Opinion Dynamics

Boston | Headquarters

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

1000 Winter St
Waltham, MA 02451

Ameren Illinois Company 2022 Business Program Impact Evaluation Report

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Opinion Dynamics

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1. Executive Summary

This report presents impact evaluation results from Ameren Illinois Company's (AIC) 2022 Business Program. The Business Program is part of AIC's overall portfolio of residential and nonresidential energy efficiency programs implemented during 2022. The overarching objective of the 2022 Business Program impact evaluation is to determine gross and net electric energy, electric demand, and natural gas impacts associated with the Program.

1.1 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 2022 evaluation:[1]

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

[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 2022 but did not lead to any completed projects (such as the Retro-Commissioning Lite channel of the Retro-Commissioning Initiative).

The initiatives are designed to achieve energy savings from nonresidential customers in accordance with AIC's plan filing. The Small Business and Standard initiatives make up the bulk of the Business Program in terms of energy savings; they primarily provide energy assessments, prescriptive rebates, 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 the Streetlighting Initiative seeks to increase adoption of energy-efficient streetlights throughout AIC's territory.

1.2 Policy Background

This is the first 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 most 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 2022 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.[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

[2] Illinois Energy Efficiency Stakeholder Advisory Group. *Weighted Average Measure Life Report*. 2018.
[3] Ibid.

maximum of 10% of the utility's 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. 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; 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 2022 energy savings) and CPAS for AIC's Business Program. As discussed in greater detail in the *2022 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 2022 Business Program achieved 216,708 MWh, 27.10 MW, and 1,926,934 therms in verified net savings. These savings are also reported after accounting for the legislatively-allowed conversion of other fuel savings to electric energy savings for the purpose of goal attainment. Converted savings include savings 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 2022 Business Program.

Table 1. 2022 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	43,933	100%	43,770	0.828	36,256
Standard - OS	1,216	137%	1,666	0.996	1,660
Standard - BOC[a]	1,132	100%	1,645	N/A	1,645
Custom - Custom Incentives	28,392	96%	27,221	0.786	21,396
Custom - New Construction Lighting	8,508	70%	5,997	0.786	4,714
RCx - Core	1,989	89%	1,773	0.880	1,560
RCx - Virtual Commissioning™	5,456	98%	5,319	0.930	4,947
Streetlighting - MOSL	442	100%	442	0.690	305
Streetlighting - UOSL	22,989	99%	22,727	1.000	22,727

[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 - SBDI	75,958	100%	75,950	0.891	67,672
Small Business - SBEP	108	137%	147	0.891	131
Midstream - Lighting	23,305	99%	23,028	0.913	21,029
Midstream - HVAC	489	94%	460	0.881	405
Midstream - Food Service	610	89%	544	0.800	435
Midstream - Lighting Carryover[b]	7,117	100%	7,117	0.857	6,098
Business Program Subtotal	*221,643*	*98%*	*217,807*	*0.877*	*190,979*
Small Business - SBEP (propane conversion)					9
Custom Incentives (gas conversion - AIC claimable therms)					9,733
Custom Incentives (gas conversion - non-AIC claimable therms)[c]					15,327
Custom Incentives (propane conversion)					4
Standard Core (gas conversion)					656
Business Program Total					**216,708**

[a] The realization rate for the BOC channel reflects the ex ante and verified savings estimates for the 2022 trainees only. There are no ex ante savings for the 2021 cohort, therefore 2021 savings are excluded from these calculations.

[b] Carryover savings are those achieved through installation of measures during 2022 that were distributed or rebated in prior Program years. For clarity, we break out carryover savings separately throughout this report.

[c] This row represents (b-25) converted gas savings produced at sites that do not receive gas service from AIC.

Table 2. 2022 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	7.16	103%	7.39	0.824	6.09
Standard - OS	0.20	206%	0.40	0.982	0.40
Standard - BOC[a]	1.13	11%	0.18	N/A	0.18
Custom - Custom Incentives	3.06	102%	3.11	0.786	2.44
Custom - New Construction Lighting	1.35	96%	1.30	0.786	1.02
RCx - Core	0.16	65%	0.10	0.822	0.09
RCx - Virtual Commissioning™	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	11.43	100%	11.42	0.891	10.17
Small Business - SBEP	0.02	347%	0.08	0.891	0.07
Midstream - Lighting	5.50	100%	5.48	0.913	5.00
Midstream - HVAC	0.14	100%	0.14	0.881	0.12
Midstream - Food Service	0.00	N/A	0.08	0.800	0.06

Initiative/Channel	Ex Ante Gross MW	Gross Realization Rate	Verified Gross MW	NTGR	Verified Net MW
Midstream - Lighting Carryover[b]	1.69	100%	1.69	0.857	1.45
Business Program Subtotal	*31.85*	*98%*	*31.36*	*0.864*	*27.10*
Business Program Total					**27.10**

[a] The realization rate for the BOC channel reflects the ex ante and verified savings estimates for the 2022 trainees only. There are no ex ante savings for the 2021 cohort, therefore 2021 savings are excluded from these calculations.

[b] Carryover savings are those achieved through installation of measures during 2022 that were distributed or rebated in prior Program years. For clarity, we break out carryover savings separately throughout this report.

Table 3. 2022 Business Program Gas Annual Savings Summary

Initiative/Channel	Ex Ante Gross Therms	Gross Realization Rate	Verified Gross Therms	NTGR	Verified Net Therms
Standard - Core	1,219,958	106%	1,287,924	0.548	705,392
Standard - OS	61,840	101%	62,438	0.880	54,945
Standard - BOC[a]	13,164	100%	17,904	N/A	17,904
Custom - Custom Incentives[b]	1,798,303	96%	1,731,269	0.800	1,385,015
Custom - New Construction Lighting	0	N/A	0	N/A	0
RCx - Core	59,742	94%	56,097	0.940	52,731
RCx - Virtual Commissioning™	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	0	N/A	0
Small Business - SBEP	21,190	100%	21,238	0.891	18,923
Midstream - Lighting	0	N/A	0	N/A	0
Midstream - HVAC	36,504	100%	36,504	0.880	32,124
Midstream - Food Service	26,241	69%	18,090	0.800	14,472
Business Program Subtotal	*3,236,943*	*100%*	*3,231,465*	*0.706*	*2,281,507*
Custom Incentives (gas conversion - AIC claimable therms)[c]					-332,199
Standard Core (gas conversion)					-22,374
Business Program Total					**1,926,934**

[a] The realization rate for the BOC channel reflects the ex ante and verified savings estimates for the 2022 trainees only. There are no ex ante savings for the 2021 cohort, therefore 2021 savings are excluded from these calculations.

[b] The ex ante, verified gross, and verified net savings listed for the Custom Incentives channel 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, as well as savings from other fossil fuels, are omitted here and accounted for in Appendix B.

[c] This row represents the total verified net therm savings that AIC could have claimed as gas savings, but instead converted to energy savings under the (b-25) cap for the purposes of goal attainment. This row does not include non-AIC claimable gas savings or other fossil fuel savings that were converted under the (b-25) cap.

1.3.2 Cumulative Persisting Annual Savings

Table 4 summarizes CPAS and WAML for the 2022 Business Program at the initiative and channel level. For additional detail related to CPAS and measure life, please see the individual initiative subsections in Section 3 and Appendix C, which present CPAS achieved in each future year. The overall WAML for the 2022 Business Program is 13.8 years.

Table 4. 2022 Business Program CPAS and WAML

Initiative/Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Standard	12.8	47,081	0.840	39,561	39,561	39,557	39,527	...	37,834	...	495,537
Custom	14.3	33,218	0.786	26,110	26,110	26,110	26,110	...	25,511	...	372,933
Retro-Commissioning	7.6	7,092	0.917	6,507	6,507	6,507	6,507	...	936	...	49,527
Streetlighting	20.0	23,168	0.994	23,031	23,031	23,031	21,572	...	21,572	...	435,821
Small Business	12.8	76,097	0.891	67,803	67,803	67,392	65,396	...	60,771	...	804,590
Midstream	14.3	24,032	0.910	21,870	21,870	21,870	21,870	...	20,737	...	310,985
Midstream - Carryover	14.4	7,117	0.857	6,098	6,098	6,098	6,098	...	5,726	...	86,846
SBEP (propane conversion)	20.0	10	0.891	9	9	9	9	...	9	...	183
Custom (gas conversion - AIC claimable therms)	14.1	12,167	0.800	9,733	9,733	9,733	9,733	...	9,733	...	137,190
Custom Incentives (gas conversion - non-AIC claimable therms)	13.8	19,159	0.800	15,327	15,327	15,327	15,327	...	15,327	...	211,505
Custom Incentives (propane conversion)	25.7	5	0.800	4	4	4	4		4		112
Standard - Core (gas conversion)	14.7	996	0.658	656	656	656	656	...	656	...	9,690
2022 CPAS		**250,144**	**0.866**	**216,708**	**216,708**	**216,294**	**212,808**	**...**	**198,816**	**...**	**2,914,920**
Expiring 2022 CPAS				**0**	**0**	**415**	**3,485**	**...**	**2,873**	**...**	
Expired 2022 CPAS				**0**	**0**	**415**	**3,900**	**...**	**17,892**	**...**	
WAML	**13.8**										

2. Evaluation Approach

The following section of the report describes the evaluation approach taken for the 2022 Business Program impact evaluation. As part of the evaluation process, the evaluation team applied versions of the Illinois Energy Efficiency Policy Manual and the Illinois Technical Reference Manual (IL-TRM) applicable to the 2022 program year (Version 2.1 and Version 10.0 [V10.0], respectively) wherever relevant.[8] Appendix A of this report provides more detailed, initiative-specific methodology where appropriate.

2.1 Research Objectives and Evaluation Approach

The overarching research questions for the impact evaluation of AIC's 2022 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

The evaluation team 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. 2022 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		✓	✓	✓	✓
RCx		✓	✓	✓	✓
Streetlighting	✓				✓
Small Business	✓				✓
Midstream	✓				✓

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

2.2 Verified Gross Impact Analysis Approach

2.2.1 Application of IL-TRM V10.0

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 V10.0 and the IL-TRM V10.0 errata document. In particular, we applied the algorithms and assumptions provided in the IL-TRM V10.0, while using project-specific data from the initiative

[8] 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.

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 databases, 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 2022 program year, AIC claims carryover savings in 2022 from lighting measures that were distributed by the Business Program in prior years but were not installed until 2022. In 2022, AIC claimed Business Program carryover savings from measures incentivized through the Midstream Initiative's Lighting channel[9] in 2020 and 2021.

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 V10.0 and IL-TRM V10.0 errata assumptions for all other relevant impact parameters.

We reported previously on AIC's 2022 carryover savings as part of an earlier memo.[10] Carryover savings are not reported as part of individual initiative subsections in Section 3.

2.2.3 Application of Custom Impact Methods

The Custom and RCx Initiatives 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 2022 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 within the Standard Initiative, for which the savings algorithms in IL-TRM V10.0 directly estimate net savings.

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 2022 evaluation. In particular, we took the following actions to address potential sources of error:

- Analysis Error:
  - **Prescriptive Gross Impact Calculations:** For prescriptive gross impact calculations, we applied IL-TRM V10.0 calculations to the participant data in the tracking database to calculate gross impacts.

[9] Formerly Instant Incentives which was part of the Standard Initiative.
[10] Memo is awaiting finalization and this report will be updated with a reference when a final version is available.

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, the evaluation team had all calculations reviewed by a separate team member to verify that calculations were performed accurately.
- **Net Impact Calculations:** For net impact calculations, we applied SAG-approved NTGRs to estimated gross impacts to derive net 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 51 of 140 Custom Initiative projects achieving savings in 2022, 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 6.4% for electric energy savings, 8.8% for electric demand savings, and 7.5% for gas savings. Further detail on our methodology for Custom Initiative sampling is provided in Appendix A.
  - **RCx Core Impact Sample:** The evaluation team completed desk reviews and site visits for a census of RCx Initiative projects (five projects). There is, therefore, no sampling error around our impact results.
- **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 and RCx initiatives and with the methods used to calculate the gross impacts.

For the Virtual Commissioning™ channel specifically, 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 Virtual Commissioning™. 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.[11]
- **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 2022 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 before producing verified savings, in cases where the inclusion of weather interactions improved model fit. We also 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. We also recommended that the implementation team include projected R^2 values in each workbook in future program years to help with assessments of over- or underfitting.

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

- **Measurement Error:** In the context of the Virtual Commissioning™ channel, 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 have 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 have one year of post-period data for all Virtual Commissioning™ projects in 2022, which introduces uncertainty because the model was not able to train on a full range of temperature data after the intervention was initiated. This may increase the prediction error for temperatures that are outside the range of the training data. The team 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. The team 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. The training is included as part of the Standard Initiative for the purpose of claiming savings.

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 rebates targeted at a variety of energy-intensive end uses. Rebate requests exceeding $10,000 require pre-approval by AIC staff. For projects that do not exceed this cap, customers can apply for rebates 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 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.

3.1.2 Initiative Annual Savings Summary

Table 6 presents the Standard Initiative annual savings achieved in 2022. The 2022 Standard Initiative achieved 39,561 MWh, 6.67 MW, and 778,241 therms in verified net savings. The Initiative also produced 22,374 therms in verified net gas savings in 2022 that are not claimable by AIC because the customers do not receive gas service from AIC; these savings are detailed further in Appendix B.

Table 6. 2022 Standard Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	46,281	8.49	1,294,963
Gross Realization Rate	101%	93%	105%
Verified Gross Savings	47,081	7.98	1,368,266
NTGR	0.840	0.836	0.569
Verified Net Savings	39,561	6.67	778,241

Note: The realization rates in this table cannot be replicated using the listed ex ante and verified savings values because the realization rates omit the savings quantified for the 2021 BOC trainees. There are no ex ante savings for the 2021 BOC trainees, therefore the verified savings for these trainees are excluded from realization rate calculations.

3.1.3 Standard Core Channel

The following sections present the impact evaluation results for the 2022 Standard Core channel. Additional details on the impact analysis methodology are provided in Appendix A.

Channel Description

The Standard Core channel offers traditional downstream rebates for lighting, variable speed drives (VSDs), HVAC equipment, refrigeration/grocery store equipment, commercial kitchen equipment, steam trap repair/replacements (STRR), and other measures. The channel separates these out into a series of distinct offerings, detailed below.

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

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the Standard Core channel in 2022:

- As of 2022, the SBDI, Midstream Lighting (formerly Instant Incentives), and Midstream HVAC channels are no longer included under the Standard Initiative.
- The implementation team increased incentives across all the Standard Core offerings in 2022 to encourage participation. Additionally, the implementation team added incentives for new measures, including infrared film for greenhouses, greenhouse boiler tune-ups, dairy water heaters, grain dryers, hand dryers, on-demand package sealers, exit signs, seasonal lighting, air operated double diaphragm pump controls, gear lubricants, desiccant dryer dewpoint controls, reduced compressed air setpoints, and forklift batteries.
- The implementation team introduced a "Made in Illinois" bonus, which added an extra 5% to early completion bonuses.
- The implementation team also introduced a "Summer Break" bonus which extended the eligibility of schools to receive a 10% early completion bonus through the end of the summer.
- The symposium coupon was increased to 20% for projects completed in 2022.

Participation Summary

The Initiative team distributed 50,879 measures through the Standard Core channel in 2022, as shown in Table 7.

Table 7. 2022 Standard Core Channel Participation Summary by Measure

Measure Category	Total Projects	Measure Quantity	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Private Sector					
SLB	395	36,320	23,098	4.30	0
SE	37	591	8,209	0.10	123,753
VSD	21	55	5,348	1.22	0
HVAC	103	530	1,855	0.36	182,719
GN	59	79	19	0.00	27,491
STRR	51	3,700	9	0.00	482,151
Private Sector Subtotal	*666*	*41,275*	*38,538*	*5.98*	*816,115*
Public Sector					
SLB	115	8,377	3,050	0.65	0
SE	4	6	35	0.00	625
VSD	8	23	786	0.24	0
HVAC	80	630	1,506	0.30	276,841
GN	1	1	15	0.00	0
STRR	10	567	3	0.00	126,377
Public Sector Subtotal	*218*	*9,604*	*5,395*	*1.19*	*403,844*
Total	**884**	**50,879**	**43,933**	**7.16**	**1,219,958**

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

Savings Detail

Table 8 presents the ex ante, verified gross, and verified net electric energy savings achieved through each of the offerings in the Standard Core channel in 2022. The Standard Core channel experienced a 20% increase in verified net energy savings in 2022 compared to 2021, despite a 13% decline in the number of projects completed through the channel. Lighting measures continued to drive channel performance, accounting for 61% of net verified electric energy savings. However, the primary driver of the Standard Core channel's overall growth in savings was an increase in activity through the SE offering, which saw a 1,235% growth in verified net savings. Several other Standard Core offerings also experienced an increase in savings compared to 2021: SLB increased by 7% and HVAC increased by 8%. The VSD and STRR offerings saw a decrease in verified net savings of 27% and 11%, respectively.

Table 8. 2022 Standard Core Channel Electric Energy Savings by Offering

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
SLB	26,148	100%	26,148	0.839	21,944
SE	8,244	100%	8,253	0.849	7,008
VSD	6,135	97%	5,973	0.833	4,977
HVAC	3,361	100%	3,349	0.683	2,288
GN	34	100%	34	0.920	31
STRR	11	117%	13	0.608	8

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Total	**43,933**	**100%**	**43,770**	**0.828**	**36,256**

Table 9 presents the ex ante, verified gross, and verified net electric demand savings achieved through the Standard Core channel. Lighting measures and VSDs accounted for 71% and 21% of verified net demand savings, respectively. Overall, the Standard Core channel experienced an 11% increase in verified net demand savings in 2022 compared to 2021.

Table 9. 2022 Standard Core 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	4.94	104%	5.12	0.839	4.30
SE	0.10	99%	0.10	0.849	0.09
VSD	1.46	103%	1.51	0.833	1.25
HVAC	0.66	100%	0.65	0.683	0.45
Total	**7.16**	**103%**	**7.39**	**0.824**	**6.09**

Table 10 presents the ex ante, verified gross, and verified net gas savings achieved through the Standard Core channel. Overall, verified net natural gas savings produced through the channel increased by 8% in 2022 compared to 2021. The STRR offering continued to be the primary driver of channel gas savings, accounting for 54% of the total channel gas savings, despite an 8% decrease in savings compared to 2021. The primary drivers of the growth in channel gas savings were the SE and HVAC offerings, which saw increases in gas savings of 172% and 14%, respectively.

Table 10. 2022 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	124,378	100%	124,397	0.675	83,968
HVAC	459,561	112%	515,126	0.426	219,444
GN	27,491	100%	27,491	0.890	24,467
STRR	608,529	102%	620,910	0.608	377,513
Total	**1,219,958**	**106%**	**1,287,924**	**0.548**	**705,392**

Note: The savings presented in this table reflect only AIC claimable gas savings. Several projects completed through the Standard Core channel produced non-AIC gas savings. More information on the savings from these projects are provided in Appendix B.

The following discussion highlights the prominent drivers of the realization rates for the Standard Core channel:

- **Standard Lighting for Business (60% of ex ante energy savings and 69% of demand savings)**: The gross realization rates for SLB are 100% for electric energy savings and 104% for demand savings.
  - For three delamping projects, the implementation team did not claim ex ante demand savings. The evaluation team included demand savings for these projects in the verified analysis, resulting in 4% higher demand savings for the SLB offering.
- **Specialty Equipment (19% of ex ante energy savings, 1% of demand savings, and 12% of therm savings)**: The gross realization rates for the SE offering are 100% for electric energy, 99% for demand, and 101% for natural gas savings.

