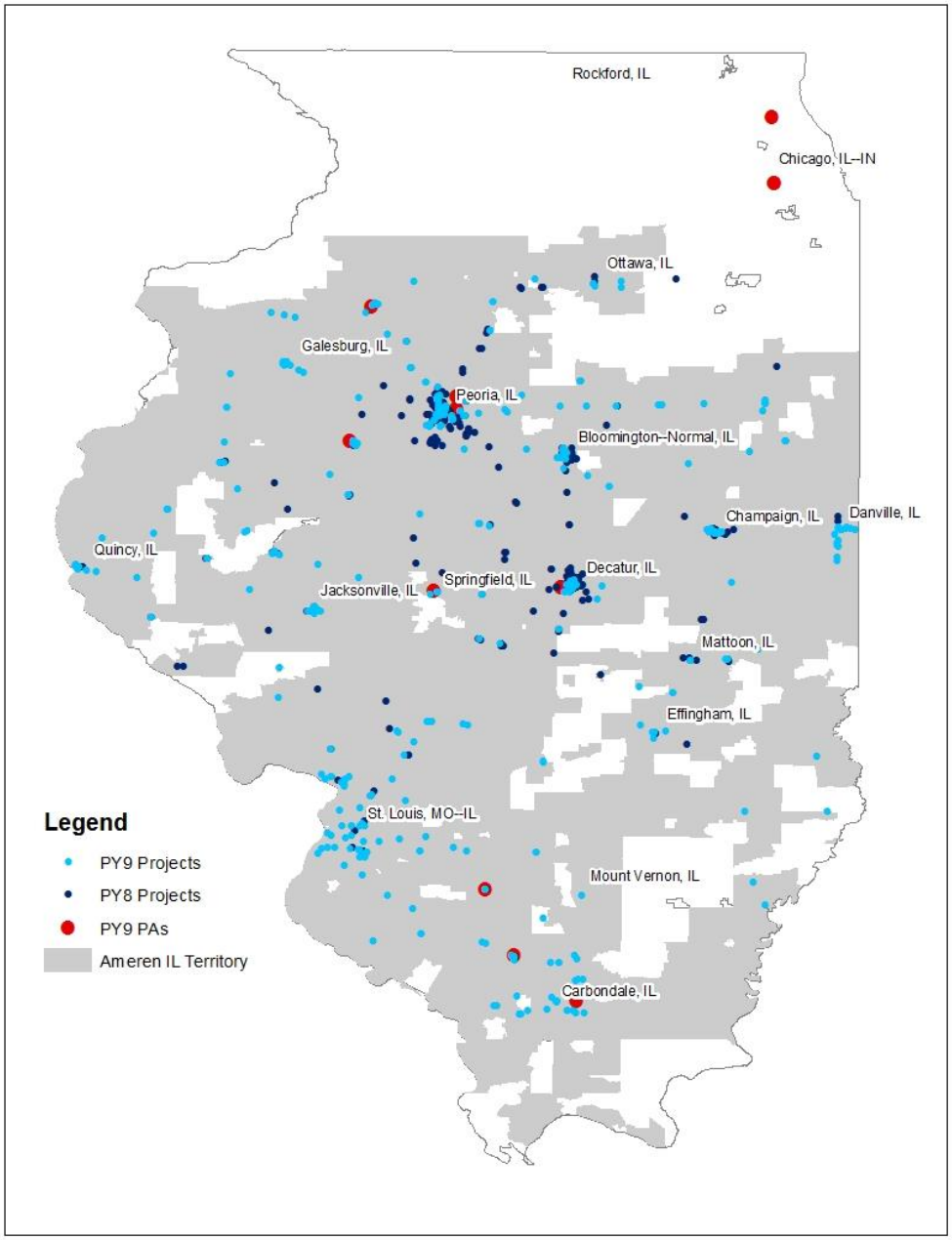
Facility Type	PY8 Conversion Rate	PY9 Conversion Rate	% Change
Grocery Store	64.0%	65.1%	+1.8%
Convenience Store	57.0%	64.8%	+13.7%
Restaurant	79.0%	49.4%	-37.5%
Liquor Store	59.0%	78.4%	+32.8%
Retail/Service	70.0%	53.3%	-23.8%
Unknown	25.0%	21.4%	-14.3%
Other	67.0%	57.1%	-14.7%
Tavern/Bar	67.0%	61.5%	-8.2%
Total	**64.0%**	**63.6%**	**-0.6%**

