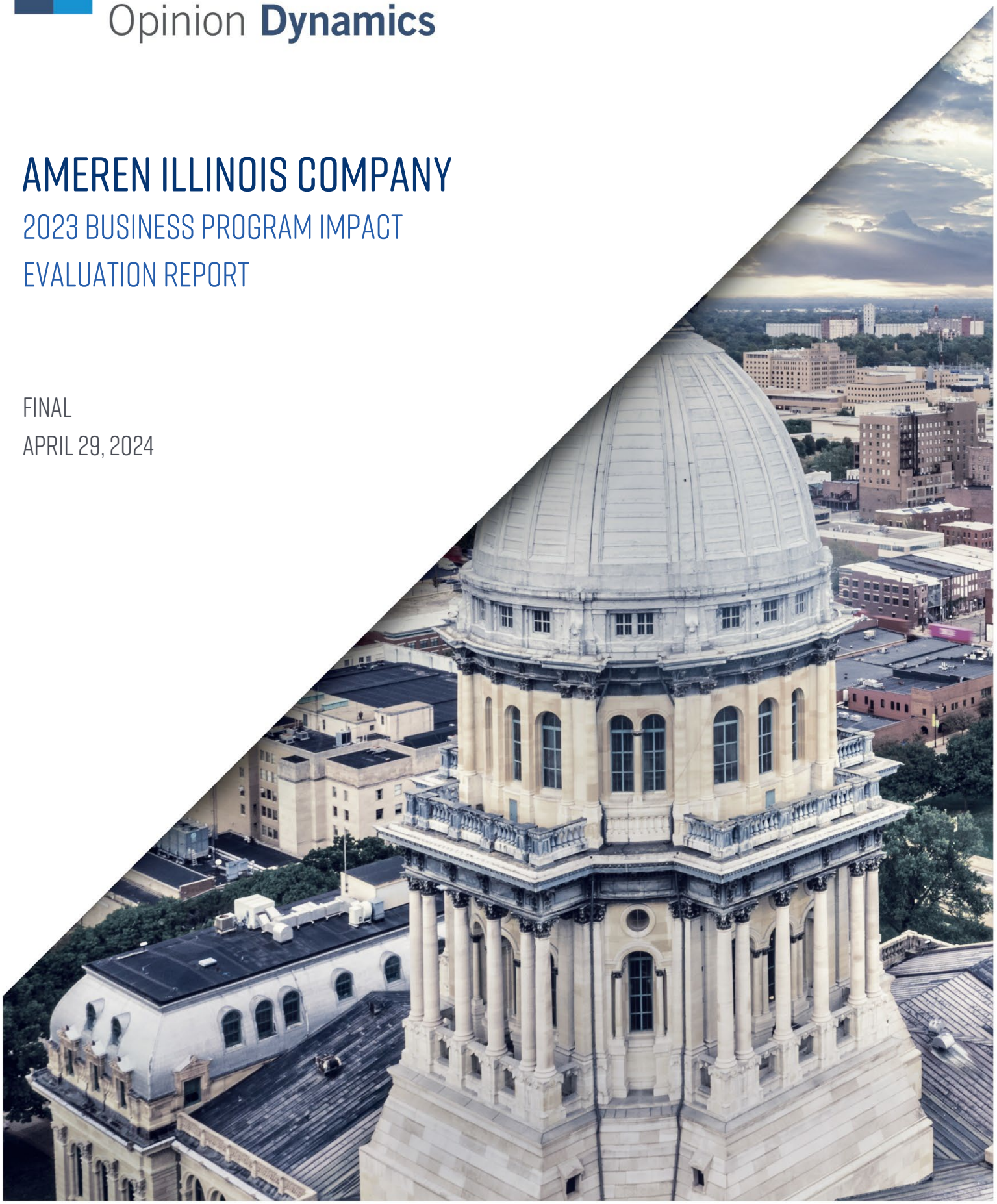
Opinion Dynamics

AMEREN ILLINOIS COMPANY

2023 BUSINESS PROGRAM IMPACT EVALUATION REPORT

FINAL

APRIL 29, 2024



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I. EXECUTIVE SUMMARY

This report presents impact evaluation results from Ameren Illinois Company's (AIC) 2023 Business Program. The Business Program is part of AIC's overall portfolio of residential and nonresidential energy efficiency programs implemented during 2023. The overarching objective of the impact evaluation is to determine the gross and net electric energy, electric demand, and fossil fuel impacts associated with the 2023 Business Program.

I.I PROGRAM OVERVIEW

The Business Program is the largest component of AIC's portfolio and is made up of several initiatives (further broken down into channels) that the evaluation team assessed as part of the 2023 evaluation:[1]

- Standard Initiative
  - Core channel
  - Online Store (OS) channel
  - Building Operator Certification (BOC) Training channel
- Custom Initiative
  - Custom Incentives channel
  - New Construction Lighting channel
- Retro-Commissioning (RCx) Initiative
  - RCx Core channel
  - Virtual Commissioning™ (VCx) channel
  - Virtual Strategic Energy Management (Virtual SEM) channel
- Streetlighting Initiative
  - Municipality-Owned Streetlighting (MOSL) channel
  - Utility-Owned Streetlighting (UOSL) channel
- Small Business Initiative
  - Small Business Direct Install (SBDI) channel
  - Small Business Energy Performance (SBEP) channel
- Midstream Initiative
  - Lighting channel
  - HVAC channel
  - Food Service channel

The initiatives are designed to achieve energy savings from nonresidential customers in accordance with AIC's Plan filing. The Small Business and Standard initiatives are key drivers of the Business Program in terms of energy savings;

[1] In addition to the channels described here, the Program operates a number of channels that provide customer services but do not directly produce energy savings (such as the Metering and Monitoring channel of the Custom Initiative), or that were operated in 2023 but did not lead to any completed projects (such as the RCx Lite channel of the RCx Initiative).

they primarily provide energy assessments, prescriptive incentives, and installation services to customers. The Custom and RCx initiatives provide information, technical support, and financial assistance for energy efficiency projects of a more custom nature. The Midstream Initiative provides incentives to equipment wholesalers and distributors to reduce prices at the point of sale, and is becoming an increasing point of emphasis for the Program team. Lastly, the Streetlighting Initiative seeks to increase the adoption of energy-efficient streetlights throughout AIC's service territory.

I.2 POLICY BACKGROUND

This is the second calendar year of AIC's sixth Electric and Gas Energy Efficiency and Demand Response Plan, covering calendar years 2022-2025 ("Plan 6"). AIC's Plan 6 portfolio is governed by components of Illinois state law (220 ILCS 5/8-103B ["Section 8-103B"] and 220 ILCS 5/8-104 ["Section 8-104"]) which directs large, regulated utilities to offer electric and gas energy efficiency programs. Section 8-103B and Section 8-104 were recently substantively revised through the passage of Illinois Public Act 102-0662 (the Climate and Equitable Jobs Act, or "CEJA") in September 2021.

Section 8-103B and Section 8-104 define key points of policy that are relevant to the evaluation of the 2023 AIC Business Program, which are summarized below as context for this evaluation report.

- **Cumulative Persisting Annual Savings (CPAS):** Since 2018, electric energy savings goals for Illinois utilities have been primarily defined based on persisting savings as a percentage of sales. As such, annual evaluations of AIC's electric energy efficiency programs must present both annual and persisting savings over the life of delivered measures. As a result, AIC and its program implementer have sought to deliver programs that achieve savings that persist for longer periods of time.
- **Weighted Average Measure Life (WAML):** Section 8-103B allows AIC to create a regulatory asset from all of its 8-103B expenditures, and amortize and recover the total expenditures of that regulatory asset "over a period that is equal to the weighted average of the measure lives implemented for that year that are reflected in the regulatory asset."[2] Therefore, annual evaluations of AIC's electric energy efficiency programs must present a WAML in accordance with the guidelines for calculation presented in the Illinois Stakeholder Advisory Group's (SAG) WAML Report and the Illinois Energy Efficiency Policy Manual.[3]
- **Applicable Annual Incremental Goal (AAIG):** Section 8-103B allows AIC to earn a rate of return on their electric energy efficiency spending if they create a regulatory asset, as discussed above. The rate of return that is earned can be adjusted either up or down as a function of AIC's performance relative to its AAIG. The AAIG is defined as the difference between the cumulative persisting electric savings goal for the year being evaluated and the cumulative persisting electric savings goal for the previous year. AIC must achieve sufficient savings through its programs to replace savings from measures at the end of their measure life before progress can be counted toward the AAIG. Therefore, annual evaluations of AIC's electric energy efficiency programs must assess AIC's performance against its AAIG.
- **(b-25) Savings Conversion:** Subsection (b-25) of Section 8-103B allows electric utilities to "convert" savings achieved of other fuels, including natural gas, to electric savings for the purposes of goal attainment in certain cases. The total amount of savings allowed to be converted is capped at a maximum of 10% of the utility's

[2] Illinois Energy Efficiency Stakeholder Advisory Group. *Weighted Average Measure Life Report.* 2018. https://www.ilsag.info/wp-content/uploads/SAG_files/SAG_Reports/SAG_WAML_Report_Final_2-20-18.pdf

[3] Ibid.

applicable annual total savings requirement.[4,5] Electric savings reported in summary sections of this report therefore include converted savings where applicable.

- **Large Customer Opt-Outs:** In 2018, the Future Energy Jobs Act (FEJA) excluded large electric customers from participating in AIC's Business Program.[6] CEJA removed this exclusion starting in the 2022 program year; however, large electric customers can still elect to opt-out of the programs if they wish. Large electric customers who opt-out of the Program must submit an American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) level 2 or higher audit report to the utility that identifies all cost-effective energy efficiency project opportunities that could be invested in over the next 10 years, as well as a detailed plan describing their intentions to reallocate the funds they would have paid into the utility's energy efficiency programs toward internal energy efficiency efforts. Opt-outs are only valid for a given plan cycle; large electric customers must request to opt-out of future cycles. In 2020, large gas customers became ineligible to participate in AIC's Business Program; they remain excluded.[7]

1.3 PROGRAM SAVINGS

In the following sections, the evaluation team presents annual savings (annualized 2023 energy savings) and CPAS for AIC's Business Program. As discussed in greater detail in the *2023 AIC Integrated Impact Evaluation Report*, AIC's performance compared to its AAIG is determined based on both types of savings.

1.3.1 ANNUAL SAVINGS

The 2023 Business Program achieved 173,614 MWh, 22.92 MW, and 1,853,524 therms in verified net savings. These savings include (b-25) conversions of fuels not provided by AIC, which are detailed further in Appendix B. Table 1, Table 2, and Table 3 present ex ante gross, verified gross, and verified net electric energy, electric demand, and gas savings, by initiative and channel, for the 2023 Business Program.

Table 1. 2023 Business Program Electric Energy Annual Savings Summary

Initiative/Channel	Ex Ante Gross MWh	Gross Realization Rate	Verified Gross MWh	Net-to-Gross Ratio (NTGR)	Verified Net MWh
Standard - Core	29,570	99%	29,351	0.825	24,206
Standard - OS	2,542	99%	2,518	0.927	2,333
Standard - BOC Training	819	92%	752	N/A	752
Custom - Custom Incentives	21,975	89%	19,565	0.786	15,382
Custom - New Construction Lighting	2,100	92%	1,940	0.786	1,525
RCx - VCx	5,597	94%	5,247	0.930	4,880
RCx – Virtual SEM	44	87%	38	1.000	38
Streetlighting - MOSL	133	100%	133	0.690	92
Streetlighting - UOSL	19,917	100%	19,917	1.000	19,917
Small Business - SBDI	61,903	100%	61,906	0.891	55,159

[4] The annual total savings requirement is the AAIG plus the additional savings that need to be acquired on an annual basis to replace any savings from measures at the end of their measure life before progress can be counted toward AAIG.

[5] Note that prior to the passage of CEJA, the (b-25) savings conversion was capped at 10% of AAIG, rather than the annual total savings requirement.

[6] Large electric customers are defined as nonresidential electric customers with electric demand of over 10 MW.

[7] Large gas customers are defined as nonresidential natural gas customers with annual usage of 4,000,000 therms or more across all AIC service points, or 8,000,000 therms or more across all Illinois service points.

Initiative/Channel	Ex Ante Gross MWh	Gross Realization Rate	Verified Gross MWh	Net-to-Gross Ratio (NTGR)	Verified Net MWh
Small Business - SBEP	711	46%	327	0.891	291
Midstream - Lighting	29,202	101%	29,577	0.913	27,010
Midstream - HVAC	215	99%	213	0.884	189
Midstream - Food Service	590	101%	594	0.800	475
Midstream - Lighting Carryover[a]	5,735	100%	5,735	0.853	4,890
Business Program Subtotal	*181,053*	*98%*	*177,813*	*0.884*	*157,138*
(b-25) Conversions – Non-AIC Gas					16,476
Business Program Total					**173,614**

[a] Carryover savings are those achieved through installation of measures during 2023 that were distributed or incentivized in prior program years. For clarity, we break out carryover savings separately throughout this report.

Table 2. 2023 Business Program Electric Demand Annual Savings Summary

Initiative/Channel	Ex Ante Gross MW	Gross Realization Rate	Verified Gross MW	NTGR	Verified Net MW
Standard - Core	4.83	100%	4.81	0.827	3.98
Standard - OS	0.62	89%	0.56	0.886	0.49
Standard - BOC Training	0.01	918%	0.08	N/A	0.08
Custom - Custom Incentives	2.69	90%	2.41	0.786	1.90
Custom - New Construction Lighting	0.37	90%	0.33	0.786	0.26
RCx - VCx	0.00	N/A	0.00	N/A	0.00
RCx – Virtual SEM	0.00	N/A	0.00	N/A	0.00
Streetlighting - MOSL	0.00	N/A	0.00	N/A	0.00
Streetlighting - UOSL	0.00	N/A	0.00	N/A	0.00
Small Business - SBDI	9.72	100%	9.73	0.891	8.67
Small Business - SBEP	0.19	81%	0.15	0.891	0.14
Midstream - Lighting	6.94	97%	6.70	0.913	6.12
Midstream - HVAC	0.05	101%	0.06	0.883	0.05
Midstream - Food Service	0.09	102%	0.09	0.800	0.07
Midstream - Lighting Carryover [a]	1.36	100%	1.36	0.853	1.16
Business Program Subtotal	*26.88*	*98%*	*26.29*	*0.872*	*22.92*
Business Program Total					**22.92**

[a] Carryover savings are those achieved through installation of measures during 2023 that were distributed or incentivized in prior program years. For clarity, we break out carryover savings separately throughout this report.

Table 3. 2023 Business Program Gas Annual Savings Summary

Initiative/Channel	Ex Ante Gross Therms	Gross Realization Rate	Verified Gross Therms	NTGR	Verified Net Therms
Standard - Core[a]	2,052,279	102%	2,086,763	0.614	1,281,871
Standard - OS	134,311	101%	136,026	0.880	119,703
Standard - BOC Training	12,371	76%	9,367	N/A	9,367
Custom - Custom Incentives[a]	488,613	90%	471,737	0.800	377,390
Custom - New Construction Lighting	0	N/A	0	N/A	0
RCx - VCx	0	N/A	0	N/A	0
RCx – Virtual SEM	0	N/A	0	N/A	0
Streetlighting - MOSL	0	N/A	0	N/A	0
Streetlighting - UOSL	0	N/A	0	N/A	0
Small Business - SBDI	0	N/A	1	1.000	1
Small Business – SBEP[a]	27,486	97%	26,729	0.891	23,815
Midstream - Lighting	0	N/A	0	N/A	0
Midstream - HVAC	13,658	100%	13,658	0.880	12,019
Midstream - Food Service	36,690	100%	36,696	0.800	29,357
Midstream - Lighting Carryover[b]	0	N/A	0	N/A	0
Business Program Subtotal	*2,765,408*	*99%*	*2,780,978*	*0.665*	*1,853,524*
Business Program Total					**1,853,524**

[a] The ex ante, verified gross, and verified net savings listed for the Standard – Core, Custom Incentives, and SBEP channels reflect only natural gas savings produced at sites where AIC provides natural gas service. Natural gas savings produced at sites that do not receive service from AIC are omitted here and accounted for in Appendix B.

[b] Carryover savings are those achieved through the installation of measures during 2023 that were distributed or incentivized in prior program years. For clarity, we break out carryover savings separately throughout this report.

I.3.2 CUMULATIVE PERSISTING ANNUAL SAVINGS

Table 4 summarizes CPAS and WAML for the 2023 Business Program at the initiative level. For additional details related to CPAS and measure life, please see the individual initiative subsections in Section 3 and Appendix C of this report, which present CPAS achieved in each future year. The overall WAML for the 2023 Business Program is 15.2 years.

Table 4. 2023 Business Program CPAS and WAML

Initiative	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
Standard	13.1	32,621	0.837	27,291	27,291	27,270	27,105	...	26,226	...	350,077
Custom	16.5	21,505	0.786	16,907	16,907	16,907	16,907	...	16,788	...	279,060
Retro-Commissioning	7.3	5,285	0.931	4,918	4,918	4,918	4,918	...	1,464	...	35,890
Streetlighting	20.0	20,050	0.998	20,009	20,009	20,009	18,464	...	18,464	...	373,912
Small Business	12.6	62,233	0.891	55,450	55,450	55,286	53,694	...	49,234	...	661,439
Midstream	14.6	30,384	0.911	27,673	27,673	27,673	27,673	...	27,664	...	403,381
Midstream - Carryover	14.3	5,735	0.853	4,890	4,890	4,890	4,890	...	4,554	...	69,304
(b-25) Conversions	23.7	20,792	0.792	16,476	16,476	16,476	16,476	...	16,129	...	392,162
2023 Portfolio CPAS		**198,605**	**0.874**	**173,614**	**173,614**	**173,429**	**170,127**	...	**160,524**	...	**2,565,226**
Expiring 2023 Portfolio CPAS				**0**	**0**	**184**	**3,302**	...	**4,806**	...	
Expired 2023 Portfolio CPAS				**0**	**0**	**184**	**3,487**	...	**13,090**	...	
WAML	**15.2**										

2. EVALUATION APPROACH

The following section of the report describes the evaluation approach taken for the 2023 Business Program impact evaluation. As part of the evaluation process, we applied versions of the Illinois Energy Efficiency Policy Manual and the Illinois Technical Reference Manual (IL-TRM) applicable to the 2023 program year (Version 3.0[8] and Version 11.0 [V11.0], respectively) wherever relevant.[9] Appendix A of this report provides more detailed, initiative-specific methodology where appropriate.

2.1 RESEARCH OBJECTIVES AND EVALUATION APPROACH

The overarching research objectives for the impact evaluation of AIC's 2023 Business Program are as follows:

- Estimate the estimated gross energy and demand impacts from the Program
- Estimate the net energy and demand impacts from the Program

We met these objectives by conducting the impact evaluation activities listed in Table 5. In addition, we reviewed initiative materials and interviewed initiative managers.

Table 5. 2023 Business Program Impact Evaluation Activities

Initiative	Gross Impacts				Net Impacts
	IL-TRM Application Review	Engineering Desk Reviews	On-Site Measurement and Verification (M&V)	Consumption Analysis	Application of SAG-Approved NTGRs
Standard	✓	✓			✓
Custom		✓	✓	✓[a]	✓
RCx				✓	✓
Streetlighting	✓				✓
Small Business	✓				✓
Midstream	✓				✓

[a] The evaluation team used site-specific regression analyses to estimate verified savings for some Custom Initiative projects.

The following sections provide further details on the approaches to estimating verified gross and net savings.

2.2 VERIFIED GROSS IMPACT ANALYSIS APPROACH

2.2.1 APPLICATION OF IL-TRM VII.0

To determine verified gross impacts associated with the Standard, Small Business, Streetlighting, and Midstream Initiatives, we reviewed the content of the initiative tracking database to identify database errors and duplicate records, and to ensure that the implementer correctly applied savings algorithms and assumptions stated in the IL-TRM V11.0

[8] Policy Manual Version 3.0 is effective as of January 1, 2024, but policies are retroactively applied to the 2023 evaluation in most cases. In some cases, Policy Manual Version 2.1 may be in effect.

[9] In future years, the evaluation team will apply updated versions of these manuals to the evaluation of this Program as required by law, Illinois Commerce Commission orders, and changes to the manuals themselves.

and the IL-TRM V11.0 errata document. In particular, we applied the algorithms and assumptions provided in the IL-TRM V11.0 while using project-specific data from the initiative tracking databases where appropriate. As part of this process, we also verified measure installations by analyzing initiative tracking databases, as well as by reviewing supporting project documentation.

We resolved discrepancies found in the database and documented details related to any gross savings adjustments in the initiative-specific sections of this report. Further, in accordance with Illinois policy, the evaluation team omitted gas penalties from savings reported in the body of this report. Appendix B presents details on gas penalties for cost-effectiveness purposes.

2.2.2 CARRYOVER SAVINGS

In addition to savings achieved by AIC's Business Program through measures delivered during the 2023 program year, AIC also claims carryover savings in 2023 from lighting measures that were distributed by the Business Program in prior years but were not installed until 2023. In 2023, AIC claimed Business Program carryover savings from measures incentivized through the Midstream Initiative's Lighting channel[10] in 2021 and 2022.

Carryover savings are evaluated using the applicable NTGR from the year in which the product was sold, the applicable in-service rate (ISR) trajectory assumption based on the year in which the product was sold, and IL-TRM V11.0 and IL-TRM V11.0 errata assumptions for all other relevant impact parameters.

We previously reported on AIC's 2023 carryover savings as part of an earlier memo.[11] Carryover savings are not reported as part of individual initiative subsections in Section 3.

2.2.3 APPLICATION OF CUSTOM IMPACT METHODS

The Custom Initiative and RCx Initiative are not suitable for gross impact analysis using the IL-TRM. These initiatives require custom energy savings calculations to determine some or all gross impacts. Further details on custom impact methods applied for these initiatives are presented in Appendix A.

2.3 VERIFIED NET IMPACT ANALYSIS APPROACH

To determine verified net savings for the 2023 Business Program, we applied SAG-approved NTGRs to verified gross savings. Details on SAG-approved NTGRs are presented in Appendix A. The one exception is the BOC Training channel within the Standard Initiative, for which the savings algorithms in IL-TRM V11.0 directly estimate net savings.

[10] Formerly Instant Incentives which was part of the Standard Initiative.
[11] Ameren Illinois Company Lighting Carryover Savings Claimable in 2023 Memorandum, accessed at: https://www.ilsag.info/wp-content/uploads/AIC-2023-Lighting-Carryover-Savings-Memo-FINAL-2024-03-02.pdf

2.4 SOURCES AND MITIGATION OF ERROR

The evaluation team took steps to mitigate potential sources of error throughout the planning and implementation of the 2023 evaluation. In particular, we took the following actions to address potential sources of error:

- Analysis Error:
  - **Prescriptive Gross Impact Calculations:** We calculated gross impacts by applying IL-TRM V11.0 calculations to the participant data in the tracking database. To minimize data analysis error, a separate team member reviewed all calculations to verify their accuracy.
  - **Custom Gross Impact Calculations:** We determined custom gross impacts using desk reviews and data collected during on-site M&V. To minimize data analysis errors, we had all calculations reviewed by a separate team member to verify that calculations were performed accurately.
  - **Net Impact Calculations:** We derived net impacts by applying SAG-approved NTGRs to estimated gross impacts. To minimize analytical errors, all calculations were reviewed by a separate team member to verify their accuracy.
- Sampling Error:
  - **Custom Initiative Impact Sample:** The evaluation team completed an impact review for 48 of 117 Custom Incentives projects achieving savings in 2023, drawing three waves of stratified samples separately for projects claiming electric and gas savings. For gross impact results, at the 90% confidence level, we achieved a relative precision of 7.6% for electric energy savings, 19.7% for electric demand savings, and 0.7% for gas savings. We also completed impact reviews for seven of 22 New Construction Lighting projects achieving savings in 2023, drawing a single stratified sample. For gross impact results, at the 90% confidence level, we achieved a relative precision of 4.1% for electric energy savings and 3.3% for electric demand savings. Further detail on our methodology for Custom Initiative sampling is provided in Appendix A.
- Non-Sampling Error:
  - **Measurement Error:** To minimize data collection error during on-site M&V, the evaluation team used trained engineers and technicians familiar with the equipment covered by the Custom Initiative and with the methods used to calculate the gross impacts.

For the VCx channel and Virtual SEM pilot, we also addressed the following types of error:

- **Errors Due to Presence of Non-Routine Events:** "Non-routine events" (NREs) refer to changes in facility energy consumption resulting from facility-related changes not related to the interventions recommended through the channel. NREs can make it difficult to accurately measure savings using meter-based approaches, including the approach used for VCx and Virtual SEM. The evaluation team accounted for NREs in our modeling approach by removing data for the affected period and/or extending the baseline back in time accordingly, consistent with International Performance Measurement and Verification Protocol (IPMVP) Non-Routine Adjustment Options 1 and 3, respectively.[12]
- **Model Specification Error:** In this type of error, variables that predict model outcomes are left out when they should be included, which can produce biased estimates. The models used to estimate ex ante impacts in 2023 excluded weather interaction terms despite the weather-sensitive nature of the interventions, such as HVAC scheduling adjustments. The evaluation team addressed this type of error by modifying the facility-level models in cases where the inclusion of weather interactions improved model fit, before producing verified savings. We also

[12] Webster, Lia. IPMVP Application Guide on Non-Routine Events and Adjustments. Efficiency Valuation Organization (EVO). 2020.

recommended that the implementation team take this approach in future years or provide documentation on their model selection process and rationale for excluding these terms.

- **Measurement Error:** In the context of the VCx channel and Virtual SEM pilot, measurement error occurs when utility electric meters do not accurately record the true energy consumption of a facility. In practice, little can be done in an evaluation context to mitigate this error. However, we know from experience that this type of error is expected to be small and not to have a significant bearing on modeling.
- **Prediction Error:** Prediction error occurs when the model does not perfectly predict what future energy consumption will be. We did not receive a full year of post-period data for all VCx and Virtual SEM projects in 2023, which introduces uncertainty because the models were not able to train on a full range of temperature data after the intervention was initiated. This could increase the prediction error for temperatures that are outside the range of the training data. We addressed this by carefully examining model fit diagnostics.
- **Multicollinearity:** This type of modeling error can both bias the model results and produce very large variance in the results. We addressed this issue by carefully considering model specifications and data to ensure that there were no multicollinearity issues.

Finally, note that the calculations in some of the tables in this report cannot be exactly reproduced due to rounding.

3. INITIATIVE-LEVEL RESULTS

3.1 STANDARD INITIATIVE

3.1.1 INITIATIVE DESCRIPTION

The Standard Initiative offers AIC private and public sector business customers fixed incentives for the installation of prescriptive energy efficiency measures. The Initiative primarily focuses on lighting retrofits, lighting controls, motors, HVAC equipment, steam traps, and specialty applications such as agricultural and refrigeration measures. AIC also offers incentives to building operators in their service territory to attend Building Operator Certification (BOC) training through the Standard Initiative.

For the purposes of this report, the Initiative offerings are grouped into three channels:

- **Standard Core channel**: The Standard Core channel consists of a collection of downstream incentives targeted at a variety of energy-intensive end uses. Incentive requests exceeding $10,000 require pre-approval by AIC staff. For projects that do not exceed this cap, customers can apply for incentives following the purchase and installation of qualifying equipment.
- **Online Store Channel**: The Online Store channel is an e-commerce marketplace where AIC business customers can purchase energy-efficient equipment at a reduced price.
- **Building Operator Certification (BOC) Training**: BOC Training is a nationally-recognized certification training that educates building operators on a variety of topics such as equipment operations, common low-cost operational improvements, performance benchmarking, and building commissioning.

Overall, the implementation team set a goal of achieving 38,856 MWh and 548,765 therms of savings through the Standard Initiative in 2023.

3.1.2 INITIATIVE ANNUAL SAVINGS SUMMARY

Table 6 presents the Standard Initiative annual savings achieved in 2023. The 2023 Standard Initiative achieved 27,291 MWh, 4.55 MW, and 1,410,941 therms in verified net savings. The Initiative also produced 22,202 therms in verified net gas savings in 2023 that are not directly claimable by AIC because the customers do not receive gas service from AIC; these savings are detailed further in Appendix B.

Table 6. 2023 Standard Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	32,932	5.46	2,198,961
Gross Realization Rate	99%	100%	102%
Verified Gross Savings	32,621	5.45	2,232,156
NTGR	0.837	0.835	0.632
Verified Net Savings	27,291	4.55	1,410,941

3.1.3 STANDARD CORE CHANNEL

The following sections present the impact evaluation results for the 2023 Standard Core channel. Additional details on the impact analysis methodology used to generate these results are provided in Appendix A.

CHANNEL DESCRIPTION

The Standard Core channel offers traditional downstream incentives for: lighting; variable frequency drives (VFDs); heating, ventilating, and air conditioning (HVAC) equipment; refrigeration/grocery store equipment; commercial kitchen equipment; steam trap repair/replacements (STRR); green nozzles; and other measures. The channel separates these out into a series of distinct offerings, detailed below.

- Standard Lighting for Business (SLB)
- Variable Frequency Drives (VFDs)
- Specialty Equipment (SE)
- Heating, Ventilating, and Air Conditioning (HVAC)
- Green Nozzles (GNs)
- Steam Trap Repair/Replacement (STRR)

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the Standard Core channel in 2023:

- The implementation team partnered with the Illinois Asphalt Pavement Association to promote available incentives for the installation of tank insulation at asphalt emulsion storage facilities. They also hosted a Compressed Air Challenge training with industrial customers across the service territory, as well as four trainings on network lighting controls (NLCs) and luminaire level lighting controls (LLLCs)with program allies throughout the service territory.
- Due to greater than expected demand, the implementation team reduced or capped incentives for several measures, including NLCs, ozone laundry, grow lights, and lithium-ion forklift batteries. They also removed incentives for several measures that were transitioned to the Midstream Initiative, including solid and glass door freezers, LED exit signs, unitary air conditioners, package sealers, and kitchen demand controlled ventilation (DCV).
- The implementation team increased incentives for HVAC DCV, as well as STRR and furnace early replacements for public sector customers only.

PARTICIPATION SUMMARY

Table 7 presents a summary of participation in the Standard Core channel in 2023 by measure category. We present these data separated by public and private sector projects to provide context as to the primary drivers of participation. AIC customers completed 669 unique projects through the channel, encompassing 46,405 incentivized measures. The SLB offering continued to dominate channel activity, accounting for 53% of total projects completed in 2023. The HVAC and SE offerings accounted for the next largest shares of completed projects at 17% and 10%, respectively.

Table 7. 2023 Standard Core Channel Participation Summary by Measure Category

Measure Category	Total Projects	Measure Quantity	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Therms
Private Sector					
SLB - Standard Lighting for Business	282	32,339	14,904	2.75	0
VFDs - Variable Frequency Drives	21	86	4,173	0.78	0
SE - Specialty Equipment	69	532	3,548	0.14	1,016,300
HVAC - Heating, Ventilating, and Air Conditioning	66	178	1,924	0.28	153,956
GNs - Green Nozzles	53	60	104	0.00	12,251
STRR - Steam Trap Repair/Replacement	33	3,889	16	0.00	717,732
Private Sector Subtotal	*524*	*37,084*	*24,668*	*3.95*	*1,900,234*
Public Sector [a]					
SLB	75	7,404	2,794	0.46	0
VFDs	10	22	1,246	0.36	0
HVAC	50	293	862	0.07	148,564
GNs	1	1	0	0.00	598
STRR	9	1,601	0	0.00	2,879
Public Sector Subtotal	*145*	*9,321*	*4,902*	*0.89*	*152,040*
Total	**669**	**46,405**	**29,570**	**4.83**	**2,052,279**

Note: The ex ante gas savings presented in this table reflect only AIC claimable gas savings. Two projects completed through the Standard Core channel produced non-AIC gas savings, and as such were not included. More information on the savings from these projects is presented in Appendix B.

[a] The project counts, measure counts, and ex ante savings values presented in the Public Sector subsection of this table include State and Federal facilities, which are not included in the list of customer types covered in the public sector minimum funding requirements in subsection (c) of 220 ILCS 5/8-103B and subsection (e) of 220 ILCS 5/8-104.

Figure 1 shows the distribution of Standard Core projects by channel and facility type. As shown, retail, educational, and manufacturing/industrial facilities were the most common types of facilities treated through the Standard Core channel in 2023.

Figure 1. 2023 Standard Core Channel Participation by Facility Type

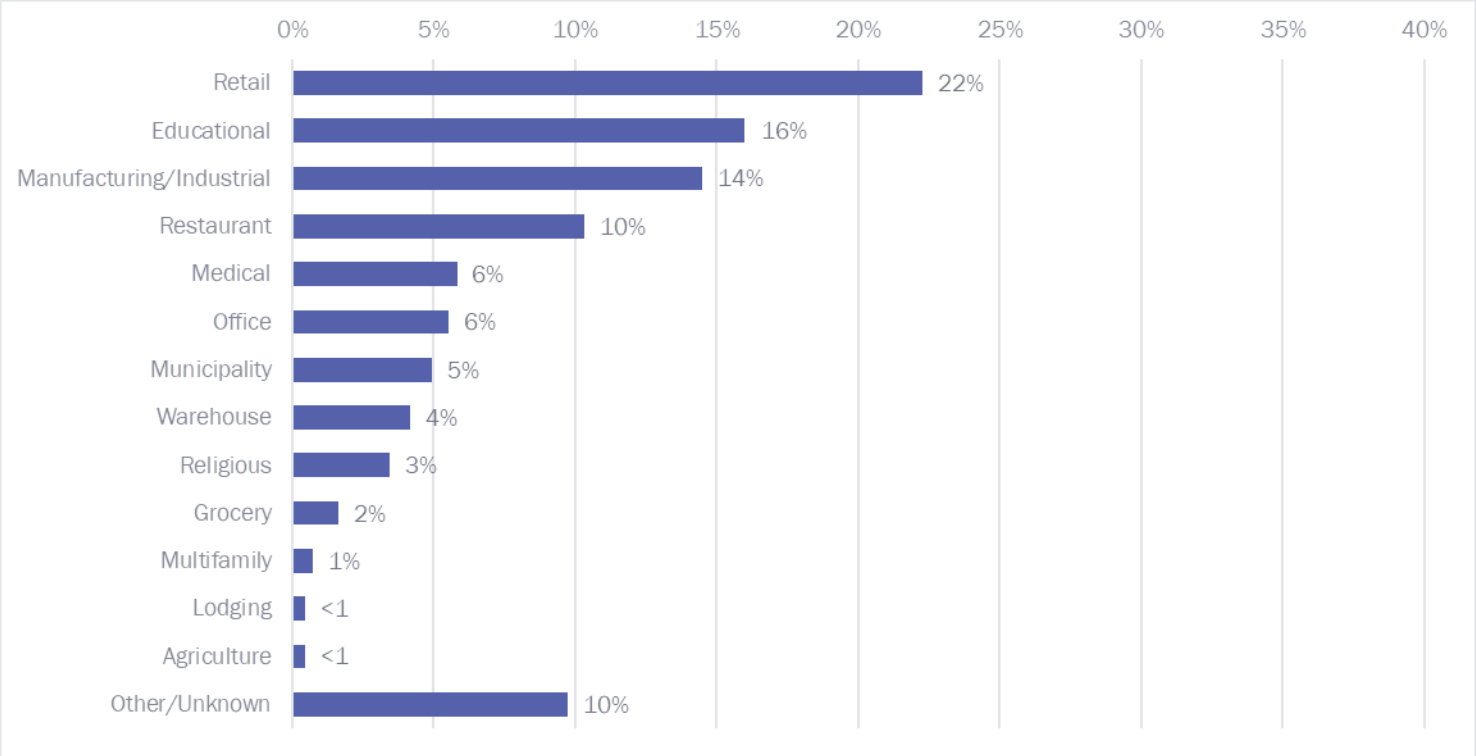

Table 8 presents information on program ally[13] participation in the channel. In total, 146 program allies participated in the channel in 2023, which is a 20% decrease compared to the 182 program allies that participated in 2022. Notably, 15% of Standard Core projects were completed by customers without the assistance of a program ally. The majority of these projects (63%) were SLB projects; 13% were VFD projects, 12% SE, 8% HVAC, and 4% GN. In addition, of the 146 active program allies that participated in the channel in 2023, 78 allies completed a single project. Table 8 presents participation information on the five program allies that were most active in each of the channel offerings in 2023.