- For three projects that added doors with LED fixtures to refrigerated display cases, the implementation team did not apply demand waste heat factors from section 4.5.4 of the IL-TRM V10.0 in the ex ante demand saving calculations. The evaluation team applied the demand waste heat factors prescribed in the IL-TRM V10.0 for refrigerated display cases in the verified analysis, resulting in a 1% decrease in demand savings for the SE offering.
- For eight ozone laundry projects, the implementation team applied a default value for associated boiler feed pump hours in the ex ante electric energy savings calculation that is included in the IL-TRM V10.0 for non-laundromat facilities. The IL-TRM specifies that custom boiler pump hours must be applied when calculating savings for installations in laundromats. The initiative tracking data indicated that these eight measures were installed in laundromats; therefore, the evaluation team applied custom pump hours for each project that we derived by applying the hours of operation of each laundromat to the pump runtime calculation included in the IL-TRM. The impact of this update on verified energy savings is negligible.[12]
- For one convection oven record, the implementation team applied the deemed natural gas savings from IL-TRM V10.0. The evaluation team calculated natural gas savings by applying algorithms and assumptions included in IL-TRM V10.0, resulting in increased verified gas savings.
- For one gas combination oven record, the implementation team did not account for pan size in the ex ante savings calculations. The evaluation team applied assumptions consistent with the pan size documented in the customer application, resulting in decreased verified natural gas savings.

- **Variable Speed Drives (14% of ex ante energy savings, 12% of demand savings)**: The gross realization rates for the VSD offering are 97% for electric energy and 103% for demand savings.
  - The evaluation team reviewed the applications for VSDs installed on process fans to verify the presence (or lack thereof) of existing controls.
    - For five 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 V10.0 when calculating verified savings. This results in lower verified electric energy savings and higher demand savings.
    - For one project, 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 V10.0 when calculating verified savings. This results in lower verified electric energy savings and higher demand savings.
    - For one project, the application mentioned the presence of an existing outlet control valve. Therefore, the evaluation team applied assumptions for an "Outlet Damper, BI & Airfoil Fans" baseline from IL-TRM V10.0 when calculating verified savings. This results in lower verified electric energy savings and higher demand savings.
- **Heating, Ventilating, and Air Conditioning (8% of ex ante energy savings, 9% of demand savings, and 37% of therm savings)**: The gross realization rates for the HVAC offering are 100% for electric energy savings, 100% for demand savings, and 112% for natural gas savings.
  - For 21 gas boiler replacements (both hot water and steam), the implementation team applied baseline efficiencies from IL-TRM V9.0 in ex ante savings calculations, rather than the appropriate values from IL-TRM V10.0. The evaluation team applied the baseline efficiency values from IL-TRM

[12] Footnote 415 in the IL-TRM V10.0 includes details on the calculation used to develop the default pump hour value for non-laundromat facilities.

V10.0 that corresponded to the boiler capacities listed in the initiative tracking data in the verified analysis, resulting in a 12% increase in natural gas savings for the HVAC channel.

- For one packaged terminal heat pump (PTHP) project, the implementation team applied assumptions for a packaged terminal air conditioner (PTAC) in the ex ante savings calculations. The evaluation team confirmed in AMPLIFY that the installed measure was a PTHP, and therefore applied PTHP assumptions in the verified savings calculations, resulting in lower verified demand savings. In addition, the evaluation team found that the implementation team estimated ex ante electric energy savings using an algorithm that does not align with IL-TRM V10.0. The evaluation team applied the appropriate electric energy savings algorithm, resulting in significantly lower verified electric energy savings. This discrepancy has a negligible impact on the overall channel realization rate.
- For three other PTHP projects, the implementation team estimated ex ante savings using early replacement assumptions and algorithms. The initiative tracking data indicated that the incentivized PTHPs replaced failed equipment. As a result, the evaluation team applied time of sale assumptions, reducing verified energy and demand savings for these projects. This discrepancy has a negligible impact on the overall channel realization rate.

- **Steam Trap Repair or Replacement (<1% of ex ante energy savings, 49% of therm savings)**: The gross realization rates for the STRR offering are 117% for electric energy savings and 102% for natural gas savings.
  - The verified energy savings include savings from secondary water supply and wastewater treatment for all records. The implementation team did not claim these secondary savings in cases where the customer is not an AIC electric customer. The verified analysis includes these savings for all records because secondary water supply and wastewater treatment savings occur at a system level; therefore, AIC electric service is not required to claim these savings. This increases electric energy savings by 17% for the STRR offering.
  - For 14 STRR projects, the implementation team assumed that the temperature of incoming water and the temperature of saturated steam were the same. The evaluation team applied IL-TRM V10.0 assumptions for the temperature of incoming water and saturated steam, resulting in a 2% increase in verified natural gas savings for the STRR offering.

3.1.4 Online Store Channel

The following sections present the impact evaluation results for the 2022 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 purchasing energy-efficient technologies (e.g., LEDs, occupancy sensors, advanced thermostats, and advanced power strips). It also serves as a resource for educating private and public sector customers about the benefits of energy-efficient products. The Online Store 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 2022:

- The implementation team discontinued the "Back to Work" bundle and introduced the "Out with the Old, In with the New" bundle due to a change in implementer and to adapt to post-pandemic conditions. The contents of the bundles did not change; participating customers received one LED desk lamp, one advanced power strip, and two LED lamps.

Participation Summary

Table 11 presents Online Store channel participation during 2022.

Table 11. 2022 Online Store Channel Participation Summary

Sector	Total Projects	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Private	843	1,157	0.18	59,855
Public	68	59	0.01	1,986
Total	**911**	**1,216**	**0.20**	**61,840**

Savings Detail

The Initiative team distributed 2,319 measures through the Online Store channel in 2022, as shown in Table 12.[13]

Table 12. 2022 Online Store Channel Participation Summary by Measure

Measure Category	IL-TRM Measure Name	Measure Quantity	Units	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Advanced Thermostat	Small Commercial Thermostats	798	Thermostat	723	0.08	61,840
LED Bulb	LED Bulbs and Fixtures	792	Bulb	352	0.07	0
Lighting Controls	Lighting Controls	153	Sensor	83	0.05	0
"Out with the Old, In with the New" Bundle	N/A	389	Bundle	43	0.00	0
Advanced Power Strip	Advanced Power Strip – Tier 1 Commercial	95	Power Strip	11	0.00	0
"Back to Work" Bundle	N/A	8	Bundle	3	<0.01	0
Smart Socket	Smart Sockets	74	Smart Socket	2	0.00	0
Exit Sign	Commercial LED Exit Signs	10	Exit Sign	<1	<0.01	0
Total		**2,319**		**1,216**	**0.20**	**61,840**

Table 13 presents the ex ante, verified gross, and verified net electric energy savings achieved by measure through the Online Store channel. The channel achieved a 137% electric energy realization rate, in large part due to discrepancies in the advanced thermostat measure, which accounts for 51% of the channel verified net energy savings. Overall, the channel experienced a 154% increase in verified net energy savings compared to 2021, due to an increase in activity across all measure categories.

[13] Bundles are counted as a single measure.

Table 13. 2022 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 Thermostat	723	133%	963	0.880	847
LED Bulb	352	108%	379	1.156	438
Lighting Controls	83	100%	83	1.156	96
"Out with the Old, In with the New" Bundle	43	517%	225	1.156	260
Advanced Power Strip	10	100%	10	1.156	12
"Back to Work" Bundle	3	100%	3	1.156	3
Smart Socket	2	188%	4	1.156	4
Exit Sign	<1	100%	<1	1.156	1
Total	**1,216**	**137%**	**1,666**	**0.996**	**1,660**

Table 14 presents the ex ante, verified gross, and verified net electric demand savings achieved through the Online Store channel. The channel achieved a 206% realization rate for demand savings, almost entirely driven by discrepancies in the advanced thermostat measure, which accounts for 55% of verified net demand savings. Overall, the channel experienced a 111% increase in verified net demand savings compared to 2021.

Table 14. 2022 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 Thermostat	0.08	323%	0.25	0.880	0.22
LED Bulb	0.07	110%	0.08	1.156	0.09
Lighting Controls	0.05	100%	0.05	1.156	0.06
"Out with the Old, In with the New" Bundle	0	N/A	0.03	1.156	0.03
"Back to Work" Bundle	<0.01	100%	<0.01	1.156	<0.01
Exit Sign	<0.01	100%	<0.01	1.156	<0.01
Total	**0.20**	**206%**	**0.40**	**0.982**	**0.40**

Table 15 presents the ex ante, verified gross, and verified net gas savings achieved through the Online Store channel. The Online Store channel achieved a realization rate of 101% for gas savings. Overall, the channel experienced a 69% increase in verified net demand savings compared to 2021, due to an increase in the number of advanced thermostats incentivized through the channel.

Table 15. 2022 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 Thermostat	61,840	101%	62,438	0.880	54,945
Total	**61,840**	**101%**	**62,438**	**0.880**	**54,945**

The following discussion highlights the prominent drivers of the realization rates for the Online Store channel:

- **Advanced Thermostats (60% of ex ante energy savings, 40% of demand savings, and 100% of therm savings)**: The gross realization rates for advanced thermostats are 133% for electric energy, 323% for demand, and 101% for natural gas savings.
  - For 459 advanced thermostat measures, the implementation team applied assumptions that do not align with the IL-TRM V10.0. The evaluation team applied IL-TRM V10.0 parameters, increasing the Online Store channel electric energy savings by 20% and demand savings by 90%.
    - The evaluation team identified a typographic error in the implementation team's algorithm for calculating ex ante demand savings. The ex ante algorithm applied coefficients of -2 and 112 in the SEER to EER conversion, rather than the -0.02 and 1.12 prescribed in the IL-TRM. This error erroneously deflated the ex ante demand savings for 231 records by a factor of 100. The evaluation team applied the correct SEER to EER conversion formula from IL-TRM V10.0, resulting in increased demand savings.
    - For 430 projects, the implementation team did not include electric energy savings from reduced furnace fan runtime in the ex ante energy savings calculation. The evaluation team included the energy savings from reduced furnace fan runtime in the verified analysis, resulting in an 18% increase in the Online Store channel electric energy savings.
    - For 432 projects, the implementation team applied the PJM summer peak coincidence factor for commercial cooling in the ex ante demand savings calculation. The evaluation team applied the summer system peak coincidence factor for commercial cooling in the verified analysis, which resulted in an increase in demand savings by 91% per measure.
- **LED Bulbs and Fixtures (29% of ex ante energy savings, 35% of demand savings)**: The gross realization rates for LED Bulbs and Fixtures are 99% for electric energy savings and 98% for demand savings.
  - For 37 measures, the implementation team applied baseline wattages that do not align with equipment information from the initiative tracking data and IL-TRM V10.0. The evaluation team assigned baseline wattages from IL-TRM V10.0 based on the lighting type and lumens indicated in the equipment description. In most cases, the baseline wattage assigned in the verified analysis was lower than the wattage applied in the ex ante calculation, resulting in slightly lower verified savings overall.
- **"Out with the Old, In with the New" Bundle (4% of ex ante energy savings)**: The gross realization rate for the "Out with the Old, In with the New" bundle is 517% for electric energy savings.
  - The ex ante savings calculated by the implementation team for the "Out with the Old, In with the New" bundles only reflect the savings from the advanced power strip measure included in the bundle. The evaluation team includes savings for all the measures in the bundle in the verified analysis, including the advanced power strip, an LED desk lamp, and two LED flood lamps, resulting in an 11% increase in channel electric energy savings and 6% increase in channel demand savings.
- **Smart Sockets (<1% of ex ante energy savings)**: The gross realization rate for Smart Sockets is 188% for electric energy savings.
  - The implementation team applied a deemed per socket electric energy savings value that does not align with IL-TRM V10.0. In addition, the ex ante calculations applied an ISR of 36%, which the IL-TRM V10.0 defines for smart sockets distributed as part of an energy efficiency kit. The evaluation team calculated the verified electric energy savings by applying IL-TRM V10.0 default savings parameters, and direct-install ISR, resulting in higher energy savings.

3.1.5 Building Operator Certification

Channel Description

AIC offers the BOC Training 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.

In 2022, we transitioned the evaluation of the BOC training to a prescriptive savings approach based on the algorithms introduced in IL-TRM V10.0. The previous evaluation approach required a year-long lag between participation and impact evaluation. Since the prescriptive approach does not require this lag period, the 2022 impact evaluation includes trainees from both 2021 and 2022 since the 2021 trainees were not included in the 2021 impact evaluation due to lag period. Relatedly, due to this transition, the implementation team did not estimate ex ante savings for the 2021 trainees. Therefore, we only present the verified savings estimates for these 2021 trainees.

Participation Summary

Table 17 summarizes participation in the 2021 and 2022 BOC trainings by segment. Overall, 16 AIC customers participated in the training.

Table 17. 2021-2022 BOC Participation Summary

Participation Year	Participant ID	BOC Level	Segment
2021	8003	I	Hospital/Medical
	8004	II	Hospital/Medical
	8005	II	Hospital/Medical
	8006	II	Hospital/Medical
2022	9001	I	School/College
	9002	I	School/College
	9003	I	School/College
	9004	I	School/College
	9005	I	Hospital/Medical
	9006	I	Hospital/Medical
	9007	I	Hospital/Medical
	9008	I	Hospital/Medical
	9009	I	School/College
	9010	I	Hospital/Medical
	9011	I	Hospital/Medical
	9012	I	Office

Savings Detail

Table 18 presents the ex ante, verified gross, and verified net electric energy savings achieved through the BOC training. Note that, per section 4.8.24 of IL-TRM V10.0, BOC savings do not require the application of NTGR because the information used to derive the savings algorithms included in the IL-TRM were in net savings.

Table 18. 2021-22 BOC Training Electric Energy Savings by Cohort

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
2021	N/A	N/A	513	N/A	513
2022	1,132	100%	1,132	N/A	1,132
Total	**1,132**	**100%**	**1,645**	**N/A**	**1,645**

Note: The realization rates included in this table reflect the 2022 ex ante and verified savings estimates. There are no ex ante savings for the 2021 cohort, therefore 2021 savings are excluded from these calculations.

Table 19 presents the ex ante, verified gross, and verified net electric demand savings achieved through the BOC training.

Table 19. 2021-22 BOC Training Electric Demand Savings by Cohort

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
2021	N/A	N/A	0.06	N/A	0.06
2022	1.13	11%	0.13	N/A	0.13
Total	**1.13**	**11%**	**0.18**	**N/A**	**0.18**

Note: The realization rates included in this table reflect the 2022 ex ante and verified savings estimates. There are no ex ante savings for the 2021 cohort, therefore 2021 savings are excluded from these calculations.

Table 20 presents the ex ante, verified gross, and verified net gas savings achieved through the BOC training.

Table 20. 2021-22 BOC Training Gas Savings by Cohort

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
2021	N/A	N/A	4,740	N/A	4,740
2022	13,164	100%	13,164	N/A	13,164
Total	**13,164**	**100%**	**17,904**	**N/A**	**17,904**

Note: The realization rates included in this table reflect the 2022 ex ante and verified savings estimates. There are no ex ante savings for the 2021 cohort, therefore 2021 savings are excluded from these calculations.

The following discussion highlights the prominent drivers of the realization rates for the BOC training:

- **2022 Cohort (69% of verified energy savings, 72% of verified demand savings, and 74% of therm savings):** The realization rates for the 2022 BOC cohort are 100% for electric energy savings, 10% for demand savings, and 100% for natural gas savings.
  - The evaluation team identified an error in the ex ante demand savings calculation for all the trainees. The implementation team calculates ex ante demand savings by dividing the ex ante electric energy savings by 1,000. This approach inherently applies the per square foot savings constant for electric energy savings in the demand savings calculation. The IL-TRM V10.0 provides different per square foot savings constants for electric energy and demand savings, which the evaluation team applied in the verified analysis, resulting in reduced demand savings.

3.1.6 Cumulative Persisting Annual Savings

Table 21 through Table 23 present CPAS and WAML for the 2022 Standard 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 of the 2022-2025 Plan.[14] The WAML for the Standard Initiative is 12.8 years and the WAML for the Standard Core, Online Store, and BOC channels are 12.9 years, 9.3 years, and 13.0 years, respectively. AIC also converted non-claimable natural gas savings produced through five Standard Core projects to electric energy savings for the purposes of goal attainment; further details on these savings can be found in Appendix B.

Table 21. 2022 Standard Initiative CPAS and WAML

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Standard Core	12.9	43,770	0.828	36,256	36,256	36,254	36,245	...	35,870	...	465,930
Online Store	9.3	1,666	0.996	1,660	1,660	1,658	1,637	...	1,009	...	14,436
BOC	13.0	1,645	N/A	1,645	1,645	1,645	1,604	...	954	...	15,171
2022 CPAS		**47,081**	**0.840**	**39,561**	**39,561**	**39,557**	**39,527**	**...**	**37,834**	**...**	**495,537**
Expiring 2022 CPAS				**0**	**0**	**4**	**30**	**...**	**99**	**...**	
Expired 2022 CPAS				**0**	**0**	**4**	**34**	**...**	**1,727**	**...**	
WAML	**12.8**										

Table 22. 2022 Standard Core Channel CPAS and WAML

Measure Category	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
SLB	11.7	26,148	0.839	21,944	21,944	21,942	21,933	...	21,630	...	255,165
SE	14.9	8,253	0.849	7,008	7,008	7,008	7,008	...	7,008	...	104,626
VSD	15.0	5,973	0.833	4,977	4,977	4,977	4,977	...	4,977	...	74,655
HVAC	13.7	3,349	0.683	2,288	2,288	2,288	2,287	...	2,255	...	31,281
GN	5.0	34	0.920	31	31	31	31	...	0	...	155
STRR	6.0	13	0.608	8	8	8	8	...	0	...	49
2022 CPAS		**43,770**	**0.828**	**36,256**	**36,256**	**36,254**	**36,245**	**...**	**35,870**	**...**	**465,930**
Expiring 2022 CPAS				**0**	**0**	**2**	**9**	**...**	**8**	**...**	
Expired 2022 CPAS				**0**	**0**	**2**	**11**	**...**	**386**	**...**	
WAML	**12.9**										

[14] For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

Table 23. 2022 Online Store Channel CPAS and WAML

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Advanced Thermostat	11.0	963	0.880	847	847	847	847	...	847	...	9,321
LED Bulb	6.4	379	1.156	438	438	436	417	...	39	...	2,407
Lighting Controls	10.0	83	1.156	96	96	96	96	...	96	...	957
"Out with the Old, In with the New" Bundle	7.0	225	1.156	260	260	259	257	...	26	...	1,617
Advanced Power Strip	7.0	10	1.156	12	12	12	12	...	0	...	81
"Back to Work" Bundle	7.9	3	1.156	3	3	3	3	...	1	...	20
Smart Socket	7.0	4	1.156	4	4	4	4	...	0	...	30
Exit Sign	5.0	0.5	1.156	1	1	1	1	...	0	...	3
2022 CPAS		**1,666**	**0.996**	**1,660**	**1,660**	**1,658**	**1,637**	**...**	**1,009**	**...**	**14,436**
Expiring 2022 CPAS				**0**	**0**	**2**	**21**	**...**	**91**	**...**	
Expired 2022 CPAS				**0**	**0**	**2**	**23**	**...**	**615**	**...**	
WAML	**9.3**										

Table 24. 2021-2022 BOC Training CPAS and WAML

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
BOC training	13.0	1,645	N/A	1,645	1,645	1,645	1,645	...	954	...	15,171
2022 CPAS		**1,645**	**N/A**	**1,645**	**1,645**	**1,645**	**1,645**	**...**	**954**	**...**	**15,171**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**691**	**...**	
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 evaluation team observed that in some instances, the implementation team does not collect key information needed to support savings calculations. For example, the implementation team does not collect information on the runtimes of boiler feed water pumps associated with ozone laundry installations. As a result, the evaluation needed to develop proxy values to apply in the verified analysis, which resulted in lower verified energy savings.
  - **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 ozone laundry, specifically, we recommend that, if possible, the implementation team begin collecting information on feed pump hours as the IL-TRM states that the default value included in the TRM is not appropriate to apply to laundromat applications; the IL-TRM requires the application of a custom value for installations in laundromats. If collecting site specific information is not feasible, we recommend that the implementation and evaluation teams coordinate about how best to characterize this parameter in future years.
- **Key Finding #2:** In some instances, key parameters collected by the implementation team are not included in the initiative tracking data or applied in ex ante savings calculations. For example, the implementation team collects information on pan size for combination ovens in the incentive application but does not include this information in the tracking data and in some cases does not apply the appropriate values in ex ante savings calculations. 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 VSDs, the implementation team collects information on existing controls in the incentive application but does not include this information in the initiative tracking data; the implementation team assumes there are no existing controls when estimating ex ante savings for all VSDs.
  - **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 VSD projects, we recommend the implementation team update the options for existing controls that are listed in the incentive application to correspond with the IL-TRM V10.0 baseline control types. We also recommend removing the write-in option. 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 #3:** Several measures incentivized through the Standard Core channel were also incentivized through other Business Program channels in 2022. For example, convection ovens were incentivized through the Standard Core channel and Midstream Food Service channel. We understand the implementation team was in the process of transitioning measures from the Standard Initiative to the Midstream Initiative in 2022, and that as measures were transitioned, they were discontinued

within the Standard Initiative to protect against cases where a customer applied for incentives for the same piece of equipment through multiple initiatives or channels.