3.2.2 Program Participation Analysis

As noted above, the number of completed projects increased by 31% from 285 in PY8 to 379 in PY9. In addition, the program's geographic coverage expanded in PY9 as evident by the increased number of projects

around St. Louis and Carbondale (Figure 2). Overall, program activity continues to be greater in urban areas such as Peoria and Decatur, and lower in the southern portions of AIC's territory, particularly in Mount Vernon. Finally, program allies were distributed across the AIC service territory with the exception of two allies who were located in Chicago.

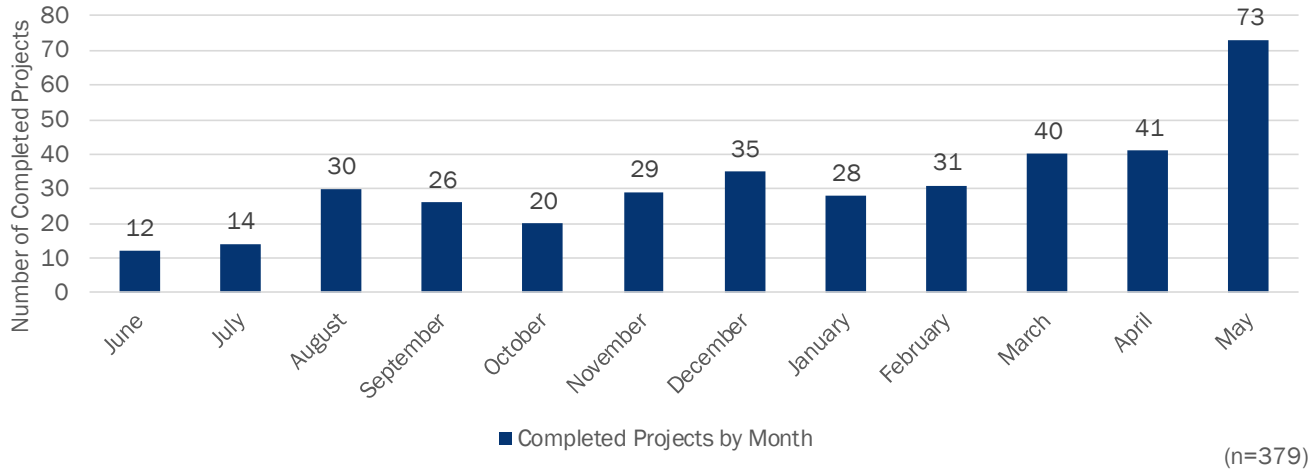
Figure 2. Small Business Cooler Savings Participation over Time



As seen in Figure 3, program activity was the lowest near the beginning of PY9. The program implementer mentioned that there was difficulty determining customer eligibility in the beginning of the program year as differences between DS-2 and DS-3 rate classes were not clear in the customer lists provided to them. As a

result, program allies completed several projects with DS-3 customers, who were later deemed to be ineligible to participate in the Small Business Cooler Savings Program. Savings from these projects were not credited to the program and the implementer absorbed the incentives paid to program allies. According to program staff, the issue was resolved in October.