Table 8. 2023 Standard Core Channel Program Ally Participation Summary

Program Ally	Projects	Share of Total
SLB (n=357)		
Ally 1	45	13%
Ally 2	42	12%
Ally 3	29	8%
Ally 4	13	4%
Ally 5	12	3%
HVAC (n=116)		
Ally 6	10	9%
Ally 7	10	9%
Ally 8	9	8%
Ally 9	8	7%
Ally 10	8	7%

[13] A program ally is a contractor or vendor that is enrolled in AIC's Program Ally Network, which is a network of companies qualified to deliver services through AIC's initiatives.

Program Ally	Projects	Share of Total
SE (n=69)		
Ally 11	19	28%
Ally 2	19	28%
Ally 12	6	9%
Ally 13	4	6%
Ally 14	2	3%
GNs (n=54)		
Ally 15	49	98%
Ally 16	1	2%
STRR (n=42)		
Ally 7	23	55%
Ally 17	2	5%
Ally 18	2	5%
Ally 19	2	5%
Ally 20	2	5%
VFDs (n=31)		
Ally 21	2	6%
Ally 22	2	6%
Ally 23	2	6%

SAVINGS DETAIL

Table 9 presents the ex ante, verified gross, and verified net electric energy savings achieved through the Standard Core channel in 2023. The channel achieved a 99% electric energy realization rate. Overall, the Standard Core channel experienced a 33% reduction in verified net energy savings in 2023 compared to 2022. The primary driver of the Standard Core channel's year-over-year decline in savings was a 32% decrease in activity through the SLB offering compared to 2022. Despite this decrease, the SLB offering continued to drive the majority of channel performance, accounting for 61% of verified net electric energy savings. Several other offerings also experienced a decrease in savings compared to 2022: VFDs decreased by 13%; SE decreased by 57%; and HVAC decreased by 17%. The GNs and STRR offerings saw an increase in verified net savings of 210% and 31%, respectively.

Table 9. 2023 Standard Core Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
SLB	17,698	100%	17,701	0.839	14,855
VFDs	5,419	96%	5,195	0.833	4,329
SE	3,548	100%	3,549	0.849	3,013
HVAC	2,785	100%	2,785	0.683	1,902
GNs	104	100%	104	0.920	96
STRR	16	109%	17	0.608	10
Total	**29,570**	**99%**	**29,351**	**0.825**	**24,206**

Table 10 presents the ex ante, verified gross, and verified net electric demand savings achieved through the Standard Core channel in 2023. The channel achieved a 100% realization rate for demand savings. Lighting measures and VFDs

accounted for 68% and 24% of verified net demand savings, respectively. Overall, the Standard Core channel experienced a 35% decline in verified net demand savings in 2023 compared to 2022.

Table 10. 2023 Standard Core Channel Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
SLB	3.21	100%	3.20	0.839	2.69
VFDs	1.14	99%	1.12	0.833	0.94
SE	0.14	100%	0.14	0.849	0.12
HVAC	0.35	100%	0.35	0.683	0.24
Total	**4.83**	**100%**	**4.81**	**0.827**	**3.98**

Table 11 presents the ex ante, verified gross, and verified net gas savings achieved through the Standard Core channel in 2023. The channel achieved a 102% realization rate for gas savings. Overall, verified net natural gas savings produced through the channel increased by 82% in 2023 compared to 2022. The SE offering was the primary driver of channel gas savings, accounting for 52% of the total verified net gas savings, which is a 689% increase in savings compared to 2022. In addition, verified net gas savings achieved through the STRR offering increased by 26% compared to 2022, while gas savings from the HVAC and GNs offerings decreased by 40% and 53%, respectively.

Table 11. 2023 Standard Core Channel Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
SE	1,016,300	97%	980,988	0.675	662,167
HVAC	302,520	102%	308,957	0.426	131,616
GNs	12,849	100%	12,849	0.890	11,436
STRR	720,610	109%	783,968	0.608	476,653
Total	**2,052,279**	**102%**	**2,086,763**	**0.614**	**1,281,871**

Note: The savings presented in this table only reflect savings that are directly claimable by AIC. Two additional projects produced non-AIC gas savings. More information on these savings are presented in Appendix B.

We discuss major discrepancies between ex ante claims and the verified analysis below.

- **Variable Frequency Drives (18% of ex ante energy savings, 24% of demand savings):** The gross realization rates for VFDs are 96% for electric energy and 99% for demand savings.
  - The evaluation team reviewed the applications for VFDs labeled as "generic" in the Initiative tracking data to verify whether the VFDs were installed on process pumps or process fans. The evaluation team limits savings for VFDs installed on process pumps and process fans to 42% and 67% of the baseline energy usage, respectively.
    - For five VFDs installed on process pumps, the implementation team did not limit savings to 42% of the baseline energy usage. This resulted in lower verified electric energy savings and lower verified demand savings.
  - The evaluation team reviewed the applications for VFDs installed on process fans to verify the presence (or lack thereof) of existing controls.
    - For three projects, the applications mentioned the presence of an existing discharge damper. Therefore, the evaluation team applied assumptions for a "Discharge Dampers" baseline from IL-TRM V11.0 when

calculating verified savings. This resulted in lower verified electric energy savings and lower verified demand savings.

  - For two projects, the application mentioned the presence of an existing inlet damper. Therefore, the evaluation team applied assumptions for an "Inlet Damper Box" baseline from IL-TRM V11.0 when calculating verified savings. This resulted in lower verified electric energy savings and higher demand savings.

- **Specialty Equipment (12% of ex ante energy savings, 3% of demand savings, and 49% of gas savings):** The gross realization rates for SE are 100% for electric energy, 100% for demand, and 97% for natural gas savings.
  - The evaluation team identified a typographic error in the implementation team's algorithm for natural gas savings for high efficiency grain dryers. The ex ante algorithm applied a value of 23 (or 2300%) for the percentage of moisture in the grain arriving at the grain dryer facility and 15 (or 1500%) for the percentage of moisture in the grain after being dried at the grain dryer facility, rather than the 23% and 15% prescribed in the IL-TRM. This error erroneously inflated ex ante gas savings for three high efficiency grain dryer measures. The evaluation team applied the correct percentage of moisture in the grain before and after grain drying from the IL-TRM V11.0, resulting in decreased natural gas savings.
  - The evaluation team identified a typographic error in the implementation team's algorithm for natural gas savings for compressed air heat recovery. The ex ante algorithm divides by 1,000,000, rather than 100,000 as prescribed in the IL-TRM. This error erroneously deflated ex ante gas savings for one compressed air heat recovery measure. The evaluation team applied the correct conversion factor from the IL-TRM V11.0, resulting in increased natural gas savings for this measure.
  - For three projects that added doors with LED fixtures to refrigerated display cases, the evaluation team applied efficient and baseline wattage assumptions for refrigerated case lighting from IL-TRM V11.0. The implementation team applied wattage information that did not align with IL-TRM V11.0 assumptions, resulting in higher verified electric energy savings and lower verified demand savings for these measures.
  - For one Desiccant Dryer Dew Point Demand Controls measure, the evaluation team applied the coincidence factor defined in IL-TRM V11.0 for a single shift facility based on information provided in the project application, whereas the implementation team assumed that shift information was unknown, resulting in decreased verified demand savings.
  - For one variable speed drive for condenser fans measure, the evaluation team applied the IL-TRM V11.0 deemed electric energy per rated horsepower per fan value based on the cooling degree day zone of the project. The implementation team applied an electric energy savings value that represented an average across all climate zones, resulting in slightly lower verified electric energy savings.
- **Heating, Ventilation, and Air Conditioning (9% of ex ante energy savings, 7% of demand savings, and 15% of gas savings):** The gross realization rates for HVAC are 100% for electric energy, 100% for demand, and 102% for natural gas savings.
  - The evaluation team applied new construction equivalent full load hours for heating and cooling for new building applications, whereas the implementation team applied existing building full load hours for all projects. The impact of applying new construction full load hours varied by building type, resulting in slightly lower verified electric energy and higher natural gas savings overall.
  - The evaluation team used site ZIP codes from the Initiative tracking data to assign cooling and heating degree day zones, which determine appropriate heating and cooling parameters such as full load hours. The implementation team used the representative cooling degree day city to determine both heating and cooling parameters. This results in higher verified natural gas savings for seven projects and lower verified natural gas savings for two projects, resulting in higher HVAC natural gas savings, overall.

- The evaluation team applied federal standard uniform energy factors for commercial gas storage water heaters based on the capacity of the tank in gallons from the Initiative tracking data. For one project with a 200-gallon tank, the evaluation team applied the federal standard uniform energy factor for over 120-gallon capacity tanks, whereas the implementation team applied the baseline energy factor for tanks with a capacity of 120-gallons or less, resulting in lower verified natural gas savings.
- Per IL-TRM V11.0, the evaluation team used the rated volume of the water heater tanks to calculate the standby loss of a baseline unit, which had a negligible impact on HVAC natural gas savings, overall.
  - For two projects, the implementation team did not include additional savings due to lower standby losses, resulting in higher verified natural gas savings.
  - For one project, the implementation team did not account for the standby loss of the new water heater, resulting in lower verified natural gas savings.
  - For one project, the implementation team did not account for the standby loss of the new water heater and incorrectly applied the uniform energy factor of the efficient unit, instead of the square root of the rated capacity when calculating the standby loss of a baseline unit, resulting in lower verified natural gas savings.
- For one advanced rooftop control (ARC) record, the evaluation team only calculated cooling savings, whereas the implementation team calculated heating and cooling savings. The implementation team only calculated cooling savings for a separate ARC record that was part of the same project, which prompted the evaluation team to review the project documentation to understand whether calculating heating and cooling savings was appropriate. The project application only included details about the associated cooling system and did not include any information about the associated heating system. Notably, the Initiative tracking data did include information on the associated heating capacity for this record, but we could not locate this information in the project documentation. The evaluation team's approach resulted in lower verified natural gas savings.

- **Steam Trap Repair/ Replacement (<1% of ex ante energy savings, 35% of gas savings):** The gross realization rates for STRR are 109% for electric energy and natural gas savings.
  - For three records, the Initiative tracking data showed that multiple steam traps were repaired or replaced; however, the ex ante savings reflected a quantity of one. The evaluation team applied the total quantities from the tracking data in the verified savings calculations, resulting in higher verified savings.

3.1.4 ONLINE STORE CHANNEL

The following sections present the impact evaluation results for the 2023 Online Store channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

The Online Store channel within the Standard Initiative provides a convenient e-commerce alternative to purchase energy-efficient technologies (e.g., LEDs, advanced thermostats, and advanced power strips). The Online Store channel also serves as a resource for educating private and public sector customers about the benefits of energy-efficient products, and is available to all AIC business customers.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the Online Store channel in 2023:

- The implementation team discontinued the "Out with the Old, In with the New" bundle offered in 2022 and added incentives for wall packs.

PARTICIPATION SUMMARY

Table 12 presents a summary of the participation of both private and public sectors through the Online Store channel in 2023. In total, Initiative staff incentivized the purchase of 2,883 units of efficient equipment.

Table 12. 2023 Online Store Channel Participation Summary by Measure

Measure	Measure Quantity	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Private Sector				
Advanced Thermostats	1,620	1,993	0.51	129,402
LED Bulbs and Fixtures	623	405	0.08	0
Advanced Power Strips – Tier 1	510	57	0.00	0
Lighting Controls	10	8	<0.01	0
Smart Sockets	51	1	0.00	0
Private Sector Subtotal	*2,814*	*2,464*	*0.60*	*129,402*
Public Sector [a]				
Advanced Thermostats	48	74	0.02	4,909
LED Bulbs and Fixtures	5	3	0.00	0
Advanced Power Strips – Tier 1	10	1	0.00	0
Smart Sockets	6	0	0.00	0
Public Sector Subtotal	*69*	*78*	*0.02*	*4,909*
Total	**2,883**	**2,542**	**0.62**	**134,311**

[a] The project counts, measure counts, and ex ante savings values presented in the Public Sector subsection of this table include State and Federal facilities, which are not included in the list of customer types covered in the public sector minimum funding requirements in subsection (c) of 220 ILCS 5/8-103B and subsection (e) of 220 ILCS 5/8-104.

SAVINGS DETAIL

Table 13 presents the ex ante, verified gross, and verified net electric energy savings achieved through the Online Store channel in 2023. The channel achieved a 99% electric energy realization rate. Overall, the channel experienced a 41% increase in verified net energy savings compared to 2022. Notably, verified net electric energy savings from advanced thermostats increased by 117% in comparison to 2022.

Table 13. 2023 Online Store Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Advanced Thermostats	2,067	101%	2,091	0.880	1,840
LED Bulbs and Fixtures	408	88%	359	1.156	415
Advanced Power Strips (APS)	58	100%	58	1.156	67
Lighting Controls	8	100%	8	1.156	10
Smart Sockets	1	100%	1	1.156	1
Total	**2,542**	**99%**	**2,518**	**0.927**	**2,333**

Table 14 presents the ex ante, verified gross, and verified net electric demand savings achieved through the Online Store channel in 2023. The channel achieved an 89% realization rate for demand savings, driven by discrepancies in the calculations for LED bulbs and fixtures, which account for 1% of verified net demand savings. Overall, the channel experienced a 23% increase in verified net demand savings compared to 2022.

Table 14. 2023 Online Store Channel Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Advanced Thermostats	0.53	103%	0.54	0.880	0.48
LED Bulbs and Fixtures	0.09	7%	0.01	1.156	0.01
Lighting Controls	<0.01	100%	<0.01	1.156	0.01
Total	**0.62**	**89%**	**0.56**	**0.886**	**0.49**

Table 15 presents the ex ante, verified gross, and verified net gas savings achieved through the Online Store channel in 2023. The Online Store channel achieved a realization rate of 101% for gas savings. Overall, the channel experienced a 118% increase in verified net natural gas savings compared to 2022.

Table 15. 2023 Online Store Channel Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Advanced Thermostats	134,311	101%	136,026	0.880	119,703
Total	**134,311**	**101%**	**136,026**	**0.880**	**119,703**

We discuss major discrepancies between ex ante claims and the verified analysis below.

- **Advanced Thermostats (81% of ex ante energy savings, 85% of demand savings, and 100% of gas savings):** The gross realization rates for advanced thermostats are 101% for electric energy, 103% for demand, and 101% for natural gas savings.

The evaluation team applied a value of 5.6 for the Heating Seasonal Performance Factor (HSPF) of baseline equipment in the verified analysis for all advanced thermostat projects with unknown heating equipment, which is consistent with guidance added to the IL-TRM through the V12.0 update process. Because V11.0 does not provide explicit guidance on what to apply in unknown situations, the evaluation adopted the V12.0 guidance for 2023. For 377 measures with "DS Thermostat" listed as the measure code, the implementation team assumed an HSPF of 3.41, which is consistent with an electric resistance baseline, resulting in lower verified electric energy savings.

- The evaluation team applied deemed Seasonal Energy Efficiency Ratio (SEER) and Energy Efficiency Ratio (EER) values defined in IL-TRM V11.0 for midstream programs in the verified analysis, which represent blends of heat pump, split system air conditioner, and package air conditioner baselines. The implementation team applied the Code of Federal Regulations minimum efficiency requirements for packed unitary air conditioners as outlined in section 4.4.15 of IL-TRM V11.0. The IL-TRM deemed efficiencies for midstream programs are lower than the code baseline applied in the ex ante calculations, resulting in higher verified electric energy savings.
- The evaluation team used site ZIP codes from the Initiative tracking data to assign cooling and heating degree day zones in the verified analysis, which determine appropriate heating and cooling parameters such as full load hours. The implementation team used the representative cooling degree day city to determine both heating and cooling parameters. For 49 measures, the cooling degree day zone representative city was different from the heating degree day zone representative city, which had a negligible impact on verified savings.

- **LED Bulbs and Fixtures (16% of ex ante energy savings, 14% of demand savings):** The gross realization rates for LED Bulbs and Fixtures are 88% for electric energy and 7% for demand savings.
  - The evaluation team assumed LED wall packs were installed in exterior spaces and applied parameters from the IL-TRM V11.0 that aligned with the Exterior Lighting - Dusk to Dawn Operation building type. The implementation team applied parameters based on the building type tracked in the Initiative data. This resulted in lower verified energy and demand savings.
  - For 29 LED wall pack measures, the implementation team applied baseline wattages that do not align with equipment information from the Initiative tracking data and IL-TRM V11.0. The evaluation team assigned baseline wattages from IL-TRM V11.0 based on the lighting type and lumens indicated in the equipment description. This resulted in baseline wattage assigned in the verified analysis being lower than the wattage applied in the ex ante calculation, resulting in lower verified savings overall.

3.1.5 BUILDING OPERATOR CERTIFICATION TRAINING

CHANNEL DESCRIPTION

AIC offers the BOC Training channel to building operators in AIC territory. BOC is a nationally-recognized course and certification training that was developed by the Northwest Energy Efficiency Council (NEEC) and includes classroom training, project assignments to be completed at the participant's facility, and in-class tests at the end of each day. Graduates who elect to complete the Certification Exam and pass earn the BOC Certification and become a Certified Building Operator. While participants do not need to be AIC customers to enroll in the course, AIC provides full tuition reimbursements to customers in their service territory upon completion of the course to incentivize participation.

The BOC training consists of two levels of training. The Level I course focuses on energy efficient building operations and the Level II course focuses on preparing building operators to evaluate their facility's performance and optimize operations. Table 16 includes a list of the topics covered in each of the course levels.

Table 16. BOC Training Topics by Level

Topics	Level I	Level II
1001 - Energy Efficient Operation of Building HVAC Systems	✓	
1002 - Measuring and Benchmarking Energy Performance	✓	
1003 - Efficient Lighting Fundamentals	✓	
1004 - HVAC Controls Fundamentals	✓	
1005 - Indoor Environmental Quality	✓	
1006 - Common Opportunities for Low-Cost Operational Improvements	✓	
2001- Building Scoping for Operational Improvements		✓
2002 – Optimizing HVAC Controls for Energy Efficiency		✓
2003 – Introduction to Building Commissioning		✓
2004 – Water Efficiency for Building Operators		✓
2005 – Presentations of Final Projects		✓

Note: In addition to the topics listed in this table, both the Level I and Level II courses include one supplemental class. The topics covered in this supplemental class vary.

PARTICIPATION SUMMARY

Table 17 summarizes participation in the 2023 BOC Training channel by segment. Overall, 12 AIC customers participated in the training. All trainees enrolled in Level I of the training.

Table 17. 2023 BOC Training Channel Participation Summary by Segment

Participant Number	BOC Level	Segment
2300099	I	Medical
2302200	I	Municipality
2302201	I	Office
2302202	I	Medical
2302204	I	Medical
2302205	I	Medical
2302206	I	Medical
2302207	I	Medical
2302208	I	Educational
2302209	I	Educational
2302210	I	Manufacturing/Industrial
2302212	I	Municipality

SAVINGS DETAIL

Table 18 presents the ex ante, verified gross, and verified net electric energy savings achieved through the BOC Training channel in 2023.

Table 18. 2023 BOC Training Channel Electric Energy Savings by Measure

Participant Number	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
2300099	137	100%	137	N/A	137
2302209	137	100%	137	N/A	137
2302200	129	100%	129	N/A	129
2302208	97	100%	97	N/A	97
2302202	82	59%	48	N/A	48
2302205	82	59%	48	N/A	48
2302204	55	100%	55	N/A	55
2302206	29	100%	29	N/A	29
2302207	27	100%	27	N/A	27
2302210	19	100%	19	N/A	19
2302201	13	100%	13	N/A	13
2302212	13	100%	13	N/A	13
Total	**819**	**92%**	**752**	**N/A**	**752**

Table 19 presents the ex ante, verified gross, and verified net electric demand savings achieved through the BOC Training channel in 2023.

Table 19. 2023 BOC Training Channel Electric Demand Savings by Measure

Participant Number	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
2300099	<0.01	1,000%	0.02	N/A	0.02
2302209	<0.01	1,000%	0.02	N/A	0.02
2302200	<0.01	1,000%	0.01	N/A	0.01
2302208	<0.01	1,000%	0.01	N/A	0.01
2302202	<0.01	588%	0.01	N/A	0.01
2302205	<0.01	588%	0.01	N/A	0.01
2302204	<0.01	1,000%	0.01	N/A	0.01
2302206	<0.01	1,000%	<0.01	N/A	<0.01
2302207	<0.01	1,000%	<0.01	N/A	<0.01
2302210	<0.01	1,000%	<0.01	N/A	<0.01
2302201	<0.01	1,000%	<0.01	N/A	<0.01
2302212	<0.01	1,000%	<0.01	N/A	<0.01
Total	**0.01**	**918%**	**0.08**	**N/A**	**0.08**

Table 20 presents the ex ante, verified gross, and verified net gas savings achieved through the BOC Training channel in 2023.

Table 20. 2023 BOC Training Channel Gas Savings by Measure

Participant Number	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
2300099	2,300	100%	2,300	N/A	2,300
2302209	2,300	100%	2,300	N/A	2,300
2302200	2,157	22%	465	N/A	465
2302208	1,624	100%	1,624	N/A	1,624
2302202	1,375	42%	720	N/A	720
2302205	1,375	42%	720	N/A	720
2302204	920	100%	920	N/A	920
2302210	319	100%	319	N/A	319
Total	**12,371**	**76%**	**9,367**	**N/A**	**9,367**

We discuss major discrepancies between ex ante claims and the verified analysis below.

- **BOC Training**: The realization rates for the 2023 BOC Training cohort are 92% for electric energy savings, 918% for demand savings, and 76% for natural gas savings.
  - The evaluation team reduced the square footage values applied in the verified savings calculations for four trainees, resulting in lower verified savings:
    - **2302200**: For trainee 2302200, the evaluation team identified that two of the facilities included in the ex ante savings calculations do not receive AIC gas service; therefore, the evaluation team removed the square footage for these facilities from the verified gas savings calculations.

- **2302202 and 2302205**: Trainees 2302202 and 2302205 manage the same facilities; therefore, both the implementation team and evaluation team split the square footage for these facilities evenly across the two participants to estimate savings. However, the evaluation team identified that two of the facilities were used as the basis for savings claims in 2022. The evaluation team removed the square footage for these facilities from the verified savings calculations. In addition, the evaluation team found that some of the facilities from the ex ante calculations only receive either AIC electric or gas service. We revised the square footage values applied in the verified calculations accordingly.

- The evaluation team identified an error in the ex ante demand savings calculations for all the trainees, which resulted in underestimating savings by a factor of ten. The implementation team appears to have calculated the ex ante demand savings by using the correct demand savings constant of 0.03 W/ft^2 prescribed in IL-TRM V11.0, but an incorrect unit conversion factor of 10,000 W per kW. The evaluation team applied the correct unit conversion factor of 1,000 W per kW, resulting in increased verified demand savings. In addition, the building square footage discrepancies described above also impacted the verified demand savings calculations, leading to a slight reduction in verified demand savings.

3.1.6 CUMULATIVE PERSISTING ANNUAL SAVINGS

Table 21 through Table 24 present CPAS and WAML for the 2023 Standard Initiative by channel. The tables also include a summary of the measure-specific and total verified gross savings for the Standard Initiative and respective channels, as well as CPAS in each year from 2023-2026.[14] The WAML for the Standard Initiative is 13.1 years and the WAML for the Standard Core, Online Store, and BOC Training channels are 13.2 years, 11.0 years, and 13.0 years, respectively. AIC also converted non-claimable natural gas savings produced through two Standard Core projects to electric savings for the purposes of goal attainment. Further details on these savings can be found in Appendix B.

Table 21. 2023 Standard Initiative CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
Standard Core	13.2	29,351	0.825	24,206	24,206	24,185	24,020	...	23,525	...	317,439
Online Store	11.0	2,518	0.927	2,333	2,333	2,333	2,333	...	2,265	...	25,705
BOC Training	13.0	752	N/A	752	752	752	752	...	436	...	6,932
2023 CPAS		**32,621**	**0.837**	**27,291**	**27,291**	**27,270**	**27,105**	...	**26,226**	...	**350,077**
Expiring 2023 CPAS				**0**	**0**	**21**	**165**	...	**167**	...	
Expired 2023 CPAS				**0**	**0**	**21**	**186**	...	**1,065**	...	
WAML	**13.1**										

[14] For further details, including achieved CPAS in years not presented in this table, please see the *2023 AIC CPAS and AAIG Workbook*.

Table 22. 2023 Standard Core Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
SLB	12.5	17,701	0.839	14,855	14,855	14,834	14,668	...	14,305	...	182,729
VFD	15.0	5,195	0.833	4,329	4,329	4,329	4,329	...	4,329	...	64,932
SE	14.7	3,549	0.849	3,013	3,013	3,013	3,013	...	3,008	...	44,228
HVAC	13.1	2,785	0.683	1,902	1,902	1,902	1,902	...	1,883	...	25,006
GNs	5.0	104	0.920	96	96	96	96	...	0	...	481
STRR	6.0	17	0.608	10	10	10	10	...	0	...	63
2023 CPAS		**29,351**	**0.825**	**24,206**	**24,202**	**24,174**	**24,121**	**...**	**23,757**	**...**	**317,439**
Expiring 2023 CPAS				**0**	**4**	**29**	**52**	**...**	**90**	**...**	
Expired 2023 CPAS				**0**	**4**	**32**	**84**	**...**	**448**	**...**	
WAML	**13.2**										

Table 23. 2023 Online Store Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
Advanced Thermostats	11.0	2,091	0.880	1,840	1,840	1,840	1,840	...	1,840	...	20,243
LEDs	11.8	359	1.156	415	415	415	415	...	415	...	4,885
Advanced Power Strip	7.0	58	1.156	67	67	67	67	...	0	...	471
Lighting Controls	10.0	8	1.156	10	10	10	10	...	10	...	98
Smart Socket	7.0	1	1.156	1	1	1	1	...	0	...	8
2023 CPAS		**2,523**	**0.927**	**2,333**	**2,333**	**2,333**	**2,333**	**...**	**2,265**	**...**	**25,705**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	**...**	**69**	**...**	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	**...**	**69**	**...**	
WAML	**11.0**										

Table 24. 2023 BOC Training Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
BOC Training	13.0	752	N/A	752	752	752	752	...	436	...	6,932
2023 CPAS		**752**	**N/A**	**752**	**752**	**752**	**752**	**...**	**436**	**...**	**6,932**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	**...**	**316**	**...**	
WAML	**13.0**										

3.1.7 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Standard Initiative moving forward:

STANDARD CORE CHANNEL

- **Key Finding #1**: The Standard Core channel experienced a year-over-year decline in verified net electric energy and demand savings of 33% and 35%, respectively, compared to 2022. This trend is consistent with efforts to increasingly drive Business Program activity through the Midstream Initiative (see Section 3.6 Midstream Initiative). The reduction in Standard Core channel savings compared to 2022 is primarily driven by a decrease in savings for the Standard Lighting for Business offering, which saw a 32% decrease in verified net energy and 37% decrease in verified net demand savings compared to 2022. As discussed in section 3.6.3, the Midstream Lighting channel saw a 28% increase in verified net energy savings compared to 2022.
- **Key Finding #2**: The evaluation team observed that in some instances, the implementation team does not collect critical information needed to support savings calculations. For example, the implementation team does not collect information on the grain type for high efficiency grain dryers.
  - **Recommendation**: In general, the evaluation team recommends that the implementation team consults the most current version of the IL-TRM to ensure they collect and track all the parameters required to estimate savings for incentivized measures using the TRM algorithms. For high efficiency grain dryers, specifically, we recommend that, if possible, the implementation team begin collecting information on the grain type, which is needed to assume the weight of a standard bushel. The IL-TRM does not define an assumption if the type of grain is unknown. If collecting project specific information is not feasible, we recommend that the implementation and evaluation teams coordinate on how best to characterize this parameter in future years.
- **Key Finding #3**: In some instances, key parameters collected by the implementation team are not included in the initiative tracking data. For example, the implementation team collects the area of the end cap of storage tanks for tank insulation measures and applies the appropriate value in ex ante savings but does not include this information in the initiative tracking data. Additionally, the implementation team collects the coefficient of performance (COP) for new PTHPs in the incentive form, and applies the appropriate value in ex ante savings calculations, but does not include this information in the initiative tracking data. Lastly, for VFDs, the implementation team collects information on controlled motor type and existing controls in the incentive application but does not include this information in the initiative tracking data; it appears that the implementation team assumes there are no existing controls when estimating ex ante savings for all VFDs.
  - **Recommendation**: To ensure that ex ante and verified savings estimates accurately represent the installed equipment, we recommend that the implementation team integrates project-specific information into the tracking data wherever possible and applies this project-specific information in ex ante savings calculations, as specified by the IL-TRM.
  - **Recommendation**: To improve the accuracy of savings estimates for VFD projects, we recommend the implementation team tracks the type of motor the VFDs are installed on (e.g., process fan, process pump, or other), corresponding with the options included on the incentive application. Additionally, we recommend the implementation team update the options for existing controls that are listed in the incentive application to correspond with the IL-TRM V11.0 baseline control types. We also recommend removing the write-in option from the application. Lastly, we recommend that the implementation team tracks baseline control type in the initiative tracking data and applies this information in ex ante savings calculations, in accordance with the IL-TRM.

- **Key Finding #4**: The evaluation team identified typographical errors in the algorithms and assumptions applied by the implementation team for high efficiency grain dryers and compressed air heat recovery measures in the Specialty Equipment Channel, which significantly impacted realization rates for these measures.
  - **Recommendation**: We recommend that the implementation team reviews the algorithms and assumptions programmed in AMPLIFY for high efficiency grain dryers and compressed air heat recovery to ensure consistency with the IL-TRM.

ONLINE STORE CHANNEL

- **Key Finding #1**: The Online Store experienced a year-over-year increase in verified net electric energy and gas savings of 41% and 118%, respectively, compared to 2022. This growth is primarily driven by a doubling in the number of advanced thermostats incentivized through the channel compared to 2022.
- **Key Finding #2**: The evaluation team observed that nearly 90% of LED measures incentivized through the Online Store in 2023 were wall pack fixtures, which are typically installed in exterior spaces of commercial buildings. The implementation team applied parameters from the IL-TRM that corresponded with the facility type tracked in the Initiative data, rather than exterior spaces. Because there are no demand savings for exterior lightings, the application of exterior lighting assumptions in the verified analysis results in significantly lower demand savings for the LED measure category.
  - **Recommendation**: To improve the accuracy of savings estimates for LED measures, we recommend that the implementation team applies exterior lighting assumptions from the IL-TRM for LED lighting measures typically installed outdoors, such as wall pack fixtures.

BUILDING OPERATOR CERTIFICATION TRAINING

- **Key Finding #1**: The IL-TRM includes two important stipulations related to claiming savings for BOC Training: (1) each trainee can only be included in savings claims twice -- once for completing BOC Level I and once for completing BOC Levell II; and (2) savings can only be claimed for a given set of square footage once over the 13-year measure life. Verifying the ex ante savings claims against these stipulations is an important EM&V step each year. In addition to these verification activities, the evaluation team must also confirm the fuel eligibility (i.e., AIC electric and/or gas service) of each facility included in a given ex ante savings claim. Currently, the Initiative tracking data does not include the necessary information to support these verification steps. The implementation team did include backup documentation on AMPLIFY which the evaluation team used, along with account information, to support verified savings calculations.
  - **Recommendation**: We recommend that the implementation team build upon the current backup documentation to track which facilities from the backup documentation are included in ex ante savings claims and which fuels AIC services to each facility. Otherwise, this channel will be subject to evaluation risk.
- **Key Finding #2**: The evaluation team identified an error in the ex ante demand savings calculation. The implementation team appears to be using the correct demand savings constant of 0.03 W/ft^2 prescribed in IL-TRM V11.0, but an incorrect unit conversion factor of 10,000 W per kW.
  - **Recommendation**: Review the demand savings algorithm in AMPLIFY to ensure alignment with the IL-TRM.

3.2 CUSTOM INITIATIVE

3.2.1 INITIATIVE DESCRIPTION

The Custom Initiative offers incentives to AIC Business Program customers for energy efficiency projects involving equipment not covered through AIC's prescriptive initiatives. The Initiative also provides an avenue for piloting novel measures prior to incorporating them into the Standard Initiative. Business customers often represent the highest potential for energy savings, but these savings frequently result from highly specialized equipment designed for particular industries or types of facilities. The Custom Initiative allows customers to propose additional measures and tailor projects to their facility and equipment needs.

The Custom Initiative is delivered to customers through several different channels. The Custom Incentives and New Construction Lighting channels produce all the energy, demand, and gas savings claimed through the Initiative; these channels are described in more detail in Sections 3.2.4 and 3.2.5, respectively. In addition to these two channels, AIC also operates several smaller efforts through the Custom Initiative, including: Staffing Grants; Metering and Monitoring; Strategic Energy Management (SEM); Building Energy Assessments (BEA); Feasibility Studies; Agricultural Energy Audits; and New Construction Design channels. These channels typically serve the purpose of engaging AIC's business customers more deeply regarding energy efficiency, and do not have direct savings claims associated with them.

Overall, the implementation team set a goal of achieving 34,534 MWh and 1,728,937 therms of savings through the Custom Initiative.

3.2.2 PARTICIPATION SUMMARY

Table 25 presents a summary of the number of projects completed through each Custom Initiative channel, as well as a breakdown of how channel participation was distributed amongst private and public sector customers.