  - **Recommendation:** We recommend that the implementation team continue to remove incentives from the Standard Initiative's offerings as the measures are transitioned to the Midstream Initiative. More generally, we recommend monitoring the Business Program for measures that are incentivized through multiple initiatives or channels and consider whether this is appropriate.

- **Key Finding #4:** The implementation team continued to incentivize green nozzles through the Standard Core channel in 2022. The evaluation team noted that the ex ante savings calculations for this measure rely on IL-TRM V10.0 "unknown" or default parameters.

  - **Recommendation:** If the implementation team plans to continue to rely on TRM defaults to calculate ex ante savings for green nozzles, we recommend that the implementation team consider whether incentivizing green nozzles through the Midstream Food Service channel might be more appropriate.

- **Key Finding #5**: There was a significant increase in the amount of savings delivered through the Specialty Equipment offering in 2022 compared to 2021, despite only a minor increase in the number of projects completed through the channel. The evaluation team identified a single project that accounted for 90% of the verified net energy savings delivered through the offering. The project included lithium-ion forklift batteries and high frequency battery chargers at a large warehouse with 24/7 operations.

Online Store Channel

- **Key Finding #1:** The implementation team continued to incentivize LED desk lamps in 2022. This measure was first introduced into the Online Store offering in 2021; however, the number of incentivized desk lamps has increased substantially, from 12 in 2021 to 397 in 2022. The IL-TRM does not currently explicitly specify parameters for LED desk lamps, so savings estimates for this measure are currently developed using assumptions that are specific to other technologies.

  - **Recommendation:** We recommend that the evaluation and implementation teams coordinate on specific language that can be added to the IL-TRM in future years that more clearly defines how LED desk lamps should be treated with respect to key savings parameters such as hours of use, ISRs, commercial/residential splits, and leakage, among others. We note that this recommendation will also support this measure in residential applications.

- **Key Finding #2:** Most bundles incentivized through the Online Store channel in 2022 were recorded in the initiative tracking data at the bundle level, rather than the measure level. In addition, the ex ante savings reflected the savings from one measure included in the bundle, rather than the full savings produced by all the measures.

  - **Recommendation:** We recommend that the implementation team track any future bundles at the measure level to ensure ex ante savings accurately reflect the full savings produced by the suite of incentivized measures.

- **Key Finding #3:** The evaluation team identified several errors in the algorithms and assumptions applied by the implementation team in ex ante savings calculations for advanced thermostats. This measure is the primary driver of the Online Store channel energy, demand, and gas savings.

  - **Recommendation:** We recommend that the implementation team reviews the algorithms and assumptions programmed in AMPLIFY for advanced thermostats to ensure consistency with the IL-TRM.

Building Operator Certification

- **Key Finding #1**: The evaluation team identified an error in the ex ante demand savings calculation. The implementation team inadvertently applied the per square foot savings constant for electric energy savings in their demand savings calculations, rather than the per square foot savings constant specified in the IL-TRM V10.0 for demand savings.
  - **Recommendation**: We recommend that the implementation team review their savings algorithms and ensure they are aligned with the IL-TRM V10.0.

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 other AIC initiatives. It also provides an avenue for piloting new 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 0, respectively. In addition to these two channels, AIC also operates several smaller efforts through the Custom Initiative, including Metering and Monitoring, Strategic Energy Management (SEM), Building Energy Assessments (BEA), Feasibility Studies, Agricultural Energy Audits, and Competitive Large Incentive Project (CLIP) offerings . 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.

3.2.2 Participation Summary

Table 25 presents a summary of the projects completed, and unique customers treated, through each Custom Initiative channel.

Table 25. 2022 Custom Initiative Participation Summary

Channel	Total Projects/Participants	Unique Customers [a]	Ex Ante Gross MWh [b]	Ex Ante Gross MW [b]	Ex Ante Gross Therms [b]
Custom Incentives	106	85	28,392	3.1	2,542,247
New Construction Lighting	37	35	8,508	1.4	–
Feasibility Study	14	12	–	–	–
Metering and Monitoring	10	10	–	–	–
Strategic Energy Management	6	5	–	–	–
Building Energy Assessment	2	2	–	–	–
Total	**175**	**137**	**36,900**	**4.4**	**2,542,247**

[a] Column does not sum to total because some unique customers participated in more than one Custom offering.

[b] Column may not sum to total because of rounding.

Since public sector customers became eligible for AIC initiatives during the Transition Period,[15] they have contributed significantly to the Custom Initiative's overall project mix. Public sector participation grew in 2022, likely as a result of the increased incentives AIC implemented to help these customers overcome the financial barriers they often face. Public sector customers were responsible for 26% of the total Initiative projects completed in 2022. Table 26 summarizes participation by sector.

Table 26. 2022 Custom Initiative Participation Summary by Sector

Channel	Total Projects/Participants
Private Sector	
Custom Incentives	71
New Construction Lighting	30
Feasibility Study	12
Metering and Monitoring	10
Strategic Energy Management	6
Private Sector Subtotal	129
Public Sector	
Custom Incentives	35
New Construction Lighting	7
Feasibility Study	2
Building Energy Assessment	2
Public Sector Subtotal	46
Total	**175**

AIC continued to utilize a list of their top 1,000 electric customers to focus Initiative recruitment efforts on sectors with the largest savings potential, namely, industrial, educational, and medical facilities. Those sectors were chosen to be the primary target for energy advisors, marketing, and other outreach staff. Analysis of the initiative tracking data shows that completed projects aligned with these targets; the highest percentage of completed Custom Initiative projects with positive savings (34%) were completed by businesses from the manufacturing/industrial sectors, followed by the educational sector (20%), and, finally, the medical sector (17%) (Table 27).

Table 27. 2022 Custom Initiative Projects by Organization Type

Organization Type	Share of Total Projects/Participants [a] (n=175)
Manufacturing/Industrial	34%
Educational	20%
Medical	17%
Municipality	7%
Warehouse	4%
Retail	3%
Office	2%
Religious	2%
Grocery	1%
Restaurant	1%

[15] The Transition Period was a partial program year that ran from June 1, 2017 through December 31, 2017.

Organization Type	Share of Total Projects/Participants [a] (n=175)
Agricultural	1%
Other/Unknown	8%

[a] These counts do not include Custom Initiative projects that did not produce savings.

3.2.3 Initiative Annual Savings Summary

Table 28 presents the annual savings achieved by the Custom Initiative in 2022. Verified net savings totaled 26,110 MWh, 3.46 MW, and 1,385,015 therms. The Initiative also produced 523,105 therms in verified net gas savings in 2022 that are not claimable by AIC because the customers do not receive gas service from AIC, as well as 148 therms in verified net propane savings; these savings are detailed further in Appendix B.

Table 28. 2022 Custom Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	36,900	4.42	1,798,303
Gross Realization Rate	90%	100%	96%
Verified Gross Savings	33,218	4.41	1,731,269
NTGR	0.786	0.786	0.800
Verified Net Savings	26,110	3.46	1,385,015

3.2.4 Custom Incentives Channel

The following sections present the impact evaluation results for the 2022 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 incented 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 2022:

- Supply-chain disruptions and inflation concerns significantly impacted participation throughout the 2022 program year.
  - In Q1 of 2022, AIC created and implemented the Custom Incentives Increase Marketing Campaign to gain more traction on Custom Incentives projects.
  - In Q2 of 2022, AIC increased incentives for the Custom Incentives channel to drive participation and mitigate the macroeconomic barriers customers were experiencing.
- With the passing of CEJA., some large business customers became eligible to participate in the Business Program. Program Staff engaged with these customers and offered to visit their facilities to try and increase interest in participating in the Custom Incentives channel.

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 29 presents the results of the gross savings analysis for the 45 Custom Incentives projects we reviewed in 2022. Realization rates for individual projects ranged from 30% to 189% for electric energy and 45% to 192% for gas. Additional details for 11 selected project reviews are provided in Appendix D to this report.

Table 29. 2022 Custom Incentives Channel Gross Impact Results for Sampled 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
2100307	CI1	Electric	3	727	0.000	–	189%	N/A	–	1,373	0.151	–
2100750	CI1	Electric	2	229	0.029	–	183%	245%	–	419	0.070	–
2100810	CI1	Electric	1	32	0.000	–	146%	N/A	–	47	0.009	–
2100024	CI1	Electric	3	373	0.046	–	120%	28%	–	446	0.013	–
2100809	CI1	Electric	1	43	0.018	–	110%	0%	–	48	0.000	–
2100955	CI1	Electric	3	511	0.058	–	107%	0%	–	549	0.000	–
2200315	CI3	Electric	1	387	0.046	–	107%	107%	–	414	0.050	–
2200128	CI3	Electric	2	571	0.067	–	106%	112%	–	603	0.075	–
2101009	CI1	Electric	3	384	0.048	–	104%	68%	–	400	0.032	–
2200051	CI2	Electric	3	390	0.000	–	101%	N/A	–	392	0.057	–
2200055	CI3	Electric	3	1,002	0.114	–	100%	100%	–	1,003	0.114	–
2200026	CI1	Electric	3	916	0.109	–	100%	100%	–	916	0.109	–
2100310	CI2	Electric	3	476	0.054	–	100%	100%	–	476	0.054	–
2200035	CI1	Electric	3	1,138	0.111	–	100%	121%	–	1,138	0.134	–
2200218	CI2	Electric	3	320	0.037	–	95%	95%	–	303	0.035	–
2101160	CI2	Electric	3	582	0.069	–	94%	94%	–	546	0.065	–
2101197	CI1	Electric	3	502	0.047	–	89%	79%	–	447	0.037	–
2101316	CI1	Electric	3	1,377	0.172	–	84%	84%	–	1,153	0.145	–
2200044	CI1	Electric	3	1,692	0.193	–	76%	76%	–	1,287	0.147	–
2200036	CI2	Electric	3	553	0.090	–	68%	75%	–	375	0.067	–
2200173	CI2	Electric	3	375	0.035	–	68%	74%	–	254	0.026	–
2100617	CI1	Electric	3	534	0.062	–	63%	86%	–	336	0.054	–
2000250	CI2	Electric	4	1,811	0.361	–	60%	118%	–	1,092	0.427	–
2200260	CI3	Electric	1	43	0.006	–	56%	56%	–	24	0.003	–
2200787	CI2	Electric	2	131	0.134	–	35%	35%	–	45	0.047	–
2200944	CI2	Electric	1	20	0.000	–	30%	N/A	–	6	0.000	–

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
2100433	CI1	Gas	3	—	—	10,446	—	—	192%	—	—	20,060
2200189	CI1	Gas	4	—	—	149,015	—	—	159%	—	—	237,275
2100150	CI2	Gas	3	—	—	61,217	—	—	137%	—	—	83,929
2200517	CI3	Gas	1	—	—	10,330	—	—	105%	—	—	10,870
2100785	CI1	Gas	3	—	—	8,278	—	—	100%	—	—	8,278
2200119	CI2	Gas	1	—	—	1,894	—	—	100%	—	—	1,894
2100104	CI1	Gas	1	—	—	987	—	—	100%	—	—	987
2100000	CI3	Gas	1	—	—	15,272	—	—	100%	—	—	15,272
2200704	CI3	Gas	3	—	—	194,795	—	—	100%	—	—	194,795
2100237	CI2	Gas	2	—	—	7,368	—	—	100%	—	—	7,368
2100318	CI1	Gas	4	—	—	337,492	—	—	94%	—	—	317,212
2100574	CI2	Gas	3	—	—	38,144	—	—	89%	—	—	34,044
2100319	CI1	Gas	4	—	—	413,854	—	—	86%	—	—	356,468
2200030	CI2	Both	3; 2	1,124	0.129	22,509	66%	66%	83%	747	0.086	18,757
2201375	CI3	Both	4; 4	2,122	0.000	601,847	62%	N/A	83%	1,306	0.000	499,550
2100772	CI1	Gas	3	—	—	7,515	—	—	76%	—	—	5,697
2200250	CI3	Gas	2	—	—	30,715	—	—	66%	—	—	20,224
2101405	CI1	Gas	2	—	—	2,002	—	—	54%	—	—	1,087
2100867	CI1	Gas	3	—	—	27,629	—	—	45%	—	—	12,393

Note: The customer that completed project 2201375 is not an AIC gas customer. Therefore, 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. More information on these savings can be found in Appendix B.

Unlike prescriptive measures, we cannot present a full summary of the reasons for differences between ex ante and verified gross savings across multiple Custom Incentives projects since each was unique in terms of measures involved and methods of estimating savings. For project-specific details, please see Appendix D to this report, as well as the separate backup calculations and documentation provided by the evaluation team for review.

Nevertheless, we did make specific findings regarding consistent differences in approach between the evaluation and implementation team that spanned multiple projects. These findings and recommendations for improvement below for consideration. Overarching findings and recommendations for the Custom Initiative are presented in Section 3.2.7.

HVAC and HVAC Controls Projects

- We noted cases in this year's evaluation where the implementation team modeled energy savings using small amounts of spot metered data. Using trended or metered energy usage when estimating annual consumption is preferred in place of spot metering. When trended or metered data is not available, we recommend developing 8760 models or binning analysis workbooks that account for seasonal variances in equipment operation.

- The evaluation team found that a few projects had occupied/unoccupied schedules that differed from the schedules that were listed in the project documentation and applied in the ex ante saving calculations.

Compressed Air Projects

- For most of the compressed air projects in the 2022 sample, the implementation team leveraged pre-installation metering data to develop ex ante savings estimates for most projects. Where possible, the evaluation team also collected post-installation data to develop verified savings estimates.

Energy Service Company (ESCO) Projects

- The evaluation included three projects that were part of an ESCO effort. The evaluation team found consistent gaps in documentation, including undefined project start and end dates and opaque calculations. Each of these findings individually present risk because the evaluation team must work with the information that is available to us, but the risk is greater when several of these issues are present. For these projects, the evaluation team worked with the customer, reviewed ESCO reports, and coordinated with the implementation team to collect the necessary information to estimate verified savings.

Overall Results

We used a stratified combined ratio estimation technique[16] to estimate gross realization rates for each wave by fuel type (Table 30).

Table 30. 2022 Custom Incentives Channel Realization Rates by Wave and Fuel Type

Wave	Energy Savings (MWh)	Demand Savings (MW)	Gas Savings (Therms)
CI1	110%	112%	100%
CI2	71%	87%	111%
CI3	97%	105%	88%

Applying these gross realization rates to the population of projects in each wave produced verified gross savings for the Custom Incentives channel. 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 82% of Custom Initiative MWh savings, 71% of Initiative MW savings, and 100% of Initiative therms savings. We achieved a relative precision of 5.9% for channel electric energy savings, 11.8% for electric demand savings, and 3.3% for gas savings at the 90% confidence level. Further details on our methodology for Custom Initiative sampling is provided in Appendix A.

Table 31. 2022 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)
CI1	9,976	110%	10,958	0.786	8,613
CI2	6,158	71%	4,398	0.786	3,457
CI3	12,258	97%	11,865	0.786	9,326
Total	**28,392**	**96%**	**27,221**	**0.786**	**21,396**

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

Table 32. 2022 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)
CI1	1.05	112%	1.17	0.786	0.92
CI2	0.96	87%	0.84	0.786	0.66
CI3	1.06	105%	1.11	0.786	0.87
Total	**3.06**	**102%**	**3.11**	**0.786**	**2.44**

Table 33. 2022 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)
CI1	990,981	100%	990,437	0.800	792,349
CI2	133,517	111%	148,431	0.800	118,744
CI3	673,806	88%	592,402	0.800	473,922
Total	**1,798,303**	**96%**	**1,731,269**	**0.800**	**1,385,015**

Note: The savings presented in this table only reflect savings that are directly claimable by AIC. There additional projects produced non-AIC therm savings and one project produced propane savings. More information on these savings are presented in Appendix B.

3.2.5 New Construction Lighting

The following sections present the impact evaluation results for the 2022 New Construction Lighting channel. Additional details on the impact analysis methodology are provided in Appendix A.

Channel Description

The New Construction Lighting channel offers additional 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.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the New Construction Lighting channel in 2022:

- Leidos began subcontracting with Willdan to assist with the development of savings calculations for new construction projects using custom calculation methods.
  - Willdan guided customers and program allies through the application process utilizing specific tactics and training.
  - Willdan helped the implementation team to better reach commercial and retail customers by leveraging existing partnerships with these companies.
- Supply-chain disruptions and inflation concerns significantly impacted participation throughout the 2022 program year. In Q2 of 2022, AIC increased incentives for the Custom Incentives channel to drive participation and mitigate the macroeconomic barriers customers were experiencing.

Savings Detail

For the Custom Initiative, 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 six New Construction Lighting projects we reviewed in 2022. Realization rates for individual projects ranged from 45% to 112% for electric energy projects.

Table 34. 2022 New Construction Lighting Channel Gross Impact Results for Sampled 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
2101494	NCL	electric	1	11	0.003	–	112%	94%	–	13	0.002	–
2200102	NCL	electric	3	1,118	0.140	–	100%	100%	–	1,122	0.140	–
2100154	NCL	electric	3	723	0.121	–	100%	100%	–	723	0.121	–
2300038	NCL	electric	2	75	0.020	–	98%	100%	–	74	0.020	–
2200105	NCL	electric	4	2,831	0.299	–	58%	85%	–	1,628	0.255	–
2200498	NCL	electric	3	1,855	0.197	–	45%	100%	–	841	0.197	–

We reviewed the sampled 2022 New Construction Lighting projects for consistent differences in approach between the evaluation and implementation team that spanned multiple projects. These findings are provided below to contextualize the impact evaluation results for the channel.