Figure 3. PY9 Small Business Cooler Savings Projects Completed by Month



(n=379)

3.2.3 Barriers to Program Implementation

Based on interviews with the program staff, low program ally participation was the main reason why the program performed below expectations. Out of the 14 program allies who completed a project in PY9, only around half were active year-round and a majority of projects (55%) were completed by three program allies. This challenge was surprising to program staff, who had assumed program ally interest in the program would increase in PY9 as a result of higher incentive levels. However, program staff offered several reasons why program ally participation was lower than expected.

- **Lack of Interest from Refrigeration Allies**: Refrigeration measures have not previously been a substantial part of the energy efficiency programs offered in AIC territory. Consistent with PY8, program staff continued to experience challenges recruiting program allies with a refrigeration or mechanical background given they are generally not familiar with utility-sponsored energy efficiency programs, and are more interested in providing service-related work. To overcome these challenges, the program started recruiting contractors from various backgrounds (e.g., lighting, heating ventilation and air conditioning, electrical, etc.) and saw interest in the program from lighting allies who had experience performing utility work. The program provided hands-on training to help allies from different trade backgrounds learn how to install refrigeration measures properly.

- **Increased Competition from Other IPA Small Business Programs:** As noted above, only half of the program allies involved in the Cooler Savings Program actively completed projects year-round. According to program staff, this was due to the fact that lighting allies were often drawn away to work on other IPA small business programs such as the Small Business Direct Install Program, the Small Business Linear LED Lighting Program, and the Small Business Lit Signage Program. To encourage

program ally participation, EAs traveled throughout the AIC service territory to generate warm and qualified leads[2] using neighborhood sweeps.

3.3 Impact Results

The following sections outline the results of the gross and net impact analysis for the PY9 Small Business Cooler Savings Program.

3.3.1 Measure Verification

As part of the PY9 impact evaluation, the evaluation team completed a thorough review of the program-tracking database to determine ex ante, audited, and verified total quantities by measure (Table 7). The evaluation team audited measure quantities by checking for duplicates and data entry errors. The evaluation team also compared the total incentive amounts with the total energy savings provided in the database to confirm consistency. Overall, the audited measure quantities closely matched ex ante quantities. However, the evaluation team adjusted the ex ante quantities for the LED Cold Case Lighting and Controls – Glass Front Refrigerated Cooler measures.[3] The adjustments resulted in two additional measures overall, which represents an increase of less than 1% of the total program measure volume. To determine verified measure quantities, the evaluation team applied an ISR of 100% to all measures.

Table 7. PY9 Small Business Cooler Savings Program Verified Measure Quantities

Measure Category	Ex Ante Measure Quantity[a]	Audited Measure Quantity	In-Service Rate[b]	Verified Measure Quantity
LED Cold Case Lighting	4,390	4,391	100%	4,391
LED Refrigerated Open Case Light	3,121	3,121	100%	3,121
Evaporator Fan Control and ECM	1,277	1,277	100%	1,277
Anti-Sweat Door Heater - High Temp	1,145	1,145	100%	1,145
Anti-Sweat Door Heater - Low Temp	953	953	100%	953
Anti-Sweat Door Heater - Medium Temp	842	842	100%	842
ECM Motor - Reach In - Grocery	475	475	100%	475
ECM Motor - Walk In - Grocery	407	407	100%	407
Controls - Glass Front Refrigerated Cooler	337	338	100%	338
Auto Door Closer - Walk In Cooler	234	234	100%	234
Walk-In Freezer Strip Curtains	106	106	100%	106
ECM Motor - Walk In - Restaurant	104	104	100%	104
LED Freezer Open Case Light	100	100	100%	100
Walk In Cooler Strip Curtains	83	83	100%	83
Auto Door Closer - Walk In Freezer	79	79	100%	79
Control - Refrigerated Beverage Vending Machine	53	53	100%	53

[2] Warm leads are customers who show interest in learning more about the program while qualified leads are customers who are the most likely to participate.

[3] The ex ante quantities of these two measures were adjusted to accurately reflect the total energy savings and total incentives reported in the tracking database.