Table 25. 2023 Custom Initiative Participation Summary by Channel

Channel	Projects	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Private Sector				
Custom Incentives	73	18,297	1.90	388,549
New Construction Lighting	16	2,000	0.33	0
Staffing Grant	34	0	0	0
Building Energy Assessment	27	0	0	0
Feasibility Study	13	0	0	0
Strategic Energy Management	12	0	0	0
Metering & Monitoring	1	0	0	0
Agricultural Energy Audit	1	0	0	0
New Construction Design	1	0	0	0
Private Sector Subtotal	*178*	*20,297*	*2.23*	*388,549*
Public Sector [a]				
Custom Incentives	44	3,679	0.79	100,064
New Construction Lighting	6	99	0.04	0
Staffing Grant	26	0	0	0
Building Energy Assessment	4	0	0	0

Channel	Projects	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Feasibility Study	1	0	0	0
Metering & Monitoring	1	0	0	0
Public Sector Subtotal	*82*	*3,778*	*0.82*	*100,064*
Total	**260**	**24,075**	**3.06**	**488,613**

Note: The ex ante therm savings presented in this table reflect only AIC claimable gas savings. Two projects completed through the Custom Incentives channel produced non-AIC gas savings. More information on the savings from these projects is presented in Appendix B. In addition, the ex ante MWh, MW, and therm savings deviate slightly from the final claimed savings for the Initiative because savings estimates were revised for two projects after the evaluation team had sampled them. The evaluation team preserved the ex ante savings as they were sampled, leading to slight differences in the ex ante totals presented here.

[a] The project counts, measure counts, and ex ante savings values presented in the Public Sector subsection of this table include State and Federal facilities, which are not included in the list of customer types covered in the public sector minimum funding requirements in subsection (c) of 220 ILCS 5/8-103B and subsection (e) of 220 ILCS 5/8-104.

Table 26 presents a summary of participation in the Custom Incentives and New Construction Lighting channels by facility type. Educational facilities, manufacturing/industrial, and medical facilities accounted for 63% of Initiative projects.

Table 26. 2023 Custom Initiative Projects by Facility Type

Facility Type	Share of Custom Incentives Projects	Share of New Construction Lighting Projects	Share of Total Projects
Educational	29%	14%	27%
Manufacturing/Industrial	24%	32%	25%
Medical	11%	9%	11%
Restaurant	9%	0%	8%
Municipality	8%	14%	9%
Religious	5%	0%	4%
Grocery	4%	5%	4%
Retail	2%	5%	2%
Lodging	1%	0%	1%
Warehouse	1%	5%	1%
Multifamily	1%	0%	1%
Other/Unknown	5%	18%	7%

In total, 53 program allies participated in the Custom Initiative in 2023, with 35 completing projects through the Custom Incentives channel and 19 completing projects through the New Construction Lighting channel.[15] Notably, 27% of Custom Incentives projects were completed without the assistance of an enrolled program ally. One program ally (Ally 9) accounted for 18% of projects completed through the Custom Incentives channel. All other allies accounted for fewer than 10% of projects.

[15] One ally completed projects through both Custom Incentives and New Construction Lighting.

3.2.3 INITIATIVE ANNUAL SAVINGS SUMMARY

Table 27 presents the Custom Initiative annual savings achieved in 2023. The 2023 Custom Initiative achieved 16,907 MWh, 2.16 MW, and 377,390 therms in verified net savings. The Initiative also produced 537,505 therms in verified net gas savings in 2023 that are not directly claimable by AIC because the customers do not receive gas service from AIC. These savings are detailed further in Appendix B.

Table 27. 2023 Custom Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	24,075	3.06	488,613
Gross Realization Rate	89%	90%	97%
Verified Gross Savings	21,505	2.75	471,737
NTGR	0.786	0.786	0.800
Verified Net Savings	16,907	2.16	377,390

3.2.4 CUSTOM INCENTIVES CHANNEL

The following sections present the impact evaluation results for the 2023 Custom Incentives channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

The Custom Incentives channel provides incentives for electric and gas measures not incentivized through other AIC offerings. Some examples of common Custom Incentives measures include compressed air improvements, energy management systems (EMS), and industrial process measures, including heat recovery, process heat, and improvements to steam systems.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the Custom Incentives channel in 2023:

- The implementation team hosted a Combined Heat and Power (CHP) educational webinar with the goal of developing a continuous pipeline of projects.
- In addition, the implementation team raised the public sector gas incentive, reduced the minimum period to receive an incentive, and raised the maximum payback period.

SAVINGS DETAIL

For the Custom Incentives channel, we verified participation and gross impacts through desk reviews and on-site M&V of a sample of projects, as described in Appendix A. Site-specific M&V was conducted for Custom Incentives projects in three distinct waves with samples independently developed for each wave by fuel type (electric or gas). We used a stratified combined ratio estimator to develop a realization rate for each wave by savings type (presented later in this chapter).

Site-Specific Results

Table 28 presents the results of the gross savings analysis for the 48 Custom Incentives projects we reviewed in 2023. Realization rates for individual projects ranged from 0% to 324% for electric energy and 56% to 699% for gas. Additional details for eight selected project reviews are provided in Appendix D to this report.

Table 28. 2023 Custom Incentives Channel Gross Impact Results for Sampled Electric and Gas Projects

Project ID	Sample			Ex Ante Gross Savings			Gross Realization Rate			Verified Gross Savings		
	Wave	Fuel	Stratum	MWh	MW	Therms	MWh	MW	Therms	MWh	MW	Therms
2300008[a]	2	Both	2; 3	84	0.05	3,357	324%	114%	324%	273	0.06	10,868
2200441	1	Electric	2	202	0.04	–	153%	152%	–	309	0.06	–
2300085	3	Electric	2	182	0.02	–	124%	400%	–	226	0.08	–
2300113	2	Electric	3	485	0.00	–	122%	N/A	–	590	0.00	–
2300108	1	Both	3; 3	627	0.00	47,154	113%	N/A	123%	707	0.00	58,184
2300040	3	Both	2; 3	291	0.00	19,111	111%	N/A	100%	323	0.00	19,111
2300055	2	Both	1; 2	46	0.00	1,854	106%	N/A	107%	48	0.00	1,982
2200447	1	Electric	3	323	0.13	–	100%	10%	–	323	0.01	–
2301809	3	Electric	3	583	0.07	–	100%	100%	–	583	0.07	–
2300247	1	Electric	1	5	0.00	–	100%	100%	–	5	0.00	–
2200795	3	Electric	1	100	0.05	–	100%	100%	–	100	0.05	–
2200412	3	Both	4; 4	2,408	0.28	639,015	100%	100%	100%	2,408	0.28	639,015
2200038	1	Electric	3	515	0.01	–	99%	256%	–	509	0.04	–
2200636	2	Electric	3	450	0.05	–	95%	96%	–	429	0.05	–
2200183	1	Electric	2	164	0.00	–	93%	N/A	–	153	0.00	–
2300011	3	Electric	1	71	0.02	–	88%	100%	–	62	0.02	–
2200053	3	Both	3; 3	1,027	0.00	53,620	87%	N/A	85%	891	0.00	45,809
2201213	1	Electric	3	469	0.05	–	83%	84%	–	389	0.05	–
2300016	3	Electric	4	2,077	0.23	–	73%	75%	–	1,509	0.17	–
2200735	2	Electric	3	781	0.12	–	37%	39%	–	291	0.05	–
2200889	1	Electric	2	196	-0.02	–	33%	100%	–	65	-0.02	–
2300049	2	Electric	2	239	0.01	–	18%	81%	–	42	0.01	–
2300014	1	Electric	4	1,082	0.12	–	17%	9%	–	181	0.01	–

Project ID	Sample			Ex Ante Gross Savings			Gross Realization Rate			Verified Gross Savings		
	Wave	Fuel	Stratum	MWh	MW	Therms	MWh	MW	Therms	MWh	MW	Therms
2200603	2	Both	3; 1	447	0.05	1,297	7%	0%	699%	30	0.00	9,074
2200056	1	Electric	2	76	0.00	—	0%	N/A	—	0	0.00	—
2200100	1	Gas	1	—	—	987	—	—	100%	—	—	987
2100735	1	Gas	2	—	—	4,025	—	—	91%	—	—	3,648
2200016	1	Gas	3	—	—	35,702	—	—	90%	—	—	32,004
2100813	1	Gas	3	—	—	23,123	—	—	100%	—	—	23,123
2200193	1	Gas	3	—	—	10,913	—	—	172%	—	—	18,759
2201086	1	Gas	3	—	—	12,110	—	—	58%	—	—	6,988
2200012	1	Gas	4	—	—	118,682	—	—	56%	—	—	66,687
2301040	2	Gas	1	—	—	411	—	—	134%	—	—	552
2300261	2	Gas	3	—	—	5,563	—	—	113%	—	—	6,274
2300104	2	Gas	3	—	—	5,977	—	—	183%	—	—	10,922
2300268	3	Gas	1	—	—	949	—	—	100%	—	—	949
2101289	3	Gas	2	—	—	7,507	—	—	100%	—	—	7,507
2301659	3	Gas	3	—	—	47,126	—	—	100%	—	—	47,126
2300041	3	Gas	3	—	—	25,537	—	—	96%	—	—	24,573

Note: The customers that completed projects 2200412 and 2300108 are not AIC gas customers. Therefore, these savings are not directly claimable by AIC towards its 8-104 gas energy efficiency goals. However, we present the savings in this table because these gas savings did inform the ratio estimator used to develop Initiative-level savings. Additionally, AIC chose to claim the gas savings achieved through these projects to electric savings as (b-25) conversions. More information on these savings can be found in Appendix B.

[a] Project 2300008 is a fuel switching project that was not identified as such until after it was sampled. The verified savings for this project do not reflect the actual at-the-meter effects produced by the project; rather, they are computed in line with IL-TRM guidance on allocation of savings from fuel switching projects. This project achieved a 324% realization rate on a British thermal unit (Btu) basis.

As part of our Wave 3 sampling activities, Leidos identified two fuel switching projects in the population of completed projects. We separated these projects into their own sample due to their unique characteristics and completed reviews of both projects. Table 29 presents the results of our gross savings analysis for these projects. Per guidance in IL-TRM V11.0, the evaluation team determined the verified savings for these fuel switching projects by estimating the change in site MMBtus (million British thermal units [Btus]) produced through the projects. As such, we present a single MMBtu realization rate for these projects as opposed to presenting specific electric energy and gas realization rates. We then allocated the MMBtu savings for each project across electric energy and gas savings for the purposes of counting savings towards goal attainment in line with IL-TRM guidance.

Table 29. 2023 Custom Incentives Channel Gross Impact Results for Sampled Fuel Switching Projects

Project ID	Ex Ante Gross Savings				MMBtu Realization Rate	Verified Gross Savings			
	MWh	MW	Therms	MMBtu		MWh	MW	Therms	MMBtu
2300603	-6	0.01	18,493	1,830	91%	-5	<0.00	16,901	1,673
2300024	235	0.21	-5,387	262	100%	235	0.17	-5,387	262

Notably, project 2300008 captured in Table 28 above was also a fuel switching project. However, this was not identified until after the project was already sampled through our traditional sampling activities. This project was evaluated in a similar manner to the projects presented in Table 29, but the evaluation team back-calculated electric energy and gas specific realization rates for use in our sample rollup. The actual at the meter impacts of all three fuel switching projects are accounted for in the cost-effectiveness inputs outlined in Appendix B.

Given that each Custom Incentives project is unique in terms of the measures involved and the methods the evaluation team used to estimate savings, we cannot present a full summary of the sources of discrepancy between the ex ante and verified gross savings estimates for the channel. However, we did make specific findings regarding consistent differences in the approach taken by evaluation and implementation teams to estimate savings. These findings are provided below. For project-specific details, please see Appendix D to this report, as well as the separate backup documentation provided by the evaluation team. Overarching findings and recommendations for the Custom Initiative are presented in Section 3.2.7.

HVAC and HVAC Controls Projects

- For several HVAC controls projects, the evaluation team found that the customers either did not fully implement the controls as planned, or they were operated or installed differently from what was listed in the project documentation. The evaluation team recommends that the implementation team verify that all equipment has been installed and is operating as intended when completing their project review. If this is not the case, the ex ante savings should be updated accordingly.
- For one project that involved the replacement of a central gas-fired heating and cooling plant with an air-cooled chiller and variable refrigerant flow (VRF) system, the implementation team did not account for the energy consumption from the new dedicated outdoor air system (DOAS) that was installed in conjunction with the chiller and VRF systems. The DOAS included gas-fired heating and direct expansion (DX) cooling. Accounting for the DOAS in the project savings calculations significantly reduced the verified gas savings, as the evaluation team discovered that the DOAS was serving as the primary source of space heating for the facility rather than the VRF. The evaluation team recommends that the implementation team gather comprehensive information on the building systems impacted by a project to ensure that the full scope of the project's impacts are reflected in savings estimates.

Process Equipment Projects

- For projects involving production or process equipment, the evaluation team found that the implementation team's meter data was limited to amp readings and was collected over time frames that were short relative to potential load variability. The evaluation team recommends including voltage and power factor measurements when metering equipment. In addition, we recommend extending the metering timeframe, when possible, to capture the variability in equipment loading. These steps will improve the accuracy of equipment demand estimates and resulting project savings. We recommend that these steps be taken for both the baseline and efficient cases.
- One project involved the installation of equipment that was previously in operation at a different facility. This was not clearly documented in the project files. The implementation team should clearly identify when a project involves the installation of pre-owned or previously used equipment and include important details in the project documentation such as the age of the equipment age, expected remaining useful life, origin, and any repairs or refurbishing that was completed. The implementation team should expect that the equipment's effective useful life will be lower than a new piece of equipment.

Projects Utilizing Energy Models

- The implementation team accepted vendor energy models from external proprietary interfaces with DOE-2 modeling software to calculate the savings for several HVAC projects. The evaluation team recommends requiring vendors and participants to submit energy modeling files in specific standardized formatting as part of the application process. The key modeling files are the baseline and proposed input data files, which are .IDF file extensions for EnergyPlus and .INP file extensions for DOE-2. These are not always the primary modelling files depending on the front-end simulation software (e.g., Trane 3D, DesignBuilder), but these files can typically be exported from the software, providing a uniform and non-proprietary set of files for documentation and evaluation. In conjunction with a detailed review of the modeling files, this will reaffirm the project scope, ensure claimed savings are reasonable and well-documented, and reduce evaluation risk.

- The implementation team accepted vendor Trane Trace 700 models to calculate the energy savings for several projects. The evaluation team recommends that the implementation team suspend the use of Trane Trace 700 and transition to using the newer version, Trane Trace 3D Plus, as Trane is currently phasing out Trane Trace 700.

Projects Utilizing the IL-TRM

- The implementation team used incorrect inputs and assumptions when calculating savings for several projects using algorithms from the IL-TRM. The evaluation team recommends that the implementation team reviews savings calculations at the completion of each project to ensure all the inputs and assumptions are consistent with the equipment that was installed.

Overall Results

We used a stratified combined ratio estimation technique[16,17] to estimate gross realization rates for each wave by fuel type. These realization rates are presented in Table 30.

Table 30. 2023 Custom Incentives Channel Realization Rates by Wave and Fuel Type

Wave	Energy Savings (MWh)	Demand Savings (MW)	Gas Savings (Therms)
1	81%	55%	84%
2	78%	75%	230%
3	96%	114%	99%
Fuel Switching (FS)	100%	78%	88%

We produced verified gross savings estimates for the Custom Incentives channel by applying these gross realization rates to the population of projects in each wave. Table 31, Table 32, and Table 33 present the annual ex ante and verified gross and net electric energy, electric demand, and gas savings for each wave. Overall, Custom Incentives channel projects accounted for 91% of Custom Initiative verified net MWh savings, 88% of Initiative verified net MW savings, and 100% of Initiative verified net therm savings. The evaluation team achieved a relative precision of 7.6% for channel electric energy savings, 19.7% for electric demand savings, and 0.7% for gas savings at the 90% confidence level. Further details on our methodology for Custom Initiative sampling is provided in Appendix A.

Table 31. 2023 Custom Incentives Channel Electric Energy Savings by Wave

Wave	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
1	6,099	81%	4,926	0.786	3,873
2	3,121	78%	2,424	0.786	1,906
3	12,526	96%	11,985	0.786	9,423
FS	229	100%	230	0.786	180
Total	**21,975**	**89%**	**19,565**	**0.786**	**15,382**

[16] Cochran, William Gemmell. 1977. *Sampling Techniques*. John Wiley & Sons.
[17] Levy, Paul S., and Stanley Lemeshow. 2008. *Sampling of populations: Methods and Applications*. John Wiley & Sons.

Table 32. 2023 Custom Incentives Channel Electric Demand Savings by Wave

Wave	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
1	0.75	55%	0.41	0.786	0.32
2	0.33	75%	0.25	0.786	0.20
3	1.38	114%	1.58	0.786	1.24
FS	0.22	78%	0.17	0.786	0.14
Total	**2.69**	**90%**	**2.41**	**0.786**	**1.90**

Table 33. 2023 Custom Incentives Channel Gas Savings by Wave

Wave	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
1	224,880	84%	188,153	0.800	150,522
2	18,288	230%	42,126	0.800	33,701
3	232,339	99%	229,944	0.800	183,955
FS	13,106	88%	11,514	0.800	9,211
Total	**488,613**	**97%**	**471,737**	**0.800**	**377,390**

Note: The savings presented in this table only reflect savings that are directly claimable by AIC. Two additional projects produced non-AIC gas savings. More information on these savings are presented in Appendix B.

3.2.5 NEW CONSTRUCTION LIGHTING CHANNEL

The following sections present the impact evaluation results for the 2023 New Construction Lighting channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

The New Construction Lighting channel offers incentives for lighting measures in new construction projects. For these New Construction Lighting projects, a tool is provided to help customers design efficient lighting no matter the size of the facility. Additionally, the simple application is used to incentivize the installation of lighting that is more efficient than Illinois energy code requirements.

SAVINGS DETAIL

For the New Construction Lighting channel, we verified initiative participation and gross impacts through desk reviews and on-site M&V of a sample of projects, as described in Appendix A. Site-specific M&V was conducted for New Construction Lighting channel projects in a single wave at the close of the program year.

Site-Specific Results

Table 34 presents the results of the gross savings analysis for the seven New Construction Lighting channel projects we reviewed in 2023. Realization rates for individual projects ranged from 42% to 139%.

Table 34. 2023 New Construction Lighting Channel Gross Impact Results for Sampled Projects

Project ID	Sample	Ex Ante Gross Savings		Gross Realization Rate		Verified Gross Savings	
	Stratum	MWh	MW	MWh	MW	MWh	MW
2300110	3	758	0.049	101%	101%	768	0.050
2300045	3	559	0.087	98%	97%	547	0.084
2200861	3	193	0.022	73%	100%	141	0.022
2300071	3	173	0.099	42%	72%	73	0.071
2200611	3	155	0.028	77%	87%	120	0.024
2300002	2	18	0.013	139%	100%	25	0.013
2301623	1	3	0.001	89%	78%	3	0.001

We reviewed the sampled 2023 New Construction Lighting projects to identify consistent differences in the savings estimation approach taken by the evaluation and implementation teams. These findings are provided below to contextualize the impact evaluation results for the channel.

- The evaluation team found that the drivers of the New Construction Lighting channel's realization rates included adjustments to building area measurements, corrections to calculations, and verification of installed fixtures, all of which were unique to individual projects. However, the evaluation team observed one systematic issue common to many of the projects; the wattages listed on the Design Lights Consortium (DLC) website for many of the installed fixtures differed from those applied by the implementation team in the ex ante savings calculations, which were primarily based on manufacturer specification sheets. Differences between the DLC-listed wattages and those used by the implementation team amounted to an average increase in wattage of approximately 1%. The impact on each project's verified savings was correspondingly small. The evaluation team recommends that the implementation team use the DLC website to confirm and verify fixture wattages when calculating savings for lighting projects, in part because the DLC has testing protocols that ensure consistency in reported wattages across lighting products and manufacturers. Use of the DLC wattages will also ensure consistency with future evaluation, which relies on the DLC for verification.
- For one project, the implementation team included several facility spaces in the savings calculations that were not part of the project. The evaluation team used the drawings included in the project documentation to confirm which parts of the facility were involved in the project and adjusted the project area applied in the verified savings estimates accordingly. This resulted in decreased verified energy and demand savings. The evaluation team recommends that the implementation team confirms the total facility area that will be part of the lighting upgrade to ensure only the applicable building and floor areas are included in savings estimates.

Overall Results

We used a stratified combined ratio estimation technique[18,19] to estimate gross realization rates for each fuel type. These realization rates are presented in Table 35.

Table 35. 2023 New Construction Lighting Channel Realization Rates

Wave	Electric Energy Savings (MWh)	Electric Demand Savings (MW)
New Construction Lighting	92%	90%

We produced verified gross savings estimates for the New Construction Lighting channel by applying these gross realization rates to the population of projects. Table 36 and Table 37 present the ex ante, verified gross, and verified net electric energy and electric demand savings for the New Construction Lighting channel in 2023. Overall, New Construction Lighting projects accounted for 9% of Custom Initiative verified net MWh savings and 12% of Custom Initiative MW savings. The evaluation team achieved a relative precision of 4.1% for channel electric energy savings and 3.3% for channel electric demand savings at the 90% confidence level. Further details on our methodology for Custom Initiative sampling is provided in Appendix A.

Table 36. 2023 New Construction Lighting Channel Electric Energy Savings

Wave	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
New Construction Lighting	2,100	92%	1,940	0.786	1,525

Table 37. 2023 New Construction Lighting Channel Electric Demand Savings

Wave	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
New Construction Lighting	0.37	90%	0.33	0.786	0.26

[18] Cochran, William Gemmell. 1977. *Sampling Techniques*. John Wiley & Sons.

[19] Levy, Paul S., and Stanley Lemeshow. 2008. *Sampling of populations: Methods and Applications*. John Wiley & Sons.

3.2.6 CUMULATIVE PERSISTING ANNUAL SAVINGS

Table 38 presents CPAS and WAML for the 2023 Custom Initiative by channel. The table also includes a summary of the total verified gross savings for the Initiative and channels, as well as CPAS in each year from 2023-2026.[20] The WAML for the Custom Initiative is 16.5 years and the WAML for the Custom Incentives and New Construction Lighting channels are 16.7 years and 14.9 years, respectively. In 2023, AIC converted non-claimable natural gas savings produced through two Custom Incentives projects to CPAS for the purposes of goal attainment; further details on these savings can be found in Appendix B and further detail on converted CPAS can be found in Appendix C.

Table 38. 2023 Custom Initiative CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
Custom Incentives	16.7	19,565	0.786	15,382	15,382	15,382	15,382	...	15,263	...	256,268
New Construction Lighting	14.9	1,940	0.786	1,525	1,525	1,525	1,525	...	1,525	...	22,792
2023 CPAS		**21,505**	**0.786**	**16,907**	**16,907**	**16,907**	**16,907**	...	**16,788**	...	**279,060**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	...	**0**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	...	**119**	...	
WAML	**16.5**										

[20] For further details, including achieved CPAS in years not presented in this table, please see the *2023 AIC CPAS and AAIG Workbook*.

3.2.7 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Custom Initiative moving forward:

CUSTOM INCENTIVES CHANNEL

- **Key Finding #1**: The Custom Incentives channel experienced a year-over-year decline in verified net electric energy, demand, and gas savings of 28%, 21%, and 75%, respectively, compared to 2022.
- **Key Finding #2**: Electric energy and demand realization rates for the channel declined slightly in 2023 compared to 2022. The electric energy realization rate is 89% for 2023; it was 96% in 2022. The electric demand realization rate for 2023 is 90%; it was 102% in 2022. The gas realization rate for the channel increased from 96% in 2022 to 97% in 2023.
- **Key Finding #3**: Several fuel-switching projects were completed in 2023. The evaluation team separated these projects into their own sample frame, when possible, to account for the unique characteristics of these projects.
  - **Recommendation**: We recommend that the implementation and evaluation teams continue to coordinate on potential fuel-switching projects in future years to ensure these projects are accounted for properly during the evaluation team's sampling activities, and to discuss how to appropriately estimate savings for these types of projects. In addition, the implementation and evaluation teams should collaborate to ensure discussions are brought to the Illinois Technical Advisory Committee, as applicable, and that any updates that may be needed to the IL-TRM are submitted for review as part of the V13.0 development process.
- **Key Finding #4:** For several projects, we observed differences between the expected performance and scheduling of equipment and controls, and the actual performance and scheduling. In some instances, customers reverted the controls or scheduling to pre-existing conditions. In other instances, meter data collected by the implementation team was inconsistent with what was collected by the evaluation team. These differences could be the result of several potential factors, including the length of the metering period implemented by both teams or timing of the metering activities (i.e., immediately after project completion versus after the customer has settled into routine usage of the new equipment). While these discrepancies resulted in increased savings in some cases and reduced savings in others, they consistently represent an evaluation risk.
  - **Recommendation**: We recommend that the implementation team follow-up with customers two or three months after a project is completed to gather information about any changes the customer has since completing the project, such as changes to occupancy schedules or control setpoints. We also recommended that post-installation metering actives are conducted at that time to confirm operating conditions and equipment performance metrics. For process-related projects, it may only take two to three weeks of metering to gather sufficient data, while HVAC projects may require several months of metering to capture seasonal variation. While the evaluation team recognizes these steps may not always be feasible, they would reduce evaluation risk.
- **Key Finding #5**: The evaluation team continued to perform early reviews of larger or more complex Custom Initiative projects in 2023. Early reviews produce key findings and recommendations relating to potential risk to the estimated savings for a project. Some recommendations are minor, such as corrections to formulas, while others are more challenging to address, such as installing metering equipment to verify baseline operating characteristics. As observed in 2022, projects where the implementation team addressed the findings and recommendations presented in the early review typically achieved realization rates near 100%; while projects where recommendations from the early review were not fully addressed achieved lower realization rates.

- **Recommendation**: We recommend continuing to address early review findings and recommendations whenever possible, and for the more challenging recommendations, working with the evaluation team to prioritize recommendations and data needs ahead of the annual impact evaluation.

NEW CONSTRUCTION LIGHTING CHANNEL

- **Key Finding #1**: The New Construction Lighting channel experienced a year-over-year decline in verified net electric energy and demand savings of 66% and 75%, respectively, compared to 2022.
- **Key Finding #2**: The electric energy realization rate for the channel increased significantly from 70% in 2022 to 92% in 2023. The electric demand realization rate for the channel decreased slightly from 96% in 2022 to 90% in 2023.
- **Key Finding #3**: The evaluation team identified several types of discrepancies in the ex ante savings for new construction lighting projects. These discrepancies included the total floor area impacted by the incentivized lighting, annual hours of use assumptions, efficient lighting wattages, and differences in the proposed and installed fixture quantities. While some discrepancies led to large differences between the ex ante and verified savings estimates, none of the discrepancies were systemic in nature.
  - **Recommendation**: Recognizing that projects may change over time, we recommend taking additional QA/QC steps to ensure the final ex ante savings reflect the final scope of the project. This will reduce the evaluation risk for the New Construction Lighting channel moving forward.

3.3 RETRO-COMMISSIONING INITIATIVE

3.3.1 INITIATIVE DESCRIPTION

The RCx Initiative helps AIC business customers evaluate their existing mechanical equipment, energy management, and industrial compressed air systems to identify no-cost and low-cost efficiency measures to optimize existing energy-using systems.

Over time, deferred maintenance and changing operating directives and practices can lead to inefficient operation of building systems. Retro-commissioning is a process that examines current equipment operations relative to the needs of equipment owners and those served by the equipment, and then determines opportunities for increasing equipment efficiency through maintenance, system tune-ups, scheduling, and optimization of operations. Most of the identified improvement opportunities require little, if any, capital funds to implement.

Major market barriers to RCx include a lack of awareness of improvement opportunities and the cost of the detailed engineering studies required to identify these opportunities. Additionally, customer apathy can inhibit the implementation of recommendations despite there being no cost. To address these barriers, the RCx Initiative subsidizes Retro-Commissioning Service Providers (RSPs) studies and publicizes the benefits of retro-commissioning to foster a market for the services, with utility-certified RSPs providing the marketing outreach.

The RCx Initiative is grouped into three offerings: the RCx Core channel, the VCx channel, and the Virtual SEM pilot. Details on the services provided through the VCx channel and the Virtual SEM pilot are provided in sections 3.3.3 and 3.3.4, respectively. AIC customers did not complete any RCx Core projects in 2023; therefore, the evaluation team did not include a detailed section on this channel.

Overall, the implementation team set a goal of achieving 5,188 MWh and 207,041 therms of savings through the RCx Initiative in 2023.

3.3.2 INITIATIVE ANNUAL SAVINGS SUMMARY

Table 39 presents the RCx Initiative annual savings achieved in 2023. The 2023 RCx Initiative achieved 4,918 MWh in verified net savings.

Table 39. 2023 Retro-Commissioning Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	5,641	0	0
Gross Realization Rate	94%	N/A	N/A
Verified Gross Savings	5,285	0	0
NTGR	0.931	N/A	N/A
Verified Net Savings	4,918	0	0

3.3.3 VIRTUAL COMMISSIONING CHANNEL

In the following section, we present the results of the impact evaluation of the 2023 VCx channel of the RCx Initiative. Additional details on the impact analysis methodology used for this evaluation are presented in Appendix A.

CHANNEL DESCRIPTION

AIC launched the VCx channel as a pilot in 2020 with Power TakeOff as the implementer. Virtual commissioning is an approach that remotely targets the traditionally hard-to-reach customer segment of small and medium business customers to support low- and no-cost energy-saving measures. The VCx approach leverages Advanced Metering Infrastructure (AMI) data to support targeted insights for hard-to-reach customers through the design, implementation, and evaluation phases of the channel.

Power TakeOff uses their internal software to complete an initial analysis of AMI data from AIC's small and medium business customers to identify prospective participants. Power TakeOff then uses the outcomes of this analysis to remotely identify opportunities for low- and no-cost energy-saving improvements at prospective participants' facilities. These opportunities commonly include HVAC system settings modifications and lighting scheduling adjustments.

Power TakeOff energy advisors then contact potential participants to share the results of the analysis, confirm the energy-saving opportunities, and verify facility characteristics. After participants implement the recommended changes, Power TakeOff develops individual facility-level regression models using the participants' pre- and post-participation energy consumption to estimate savings. The models must meet certain criteria for robustness in order for savings to be claimed.[21] If a project demonstrates continued savings for three months and meets the model robustness criteria, annualized savings can be claimed for the project.

There were no specific participation goals for the channel in 2023; however, the channel did have a goal of saving 5,000 MWh of electric energy savings. Since VCx operates using a pay-for-performance delivery model, the channel focuses on achieving savings goals by serving customers with a high potential to save energy rather than on enrolling a target number of customers to participate in the channel. Power TakeOff also provides Leidos, the prime implementer

[21] These criteria are specified in AIC's Virtual Commissioning M&V Plan authored by Power TakeOff and are as follows: the normalized savings uncertainty must be below 50% at 68% confidence; the absolute value of normalized mean bias error (NMBE) must be below 0.5%; and the coefficient of variation of root mean square error [CV(RMSE)] must be below 25%. CV(RMSE) and NMBE are both metrics of how well a regression model explains or fits the data.

of AIC's Business Program, with small and medium business customer contact information and referrals to support lead generation for other AIC initiatives.

PARTICIPATION SUMMARY

The VCx channel served 31 participants (i.e., unique sites) across 21 unique organizations in 2023.[22] This represents a significant decrease (50%) in the number of participating organizations and in the number of participating sites (38%) compared to 2022. VCx participants commonly adjusted their lighting system scheduling, HVAC system setpoints, and/or HVAC system scheduling. In 2023, the most common facility types served through the VCx channel were healthcare facilities and office buildings (Figure 2).

Figure 2. 2023 Virtual Commissioning Channel Participant Facility Types

SAVINGS DETAIL

Table 40 presents the ex ante, verified gross, and verified net electric energy and demand savings achieved through the VCx channel in 2023. Savings are presented at the channel level only as VCx is a single-measure channel. The 2023 VCx channel achieved 4,880 MWh in verified net electric energy savings after adjusting for cross-participation and free ridership. The gross realization rate, the ratio of ex ante modeled savings to the evaluation team's modeled savings, is 94%. The primary source of discrepancy is that the evaluation team included weather interaction terms in relevant models whereas the implementation team did not. The evaluation team included weather interaction terms in the models when: 1) interventions were weather sensitive; 2) there was at least nine months of post-period data; and, 3) the inclusion of weather added explanatory value to the model. In addition, for two projects, we refined the models by removing the time interaction terms (i.e., between hour/day of the week and the intervention) because these did not add explanatory value to the models. Lastly, the evaluation team adjusted verified savings estimates for cross-participation for five sites; the ex ante did not adjust for cross-participation.

[22] We identified unique organizations by using unique contacts in the program tracking database.

Table 40. 2023 Virtual Commissioning Channel Annual Savings

Measure Category	Electric Energy Savings (MWh)
Ex Ante Gross Savings	5,597
Gross Realization Rate	94%
Verified Gross Savings	5,247
NTGR	0.930
Verified Net Savings	4,880

Note: Gross savings have been adjusted for cross-program participation.

3.3.4 VIRTUAL STRATEGIC ENERGY MANAGEMENT CHANNEL

In the following section, we present the results of the impact evaluation of the 2023 Virtual Strategic Energy Management (SEM) pilot of the RCx Initiative. Additional details on the impact analysis methodology used for this evaluation is presented in Appendix A.

CHANNEL DESCRIPTION

AIC launched a Virtual SEM pilot in partnership with Power TakeOff in 2023. The Virtual SEM pilot is designed in accordance with the Consortium for Energy Efficiency's minimum elements for effective SEM, and seeks to educate participants and enable them to manage their facility's energy usage in a holistic manner. Power TakeOff targeted customers who were previously engaged with the VCx channel but withdrew before implementation. Once participants enroll in the pilot, Power TakeOff conducts an energy audit of the facility to identify all available low and no-cost operational, maintenance, and behavioral improvement opportunities. They then work with the facility staff to develop an energy improvement plan. Participants receive the training, tools, and resources they need to develop and implement their continuous energy improvement plan. The goal for the pilot year was to achieve 500 MWh of electric energy savings.

PARTICIPATION SUMMARY

One participant completed energy-saving improvements through the Virtual SEM pilot in 2023. This participant made improvements to the operation of the HVAC and lighting systems at their grade school building, removed inefficient fluorescent lighting, and made minor operational changes to kitchen equipment.

SAVINGS DETAIL

Table 41 presents the ex ante, verified gross, and verified net electric energy and demand savings achieved through the Virtual SEM pilot in 2023. Savings are presented at the channel level only as Virtual SEM is a single-measure channel. The 2023 Virtual SEM pilot achieved 38 MWh in verified net electric energy savings. The gross realization rate, the ratio of ex ante modeled savings to the evaluation team's modeled savings, is 87%. The primary source of this discrepancy is that the evaluation team included weather interaction terms in the verified model whereas the implementation team did not include these terms in the ex ante model. The evaluation team included weather interaction terms in the model because 1) some of the interventions were weather sensitive, 2) at least nine months of post-period data were available, and 3) the inclusion of weather added explanatory value to the model. In addition, the evaluation team refined the model by removing the time interaction terms (i.e., between hour/day of the week and the intervention) because these did not add explanatory value to the model. Finally, the evaluation team found that the effect of the lighting intervention was not statistically significant and therefore excluded it from the savings calculations.