- **Hours of Use:** The primary difference between ex ante and verified energy savings for New Construction Lighting projects in 2022 was assumed hours of use. The implementation team applied expected hours of use based on applicant information and IL-TRM guidance, but the evaluation team verified lower actual hours of use through verification activities, which resulted in lower verified energy savings.

Overall Results

We used a stratified combined ratio estimation technique[17] to estimate gross realization rates for each wave by fuel type (Table 35).

Table 35. 2022 New Construction Lighting Channel Realization Rates

Wave	MWh	MW
NCL	70%	96%

Applying these gross realization rates to the population of projects in each wave produced verified gross savings for the Initiative. Table 36 and Table 37 present the annual ex ante and verified gross and net electric energy, electric demand, and gas savings for each wave. Overall, New Construction Lighting projects accounted for 18% of Initiative MWh savings and 29% of Initiative MW savings. For gross impact results of New Construction Lighting projects, we achieved a relative precision of 12.1% for electric energy savings, and

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

1.5% for electric demand savings at the 90% confidence level. Further details on our methodology for Custom Initiative sampling is provided in Appendix A.

Table 36. 2022 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)
NCL	8,508	70%	5,997	0.786	4,714
Total	**8,508**	**70%**	**5,997**	**0.786**	**4,714**

Table 37. 2022 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)
NCL	1.35	96%	1.30	0.786	1.02
Total	**1.35**	**96%**	**1.30**	**0.786**	**1.02**

3.2.6 Cumulative Persisting Annual Savings

Table 38 and Table 39 present CPAS and WAML for the 2022 Custom Initiative by channel. The tables also include a summary of the total verified gross savings for the Initiative and channels, as well as CPAS in each year of the 2022-2025 Plan.[18] The WAML for the Custom Initiative is 14.3 years and the WAML for the Custom Incentives and New Construction Lighting channels is 14.3 years and 14.1 years, respectively. AIC also converted the natural gas savings produced through ten Custom Incentives projects to electric energy savings for the purposes of goal attainment. The associated CPAS are presented separately in Table 39. Additionally, AIC converted non-claimable natural gas and propane savings produced through four other Custom Incentives projects; further details on these savings can be found in Appendix B.

Table 38. 2022 Custom Initiative CPAS and WAML

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Custom Incentives	14.3	27,221	0.786	21,396	21,396	21,396	21,396	...	20,860	...	306,585
New Construction Lighting	14.1	5,997	0.786	4,714	4,714	4,714	4,714	...	4,540	...	56,920
2022 CPAS		**33,218**	**0.786**	**26,110**	**26,110**	**26,110**	**26,110**	**...**	**25,511**	**...**	**372,933**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**82**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**599**	**...**	
WAML	**14.3**										

Table 39. 2022 Custom Initiative Gas Conversion CPAS and WAML

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Custom Incentives Gas Conversion	14.1	12,167	0.800	9,733	9,733	9,733	9,733	...	9,733	...	137,190
2022 CPAS		**12,167**	**0.800**	**9,733**	**9,733**	**9,733**	**9,733**	**...**	**9,733**	**...**	**137,190**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
WAML	**14.1**										

[18] For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

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:

- **Key Finding #1:** We observed a number of projects where baseline and efficient case estimates did not make full use of available benchmark data, including post-installation data. These observations are indicators of potential evaluation risk, which bore out for a number of 2022 projects that received low gross realization rates. We recommend that the implementation team continue to improve several items in the documentation and classification of major custom projects to avoid this risk.
  - **Recommendation:** Custom Initiative projects should include documentation on a number of key components to support ex ante savings claims, including a full articulation of the baseline conditions chosen for a project (including reasoning to support why the chosen baseline is appropriate), a clear explanation of what was (or will be) done to improve energy efficiency, clearly documented and verifiable energy savings calculations, and a clear description of planned/actual post-implementation operating conditions. In the absence of one or more of these components, Custom Initiative projects are subject to significant evaluation risk. While we have observed improvement around a number of these items, supporting documentation is still insufficient for some projects.
  - **Recommendation:** We recommend that the implementation team continue refining the existing project QA/QC checklist to better support the data requirements for successful project evaluation. The evaluation team plans to continue developing guidance in collaboration with the implementation team for determining project baselines and comprehensive data needs for common project types.
  - **Recommendation**: We recommend conducting verification of hours of operation for lighting projects no earlier than two months following project completion. Waiting several months will allow the building occupants to settle into routines and refine building operations with new technology, which will more closely align to the conditions observed during evaluation. Conducting this post-installation verification will improve overall realization rates for lighting projects, in particular for New Construction Lighting projects, which received relatively low gross realization rates this year due to hours of operation discrepancies. If the hours of operation are unknown, the implementation team should use the deemed hours of operation in the IL-TRM for the specific building type. In addition, when lighting is a significant portion of the total facility energy usage, we recommend verifying the baseline energy usage against utility data.
  - **Recommendation**: For HVAC controls projects, we recommend that the implementation team follow-up with customers after two or three months to gather information on any changes made to occupancy schedules or control setpoints since project completion.
  - **Recommendation**: For compressed air projects, we recommend conducting post-installation metering for one to two weeks following project implementation. This will improve ex ante calculations and help identify discrepancies between actual and intended control strategies and equipment performance and track down calculation errors.
  - **Recommendation**: For ESCO projects, we recommend that the implementation team collect a standard set of information on the incentivized project, including key project dates, detailed project scope (including the specific measures within the scope), ex ante savings estimates, and transparent savings calculations detailing the assumptions and calculations employed by the ESCO. In addition, when information is available, it is recommended that the implementation team

collect information on any other energy efficiency project(s) or action(s) completed by the customer that are unaffiliated with the incentivized project but overlap in terms of the timing of completion. Collecting this additional information, such as project scope, key project dates, and energy savings calculations, will reduce evaluation risk by providing details about additional efficiency improvements which may influence verified savings estimates - e.g., lowering the baseline consumption used in a regression analysis.

- **Key Finding #2:** The evaluation team continued to conduct early reviews of Custom Initiative projects in 2022. The scope of these project reviews expanded from just large projects, to include smaller (i.e., less than one million kWh in ex ante savings) and more complex (e.g., those using energy modeling) projects. Similar to previous years, projects that received an early review achieved better realization rates on average than projects that did not. Projects that received an early review achieved average realization rates of 94% for MWh, 101% for MW and 93% for therms, compared to projects that did not receive an early review, which achieved average realization rates of 75% for MWh, 95% for MW and 96% for therms. However, several individual projects that received an early review achieved lower than expected verified savings due, in part, to unaddressed items noted during the early review process.
  - **Recommendation:** Continue refining the criteria for which projects receive early reviews. Results from the 2021 and 2022 evaluations suggest that early reviews have a positive impact on realization rates. Additionally, continue to work with the evaluation team following the early review to address early review findings and prioritize data needs ahead of end of year reporting.
  - **Recommendation:** If the implementation team chooses not to accept a recommendation from an early review for ex ante savings characterization, discussion and justification of that choice with the evaluation team may lead to improved outcomes.
- **Key Finding #3**: In the 2022 sample, the evaluation team observed four projects that utilized energy modeling software that produced output files that were not industry standard and were unreadable by industry standard modeling software.
  - **Recommendation**: Energy modeling is an increasingly common method of estimating energy savings for complex projects involving multiple building system improvements. We recommend that the implementation team include a list of preferred industry standard energy models and modeling output files (see the Custom Data Request Memo previously submitted to AIC by the evaluation team) on the incentive application. The ability to review these modelling files will help to reaffirm the project scope, ensure claimed savings are reasonable and well-documented, and reduce evaluation risk.
- **Key Finding #4**: Similar to the 2021 evaluation, the evaluation team found that the list of HVAC control measures included in ex ante claimed savings is not always clear in the project documentation, models, and calculation workbooks.
  - **Recommendation**: For each project, we recommend drafting a summary of the measures that are implemented and the associated setpoints. This will reduce evaluation risk by ensuring the evaluation team has all the necessary information to support savings claims. These reports will also support more in-depth discussion on sources of discrepancies between ex ante and verified savings, which the implementation team can address in future projects.

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 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 Initiative is grouped into two sets of offerings: the RCx Core channel and Virtual Commissioning™ channel. Details on the services provided through these two channels are provided in sections 3.3.3 and 3.3.4, respectively.

3.3.2 Initiative Annual Savings Summary

Table 40 presents Retro-Commissioning Initiative annual savings achieved in 2022. The 2022 Retro-Commissioning Initiative achieved 6,507 MWh, 0.09 MW, and 52,731 therms in verified net savings.

Table 40. 2022 Retro-Commissioning Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	7,445	0.16	59,742
Gross Realization Rate	95%	65%	94%
Verified Gross Savings	7,092	0.10	56,097
NTGR	0.917	0.822	0.940
Verified Net Savings	6,507	0.09	52,731

3.3.3 Retro-Commissioning Core Channel

The following sections present the impact evaluation results for the 2022 Retro-Commissioning Core channel. Additional details on the impact analysis methodology are provided in Appendix A.

Channel Description

The RCx Core channel includes three sets of offerings, each targeted at different customers segments:

- **Industrial Refrigeration Retro-Commissioning**: The Industrial Refrigeration offering provides incentives to defray the cost of a retro-commissioning study of industrial refrigeration equipment, leading to the implementation of low- and no-cost energy efficiency measures for existing industrial refrigeration systems. Typical measures include optimizing condensing pressure, suction pressure, evaporator fan controls, evaporator defrost settings, and compressor sequencing.
- **Large Facilities Retro-Commissioning**: The Large Facilities offering has historically targeted two separate types of facilities: healthcare facilities and large commercial facilities (primarily office buildings). Healthcare facilities represent a major opportunity for energy savings in AIC's service territory and historically have driven this offering. Most savings achieved through this offering are from adjusting energy management system (EMS) settings to optimize the operation of HVAC systems, as well as other HVAC and lighting optimization activities.

  Large Facilities retro-commissioning projects go through a screening phase that examines the feasibility of retro-commissioning at the facility. If the RSP determines that the site has good savings potential, the customer is eligible to apply to the Initiative. RSPs commit resources to this deliverable, which may or may not result in a viable retro-commissioning project. To defray potential financial risk to RSPs and to encourage them to market the Initiative more aggressively, AIC pays a screening stipend of 5% to 10% of the retro-commissioning study cost to the RSP for complex projects. This stipend does not require a commitment to implement a project and does not necessarily mean that energy savings will be achieved in future years.
- **Retro-Commissioning Lite**: This offering is an option for smaller facilities that do not qualify for the Large Facilities channel. To date, there has been one Retro-Commissioning Lite project completed in the AIC territory.

Table 41 includes a summary of the incentives provided through each offering.

Table 41. 2022 Retro-Commissioning Core Channel Incentive Structure

Offering	Survey Incentive	Customer Implementation Incentive	Incentive Requirements
Industrial Refrigeration	▪ 90% of survey cost	▪ $0.02/kWh saved	▪ Payback period of 0–1 year ▪ Measure must be completed before incentive is paid
Large Facilities	▪ 90% of survey cost for facilities where AIC provides both electric and gas service; 45% for facilities where AIC provides only one fuel source ▪ 10% of survey cost as "stipend" to RSPs for complex projects	▪ $0.02/kWh saved ▪ $0.10/therm saved	▪ Payback period of 0–1 year ▪ Measure must be completed before incentive is paid ▪ Measures do not need to be completed for stipend to be paid
Lite	▪ 100% of survey cost, capped at $15,000; 50% for facilities where AIC provides only one fuel source	▪ $0.02/kWh saved ▪ $0.10/therm saved	▪ Payback period of 0–1 year ▪ Measure must be completed before incentive is paid

Participation Summary

Table 42 presents RCx Core channel participation during 2022. Three projects were completed through the Industrial Refrigeration offering and two projects were completed through the Large Facilities offering.

Table 42. 2022 Retro-Commissioning Core Channel Participation Summary

Offering	Project Number	Ex Ante Gross Savings			
		MWh	% of Total	Therms	% of Total
Large Facilities	2100081	659	33%	22,735	38%
	2200015	392	20%	37,007	62%
Industrial Refrigeration	2101416	228	11%	0	N/A
	2101418	262	13%	0	N/A
	2200042	448	23%	0	N/A
Total	**5**	**1,989**	**100%**	**59,742**	**100%**

The RCx Core channel has existed since the inception of the AIC portfolio in 2008. Historically, the channel has maintained consistent, but relatively low, participation. Notably, the exclusion of 10 MW customers from AIC's programs, beginning in the Transition Period, significantly affected the overall savings achieved by the channel, which declined precipitously after Program Year PY9 (2016–2017). However, participation increased in 2022 compared to 2021, and the renewed eligibility among large customers offers opportunities to continue this trend in future years. Table 43 shows historic RCx Core participation for PY1 through 2022.

Table 43. Retro-Commissioning Core Channel Participation Summary by Program Year

Program Year	Projects [a]	Ex Ante Gross Savings	
		MWh	Therms
PY1 (2008–2009)	1	2,045	0
PY2 (2009–2010)	17	10,640	0
PY3 (2010–2011)	21	29,819	0
PY4 (2011–2012)	25	19,273	412,666
PY5 (2012–2013)	35	29,257	577,834
PY6 (2013–2014)	26	12,091	248,851
PY7 (2014–2015)	16	10,175	226,171
PY8 (2015–2016)	18	12,193	514,070
PY9 (2016–2017)	21	10,741	252,564
Transition Period	6	932	266,604
2018	12	5,992	190,552
2019	20	5,322	83,622
2020	9	5,192	74,471
2021	2	314	29,640
2022	5	1,989	59,742

[a] This project count reflects projects with associated savings. A number of projects listed in the AIC database as paid—the vast majority of which are "stipend" projects—have no associated savings.

Savings Detail

Table 44 presents the ex ante, verified gross, and verified net electric energy savings achieved through the RCx Core channel.

Table 44. 2022 Retro-Commissioning Core Channel Electric Energy Savings by Project

Project ID	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
2100081	659	81%	531	0.940	499
2200015	392	89%	351	0.940	330
2101416	228	87%	199	0.820	163
2101418	262	93%	245	0.820	201
2200042	448	100%	448	0.820	367
Total	**1,989**	**89%**	**1,773**	**0.880**	**1,560**

Table 45 presents the ex ante, verified gross, and verified net electric demand savings achieved through the RCx Core channel.

Table 45. 2022 Retro-Commissioning Core Channel Electric Demand Savings by Project

Project ID	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
2100081	0.01	0%	0.00	0.940	0.00
2200015	0.04	4%	0.00	0.940	0.00
2101416	0.03	87%	0.02	0.820	0.02
2101418	0.03	93%	0.03	0.820	0.02
2200042	0.05	100%	0.05	0.820	0.04
Total	**0.16**	**65%**	**0.10**	**0.822**	**0.09**

Table 46 presents the ex ante, verified gross, and verified net gas savings achieved through the RCx Core channel.

Table 46. 2022 Retro-Commissioning Core Channel Gas Savings by Project

Project ID	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
2100081	22,735	68%	15,347	0.940	14,426
2200015	37,007	110%	40,750	0.940	38,305
Total	**59,742**	**94%**	**56,097**	**0.940**	**52,731**

The following discussion highlights the prominent drivers of the realization rates for the RCx Core channel:

- **Project 2100081**: The gross realization rate for Project 2100081 is 81% for electric energy savings, 0% for electric demand savings, and 68% for gas savings. Discrepancies between the ex ante and verified savings include:
  - The evaluation team adjusted the verified savings estimated for the holiday break scheduling, updates to minimum outside air levels, implementation of demand control ventilation, and VAV box scheduling to account for interactive effects. While the evaluation team verified during the onsite visit that these measures were implemented, the ex ante savings did not account for the interactive nature of these measures when implemented together. For example, reducing the minimum outside air levels for the VAV boxes impacted the savings produced from scheduling the VAVs. Similarly, the savings produced from the implementation of demand control ventilation were

reduced because the outside air minimums had already been reduced. These adjustments reduced verified electric energy and gas savings.

- The evaluation team also determined that the ex ante calculations for two of the implemented measures included savings associated with pieces of equipment or parts of the facility that were not impacted by the implemented measures. For example, ex ante calculations included savings from air-handler units that were not impacted by the holiday break scheduling. In another case, ex ante savings calculations for reductions in minimum outside air included parts of the facility that were not impacted by the measure. The evaluation team updated the verified analysis accordingly, which lowered verified energy and gas savings.
- Lastly, the evaluation team determined that none of the implemented measures impacted energy usage during the IL-TRM defined peak hours and therefore did not calculate any verified demand savings.

- **Project 2200015**: The gross realization rate for Project 2200015is 89% for electric energy savings, 0% for electric demand savings, and 110% for gas savings. Discrepancies between the ex ante and verified savings include:
  - For nearly all the measures, the ex ante calculations applied motor efficiencies that were not consistent with AIC standard values.[19] The evaluation team applied AIC standard values in the verified analysis, which generally reduced verified energy savings.
  - The verified calculations were also updated to reflect conditions observed during the onsite visit, including:
    - Increased discharge air temperature maximums compared to what was applied in the ex ante calculations, resulting in increased verified therm savings;
    - Changes to occupancy scheduling compared to the ex ante calculations, resulting in reduced verified energy and gas savings; and
    - Updates to the scope of equipment scheduling compared to the ex ante calculations -- e.g., removing an exhaust fan that was not scheduled from the verified analysis -- resulting in lower verified energy savings.
  - Lastly, the evaluation team determined that none of the Building Energy Management System-related measures impacted energy usage during the IL-TRM defined peak hours and therefore did not calculate verified demand savings for these measures.
- **Project 2101416**: The gross realization rate for Project 2101416 is 87% for electric energy savings and 87% for electric demand savings. Discrepancies between the ex ante and verified savings include:
  - During the onsite visit, the evaluation team identified that the customer was not able to maintain the minimum condensing pressure setpoint reflected in the ex ante savings calculations. The customer increased the setpoint by ten pounds per square gauge (PSIG) due to freezing concerns. This reduced verified energy and demand savings.
  - The evaluation team also identified that the customer was not able to maintain the suction pressure setpoint reflected in the ex ante savings calculations. The customer reduced the setpoint by three PSIG due to freezing concerns. This reduced verified energy and demand savings.
  - The ex ante calculations for reducing pump and fan speeds applied a load factor that was not consistent with AIC standard values. Additionally, the ex ante calculations for reduced fan speed

[19] Opinion Dynamics. "2019 Retro-Commissioning Impact Evaluation Report Recommendations." 2021.

included a duty factor that differed from what the evaluation team documented on site. The verified calculations reflect AIC standard values for load factor and site-specific duty factors. These adjustments reduced verified energy and demand savings.