Measure Category	Ex Ante Measure Quantity[a]	Audited Measure Quantity	In-Service Rate[b]	Verified Measure Quantity
Pre-Rinse Spray Valve - Electric Hot Water Heater Only	6	6	100%	6
Total	**13,712**	**13,714**	**N/A**	**13,714**

[a] Source: Evaluation team analysis of final program-tracking data.
[b] In the absence of TRM default ISRs, assumed 100% for direct install programs.

3.3.2 Ex Post Gross Impact Results

Overall, total ex post gross energy and demand impacts for the PY9 Small Business Cooler Savings Program were 6,062 MWh and 0.41 MW. The program achieved a 114% gross realization rate for energy savings (Table 8).

Table 8. PY9 Small Business Cooler Savings Program Gross Impacts

Program	Ex Ante Gross[a]		Ex Post Gross		Gross Realization Rate[b]	
	MW	MWh	MW	MWh	MW	MWh
Small Business Cooler Savings	N/A	5,306	0.41	6,062	N/A	114%

[a] Source of ex ante savings: PY9 program-tracking database. The ex ante analysis did not include any demand savings.
[b] Gross Realization Rate = ex post gross value ÷ ex ante gross value.

As shown in Table 9, overall ex post gross impacts were higher than ex ante gross impacts. This was driven primarily by higher realization rates for Anti-Sweat Door Heater – Low Temp and LED Cold Case Lighting measures, which collectively accounted for 39% of ex ante program savings.

Table 9. PY9 Small Business Cooler Savings Program Gross Impacts by Measure

Measure	Verified Measure Quantity	Ex Ante Gross MWh	Ex Post Gross		Gross Realization Rate[a] MWh
			MW	MWh	
Anti-Sweat Door Heater - Low Temp	953	1,047	0.159	1,219	116%
LED Cold Case Lighting	4,391	992	0.021	1,160	117%
Evaporator Fan Control and ECM	1,277	607	0.091	792	130%
Anti-Sweat Door Heater - High Temp	1,145	502	0.000	584	116%
Anti-Sweat Door Heater - Medium Temp	842	392	0.000	456	116%
Controls - Glass Front Refrigerated Cooler	338	351	0.000	409	116%
Walk-In Freezer Strip Curtains	106	315	0.016	315	100%
Auto Door Closer - Walk In Cooler	234	221	0.021	221	100%
ECM Motor - Reach In - Grocery	475	186	0.000	186	100%
Auto Door Closer - Walk In Freezer	79	182	0.032	182	100%
LED Refrigerated Open Case Light	3,121	178	0.036	178	100%
ECM Motor - Walk In - Grocery	407	161	0.003	164	102%
Control - Refrigerated Beverage Vending Machine	53	73	0.001	85	116%
ECM Motor - Walk In - Restaurant	104	44	0.004	48	108%

Measure	Verified Measure Quantity	Ex Ante Gross MWh	Ex Post Gross		Gross Realization Rate[a] MWh
			MW	MWh	
Walk In Cooler Strip Curtains	83	35	0.024	35	100%
LED Freezer Open Case Light	100	10	0.000	10	100%
Pre-Rinse Spray Valve - Electric Hot Water Heater Only	6	9	0.000	21	237%
Total	**13,714**	**5,306**	**0.409**	**6,062**	**114%**

[a] Gross Realization Rate = ex post gross value ÷ ex ante gross value.
Note: Numbers may not total due to rounding.

Differences in ex post and ex ante gross savings stem from differences in input values for the savings algorithms for each measure. Table 10 summarizes the source of differences between ex ante and ex post gross savings for measures with realization rates that differ from 100%. Specific inputs for all ex post savings estimates are provided in Appendix A.