Table 41. 2023 Virtual Strategic Energy Management Pilot Annual Savings

Measure Category	Electric Energy Savings (MWh)
Ex Ante Gross Savings	44
Gross Realization Rate	87%
Verified Gross Savings	38
NTGR	1.000
Verified Net Savings	38

Note: Gross savings have been adjusted for cross-program participation.

3.3.5 CUMULATIVE PERSISTING ANNUAL SAVINGS

Table 42 presents CPAS and WAML for the 2023 RCx Initiative by channel. The table also include a summary of the total verified gross savings for the Initiative and its channels, as well as CPAS in each year from 2023-2026.[23] The WAML for the RCx Initiative is 7.3 years and the WAML for the VCx and Virtual SEM channels are 7.3 years and 7.0 years, respectively.

Table 42. 2023 Retro-Commissioning Initiative CPAS and WAML

Channel	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
VCx	7.3	5,247	0.931	4,880	4,880	4,880	4,880	...	1,464	...	35,624
Virtual SEM	7.0	38	1.000	38	38	38	38	...	0	...	266
2023 CPAS		**5,285**	**0.931**	**4,918**	**4,918**	**4,918**	**4,918**	...	**1,464**	...	**35,890**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	...	**3,454**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	...	**3,454**	...	
WAML	**7.3**										

[23] For further details, including achieved CPAS in years not presented in this table, please see the *2023 AIC CPAS and AAIG Workbook*.

3.3.6 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the RCx Initiative moving forward:

VIRTUAL COMMISSIONING CHANNEL

- **Key Finding #1**: In 2022, the evaluation team noted that the implementation team did not include weather interaction terms in their ex ante models for projects that included weather-sensitive interventions. The implementation team expressed that including these terms in the ex ante models was not practical from an implementation perspective due to the need to provide timely savings estimates to participating facilities. The evaluation team acknowledges these considerations but continued to apply weather interactions in the 2023 verified models for projects that met the following criteria: 1) interventions were weather sensitive; (2) the post-period contained more than nine months of data covering all four seasons in a typical weather year; and, 3) inclusion of weather interactions added explanatory value to the model.
  - **Recommendation**: The evaluation team recognizes the implementation team's desire to provide timely savings estimates to participating facilities and that the application of simplified models enables quick feedback due to the reduced post-period data requirements. However, if the implementation team wishes to reduce evaluation risk, we recommend applying the more robust model specifications when estimating ex ante savings for projects including weather-sensitive interventions whenever sufficient data is available.
- **Key Finding #2**: The implementation team used TMY3 weather data to normalize ex ante savings estimates. The evaluation team matched this approach when estimating verified energy savings. It is our understanding that the implementation team plans to transition to applying TMYx data in 2024.[24]
  - **Recommendation**: The evaluation team agrees with the decision to transition to TMYx in 2024. TMYx weather data is constructed using more recent weather observations; therefore, we feel it is appropriate to apply this data going forward. Specifically, the evaluation team recommends applying TMYx values derived from the most recent 15 years available.

VIRTUAL STRATEGIC ENERGY MANAGEMENT CHANNEL

- **Key Finding #1**: Virtual SEM was a new pilot in 2023 and savings were claimed for a single participant. Ex ante savings were estimated for this participant using an approach similar to the one applied to estimate savings for the VCx channel. The Virtual SEM channel provided a broader set of interventions, and, individually, each of those interventions are expected to produce different magnitudes of savings. The interventions were also applied in multiple stages and over a longer period of time. The evaluation team understands that, in the future, the ex ante savings for some Virtual SEM participants may be developed using different modeling approaches based on the types of interventions completed at the facilities.
  - **Recommendation**: We recommend that the implementation team develop an M&V plan that addresses the challenges of estimating savings when interventions occur in multiple stages and when individual interventions may generate different magnitudes of savings. We recommend that the implementation team engage with the evaluation team early in the process of deciding a savings estimation approach. This will give the evaluation and implementation teams time to coordinate and discuss the key considerations involved in selecting the appropriate savings estimation and modeling technique to apply, thus reducing evaluation risk.

[24] TMYx data is a publicly-available data source for weather normals based on more recent weather data than the TMY3 values. Lawrie, Linda K, Drury B Crawley. 2022. Development of Global Typical Meteorological Years (TMYx). http://climate.onebuilding.org.

3.4 STREETLIGHTING INITIATIVE

3.4.1 INITIATIVE DESCRIPTION

The AIC Streetlighting Initiative, launched in 2018, encourages replacement of streetlighting using high-pressure sodium (HPS) and mercury vapor (MV) lighting with energy-efficient LED technology. High-intensity discharge lighting, specifically HPS, is still the standard technology used for streetlighting in the United States today.

The Initiative targets streetlighting for upgrades through two channels: Municipality-Owned Streetlighting (MOSL) and Utility-Owned Streetlighting (UOSL), described in more detail in subsequent sections.

Overall, the implementation team set a goal of achieving 19,893 MWh of savings through the Streetlighting Initiative in 2023.

3.4.2 INITIATIVE ANNUAL SAVINGS SUMMARY

Table 43 presents the Streetlighting Initiative annual savings achieved in 2023. The 2023 Streetlighting Initiative achieved 20,009 MWh in verified net savings.

Table 43. 2023 Streetlighting Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	20,050	0	0
Gross Realization Rate	100%	N/A	N/A
Verified Gross Savings	20,050	0	0
NTGR	0.998	N/A	N/A
Verified Net Savings	20,009	0	0

3.4.3 MUNICIPALITY-OWNED STREETLIGHTING CHANNEL

The following sections present the impact evaluation results for the 2023 MOSL channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

Through the MOSL channel, AIC targets municipal customers who own their streetlighting fixtures. Incentives are provided to encourage these customers to replace existing streetlights (typically HPS and MV) with LED streetlights.

Overall, the implementation team set a goal of achieving 488 MWh of savings through the MOSL channel in 2023.

- A marketing piece focused on municipal-owned streetlights was emailed to local government customers to increase Channel participation.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the MOSL channel in 2023:

- The implementation team held a training to educate field inspectors on how to identify potential community streetlight projects to help increase participation in the channel.

SAVINGS DETAIL

In total, the Initiative staff incentivized the installation of 129 measures across four municipalities. Table 44 presents the ex ante, verified gross, and verified net electric energy savings achieved through the MOSL channel in 2023. We did not observe any discrepancies between the ex ante and verified savings calculations for the MOSL channel in 2023.

Table 44. 2023 Municipality-Owned Streetlighting Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
MOSL (HPS Baseline)	133	100%	133	0.690	92
Total	**133**	**100%**	**133**	**0.690**	**92**

3.4.4 UTILITY-OWNED STREETLIGHTING CHANNEL

The following sections present the impact evaluation results for the 2023 UOSL channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

Through the UOSL channel, AIC targets municipal customers with AIC-owned streetlighting fixtures. Early replacement of functioning HPS and MV streetlights with LED streetlights is available to customers through the Initiative for a per-fixture fee. The channel incentivizes customers to request early replacement of these fixtures and provides an incentive to decrease the per-fixture cost of the early replacement to customers. In addition, through this channel, AIC claims savings from ongoing replacement of existing AIC-owned HPS streetlighting with LED streetlights upon burnout.

Overall, the implementation team set a goal of achieving 19,405 MWh of savings through the UOSL channel in 2023.

SAVINGS DETAIL

In total, Initiative staff incentivized the installation of 29,389 measures across 65 projects. Table 45 presents the ex ante, verified gross, and verified net electric energy savings achieved through the UOSL channel in 2023. We did not observe any discrepancies between the ex ante and verified savings calculations for the UOSL channel in 2023.

Table 45. 2023 Utility-Owned Streetlighting Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
UOSL (HPS Baseline, AIC ROB)	12,339	100%	12,339	1.000	12,339
UOSL (HPS Baseline, Dusk to Dawn Operation)	4,297	100%	4,297	1.000	4,297
UOSL (MV Baseline, Dusk to Dawn Operation)	3,281	100%	3,281	1.000	3,281
Total	**19,917**	**100%**	**19,917**	**1.000**	**19,917**

3.4.5 CUMULATIVE PERSISTING ANNUAL SAVINGS

Table 46 through Table 48 present CPAS and WAML for the 2023 Streetlighting Initiative by channel. The tables also include a summary of the measure-specific and total verified gross savings for the Initiative and respective channels, as well as CPAS in each year from 2023-2026.[25] The WAML for the Streetlighting Initiative is 20.0 years and the WAML for the MOSL and UOSL channels are 20.0 years and 20.0 years, respectively.

Table 46. 2023 Streetlighting Initiative CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
MOSL	20.0	133	0.690	92	92	92	92	...	92	...	1,834
USOL	20.0	19,917	1.000	19,917	19,917	19,917	18,372	...	18,372	...	372,078
2023 CPAS		**20,050**	**0.998**	**20,009**	**20,009**	**20,009**	**18,464**	...	**18,464**	...	**373,912**
Expiring 2023 CPAS				**0**	**0**	**0**	**1,545**	...	**0**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**1,545**	...	**1,545**	...	
WAML	**20.0**										

Table 47. 2023 Municipality-Owned Streetlighting Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
MOSL (HPS Baseline)	20.0	133	0.690	92	92	92	92	...	92	...	1,834
2023 CPAS		**133**	**0.690**	**92**	**92**	**92**	**92**	...	**92**	...	**1,834**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	...	**0**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	...	**0**	...	
WAML	**20.0**										

[25] For further details, including achieved CPAS in years not presented in this table, please see the *2023 AIC CPAS and AAIG Workbook*.

Table 48. 2023 Utility-Owned Streetlighting Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
UOSL (HPS Baseline, AIC ROB)	20.0	12,339	1.000	12,339	12,339	12,339	12,339	...	12,339	...	246,777
UOSL (HPS Baseline)	20.0	4,297	1.000	4,297	4,297	4,297	4,297	...	4,297	...	85,942
UOSL (MV Baseline)	20.0	3,281	1.000	3,281	3,281	3,281	1,736	...	1,736	...	39,359
2023 CPAS		**19,917**	1.000	**19,917**	**19,917**	**19,917**	**18,372**	...	**18,372**	...	**372,078**
Expiring 2023 CPAS				**0**	**0**	**0**	**1,545**	...	**0**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**1,545**	...	**1,545**	...	
WAML	**20.0**										

3.4.6 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this evaluation, the evaluation team offers the following key findings for the Streetlighting Initiative:

MUNICIPALITY-OWNED STREETLIGHTING CHANNEL

- **Key Finding #1**: Consistent with the 2022 evaluation, verified and ex ante savings estimates matched; resulting in a realization rate of 100%.

UTILITY-OWNED STREETLIGHTING CHANNEL

- **Key Finding #1**: Verified and ex ante savings estimates matched; resulting in a realization rate of 100%.

3.5 SMALL BUSINESS INITIATIVE

3.5.1 INITIATIVE DESCRIPTION

The primary objective of the Small Business Initiative is to deliver energy savings to small commercial and industrial customers by increasing access to energy efficient products through financial and technical support. The Initiative targets private and public facilities through two channels that work in tandem to provide a comprehensive suite of offerings:

- **Small Business Direct Install (SBDI) channel**: The SBDI channel is available to all small nonresidential facilities in AIC's service territory and focuses on rapidly deployable lighting and refrigeration measures. The SBDI channel is the primary driver of the Small Business Initiative electric savings.
- **Small Business Energy Performance (SBEP) channel**: The SBEP channel targets facilities located in Empower Communities[26] and focuses on delivering building envelope upgrades, HVAC improvements, and other non-SBDI measures supported by participating program allies.

Both channels leverage a network of program allies to coordinate and install the incentivized measures in participating facilities. These program allies specialize in serving small businesses, non-profits, schools, and local governments. Many projects are fully funded through channel incentives and require no out-of-pocket contribution from the customer. The low-touch, high-impact measures incentivized through the SBDI channel, combined with the customized, deeper retrofits incentivized through the SBEP channel offer customers in this segment an opportunity to comprehensively upgrade their facilities.

Overall, the implementation team set a goal of achieving 64,069 MWh and 104,488 therms of savings through the Small Business Initiative in 2023.

[26] Predominately non-White and/or economically challenged communities.

3.5.2 INITIATIVE ANNUAL SAVINGS SUMMARY

Table 49 presents the Small Business Initiative annual savings achieved in 2023. The 2023 Small Business Initiative achieved 55,450 MWh, 8.80 MW, and 23,815 therms in verified net savings. The Initiative also produced 2,614 therms in verified net gas savings in 2023 that are not directly claimable by AIC because the customers do not receive gas service from AIC. These savings are detailed further in Appendix B.

Table 49. 2023 Small Business Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	62,614	9.91	27,486
Gross Realization Rate	99%	100%	97%
Verified Gross Savings	62,233	9.88	26,730
NTGR	0.891	0.891	0.891
Verified Net Savings	55,450	8.80	23,815

3.5.3 SMALL BUSINESS DIRECT INSTALL CHANNEL

The following sections present the impact evaluation results for the 2023 SBDI channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

The SBDI channel provides small nonresidential customers with electric energy savings opportunities by offering a free energy assessment and streamlined process for installing incentivized measures. Eligible customers receive a on-site assessment and report outlining recommended measures, project costs, estimated energy savings, and estimated bill savings. The customer then selects the package of measures they wish to have installed. All measures must be installed by qualified program allies and incentives are paid directly to program allies, enabling a streamlined transaction at the time of installation with zero or minimal out-of-pocket costs.

Program allies conduct most of the customer outreach activities for the channel, either through their own marketing efforts or direct conversations with prospective participants. Initiative staff support the allies through co-branding marketing materials, hosting community events and webinars, targeted customer outreach through email/mailer campaigns, partnerships with local chambers of commerce and other CBOs, and maintenance of a Small Business landing page on the AIC Energy Efficiency website. The Business Program Energy Advisors contribute to recruitment efforts, as well, by conducting ad-hoc outreach like visiting organizations in their region that have not participated in the Initiative.

Small Business Initiative staff continue to partner with AIC Market Development Initiative staff to identify diverse contractors and train them to participate in the SBDI channel. Initiative staff provide allies with training and documentation for best practices for completing projects. In addition, Initiative staff engage program allies on their workforce development needs to help them expand their services and overall business, through job placements, scholarships, seasonal employment, and training.

Overall, the implementation team set a goal of achieving 63,277 MWh of savings through the SBDI channel in 2023.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the SBDI channel in 2023:

- The implementation team held diverse Program Ally trainings throughout the service territory.
- In addition, the implementation team conducted six program ally trainings on NLCs and LLLCs, which successfully led to an increase in channel activity for these measures.
- Initiative staff partnered with two past participants in Empower Communities to host open houses at their facilities to showcase the channel offerings to other customers.

PARTICIPATION SUMMARY

Table 50 presents a summary of participation in the SBDI channel in 2023. We present these data separated by public and private sectors to provide context as to the primary drivers of participation. AIC customers completed 1,888 unique projects through the channel, encompassing 243,966 incentivized measures. LED bulbs and fixtures continued to dominate channel activity, accounting for 91% of total measures incentivized in 2023. Lighting controls and fluorescent delamping accounted for the next largest shares of incentivized measures at 6% and 3%, respectively.

Table 50. 2023 Small Business Direct Install Channel Participation Summary by Measure

Measure	Unique Projects	Measure Quantity	Ex Ante Gross MWh	Ex Ante Gross MW
Private Sector				
LED Bulbs & Fixtures	1,568	171,358	48,711	6.89
Lighting Controls	206	10,066	2,608	0.79
ECMs for Walk-in and Reach-in Coolers/Freezers	42	667	1,058	0.12
Fluorescent Delamping	110	6,300	672	0.14
Door Heater Controls for Coolers and Freezers	11	156	195	0.01
LED Exit Signs	58	418	99	0.01
Evaporator Fan Control for ECMs	37	118	89	0.01
Automatic Door Closer for Walk-in Coolers and Freezers	10	13	15	0.00
Private Sector Subtotal	*1,598*	*189,096*	*53,447*	*7.98*
Public Sector [a]				
LED Bulbs & Fixtures	264	49,845	7,397	1.42
Lighting Controls	67	3,400	907	0.29
Fluorescent Delamping	6	1,357	80	0.02
LED Exit Signs	27	268	72	0.01
Public Sector Subtotal	*290*	*54,870*	*8,456*	*1.74*
Total	**1,888**	**243,966**	**61,903**	**9.72**

[a] The project counts, measure counts, and ex ante savings values presented in the Public Sector subsection of this table include State and Federal facilities, which are not included in the list of customer types covered in the public sector minimum funding requirements in subsection (c) of 220 ILCS 5/8-103B and subsection (e) of 220 ILCS 5/8-104.

Figure 3 shows the distribution of SBDI projects by facility type. In total, customers completed 1,888 projects through the channel. Retail, office, and warehouse facilities were the most common facility types treated through the channel.

Figure 3. 2023 Small Business Direct Install Channel Participation by Facility Type

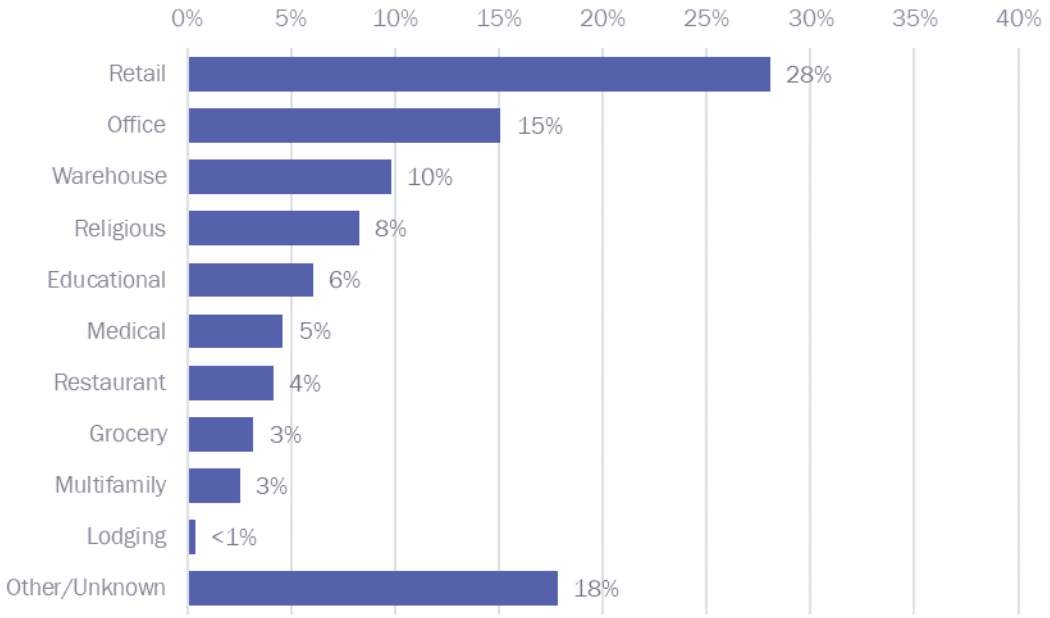

Table 51 presents information on program ally participation in the channel. In total, 107 program allies participated in the channel in 2023, which is a 20% decrease compared to the 133 program allies that participated in 2022. Table 51 presents information on the 10 program allies that were most active in the channel in 2023.

Table 51. 2023 Small Business Direct Install Channel Program Ally Participation Summary

Program Ally	Projects	Share of Total (n=1,888)
Ally 24	260	14%
Ally 25	186	10%
Ally 26	165	9%
Ally 27	113	6%
Ally 28	91	5%
Ally 29	85	5%
Ally 30	64	3%
Ally 31	61	3%
Ally 32	59	3%
Ally 33	59	3%

SAVINGS DETAIL

Table 52 presents the ex ante, verified gross, and verified net electric energy savings achieved through the SBDI channel in 2023. The SBDI channel achieved a 100% realization rate for gross electric energy savings. The channel's performance is primarily driven by lighting measures with 91% of the verified net electric savings for the channel produced through the installation of LED bulbs and fixtures, and 6% were produced through the installation of lighting controls. Electronically commutated motors (ECMs) for walk-in and reach-in coolers and freezers and fluorescent delamping were the next largest contributors of electric energy savings at 2% and 1% of verified net energy savings, respectively. Overall, the channel experienced an 18% decrease in verified net energy savings compared to 2022.

Table 52. 2023 Small Business Direct Install Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
LED Bulbs and Fixtures	56,109	100%	56,123	0.891	50,006
Lighting Controls	3,515	101%	3,556	0.891	3,168
ECMs for Coolers/Freezers	1,058	100%	1,058	0.891	943
Fluorescent Delamping	752	100%	752	0.891	670
Door Heater Controls	195	60%	117	0.891	104
Exit Signs	171	100%	171	0.891	152
Evaporator Fan Control for ECMs	89	100%	89	0.891	79
Automatic Door Closer	15	269%	40	0.891	36
Total	**61,903**	**100%**	**61,906**	**0.891**	**55,159**

Table 53 presents the ex ante, verified gross, and verified net electric demand savings achieved through the SBDI channel in 2023. The SBDI channel achieved a 100% realization rate for gross demand savings. LED bulbs and fixtures produced 86% of the channel verified net demand savings, followed by lighting controls, fluorescent delamping, and ECMs for walk-in and reach-in coolers and freezers (11%, 2%, and 1% of savings, respectively). Overall, the channel experienced a 15% decrease in verified net demand savings compared to 2022.

Table 53. 2023 Small Business Direct Install Channel Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
LED Bulbs and Fixtures	8.31	100%	8.33	0.891	7.43
Lighting Controls	1.09	98%	1.06	0.891	0.95
ECMs for Coolers/Freezers	0.12	100%	0.12	0.891	0.11
Fluorescent Delamping	0.16	100%	0.16	0.891	0.14
Door Heater Controls	0.01	60%	0.01	0.891	0.01
Exit Signs	0.02	102%	0.02	0.891	0.02
Evaporator Fan Control for ECMs	0.01	100%	0.01	0.891	0.01
Automatic Door Closer	<0.01	444%	0.01	0.891	0.01
Total	**9.72**	**100%**	**9.73**	**0.891**	**8.67**

Table 54 presents the ex ante, verified gross, and verified net gas savings achieved through the SBDI channel in 2023. No ex ante gas savings were claimed for the channel; however, the evaluation team estimated savings for automatic door closers installed in facilities that receive AIC gas service.

Table 54. 2023 Small Business Direct Install Channel Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Automatic Door Closer	0	N/A	1	0.891	1
Total	**0**	**N/A**	**1**	**0.891**	**1**

We discuss major discrepancies between ex ante claims and the verified analysis below.

- **LED Bulbs and Fixtures (91% of ex ante energy savings and 85% of demand savings):** The gross realization rate for LED Bulbs and Fixtures is 100% for energy savings and 100% for demand savings.

- For 41 records, the implementation team applied the coincidence factor for an uncooled building type rather than the garage building type listed in the tracking data. The evaluation team, applied the garage coincidence factor in the verified calculations, resulting in higher verified electric demand savings.
- For four records, the implementation team applied the uncooled value for the waste heat electric resistance heating (IFkWh) factor rather than the value for the garage building type listed in the tracking data. The evaluation team applied the correct IFkWh for garages in the verified calculations, resulting in higher verified electric energy savings.
- For three exterior lighting records, the implementation team applied coincidence factor assumptions based on the listed building type, rather than the exterior installation location. All exterior lighting measures should use the exterior building/space type designations. The coincidence factor for exterior spaces is zero, resulting in lower verified demand savings.

- **Lighting Controls (6% of ex ante energy savings and 11% of demand savings):** The gross realization rate for Lighting Controls is 101% for energy savings and 98% for demand savings.
  - For 122 NLC records, the implementation team applied the coincidence factors for the listed building type rather than the uncooled building type. The evaluation team applied the uncooled coincidence factors to each of the records, resulting in lower verified demand savings.
  - For 26 NLC records, the implementation team applied the annual operating hour assumption for low-rise office buildings from section 4.5 of the IL-TRM to support ex ante savings calculations. However, the IL-TRM V11.0 provides separate deemed annual operating hour assumptions for NLCs in section 4.5.10, which should be applied to estimate savings. The evaluation team applied the NLC-specific operating hours assumptions in the verified calculations, resulting in higher verified electric energy savings.
  - For four fixture-mounted occupancy sensor records, the implementation team applied the coincidence factor deemed in the IL-TRM V11.0 for uncooled spaces, rather than the value deemed for the garage building type listed in the tracking data. The evaluation team applied the coincidence factor for garages in the verified calculations, resulting in higher verified demand savings.
  - For one fixture mounted occupancy sensor record, the implementation team applied the IFkWh value deemed in the IL-TRM V11.0 for uncooled spaces, rather than the value deemed for the garage building type listed in the tracking data. The evaluation team applied the correct IFkWh for garages in the verified calculations, resulting in higher electric energy savings.
- **Fluorescent Delamping (1% of ex ante energy savings and 2% of demand savings):** The gross realization rate for Fluorescent Delamping is 100% for energy savings and 100% for demand savings.
  - For one fluorescent delamping measure, the implementation team applied the coincidence factor deemed in the IL-TRM V11.0 for uncooled spaces, rather than the value deemed for the garage building type listed in the tracking data. The evaluation team applied the coincidence factor for garages in the verified calculations, resulting in higher verified demand savings.
- **Door Heater Controls (<1% of ex ante energy savings and <1% of demand savings):** The gross realization rate for Door Heater Controls is 60% for energy savings and 60% for demand savings.
  - The implementation team applied the kWbase value deemed for freezers (0.230 kW) in the ex ante calculations for eight "anti-sweat heater control – freezer (0°-20°F) with humidity sensing controls" records. The IL-TRM V11.0 defines a refrigeration unit that is between a temperature of 0° to 20°F as a cooler, not a freezer. The evaluation team applied the kWbase value deemed for coolers (0.066 kW) in the verified calculations, resulting in lower electric energy and demand savings.

- **Exit Signs (<1% of ex ante energy savings and <1% of demand savings):** The gross realization rate for Exit Signs is 100% for energy savings and 102 % for demand savings.
  - For three records, the implementation team applied the coincidence factor for an uncooled building type rather than using the deemed value of 1.0 prescribed in section 4.5.5 of the IL-TRM V11.0. The evaluation team applied the correct coincidence factor of 1.0, resulting in greater verified demand savings.
- **Automatic Door Closers (<1% of ex ante energy savings, <1% of demand savings and 100% of gas savings):** The gross realization rate for Automatic Door Closers is 269% for energy savings, 444% for demand savings, and 100% for gas savings.
  - The implementation team applied outdated deemed savings values from IL-TRM V10.0 to calculate the energy and demand savings for all records. The evaluation team applied the current set of deemed savings values as defined in IL-TRM V11.0 for energy and demand savings, resulting in higher verified electric energy and demand savings.

3.5.4 SMALL BUSINESS ENERGY PERFORMANCE CHANNEL

The following sections present the impact evaluation results for the 2023 SBEP channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

The SBEP channel targeted nonresidential customers located in Empower Communities, including schools, municipal buildings, and other non-profit organizations. The eligible measures included building envelope upgrades, HVAC improvements, and other non-SBDI measures. In 2023, most of the completed projects consisted of air-sealing facility building envelopes. Similar to the SBDI channel, the services delivered through the SBEP channel are provided at zero or minimal out-of-pocket cost to the customer, all measures must be installed by qualified program allies, and incentives are paid directly to program allies to enable a streamlined transaction at the time of installation. A key focus of channel staff continues to be building out the program ally base for the channel; particularly by adding contractors who can provide the HVAC and weatherization services offered through the program.

Overall, the implementation team set a goal of achieving 792 MWh and 104,488 therms of savings through the SBEP channel in 2023.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the SBEP channel in 2023:

- The implementation team focused engagement efforts on school districts in an attempt to increase channel participation.
- The implementation team also conducted outreach to target weatherization contractors to enroll as Program Allies.
- A new application for Room Air Conditioners, including Weatherization, was added to the channel offerings.

PARTICIPATION SUMMARY

Table 55 presents a summary of participation in the SBEP channel in 2023. We present these data separated by public and private sectors to provide context as to the primary drivers of participation. AIC customers completed 59 unique projects through the channel, with C&I air sealing dominating channel activity.

Table 55. 2023 Small Business Energy Performance Channel Participation Summary by Measure

Measure	Projects	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Private Sector				
Room Air Conditioner (Room ACs)	1	10	<0.01	0
C&I Air Sealing (RACs)	1	3	<0.01	184
Window Film	1	<1	<0.01	-169
Private Sector Subtotal	2	13	<0.01	15
Public Sector [a]				
C&I Air Sealing	57	698	0.19	26,419
Covers and Gap Sealers for Room ACs	4	0	0.00	1,052
Public Sector Subtotal	*57*	*698*	*0.19*	*27,471*
Total	**59**	**711**	**0.19**	**27,486**

Note: The ex ante therm savings presented in this table reflect only AIC claimable gas savings. Two projects completed through the SBEP channel produced non-AIC gas savings. More information on the savings from these projects is presented in Appendix B.

[a] The project counts, measure counts, and ex ante savings values presented in the Public Sector subsection of this table include State and Federal facilities, which are not included in the list of customer types covered in the public sector minimum funding requirements in subsection (c) of 220 ILCS 5/8-103B and subsection (e) of 220 ILCS 5/8-104.

Figure 4 shows the distribution of SBEP projects by facility type. Educational facilities accounted for 71% of projects completed through the channel.

Figure 4. 2023 Small Business Energy Performance Channel Participation by Facility Type

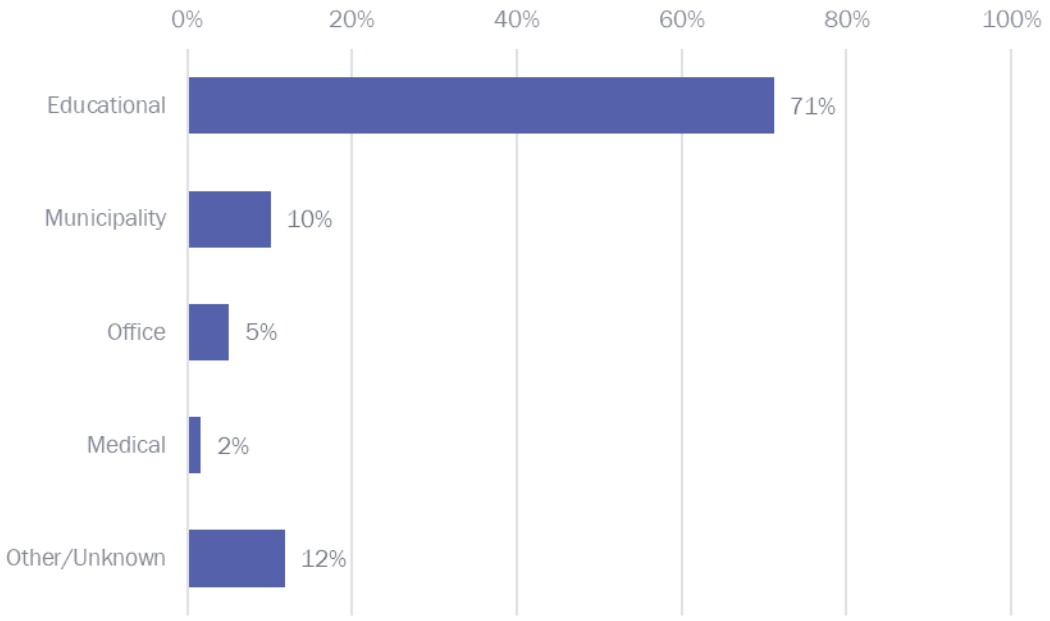

Table 56 presents information on program ally participation in the channel. In total, four program allies participated in the channel in 2023; an increase from three in 2022. In total, these allies completed 59 projects compared to the 39 completed in 2022. In 2022, Ally 36 completed 95% of channel projects; in 2023 they completed 3%.

Table 56. 2023 Small Business Energy Performance Channel Program Ally Participation Summary

Program Ally	Projects	Share of Total (n=59)
Ally 34	42	71%
Ally 35	14	24%
Ally 36	2	3%
Ally 5	1	2%

SAVINGS DETAIL

Table 57 presents the ex ante, verified gross, and verified net electric energy savings achieved through the SBEP channel in 2023. The SBEP channel achieved a 46% realization rate for gross electric energy savings. The channel's performance is primarily driven by C&I Air Sealing measures, accounting for 96% of the verified net electric savings for the channel. RACs were the next largest contributor, accounting for 3% of verified net electric savings. Overall, the channel experienced a 122% increase in verified net energy savings compared to 2022.

Table 57. 2023 Small Business Energy Performance Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
C&I Air Sealing	698	45%	314	0.891	280
Room ACs	10	97%	10	0.891	9
C&I Air Sealing (RAC)	3	34%	1	0.891	1
Window Film	<1	1,531%	2	0.891	1
Total	**711**	**46%**	**327**	**0.891**	**291**

Table 58 presents the ex ante, verified gross, and verified net electric demand savings achieved through the SBEP channel in 2023. The SBEP channel achieved an 81% realization rate for gross demand savings. C&I Air Sealing produced 93% of the channel verified net demand savings, followed by RACs at 7%; the rest of the measures produced less than 1% of channel verified net demand savings. Overall, the channel experienced a 100% increase in verified net demand savings compared to 2022.

Table 58. 2023 Small Business Energy Performance Channel Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
C&I Air Sealing	0.19	76%	0.14	0.891	0.13
Room ACs	<0.01	827%	0.01	0.891	0.01
C&I Air Sealing (RAC)	<0.01	205%	<0.01	0.891	<0.01
Window Film	<0.01	1,417%	<0.01	0.891	<0.01
Total	**0.19**	**81%**	**0.15**	**0.891**	**0.14**

Table 59 presents the ex ante, verified gross, and verified net gas savings achieved through the SBEP channel in 2023. The SBEP channel achieved a 97% realization rate for gross demand savings. C&I Air Sealing produced 99% of channel verified net gas savings. Overall, the channel experienced a 26% increase in verified net demand savings compared to 2022.

Table 59. 2023 Small Business Energy Performance Channel Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
C&I Air Sealing	26,419	100%	26,502	0.891	23,613
Covers and Gap Sealers for Room ACs	1,052	9%	94	0.891	84
C&I Air Sealing (RAC)	184	72%	133	0.891	118
Window Film	-169	N/A	0	0.891	0
Total	**27,486**	**97%**	**26,729**	**0.891**	**23,815**

Note: The savings presented in this table only reflect savings that are directly claimable by AIC. Six additional projects produced non-AIC gas savings. More information on these savings are presented in Appendix B.

We discuss major discrepancies between ex ante claims and the verified analysis below.