- **Project 2101418**: The gross realization rate for Project 2101418 is 93% for electric energy savings and 93% for electric demand savings. Discrepancies between the ex ante and verified savings include:
  - During the onsite visit, the evaluation team identified that the customer was not able to maintain the minimum condensing pressure setpoint reflected in the ex ante savings calculations. The customer increased the setpoint by ten PSIG due to freezing concerns. This reduced verified energy and demand savings.
  - The ex ante calculations for reducing water pump runtimes applied a load factor that was not consistent with AIC standard values. Additionally, the ex ante calculations included a duty factor that differed from what the evaluation team documented on site. The verified calculations reflect AIC standard values for load factor and site-specific duty factors. These adjustments reduced verified energy and demand savings.
  - The ex ante calculations for reducing the runtime of the freezer glycol pump system applied a load factor that was not consistent with AIC standard values. Additionally, during the site visit the evaluation team noted that the measure was only partially implemented; the programming was used in the summer months but not in the winter months. The verified calculations reflect AIC standard values for load factor and increased pump runtimes in the winter. These adjustments reduced verified energy and demand savings.
- **Project 2200042**: The gross realization rate for Project 2200042 is 100% for electric energy savings and 100% for electric demand savings.

3.3.4 Virtual Commissioning™ Channel

The following sections present the impact evaluation results for the 2022 Virtual Commissioning™ channel. Additional details on the impact analysis methodology are provided in Appendix A.

Channel Description

AIC launched the Virtual Commissioning™ channel, implemented by Power TakeOff, as a pilot in 2020. 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 Virtual Commissioning™ approach leverages Advanced Metering Infrastructure (AMI) data to support targeted insights for these 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 the participants' facilities. These opportunities commonly include HVAC system 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 for Power TakeOff to claim savings.[20] If a project both demonstrates continued savings for three months and meets the model robustness criteria, Power TakeOff can claim annualized savings for the project for the program year.

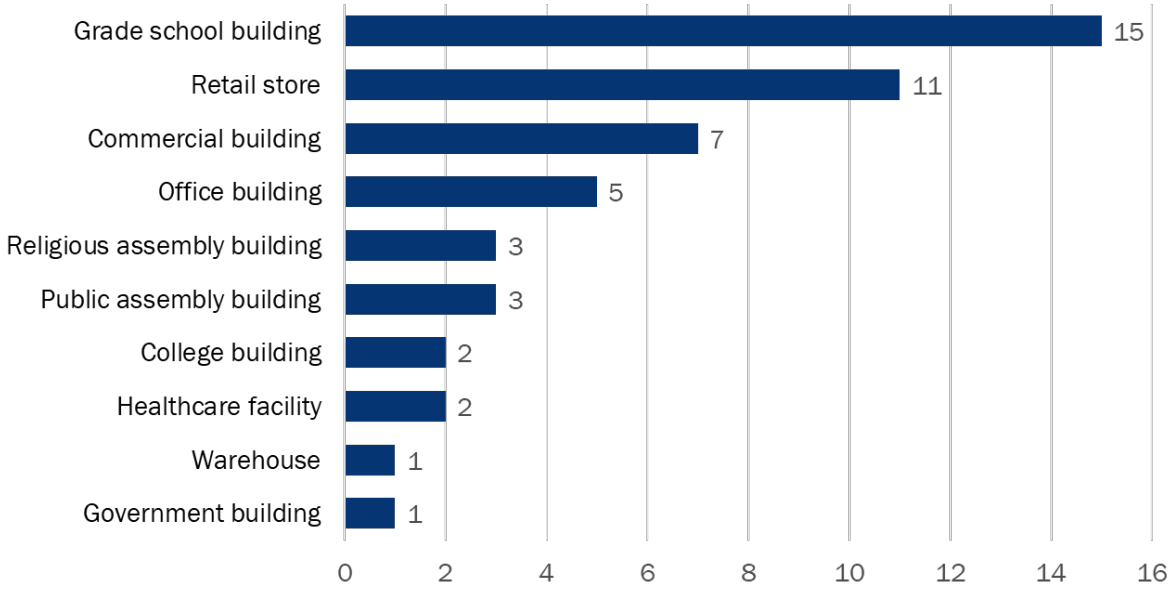
Power TakeOff also provides Leidos with small and medium business customer contact information and referrals to support lead generation for other AIC initiatives.

Participation Summary

The Virtual Commissioning™ channel served 50 participants (i.e., unique sites) across 42 unique organizations in 2022.[21] This represents a slight increase (14%) in the number of organizations reached compared to 2021, while the number of participating sites remained the same. Virtual Commissioning™ participants commonly adjusted their lighting system scheduling, HVAC system setpoints, and/or HVAC system scheduling. Both Power TakeOff and AIC staff reported that they did not have specific Virtual Commissioning™ participation goals in 2022; because Virtual Commissioning™ 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.

In 2022, the Virtual Commissioning™ channel continued to target schools, public buildings, and small businesses. The most common facility types served were schools and retail stores (Figure 1).

Figure 1. Virtual Commissioning™ Channel Facility Types



[20] 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.

[21] We identified unique organizations by summing unique contacts in the program tracking database.

Savings Detail

Table 47 presents the Virtual Commissioning™ channel's annual savings achieved in 2022. The 2022 Virtual Commissioning™ channel achieved 4,947 MWh in verified net electric energy savings after adjusting for cross-participation and free ridership. The gross realization rate, when comparing Power TakeOff and the evaluation team's modeled savings, was 98%. AIC did not claim demand savings or gas savings from Virtual Commissioning™ in 2022. Savings are presented at the channel level only as Virtual Commissioning™ is a single-measure channel.

Table 47. 2022 Virtual Commissioning™ Channel Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings*	5,456	0	0
Gross Realization Rate	98%	N/A	N/A
Verified Gross Savings*	5,319	0	0
NTGR	0.930	N/A	N/A
Verified Net Savings	4,947	0	0

* Gross savings have been adjusted for cross-program participation.

3.3.5 Cumulative Persisting Annual Savings

Table 48 through Table 50 present CPAS and WAML for the 2022 Retro-Commissioning 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 of the 2022-2025 Plan.[22] The WAML for the Retro-Commissioning Initiative is 7.6 years, and the WAML for the Core and VCx channels is 8.6 years and 7.3 years, respectively.

Table 48. 2022 Retro-Commissioning Initiative CPAS and WAML Summary

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
RCx - Core	8.6	1,773	0.880	1,560	1,560	1,560	1,560	...	936	...	13,415
RCx - VCx	7.3	5,319	0.930	4,947	4,947	4,947	4,947	...	0	...	36,112
2022 CPAS		**7,092**	**0.917**	**6,507**	**6,507**	**6,507**	**6,507**	**...**	**936**	**...**	**49,527**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**2,108**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**5,571**	**...**	
WAML	**7.6**										

Table 49. 2022 Retro-Commissioning Core Channel CPAS and WAML Summary

Offering	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Large Facility RCx	8.6	882	0.940	829	829	829	829	...	497	...	7,129
Industrial Refrigeration	8.6	891	0.820	731	731	731	731	...	439	...	6,286
2022 CPAS		**1,773**	**0.880**	**1,560**	**1,560**	**1,560**	**1,560**	**...**	**936**	**...**	**13,415**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**624**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**624**	**...**	
WAML	**8.6**										

[22] For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

Table 50. 2022 Virtual Commissioning™ Channel CPAS and WAML

Channel	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Virtual Commissioning™	7.3	5,319	0.930	4,947	4,947	4,947	4,947	...	0	...	36,112
2022 CPAS		**5,319**	**0.930**	**4,947**	**4,947**	**4,947**	**4,947**	**...**	**0**	**...**	**36,112**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**1,484**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**4,947**	**...**	
WAML	**7.3**										

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 Retro-Commissioning Initiative moving forward:

RCx Core Channel

- **Key Finding #1**: The implementation team estimated ex ante electric demand savings for all projects by dividing the ex ante electric energy savings by 8,760 hours. This approach assumes that all the energy savings produced by each project have a 100% coincidence factor with the peak hours defined in the IL-TRM. In general, this assumption is valid for Industrial Refrigeration RCx projects. However, the HVAC scheduling changes that commonly drive the savings delivered through Large Facility RCx projects are often targeted at periods of low occupancy - e.g., early morning and late evening hours, weekends, holidays, etc. -- and therefore do not impact peak hours.
  - **Recommendation**: We recommend that the implementation team review their approach to estimating ex ante demand savings for Large Facility RCx projects and limit savings claims to measure that are likely to impact the facility's energy usage during the IL-TRM defined peak hours.

Virtual Commissioning™ Channel

- **Key Finding #1:** Following the evaluation team's recommendation from the 2021 AIC Virtual Commissioning™ impact evaluation, Power TakeOff simplified their models and minimized the use of unnecessary interaction terms. However, Power TakeOff also excluded weather interaction terms from their models, despite the important explanatory value that these terms provide.
  - **Recommendation:** The evaluation team recognizes Power TakeOff's desire to provide timely savings estimates to participating facilities and that the application of these 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 for the purposes of claiming ex ante savings. Specifically, we recommend including weather interaction terms when modeling savings for projects that meet the following criteria: Interventions are weather sensitive; the post-period contains more than nine months of data (to cover all four seasons in a typical weather year); and inclusion of weather interactions adds explanatory value to the model.
- **Key Finding #2:** Following the evaluation team's recommendation from the 2021 AIC Virtual Commissioning™ impact evaluation, Power TakeOff began coordinating with Leidos to acquire a list of Virtual Commissioning™ participants that also participated in other AIC Business Program initiatives and leveraged this list to account for known instances of cross-program participation in ex ante savings estimates. This practice reduced discrepancies between ex ante and ex post gross savings in 2022. However, the evaluation team identified one project for which Virtual Commissioning™ did not adjust for cross-participation, and the evaluation team did not adjust savings for two projects that Virtual Commissioning™ identified, as the participation in the other initiatives occurred before completion of the Virtual Commissioning™ project.
  - **Recommendation:** We recommend that Power TakeOff continues working with Leidos to identify instances of cross-participation and adjusts ex ante savings estimates accordingly. Projects should only be adjusted for cross-participation when participation in the other initiative occurs following Virtual Commissioning™ participation.

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.

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.

3.4.2 Initiative Annual Savings Summary

Table 51 presents overall Streetlighting Initiative annual savings achieved in 2022. The 2022 Streetlighting Initiative achieved 23,031 MWh in verified net savings.

Table 51. 2022 Streetlighting Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	23,431	N/A	N/A
Gross Realization Rate	99%	N/A	N/A
Verified Gross Savings	23,168	N/A	N/A
NTGR	0.994	N/A	N/A
Verified Net Savings	23,031	N/A	N/A

3.4.3 Municipality Owned Streetlighting Channel

The following sections present the impact evaluation results for the 2022 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.

Participation Summary

Table 52 presents MOSL channel participation during 2022. The measure counts are based on the total quantity of LED fixtures installed.

Table 52. 2022 Municipality Owned Streetlighting Channel Participation Summary

Participation	MOSL
Participants	12
Project Count	12
Fixture Count	378

As shown in Table 53, the MOSL channel replaced 378 measures during 2022, described in more detail below. Note that Table 53 presents measure counts as defined in ex ante data.

Table 53. 2022 Municipality Owned Streetlighting Channel Participation Summary by Measure

Measure Category	IL-TRM Measure Name	Measure Quantity	Units	Ex Ante Gross MWh	Ex Ante Gross MW
MOSL (HPS Baseline)	LED Streetlighting	378	Streetlights	442	0.000
Total		**378**	**Streetlights**	**442**	**0.000**

Savings Detail

Ex ante gross, verified gross, and verified net electric energy savings for the MOSL channel are presented in Table 54. The Initiative produced no verified net demand or gas savings.

Table 54. 2022 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)	442	100%	442	0.690	305
Total	**442**	**100%**	**442**	**0.690**	**305**

The evaluation team found no meaningful discrepancies in our 2022 MOSL impact analysis, yielding a 100% gross realization rate. Two notable findings did not affect estimated impacts for the channel:

- Two completed measures (projects 2200523 and 2200761) included a change in both fixture count as well as fixture wattage. Per the IL-TRM characterization of LED streetlighting, we concluded that this is an allowable approach to meet customer needs but caution the implementation team to ensure that the overall lumens produced are not significantly changed in future projects of this type to minimize evaluation risk. No adjustments were made to savings because of this finding.
- Two completed measures assumed by the implementation team to replace HPS fixtures appear to instead have replaced metal halide (MH) and incandescent fixtures, respectively (projects 2200523 and 2200612). Lumen equivalencies for these projects appeared to be reasonable and therefore the evaluation team did not make any adjustments to savings as a result of this finding.

3.4.4 Utility Owned Streetlighting Channel

The following sections present the impact evaluation results for the 2022 UOSL channel. Additional details on the impact analysis methodology are provided in Appendix A.

Channel Description

Through the UOSL channel, AIC targets municipal customers who have 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.

Participation Summary

Table 55 presents UOSL channel participation during 2022. The measure counts are based on the total quantity of LED fixtures installed.

Table 55. 2022 Utility Owned Streetlighting Channel Participation Summary

Participation	UOSL
Participants	109
Project Count	109
Fixture Count	34,873

Note: UOSL participant count is the number of unique participants plus 1 additional for AIC replacement on burn-out (ROBs).

As shown in Table 56, the UOSL channel replaced 34,873 measures during 2022, described in more detail below. Note that Table 56 presents measure counts as defined in ex ante data.

Table 56. 2022 Utility Owned Streetlighting Channel Participation Summary by Measure

Measure Category	IL-TRM Measure Name	Measure Quantity	Units	Ex Ante Gross MWh	Ex Ante Gross MW
UOSL (HPS Baseline)	LED Streetlighting	6,904	Streetlights	4,497	0.000
UOSL (HPS Baseline, AIC ROB)	LED Streetlighting	23,616	Streetlights	15,290	0.000
UOSL (MV Baseline)	LED Streetlighting	4,353	Streetlights	3,203	0.000
Total		**34,873**	**Streetlights**	**22,989**	**0.000**

Savings Detail

Ex ante gross, verified gross, and verified net electric energy savings for the UOSL channel are presented in Table 57. The channel produced no verified net demand or gas savings.

Table 57. 2022 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)	4,497	94%	4,235	1.000	4,235
UOSL (HPS Baseline, AIC ROB)	15,290	100%	15,289	1.000	15,289
UOSL (MV Baseline)	3,203	100%	3,203	1.000	3,203
Total	**22,989**	**99%**	**22,727**	**1.000**	**22,727**

While the overall realization rate for the channel is high (99%), we identified and commented on a small number of errors in the verified analysis, detailed below, many of which led to minor changes in verified savings.

- Similar to the 2021 program year, a number of streetlighting replacements were incorrectly categorized:
  - Seven sets of UOSL fixture replacements treated as HPS replacements appear to be replacements of 202W, 327W, and 448W incandescent multiple streetlighting with 39W LED fixtures.
    - Incandescent multiple streetlighting is much less efficient on a lumen-per-watt basis than typical streetlighting fixtures and has a much shorter measure life. IL-TRM Measure 4.5.16

does not explicitly characterize this replacement type and instead instructs the user to assume the appropriate HPS lamp wattage for the application.

  - For the 2022 evaluation, per the IL-TRM guidance, we determined an appropriate HPS-equivalent baseline for these replacements when calculating verified savings based on a lumen comparison. For all three sets of replacements, we used a 138W HPS fixture as a baseline instead of the stated incandescent baseline. This change significantly reduced verified savings for these measures.
  - This may be a conservative treatment of this measure, given that alternative, less efficient options that do not require complete replacements of the incandescent multiple streetlighting fixtures could be possible. If AIC expects these types of replacements to increase in frequency in future years, we suggest that the implementation and evaluation teams discuss how to fully characterize these replacements on a prescriptive basis.

- One set of AIC ROB fixture replacements treated as 455W HPS replacements appears to be the replacements of 455W MV fixtures.
  - These replacements are not addressing currently functioning equipment, and therefore, early replacement assumptions are not required. However, the ex ante analysis used the previously existing MV fixture wattage as an HPS baseline when computing savings. Without program action, the correct baseline would be a 455W MV-equivalent HPS fixture of 295W (as detailed in Appendix A). The verified analysis used a 295W baseline when calculating savings for these replacements.
- Nine sets of AIC ROB fixture replacements treated as HPS replacements appear to potentially be replacements of non-MV MH fixtures.
  - MH streetlighting is much less efficient on a lumen-per-watt basis than HPS fixtures and has a much shorter measure life, and IL-TRM Measure 4.5.16 does not specifically characterize this replacement type.
  - Given the relatively small impact of these replacements, we passed ex ante assumptions through in the verified analysis. However, if AIC expects to continue to replace these types of fixtures in future years, further discussion around the most appropriate savings methodology is warranted.

3.4.5 Cumulative Persisting Annual Savings

Table 58 through Table 60 present CPAS and WAML for the 2022 Streetlighting 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 of the 2022-2025 Plan.[23] The WAML for the Streetlighting Initiative and both channels is 20 years.

Table 58. 2022 Streetlighting Initiative CPAS and WAML

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
MOSL	20.0	442	0.690	305	305	305	305	...	305	...	6,093
UOSL	20.0	22,727	1.000	22,727	22,727	22,727	21,268	...	21,268	...	429,728
2022 CPAS		**23,168**	**0.994**	**23,031**	**23,031**	**23,031**	**21,572**	**...**	**21,572**	**...**	**435,821**
Expiring 2022 CPAS				**0**	**0**	**0**	**1,459**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**1,459**	**...**	**1,459**	**...**	
WAML	**20.0**										

Table 59. 2022 Municipality-Owned Streetlighting Channel CPAS and WAML

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
MOSL (HPS Baseline)	20.0	442	0.690	305	305	305	305	...	305	...	6,093
2022 CPAS		**442**	**0.690**	**305**	**305**	**305**	**305**	**...**	**305**	**...**	**6,093**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
WAML	**20.0**										

[23] For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

Table 60. 2022 Utility-Owned Streetlighting Channel CPAS and WAML

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
UOSL (HPS Baseline)	20.0	4,235	1.000	4,235	4,235	4,235	4,235	...	4,235	...	84,701
UOSL (HPS Baseline, AIC ROB)	20.0	15,289	1.000	15,289	15,289	15,289	15,289	...	15,289	...	305,783
UOSL (MV Baseline)	20.0	3,203	1.000	3,203	3,203	3,203	1,743	...	1,743	...	39,244
2022 CPAS		**22,727**	**1.000**	**22,727**	**22,727**	**22,727**	**21,268**	**...**	**21,268**	**...**	**429,728**
Expiring 2022 CPAS				**0**	**0**	**0**	**1,459**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**1,459**	**...**	**1,459**	**...**	
WAML	**20.0**										

3.4.6 Conclusions and Recommendations

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

- **Key Finding #1:** In 2022, the Streetlighting Initiative appears to have replaced a handful of measures that are not HPS or MV, including incandescent and MH streetlights.
  - **Recommendation:** Clearly label non-HPS or non-MV replacements in the database to ensure that baselines can be set correctly and that savings assumptions are transparent.
  - **Recommendation:** If non-HPS or non-MV streetlights are replaced, it is important to carefully document the existing baseline condition beyond the current level of documentation provided by the Initiative. Unlike for HPS and MV streetlights, the IL-TRM does not currently provide strong guidance on how to treat replacements of other streetlighting technologies, and it is not clear what the expected behavior would be in the absence of the Initiative. We applied generally conservative assumptions in verified savings calculations for these cases given their small impact on Initiative savings, but additional discussions on how to best handle these replacements might lead to different outcomes.
- **Key Finding #2:** Documentation of AIC ROB fixture replacements in Initiative tracking data includes information that appears to be conflicting and/or in error.
  - **Recommendation:** While the evaluation team broadly has enough information to appropriately estimate impacts for these measures, increasing the quality of tracking data will minimize evaluation back and forth, and decrease evaluation risk for the Initiative.