Table 10. Reasons for Realization Rates per Measure

Measure	Gross MWh RR	Source of Discrepancy
Anti-Sweat Door Heater - Low Temp	116%	Ex ante gross analysis applied NTGRs
LED Cold Case Lighting	117%	Ex ante analysis applied weighted savings average
Evaporator Fan Control and ECM	130%	Ex ante analysis applied IL-TRM V5.0 assumptions
Anti-Sweat Door Heater - High Temp	116%	Ex ante gross analysis applied NTGRs
Anti-Sweat Door Heater - Medium Temp	116%	Ex ante gross analysis applied NTGRs
Controls - Glass Front Refrigerated Cooler	116%	Ex ante gross analysis applied NTGRs
ECM Motor - Walk In - Grocery	102%	Ex ante analysis applied weighted savings average
Control - Refrigerated Beverage Vending Machine	116%	Ex ante gross analysis applied NTGRs
ECM Motor - Walk In - Restaurant	108%	Ex ante analysis applied weighted savings average
Pre-Rinse Spray Valve - Electric Hot Water Heater Only	237%	Hours of use

Through discussions with the implementer, the evaluation team identified sources of the differences between ex ante and ex post savings. While certain inputs may increase savings, others decrease savings. The combination of all inputs brings about the overall realization rate for a specific measure. The differences in ex ante and ex post savings calculations are described below:

- **The ex ante gross savings presented for certain measures were actually net savings.** The implementer applied the SAG-approved NTGR of 0.86 to calculate ex ante gross savings for three anti-sweat door heater and two control measures, and again to net savings, effectively double-counting the NTGR. As a result, ex post gross energy savings are 16% higher than ex ante estimates.

- **Ex ante analysis used a weighted average of default TRM savings for LED cold case lighting.** For the ex ante analysis, the implementer applied a weighted average based on an assumed mix of installation locations (refrigerated vs. freezer cases). The evaluation team calculated savings for LEDs installed in refrigerated and freezer cases per the IL-TRM V5.0 methodology, and applied them to LED cold case lighting measures based on installation location. For projects with an unknown location, the evaluation

team applied a weighted average calculated using the quantity of LEDs installed in refrigerated and freezer cases in PY9. Overall, this resulted in an increase in ex post savings.

- **Ex ante analysis applied IL-TRM V5.0 assumptions for evaporator fan control and ECMs.** For the ex ante analysis, the implementer applied IL-TRM V5.0 methodology, which provides default savings for evaporator fan controls and ECMs as two separate measures. Ex ante gross energy savings for evaporator fan control and ECM measures is the sum of IL-TRM V5.0 default savings for ECMs installed in grocery stores and 20% of savings for evaporator fan controls. The evaluation team calculated ex post savings using the IL-TRM V6.0 methodology, which provided guidance on how to claim savings for a combined evaporator fan control and ECM measure.

- **Ex ante analysis used a weighted average of default TRM savings for ECM measures.** The ex ante analysis for ECMs installed in reach-in and walk-in freezers and coolers used the IL-TRM V5.0 average default savings values, which assume that 80% of ECM measures are installed in coolers and 20% are installed in freezers. To determine ex post savings, the evaluation team applied IL-TRM V5.0 default savings for ECMs based on actual installation location. For projects with an unknown location, the evaluation team calculated a weighted average using the quantity of ECM measures installed in coolers and freezers in PY9. As a result, ex post savings are slightly higher than ex ante savings.

- **Ex ante and ex post calculations for pre-rinse spray valves used different hours per day assumptions.** Both the ex ante and ex post calculations of savings for pre-rinse spray valves follow the IL-TRM V5.0 methodology. However, while the ex ante savings in the database apply a value of 0.61 hours per day, the ex post savings apply an average of 1.25 hours per day, which assumes an equal split between small, quick-service restaurants (1 hour per day) and medium-sized, casual dining restaurants (1.5 hours per day). The evaluation team chose to use an equal split between restaurant types based on a review of the PY9 participant database and the types of facilities that received this measure. Overall, this resulted in an increase in ex post estimates.