- **C&I Air Sealing (98% of ex ante energy savings, 99% of demand savings, and 96% of gas savings):** The gross realization rate for C&I Air Sealing is 45% for energy savings, 76% for demand savings, and 100% for natural gas savings.
  - For one C&I Air Sealing measure, the implementation team applied custom inputs to the algorithms defined in section 4.8.27 of the IL-TRM V11.0 to calculate ex ante energy, demand and gas savings. When calculating furnace combustion fan savings, the implementation team multiplied by the F_e value twice. Additionally, when calculating demand savings, the implementation team did not include a coincidence factor for commercial cooling and applied a value of 4,380 for the cooling equivalent full load hours (EFLH) parameter. The evaluation team removed the duplicate error for the F_e multiplier, applied the EFLHcooling for unknown building types provided in section 4.4 of the IL-TRM V11.0, and multiplied the demand savings by a coincidence factor in the verified calculations, resulting in lower verified electric energy savings and higher the verified demand savings.
  - For the remaining C&I Air Sealing records, the implementation team applied prescriptive assumptions defined in IL-TRM V11.0 to calculate the ex ante savings. However, they applied incorrect values for the Cooling Degree Days (CDD) parameter, which resulted in overestimates of both energy and demand savings. The evaluation team applied the correct CDD factors in the verified savings calculations, resulting in lower verified electric energy and demand savings.
  - For 16 project records, the evaluation team was unable to reproduce the ex ante gas savings calculated by the implementation team. The evaluation team applied the assumptions and algorithms defined in section 4.8.27 of IL-TRM V11.0 to calculate the gas savings, resulting in slightly higher verified gas savings.
- **Room Air Conditioners (1% of ex ante energy savings and <1% of demand savings):** The gross realization rate for Room Air Conditioners is 97% for energy savings and 827% for demand savings.
  - The implementation team applied the cooling full load hours (FLH) defined for a religious building in the reference table in section 4.4 of the IL-TRM rather than the value defined for an assembly building, which was the building type listed in the project documentation. The evaluation team updated the FLH to the value in the verified calculations, resulting in lower verified electric energy savings.
  - The implementation team calculated the ex ante demand savings by taking the total energy savings and dividing by 8,760 hours. The evaluation team applied the demand savings algorithm defined in section 4.4.7 of the IL-TRM V11.0, using the correct FLH for the building type as well as accounting for a coincidence factor, resulting in higher verified demand savings.

- **C&I Air Sealing (RACs) (<1% of ex ante energy savings, <1% of demand savings, <1% of gas savings):** The gross realization rate for C&I Air Sealing (RACs) is 34% for energy savings, 205% for demand savings, and 72% for natural gas savings.
  - The implementation team applied a combination of savings algorithms to estimate ex ante savings for a single measure meant to capture air sealing the edges of RAC installations. They applied an algorithm from section 4.4.38 of IL-TRM V11.0 (Covers and Gap Sealers for Room Air Conditioners) to calculate gas savings and a custom calculation to determine the electric energy and demand savings. The evaluation team determined that the measure characterization in section 4.4.38 of the IL-TRM differed from what the implementation team delivered in the field, and that applying the air sealing algorithms from section 4.8.27 of IL-TRM V11.0 was more appropriate. Therefore, the evaluation team applied the algorithms from IL-TRM V11.0 to the underlying assumptions from the ex ante calculations, to estimate the verified electric energy, demand, and gas savings from these measures, resulting in lower verified electric energy savings, higher verified demand, and lower verified therm savings.
- **Window Film (<1% of ex ante energy savings and <1% of demand savings):** The gross realization rate for Window Film is 1,531% for energy savings and 1,149% for demand savings)
  - For one record, the implementation team used algorithms from the Ohio TRM to calculate the savings for the installation of window film. The implementation team did not normalize for Cooling Degree Days (CDD) when calculating the ex ante energy and demand savings. They also did not apply a coincidence factor (CF) in the demand savings calculation. The evaluation team normalized for CDD and applied a CF. These adjustments increased the verified electric energy and demand savings. The evaluation team also corrected an adjustment the implementation team improperly applied to this record accounting for interactions with another project.
- **Covers and Gap Sealers for Room ACs (3% of ex ante gas savings):** The gross realization rate for Covers and Gap Sealers for Room ACs is 9% for natural gas savings.
  - For all records, the implementation team multiplied by the quantity of units installed twice in the ex ante calculations, which erroneously inflated the ex ante gas savings for this measure. The evaluation team corrected this error in the verified calculations, decreasing the verified gas savings.
  - For three records, the Initiative tracking data listed the building type as being a high school/middle school. However, the backup files that contained the details of the ex ante calculations listed the building type as an elementary school. The evaluation team assumed the building type listed in the backup files/calculations to be correct for the purposes of applying an EFLH assumption. This resulted in lower verified gas savings.
  - For one record, the implementation team noted that there was an inspection at the end of the year that found the measure was not completed. As such, the evaluation team did not estimate verified savings for this record, decreasing the verified gas savings.

3.5.5 CUMULATIVE PERSISTING ANNUAL SAVINGS

Table 60 through Table 62 present CPAS and WAML for the 2023 Small Business Initiative by channel. The tables also include a summary of the measure-specific and total verified gross savings for the Initiative and channels, as well as CPAS in each year from 2023-2026.[27] The WAML for the Small Business Initiative is 12.6 years and the WAML for the SBDI and SBEP channels are 12.5 years and 19.7 years, respectively. In 2023, AIC converted non-claimable natural gas savings produced through six SBEP projects to CPAS for the purposes of goal attainment; further details on these savings can be found in Appendix B and further detail on converted CPAS can be found in Appendix C.

Table 60. 2023 Small Business Initiative CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
SBDI	12.5	61,906	0.891	55,159	55,159	54,995	53,403	...	48,943	...	655,702
SBEP	19.7	327	0.891	291	291	291	291	...	291	...	5,737
2023 CPAS		**62,233**	**0.891**	**55,450**	**55,450**	**55,286**	**53,694**	...	**49,234**	...	**661,439**
Expiring 2023 CPAS				**0**	**0**	**163**	**1,592**	...	**1,007**	...	
Expired 2023 CPAS				**0**	**0**	**163**	**1,756**	...	**6,216**	...	
WAML	**12.6**										

[27] For further details, including achieved CPAS in years not presented in this table, please see the *2023 AIC CPAS and AAIG Workbook*.

Table 61. 2023 Small Business Direct Install Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
LED Bulbs and Fixtures	12.4	56,123	0.891	50,006	50,006	49,842	48,250	...	43,942	...	584,583
Lighting Controls	14.7	3,556	0.891	3,168	3,168	3,168	3,168	...	3,168	...	46,487
ECMs for Coolers/Freezers	15.0	1,058	0.891	943	943	943	943	...	943	...	14,138
Fluorescent Delamping	11.0	752	0.891	670	670	670	670	...	670	...	7,369
Door Heater Controls	10.0	117	0.891	104	104	104	104	...	104	...	1,044
Exit Signs	5.0	171	0.891	152	152	152	152	...	0	...	761
Evaporator Fan Control for ECMs	13.0	89	0.891	79	79	79	79	...	79	...	1,032
Automatic Door Closer	8.0	40	0.891	36	36	36	36	...	36	...	287
2023 CPAS		**61,906**	**0.891**	**55,159**	**55,159**	**54,995**	**53,403**	...	**48,943**	...	**655,702**
Expiring 2023 CPAS				**0**	**0**	**163**	**1,592**	...	**1,007**	...	
Expired 2023 CPAS				**0**	**0**	**163**	**1,756**	...	**6,216**	...	
WAML	**12.5**										

Table 62. 2023 Small Business Energy Performance Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
C&I Air Sealing	20.0	314	0.891	280	280	280	280	...	280	...	5,602
Room ACs	12.0	10	0.891	9	9	9	9	...	9	...	103
C&I Air Sealing (RAC)	20.0	1	0.891	1	1	1	1	...	1	...	19
Window Film	10.0	2	0.891	1	1	1	1	...	1	...	14
2023 CPAS		**327**	**0.891**	**291**	**291**	**291**	**291**	...	**291**	...	**5,737**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	...	**0**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	...	**0**	...	
WAML	**19.7**										

3.5.6 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Small Business Initiative moving forward:

SMALL BUSINESS DIRECT INSTALL CHANNEL

- **Key Finding #1**: The SBDI channel continued to be the single largest contributor to Business Program electric energy and demand savings. However, the channel experienced an 18% decrease in channel verified net electric energy savings and 15% decrease in verified net demand savings compared to 2022.
- **Key Finding #2**: The IL-TRM V11.0 deems specific parameter values for garages, uncooled spaces, and exterior spaces, regardless of building type. Additionally, for garage space types, Volume 1, Section 3.6 of the TRM specifies that garages are "unconditioned spaces." In some cases, the implementation team is inconsistent when applying waste heat factor and coincidence factor assumptions for lighting projects that are designated as occurring in garages, uncooled, or exterior space types.
  - **Recommendation**: We recommend using the IL-TRM V11.0 to confirm the correct building conditions and lighting locations are being applied for each unique lighting scenario. The evaluation team defaulted to applying assumptions from IL-TRM V11.0 for exterior space types to any record labeled as exterior lighting. In addition, we defaulted to assumptions for the garage space type for all records where the tracking data listed the facility as a garage, including in cases where the tracking data also specified the space as uncooled. Lastly, we defaulted to applying assumptions for an uncooled building to all records labeled as uncooled and not also labeled as installed in exterior locations or garages.
- **Key Finding #3**: The reference table in Section 4.5 of the IL-TRM V11.0 specifies commonly used factors by building/space type be used for calculating savings for certain lighting measures. Multi-family common spaces are split into two categories in the table, "MF – High Rise – Common" and "MF – Mid-Rise – Common". The factors differ between these two space types. The implementation team appears to only be tracking multi-family spaces as one category in their tracking database, "Multi-Family Common Areas".
  - **Recommendation**: To ensure that the proper factors are being used in the lighting calculations, it would be advantageous for the implementation team to add these space/building types listed in the reference table in Section 4.5 of the IL TRM V11.0.
- **Key Finding #4**: The IL-TRM V11.0 provides deemed annual operating hours values specific to networked lighting controls in section 4.5.10. The implementation team is currently applying the annual operating hours values provided in section 4.5 of the IL-TRM.
  - **Recommendation**: For networked lighting control measures, we recommend using the table provided in the IL-TRM under measure 4.5.10 Lighting Controls for determining the appropriate annual hours of use to apply in ex ante savings calculations.
- **Key Finding #5**: For the purposes of estimating savings for Door Heater Controls, the IL-TRM V11.0 defines a freezer as a refrigeration unit kept at temperatures between -35 and 0°F. Units kept at temperatures between 0 and 45°F are defined as coolers. The implementation team applied savings assumptions for freezers in the ex ante savings calculations for equipment that, under the temperature definitions defined in the IL-TRM, should have been considered coolers.
  - **Recommendation**: We recommend that the implementation team review this measure in AMPLIFY as well as the assumptions defined in section 4.6.3 in the IL-TRM V11.0 to ensure ex ante calculations align with the IL-TRM.

- **Key Finding #6**: The implementation team appears to be applying deemed savings values from IL-TRM V10.0 to estimate savings from automatic door closers for walk-in coolers and freezers.
  - **Recommendation**: We recommend that the implementation team review this measure in AMPLIFY and apply the updated deemed savings values for energy and demand savings defined in IL-TRM V11.0.

SMALL BUSINESS ENERGY PERFORMANCE CHANNEL

- **Key Finding #1**: The SBEP channel grew significantly from 2022. Verified net electric energy savings increased year-over-year by 122%, demand savings increased by 100%, and gas savings increased by 26%.
- **Key Finding #2**: C&I Air Sealing accounted for 98% of the ex ante energy savings, 99% of demand savings, and 96% of gas savings claimed through the SBEP channel. The implementation team is applying incorrect cooling degree days (CDD) as prescribed in the IL-TRM in ex ante savings calculations. This resulted in significant overestimates of electric energy and demand savings for this measure. In addition, the Initiative tracking data includes limited information on the parameters applied in ex ante savings calculations.
  - **Recommendation**: We recommend that the implementation team reviews the algorithms and assumptions programmed in AMPLIFY for C&I Air Sealing to ensure consistency with the IL-TRM. We also recommend including details on the parameters applied in the ex ante savings in the Initiative tracking data where possible.
- **Key Finding #3**: The implementation team mistakenly multiplied by the quantity of units installed twice in their calculations for Covers and Gap Sealers.
  - **Recommendation**: We recommend that the implementation team review the algorithms programmed in AMPLIFY for this measure to ensure the quantity field is applied appropriately.

3.6 MIDSTREAM INITIATIVE

3.6.1 INITIATIVE DESCRIPTION

The Midstream Initiative provides incentives to distributors and wholesalers to reduce prices at the point of sale for efficient equipment. The Initiative includes three channels: Midstream Lighting, Midstream HVAC, and Midstream Food Service. The goal is to increase the adoption of high efficiency equipment without requiring the end-customer to submit an incentive application. Public sector and non-profit customers can receive an additional incentive to cover the cost of installation services if they hire a qualified program ally to install equipment purchased through the HVAC and Lighting channels.

Overall, the implementation team set a goal of achieving 27,923 MWh and 120,507 therms of savings through the Midstream Initiative in 2023.

3.6.2 INITIATIVE ANNUAL SAVINGS SUMMARY

Table 63 presents the Midstream Initiative annual savings achieved in 2023. The 2023 Midstream Initiative achieved 27,673 MWh, 6.24 MW, and 41,376 therms in verified net savings.

Table 63. 2023 Midstream Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	30,007	7.09	50,348
Gross Realization Rate	101%	97%	100%
Verified Gross Savings	30,384	6.85	50,354
NTGR	0.911	0.911	0.822
Verified Net Savings	27,673	6.24	41,376

3.6.3 LIGHTING CHANNEL

The following sections present the impact evaluation results for the 2023 Midstream Lighting channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

The Midstream Lighting channel provides incentives to participating lighting equipment distributors to reduce the final sale price of equipment for end-customers and to encourage distributors to promote higher efficiency equipment. AIC has offered midstream incentives for efficient nonresidential lighting since the 2014-2015 cycle. Channel staff provide incentives for the sale of linear LED tubes, pin-based bulbs, mogul-based LED lamps, wall pack lamps, and LED exit signs. By providing incentives to distributors, channel staff aim to increase the adoption of high-efficiency lighting without requiring customers to submit an incentive application.

Distributors are required to pass the full incentive through to the purchaser through a point-of-sale discount. However, participating distributors are eligible to receive bonuses based on their channel activity. The ally bonus incentive structure encourages early participation by awarding increasingly higher bonus incentives the sooner the transaction occurs in the year. To receive incentives, distributors collect equipment and end-customer information from contractors and submit the information via an online Midstream Lighting portal that is hosted and managed by Leidos.[28] Only sales to AIC end-customers are eligible to receive channel incentives. Implementation partner Energy Sciences reviews all incoming transaction data for completeness, accuracy, and eligibility. Once a transaction is approved, the incentive is paid to the distributor.

AIC provides cobranded marketing materials to participating distributors, as well as educational materials and training on channel participation requirements. Leidos partners with CMC Energy Services to assist with managing the network of participating distributors. CMC provides each distributor with an account manager that helps them with troubleshooting issues and increasing their channel activity. AIC and Leidos continually recruit new distributors, with a focus on reaching those in empowered communities.

Overall, the implementation team set a goal of achieving 26,836 MWh of savings through the Lighting channel in 2023.

[28] Not all distributors have been onboarded to the portal yet. These distributors submit the necessary information via email.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the Midstream Lighting channel in 2023:

- The early completion bonus for distributors was reintroduced to encourage participation.
- Directional, decorative, and downlight fixtures were removed from the channel measure offerings; wall packs were added to the suite of offerings.
- Channel staff launched an online submission portal for distributor transactions, which is expected to facilitate faster approval and payment times for distributors.

PARTICIPATION SUMMARY

Table 77 presents a summary of participation in the Midstream Lighting channel in 2023. We present these data separated by public and private sectors to provide context as to the primary drivers of participation. AIC customers purchased 774,926 units of efficient lighting through the channel, which represents an 84% increase compared to 2022. Linear LEDs dominated channel activity, accounting for 94% of all incentivized measures.

Table 64. 2023 Midstream Lighting Channel Participation Summary by Measure

Measure Category	Quantity	Ex Ante Gross MWh	Ex Ante Gross MW
Private Sector			
Linear LEDs	190,333	9,554	2.28
Mogul LEDs	3,222	2,020	0.48
Wall Packs	951	503	0.11
Exit Signs	89	52	0.01
Pin Base LEDs	152	3	<0.01
Private Sector Subtotal	194,747	12,131	2.88
Public Sector [a]			
Linear LEDs	156,402	7,279	1.74
Mogul LEDs	15,623	9,242	2.21
Wall Packs	1,175	543	0.12
Pin Base LEDs	768	31	0.01
Exit Signs	105	8	0.00
Public Sector Subtotal	174,073	17,071	4.06
Total	**368,820**	**29,202**	**6.94**

[a] The project counts, measure counts, and ex ante savings values presented in the Public Sector subsection of this table include State and Federal facilities, which are not included in the list of customer types covered in the public sector minimum funding requirements in subsection (c) of 220 ILCS 5/8-103B and subsection (e) of 220 ILCS 5/8-104.

Table 65 presents information on distributor participation in the channel. In total, 41 distributors participated in the channel in 2023, which is a 15% decrease compared to the 48 distributors that participated in 2022. In total, these distributors completed 435 projects. Table 65 presents information on the ten distributors that were most active in the channel in 2023.

Table 65. 2023 Midstream Lighting Channel Participating Distributor Summary

Distributor	Projects	Share of Total (n=435)
Ally 3	45	10%
Ally 1	38	9%
Ally 37	28	6%
Ally 38	22	5%
Ally 4	22	5%
Ally 39	21	5%
Ally 40	19	4%
Ally 41	18	4%
Ally 42	16	4%
Ally 43	15	3%

Note: The project counts included in this table are based on project numbers as they are tracked in the Initiative tracking data. For the Midstream Lighting channel, project numbers correspond to invoices; some invoices include a single customer purchase while others can include several. Therefore, project numbers are used as a proxy for channel activity but may not be reflective of the true distribution of channel activity among distributors.

SAVINGS DETAIL

Table 66 presents the ex ante, verified gross, and verified net electric energy savings achieved through the Midstream Lighting channel in 2023. The Midstream Lighting channel achieved a gross realization rate of 101% for electric energy savings. Initiative staff continued to incentivize the same measures as in 2022 with the addition of wall packs and LED exit signs. Linear LEDs accounted for the majority of verified net electric energy savings at 57% of channel savings, which is a decrease from 2022 when linear LEDs accounted for 80% of channel electric energy savings. Mogul lighting and other LEDs accounted for 38% of channel electric energy savings and wall packs, a newly added measure, accounted for 5% of electric energy savings. Overall, the channel saw an increase in verified net electric energy savings of 28% from 2022.

Table 66. 2023 Midstream Lighting Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Linear LEDs	16,833	100%	16,811	0.913	15,352
Mogul LEDs	11,231	100%	11,231	0.913	10,256
Wall Packs	1,096	137%	1,502	0.913	1,371
Pin Base LEDs	34	71%	24	0.913	22
Exit Signs	9	100%	9	0.913	8
Total	**29,202**	**101%**	**29,577**	**0.913**	**27,010**

Table 67 presents the ex ante, verified gross, and verified net electric demand savings achieved through the Midstream Lighting channel in 2023. The Midstream Lighting channel achieved a gross realization rate of 97% for electric demand savings. Linear LEDs accounted for 60% of verified net demand savings compared to 80% in 2022, and mogul LEDs accounted for the remaining 40% of demand savings. Overall, the channel saw an increase in verified net demand savings of 22% from 2022.

Table 67. 2023 Midstream Lighting Channel Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Linear LEDs	4.02	100%	4.01	0.913	3.66
Mogul LEDs	2.68	100%	2.68	0.913	2.45
Wall Packs	0.23	0%	0.00	0.913	0.00
Pin Base LEDs	0.01	71%	0.01	0.913	0.01
Exit Signs	<0.01	100%	<0.01	0.913	<0.01
Total	**6.94**	**97%**	**6.70**	**0.913**	**6.12**

We discuss major discrepancies between ex ante claims and the verified analysis below.

- **Wall Packs (4% of ex ante electric energy and 3% of demand savings):** The gross realization rates for Wall Packs are 137% for electric energy savings and 0% for demand savings.
  - For all Wall Pack records, the implementation team applied a value of 3,137 for the hours of use (HOU) in ex ante calculations. The evaluation team applied the fixture HOU assumption for the "Exterior – dusk to dawn" space type (4,303), resulting in higher verified savings.
  - For all Wall Pack records the implementation team applied a coincidence factor (CF) of 0.67. The evaluation team applied the CF associated with exterior spaces (0.0), resulting in zero verified demand savings for these records.
- **Pin Base LEDs (<1% of ex ante electric energy and demand savings):** The gross realization rate for Pin Base LEDs is 71% for electric energy and demand savings.
  - The evaluation team identified what appeared to be duplicate projects in the Initiative tracking data. The backup documentation for projects 2350386 and 2350348 contain all of the same information, including identical invoice numbers. The only difference in the project documentation was in the Transaction Report dates. The evaluation team removed project 2350386 from the verified analysis, resulting in a lower verified electric energy and demand savings for this measure.[29]

3.6.4 HVAC CHANNEL

The following sections present the impact evaluation results for the 2023 Midstream HVAC channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

The Midstream HVAC channel provides incentives to participating HVAC equipment distributors to reduce the final sale price of equipment for end-customers and to encourage distributors to promote higher efficiency HVAC and water heating equipment. By providing incentives to distributors, channel staff aim to increase the adoption of high-efficiency HVAC and water heating equipment without requiring customers to submit an incentive application. The list of measures currently incentivized through the channel includes ducted air source heat pumps, central air conditioners, heat pump water heaters, smart thermostats, and notched v-belts. Distributors are permitted to keep up to 25% of the

[29] Project 2350386 also included linear LEDs but the removal of the duplicate project had a negligible impact on the savings for his measure, as well as the measure-level realization rate.

incentive to support their internal data tracking and incentive submission processes, as well as their marketing, education, and outreach efforts.

AIC provides cobranded marketing materials to participating distributors, as well as educational materials and training on channel participation requirements and eligible equipment specifications. Leidos partners with CMC Energy Services to assist with managing the network of participating distributors. CMC provides each distributor with an account manager that helps them with troubleshooting issues and increasing their channel activity. The distributors are encouraged to disseminate the provided marketing and educational materials to contractors and to host their own equipment showcases, events, and training sessions to increase contractor engagement with the channel. Any contractor in AIC's service territory is eligible to engage with the channel; however, those who enroll as Program Ally Contractors are listed on AIC's website and receive cobranded marketing materials and channel-related communications from AIC. AIC and Leidos continually recruit new distributors and contractors, with a focus on reaching those in empowered communities.

To receive incentives, distributors collect equipment and end-customer information from contractors and submit the information via an online Midstream HVAC portal that is hosted and managed by Leidos. Only sales to AIC end-customers are eligible to receive channel incentives. Implementation partner Energy Sciences reviews all incoming transaction data for completeness, accuracy, and eligibility. Once a transaction is approved, the incentive is paid to the distributor. Given the dynamics of the HVAC market and the requirement that distributors verify end-customer eligibility, incentivized sales typically occur in one of two ways:

- **Scenario 1:** A contractor purchases a piece of equipment for a specific end-customer and provides the customer's information to the distributor at the time of purchase. In this scenario, the distributor can typically confirm the customer's eligibility on the spot and sell the equipment to the contractor at a discounted price. Distributors submit the transaction information via the web portal and recoup the incentive.
- **Scenario 2**: A contractor purchases a piece of equipment for stock and not for a specific end-customer. In this scenario, the distributor sells the equipment to the contractor at full price. Once the contractor sells that equipment to an eligible end-customer, they can provide the necessary end-customer information to the distributor who can issue a credit to the contractor and submit the information via the web portal for approval.

In both scenarios, the intent is that the incentive is passed through as savings to the end-customer through a lower purchase price with their contractor.

Overall, the implementation team set a goal of achieving 526 MWh and 26,473 therms of savings through the HVAC channel in 2023.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the Midstream HVAC channel in 2023:

- The implementation team added an incentive tier for lower efficiency ASHPs in order to expand opportunities for customers. The incentive for this new tier is lower than what is provided for equipment that meets the higher efficiency criteria.
- Smart thermostat incentives were increased from $100 to $125 to drive participation.
- The implementation team simplified the payment structure for participating distributors, eliminating the pay for performance incentive and allowing distributors to keep up to 25% of the total incentive payment for marketing and training activities.
- Initiative staff enrolled distributors in direct deposit for payment to provide incentive funds more quickly. Direct deposit is not new to the Program as a whole, but it is a new addition to the Midstream HVAC channel.

PARTICIPATION SUMMARY

Table 68 presents a summary of participation in the Midstream HVAC channel in 2023. We present these data separated by public and private sectors to provide context as to the primary drivers of participation. AIC customers purchased 187 units of efficient HVAC equipment through the channel, which represents a 54% decrease compared to 2022. Advanced thermostats dominated channel activity, accounting for 65% of all incentivized measures.

Table 68. 2023 Midstream HVAC Channel Participation Summary by Measure

Column	Measure Quantity	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Private Sector				
Small Commercial Thermostats	119	119	0.03	13,658
Air and Water Source Heat Pumps	24	52	0.01	0
Single-Package and Split System Unitary Air Conditioners	21	13	0.01	0
Water Heaters	4	12	<0.01	0
Notched V Belts for HVAC Systems	8	2	<0.01	0
Private Sector Subtotal	*176*	*198*	*0.05*	*13,658*
Public Sector [a]				
Single-Package and Split System Unitary Air Conditioners	7	8	<0.01	0
Water Heaters	1	4	<0.01	0
Small Commercial Thermostats	2	2	<0.01	0
Air and Water Source Heat Pumps	1	2	<0.01	0
Public Sector Subtotal	*11*	*17*	*<0.01*	*0*
Total	**187**	**215**	**0.05**	**13,658**

[a] The project counts, measure counts, and ex ante savings values presented in the Public Sector subsection of this table include State and Federal facilities, which are not included in the list of customer types covered in the public sector minimum funding requirements in subsection (c) of 220 ILCS 5/8-103B and subsection (e) of 220 ILCS 5/8-104.

Table 69 presents information on distributor participation in the channel. In total, 21 distributors participated in the channel in 2023, which is a 50% increase compared to the 14 distributors that participated in 2022. In total, these distributors completed 187 projects – a 51% increase compared to 2022. Table 69 presents information on the ten distributors that were most active in the channel in 2023.

Table 69. 2023 Midstream HVAC Channel Participating Distributor Summary

Distributor	Projects	Share of Total (n=151)
Ally 44	21	14%
Ally 45	20	13%
Ally 46	17	11%
Ally 47	15	10%
Ally 48	13	9%
Ally 49	7	5%
Ally 50	7	5%
Ally 51	6	4%
Ally 52	6	4%
Ally 53	6	4%

SAVINGS DETAIL

Table 70 presents the ex ante, verified gross, and verified net electric energy savings achieved through the Midstream HVAC channel in 2023. The channel achieved a gross realization rate of 99% for electric energy savings. Initiative staff continued to incentivize the same measures as in 2022. Advanced thermostats accounted for 59% of the channel's verified net electric energy savings, which was a reduction from 96% in 2022. The decrease in the share of channel electric energy savings produced by advanced thermostats in 2023 is due in part to a 70% decrease in measure participation as compared to 2022. In addition, other measures increased their contribution, including unitary air source heat pumps (ASHPs) which account for 21% of channel verified net savings (up from 4% in 2022), followed by Unitary ACs at 10% (up from 6%), and heat pump water heaters at 9% (up from 2%). Overall, the channel experienced a 49% decrease in verified net electric energy savings compared to 2022.

Table 70. 2023 Midstream HVAC Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Advanced Thermostats	122	105%	127	0.880	112
Unitary ASHPs	55	82%	45	0.890	40
Unitary ACs	21	100%	21	0.890	19
Heat Pump Water Heaters	15	125%	19	0.890	17
Notched V-Belts	2	35%	1	0.800	1
Total	**215**	**99%**	**213**	**0.884**	**189**

Table 71 presents the ex ante, verified gross, and verified net electric demand savings achieved through the Midstream HVAC channel in 2023. The Midstream HVAC channel achieved a gross realization rate of 101% for electric demand savings. Overall, the channel saw a reduction in verified net demand savings of 54% compared to 2022.

Table 71. 2023 Midstream HVAC Channel Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Advanced Thermostats	0.04	100%	0.04	0.880	0.03
Unitary ASHPs	0.01	100%	0.01	0.890	0.01
Unitary ACs	0.01	100%	0.01	0.890	0.01
Heat Pump Water Heaters	<0.01	125%	<0.01	0.890	<0.01
Notched V-Belts	<0.01	35%	<0.01	0.800	<0.01
Total	**0.05**	**101%**	**0.06**	**0.883**	**0.05**

Table 72 presents the ex ante, verified gross, and verified net gas savings achieved through the Midstream HVAC channel in 2023. The channel achieved a realization rate of 100% for gas savings. Overall, the channel produced 63% fewer verified net gas savings compared to 2022.

Table 72. 2023 Midstream HVAC Channel Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Advanced Thermostats	13,658	100%	13,658	0.880	12,019
Total	**13,658**	**100%**	**13,658**	**0.880**	**12,019**

We discuss major discrepancies between ex ante claims and the verified analysis below.

- **Advanced Thermostats (57% of ex ante energy savings and 65% of demand savings):** The gross realization rates for Advanced Thermostats are 105% for electric energy and 100% for demand savings.
  - The implementation team applied the IL-TRM V11.0 assumptions and followed the evaluation team's previous guidance to assume a code compliant ASHP as the controlled equipment for the midstream HVAC channel. IL-TRM V12.0 implemented a change to the HSPF baseline assumption for unknown situations, adopting a blended average of 5.6 HSPF (5.1 HSPF2) based on the penetration of air source heat pumps (40.17%) and electric resistance furnaces (59.83%) and their existing heating efficiencies, 7.5 HSPF2 and 3.41 HSPF, respectively. Because the update in IL-TRM V12.0 explicitly defines a baseline assumption for unknown scenarios and IL-TRM V11.0 does not, the evaluation team adopted the assumption in the current program year's evaluation, resulting in slightly higher verified electric energy savings.
- **Unitary ASHPs (25% of ex ante energy savings and 18% of demand savings):** The gross realization rates for Unitary ASHPs are 82% for electric energy and 100% for demand savings.
  - The evaluation team found that the implementation team applied the cooling capacity in calculating the heat load in the ex ante electric energy savings calculations. The evaluation team applied the heating capacity from the program tracking data to calculate the heat load, in accordance with the IL-TRM V11.0, resulting in lower verified electric energy savings.
  - The implementation team applied an HSPF climate adjustment factor of 0.81 in ex ante calculations regardless of the installation location of the equipment. The IL-TRM V11.0 stipulates that the HSPF climate adjustment factor specific to the site's climate zone should be applied when the installation location is known. The evaluation team applied the appropriate adjustment factors in the verified calculations, resulting in slightly higher verified electric energy savings.
- **Heat Pump Water Heaters (7% of ex ante energy savings and 4% of demand savings):** The gross realization rates for Heat Pump Water Heaters are 125% for energy and 125% for demand savings.
  - The implementation team assumed that all installations occurred at businesses where an ASHP is the primary HVAC system, resulting in the use of a heating coefficient of performance (COP) of 1.92. This assumption results in negative electric heating impacts due to the output of cool air from the HPWH into a conditioned space. The IL-TRM does not stipulate an assumed heating system for this measure. The evaluation team assumed that all installations occurred at businesses with a natural gas furnace as the primary heating system, due to the prevalence of natural gas furnaces throughout the service territory. This assumption resulted in the replacement of electric heating penalties with gas heating penalties in the verified analysis, increasing verified electric energy and demand savings. This is the primary driver of the measure's realization rates.
  - The evaluation team found a misapplication of the IL-TRM V11.0 algorithm in the ex ante calculations. The implementation team subtracted both waste heat cooling and waste heat heating impacts. The correct formula subtracts the waste heat heating impacts and adds the waste heat cooling impacts. The evaluation team applied the TRM formulas correctly in the verified savings calculations applies. The combination of both discrepancies results in an increase in verified electric energy savings and generation of a negative gas heating penalty.
- **Notched V-Belts (1% of ex ante energy savings and 1% of demand savings):** The gross realization rates for notched V-belts are 35% for energy and 35% for demand savings.
  - The implementation team assumed that each notched v-belt controls a 3 horsepower (hp) motor, and correctly applied the default motor efficiency from the IL-TRM V11.0. The evaluation team cannot confirm the hp controlled by each notched v-belt and therefore assumed a conservative 1-hp motor with default efficiency from the IL-TRM V11.0. This resulted in lower verified electric energy and demand savings.

3.6.5 FOOD SERVICE CHANNEL

The following sections present the impact evaluation results for the 2023 Midstream Food Service channel. Additional details on the impact analysis methodology are provided in Appendix A.

CHANNEL DESCRIPTION

The Food Service channel is a statewide offering that was launched in 2022 as a pilot and rolled out as a full channel in 2023. The Midstream Food Service channel provides incentives to participating food service equipment distributors to reduce the final sale price of equipment for end-customers and to encourage distributors to promote higher efficiency equipment. By providing incentives to distributors, channel staff aim to increase the adoption of high-efficiency food service equipment without requiring customers to submit an incentive application. Distributors are permitted to keep a portion of equipment incentives to support their internal data tracking and incentive submission processes, as well as their marketing, education, and outreach efforts. The channel targets both national and local food service equipment suppliers to participate in the channel. The intent is that the incentives are passed through as savings to the end-customer through a lower purchase price, either directly from the participating distributor, or through a contractor.

Frontier Energy transitioned into the role as the prime implementer in 2023, after previously implementing the channel under subcontract to another firm in 2022. Frontier Energy sets the incentive levels for the channel, establishes eligibility criteria, and pays out the incentives to distributors. They coordinate with Leidos to share transaction data used to estimate savings and track AIC-specific channel activity.

Overall, the implementation team set a goal of achieving 561 MWh and 94,034 therms of savings through the Food Service channel in 2023.

PARTICIPATION SUMMARY

Table 73 presents a summary of participation in the Midstream Food Service channel in 2023. We present these data separated by public and private sectors to provide context as to the primary drivers of participation. AIC customers purchased 233 units of efficient food service equipment through the channel. Solid and Glass Door Refrigerators & Freezers dominated channel activity, accounting for 52% of all incentivized measures.

Table 73. 2023 Midstream Food Service Channel Participation Summary by Measure

Column	Measure Quantity	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Private Sector				
Steam Cookers	7	202	0.04	3,008
Broilers	5	96	0.02	15
Fryers	51	52	<0.01	21,248
Solid and Glass Door Refrigerators & Freezers	100	38	<0.01	0
Dishwashers	2	19	<0.01	294
Deck Ovens	1	15	<0.01	0
Combination Ovens	1	14	<0.01	0
Ice Makers	22	11	<0.01	0
Griddles	1	3	<0.01	0
Convection Ovens	4	2	<0.01	917
Private Sector Subtotal	*194*	*452*	*0.07*	*25,481*

Column	Measure Quantity	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Public Sector [a]				
Steam Cookers	9	116	0.02	9,023
Dishwashers	2	16	<0.01	45
Solid and Glass Door Refrigerators & Freezers	21	4	<0.01	0
Ice Makers	2	1	<0.01	0
Convection Ovens	1	0	<0.01	367
Fryers	4	0	<0.01	1,774
Public Sector Subtotal	*39*	*138*	*0.02*	*11,209*
Total	**233**	**590**	**0.09**	**36,690**

[a] The project counts, measure counts, and ex ante savings values presented in the Public Sector subsection of this table include State and Federal facilities, which are not included in the list of customer types covered in the public sector minimum funding requirements in subsection (c) of 220 ILCS 5/8-103B and subsection (e) of 220 ILCS 5/8-104.