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 Initiative electric savings.
- **Small Business Energy Performance (SBEP) channel**: The SBEP channel targets facilities located in Empower Communities[24] 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,

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

combined with the customized, deeper retrofits incentivized through the SBEP channel offer customers in this segment an opportunity to comprehensively upgrade their facilities.

3.5.2 Initiative Annual Savings Summary

Table 61 presents the annual savings achieved through the Small Business Initiative in 2022. The 2022 Small Business Initiative achieved 67,803 MWh, 10.24 MW, and 18,923 therms in verified net savings. The Initiative also produced 312 therms in verified net propane savings in 2022, which are detailed further in Appendix B.

Table 61. 2022 Small Business Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	76,065	11.45	21,190
Gross Realization Rate	100%	100%	100%
Verified Gross Savings	76,097	11.50	21,238
NTGR	0.891	0.891	0.891
Verified Net Savings	67,803	10.24	18,923

Note: The savings presented in this table reflect only AIC claimable gas savings. One project completed through the SBEP channel produced propane savings. More information on the savings from this project are provided in Appendix B.

3.5.3 Small Business Direct Install Channel

The following sections present the impact evaluation results for the 2022 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 an 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. SBDI incentives are paid directly to program allies, which improves the customer's experience by providing a streamlined transaction at the time of installation with zero or minimal out-of-pocket costs.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the SBDI channel in 2022:

- The Small Business Initiative was a new initiative in AIC's Business Program in 2022. However, the SBDI channel has been part of AIC's Business Program since 2018 and was previously part of the Standard Initiative. In 2022, Initiative staff reorganized the Business Program offerings and moved the SBDI channel under the newly established Small Business Initiative.

Participation Summary

Table 62 presents participation and ex ante gross savings estimates for the SBDI channel in 2022. We present these data separated by public and private sectors to provide context as to the primary drivers of participation. Altogether, the SBDI channel reported a total of 75,958 MWh and 11.43 MW in ex ante gross savings.

Table 62. 2022 Small Business Direct Install Channel Participation Summary

Measure Category	Unique Projects	Ex Ante Gross MWh	Ex Ante Gross MW
Private Sector			
LED Bulbs and Fixtures	2,097	62,523	9.12
ECMs for Walk-in and Reach-in Coolers/Freezers	36	1,478	0.17
Fluorescent Delamping	99	1,336	0.27
Lighting Controls	102	295	0.19
LED Exit Signs	106	165	0.02
Evaporator Fan Control for Electrically Commutated Motors	29	72	0.01
Door Heater Controls for Cooler or Freezer	4	45	<0.01
Automatic Door Closer for Walk-in Coolers and Freezers	8	14	<0.01
Beverage and Snack Machine Controls	6	11	0.00
Private Sector Subtotal[a]	*2,115*	*65,939*	*9.78*
Public Sector			
LED Bulbs and Fixtures	355	9,806	1.59
Fluorescent Delamping	6	56	0.01
Lighting Controls	15	35	0.03
Exit Signs	23	122	0.02
Public Sector Subtotal[a]	*357*	*10,019*	*1.65*
Total[a]	**2,472**	**75,958**	**11.43**

[a] Project count numbers do not add to total due to projects implementing measures in multiple measure categories.

Savings Detail

The Initiative team distributed 301,088 measures through the SBDI channel in 2022, as shown in Table 63.

Table 63. 2022 Small Business Direct Install Channel Participation Summary by Measure

IL-TRM Measure Name	Measure Quantity	Units	Ex Ante Gross MWh	Ex Ante Gross MW
LED Bulbs and Fixtures	286,452	Fixtures	72,329	10.71
ECMs for Walk-in and Reach-in Coolers/Freezers	932	Motors	1,478	0.17
Fluorescent Delamping	9,558	Fixtures	1,392	0.28
Lighting Controls	2,967	Controls	330	0.22
LED Exit Signs	1,039	Exit Signs	287	0.04
Evaporator Fan Control for ECMs	83	Controls	72	0.01
Door Heater Controls for Cooler or Freezer	38	Controls	45	<0.01
Automatic Door Closer for Walk-in Coolers and Freezers	10	Door Closers	14	<0.01
Beverage and Snack Machine Controls	9	Controls	11	0.00
Total	**301,088**		**75,958**	**11.43**

Table 64 summarizes the 2022 ex ante and verified electric energy savings for the SBDI channel. The SBDI channel achieved a 100% realization rate for gross electric energy savings. The channel's performance is

primarily driven by lighting measures; 95% of the verified net electric savings for the channel were produced through the installation of LED bulbs and fixtures. 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% of verified net energy savings each. Overall, the channel experienced a 28% decrease in verified net energy savings compared to 2021.

Table 64. 2022 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	72,329	100%	72,329	0.891	64,445
ECMs for Coolers/Freezers	1,478	100%	1,478	0.891	1,317
Fluorescent Delamping	1,392	100%	1,392	0.891	1,240
Lighting Controls	330	100%	330	0.891	294
Exit Signs	287	100%	287	0.891	256
Evaporator Fan Control for ECMs	72	100%	72	0.891	64
Door Heater Controls	45	100%	45	0.891	40
Automatic Door Closer	14	100%	14	0.891	12
Beverage Machine Controls	11	31%	3	0.891	3
Total	**75,958**	**100%**	**75,950**	**0.891**	**67,672**

Table 65 summarizes the 2022 ex ante and verified electric demand savings for the SBDI channel. The SBDI channel achieved a 100% realization rate for gross demand savings. LED bulbs and fixtures produced 94% of the channel verified net demand savings, followed by fluorescent delamping and lighting controls (2% and 1% of savings, respectively). Overall, the channel experienced a 29% decrease in verified net demand savings compared to 2021 channel.

Table 65. 2022 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	10.71	100%	10.70	0.891	9.53
ECMs for Coolers/Freezers	0.17	100%	0.17	0.891	0.15
Fluorescent Delamping	0.28	100%	0.28	0.891	0.25
Lighting Controls	0.22	100%	0.22	0.891	0.20
Exit Signs	0.04	100%	0.04	0.891	0.03
Evaporator Fan Control for ECMs	0.01	100%	0.01	0.891	0.01
Door Heater Controls	<0.01	100%	<0.01	0.891	<0.01
Automatic Door Closer	<0.01	100%	<0.01	0.891	<0.01
Beverage Machine Controls	0.00	N/A	0.00	0.891	0.00
Total	**11.43**	**100%**	**11.42**	**0.891**	**10.17**

The following discussion covers the main reasons for discrepancies between the ex ante and verified gross savings for the SBDI channel:

- **LED Bulbs and Fixtures (95% of ex ante energy savings and 94% of ex ante demand savings)**: The gross realization rates for LED Bulbs and Fixtures are 100% for energy savings and 100% for demand savings.
  - LED exterior fixture or retrofit replacing HID: For four records, the implementation team applied a coincidence factor based on the building type, despite the fixtures being installed in exterior locations. The evaluation team applied a coincidence factor of zero for the exterior-dusk-dawn space type, in accordance with IL-TRM V10.0, resulting in lower demand savings.
- **Beverage Machine Control (<1% of ex ante energy savings)**: The gross realization rate for Beverage Machine Controls is 31% for electric energy savings.
  - The evaluation team could not calculate verified savings using the algorithm referenced in IL-TRM V10.0 and the information provided in the initiative tracking data. Based on a review of the savings algorithm programmed in AMPLIFY, we determined the implementation team calculated ex ante savings using the algorithms included in IL-TRM V9.0. The savings algorithms in V9.0 and V10.0 of the IL-TRM are considerably different and require different parameters. Some of the parameters required in the V10.0 algorithm are not currently tracked in the initiative tracking data; therefore, the evaluation team calculated verified savings using default values provided in the IL-TRM V10.0, resulting in lower verified savings.

3.5.4 Small Business Energy Performance Channel

The following sections present the impact evaluation results for the 2022 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, community support facilities, religious buildings, and other non-profit organizations. The eligible measures included building envelope upgrades, HVAC improvements, and other non-SBDI measures. In 2022, most of the completed projects consisted of air sealing facility building envelopes. However, two participants received efficient room air conditioners (RACs), as well as air sealing around the perimeter of the installed RAC units.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the SBDI channel in 2022:

- The SBEP channel was previously offered as a pilot in 2019 and 2020 under the Standard Initiative and was reintroduced as a full offering in 2022 under the newly established Small Business Initiative.

Participation Summary

Table 66 presents participation and ex ante gross savings estimates for SBEP channel in 2022. We present these data separated by public and private sectors to provide context as to the primary drivers of participation. Altogether, the SBEP channel reported a total of 108 MWh, 0.02 MW, and 21,190 therms in ex ante gross savings.

Table 66. 2022 Small Business Energy Performance Channel Participation Summary

Measure Category	Unique Projects	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Therms
Private Sector				
C&I Air Sealing	16	32	0.01	5,976
C&I Air Sealing (RAC)	1	5	<0.01	122
ENERGY STAR® and CEE Tier 2 Room Air Conditioners	1	2	<0.01	N/A
Private Sector Subtotal[a]	17	39	0.01	6,098
Public Sector				
C&I Air Sealing	21	66	0.02	15,056
C&I Air Sealing (RAC)	1	1	<0.01	36
ENERGY STAR and CEE Tier 2 Room Air Conditioners	1	1	<0.01	N/A
Public Sector Subtotal[a]	22	69	0.02	15,092
Total[a]	**39**	**108**	**0.02**	**21,190**

[a] Project count numbers do not add to total due to projects implementing measures in multiple measure categories. Additionally, the ex ante therm savings presented in this table reflect only AIC claimable gas savings. One project completed through the SBEP channel produced propane savings. More information on these savings from this project are provided in Appendix B.

Savings Detail

The Initiative team distributed 41 measures through the Small Business Energy Performance channel in 2022, as shown in Table 67.

Table 67. 2022 Small Business Energy Performance Channel Participation Summary by Measure

Measure Category	IL-TRM Measure Name	Measure Quantity	Units	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Air Sealing	C&I Air Sealing	37	Projects	98	0.02	21,032
Air Sealing (RACs)	C&I Air Sealing	2	Projects	6	<0.01	157
RACs	ENERGY STAR and CEE Tier 2 Room Air Conditioners	2	Air Conditioners	3	<0.01	0
Total		**41**		**108**	**0.02**	**21,190**

Table 68 summarizes the 2022 ex ante and verified electric energy savings for the SBEP channel. The SBEP channel achieved a 137% realization rate for gross electric energy savings. Air sealing of building envelopes contributed 97% of verified net energy savings, followed by RACs and air sealing around the RACs (2% and 1% of savings, respectively).

Table 68. 2022 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)
Air Sealing	98	145%	143	0.891	127
Air Sealing (RACs)	6	26%	2	0.891	1
RACs	3	100%	3	0.891	3
Total	**108**	**137%**	**147**	**0.891**	**131**

Table 69 summarizes the 2022 ex ante and verified electric demand savings for the SBEP channel. The SBEP channel achieved a 347% realization rate for gross electric demand savings. Air sealing of building envelopes produced more than 99% of the channel verified net demand savings.

Table 69. 2022 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)
Air Sealing	0.02	347%	0.08	0.891	0.07
Air Sealing (RACs)	<0.01	119%	<0.01	0.891	<0.01
RACs	<0.01	827%	<0.01	0.891	<0.01
Total	**0.02**	**347%**	**0.08**	**0.891**	**0.07**

Table 70 summarizes the 2022 ex ante and verified gas savings for the SBEP channel. The SBEP channel achieved a 100% realization rate for gross gas savings. Air sealing of building envelopes contributed 99% of verified net gas savings; air sealing around RACs produced the remaining 1% of verified net gas savings.

Table 70. 2022 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)
Air Sealing	21,032	100%	21,032	0.891	18,740
Air Sealing (RACs)	157	131%	206	0.891	184
Total	**21,190**	**100%**	**21,238**	**0.891**	**18,923**

Note: The savings presented in this table reflect only AIC claimable gas savings. One project completed through the SBEP channel produced propane savings. More information on the savings from this project are provided in Appendix B.

The following discussion highlights the prominent drivers of realization rates for the SBEP channel observed by the evaluation team.

- **Air Sealing (91% of ex ante energy savings, 99% of ex ante demand savings, and 99% of ex ante therm savings):** The gross realization rate for air sealing is 145% for electric energy, 347% for electric demand and 100% for therm savings.
  - The implementation team leveraged algorithms from measure 4.8.27 (C&I Air Sealing) in IL-TRM V11.0 to estimate air sealing savings because IL-TRM V10.0 does not include a prescriptive air sealing measure characterization. The evaluation team also applied the V11.0 algorithms to calculate verified savings. The implementation team mistakenly applied a furnace fan energy consumption term (Fe) twice in the ex ante energy savings calculations. The evaluation team removed the second instance of the term in the verified savings calculation, resulting in higher electric energy savings.

- Additionally, the implementation team applied a value of 4,380 for the cooling equivalent full load hours ($EFLH_{cooling}$) parameter in the ex ante demand savings calculation and did not include a coincidence factor. The evaluation team applied the EFLHcooling for unknown building types provided in section 4.4 of the IL-TRM V11.0, and applied a summer system peak coincidence factor, resulting in higher electric demand savings.

- **Air Sealing (RACs) (6% of ex ante energy savings, <1% of ex ante demand savings, and 1% of ex ante therm savings)**: The gross realization rate for air sealing (RACs) is 26% for electric energy, 119% for electric demand and 131% for therm savings.
  - The implementation team applied a combination of savings algorithms to estimate ex ante savings for air sealing the edges of RAC installations. They applied an algorithm from section 4.4.38 of IL-TRM V10.0 (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 electric savings and higher demand and therm savings.

- **RACs (3% of ex ante energy savings and <1% of ex ante demand savings):** The gross realization rate for RACs is 100% for electric energy and 827% for electric demand.
  - The implementation team calculated ex ante demand savings by dividing the electric energy savings by 8,760 hours. The evaluation team used the algorithm for the IL-TRM V10.0 for ENERGY STAR and CEE Tier 2 Room Air Conditioners to calculate the electric demand by dividing the energy savings by the applicable cooling full load hours and multiplying by the coincidence factor, resulting in higher electric demand savings.

3.5.5 Cumulative Persisting Annual Savings

Table 71 through Table 73 present CPAS and WAML for the 2022 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 of the 2022-2025 Plan.[25] The WAML for the Small Business Initiative is 12.8 years and the WAML for the SBDI and SBEP channels is 12.8 years and 19.8 years, respectively. In 2022, AIC converted propane savings produced the SBEP channel to CPAS for the purposes of goal attainment; further details on these savings can be found in Appendix B.

Table 71. 2022 Small Business Initiative CPAS and WAML

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
SBDI	12.8	75,950	0.891	67,672	67,672	67,261	65,265	...	60,639	...	801,987
SBEP	19.8	147	0.891	131	131	131	131	...	131	...	2,604
2022 CPAS		**76,097**	**0.891**	**67,803**	**67,803**	**67,392**	**65,396**	**...**	**60,771**	**...**	**804,590**
Expiring 2022 CPAS				**0**	**0**	**411**	**1,996**	**...**	**584**	**...**	
Expired 2022 CPAS				**0**	**0**	**411**	**2,407**	**...**	**7,032**	**...**	
WAML	**12.8**										

[25] For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

Table 72. 2022 Small Business Direct Install Channel CPAS and WAML

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
LED Bulbs and Fixtures	12.8	72,329	0.891	64,445	64,445	64,035	62,039	...	57,684	...	764,195
ECMs for Coolers/Freezers	15.0	1,478	0.891	1,317	1,317	1,317	1,317	...	1,317	...	19,756
Fluorescent Delamping	11.0	1,392	0.891	1,240	1,240	1,240	1,240	...	1,240	...	13,643
Lighting Controls	10.0	330	0.891	294	294	294	294	...	294	...	2,940
Exit Signs	5.0	287	0.891	256	256	256	256	...	0	...	1,280
Evaporator Fan Control for ECMs	13.0	72	0.891	64	64	64	64	...	64	...	831
Door Heater Controls	10.0	45	0.891	40	40	40	40	...	40	...	399
Automatic Door Closer	8.0	14	0.891	12	12	12	12	...	0	...	96
Beverage Machine Controls	5.0	3	0.891	3	3	3	3	...	0	...	15
2022 CPAS		**75,950**	**0.891**	**67,672**	**67,672**	**67,261**	**65,265**	**...**	**60,639**	**...**	**801,987**
Expiring 2022 CPAS				**0**	**0**	**411**	**1,996**	**...**	**584**	**...**	
Expired 2022 CPAS				**0**	**0**	**411**	**2,407**	**...**	**7,032**	**...**	
WAML	**12.8**										

Table 73. 2022 Small Business Energy Performance Channel CPAS and WAML

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Air Sealing	20.0	143	0.891	127	127	127	127	...	127	...	2,543
Air Sealing (RACs)	20.0	2	0.891	1	1	1	1	...	1	...	29
RACs	12.0	3	0.891	3	3	3	3	...	3	...	31
2022 CPAS		**147**	**0.891**	**131**	**131**	**131**	**131**	**...**	**131**	**...**	**2,604**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
WAML	**19.8**										

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:** For several lighting measures, the implementation team applied incorrect parameters in savings calculations by applying assumptions based on the building type associated with the installation, despite the installations being labeled as occurring in exterior spaces.
  - **Recommendation:** The IL-TRM deems specific parameter values for lighting installations in exterior spaces. We recommend that the implementation team review the algorithms and assumptions in AMPLIFY for exterior lighting measures to confirm the correct IL-TRM assumptions are applied.
- **Key Finding #2:** The implementation team applied the savings algorithms from IL-TRM V9.0 for Beverage and Snack Machine Control measures.
  - **Recommendation:** We understand that the implementation team discontinued the offering of this measure in the middle of 2022. In the event the implementation team decides to resume incentivizing this measure, we recommend they update AMPLIFY to align the savings algorithms and inputs for this measure with the current IL-TRM algorithms.

Small Business Energy Performance Channel

- **Key Finding #1:** The evaluation team identified several errors in the ex ante savings calculations for C&I Air Sealing measures, including applying a furnace fan energy consumption term (Fe) twice in the energy savings calculations, applying an EFLHcooling value in the demand savings calculations that was inconsistent with IL-TRM guidance, and not applying a coincidence factor in the demand savings calculations.
  - **Recommendation:** We recommend the implementation team review the calculation workbook for this measure and ensure the savings algorithms and assumptions align with the IL-TRM.
- **Key Finding #2:** The implementation team applied a combination of algorithms to estimate savings for air sealing around the edges of RAC installations, including an algorithm from IL-TRM V10.0 for Covers and Gap Sealers for Room Air Conditioners to estimate gas savings, and a custom calculation to estimate energy and demand savings.
  - **Recommendation:** The IL-TRM V10.0 states that the Covers and Gaps Sealers for Room Air Conditioners measure: "constitutes either a rigid cover that fits inside the empty sleeve or completely covers the indoor side of a window AC unit, with foam gaskets sealing the edges [or] a flexible insulated cover that perfectly covers the indoor side of the unit and seals gaps may also be installed. Covers should remain installed throughout the winter heating season." Based on this description, the evaluation team determined that this measure did not accurately characterize the actions taken in the field, which entailed sealing the perimeter of installed RAC units. In addition, the custom calculation used to estimate energy and demand savings does not align with the IL-TRM. Therefore, the evaluation team recommends that the implementation team applies the air sealing algorithms from section 4.8.27 of the IL-TRM V11.0 to estimate savings for air sealing around the edges of RAC installations.
- **Key Finding #3:** The implementation team's algorithm for estimating ex ante demand savings from RAC installations does not align with the IL-TRM.