3.3.3 Ex Post Net Impact Results

To determine the overall net savings associated with the Small Business Cooler Savings Program, the team applied the SAG-approved NTGR (0.86) to ex post gross savings. As a result, the program achieved a net realization rate of 114% for electric energy.

Table 11. Small Business Cooler Savings Program Net Impacts

Program	Ex Ante Net Impacts		Ex Post NTGR	Ex Post Net Impacts	
	MW	MWh		MW	MWh
Small Business Cooler Savings	N/A[a]	4,564	0.86	0.35	5,214
Net Realization Rate[b]				**N/A**	**114%**

[a] The program did not report ex ante gross demand savings.
[b] Net realization rate = ex post net value ÷ ex ante net value.

4. Key Findings and Recommendations

In PY9, the Small Business Cooler Savings Program fell short of its energy savings goal. Program staff attribute this shortfall to low program ally participation in the program, which ultimately led to lower customer participation than needed to meet the program goal. The following are the supporting findings and recommendations based on the PY9 evaluation:

- **Key Finding #1:** A small number of program allies actively participated in the program. The number of program allies supporting the program decreased slightly from 15 in PY8 to 14 in PY9, and a majority of the PY9 projects (55%) were completed by three program allies. Consistent with the program's PY8 findings, program staff continued to experience difficulty recruiting allies with refrigeration and mechanical backgrounds given that they are generally not familiar with utility-sponsored energy efficiency programs and tend to be more interested in providing service-related work such as maintenance and repairs. Furthermore, registered lighting program allies that engaged with the Cooler Savings Program were often drawn to work on other IPA small business programs.
  - **Recommendation:** In the short term, program implementers should target allies with experience working in utility-sponsored programs such as lighting allies rather than allies with a refrigeration or mechanical background. In the long term, program implementers should conduct outreach to refrigeration and mechanical contractors to increase program awareness and interest in these trade areas. Additionally, program implementers should continue to provide hands-on training to help allies from different trade backgrounds learn how to install refrigeration measures properly for future programs.
  - **Recommendation:** To increase program ally participation in this type of offering, program implementers should generate leads and provide them to program allies. Program implementers should also consider using neighborhood sweeps as a primary outreach method as this was reported by PY9 program staff to be the most effective technique in generating leads.
- **Key Finding #2**: Program-tracking data does not include comprehensive installation location information for LED cold case lighting and ECMs installed in freezers and coolers. The IL-TRM provides different savings assumptions for LED cold case lighting and ECM measures based on installation location (e.g., freezer or cooler). While the program collected space type information, the data was not available for all projects and was not used to inform the ex ante analysis.
  - **Recommendation:** To ensure consistency across all measures and minimize discrepancies, implementers should provide the space type information collected and use the data to inform savings calculations for future programs.
- **Key Finding #3**: Program-tracking data does not include information on facility type for pre-rinse spray valves.
  - **Recommendation:** In order to apply the most accurate IL-TRM default values and minimize discrepancies for future programs, implementers should classify facilities that receive pre-rinse spray valves as either small, quick-service restaurants or medium-sized, casual dining restaurants.

Appendix A. Small Business Cooler Savings Program Assumptions and Algorithms

Anti-Sweat Door Heater Controls

The evaluation team used the following equation from the IL-TRM V5.0 to estimate energy savings for anti-sweat door heater controls. The TRM currently does not provide methodology for estimating demand savings.

Equation 1. Anti-Sweat Door Heater Control Energy Algorithm

$$\Delta kWh/door = kW_{base} \times ESF \times BF \times Hours$$

Table 12 provides assumptions used to estimate ex post energy savings for anti-sweat door heater controls.