SAVINGS DETAIL

Table 74 presents the ex ante, verified gross, and verified net electric energy savings achieved through the Midstream Food Service channel in 2023. Initiative staff added ENERGY STAR broilers, ENERGY STAR fryers, ENERGY STAR griddles and deck ovens to the suite of measure offerings and they removed hot food holding cabinets. The channel achieved a realization rate of 101% for electric energy savings. Channel energy savings were primarily driven by steam cookers which accounted for 54% of channel verified net electric energy savings, down from 61% in 2022. Overall, the channel experienced a 9% increase in verified net electric energy savings compared to 2022, primarily due to the addition of broilers which accounted for 16% of channel savings and an increase in the number of incentivized refrigerators and freezers which accounted for 9% of savings, up from 2% in 2022.

Table 74. 2023 Midstream Food Service Channel Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Steam Cookers	319	100%	319	0.800	255
Broilers	96	100%	95	0.800	76
Fryers	52	100%	52	0.800	42
Refrigerators and Freezers	42	119%	51	0.800	40
Dishwashers	35	100%	35	0.800	28
Deck Ovens	15	100%	15	0.800	12
Combination Ovens	14	62%	9	0.800	7
Ice Machines	12	112%	14	0.800	11
Griddles	3	102%	3	0.800	2
Convection Ovens	2	98%	2	0.800	2
Total	**590**	**101%**	**594**	**0.800**	**475**

Table 75 presents the ex ante, verified gross, and verified net electric demand savings achieved through the Midstream Food Service channel in 2023. The channel achieved a realization rate of 102% for electric demand savings. Steam cookers also drove channel demand savings, accounting for 63% of total savings; down from 78% in 2022. Overall, the channel experienced a 24% increase in verified net electric demand savings compared to 2022.

Table 75. 2023 Midstream Food Service Channel Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Steam Cookers	0.06	100%	0.06	0.800	0.05
Broilers	0.02	100%	0.02	0.800	0.01
Fryers	<0.01	100%	<0.01	0.800	<0.01
Refrigerators and Freezers	<0.01	119%	<0.01	0.800	<0.01
Dishwashers	<0.01	100%	<0.01	0.800	<0.01
Deck Ovens	<0.01	100%	<0.01	0.800	<0.01
Combination Ovens	<0.01	1,346%	<0.01	0.800	<0.01
Ice Machines	<0.01	112%	<0.01	0.800	<0.01
Griddles	<0.01	102%	<0.01	0.800	<0.01
Convection Ovens	<0.01	99%	<0.01	0.800	<0.01
Total	**0.09**	**102%**	**0.09**	**0.800**	**0.07**

Table 76 presents the ex ante, verified gross, and verified net gas savings achieved through the Midstream Food Service channel in 2023. The channel achieved a realization rate of 100% for gas savings. Overall, the channel experienced a 154% increase in verified net gas savings compared to 2022.

Table 76. 2023 Midstream Food Service Channel Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Steam Cookers	12,031	100%	12,031	0.800	9,625
Broilers	15	100%	15	0.800	12
Fryers	23,022	100%	23,022	0.800	18,418
Dishwashers	339	100%	339	0.800	271
Convection Ovens	1,283	100%	1,290	0.800	1,032
Total	**36,690**	**100%**	**36,696**	**0.800**	**29,357**

We discuss major discrepancies between ex ante claims and the verified analysis below.

- **Refrigerators and Freezers (7% of ex ante energy savings and 5% of demand savings):** The gross realization rate for refrigerators and freezers is 119% for both electric energy and demand savings.

For all records, the evaluation team used conservative values within the volume ranges included in the Initiative tracking data (e.g., 15-30 ft^3) to support verified savings calculations. The evaluation team used the mid-point of each range, with the exception of the ">50 ft^3" range for which we applied a value of 50 ft^3. This resulted in an overall increase in verified electric energy and demand savings.

- **Combination Ovens (2% of ex ante energy and <1% of demand savings):** The gross realization rates for combination ovens are 62% for electric energy and 1346% for demand savings.
  - The implementation team appears to have applied assumptions associated with combination ovens with pan capacities between 15 and 30 in the ex ante calculations. The evaluation team applied the assumptions associated with combination ovens with pan capacities of less than 15 pans, consistent with the information provided in the Initiative tracking data. This resulted in lower verified electric energy and demand savings.

- The implementation appears to have applied a CF value that is much smaller than what the evaluation team applied. The evaluation team applied the CF for unknown locations defined in the IL-TRM V11.0. This resulted in a large increase in verified demand savings.

- **Ice machines (2% of ex ante energy savings and 3% of demand savings):** The gross realization rate for ice machines is 112% for both electric energy and demand.
  - The implementation team does not appear to use the correct deemed savings algorithm for ice machines based on system type and harvest rate range based on available data. The evaluation team used the harvest rate provided in the project documentation along with the system type from the initiative tracking data to determine savings. This resulted in increased verified savings for the measure.

3.6.6 CUMULATIVE PERSISTING ANNUAL SAVINGS

Table 77 through Table 80 present CPAS and WAML for the 2023 Midstream Initiative by channel. The tables also include a summary of the measure-specific and total verified gross savings for the Initiative and respective channels, as well as CPAS in each year from 2023-2026.[30] The WAML for the Midstream Initiative is 14.6 years and the WAML for the Lighting, HVAC, and Food Service channels are 14.6 years, 12.8 years, and 12.1 years, respectively.

Table 77. 2023 Midstream Initiative CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
Lighting	14.6	29,577	0.913	27,010	27,010	27,010	27,010	...	27,001	...	395,232
HVAC	12.8	213	0.884	189	189	189	188	...	188	...	2,413
Food Service	12.1	594	0.800	475	475	475	475	...	475	...	5,736
2023 CPAS		**30,384**	**0.911**	**27,673**	**27,673**	**27,673**	**27,673**	...	**27,664**	...	**403,381**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	...	**0**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	...	**9**	...	
WAML	**14.6**										

[30] For further details, including achieved CPAS in years not presented in this table, please see the *2023 AIC CPAS and AAIG Workbook*.

Table 78. 2023 Midstream Lighting Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
Linear LED	14.8	16,811	0.913	15,352	15,352	15,352	15,352	...	15,352	...	227,167
Mogul LEDs	14.8	11,231	0.913	10,256	10,256	10,256	10,256	...	10,256	...	151,761
Wall Pack	11.6	1,502	0.913	1,371	1,371	1,371	1,371	...	1,371	...	15,934
Pin Base LEDs	14.8	24	0.913	22	22	22	22	...	22	...	327
Exit Sign	5.0	9	0.913	8	8	8	8	...	0	...	42
2023 CPAS		**29,577**	**0.891**	**27,010**	**27,010**	**27,010**	**27,010**	...	**27,001**	...	**395,232**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	...	**0**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	...	**8**	...	
WAML	**14.6**										

Table 79. 2023 Midstream HVAC Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
Advanced Thermostats	11.0	127	0.880	112	112	112	112	...	112	...	1,233
Unitary ASHP	16.0	45	0.890	40	40	40	40	...	40	...	640
Unitary AC	15.0	21	0.890	19	19	19	19	...	19	...	284
Heat Pump Water Heater	15.0	19	0.890	17	17	17	17	...	17	...	254
Notched V-Belt	3.8	1	0.800	1	1	1	0	...	0	...	2
2023 CPAS		**213**	**0.884**	**189**	**189**	**189**	**188**	...	**188**	...	**2,413**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	...	**0**	...	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	...	**1**	...	
WAML	**12.8**										

Table 80. 2023 Midstream Food Service Channel CPAS and WAML

Measure	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2023	2024	2025	2026	...	2030	...	
Steam Cookers	12.0	319	0.800	255	255	255	255	...	255	...	3,059
Broilers	12.0	95	0.800	76	76	76	76	...	76	...	917
Fryers	12.0	52	0.800	42	42	42	42	...	42	...	503
Refrigerators and Freezers	12.0	51	0.800	40	40	40	40	...	40	...	485
Dishwashers	14.5	35	0.800	28	28	28	28	...	28	...	403
Deck Ovens	12.0	15	0.800	12	12	12	12	...	12	...	144
Ice Machines	9.0	14	0.800	11	11	11	11	...	11	...	98
Combination Ovens	12.0	9	0.800	7	7	7	7	...	7	...	82
Griddles	12.0	3	0.800	2	2	2	2	...	2	...	25
Convection Ovens	12.0	2	0.800	2	2	2	2	...	2	...	19
2023 CPAS		**594**	**0.800**	**475**	**475**	**475**	**475**	**...**	**475**	**...**	**5,736**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2023 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
WAML	**12.1**										

3.6.7 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Midstream Initiative moving forward:

LIGHTING CHANNEL

- **Key Finding #1**: The Midstream Lighting channel experienced a year-over-year increase in verified net electric energy and demand savings of 28% and 22%, respectively, compared to 2022. This trend is consistent with efforts to increasingly drive Business Program activity through the Midstream Initiative. Notably, the Standard Lighting for Business offering through the Standard Core channel experienced a year-over-year decrease of 32% for verified net energy savings and 37% decrease in verified net demand savings, compared to 2022.
- **Key Finding #2**: The evaluation team identified what appeared to be duplicate projects in the Initiative tracking data. The backup documentation for projects 2350386 and 2350348 contain all the same information, including identical invoice numbers. The only difference in the project documentation was in the Transaction Report dates. The evaluation team removed project 2350386 from the verified analysis, resulting in a negligible reduction in channel verified electric energy and demand savings.
- **Key Finding #3**: For all wall packs, the implementation team applied a custom value for hours of use (3,173). The implementation team also calculated demand savings for wall packs using a coincidence factor value of 0.67, which corresponds to the assumption in IL-TRM V11.0 for an unknown building type. Since the fixtures are installed in an exterior location, the evaluation team applied hours of use and coincidence factor assumptions in accordance with the IL-TRM V11.0 values for an "Exterior – dusk to dawn" space type.
  - **Recommendation**: Review the inputs and assumptions in project documentation for wall packs to ensure the measure is characterized appropriately.

HVAC CHANNEL

- **Key Finding #1**: The evaluation team found several minor discrepancies in ex ante calculations stemming from misapplication of the IL-TRM V11.0. The differences in verified and ex ante calculations are easily corrected through a review of internal initiative tracking systems, and for the most part are not differences in interpretation of the TRM.
  - **Recommendation**: We recommend that the implementation team review their internal tracking systems and make the corrections identified earlier. These changes will result in improved realization rates for the channel, noting that the channel's realization rates are already strong.

FOOD SERVICE CHANNEL

- **Key Finding #1**: Most of the discrepancies between ex ante verified savings estimates are driven by gaps in the Initiative tracking data. For several measures, the tracking data does not include specific equipment characteristics that are needed in order to apply appropriate assumptions from the IL-TRM. For example, the Initiative tracking data does not include specific information on the volume of the refrigerators and freezers incentivized through the channel. Instead, the data includes volume ranges (e.g., 15-30 ft^3). This range information is sufficient to support the application of some assumptions in the IL-TRM, but the specific values are needed for other portions of the calculation. This lack of data requires both the implementation and evaluation teams to make assumptions or employ the use of averages, which can result in differences in savings estimates.

- **Recommendation**: The evaluation team understands that the midstream implementation model limits the amount of data that can be collected and tracked. However, we recommend that the implementation team collect data on equipment characteristics wherever possible to reduce the evaluation risk around these measures.

APPENDIX A. IMPACT ANALYSIS METHODOLOGY

STANDARD INITIATIVE

GROSS IMPACT METHODOLOGY

The evaluation team calculated verified savings for the Standard Initiative by applying savings algorithms from the IL-TRM V11.0. The team leveraged information from the initiative tracking data such as primary heating and cooling type, LED wattage, LED lamp type, project location (e.g., for weather-dependent variables), etc., to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V11.0. Table 81 lists the measures in the Standard Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2023 evaluation.

Table 81. Standard Initiative Evaluated Measures

IL-TRM Measure Name	IL-TRM Measure Code	Errata Applied?
High Speed Fans	4.1.3	No errata present for this measure
Commercial LED Grow Lights	4.1.11	No errata present for this measure
High Efficiency Grain Dryer	4.1.14	No errata present for this measure
High Efficiency Pre-Rinse Spray Valve	4.2.11	No errata present for this measure
Kitchen Demand Ventilation Controls	4.2.16	No errata present for this measure
Water Heater	4.3.1	No errata present for this measure
Ozone Laundry	4.3.6	No errata present for this measure
Tank Insulation	4.3.12	No errata present for this measure
Space Heating Boiler Tune-up	4.4.2	No errata present for this measure
Process Boiler Tune-up	4.4.3	No errata present for this measure
Boiler Lockout/Reset Controls	4.4.4	No errata present for this measure
Electric Chiller	4.4.6	No errata present for this measure
High Efficiency Boiler	4.4.10	No errata present for this measure
High Efficiency Furnace	4.4.11	No errata present for this measure
Package Terminal Air Conditioner (PTAC) and Package Terminal Heat Pump (PTHP)	4.4.13	No errata present for this measure
Single-Package and Split System Unitary Air Conditioners	4.4.15	No errata present for this measure
Steam Trap Replacement or Repair	4.4.16	No errata present for this measure
Variable Speed Drives for HVAC Pumps and Cooling Tower Fans	4.4.17	No errata present for this measure
Demand Controlled Ventilation	4.4.19	No errata present for this measure
Linkageless Boiler Controls for Space Heating	4.4.21	No errata present for this measure
Variable Speed Drives for HVAC Supply and Return Fans	4.4.26	No errata present for this measure
High Temperature Heating and Ventilation (HTHV) Direct Fired Heater	4.4.39	No errata present for this measure
Advanced Rooftop Controls (ARC)	4.4.41	No errata present for this measure
Small Commercial Thermostats	4.4.48	No errata present for this measure
Fluorescent Delamping	4.5.2	No errata present for this measure
LED Bulbs and Fixtures	4.5.4	Errata applied

IL-TRM Measure Name	IL-TRM Measure Code	Errata Applied?
Commercial LED Exit Signs	4.5.5	No errata present for this measure
Lighting Controls	4.5.10	No errata present for this measure
Door Heater Controls for Cooler or Freezer	4.6.3	No errata present for this measure
Electronically Commutated Motors (ECM) for Walk-in and Reach-in Coolers / Freezers	4.6.4	No errata present for this measure
Variable Frequency Drive for Condenser Fans	4.6.12	No errata present for this measure
Add Doors to Open Refrigerated Display Cases	4.6.13	No errata present for this measure
VFD Air Compressor	4.7.1	No errata present for this measure
Compressed Air Low Pressure Drop Filters	4.7.2	No errata present for this measure
Desiccant Dryer Dew Point Demand Controls	4.7.8	No errata present for this measure
Compressed Air Heat Recovery	4.7.9	No errata present for this measure
Advanced Power Strip – Tier 1 Commercial	4.8.7	No errata present for this measure
High Frequency Battery Chargers	4.8.9	No errata present for this measure
Variable Speed Drives for Process Fans	4.8.13	No errata present for this measure
Smart Sockets	4.8.22	No errata present for this measure
Lithium Ion Forklift Batteries	4.8.23	Errata applied
Building Operator Certification	4.8.24	No errata present for this measure

NON-TRM MEASURES AND ASSUMPTIONS

Variable-Speed Drives for Process Pumps

Process VFDs are available through the Standard Core channel's VFD offering and include installations for both process fans and process pumps. The IL-TRM V11.0 Volume 2 includes a VFD measure for process fans but does not provide an approach for calculating gross impacts for process pump VFDs. For VFDs controlling process pumps, the evaluation team applied a mix of methods to evaluate verified savings, including the use of IL-TRM V11.0 Section 4.8.13 algorithms and assumptions in coordination with a 2010 memorandum[31] that provides guidance on capping savings at a percentage of estimated base energy consumption. The following discussion details the evaluation team's methods for evaluating verified savings.

The evaluation team adopted the IL-TRM V11.0 Section 4.8.13 algorithms for calculating the base energy consumption of processes before the installation of VFDs. The algorithms for calculating verified energy and demand savings are provided below in Equation 1 through Equation 3 provided in Table 82:

Equation 1. Base Annual Electric Energy Usage

$$kWh_{base} = \left[\left(0.746 \times HP \times \frac{LF}{\eta_{motor}}\right) \times RHRS_{Base} \times \sum_{0\%}^{100\%} (\%FF \times PLR_{Base})\right]$$

Equation 2. VFD Electric Energy Savings for Process Pumps

$$\text{Energy (kWh)} = kWh_{base} \times ESF$$

[31] The memorandum titled "Recommendations for Verifying Savings for non-HVAC VFDs" was submitted in response to program administrator comments regarding the PY2 evaluation methods for non-HVAC VFDs.

Equation 3. VFD Electric Demand Savings for Process Pumps

$$\text{Demand (kW)} = \left[\left(0.746 \times HP \times \frac{LF}{\eta_{motor}}\right) \times PLR_{Base,FFpeak}\right] \times ESF$$

Energy and demand savings are capped by the energy savings factor (ESF) of 42% for pump applications. To ensure that savings are capped, the evaluation team compares the verified energy and demand savings against the claimed savings. If the proportion of claimed savings to kWh_{base} is greater than the savings limit, then the savings limit is applied to the kWh_{base}. If the proportion is less than the claimed savings, then the claimed savings are accepted as the verified savings.

Table 82. Deemed Inputs for VFD Calculations

Algorithm Variable	Description	Value	Source
kWh_{base}	Base energy consumption of the existing motor prior to installation of the VFD	Calculated	IL-TRM V11.0
HP	Nominal horsepower of controlled motor	Actual value	Initiative tracking database
Motor LF	Motor load factor	75%	2010 memorandum[b]
Σ (%FF * PLR)	Flow Fraction and Part Load Ratio (PLR) factor; assumes "No Control or Bypass Damper"	1	IL-TRM V11.0
ηmotor	Installed nominal/nameplate motor efficiency, based on horsepower[a]	NEMA Standard	Extracted from IL-TRM V11.0 Table of NEMA Motor Efficiencies
$RHRS_{base}$	Annual operating hours of base motor	Actual value	Initiative tracking database
ESF (pump)	Energy Savings Factor for pump applications	42%	2010 memorandum[b]

[a] Default motor type is a National Electrical Manufacturers Association (NEMA) Premium Efficiency, Open Drip Proof, 4-pole/1800 RPM fan motor.
[b] Recommendations for Verifying Savings for non-HVAC VFDs provides details on load factor and ESF assumptions.

The evaluation team will continue to apply the methods outlined above to calculate verified savings for VFDs installed on process pumps until the IL-TRM provides guidance for this application of VFDs.

Measure Lives and Cumulative Persisting Annual Savings

For prescriptive measures, the evaluation team applied measure lives and mid-life adjustments from the IL-TRM V11.0.

NET IMPACT METHODOLOGY

The evaluation team applied SAG-approved 2023 NTGRs to the verified gross savings to calculate verified net savings.

Table 83. 2023 SAG-Approved Standard Initiative NTGRs

Channel	Measure	Electric NTGR	Gas NTGR
Online Store	Advanced Thermostats	0.880	0.880
Online Store	All Other Measures	1.156	0.800
Standard Prescriptive/Public	Core Program Lighting	0.839	N/A
Standard Prescriptive/Public	Core Program HVAC	0.683	0.426
Standard Prescriptive/Public	Core Program HVAC - Thermostats	0.842	0.713
Standard Prescriptive/Public	Core Program Specialty	0.849	0.675
Standard Prescriptive/Public	Core Program Steam Trap	0.608	0.608
Standard Prescriptive/Public	Core Program VFD	0.833	N/A

Channel	Measure	Electric NTGR	Gas NTGR
Standard Prescriptive/Public	Green Nozzles	0.920	0.890
BOC Training	BOC	N/A	N/A

CUSTOM INITIATIVE

GROSS IMPACT METHODOLOGY – CUSTOM INCENTIVES CHANNEL

The evaluation team's gross impact analysis for the Custom Incentives channel used desk reviews and on-site M&V to determine verified gross impacts. Overall, the evaluation team reviewed a total of 48 Custom Incentives channel projects.

The evaluation team completed desk reviews (and in most cases, on-site M&V to provide increased accuracy) for the 48 sampled projects to determine gross impact results. Desk reviews were used to compare the inputs provided in the application to the assumptions used in the analysis, verify consistency in savings estimates throughout the project file, and provide insight into the validity of the ex ante energy savings. The team accomplished this by reviewing the submitted information and calculations for consistency, accuracy, and correct application of engineering principles.

SAMPLING APPROACH

We selected the sample of 2023 projects for evaluation in three waves, drawing each sample from the entire population of completed Custom Incentives channel projects. As part of this process, we selected projects independently by fuel type and by wave to satisfy random sampling requirements.

We chose a sample of 48 projects using a stratified random sample design targeting 10% relative precision at 90% level of confidence for each fuel. For the stratification, we used the Dalenius-Hodges method[32] to determine strata boundaries and the Neyman allocation[33] to determine the optimal allocation of the available projects to the strata.

In total, the sample included 25 projects chosen for the Custom Incentives electric sample and 21 projects chosen for the gas sample.[34] We also sampled two projects that the implementation team identified as having fuel switching impacts. The evaluation team separated these fuel switching projects into their own sample and reviewed a census of projects. The 48 total project reviews accounted for 59.5% of the total ex ante gross Custom Incentives electric energy savings and 91.6% of total ex ante gross gas savings. Table 84 and Table 85 present details around the sample of electric and gas projects chosen for the 2023 evaluation.

Table 84. Custom Incentives Channel Sampling Approach for Projects with Electric Savings

Wave	Sampling Stratum	Savings Range	Population of Projects		Completed Reviews	
			Count	Ex Ante MWh	Count	Ex Ante MWh
1	1	< 52 MWh	16	124	1	5
	2	> 52 MWh & < 292 MWh	12	1,787	4	638

[32] Dalenius, Tore, and Joseph L. Hodges. "Minimum Variance Stratification." Journal of the American Statistical Association 54, no. 285 (1959): 88–101. https://doi.org/10.2307/2282141.

[33] Neyman, Jerzy. "On the Two Different Aspects of the Representative Method: The Method of Stratified Sampling and the Method of Purposive Selection." Journal of the Royal Statistical Society 97, no. 4 (1934): 558–625. https://doi.org/10.2307/2342192.

[34] Seven projects were sampled as part of both the electric and gas samples.

Wave	Sampling Stratum	Savings Range	Population of Projects		Completed Reviews	
			Count	Ex Ante MWh	Count	Ex Ante MWh
	3	> 292 MWh & < 1,082 MWh	7	3,107	4	1,935
	4	> 1,082 MWh	1	1,082	1	1,082
		Subtotal	36	6,099	10	3,659
2	1	< 125 MWh	6	222	1	46
	2	> 125 MWh & < 347 MWh	4	736	2	323
	3	> 347 MWh	4	2,163	4	2,163
		Subtotal	14	3,121	7	2,532
3	1	< 131 MWh	32	1,673	2	171
	2	> 131 MWh & < 509 MWh	11	2,653	2	473
	3	> 509 MWh & < 2,000 MWh	4	3,714	2	1,610
	4	> 2,000 MWh	2	4,486	2	4,486
		Subtotal	49	12,526	8	6,741
Total			**99**	**21,746**	**25**	**12,932**

Table 85. Custom Incentives Channel Sampling Approach for Projects with Gas Savings

Wave	Sampling Stratum	Savings Range	Population of Projects		Completed Reviews	
			Count	Ex Ante Therms	Count	Therms
1	1	< 2,879 therms	4	3,343	1	987
	2	> 2,879 & < 10,454 therms	3	21,008	1	4,025
	3	> 10,454 & < 118,681 therms	5	129,001	5	129,001
	4	> 118,681 therms	1	118,682	1	118,682
		Subtotal	13	272,034	8	252,695
2	1	< 1,575 therms	3	1,538	2	1,708
	2	> 1,575 & < 4,459 therms	1	1,854	1	1,854
	3	> 4,459 therms	3	14,896	3	14,896
		Subtotal	7	18,288	6	18,458
3	1	< 4,812 therms	15	27,783	1	949
	2	> 4,812 & < 15,485 therms	7	59,162	1	7,507
	3	> 15,485 & < 500,000 therms	4	145,393	4	145,393
	4	> 500,000 therms	1	639,015	1	639,015
		Subtotal	27	871,354	7	792,864
Total			**47**	**1,161,676**	**21**	**1,064,017**

Note: The therm savings presented in this table include savings for two non-AIC gas customers. These savings are not directly claimable by AIC. However, we present the savings in this table because these therm savings did inform the ratio estimator used to develop Initiative-level savings. Additionally, AIC chose to convert the therm savings achieved through this project to electric savings under section b-25.

To estimate the channel's verified savings, the evaluation team used the combined ratio adjustment method.[35,36] As described in Equation 4, we calculated the gross realization rate based on the desk reviews (and on-site M&V for the majority of projects) for a stratified random sample of projects. For each wave and fuel, we then applied the ratio of the

[35] Cochran, William Gemmell. 1977. *Sampling Techniques*. John Wiley & Sons.

[36] Levy, Paul S., and Stanley Lemeshow. 2008. *Sampling of populations: Methods and Applications*. John Wiley & Sons.

verified gross savings to the ex ante gross savings (the realization rate) to adjust the ex ante gross savings for the population of all 2023 Custom Incentives channel projects (N=117).

Equation 4. Ratio Adjustment Method

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

where:

I_{EP} = the verified population energy and demand impacts

I_{EA} = the ex ante population energy and demand impacts

I_{EPS} = the verified sample energy and demand impacts

I_{EAS} = the ex ante sample energy and demand impacts

Precision Calculations

We calculated precision for our gross impact results by pooling the results from all waves of project reviews.[37] To calculate relative precision, the team first determined the variance in the sample and then calculated the standard error and confidence interval. We used Equation 5 through Equation 8 to support these calculations.

Equation 5. Stratified Ratio Estimator

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

Equation 6. Standard Error

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

Equation 7. Confidence Interval

$$90\%\ Confidence\ Interval = \ 1.645 * Standard\ Error$$

Equation 8. Relative Precision

$$Relative\ Precision = \frac{90\%\ Confidence\ Interval}{Stratified\ Ratio\ Estimator}$$

where:

w = case weights for each stratum h (Nh/nh)

y = verified savings

[37] 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 or group of projects. These calculations are consistent with the California Evaluation Framework.

x = ex ante savings

e = yi – b xi

$\hat{X} = w_i x_i$

MEASURE LIVES AND CUMULATIVE PERSISTING ANNUAL SAVINGS

In accordance with methods presented and discussed in the IL-TRM V11.0 Attachment B,[38] the evaluation team reviewed the ex ante measure life assumptions provided by the implementation team for sampled Custom Incentives channel projects in 2023 and revised these assumptions where necessary. We then calculated an adjustment to ex ante measure lives in a manner similar to that of calculating a gross savings realization rate and applied that adjustment to all population ex ante measure lives. Table 86 provides a summary of Custom Incentives channel project measure lives that were adjusted after evaluation. All other ex ante measure lives in our sample were determined to have been appropriately applied.

Table 86. Custom Incentives Channel Measure Life Adjustments Due to Evaluation

Project Number	End Use	Measure Life		Rationale for Adjustment
		Ex Ante	Verified	
2200889	Industrial Process	17.0	10.0	The savings for this project result from transporting an existing piece of equipment to a new facility. The ex ante EUL reflects the implementation team's position of a conservative EUL based on discussions with the customer about the length of time other equipment in the facility has been in operation. The evaluation team acknowledges that the customer feels confident in their and the equipment's ability to operate beyond the next 10 years, but this does not mean the equipment will continue to achieve the evaluated savings over that same timeframe. In particular, the customer has exhibited a need to change production to meet the changing needs of their customers. Changes in production may result in different savings than those for which the evaluation and implementation team both characterized savings. This is core to the definition of measure lifetime in the IL-TRM, which defines EUL as "the number of years (or hours) that the new high efficiency equipment is expected to provide the savings characterized in the measure." In addition, the IL-TRM offers the following guidance for adjusting EULs, "the measure lifetime is generally based on the technical lifetime but should represent an estimate of the median number of years that the measures installed under a program are still in place and operable. This may include consideration of the potential for users to remove or remodel and to allow for breakages or imperfect operation, resulting in a shorter measure life." Therefore, the evaluation team applied a verified EUL of 10 years.
2200100	Misc.	17.4	17.7	The implementation team applied the recommended measure life for electric new construction projects from IL-TRM Volume 4 Attachment B. The evaluation team applied an average of the recommended measure lives for electric new construction, gas new construction, and lighting new construction projects to match the suite of measures included in the project.
2201086	HVAC	16.0	19.0	The implementation team applied the measure life for Linkageless Boiler Controls for Space Heating as defined in section 4.4.21 of IL-TRM V9.0 Volume 2. The evaluation team applied an average of the recommended measures lives from IL-TRM V11.0 for each type of control measure included in the project.
2101289	Hot Water	17.4	20.6	The implementation team applied the recommended measure life for electric new construction projects from IL-TRM Volume 4 Attachment B. The evaluation team applied the recommended measure life for gas new construction projects.

[38] Illinois Statewide Technical Reference Manual – Attachment B: Effective Useful Life for Custom Measure Guidelines.

Project Number	End Use	Measure Life		Rationale for Adjustment
		Ex Ante	Verified	
2200056	HVAC	13.0	15.0	The implementation team incorrectly applied the EUL associated with "Add Doors to Open Refrigerated Display Cases" as found in the ex ante workbook. The evaluation team applied the default EUL for Custom HVAC – Controls defined in IL-TRM V11.0 Volume 4 Attachment B.

GROSS IMPACT METHODOLOGY – NEW CONSTRUCTION LIGHTING CHANNEL

The evaluation team's gross impact analysis for the New Construction Lighting channel used desk reviews and on-site M&V to determine verified gross impacts. Overall, the evaluation team reviewed a total of seven New Construction Lighting projects.

The evaluation team completed desk reviews for the seven sampled projects to determine gross impact results. Desk reviews were used to compare the inputs provided in the application to the assumptions used in the analysis, verify consistency in savings estimates throughout the project file, and provide insight into the validity of the ex ante energy savings. The team accomplished this by reviewing the submitted information and calculations for consistency, accuracy, and correct application of engineering principles.

SAMPLING APPROACH

We chose the sample of seven New Construction Lighting projects using a stratified random sample design targeting 10% relative precision at 90% level of 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.

In total, the sample drawn included seven projects chosen for the New Construction Lighting electric sample. The seven reviews that we conducted account for 88.5% of the total ex ante gross New Construction Lighting electric energy savings. Table 87 presents details around the sample of projects chosen for the 2023 evaluation.

Table 87. Sampling Approach for New Construction Lighting Projects with Electric Savings

Wave	Sampling Stratum	Savings Range	Population of Projects		Completed Reviews	
			Count	Ex Ante MWh	Count	Ex Ante MWh
New Construction Lighting	1	< 17 MWh	11	76	1	3
	2	> 17 MWh & < 98 MWh	6	186	1	18
	3	> 98 MWh	5	1,838	5	1,838
Total			**22**	**2,100**	**7**	**1,859**

To estimate the channel's verified savings, the evaluation team used the combined ratio adjustment method.[39] As described in Equation 9, we calculated the gross realization rate based on the desk reviews for a stratified random sample of projects. We then applied the ratio of the verified gross savings to the ex ante gross savings (the realization rate) to adjust the ex ante gross savings for the population of all 2023 New Construction Lighting projects with savings (N=22).

[39] Cochran, William G. Sampling Techniques. New York: John Wiley & Sons, 1977.

Equation 9. Ratio Adjustment Method

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

where:

I_{EP} = the verified population energy and demand impacts

I_{EA} = the ex ante population energy and demand impacts

I_{EPS} = the verified sample energy and demand impacts

I_{EAS} = the ex ante sample energy and demand impacts

Precision Calculations

To calculate relative precision, the team first determined the variance in the sample and then calculated the standard error and confidence interval. We used Equation 10 through Equation 13 to support these calculations.

Equation 10. Stratified Ratio Estimator

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

Equation 11. Standard Error

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

Equation 12. Confidence Interval

$$90\%\ Confidence\ Interval = \ 1.645 * Standard\ Error$$

Equation 13. Relative Precision

$$Relative\ Precision = \frac{90\%\ Confidence\ Interval}{Stratified\ Ratio\ Estimator}$$

where:

w = case weights for each stratum h (Nh/nh)

y = verified savings

x = ex ante savings

e = yi – b xi

$\hat{X} = \ w_i\ x_i$

MEASURE LIVES AND CUMULATIVE PERSISTING ANNUAL SAVINGS

In accordance with methods presented and discussed in the IL-TRM V11.0 Attachment B,[40] the evaluation team reviewed the ex ante measure life assumptions provided by the implementation team for sampled New Construction Lighting channel projects in 2023. The evaluation team agreed with the measure lives assigned by the implementation team..

NET IMPACT METHODOLOGY

The evaluation team applied SAG-approved 2023 NTGRs to verified gross savings to calculate verified net savings. Table 88 outlines the SAG-approved NTGR values applied to verified gross savings to calculate verified net savings.

Table 88. SAG-Approved Custom Initiative NTGRs

Channel	Electric NTGR	Gas NTGR
Custom Incentives	0.786	0.800
New Construction Lighting	0.786	N/A

RETRO-COMMISSIONING INITIATIVE

GROSS IMPACT METHODOLOGY – VIRTUAL COMMISSIONING CHANNEL

The evaluation team evaluated gross savings resulting from VCx channel activities in 2023 by replicating and verifying Power TakeOff's facility-level modeling approach. Our approach, which leans heavily on the IPMVP Option C guidelines, was focused on verification of Power TakeOff's methods. We were able to take this approach because Power TakeOff agreed to adopt the evaluation team's methodological recommendations from the 2021 AIC Virtual Commissioning impact evaluation, which enabled both Power TakeOff and the evaluation team to come to agreement on a common methodology to estimate savings for 2022 and beyond. In 2023, after replicating Power TakeOff's models, the evaluation team ultimately modified the facility-level models for 21 projects due to the exclusion of weather interaction terms and/or the inclusion of insignificant time and main effect interactions in Power TakeOff's approach. This decision is explained in more detail in the sections that follow.

As part of the verification process, the evaluation team assessed Power TakeOff's data cleaning and processing methods; their model specifications and model evaluation process; and their process for calculating electric savings. In addition to verifying the savings associated with VCx, the evaluation team independently verified whether the individual project modeling results met the channel's guidelines with respect to model fitness criteria. All projects that Power TakeOff claimed as part of the 2023 VCx channel met model robustness criteria.

DATA REVIEW AND CLEANING

The evaluation team compared the raw and processed AMI data provided by Power TakeOff for a subset of projects to independently verify the data cleaning process that Power TakeOff used to estimate their models. The evaluation team utilized Power TakeOff's processed data for modeling and reviewed this data for completeness.