- **Recommendation:** We recommend that the implementation team applies the algorithm from section 4.7.7 of the IL-TRM V10.0 and EFLHcooling assumptions from section 4.4 to estimate electric demand savings for this measure.

- **Key Finding #4:** The implementation team applied "unknown" facility type assumptions for all SBEP savings calculations. Given that all SBEP measures are installed onsite by program allies, the implementation team should be able to collect detailed information about participating facilities.
  - **Recommendation:** The evaluation team recommends that the implementation team collect information on the types of facilities participating in the channel and apply the corresponding parameters and assumptions in savings calculations.

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 goal is to increase the adoption of high efficiency equipment without requiring the end-customer to submit a rebate application. 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 Initiative. The Initiative includes three channels: Midstream Lighting, Midstream HVAC, and Midstream Food Service.

3.6.2 Initiative Annual Savings Summary

Table 74 presents the Midstream Initiative annual savings achieved in 2022. The 2022 Midstream Initiative achieved 21,870 MWh, 5.18 MW, and 46,596 therms in verified net savings.[26]

Table 74. 2022 Midstream Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	24,404	5.64	62,745
Gross Realization Rate	98%	101%	87%
Verified Gross Savings	24,032	5.69	54,594
NTGR	0.910	0.911	0.853
Verified Net Savings	21,870	5.18	46,596

3.6.3 Lighting Channel

The following sections present the impact evaluation results for the 2022 Midstream Lighting channel. Additional details on the impact analysis methodology are provided in Appendix A.

Channel Description

AIC has offered midstream incentives for efficient nonresidential lighting since the 2014-2015 cycle. The Lighting channel incentivizes the sale of linear LED tubes and mogul-based LED lamps at the distributor level and is a significant contributor of savings for the portfolio.

[26] Throughout the Midstream Initiative chapter, reported savings are for 2022 sales only and do not include carryover savings.

Summary of Key Implementation Changes

Initiative staff instituted the following design and implementation changes to the Midstream Lighting channel in 2022:

- The Midstream Initiative was a new initiative in AIC's Business Program in 2022. However, the Instant Incentives channel has been part of AIC's Business Program since 2014 and was previously part of the Standard Initiative. In 2022, Initiative staff reorganized the Business Program offerings and moved the Instant Incentives channel under the newly established Midstream Initiative, as the Midstream Lighting channel.
- The Lighting channel increased its incentives in March 2022 across all lighting equipment.
- The channel re-introduced incentives for pin-based LEDs.

Participation Summary

Table 75 presents Midstream Lighting channel participation during 2022. We present these data separated by public and private sectors to provide context as to the primary drivers of participation.

Table 75. 2022 Midstream Lighting Channel Participation Summary

Sector	Total Projects	Ex Ante Gross MWh	Ex Ante Gross MW
Private	270	12,994	3.07
Public	172	10,312	2.43
Total	**442**	**23,305**	**5.50**

Savings Detail

The Initiative team incentivized 420,916 measures through the Midstream Lighting channel in 2022, as shown in Table 76. The Midstream Lighting channel reduces the cost of LED lighting measures to encourage customers to replace less efficient lighting equipment, such as fluorescent tubes and high intensity discharge fixtures. The efficient lighting measures offered through the channel include linear, mogul, and specialty LED lamps and fixtures.

Table 76. 2022 Midstream Lighting Channel Participation Summary by Measure

Measure Category	IL-TRM Measure Name	Measure Quantity	Units	Ex Ante Gross MWh	Ex Ante Gross MW
Linear LED	LED Bulbs and Fixtures	404,373	Lamps	18,347	4.38
Mogul LED	LED Bulbs and Fixtures	4,861	Lamps	3,685	0.83
Specialty LEDs and Downlights [a]	LED Bulbs and Fixtures	11,682	Lamps/fixtures	1,273	0.29
Total		**420,916**		**23,305**	**5.50**

[a] Directional and decorative lamps are included in the specialty LED category.

Table 77 presents the ex ante and verified electric energy savings for the Midstream Lighting channel. The Midstream Lighting channel achieved a gross realization rate of 99% for electric energy savings. Linear LEDs continue to be the dominant source of savings for the channel, accounting for 80% of verified net electric energy savings; however, this is down from 86% in 2021. Mogul LEDs contributed 15% of savings in 2022, up from 6% in 2021. Specialty LEDs contributed the remaining 5% of electric energy savings, which is consistent

with their average contribution over the past four program years. Overall, the channel experienced a 35% decrease in verified net electric energy savings compared to 2021, primarily driven by a reduction in the number of linear LEDs incentivized through the channel, which is a break from recent trends of increasing linear LED contributions over the past three years.

Table 77. 2022 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 LED	18,347	100%	18,347	0.913	16,754
Mogul LED	3,685	93%	3,436	0.913	3,138
Specialty LEDs and Downlights	1,273	98%	1,245	0.913	1,137
Total	**23,305**	**99%**	**23,028**	**0.913**	**21,029**

Table 78 presents the ex ante and verified electric demand savings for the Midstream Lighting channel. The Midstream Lighting channel achieved a gross realization rate of 100% for electric demand savings. Overall, the channel experienced a 34% decrease in verified net demand savings compared to 2021, primarily driven by the reduction in incentivized linear LEDs.

Table 78. 2022 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 LED	4.38	100%	4.38	0.913	4.00
Mogul LED	0.83	99%	0.82	0.913	0.75
Specialty LEDs and Downlights	0.29	96%	0.28	0.913	0.25
Total	**5.50**	**100%**	**5.48**	**0.913**	**5.00**

The following discussion highlights the prominent drivers of the realization rates for the Midstream Lighting channel:

- **Mogul LEDs (15% of ex ante energy savings and 15% of demand savings):** The gross realization rates for mogul LEDs are 93% for electric energy and 99% for electric demand savings.
  - The primary drivers to electric energy and demand realization rates are the selection of hours of use (HOU) and ISR in the savings calculations. The IL-TRM V10.0 does not provide clear guidance on how to appropriately characterize mogul lights for the purposes of assigning savings assumptions.[27] Specifically, the IL-TRM V10.0 does not define whether it is appropriate to apply assumptions for LED bulbs or fixtures to mogul lighting measures.

    In a December 2022 meeting, the evaluation and implementation teams agreed to apply LED fixture assumptions for HOU (3,379 hours) and LED bulb assumptions for first year ISR (82.5%), based on the underlying research in IL-TRM V10.0 and the practical applications of high-intensity lighting like moguls through the channel. The evaluation team applied these assumptions in the verified calculations. The implementation team used a combination of assumptions from IL-TRM

[27] *2022 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 10.0, Volume 2: Commercial and Industrial Measures*. Section 4.5.4, LED Bulbs and Fixtures. 2021. pp 554–569.

V9.0 and IL-TRM V10.0, but correctly applied the agreed upon assumptions towards the end of the program year.[28] This resulted in lower verified electric energy and demand savings.

- The implementation team applied a residential adjustment factor of 2% to specialty LED measures, presumably pulling that value from the previous IL-TRM V9.0.[29] The evaluation team applied a residential adjustment factor of 3% to specialty LED measures in accordance with IL-TRM V10.0. This discrepancy has minimal impact on savings.

- **Specialty LEDs and Downlights (5% of ex ante energy savings and 5% of demand savings)**: The gross realization rates for specialty LEDs are 98% for electric energy and 96% for electric demand savings.
  - The primary driver of electric energy and demand realization rates is a difference in the characterization of downlights in the ex ante and verified analyses. The IL-TRM V10.0 does not include clear guidance on the appropriate classification of these products as LED bulbs or fixtures. In the ex ante calculations, the implementation team categorized downlights as LED fixtures, and applied the following IL-TRM V10.0 assumptions: 92.9% first-year ISR and 3,379 HOU for commercial installations and 100% first-year ISR, 926 HOU, and 0.127 CF for residential installations.[30] The evaluation team reviewed the characteristics of incentivized downlights using model numbers included in the initiative tracking data and determined that downlights fit better within the specialty lamp classification. Therefore, the verified savings calculations applied an 82.5% ISR and 3,612 HOU for commercial installations and an 81.5% ISR, 1,020 HOU, and 0.117 CF for residential installations. These differences in assumptions resulted in lower verified savings.

3.6.4 HVAC Channel

The following sections present the impact evaluation results for the 2022 Midstream HVAC channel. Additional details on the impact analysis methodology are provided in Appendix A.

Channel Description

AIC began offering midstream incentives for nonresidential HVAC equipment in late 2020. The HVAC channel incentivizes the sale of air source heat pumps, single package and split air conditioners, advanced thermostats, notched V-belts, and air source heat pump water heaters.

Summary of Key Implementation Changes

During 2022, the Midstream HVAC channel implemented the following design and implementation changes relative to 2021:

- The Midstream Initiative was a new initiative in AIC's Business Program in 2022. However, MHVAC channel has been part of AIC's Business Program since 2020 and was previously part of the Standard Initiative. In 2022, Initiative staff reorganized the Business Program offerings and moved the MHVAC channel under the newly established Midstream Initiative, as the Midstream HVAC channel.
- The HVAC channel increased the incentive payment to distributors for heat pump water heaters.

[28] *2021 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 9.0, Volume 2: Commercial and Industrial Measures*. Section 4.5.4, LED Bulbs and Fixtures. 2020. pp 489–504

[29] The IL-TRM V10.0 stipulates that when an implementation strategy does not allow installation location of lamps to be known, that a residential adjustment factor be applied to account for a portion of lamps that are expected to be taken home and installed by participants.

[30] *2022 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 10.0, Volume 3: Residential Measures.* Section 5.5.9, LED Fixtures. 2021. pp 316–323

Participation Summary

Table 79 presents Midstream HVAC Channel participation during 2022. We present these data separated by public and private sectors to provide context as to the primary drivers of participation.

Table 79. 2022 Midstream HVAC Channel Participation Summary

Sector	Total Projects	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Private	118	351	0.10	23,923
Public	6	138	0.04	12,581
Total	**124**	**489**	**0.14**	**36,504**

Savings Detail

The Initiative team distributed 410 measures through the Midstream HVAC Channel in 2022, as shown in Table 80. The Midstream HVAC channel offers high efficiency space and water heating equipment to customers aimed at replacing older, less efficient units. The measures offered through the channel include advanced thermostats, unitary air conditioners (AC) and air source heat pumps (ASHP), heat pump water heaters (HPWH), and notched V-belts.

Table 80. 2022 Midstream HVAC Channel Participation Summary by Measure

Measure Category	IL-TRM Measure Name	Measure Quantity	Units	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Advanced Thermostat	Small Commercial Thermostats	351	Thermostat	436	0.12	36,504
Unitary AC	Single-Package and Split System Unitary Air Conditioners	41	Air Conditioner	27	0.02	0
Unitary ASHP	Air and Water Source Heat Pump Systems	10	Heat Pump	15	0.003	0
Heat Pump Water Heater	Water Heater	3	Water Heater	10	0.002	0
Notched V-Belt	Notched V-Belts for HVAC Systems	5	V-Belt	1	0.0002	0
Total		**410**		**489**	**0.14**	**36,504**

Table 81 presents the ex ante and verified electric energy savings produced through the Midstream HVAC channel in 2022. The channel achieved a gross realization rate of 94% for electric energy savings. Advanced thermostats drove electric energy savings for the channel in 2022, accounting for 89% of the channel verified net electric savings. Unitary ACs made up 6% of verified net electric energy savings, followed by unitary ASHPs (3%), HPWHs (2%), and notched V-belts (<1%). Overall, the channel experienced a 4% increase in verified net electric energy savings compared to 2021.

Table 81. 2022 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 Thermostat	436	94%	408	0.880	359
Unitary AC	27	100%	27	0.890	24
Unitary ASHP	15	101%	15	0.890	13

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Heat Pump Water Heater	10	96%	10	0.890	8
Notched V-Belt	1	100%	1	0.800	1
Total	**489**	**94%**	**460**	**0.881**	**405**

Table 82 presents the ex ante and verified electric demand savings produced through the Midstream HVAC channel in 2022. The channel achieved a gross realization rate of 100% for electric demand savings. Advanced thermostats accounted for 83% of verified net demand savings, followed by unitary ACs (17%), with the remaining measures accounting for <1% of verified net demand savings.

Table 82. 2022 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 Thermostat	0.12	100%	0.12	0.880	0.10
Unitary AC	0.02	100%	0.02	0.890	0.02
Unitary ASHP	<0.01	97%	<0.01	0.890	<0.01
Heat Pump Water Heater	<0.01	82%	<0.01	0.890	<0.01
Notched V-Belt	<0.01	100%	<0.01	0.800	<0.01
Total	**0.14**	**100%**	**0.14**	**0.881**	**0.12**

Table 83 presents the ex ante and verified gas savings produced through the Midstream HVAC channel in 2022. The channel achieved a gross realization rate of 100% for therm savings. Advanced thermostats were the only measure that produced therm savings.

Table 83. 2022 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 Thermostat	36,504	100%	36,504	0.880	32,124
Total	**36,504**	**100%**	**36,504**	**0.880**	**32,124**

The following discussion highlights the prominent drivers of the realization rates for the Midstream HVAC channel:

- **Advanced Thermostats (89% of ex ante energy savings, 85% of demand savings, and 100% of therm savings):** The gross realization rates for advanced thermostats are 94% for electric energy, 100% for electric demand, and 100% for therm energy savings.
  - For 331 advanced thermostat measures, the implementation team assumed a baseline heating seasonal performance factor (HSPF) of 3.41, which is equivalent to an electric resistance heating system. The evaluation team assumed a baseline HSPF of 8.2, which is equivalent to an air source heat pump. The evaluation team maintains that the appropriate baseline to apply is an air source heat pump because electric resistance baseboards are not compatible with typical advanced thermostats and electric resistance furnaces are less common than air source heat pumps. While this discrepancy is present in nearly all the advanced thermostat calculations, the decrease in verified electric energy savings is only 9% due to the heating fuel ratio.
  - For 88 advanced thermostat measures, the implementation team did not claim electric energy savings from reduced natural gas furnace fan operations. In each case, the participating customer

did not receive natural gas service from AIC, which the evaluation team believes is the reason the implementation team did not claim the energy savings. While the evaluation team agrees that therm energy savings are not eligible in these instances, the electric energy savings are eligible because the participants are AIC electric customers. Therefore, the evaluation team included these savings in the verified analysis, resulting in higher verified electric energy savings.

- **Unitary Air Source Heat Pumps (3% of ex ante energy savings and 2% of demand savings)**: The gross realization rates for unitary ASHPs are 101% for electric energy and 97% for electric demand savings.
  - The implementation team applied the average EFLH for cooling (1,178) and heating (1,519) for the unknown building type in all ex ante calculations. The evaluation team applied the appropriate EFLH assumptions, as defined for each climate zone in IL-TRM V10.0, in the verified analysis based on the address information included in the initiative tracking data for each project. This discrepancy accounts for all differences between verified and ex ante savings.
- **Heat Pump Water Heaters (2% of ex ante energy savings and 1% of demand savings)**: The gross realization rates for heat pump water heaters are 96% for electric energy and 82% for electric demand savings.
  - The implementation team applied a consumption per gallon of useable tank capacity (consumption/cap) of 576.79 gallons in the ex ante calculations for all records. The IL-TRM V10.0 provides estimates of consumption per capacity for different building types. The evaluation team used the account numbers associated with each project to identify the building type associated with each installation and applied the facility-specific consumption per capacity values in the verified calculations. This resulted in lower verified electric energy and demand savings.
  - The implementation team assumed that the associated building was electrically heated in the ex ante calculations, and in turn applied a coefficient of performance (COP) of 1.92 to calculate electric heating penalties. While the IL-TRM V10.0 is not explicit on how to treat unknown heating conditions for this measure, other measures, such as LED lighting, clearly state to assume natural gas.[31] Therefore, the evaluation team assumed a natural gas heating efficiency of 80%; natural gas heating penalties are reported in Appendix B. This resulted in higher verified electric energy savings.
  - The evaluation team found inconsistencies between ex ante demand calculations and the IL-TRM V10.0 algorithm for demand savings. Ex ante demand calculations included the coincidence factor (CF) in the denominator, while verified calculations followed IL-TRM V10.0 guidance to apply the CF in the numerator. This resulted in lower verified demand savings.

3.6.5 Food Service Channel

The following sections present the impact evaluation results for the 2022 Midstream Food Service channel. Additional details on the impact analysis methodology are provided in Appendix A.

Channel Description

The Food Service channel launched in 2022 as a pilot and was implemented at a statewide level. The offering will be rolled out as a full channel in 2023. The channel targets both national and local food service equipment suppliers to offer point-of-sale incentives for commercial food service equipment such as freezer/refrigerator doors, griddles, fryers, ovens, and broilers. In 2022, GTI was the prime implementer of the pilot and was

[31] *2022 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 10.0, Volume 2: Commercial and Industrial Measures*. Section 4.5, Lighting End Use. 2021. pp 562

responsible for project and contract management, as well as overseeing internal and external project coordination. GTI partnered with Frontier Energy and Energy Solutions to implement the pilot. Frontier Energy was responsible for onboarding suppliers, QA/QC, incentive payouts, and monthly reporting. Energy Solutions managed the Iris System (application portal) and provided outreach to its established network of national food service equipment suppliers.

Participation Summary

Table 84 presents Midstream Food Service Channel participation during 2022.

Table 84. 2022 Midstream Food Service Channel Participation Summary

Participation	Food Service Channel
Unique Projects	89
Measure Count	105

Savings Detail

The Initiative team distributed 105 measures through the Midstream Food Service channel in 2022, as shown in Table 85. The Midstream Food Service Channel offers ENERGY STAR® certified commercial cooking, refrigeration, and other kitchen equipment.

Table 85. 2022 Midstream Food Service Channel Participation Summary by Measure

Measure Category	IL-TRM Measure Name	Measure Quantity	Units	Ex Ante Gross MWh	Ex Ante Gross MW	Ex Ante Gross Therms
Steam Cooker	Commercial Steam Cooker	11	Steam Cooker	350	0	0
Combination Oven	Combination Oven	19	Combination Oven	175	0	486
Dishwasher	ENERGY STAR Dishwasher	5	Dishwasher	61	0	294
Refrigerators and Freezers	Commercial Solid and Glass Door Refrigerators and Freezers	31	Refrigeration Unit	10	0	0
Convection Oven	ENERGY STAR Convection Oven	16	Convection Oven	9	0	13,446
Hot Food Holding Cabinet	ENERGY STAR Hot Food Holding Cabinets	1	Hot Food Holding Cabinet	3	0	0
Ice Machine	Ice Maker	4	Ice Machine	1	0	0
Conveyor Oven	Conveyor Oven	1	Conveyor Oven	0	0	1,768
Fryer	ENERGY STAR Fryer	17	Fryer	0	0	10,247
Total		**105**		**610**	**0**	**26,241**

Table 86 presents the ex ante and verified electric energy savings produced through the Food Service channel. The Food Service channel achieved a gross realization rate of 89% for electric energy savings. Steam cookers were the primary driver of channel verified net electric energy savings, contributing 61% of channel verified net energy savings; combination ovens contributed 24% and dishwashers contributed 12%. The remaining combined measures accounted for 3% of verified net electric energy savings.