Table 12. Ex Post Assumptions for Anti-Sweat Door Heater Controls

Parameter	Value	Units	Notes/Reference
kW_{base}	Freezer: 0.195 Cooler: 0.092	Connected load (kW)	IL-TRM V5.0
Energy Savings Factor (ESF)	0.55	N/A	Percentage of hours annually that the door heater is powered off due to humidity-based controls (IL-TRM V5.0)
Bonus Factor (BF)	Low Temp: 1.36 Med Temp: 1.22 High Temp: 1.15	N/A	Represents the increased savings due to reduction in cooling load inside the cases and the increased cooling load in the building space to cool the additional heat generated by door heaters (IL-TRM V5.0)
Hours	8,766	Hours	IL-TRM V5.0

LED Cold Case Lighting

The evaluation team used the following equations from the IL-TRM V5.0 to estimate energy and demand savings for LED cold case lighting.

Equation 2. LED Cold Case Lighting Energy Algorithm

$$\Delta kWh = \left(\frac{Watts_{base} - Watts_{EE}}{1{,}000}\right) \times Hours \times WHFe$$

Equation 3. LED Cold Case Lighting Demand Algorithm

$$\Delta kW = \left(\frac{Watts_{base} - Watts_{EE}}{1{,}000}\right) \times CF \times WHFd$$

Table 13 provides assumptions used to estimate ex post savings for LED cold case lighting measures.

Table 13. Ex Post Assumptions for LED Cold Case Lighting

Parameter	Value	Units	Notes/Reference
$Watts_{base}$	Refrigerated case: 15.2 Freezer case: 18.7	Watts	IL-TRM V5.0
$Watts_{EE}$	Refrigerated case: 7.6 Freezer case: 7.7	Watts	
W/kW	1,000	Watts/kilowatts	Conversion factor
Hours	5,802	Hours	IL-TRM V5.0
WHFe	Refrigerated case: 1.29 Freezer case: 1.50	N/A	
WHFd	Refrigerated case: 1.29 Freezer case: 1.50	N/A	
CF	0.69	N/A	

Evaporator Fan Controls and ECMs

The evaluation team applied default savings values from the IL-TRM V6.0[4] to estimate energy and demand savings for evaporator fan controls and ECMs (Table 14). The evaluation team applied the most conservative default savings values which assume an ECM with a motor rating of 16 watts.

Table 14. Ex Post Per-Measure Savings for Evaporator Fan Controls and ECMs

Measure	kWh Savings	kW Savings	Notes/Reference
Evaporator Fan Controls	212	0.024	IL-TRM V6.0
ECMs	408	0.047	
Evaporator Fan Controls and ECMs	620	0.071	

Beverage and Snack Machine Controls

The evaluation team used the following equation from the IL-TRM V5.0 to estimate energy savings for beverage and snack machine controls. The TRM currently does not provide a methodology for estimating demand savings.

Equation 4. Beverage and Snack Machine Controls Energy Algorithm

$$\Delta kWh = \left(\frac{Watts_{base}}{1{,}000}\right) \times Hours \times ESF$$

Table 15 provides assumptions used to estimate ex post savings for beverage and snack machine controls.

[4] The IL-TRM V5.0 did not provide guidance on how to calculate savings for a combined evaporator fan control and ECM measure.

Table 15. Ex Post Assumptions for Beverage and Snack Machine Controls

Parameter	Value	Units	Notes/Reference
$Watts_{base}$	Refrigerated beverage vending machines: 400 Glass front refrigerated coolers: 460	Connected kW	IL-TRM V5.0
W/kW	1,000	Watts/kilowatts	Conversion factor
Hours	8,766	Hours	IL-TRM V5.0
ESF (Energy Savings Factor)	Refrigerated beverage vending machines: 0.46 Glass front refrigerated coolers: 0.30	N/A	

Walk-In Cooler and Freezer Strip Curtains

The evaluation team used the following default energy savings and equations from the IL-TRM V5.0 to estimate energy and demand savings for walk-in cooler and freezer strip curtains.

Equation 5. Walk-In Strip Curtain Demand Algorithm

$$\Delta kW = \frac{\Delta kWh}{8{,}766 \times CF}$$

Table 16 provides assumptions used to estimate ex post savings for walk-in cooler and freezer strip curtain measures.