[40] Illinois Statewide Technical Reference Manual V11.0 – Attachment B: Effective Useful Life for Custom Measure Guidelines.

MODELING APPROACH

The evaluation team verified the electric savings results Power TakeOff claimed for VCx by validating their site-level model specifications and replicating Power TakeOff's results. To calculate annualized savings, we first developed regression-based baseline energy usage models. We then used these baseline models, together with Typical Meteorological Year Version 3 (TMY3) data, to estimate normalized gross annual savings.

We developed the baseline model by fitting a regression model to pre- and post-intervention data. Power TakeOff selected either an hourly or a daily regression model, depending on the project. Hourly models were estimated for 26 facilities and daily models were estimated for five facilities. Model specifications also differed depending on whether there was a non-routine event (NRE).

Power TakeOff did not include any weather interactions in their 2023 ex ante models. The evaluation team added weather interactions to the model specifications of 21 projects that had: i) weather-sensitive interventions (i.e., HVAC set point or scheduling adjustments), ii) at least nine months of post-period data, and iii) the combined effect of the interacted terms was statistically significant. In addition to the weather interactions, for two of the above-mentioned projects, the evaluation team decided to remove the main effect and time interactions because these terms were insignificant in the models. All other model specifications were kept the same.

Power TakeOff enrolls sites on a rolling basis throughout the program year. As a result, not all sites had a full year of post-period data available. This introduces greater uncertainty since the post-intervention data used to estimate the models do not have the full range of temperatures experienced at the project site during the year.

TIME-BASED REGRESSION MODEL

Equation 14 through Equation 17 below describe the four model specifications utilized in our evaluation.

Equation 14. Regression Model Considering Time Interactions

$$E(i) = \sum_{j=1}^{k} \beta_j Time(i) + \alpha_j Change(i) + H(i) + C(i) + \left(\sum_{j=1}^{k} \beta_j Time(i) * \alpha_j Change(i) \right)$$

Equation 15. Regression Model Considering Time and Weather Interactions

$$E(i) = \sum_{j=1}^{k} \beta_j Time(i) + \alpha_j Change(i) + H(i) + C(i) + \left(\sum_{j=1}^{k} \beta_j Time(i) * \alpha_j (Change(i) \right) + \Big(\big(H(i) + C(i) \big) * \alpha_j Change(i) \Big)$$

Equation 16. Regression Model Considering Time, Weather, and NRE Interactions

$$E(i) = \sum_{j=1}^{k} \beta_j Time(i) + \alpha_j Change(i) + H(i) + C(i) + NRE(i) + \left(\sum_{j=1}^{k} \beta_j Time(i) * \alpha_j Change(i) \right) + \left(\sum_{j=1}^{k} \beta_j Time(i) * NRE(i) \right) + \Big(\big(H(i) + C(i) \big) * \alpha_j Change(i) \Big)$$

Equation 17. Regression Model Considering Weather Interactions and no Time Interactions

$$E(i) = \sum_{j=1}^{k} \beta_j Time(i) + \alpha_j Change(i) + H(i) + C(i) + \Big(\big(H(i) + C(i)\big) * \alpha_j Change(i) \Big)$$

Across these four specifications, two time-based models were run.

Where daily consumption data were present, the time used in j was the day of the week, k represents 1 through 7 for the days in a week. $H(i)$ represents the heating component while $C(i)$ reflects the cooling component. $H(i)$ is defined as:

$$H(i) = h_1 T_1(i) + h_2 T_2(i) + h_3 T_3(i) + h_4 T_4(i)$$

Where:

$$T_1(i) = \sum_{i=1}^{24} \min(\max(55 - Temp(i), 0), 10)$$

$$T_2(i) = \sum_{i=1}^{24} \min(\max(45 - Temp(i), 0), 10)$$

$$T_3(i) = \sum_{i=1}^{24} \min(\max(35 - Temp(i), 0), 15)$$

$$T_4(i) = \sum_{i=1}^{24} \max(20 - Temp(i), 0)$$

$Temp(i)$ is temperature in degrees Fahrenheit for hour i.

$C(i)$ is defined as:

$$\mathrm{C}(i) = c_1 P_1(i) + c_2 P_2(i) + c_3 P_3(i) + c_4 P_4(i)$$

Where

$$P_1(i) = \sum_{i=1}^{24} \min(\max(Temp(i) - 55, 0), 10)$$

$$P_2(i) = \sum_{i=1}^{24} \min(\max(Temp(i) - 65, 0), 10)$$

$$P_3(i) = \sum_{i=1}^{24} \min(\max(Temp(i) - 75, 0), 15)$$

$$P_4(i) = \sum_{i=1}^{24} \max(Temp(i) - 90, 0)$$

Where hourly data were present, the time period j used was the hour of the week and k represents the hours in a week (1 of 168). $H(i)$ represents the heating component while $C(i)$ reflects the cooling component. $H(i)$ is defined as:

$$H(i) = h_1 T_1(i) + h_2 T_2(i) + h_3 T_3(i) + h_4 T_4(i)$$

Where:

$$T_1(i) = \min(\max(55 - Temp(i), 0), 10)$$
$$T_2(i) = \min(\max(45 - Temp(i), 0), 10)$$
$$T_3(i) = \min(\max(35 - Temp(i), 0), 15)$$
$$T_4(i) = \max(20 - Temp(i), 0)$$

$Temp(i)$ is temperature in degrees Fahrenheit for hour i.

$C(i)$ is defined as:

$$\mathrm{C}(i) = c_1 P_1(i) + c_2 P_2(i) + c_3 P_3(i) + c_4 P_4(i)$$

Where

$$P_1(i) = \min(\max(Temp(i) - 55, 0), 10)$$
$$P_2(i) = \min(\max(Temp(i) - 65, 0), 10)$$
$$P_3(i) = \min(\max(Temp(i) - 75, 0), 15)$$
$$P_4(i) = \max(Temp(i) - 90, 0)$$

$Time(i)$ is an indicator variable set to one if i is the j^{th} hour of the week or day of the week and zero otherwise.

$Change(i)$ is the treatment variable, set to one if hour i occurs during the reporting period and zero otherwise.

$NRE(i)$ is a flag for all nonroutine event periods. There can be multiple NRE periods per model; each NRE is treated as separate and will add a new set of NRE terms and interactions if applicable.

NORMALIZED GROSS ANNUAL SAVINGS

To verify gross annual savings resulting from the VCx channel, the evaluation team first estimated the hourly model for 26 facilities and daily model for five facilities using actual weather data. Next, we calculated annual predicted baseline and reporting period electricity consumption for each facility using estimated regression coefficients and TMY3 weather data. Finally, we computed the annual savings by calculating the difference between the annual predicted baseline and reporting period electricity consumption.

For each facility for which Power TakeOff estimated the hourly regression model specified in Equation 14 through Equation 17, the evaluation team calculated hourly predicted baseline period electricity consumption based on Equation 18 defined below. Equation 18 contains the maximum terms that would be used to calculate the baseline. Models corresponding to facilities that do not have an NRE (Equation 14, Equation 15, and Equation 17) did not include the NRE terms. The following equations show how we calculated the gross annual savings in detail.

Equation 18. Hourly Predicted Baseline Period Electricity Consumption

$$E_B(i) = \sum_{j=1}^{7\times24} \hat{\beta}_j HOW_j(i) + \hat{H}(i) + \hat{C}(i) + NRA(i) + \left(\sum_{j=1}^{7\times24} \beta_j HOW_j(i) * NRA(i) \right) + \left(\left(\hat{H}(i) + \hat{C}(i) \right) * \mathrm{NRE}(i) \right)$$

In Equation 18, $E_B(i)$ is predicted baseline period electricity consumption for hour i. $\hat{\beta}_j$ is the estimated coefficient on the j^{th} hour/day of the week indicator variable as defined in Equation 14 through Equation 17, $\hat{H}(i)$ and $\hat{C}(i)$ specified below are estimated heating and cooling components evaluated using TMY3 weather data and regression coefficients.

$$\hat{H}(i) = \hat{h}_1 T_1(i) + \hat{h}_2 T_2(i) + \hat{h}_3 T_3(i) + \hat{h}_4 T_4(i)$$
$$\hat{C}(i) = \hat{c}_1 P_1(i) + \hat{c}_2 P_2(i) + \hat{c}_3 P_3(i) + \hat{c}_4 P_4(i)$$

We calculated hourly reporting period electricity consumption based on Equation 19 defined below. Equation 19 contains the maximum terms that would be used to calculate the reporting period. Models that do not interact the *Change* variable with weather (Equation 14) will not include that interaction. Models that do not interact the hour of the week (*HOW)* variable with the Change variable (Equation 17) will not include that interaction.

Equation 19. Hourly Predicted Reporting Period Electricity Consumption

$$E_R(i) = \sum_{j=1}^{7\times 24} \hat{\beta}_j HOW_j(i) + \hat{H}(i) + \hat{C}(i) + \alpha_j Change(i) + \left(\sum_{j=1}^{7\times 24} \beta_j HOW_j(i) * \alpha_j (Change(i) \right) + \left(\left(\hat{H}(i) + \hat{C}(i) \right) * \alpha_j Change(i) \right)$$

In Equation 19, $E_R(i)$ is predicted reporting period electricity consumption for hour i. $\hat{\alpha}_j$ is the estimated coefficient on the interaction term between the treatment variable and the j^{th} hour of the week indicator variable as defined for the hourly model versions of Equation 14 through Equation 17.

Annual savings were calculated as:

$$\sum_{i \in TMY} E_B(i) - \sum_{i \in TMY} E_R(i)$$

Where each sum was over all the hours in the TMY.

Similarly, for each facility for which Power TakeOff estimated the daily regression model specified in Equation 14 through Equation 17, the evaluation team calculated daily predicted baseline and reporting period electricity consumption based on Equation 20 and Equation 21 defined below. We calculated annual savings using the formula defined above, but the sum included all the days in the TMY. Equation 20 below contains the maximum terms that would be used to calculate the daily baseline. Models that do not include an NRE (Equation 14, Equation 15 and Equation 17) will not include NRE terms. Equation 21 below contains the maximum terms that would be used to calculate the reporting period. Models that do not interact the *Change* variable with weather (Equation 14) will not include that interaction. Models that do not interact the day of week (*W)* variable with the *Change* variable (Equation 17) will not include that interaction.

Equation 20. Daily Predicted Baseline Period Electricity Consumption

$$E_B(i) = \sum_{j=1}^{7} \hat{\beta}_j W_j(i) + \hat{H}(i) + \hat{C}(i) + NRE(i) + \left(\sum_{j=1}^{7} \beta_j W_j(i) * NRE(i) \right) + \left(\left(\hat{H}(i) + \hat{C}(i) \right) * \mathrm{NRE}(i) \right)$$

Equation 21. Daily Predicted Reporting Period Electricity Consumption

$$E_R(i) = \sum_{j=1}^{7} \hat{\beta}_j W_j(i) + \hat{H}(i) + \hat{C}(i) + \alpha_j Change(i) + \left(\sum_{j=1}^{7} \beta_j W_j(i) * \alpha_j (Change(i) \right) + \left(\left(\hat{H}(i) + \hat{C}(i) \right) * \alpha_j Change(i) \right)$$

As before, annual savings were calculated as:

$$\sum_{i \in TMY} E_B(i) - \sum_{i \in TMY} E_R(i)$$

Where each sum was over all the hours in the TMY.

NON-ROUTINE EVENTS

Power TakeOff identified one type of NRE that occurred at participating sites in 2023, a summer break school closure. Both teams handled these NREs in accordance with the IPMVP NRE guidelines[41] by dropping data for the affected period and extending the baseline back in time accordingly.

MODEL FITNESS CRITERIA

To claim project savings as part of the channel, the model for each project must meet the following goodness-of-fit criteria:

- Absolute Value of Normalized Mean Bias Error (NMBE) < 0.5%
- Coefficient of Variation of Root Mean Square Error CV(RMSE) < 25%
- Savings Uncertainty < 50% at 68% confidence

These goodness-of-fit metrics were calculated consistent with industry best practices.[42] All of the projects met the savings uncertainty criteria.

DETAILED PROJECT SAVINGS

Table 89 presents the results of the gross savings analysis (unadjusted for cross-participation) for the 31 VCx projects completed in 2023. Realization rates for individual projects range from 78% to 134% for electric energy savings. All projects met model uncertainty thresholds in 2023.

Table 89. 2023 Virtual Commissioning Annual Savings by Project

Project ID	Ex Ante Gross kWh	Verified Gross kWh	Gross Realization Rate
a1C1Q00000RJG9MUAX*	122,068	163,397	134%
a1C1Q00000RJG9AUAX**	32,719	40,065	122%
a1CHp00000RaVVJMA3*	41,226	47,324	115%
a1C1Q00000QsgYQUAZ*	26,098	28,091	108%

[41] Webster, Lia. (2020). IPMVP Application Guide on Non-Routine Events and Adjustments. Energy Valuation Organization (EVO).
[42] Uncertainty Assessment for IPMVP. Efficiency Valuation Organization (EVO). 2019.

Project ID	Ex Ante Gross kWh	Verified Gross kWh	Gross Realization Rate
a1CHp00000RaVV8MAN*	18,116	19,477	108%
a1CHp00000Rl25hMAB**	25,528	26,803	105%
a1C1Q00000Qw8JYUAZ*	34,064	34,587	102%
a1C1Q00000RJG8hUAH	175,440	177,498	101%
a1CHp00000Rv0diMAB	44,604	44,605	100%
a1CHp00000SFe6oMAD	23,489	23,489	100%
a1CHp00000Rv0dyMAB	47,409	47,409	100%
a1CHp00000SFe6bMAD	312,788	312,788	100%
a1CHp00000RaVV4MAN	87,707	87,706	100%
a1C1Q00000Qw8JhUAJ	20,942	20,942	100%
a1C1Q00000R4WacUAF	13,900	13,900	100%
a1CHp00000SFe7bMAD	9,589	9,588	100%
a1C1Q00000RJG8cUAH*	59,623	59,300	99%
a1C1Q00000R4WabUAF*	21,212	21,089	99%
a1CHp00000Rv0d5MAB	9,246	9,140	99%
a1CHp00000RaVVWMA3*	124,486	122,950	99%
a1C1Q00000RJG8aUAH*	226,748	222,345	98%
a1C1Q00000RJG8sUAH*	2,042,663	1,973,156	97%
a1C1Q00000Qw8JkUAJ*	315,967	304,843	96%
a1C1Q00000R4WZpUAN*	228,714	219,905	96%
a1CHp00000RaVV2MAN*	79,123	75,910	96%
a1C1Q00000R4Wa4UAF*	98,690	93,575	95%
a1CHp00000Rl25FMAR*	42,745	40,273	94%
a1CHp00000RaVVmMAN*	20,897	19,129	92%
a1CHp00000RaVVKMA3*	937,950	847,806	90%
a1CHp00000RaVVdMAN*	41,350	35,591	86%
a1C1Q00000RJG8bUAH*	312,321	242,804	78%
Total	**5,597,422**	**5,385,485**	**96%**

*Evaluation team model included weather interactions.

**Evaluation team model included weather interactions and removed time and main effect interactions.

Table 90 shows the model goodness-of-fit metrics that Power TakeOff and the evaluation team produced for the 31 VCx projects.

Table 90. 2023 Virtual Commissioning Model Goodness-of-Fit Metrics by Project

Project ID	Adjusted R^2		CV(RMSE)		NMBE		Savings Uncertainty	
	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff
a1C1Q00000RJG9MUAX*	0.84	0.84	23.88%	23.93%	0.00%	0.00%	12.09%	4.97%
a1C1Q00000RJG9AUAX**	0.67	0.66	19.09%	19.50%	0.00%	0.00%	26.61%	34.88%
a1CHp00000RaVVJMA3*	0.71	0.71	13.65%	13.76%	0.00%	0.00%	3.03%	8.21%
a1C1Q00000QsgYQUAZ*	0.85	0.85	20.96%	21.36%	0.00%	0.00%	2.67%	6.28%
a1CHp00000RaVV8MAN*	0.70	0.69	20.99%	21.28%	0.00%	0.00%	6.90%	4.66%

Project ID	Adjusted R^2		CV(RMSE)		NMBE		Savings Uncertainty	
	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff
a1CHp00000RI25hMAB**	0.84	0.83	19.64%	19.74%	0.00%	0.00%	5.39%	6.33%
a1C1Q00000Qw8JYUAZ*	0.72	0.72	22.09%	22.29%	0.00%	0.00%	3.57%	12.88%
a1C1Q00000RJG8hUAH	0.79	0.78	22.37%	23.01%	0.00%	0.00%	4.40%	11.96%
a1CHp00000Rv0diMAB	0.44	0.44	24.59%	24.59%	0.00%	0.00%	3.29%	6.72%
a1CHp00000SFe6oMAD	0.81	0.81	13.06%	13.06%	0.00%	0.00%	7.74%	11.09%
a1CHp00000Rv0dyMAB	0.91	0.91	20.60%	20.60%	0.00%	0.00%	3.76%	6.18%
a1CHp00000SFe6bMAD	0.90	0.90	10.95%	10.95%	0.00%	0.00%	2.40%	4.72%
a1CHp00000RaVV4MAN	0.82	0.82	20.83%	20.83%	0.00%	0.00%	1.91%	3.86%
a1C1Q00000Qw8JhUAJ	0.93	0.93	9.05%	9.05%	0.00%	0.00%	3.60%	6.02%
a1C1Q00000R4WacUAF	0.88	0.88	20.42%	20.42%	0.00%	0.00%	9.01%	21.79%
a1CHp00000SFe7bMAD	0.89	0.89	15.57%	15.57%	0.00%	0.00%	1.93%	12.61%
a1C1Q00000RJG8cUAH*	0.79	0.77	14.69%	15.30%	0.00%	0.00%	26.39%	26.23%
a1C1Q00000R4WabUAF*	0.92	0.92	13.69%	14.06%	0.00%	0.00%	25.16%	26.56%
a1CHp00000Rv0d5MAB	0.83	0.83	16.33%	16.46%	0.00%	0.00%	9.45%	10.65%
a1CHp00000RaVVWMA3*	0.78	0.78	9.90%	9.95%	0.00%	0.00%	1.24%	2.06%
a1C1Q00000RJG8aUAH*	0.87	0.86	17.94%	18.48%	0.00%	0.00%	4.34%	1.09%
a1C1Q00000RJG8sUAH*	0.83	0.83	15.47%	15.57%	0.00%	0.00%	5.04%	9.07%
a1C1Q00000Qw8JkUAJ*	0.78	0.77	23.55%	23.99%	0.00%	0.00%	3.61%	4.87%
a1C1Q00000R4WZpUAN*	0.68	0.67	21.68%	22.05%	0.00%	0.00%	5.01%	2.45%
a1CHp00000RaVV2MAN*	0.87	0.86	14.49%	15.49%	0.00%	0.00%	1.48%	2.19%
a1C1Q00000R4Wa4UAF*	0.77	0.77	17.72%	17.86%	0.00%	0.00%	2.31%	11.74%
a1CHp00000RI25FMAR*	0.85	0.84	15.98%	16.54%	0.00%	0.00%	2.83%	5.10%
a1CHp00000RaVVmMAN*	0.73	0.73	21.49%	21.53%	0.00%	0.00%	5.62%	11.26%
a1CHp00000RaVVKMA3*	0.87	0.86	18.87%	19.19%	0.00%	0.00%	2.02%	1.17%
a1CHp00000RaVVdMAN*	0.91	0.91	13.88%	14.23%	0.00%	0.00%	2.47%	4.84%
a1C1Q00000RJG8bUAH*	0.80	0.77	20.88%	22.36%	0.00%	0.00%	5.68%	1.48%

*Evaluation team model included weather interactions.

**Evaluation team model included weather interactions and removed time and main effect interactions.

UPLIFT FROM OTHER AIC INITIATIVES

The savings analysis for the VCx channel considers energy savings that resulted from energy-efficient actions taken through other AIC Business Program initiatives. The evaluation team identified five VCx participants that completed projects through other AIC Business Program initiatives after they participated in the VCx offering in 2023. In all of these instances, the evaluation team accounted for cross-program participation by subtracting verified gross savings for each project completed through another AIC initiative from the verified gross electric savings from the VCx channel at the corresponding site. Table 91 summarizes the projects completed through other AIC Initiatives and the associated verified gross electric energy savings.

Table 91. Summary of Projects Completed through Other AIC Initiatives

Project ID	Source of Cross-Program Participation	Verified Gross Savings (kWh)	Verified Gross Savings from Cross-Program Participation (kWh)	Verified Gross Savings Adjusted for Cross-Program Participation (kWh)
a1C1Q00000Qw8JkUAJ	Midstream Lighting	304,843	97,147	207,696
a1C1Q00000R4Wa4UAF	Midstream Lighting	93,575	5,014	88,561
a1C1Q00000RJG8hUAH	Midstream Lighting	177,498	9,098	168,400
a1CHp00000RaVVdMAN	Midstream Lighting	35,591	21,835	13,757
a1CHp00000Rv0diMAB	Midstream Lighting	44,605	5,067	39,537

MEASURE LIVES AND CUMULATIVE PERSISTING ANNUAL SAVINGS

The evaluation team applied an EUL of 7.3 for VCx based on guidance in Attachment B of IL-TRM V11.0, Volume 4.[43]

GROSS IMPACT METHODOLOGY – VIRTUAL STRATEGIC ENERGY MANAGEMENT CHANNEL

The evaluation team evaluated gross savings resulting from Virtual SEM in 2023 by replicating and verifying Power TakeOff's facility-level modeling approach. Our approach, which leans heavily on the IPMVP Option C guidelines, was focused on verification of Power TakeOff's methods. In 2023, after replicating Power TakeOff's model, the evaluation team ultimately modified the facility-level model due to the exclusion of weather interaction terms and the inclusion of insignificant time and main effect interactions in Power TakeOff's approach. This decision is explained in more detail in the sections that follow.

As part of the verification process, the evaluation team assessed Power TakeOff's data cleaning and processing methods; their model specification and model evaluation process; and their process for calculating electric savings. In addition to verifying the savings associated with Virtual SEM, the evaluation team independently verified whether the individual project modeling results met the channel's guidelines with respect to model robustness. The project that Power TakeOff claimed as part of the 2023 Virtual SEM channel met model robustness criteria.

DATA REVIEW AND CLEANING

Opinion Dynamics compared the raw and processed AMI data provided by Power TakeOff for the individual project to independently verify the data cleaning process that Power TakeOff used to estimate their model. The evaluation team utilized Power TakeOff's processed data for modeling and reviewed this data for completeness.

MODELING APPROACH

The evaluation team verified the electric savings results Power TakeOff claimed for Virtual SEM by validating their site-level model specification and replicating Power TakeOff's results. To calculate annualized savings, we first developed a regression-based baseline energy usage model. We then used the baseline model, together with Typical Meteorological Year Version 3 (TMY3) data, to estimate normalized gross annual savings.

Following Power TakeOff's process, we developed the baseline model by fitting a regression model to pre- and post-intervention data. Power TakeOff selected a daily regression model and there were no NREs.

[43] https://www.ilsag.info/wp-content/uploads/IL-TRM_Effective_010123_v11.0_Vol_4_X-Cutting_Measures_and_Attach_09222022_FINAL.pdf .

The evaluation team decided to add weather interactions to the model specification since the project had a weather-sensitive interventions (e.g., HVAC set point or scheduling adjustments), at least nine months of post-period data, and the combined effect of the interacted terms was statistically significant. In addition to the weather interactions, the evaluation team decided to remove the main effect and time interactions for the Lighting intervention because these terms were all insignificant in the model. The main effect and time interactions for the HVAC intervention were not removed.

TIME-BASED REGRESSION MODEL

Equation 22 below describes the model specification utilized in our evaluation.

Equation 22. Regression Model Considering Weather Interactions and Time Interactions

$$E(i) = \sum_{j=1}^{k} \beta_j Time(i) + \alpha_j Change(i) + H(i) + C(i) + \Big(\big(H(i) + C(i)\big) * \alpha_j Change(i)\Big) + \left(\sum_{j=1}^{k} \beta_j Time(i) * \alpha_j Change(i)\right)$$

Since daily consumption data was present, the time used in *j* was the day of the week, *k* represents 1 through 7 for the days in a week. $H(i)$ represents the heating component while $C(i)$ reflects the cooling component. $H(i)$ is defined as:

$$H(i) = h_1 T_1(i) + h_2 T_2(i) + h_3 T_3(i) + h_4 T_4(i)$$

Where:

$$T_1(i) = \sum_{i=1}^{24} \min(\max(55 - Temp(i), 0), 10)$$

$$T_2(i) = \sum_{i=1}^{24} \min(\max(45 - Temp(i), 0), 10)$$

$$T_3(i) = \sum_{i=1}^{24} \min(\max(35 - Temp(i), 0), 15)$$

$$T_4(i) = \sum_{i=1}^{24} \max(20 - Temp(i), 0)$$

$Temp(i)$ is temperature in degrees Fahrenheit for hour i.

$C(i)$ is defined as:

$$C(i) = c_1 P_1(i) + c_2 P_2(i) + c_3 P_3(i) + c_4 P_4(i)$$

Where

$$P_1(i) = \sum_{i=1}^{24} \min(\max(Temp(i) - 55, 0), 10)$$

$$P_2(i) = \sum_{i=1}^{24} \min(\max(Temp(i) - 65, 0), 10)$$

$$P_3(i) = \sum_{i=1}^{24} \min(\max(Temp(i) - 75, 0), 15)$$

$$P_4(i) = \sum_{i=1}^{24} \max(Temp(i) - 90, 0)$$

$Time(i)$ is an indicator variable set to one if i is the j^{th} day of the week and zero otherwise.

$Change(i)$ is the treatment variable, set to one if day i occurs during the reporting period and zero otherwise.

NORMALIZED GROSS ANNUAL SAVINGS

To verify gross annual savings resulting from the Virtual SEM channel, the evaluation team first estimated the daily model for the individual facility using actual weather data. Next, we calculated the annual predicted baseline and reporting period electricity consumption for the facility using estimated regression coefficients and TMY3 weather data. Finally, we computed the annual savings by calculating the difference between the annual predicted baseline and reporting period electricity consumption.

For the individual facility for which Power TakeOff estimated the daily regression model specified in Equation 22, the evaluation team calculated daily predicted baseline and reporting period electricity consumption based on Equation 23 and Equation 24 defined below. We calculated annual savings using the formula defined above, but the sum included all the days in the TMY. The following equations show how we calculated the gross annual savings in detail.

Equation 23. Daily Predicted Baseline Period Electricity Consumption

$$E_B(i) = \sum_{j=1}^{7} \hat{\beta}_j W_j(i) + \hat{H}(i) + \hat{C}(i)$$

Equation 24. Daily Predicted Reporting Period Electricity Consumption

$$E_R(i) = \sum_{j=1}^{7} \hat{\beta}_j W_j(i) + \hat{H}(i) + \hat{C}(i) + \alpha_j Change(i) + \left(\sum_{j=1}^{7} \beta_j W_j(i) * \alpha_j (Change(i) \right) + \left(\left(\hat{H}(i) + \hat{C}(i) \right) * \alpha_j Change(i) \right)$$

Annual savings were calculated as:

$$\sum_{i \in TMY} E_B(i) - \sum_{i \in TMY} E_R(i)$$

Where each sum was over all the hours in the TMY.

NON-ROUTINE EVENTS

Power TakeOff did not identify any NREs that occurred at the participating site in 2023.

MODEL FITNESS CRITERIA

To claim project savings as part of the channel, the model for the project needed to meet the following goodness-of-fit criteria:

- Absolute Value of Normalized Mean Bias Error (NMBE) < 0.5%
- Coefficient of Variation of Root Mean Square Error CV(RMSE) < 25%
- Savings Uncertainty < 50% at 68% confidence

These goodness-of-fit metrics were calculated consistent with industry best practices.[44] The project met the savings uncertainty criteria.

DETAILED PROJECT SAVINGS

Table 92 presents the results of the gross savings analysis for the one Virtual SEM project completed in 2023. The realization rate was 87% for electric energy savings. The project met model uncertainty thresholds in 2023.

Table 92. 2023 Virtual SEM Annual Savings by Project

Project ID	Ex Ante Gross kWh	Verified Gross kWh	Gross Realization Rate
a1CHp00000RoyMIMAJ**	43,812	37,981	87%

Note: **Evaluation team model included weather interactions and removed time and main effect interactions.

Table 93 shows the model goodness-of-fit metrics that Power TakeOff and the evaluation team produced for the one Virtual SEM project.

Table 93. 2023 Virtual SEM Model Goodness-of-Fit Metrics by Project

Project ID	Adjusted R^2		CV(RMSE)		NMBE		Savings Uncertainty	
	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff
a1CHp00000RoyMIMAJ**	0.51	0.49	21.40%	21.77%	0.00%	0.00%	25.43%	17.51%

Note: **Evaluation team's model included weather interactions and removed time and main effect interactions.

UPLIFT FROM OTHER AIC INITIATIVES

The savings analysis for the Virtual SEM channel considers energy savings that resulted from energy-efficient actions taken through other AIC Business Program initiatives. However, the Virtual SEM participant did not complete any projects through other AIC Business Program initiatives after they began participating in the Virtual SEM offering in 2023.

[44] Uncertainty Assessment for IPMVP. Efficiency Valuation Organization (EVO). 2019.

MEASURE LIVES AND CUMULATIVE PERSISTING ANNUAL SAVINGS

The evaluation team applied an EUL of 7.0 for Virtual SEM based on guidance in Attachment B of IL-TRM V11.0, Volume 4.[45]

NET IMPACT METHODOLOGY

The evaluation team applied SAG-approved 2023 NTGRs to the verified gross savings estimated for each channel to calculate verified net savings. Table 94 outlines the SAG-approved NTGR values applied to the verified gross savings for Virtual Commissioning and Virtual SEM.

Table 94. SAG-Approved Virtual Commissioning and Virtual SEM NTGRs

Column	Electric NTGR
Virtual Commissioning	0.930
Virtual SEM	1.000

STREETLIGHTING INITIATIVE

GROSS IMPACT METHODOLOGY

The evaluation team calculated verified savings for the Streetlighting Initiative by applying savings algorithms from the IL-TRM V11.0. The team leveraged information from the initiative tracking data such as fixture quantity, baseline fixture wattage and type, and LED wattage to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V11.0. Table 95 lists the measures in the Streetlighting Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2023 evaluation.

Table 95. Streetlighting Initiative Evaluated Measures

IL-TRM Measure Name	IL-TRM Measure Code	Errata Applied?
LED Streetlighting	4.5.16	No errata present for this measure

MEASURE LIVES AND CUMULATIVE PERSISTING ANNUAL SAVINGS

We applied EULs and baseline adjustments per IL-TRM V11.0 to determine CPAS for this evaluation. The IL-TRM indicates EULs of 20 years for an LED streetlight under standard operation and 10 years for an LED streetlight under continuous operation.[46]

In cases where LED streetlights replaced existing, functional MV fixtures, a baseline adjustment is made after the remaining useful life (RUL) of the MV fixture expires. The RUL for MV streetlights is assumed to be three years under standard operation per IL-TRM V11.0.

[45] https://www.ilsag.info/wp-content/uploads/IL-TRM_Effective_010123_v11.0_Vol_4_X-Cutting_Measures_and_Attach_09222022_FINAL.pdf
[46] All evaluated streetlights in 2023 were determined to be under standard operation.

NET IMPACT METHODOLOGY

The evaluation team applied SAG-approved 2023 NTGRs to the verified gross savings to calculate verified net savings.

Table 96. 2023 SAG-Approved Streetlighting Initiative NTGRs

Channel	Electric NTGR	Gas NTGR
MOSL	0.690	N/A
UOSL	1.000	N/A

SMALL BUSINESS INITIATIVE

GROSS IMPACT METHODOLOGY

The evaluation team calculated verified savings for the Small Business Initiative by applying savings algorithms from the IL-TRM V11.0. The team leveraged information from the initiative tracking data such primary heating and cooling type, LED wattage, LED lamp type, project location (e.g., for weather-dependent variables), building type, etc., to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V11.0. Table 97 lists the measures in the Small Business Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2023 evaluation.

Table 97. Small Business Initiative Evaluated Measures

IL-TRM Measure Name	IL-TRM Measure Code	Errata Applied?
LED Bulbs and Fixtures	4.5.4	Errata applied
Lighting Controls	4.5.10	No errata present for this measure
ECMs for Coolers/Freezers	4.6.4	No errata present for this measure
Fluorescent Delamping	4.5.2	No errata present for this measure
Door Heater Controls	4.6.3	No errata present for this measure
Exit Signs	4.5.5	No errata present for this measure
Evaporator Fan Control for ECMs	4.6.6	No errata present for this measure
Automatic Door Closer	4.6.1	No errata present for this measure
Commercial Air Sealing	4.8.27	Errata applied
Covers and Gap Sealers for Room AC	4.4.38	No errata present for this measure
Room Air Conditioners	4.4.7	No errata present for this measure

MEASURE LIVES AND CUMULATIVE PERSISTING ANNUAL SAVINGS

For prescriptive measures, the evaluation team applied measure lives and mid-life adjustments from the IL-TRM V11.0.

NET IMPACT METHODOLOGY

The evaluation team applied SAG-approved 2023 NTGRs to the verified gross savings to calculate verified net savings.

Table 98. 2023 SAG-Approved Small Business Initiative NTGRs

Channel	Measure	Electric NTGR	Gas NTGR
SBDI	All measures	0.891	0.891
SBEP	All measures	0.891	0.891

MIDSTREAM INITIATIVE

GROSS IMPACT METHODOLOGY

The evaluation team calculated verified savings for the Midstream Initiative by applying savings algorithms from the IL-TRM V11.0. The team leveraged information from the initiative tracking data such equipment capacity and efficiency, LED wattage, LED lamp type, and project location and facility type (e.g., for weather-dependent variables) to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V11.0. Table 99 lists the measures in the Midstream Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2023 evaluation.

Table 99. Midstream Initiative Evaluated Measures

IL-TRM Measure Name	IL-TRM Measure Code	Errata Applied?
Combination Oven	4.2.1	No errata present for this measure
Refrigeration	4.2.2	No errata present for this measure
Steam Cooker	4.2.3	No errata present for this measure
Convection Oven	4.2.5	No errata present for this measure
Dishwasher	4.2.6	No errata present for this measure
Fryer	4.2.7	No errata present for this measure
Griddle	4.2.8	No errata present for this measure
Ice Machine	4.2.10	No errata present for this measure
Broiler	4.2.22	No errata present for this measure
Deck Oven	4.2.23[a]	No errata present for this measure
Water Heater	4.3.1	No errata present for this measure
Air and Water Source Heat Pump Systems	4.4.9	No errata present for this measure
Single-Package and Split System Unitary Air Conditioners	4.4.15	No errata present for this measure
Notched V Belts for HVAC Systems	4.4.30	No errata present for this measure
Small Commercial Thermostats	4.4.48	No errata present for this measure
LED Bulbs and Fixtures	4.5.4	Errata applied
Commercial LED Exit Signs	4.5.5	No errata present for this measure

[a] The implementation and evaluation teams referenced IL-TRM V12.0 for the 4.2.23 - Electric Deck Oven measure characterization because this measure is not present in IL-TRM V11.0.