Table 16. Ex Post Assumptions for Walk-In Cooler and Freezer Strip Curtains

Parameter	Value	Units	Notes/Reference
ΔkWh	Freezer: 2,974 Cooler: 422	kWh	IL-TRM V5.0
Hours	8,766	Hours	
CF	1	N/A	

Electronically Commutated Motors (ECMs) for Walk-In and Reach-In Coolers and Freezers

The evaluation team applied the following deemed savings assumptions from the IL-TRM V5.0 to estimate energy and demand savings for ECMs (Table 17). The IL-TRM V5.0 provides default savings for ECMs installed in coolers and freezers. For projects with unknown installation location, the evaluation team calculated a weighted average using the quantity of ECMs installed in coolers and freezers for each measure type in PY9.

Table 17. Ex Post Per-Measure Savings for ECMs

Measure	Cooler		Freezer		Unknown		Notes/Reference
	kWh	kW	kWh	kW	kWh	kW	
ECM Motor - Reach In - Grocery	328	0.033	411	0.035	391	0.035	IL-TRM V5.0
ECM Motor - Walk In - Grocery	357	0.050	532	0.058	402	0.052	
ECM Motor - Walk In - Restaurant	358	0.032	622	0.036	457	0.034	

Auto Door Closers

The evaluation team applied the default savings values provided in Table 18 to estimate ex post savings for auto door closers.

Table 18. Ex Post Per-Measure Savings for Auto Door Closers

Measure	kWh Savings	kW Savings	Notes/Reference
Auto Door Closer - Walk-In Cooler	943	0.137	IL-TRM V5.0
Auto Door Closer - Walk-In Freezer	2,307	0.309	

Pre-Rinse Spray Valves

The evaluation team used the following equations from the IL-TRM V5.0 to estimate energy savings for pre-rinse spray valves. The TRM currently does not provide methodology for estimating demand savings.

Equation 6. Pre-Rinse Spray Valve Energy Algorithm

$$\Delta kWh = \Delta Gallons \times 8.33 \times 1 \times (Tout - Tin) \times \frac{1}{EFF_{electric}} \times \frac{1}{3{,}413}$$

Equation 7. Pre-Rinse Spray Valve Gallons Algorithm

$$\Delta Gallons = (FLObase - FLOeff) \times MINhour \times HOURSday \times DAYSyear$$

Table 19 provides assumptions used to estimate ex post savings for pre-rinse spray valve measures.

Table 19. Ex Post Assumptions for Pre-Rinse Spray Valves

Parameter	Value	Units	Notes/Reference
ΔGallons	Calculated	gallons	Calculated
Tout	124.1	°F	Water heater outlet water temperature (IL-TRM V5.0)
Tin	54.1	°F	Inlet water temperature (IL-TRM V5.0)
Specific mass of one gallon of water	8.33	lbm/gal	IL-TRM V5.0
Specific heat of water	1	Btu/lbm°F	
$EFF_{electric}$	0.97	N/A	Efficiency of electric water heater (IL-TRM V5.0)
FLObase	1.9	gal/min	Base case flow (IL-TRM V5.0)
FLOeff	1.06	gal/min	Efficient case flow (IL-TRM V5.0)
MINhour	60	min/hour	IL-TRM V5.0

Parameter	Value	Units	Notes/Reference
HOURSday	1.25	hour/day	Assume average between small, quick-service restaurants (1 hour/day) and medium-sized, casual dining restaurants (1.5 hours/day) (IL-TRM V5.0)
DAYSyear	312	days/year	IL-TRM V5.0

For more information, please contact:

Hannah Howard
Managing Director

510 444 5050 x0183 tel
510 444 5222 fax
hhoward@opiniondynamics.com

1 Kaiser Plaza, Suite 445
Oakland, CA 94612