MEASURE LIVES AND CUMULATIVE PERSISTING ANNUAL SAVINGS

For prescriptive measures, the evaluation team applied measure lives and mid-life adjustments from the IL-TRM V11.0.

NET IMPACT METHODOLOGY

The evaluation team applied SAG-approved 2023 NTGRs to the verified gross savings to calculate verified net savings.

Table 100. 2023 SAG-Approved Midstream Initiative NTGRs

Channel	Measure	Electric NTGR	Gas NTGR
Midstream Lighting	All measures	0.913	N/A
Midstream HVAC	Advanced thermostats	0.880	0.880
Midstream HVAC	All other measures	0.890	0.890
Midstream Food Service	All measures	0.800	0.800

APPENDIX B. ADDITIONAL IMPACTS

INTRODUCTION

In this appendix, we provide additional quantified impacts from AIC's Business Program that are not presented in the body of the report. Three specific types of additional inputs are provided:

- Summaries of fossil fuel impacts achieved by the Business Program that cannot be directly claimed against AIC's goals but can be used in cost-effectiveness testing and support savings conversions under Illinois law;
- Summaries of gas penalties that are not counted toward goal attainment but are required for cost-effectiveness analysis; and
- Summaries of water savings and secondary electric energy savings from water supply and wastewater treatment that are required for cost-effectiveness analysis.

ADDITIONAL FOSSIL FUEL IMPACTS

Some AIC customers receive natural gas service from other providers or use unregulated fuels such as propane to serve their energy needs. Measures that are provided by AIC to these customers through its existing programs may save units of these fuels in addition to energy sources provided by AIC. While these savings cannot be directly claimed against AIC's energy savings goals, where possible, we quantify these impacts in this appendix to support both cost-effectiveness testing as well as savings conversions under Illinois state law.

The Standard Core, Custom Incentives, and Small Business Energy Performance channels produced quantifiable non-AIC natural gas impacts in 2023.

GAS HEATING PENALTIES

Per the Policy Manual, AIC is not required to account for gas heating penalties resulting from the installation of energy efficiency measures designed to save electricity when considering savings for goal attainment purposes. [47,48] Therefore, we exclude those effects from all savings reported throughout the body of this report. However, these effects must be evaluated and considered as part of cost-effectiveness testing and are therefore presented in this appendix.

In the following sections, the evaluation team focuses specifically on the following gas heating penalties:

- Lighting Heating Penalties. The inclusion of waste heat factors for lighting is based on the concept that heating loads are increased to supplement the reduction in waste heat that was once provided by the existing, less-efficient lamp type. The evaluation team applied the IL-TRM waste heat factors to lamps based on heating fuel types provided in the tracking database to arrive at gross heating penalties. For the cases where tracking data did not provide the heating type, the team assumed natural gas heating, per the IL-TRM.
- Furnace Blower Motor Heating Penalties. High-efficiency fan motors operate at cooler temperatures than traditional furnace blower motors. The amount of heat that is released decreases due to cooler operating

[47] Illinois Energy Efficiency Policy Manual. Section 7.7. https://www.ilsag.info/wp-content/uploads/IL_EE_Policy_Manual_Version_3.0_Final_11-3-2023.pdf

[48] AIC is, however, required to account for *electric* heating penalties resulting from the installation of energy efficiency measures designed to save electricity, and those effects are accounted for throughout this report.

conditions. Heating equipment must make up for this loss of heat during the heating season, resulting in an increase in HVAC heating loads. The team applied IL-TRM algorithms to calculate the associated heating penalty.

- Heat Pump Water Heater Heating Penalties. When HPWHs are installed in conditioned space, they move heat from the ambient air into water stored in a tank. During the heating season, this can result in an increase in HVAC heating loads. The team applied IL-TRM algorithms to calculate the associated heating penalty.

All gas heating penalties were calculated using algorithms from the IL-TRM V11.0 (with applicable errata applied).

SECONDARY ELECTRIC SAVINGS FOR WATER SUPPLY AND WASTEWATER TREATMENT

Some measures delivered through the Business Program produce water savings as well as energy savings. For applicable measures, the IL-TRM V11.0 includes an algorithm to calculate the secondary electric impacts of these water savings resulting from decreased electricity usage for water supply and wastewater treatment. As directly instructed in the IL-TRM, these savings may be included toward goal attainment but must be removed for the purpose of cost-effectiveness calculations. Therefore, we present these savings separately in this appendix to provide transparency on the reduced savings that will be used when conducting testing for cost-effectiveness. All secondary electric savings were calculated using algorithms from the IL-TRM V11.0.

STANDARD INITIATIVE

ADDITIONAL FOSSIL FUEL IMPACTS

Two projects completed through the Standard Core channel produced non-AIC gas savings in 2023. The ex ante gross, verified gross, and verified net therm savings produced through these projects are summarized in Table 101.

Table 101. 2023 Standard Core Channel non-AIC Natural Gas Savings

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
SE	15,366	100%	15,366	0.675	10,372
STRR	19,457	100%	19,456	0.608	11,829
Total	**34,823**	**100%**	**34,823**	**0.638**	**22,202**

In 2023, AIC converted these savings to CPAS for the purposes of goal attainment. Those conversion-related savings are presented separately in Appendix C.

GAS HEATING PENALTIES

Table 102 presents gas penalties not reported in the body of the report for the Standard Initiative.

Table 102. 2023 Standard Initiative Gas Heating Penalties

Channel	Measure	Therms
Standard Core	LED Fixtures and Bulbs	-118,369
	Delamping	-11,729
	Lighting Controls	-28,120

Channel	Measure	Therms
	LED Exit Signs	-121
Online Store	LEDs	-336
	Lighting Controls	-129
Total Gas Penalties		**-158,804**

SECONDARY ELECTRIC SAVINGS FOR WATER SUPPLY AND WASTEWATER TREATMENT

Table 103 presents water savings and secondary electric savings for the Standard Initiative.

Table 103. 2023 Standard Initiative Secondary Electric and Water Savings by Measure

Measure Category	Verified Gross Water Savings (Gallons)	Conversion Factor	Verified Gross Secondary Electric Savings (kWh)
SE	4,376,568	5,010 kWh/million gal[a]	21,927
GNs	2,295,821		11,502
STRR	6,712,024	2,571 kWh/million gal[a]	17,257
Total	**13,384,413**		**50,685**

[a] Source: IL-TRM V11.0.

TOTAL IMPACTS FOR COST-EFFECTIVENESS

Table 104 presents a summary of the 2023 Standard Initiative verified gross impacts adjusted for the above effects.

Table 104. 2023 Standard Initiative Verified Gross Impacts for Cost-Effectiveness

	Electric Energy (kWh)	Gas (Therms)	Non-AIC Gas (Therms)	Water (Gallons)
Verified Gross Impacts for Goal Attainment	32,620,839	2,232,156	N/A	N/A
Gas Penalties	N/A	-158,804	N/A	N/A
Water Savings	N/A	N/A	N/A	13,384,413
Secondary Electric Savings	-50,685	N/A	N/A	N/A
Additional Fossil Fuel Impacts	N/A	N/A	34,823	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**32,570,154**	**2,073,353**	**34,823**	**13,384,413**

Note: All electric demand savings used in cost-effectiveness testing align with those presented in Section 3.

CUSTOM INITIATIVE

ADDITIONAL FOSSIL FUEL IMPACTS

Two projects completed through the Custom Incentives channel of the Custom Initiative produced non-AIC gas savings in 2023. The ex ante gross, verified gross, and verified net therm savings produced through these projects are summarized in Table 105.

Table 105. 2023 Custom Initiative non-AIC Natural Gas Savings

Channel	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Custom Incentives	686,169	98%	671,881	0.800	537,505
Total	**686,169**	**98%**	**671,881**	**0.800**	**537,505**

In 2023, AIC converted these savings to CPAS for the purposes of goal attainment. Those conversion-related savings are presented separately in Appendix C.

GAS HEATING PENALTIES

No measures delivered through the Custom Initiative produced quantifiable gas penalties in 2023.

SECONDARY ELECTRIC SAVINGS FOR WATER SUPPLY AND WASTEWATER TREATMENT

No measures delivered through the Custom Initiative produced quantifiable secondary electric savings in 2023.

TOTAL IMPACTS FOR COST-EFFECTIVENESS

Table 106 presents a summary of the 2023 Custom Initiative verified gross impacts adjusted for the above effects.

Table 106. 2023 Custom Initiative Verified Gross Impacts for Cost-Effectiveness

	Electric Energy (kWh)	Gas (Therms)	Non-AIC Gas (Therms)	Water (Gallons)
Verified Gross Impacts for Goal Attainment	21,505,035	471,737	N/A	N/A
Gas Penalties	N/A	0	N/A	N/A
Water Savings	N/A	N/A	N/A	0
Secondary Electric Savings	0	N/A	N/A	N/A
Additional Fossil Fuel Impacts	N/A	N/A	671,881	N/A
Fuel Switching Project Adjustments	-378,674	12,920	0	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**21,126,361**	**484,658**	**671,881**	**0**

Note: All electric demand savings used in cost-effectiveness testing align with those presented in Section 3.

RETRO-COMMISSIONING INITIATIVE

ADDITIONAL FOSSIL FUEL IMPACTS

The RCx Initiative produced no additional fossil fuel impacts in 2023.

GAS HEATING PENALTIES

No measures delivered through the RCx Initiative produced quantifiable gas penalties in 2023.

SECONDARY ELECTRIC SAVINGS FOR WATER SUPPLY AND WASTEWATER TREATMENT

No measures delivered through the RCx Initiative produced quantifiable secondary electric savings in 2023.

TOTAL IMPACTS FOR COST-EFFECTIVENESS

Table 107 presents a summary of the 2023 RCx Initiative verified gross impacts adjusted for the above effects.

Table 107. 2023 Retro-Commissioning Initiative Verified Gross Impacts for Cost-Effectiveness

	Electric Energy (kWh)	Gas (Therms)	Water (Gallons)
Verified Gross Impacts for Goal Attainment	5,285,306	0	N/A
Gas Penalties	N/A	0	N/A
Water Savings	N/A	N/A	0
Secondary Electric Savings	0	N/A	N/A
Additional Fossil Fuel Impacts	N/A	N/A	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**5,285,306**	**0**	**0**

Note: All electric demand savings used in cost-effectiveness testing align with those presented in Section 3.

STREETLIGHTING INITIATIVE

ADDITIONAL FOSSIL FUEL IMPACTS

The Streetlighting Initiative produced no additional fossil fuel impacts in 2023.

GAS HEATING PENALTIES

Because all measures installed through the Streetlighting Initiative in 2023 are located in unconditioned space, no measures installed through the Initiative produced gas heating penalties.

SECONDARY ELECTRIC SAVINGS FOR WATER SUPPLY AND WASTEWATER TREATMENT

No measures delivered through the Streetlighting Initiative produced secondary electric savings in 2023.

TOTAL IMPACTS FOR COST-EFFECTIVENESS

Table 108 presents a summary of the 2023 Streetlighting Initiative verified gross impacts adjusted for the above effects.

Table 108. 2023 Streetlighting Initiative Verified Gross Impacts for Cost-Effectiveness

	Electric Energy (kWh)	Gas (Therms)	Water (Gallons)
Verified Gross Impacts for Goal Attainment	20,049,765	0	N/A
Gas Penalties	N/A	0	N/A

	Electric Energy (kWh)	Gas (Therms)	Water (Gallons)
Water Savings	N/A	N/A	0
Secondary Electric Savings	0	N/A	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**20,049,765**	**0**	**0**

Note: All electric demand savings used in cost-effectiveness testing align with those presented in Section 3.

SMALL BUSINESS INITIATIVE

ADDITIONAL FOSSIL FUEL IMPACTS

Six projects completed through the SBEP channel produced non-AIC gas savings in 2023. The ex ante gross, verified gross, and verified net therm savings produced through these projects are summarized in Table 109.

Table 109. 2023 Small Business Energy Performance Channel non-AIC Natural Gas Savings

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
C&I Air Sealing	2,979	98%	2,934	0.891	2,614
Total	**2,979**	**98%**	**2,934**	**0.891**	**2,614**

In 2023, AIC converted these savings to CPAS for the purposes of goal attainment. Those conversion-related savings are presented separately in Appendix C.

GAS HEATING PENALTIES

Table 110 presents gas penalties not reported in the body of the report for the Small Business Initiative.

Table 110. 2023 Small Business Initiative Gas Heating Penalties

Channel	Measure	Therms
SBDI	LED Bulbs and Fixtures	-578,018
	Lighting Controls	-49,106
	Fluorescent Delamping	-12,276
	Exit Signs	-2,373
SBEP	Window Film	-107
Total Gas Penalties		**-641,879**

SECONDARY ELECTRIC SAVINGS FOR WATER SUPPLY AND WASTEWATER TREATMENT

No measures delivered through the Small Business Initiative produced secondary electric savings in 2023.

TOTAL IMPACTS FOR COST-EFFECTIVENESS

Table 111 presents a summary of the 2023 Small Business Initiative verified gross impacts adjusted for the above effects.

Table 111. 2023 Small Business Initiative Verified Gross Impacts for Cost-Effectiveness

	Electric Energy (kWh)	Gas (Therms)	Non-AIC Gas (Therms)	Water (Gallons)
Verified Gross Impacts for Goal Attainment	62,232,919	26,730	N/A	N/A
Gas Penalties	N/A	-641,879	N/A	N/A
Water Savings	N/A	N/A	N/A	0
Secondary Electric Savings	0	N/A	N/A	N/A
Additional Fossil Fuel Impacts	N/A	N/A	2,934	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**62,232,919**	**-615,149**	**2,934**	**0**

Note: All electric demand savings used in cost-effectiveness testing align with those presented in Section 3.

MIDSTREAM INITIATIVE

ADDITIONAL FOSSIL FUEL IMPACTS

The Midstream Initiative produced no additional fossil fuel impacts in 2023.

GAS HEATING PENALTIES

Table 112 presents gas penalties not reported in the body of the report for the Midstream Initiative.

Table 112. 2023 Midstream Initiative Gas Heating Penalties

Channel	Measure	Therms
Lighting	Linear LEDs	-233,488
	Mogul LEDs	-155,984
	Pin Base LEDs	-336
HVAC	Heat Pump Water Heaters	-144
Total Gas Penalties		**-389,952**

SECONDARY ELECTRIC SAVINGS FOR WATER SUPPLY AND WASTEWATER TREATMENT

Table 113 presents water savings and secondary electric savings for the Midstream Initiative.

Table 113. 2023 Midstream Initiative Secondary Electric Savings

Channel	Measure Category	Verified Gross Water Savings (Gallons)	Conversion Factor	Verified Gross Secondary Electric Savings (kWh)
Midstream Food Service	Steam Cooker	1,249,155	2,571 kWh/million gal[a]	3,043
	Dishwasher	129,025	5,010 kWh/million gal[a]	646
Total Savings		**1,378,180**		**3,689**

[a] Source: IL-TRM V11.0

TOTAL IMPACTS FOR COST-EFFECTIVENESS

Table 114 presents a summary of the 2023 Midstream Initiative verified gross impacts adjusted for the above effects.

Table 114. 2023 Midstream Initiative Verified Gross Impacts for Cost-Effectiveness

	Electric Energy (kWh)	Gas (Therms)	Water (Gallons)
Verified Gross Impacts for Goal Attainment	30,384,046	50,354	N/A
Gas Penalties	N/A	-389,952	N/A
Water Savings	N/A	N/A	1,378,180
Secondary Electric Savings	-3,689	N/A	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**30,380,357**	**-339,598**	**1,378,180**

Note: All electric demand savings used in cost-effectiveness testing align with those presented in Section 3.

APPENDIX C. CUMULATIVE PERSISTING ANNUAL SAVINGS

This appendix presents detailed CPAS for the Business Program initiatives and channels. Due to many years of CPAS, tables are challenging to read; please reference the separately provided *2023 AIC CPAS and AAIG Workbook* for additional detail as needed.

Table 115 provides CPAS for the 2023 Business Program through 2054 at the initiative level. Lifetime savings for the 2023 Business Program through 2054 are 2,565,226 MWh.

Table 115. 2023 Business Program CPAS and WAML

Initiative	Initiative-Level WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)															
				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Standard	13.1	32,621	0.837	27,291	27,291	27,270	27,105	26,680	26,512	26,393	26,226	26,173	25,985	24,215	17,616	14,393	13,459	13,256	30
Custom	16.5	21,505	0.786	16,907	16,907	16,907	16,907	16,907	16,839	16,788	16,788	16,788	16,702	16,546	16,508	15,965	12,977	12,105	4,173
Retro-Commissioning	7.3	5,285	0.931	4,918	4,918	4,918	4,918	4,918	4,918	4,918	1,464	0	0	0	0	0	0	0	0
Streetlighting	20.0	20,050	0.998	20,009	20,009	20,009	18,464	18,464	18,464	18,464	18,464	18,464	18,464	18,464	18,464	18,464	18,464	18,464	18,464
Small Business	12.6	62,233	0.891	55,450	55,450	55,286	53,694	52,501	51,893	50,240	49,234	49,078	48,170	47,032	37,461	20,219	17,413	16,915	281
Midstream	14.6	30,384	0.911	27,673	27,673	27,673	27,673	27,673	27,664	27,664	27,664	27,664	27,653	27,651	27,017	25,731	25,731	20,535	40
Midstream - Carryover	14.3	5,735	0.853	4,890	4,890	4,890	4,890	4,757	4,749	4,734	4,554	4,554	4,554	4,553	4,553	4,553	4,553	3,630	0
(b-25) Conversions	23.7	20,792	0.792	16,476	16,476	16,476	16,476	16,476	16,476	16,129	16,129	16,129	16,129	16,129	16,129	16,129	16,129	15,647	14,901
2023 Portfolio CPAS		**198,605**	**0.874**	**173,614**	**173,614**	**173,429**	**170,127**	**168,375**	**167,515**	**165,331**	**160,524**	**158,851**	**157,658**	**154,590**	**137,748**	**115,455**	**108,727**	**100,552**	**37,888**
Expiring 2023 Portfolio CPAS				**0**	**0**	**184**	**3,302**	**1,752**	**860**	**2,184**	**4,806**	**1,673**	**1,192**	**3,069**	**16,842**	**22,293**	**6,728**	**8,175**	**62,664**
Expired 2023 Portfolio CPAS				**0**	**0**	**184**	**3,487**	**5,238**	**6,099**	**8,283**	**13,090**	**14,763**	**15,955**	**19,024**	**35,866**	**58,159**	**64,887**	**73,062**	**135,726**

Initiative	Initiative-Level WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)															
				2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Standard	13.1	32,621	0.837	30	30	30	30	21	21	21	0	0	0	0	0	0	0	0	0
Custom	16.5	21,505	0.786	3,906	3,590	3,439	3,211	3,103	3,103	2,774	2,660	2,647	782	782	782	782	782	0	0
Retro-Commissioning	7.3	5,285	0.931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Streetlighting	20.0	20,050	0.998	18,464	18,464	18,464	18,464	0	0	0	0	0	0	0	0	0	0	0	0
Small Business	12.6	62,233	0.891	281	281	281	281	0	0	0	0	0	0	0	0	0	0	0	0
Midstream	14.6	30,384	0.911	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Midstream - Carryover	14.3	5,735	0.853	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(b-25) Conversions	23.7	20,792	0.792	14,901	14,901	14,901	14,901	14,824	14,824	14,824	14,824	14,824	0	0	0	0	0	0	0
2023 Portfolio CPAS		**198,605**	**0.874**	**37,582**	**37,266**	**37,114**	**36,887**	**17,948**	**17,948**	**17,620**	**17,484**	**17,471**	**782**	**782**	**782**	**782**	**782**	**0**	**0**
Expiring 2023 Portfolio CPAS				**306**	**316**	**151**	**228**	**18,939**	**0**	**328**	**135**	**13**	**16,689**	**0**	**0**	**0**	**0**	**782**	**0**
Expired 2023 Portfolio CPAS				**136,032**	**136,348**	**136,499**	**136,727**	**155,665**	**155,666**	**155,994**	**156,130**	**156,142**	**172,832**	**172,832**	**172,832**	**172,832**	**172,832**	**173,614**	**173,614**
WAML	**15.2**																		

STANDARD INITIATIVE

Table 116 provides CPAS for the 2023 Standard Initiative through 2046 at the channel level. Lifetime savings for the Initiative are 350,077 MWh.

Table 116. 2023 Standard Initiative Program CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)											
				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Core	13.2	29,351	0.825	24,206	24,206	24,185	24,020	23,910	23,742	23,623	23,525	23,472	23,284	21,525	16,918
Online Store	11.0	2,518	0.927	2,333	2,333	2,333	2,333	2,333	2,333	2,333	2,265	2,265	2,265	2,254	262
BOC	13.0	752	1.000	752	752	752	752	436	436	436	436	436	436	436	436
2023 CPAS		**32,621**	**0.837**	**27,291**	**27,291**	**27,270**	**27,105**	**26,680**	**26,512**	**26,393**	**26,226**	**26,173**	**25,985**	**24,215**	**17,616**
Expiring 2023 CPAS				**0**	**0**	**21**	**165**	**425**	**168**	**119**	**167**	**53**	**188**	**1,770**	**6,599**
Expired 2023 CPAS				**0**	**0**	**21**	**186**	**612**	**779**	**898**	**1,065**	**1,118**	**1,306**	**3,076**	**9,675**

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)											
				2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Core	13.2	29,351	0.825	13,936	13,439	13,236	30	30	30	30	30	21	21	21	0
Online Store	11.0	2,518	0.927	21	21	21	0	0	0	0	0	0	0	0	0
BOC	13.0	752	1.000	436	0	0	0	0	0	0	0	0	0	0	0
2022 CPAS		**32,621**	**0.837**	**14,393**	**13,459**	**13,256**	**30**	**30**	**30**	**30**	**30**	**21**	**21**	**21**	**0**
Expiring 2022 CPAS				**3,223**	**933**	**203**	**13,227**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**21**
Expired 2022 CPAS				**12,898**	**13,832**	**14,035**	**27,261**	**27,261**	**27,261**	**27,261**	**27,261**	**27,270**	**27,270**	**27,270**	**27,291**
WAML	**13.1**														

CUSTOM INITIATIVE

Table 117 provides CPAS for the 2023 Custom Initiative through 2054. Lifetime savings for the Initiative are 279,060 MWh.

Table 117. 2023 Custom Initiative Program CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)															
				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Custom Incentives	16.7	19,565	0.786	15,382	15,382	15,382	15,382	15,382	15,314	15,263	15,263	15,263	15,177	15,021	15,000	14,463	11,475	10,603	4,173
New Construction Lighting	14.9	1,940	0.786	1,525	1,525	1,525	1,525	1,525	1,525	1,525	1,525	1,525	1,525	1,525	1,508	1,502	1,502	1,502	0
2023 CPAS		**21,505**	**0.786**	**16,907**	**16,907**	**16,907**	**16,907**	**16,907**	**16,839**	**16,788**	**16,788**	**16,788**	**16,702**	**16,546**	**16,508**	**15,965**	**12,977**	**12,105**	**4,173**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	**0**	**68**	**51**	**0**	**0**	**86**	**156**	**38**	**543**	**2,988**	**872**	**7,933**
Expired 2023 CPAS				**0**	**0**	**0**	**0**	**0**	**68**	**119**	**119**	**119**	**205**	**361**	**399**	**942**	**3,930**	**4,802**	**12,735**

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)															
				2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Custom Incentives	16.7	19,565	0.786	3,906	3,590	3,439	3,211	3,103	3,103	2,774	2,660	2,647	782	782	782	782	782	0	0
New Construction Lighting	14.9	1,940	0.786	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2023 CPAS		**21,505**	**0.786**	**3,906**	**3,590**	**3,439**	**3,211**	**3,103**	**3,103**	**2,774**	**2,660**	**2,647**	**782**	**782**	**782**	**782**	**782**	**0**	**0**
Expiring 2023 CPAS				**266**	**316**	**151**	**228**	**109**	**0**	**328**	**114**	**13**	**1,865**	**0**	**0**	**0**	**0**	**782**	**0**
Expired 2023 CPAS				**13,001**	**13,317**	**13,468**	**13,696**	**13,804**	**13,805**	**14,133**	**14,247**	**14,260**	**16,125**	**16,125**	**16,125**	**16,125**	**16,125**	**16,907**	**16,907**
WAML	**16.5**																		

RETRO-COMMISSIONING INITIATIVE

Table 118 provides CPAS for the 2023 RCx Initiative through 2031. Lifetime savings for the Initiative are 35,890 MWh.

Table 118. 2023 Retro-Commissioning Initiative Program CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)								
				2023	2024	2025	2026	2027	2028	2029	2030	2031
Virtual Commissioning	7.3	5,247	0.930	4,880	4,880	4,880	4,880	4,880	4,880	4,880	1,464	0
Virtual SEM	7.0	38	1.000	38	38	38	38	38	38	38	0	0
2023 CPAS		**5,285**	**0.931**	**4,918**	**4,918**	**4,918**	**4,918**	**4,918**	**4,918**	**4,918**	**1,464**	**0**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3,454**	**1,464**
Expired 2023 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3,454**	**4,918**
WAML	**7.3**											

STREETLIGHTING INITIATIVE

Table 119 provides CPAS for the 2023 Streetlighting Initiative through 2044. Lifetime savings for the Initiative are 373,912 MWh.

Table 119. 2023 Streetlighting Initiative Program CPAS and WAML

Channel	WAML	First-Year Verified Gross MWh	NTGR	CPAS - Verified Net Savings (MWh)										
				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Municipality-Owned Streetlighting	20.0	133	0.690	92	92	92	92	92	92	92	92	92	92	92
Utility-Owned Streetlighting	20.0	19,917	1.000	19,917	19,917	19,917	18,372	18,372	18,372	18,372	18,372	18,372	18,372	18,372
2023 CPAS		**20,050**	**0.998**	**20,009**	**20,009**	**20,009**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**
Expiring 2023 CPAS				**0**	**0**	**0**	**1,545**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Expired 2023 CPAS				**0**	**0**	**0**	**1,545**	**1,545**	**1,545**	**1,545**	**1,545**	**1,545**	**1,545**	**1,545**

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS - Verified Net Savings (MWh)										
				2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Municipality-Owned Streetlighting	20.0	133	0.690	92	92	92	92	92	92	92	92	92	0	0
Utility-Owned Streetlighting	20.0	19,917	1.000	18,372	18,372	18,372	18,372	18,372	18,372	18,372	18,372	18,372	0	0
2022 CPAS		**20,050**	**0.998**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**	**18,464**	**0**	**0**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**18,464**	**0**
Expired 2022 CPAS				**1,545**	**1,545**	**1,545**	**1,545**	**1,545**	**1,545**	**1,545**	**1,545**	**1,545**	**20,009**	**20,009**
WAML	**20.0**													

SMALL BUSINESS INITIATIVE

Table 120 provides CPAS for the 2023 Small Business Initiative through 2044. Lifetime savings for the Initiative are 661,439 MWh.

Table 120. 2023 Small Business Initiative Program CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)										
				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
SBDI	12.5	61,906	0.891	55,159	55,159	54,995	53,403	52,210	51,602	49,949	48,943	48,787	47,879	46,742
SBEP	19.7	327	0.891	291	291	291	291	291	291	291	291	291	291	290
2023 CPAS		**62,233**	**0.891**	**55,450**	**55,450**	**55,286**	**53,694**	**52,501**	**51,893**	**50,240**	**49,234**	**49,078**	**48,170**	**47,032**
Expiring 2023 CPAS				**0**	**0**	**163**	**1,592**	**1,193**	**608**	**1,653**	**1,007**	**156**	**908**	**1,138**
Expired 2023 CPAS				**0**	**0**	**163**	**1,756**	**2,948**	**3,556**	**5,209**	**6,216**	**6,372**	**7,280**	**8,418**

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS - Verified Net Savings (MWh)										
				2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
SBDI	12.5	61,906	0.891	37,171	19,938	17,132	16,634	0	0	0	0	0	0	0
SBEP	19.7	327	0.891	290	281	281	281	281	281	281	281	281	0	0
2023 CPAS		**62,233**	**0.891**	**37,461**	**20,219**	**17,413**	**16,915**	**281**	**281**	**281**	**281**	**281**	**0**	**0**
Expiring 2023 CPAS				**9,571**	**17,241**	**2,806**	**498**	**16,634**	**0**	**0**	**0**	**0**	**281**	**0**
Expired 2023 CPAS				**17,989**	**35,230**	**38,037**	**38,535**	**55,168**	**55,168**	**55,168**	**55,168**	**55,168**	**55,450**	**55,450**
WAML	**12.6**													

MIDSTREAM INITIATIVE

Table 121 provides CPAS for the 2023 Midstream Initiative through 2040. Lifetime savings for the Initiative are 403,381 MWh.

Table 121. 2023 Midstream Initiative Program CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)								
				2023	2024	2025	2026	2027	2028	2029	2030	2031
Lighting	14.6	29,577	0.913	27,010	27,010	27,010	27,010	27,010	27,001	27,001	27,001	27,001
HVAC	12.8	213	0.884	189	189	189	188	188	188	188	188	188
Food Service	12.1	594	0.800	475	475	475	475	475	475	475	475	475
2023 CPAS		**30,384**	**0.911**	**27,673**	**27,673**	**27,673**	**27,673**	**27,673**	**27,664**	**27,664**	**27,664**	**27,664**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**
Expired 2023 CPAS				**0**	**0**	**0**	**0**	**1**	**9**	**9**	**9**	**9**

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)								
				2032	2033	2034	2035	2036	2037	2038	2039	2040
Lighting	14.6	29,577	0.913	27,001	27,001	26,480	25,630	25,630	20,434	0	0	0
HVAC	12.8	213	0.884	188	188	76	76	76	76	40	0	0
Food Service	12.1	594	0.800	464	461	461	25	25	25	0	0	0
2023 CPAS		**30,384**	**0.911**	**27,653**	**27,651**	**27,017**	**25,731**	**25,731**	**20,535**	**40**	**0**	**0**
Expiring 2023 CPAS				**11**	**3**	**633**	**1,286**	**0**	**5,196**	**20,495**	**40**	**0**
Expired 2023 CPAS				**20**	**22**	**656**	**1,942**	**1,942**	**7,138**	**27,633**	**27,673**	**27,673**
WAML	**14.6**											

CARRYOVER

Table 122 presents 2023 Business Program CPAS achieved through carryover through 2038. Lifetime savings from Business Program carryover are 69,304 MWh.

Table 122. 2023 Business Program Carryover Savings CPAS and WAML

Measure Category	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							
				2023	2024	2025	2026	2027	2028	2029	2030
2021 Linear LEDs	14.8	3,008	0.813	2,446	2,446	2,446	2,446	2,446	2,446	2,446	2,446
2021 Mogul LEDs	14.8	189	0.813	154	154	154	154	154	154	154	154
2021 Specialty LEDs	8.3	272	0.813	221	221	221	221	134	128	118	1
2022 Linear LEDs	14.8	1,788	0.913	1,633	1,633	1,633	1,633	1,633	1,633	1,633	1,633
2022 Mogul LEDs	14.8	350	0.913	319	319	319	319	319	319	319	319
2022 Specialty LEDs	8.4	127	0.913	116	116	116	116	70	68	63	1
2023 CPAS		**5,735**	**0.853**	**4,890**	**4,890**	**4,890**	**4,890**	**4,757**	**4,749**	**4,734**	**4,554**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	**133**	**8**	**15**	**179**
Expired 2023 CPAS				**0**	**0**	**0**	**0**	**133**	**141**	**156**	**335**

Measure Category	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							
				2031	2032	2033	2034	2035	2036	2037	2038
2021 Linear LEDs	14.8	3,008	0.813	2,446	2,446	2,446	2,446	2,446	2,446	1,951	0
2021 Mogul LEDs	14.8	189	0.813	154	154	154	154	154	154	123	0
2021 Specialty LEDs	8.3	272	0.813	1	1	0	0	0	0	0	0
2022 Linear LEDs	14.8	1,788	0.913	1,633	1,633	1,633	1,633	1,633	1,633	1,302	0
2022 Mogul LEDs	14.8	350	0.913	319	319	319	319	319	319	255	0
2022 Specialty LEDs	8.4	127	0.913	1	1	0	0	0	0	0	0
2023 CPAS		**5,735**	**0.853**	**4,554**	**4,554**	**4,553**	**4,553**	**4,553**	**4,553**	**3,630**	**0**
Expiring 2023 CPAS				**0**	**0**	**2**	**0**	**0**	**0**	**923**	**3,630**
Expired 2023 CPAS				**335**	**335**	**337**	**337**	**337**	**337**	**1,260**	**4,890**
WAML	**14.3**										

(B-25) CONVERSIONS

Table 123 presents 2023 Business Program CPAS achieved through (b-25) conversions through 2048. Lifetime savings from Business Program (b-25) conversions are 392,162 MWh.

Table 123. 2023 Business Program (b-25) Conversion Savings CPAS and WAML

Channel	WAML	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)												
				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Standard - Core	10.0	1,020	0.638	651	651	651	651	651	651	304	304	304	304	304	304	304
Custom - Custom Incentives	24.4	19,686	0.800	15,749	15,749	15,749	15,749	15,749	15,749	15,749	15,749	15,749	15,749	15,749	15,749	15,749
Small Business - SBEP	20.0	86	0.891	77	77	77	77	77	77	77	77	77	77	77	77	77
2023 CPAS		**20,792**	**0.792**	**16,476**	**16,476**	**16,476**	**16,476**	**16,476**	**16,476**	**16,129**	**16,129**	**16,129**	**16,129**	**16,129**	**16,129**	**16,129**
Expiring 2023 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**347**	**0**	**0**	**0**	**0**	**0**	**0**
Expired 2023 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**347**	**347**	**347**	**347**	**347**	**347**	**347**

Channel	Measure Life	Annual Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)												
				2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
Standard - Core	10.0	1,020	0.638	304	304	0	0	0	0	0	0	0	0	0	0	0
Custom - Custom Incentives	24.4	19,686	0.800	15,749	15,266	14,824	14,824	14,824	14,824	14,824	14,824	14,824	14,824	14,824	14,824	0
Small Business - SBEP	20.0	86	0.891	77	77	77	77	77	77	77	0	0	0	0	0	0
2023 CPAS		**20,792**	**0.792**	**16,129**	**15,647**	**14,901**	**14,901**	**14,901**	**14,901**	**14,901**	**14,824**	**14,824**	**14,824**	**14,824**	**14,824**	**0**
Expiring 2023 CPAS				**0**	**483**	**746**	**0**	**0**	**0**	**0**	**77**	**0**	**0**	**0**	**0**	**14,824**
Expired 2023 CPAS				**347**	**829**	**1,575**	**1,575**	**1,575**	**1,575**	**1,575**	**1,652**	**1,652**	**1,652**	**1,652**	**1,652**	**16,476**
WAML	**23.7**															

APPENDIX D. CUSTOM INITIATIVE PROJECT REPORTS

This appendix is provided under a separate cover.

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