Table 86. 2022 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 Cooker	350	94%	331	0.800	265
Combination Oven	175	75%	131	0.800	104
Dishwasher	61	109%	67	0.800	54
Refrigerators and Freezers	10	89%	9	0.800	7
Convection Oven	9	13%	1	0.800	1
Hot Food Holding Cabinet	3	79%	3	0.800	2
Ice Machine	1	220%	2	0.800	2
Total	**610**	**89%**	**544**	**0.800**	**435**

Table 87 presents the verified electric demand savings produced through the Midstream Food Service channel in 2022. The implementation team did not claim ex ante demand savings for the channel, but the evaluation team included electric demand savings in the verified analysis.

Table 87. 2022 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 Cooker	0.00	N/A	0.06	0.800	0.05
Combination Oven	0.00	N/A	0.01	0.800	0.01
Dishwasher	0.00	N/A	<0.01	0.800	<0.01
Refrigerators and Freezers	0.00	N/A	<0.01	0.800	<0.01
Convection Oven	0.00	N/A	<0.01	0.800	<0.01
Hot Food Holding Cabinet	0.00	N/A	<0.01	0.800	<0.01
Ice Machine	0.00	N/A	<0.01	0.800	<0.01
Total	**0.00**	**N/A**	**0.08**	**0.800**	**0.06**

Table 88 presents the ex ante and verified gas savings produced through the Midstream Food Service channel in 2022. The channel achieved a gross realization rate of 69% for therm savings. The largest contributors to verified net therm savings were fryers (57%), convection ovens (33%), and conveyor ovens (5%).

Table 88. 2022 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)
Combination Oven	486	123%	596	0.800	477
Dishwasher	294	100%	294	0.800	235
Convection Oven	13,446	44%	5,967	0.800	4,774
Conveyor Oven	1,768	50%	884	0.800	707
Fryer	10,247	101%	10,348	0.800	8,279
Total	**26,241**	**69%**	**18,090**	**0.800**	**14,472**

The following discussion highlights the prominent drivers of the realization rates for the Midstream Food Service channel:

- **Steam Cooker (57% of ex ante energy savings)**: The gross realization rate for steam cookers is 94% for electric energy savings.
  - For three steam cooker measures, the implementation team applied daily operating hours based on the type of food service that are inconsistent with IL-TRM V10.0 assumptions. In one case, the food service type listed in the initiative tracking data is "health care," which is not included as an option in the IL-TRM V10.0. The evaluation team applies the TRM-defined "unknown" food service type. This resulted in lower verified electric energy savings.
- **Combination Oven (29% of ex ante energy savings and 2% of therm energy savings)**: The gross realization rates for combination ovens are 75% for electric energy and 123% for therm energy savings.
  - The implementation team provided the necessary data on all incented combination ovens to calculate savings using IL-TRM V10.0 default assumptions where the initiative tracking data had gaps. The evaluation team was unable to replicate ex ante savings using the tracking data and default assumptions, leading to the conclusion that sources of discrepancies are likely due to differences in assumptions applied in the ex ante and verified analyses. This type of data limitation is a source of discrepancy among several other measures in the channel.
- **Dishwasher (10% of ex ante energy savings and 1% of therm energy savings)**: The gross realization rates for dishwashers are 109% for electric energy and 100% for therm energy savings.
  - One dishwasher measure contained an erroneous half quantity. The evaluation team applied a quantity of one for the record, resulting in higher electric energy savings.
- **Refrigerators and Freezers (2% of ex ante energy savings)**: The gross realization rate for Refrigerators and Freezers is 89% for electric energy savings.
  - For 11 refrigerators and freezer measures, the evaluation team was unable to replicate ex ante savings due to data limitations. For the remaining 20 measures, the ex ante and verified electric energy savings align. The precise source of the discrepancy for the remaining measures is unclear.
- **Convection Oven (2% of ex ante energy savings and 51% of therm energy savings)**: The gross realization rates for convection ovens are 13% for electric energy and 44% for therm energy savings.
  - For three measures, the implementation team incented convection ovens that are below the IL-TRM V10.0 baseline efficiency. Specifically, the IL-TRM V10.0 specifies a baseline efficiency of 77% for full-size electric convection ovens, while the efficiency of the incented equipment listed in the initiative tracking data is 76%.[32] These three measures reduced electric energy savings for convection ovens by 87%.
- **Conveyor Oven (7% of ex ante therm energy savings):** The gross realization rate for conveyor ovens is 50% for therm energy savings.
  - For the only conveyor oven measure, the implementation team doubled the savings, presumably because the incented unit contained two conveyor decks as opposed to one. The IL-TRM V10.0 deems the savings for this measure at 884 therms. The measure definition stipulates that the savings are realized from the replacement of "existing natural gas units with conveyor width greater

[32] *2022 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 10.0, Volume 2: Commercial and Industrial Measures*. Section 4.2.19, ENERGY STAR Electric Convection Oven. 2021. pp 143–146

than 25 inches."[33] The TRM does not indicate that savings are based on the number of decks contained in the conveyor oven. The evaluation team applied the deemed savings as prescribed in the IL-TRM, resulting in lower verified therm savings.

- **Hot Food Holding Cabinet (1% of ex ante energy savings)**: The gross realization rate for hot food holding cabinets is 79% for electric energy savings.
  - The implementation team provided the minimum data required by the IL-TRM V10.0 algorithms (e.g., actual cabinet size of efficient unit) to calculate savings. Using the TRM default assumptions for the remaining algorithm inputs, the evaluation team was unable to replicate ex ante savings, leading to the conclusion that sources of discrepancies are likely a result of assumptions applied by the implementation team, but not shared in the initiative tracking data.
- **Ice Machine (<1% of ex ante energy savings)**: The gross realization rate for ice machines is 220% for electric energy savings.
  - The implementation team provided the minimum data required by the IL-TRM V10.0 algorithms (e.g., actual production capacity of the efficient unit) to calculate savings. Using the TRM default assumptions for the remaining algorithm inputs, the evaluation team is unable to replicate ex ante savings, leading to the conclusion that sources of discrepancies are likely a result of assumptions applied by the implementation team, but not shared in the initiative tracking data.

[33] *2022 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 10.0, Volume 2: Commercial and Industrial Measures*. Section 4.2.4, Conveyor Oven. 2021. p 91

3.6.6 Cumulative Persisting Annual Savings

Table 89 through Table 92 present CPAS and WAML for the 2022 Midstream 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 of the 2022-2025 Plan.[34] The WAML for the Midstream Initiative is 14.3 years and the WAML for the Lighting, HVAC, and Food Service channels is 14.4, 11.5, and 12.5 years, respectively.

Table 89. 2022 Midstream Initiative CPAS and WAML Summary

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Lighting Channel	14.4	23,028	0.913	21,029	21,029	21,029	21,029	...	19,898	...	300,890
HVAC Channel	11.5	460	0.881	405	405	405	405	...	404	...	4,648
Food Service Channel	12.5	544	0.800	435	435	435	435	...	435	...	5,447
2022 CPAS		**24,032**	**0.910**	**21,870**	**21,870**	**21,870**	**21,870**	**...**	**20,737**	**...**	**310,985**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**1,132**	**...**	
WAML	**14.3**										

Table 90. 2022 Midstream Lighting Channel CPAS and WAML Summary

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Linear LED	14.8	18,347	0.913	16,754	16,754	16,754	16,754	...	16,754	...	247,920
Mogul LED	14.8	3,436	0.913	3,138	3,138	3,138	3,138	...	3,138	...	46,432
Specialty LED	6.8	1,245	0.913	1,137	1,137	1,137	1,137	...	6	...	6,538
2022 CPAS		**23,028**	**0.913**	**21,029**	**21,029**	**21,029**	**21,029**	**...**	**19,898**	**...**	**300,890**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**1,131**	**...**	
WAML	**14.4**										

[34] For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

Table 91. 2022 Midstream HVAC Channel CPAS and WAML Summary

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Advanced Thermostat	11.0	408	0.880	359	359	359	359	...	359	...	3,945
Unitary AC	15.0	27	0.890	24	24	24	24	...	24	...	357
Unitary ASHP	16.0	15	0.890	13	13	13	13	...	13	...	215
Heat Pump Water Heater	15.0	10	0.890	8	8	8	8	...	8	...	127
Notched V-Belt	3.8	1	0.800	1	1	1	1	...	0	...	4
2022 CPAS		**460**	**0.881**	**405**	**405**	**405**	**405**	**...**	**404**	**...**	**4,648**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**1**	**...**	
WAML	**11.5**										

Table 92. 2022 Midstream Food Service Channel CPAS and WAML Summary

Measure Category	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2022	2023	2024	2025	...	2030	...	
Steam Cooker	12.0	331	0.800	265	265	265	265	...	265	...	3,177
Combination Oven	12.0	131	0.800	104	104	104	104	...	104	...	1,254
Dishwasher	16.0	67	0.800	54	54	54	54	...	54	...	876
Refrigerators and Freezers	12.0	9	0.800	7	7	7	7	...	7	...	90
Convection Oven	12.0	1	0.800	1	1	1	1	...	1	...	12
Hot Food Holding Cabinet	12.0	3	0.800	2	2	2	2	...	2	...	25
Ice Machine	9.0	2	0.800	2	2	2	2	...	2	...	14
2022 CPAS		**544**	**0.800**	**435**	**435**	**435**	**435**	**...**	**435**	**...**	**5,447**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**...**	**0**	**...**	
WAML	**12.5**										

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:

Midstream Lighting Channel

- **Key Finding #1:** The evaluation team observed that the largest project in the Midstream Lighting channel installed 1,500 mogul fixtures and claimed 885,834 kWh and 198 kW of savings, each representing 4% of the Midstream Lighting channel total. Conducting additional review of this project, the evaluation team found that the lamps included in this project are rated for exterior use and include indicators in their ENERGY STAR description that the measures may be intended for exterior pole arms, e.g., lighting along walkways and paths.
  - **Recommendation:** While ultimately a programmatic choice, the evaluation team recommends that the implementation team consider instituting a per project or per customer incentive cap for this channel. An incentive cap would protect the Initiative against incentivizing large projects without understanding the specific project details, as well as the potential evaluation risk associated with mischaracterizing such projects in ex ante savings calculations.

Midstream HVAC

- **Key Finding #1:** Heat pump water heaters have large savings potential (>2,000 kWh per unit, on average), but participation has been low for this measure in comparison to other Midstream HVAC measures.
  - **Recommendation:** Consider ways to increase adoption of this technology in small and medium businesses where residential-sized water heaters are more common. Potential ways to increase adoption include providing contractors with informative materials and educational workshops. Consider also conducting additional research with distributors to better understand the market for heat pump water heaters.
- **Key Finding #2**: Notched V-belts have been offered through the Midstream Initiative for several years but have had low uptake. Moreover, the savings potential of this measure is lower (~250 kWh) compared to other measures offered through the channel.
  - **Recommendation:** Monitor participation and customer interest and consider dropping this measure from the channel. Consider also conducting additional research with distributors to better understand the market for notched V-belts.

Midstream Food Service

- **Key Finding #1:** The Midstream Food Service channel successfully engaged commercial kitchen customers in 2022, a typically hard to reach customer segment.
  - Recommendation: We recommend the implementation team continue to emphasize this offering. The food service segment offers high energy savings potential and AIC would do well to continue targeting these customers.

- **Key Finding #2:** The evaluation team was not able to replicate ex ante savings calculations in many cases. The tracking data did not include all the savings parameters applied in the ex ante calculations and it appears that, at least in some cases, the implementation team did not apply the appropriate default values from the IL-TRM for the omitted parameters.
  - **Recommendation:** We recommend that the implementation team review the default parameters included in the IL-TRM to ensure the appropriate values are applied in ex ante calculations.

Appendix A. Impact Analysis Methodology

Standard Initiative

Gross Impact Methodology

The evaluation team primarily calculated verified savings for the Standard Initiative by applying savings algorithms from the IL-TRM V10.0. The team leveraged information from the initiative tracking data such as primary heating and cooling type, the delivery mechanism (e.g., direct install, leave behind), LED wattage, LED lamp type, project location (e.g., for weather-dependent variables), and installed measure location (e.g., for faucet aerators) to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V10.0. Table 93 lists the measures in the Standard Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2022 evaluation.

Table 93. Standard Initiative Measures Evaluated

IL-TRM Measure Name	IL-TRM Measure	Errata Applied?
Livestock Waterer	4.1.4	No errata present for this measure
Combination Oven	4.2.1	No errata present for this measure
ENERGY STAR Dishwasher	4.2.6	No errata present for this measure
ENERGY STAR Fryer	4.2.7	No errata present for this measure
ENERGY STAR Hot Food Holding Cabinets	4.2.9	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
ENERGY STAR Electric Convection Oven	4.2.19	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
Controls for Central Domestic Hot Water	4.3.8	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
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
Advanced Rooftop Controls (ARC)	4.4.41	No errata present for this measure
Small Commercial Thermostats	4.4.48	Errata applied

IL-TRM Measure Name	IL-TRM Measure	Errata Applied?
LED Bulbs and Fixtures	4.5.4	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
Evaporator Fan Control for Electrically Commutated Motors	4.6.6	No errata present for this measure
Add Doors to Open Refrigerated Display Cases	4.6.13	No errata present for this measure
VSD 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
Compressed Air No-Loss Condensate Drains	4.7.3	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
Compressed Air Storage Receiver Tank	4.7.10	No errata present for this measure
Commercial Weather Stripping	4.8.16	No errata present for this measure
Energy Efficient Hydraulic Oils - Provisional Measure	4.8.20	No errata present for this measure
Smart Sockets	4.8.22	No errata present for this measure
Lithium Ion Forklift Batteries	4.8.23	No errata present for this measure
Building Operator Certification	4.8.24	No errata present for this measure

Non-TRM Measures and Assumptions

Variable-Speed Drives for Process Pumps

Process VSDs are available through the Standard Core channel's VSD offering and include installations for both process fans and process pumps. The IL-TRM V10.0 Volume 2 includes a VSD measure for process fans but does not provide an approach for calculating gross impacts for process pump VSDs. For VSDs controlling process pumps, the evaluation team applied a mix of methods to evaluate verified savings, including the use of IL-TRM V10.0 Section 4.8.13 algorithms and assumptions in coordination with a 2010 memorandum[35] 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 V10.0 Section 4.8.13 algorithms for calculating the base energy consumption of processes before the installation of VSDs. The algorithms for calculating verified energy and demand savings are provided below in Equation 1 through Equation 3, with all input variable descriptions and values, if deemed, provided in Table 94:

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. VSD Electric Energy Savings for Process Pumps

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

[35] 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 VSDs.

Equation 3. VSD 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 94. Deemed Inputs for VSD Calculations

Algorithm Variable	Description	Value	Source
kWh_{base}	Base energy consumption of the existing motor prior to installation of the VSD	Calculated	IL-TRM V10.0
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 factor; assumes "No Control or Bypass Damper"	1	IL-TRM V10.0
ηmotor	Installed nominal/nameplate motor efficiency, based on horsepower [a]	NEMA Standard	Extracted from IL-TRM V10.0 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 VSDs installed on process pumps until the IL-TRM provides guidance for this application of VSDs.

Ozone Laundry

The implementation team incentivized Ozone Laundry equipment through the Standard Core channel in 2022. One of the parameters included in the electric energy savings algorithm prescribed in IL-TRM V10.0 Measure 4.3.6 is the runtime (in hours) of the associated boiler feed water pumps. Per IL-TRM V10.0, a custom value must be applied in laundromat applications; the listed default value of 800 hours is not valid to use in these cases. The evaluation team determined that the implementation team applied the default value in the ex ante savings calculations, and therefore needed to develop an appropriate custom value to apply in the verified calculations.

To develop these custom pump runtimes, we started by identifying the annual hours of operation for each laundromat based on the daily hours of operation each business listed on their website. This value served as a proxy for the number of hours each laundry machine is in operation. Footnote 415 of IL-TRM V10.0 includes details on the underlying calculation used to develop the default runtime of 800 hours listed in the IL-TRM. The default value was developed by multiplying the number of minutes per hour a laundry machine spends filling with water, by the number of hours the machine is in operation. The IL-TRM estimates that laundry machines spend an average of seven minutes per hour filling with water. The evaluation team multiplied this value by the estimated annual hours of operation of the laundry machines, to estimate the annual runtime of the associated water pumps. The estimated runtimes fell between 500 and 700 hours for each project. This

approach is not ideal and should not be relied on for future years, but was used in 2022 in lieu of other available data.

Measure Lives and Cumulative Persisting Annual Savings

For prescriptive measures, the evaluation team applied measure lives and mid-life adjustments from the IL-TRM V10.0.

Net Impact Methodology

The evaluation team applied SAG-approved 2022 NTGRs to the verified gross savings to calculate verified net savings. Table 95 outlines the SAG-approved Standard Initiative NTGR values applied to verified gross savings to calculate verified net savings. Per section 4.8.24 of IL-TRM V10.0, the Building Operator Certification measure does not require the application of a net-to-gross ratio because the information used to derive the savings algorithms included in the IL-TRM were in net savings.

Table 95. 2022 SAG-Approved Standard Initiative NTGRs

Channel	Measure	Electric NTGR	Gas NTGR
Core	Lighting	0.839	0.839
	HVAC	0.683	0.426
	HVAC - Thermostats	0.842	0.713
	Variable Speed Drives	0.833	*N/A*
	Specialty Equipment	0.849	0.675
	Green Nozzles	0.920	0.890
	Sink Aerators	0.849	0.675
Online Store	Adv. Thermostat	0.880	0.880
	All Other Online Store Measures	1.156	0.800

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 45 Custom Incentives channel projects.

The evaluation team completed desk reviews (and in most cases, on-site M&V to provide increased accuracy) for the 45 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 2022 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 45 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 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 28 projects chosen for the Custom Incentives channel electric sample and 19 projects chosen for the Custom Incentives gas sample.[36] The 45 reviews that we conducted account for 64.7% of the total ex ante gross Custom Incentives channel electric energy savings and 76.3% of total ex ante gross Custom Incentives channel gas savings. Table 96 and Table 97 present details around the sample of electric and gas projects chosen for the 2022 evaluation.

Table 96. 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
CI1	1	< 169 MWh	12	676	2	76
	2	> 169 MWh & < 322 MWh	5	1,155	1	229
	3	> 322 MWh & < 3,460 MWh	10	8,155	10	8,155
		Subtotal	27	9,986	13	8,459
CI2	1	< 86 MWh	8	136	1	20
	2	> 86 MWh & < 289 MWh	2	391	1	131
	3	> 289 MWh & < 1,810 MWh	7	3,821	7	3,821
	4	> 1,810 MWh	1	1,811	1	1,811
		Subtotal	18	6,158	10	5,783
CI3	1	< 423 MWh	29	3,430	2	430
	2	> 423 MWh & < 970 MWh	7	4,524	1	571
	3	> 970 MWh & < 2,120 MWh	2	2,182	1	1,002
	4	> 2,120 MWh	1	2,122	1	2,122
		Subtotal	39	12,258	5	4,124
Total			**84**	**28,403**[a]	**28**	**18,366**

[a] Note that this value is slightly higher than the ex ante MWh value presented in Table 31. This is because one of the projects in the population produced negative electric energy savings. We excluded projects with negative savings from our sampling, so those negative energy savings are not reflected in the sampling approach.

Table 97. 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	Ex Ante Therms
CI1	1	< 1,700 therms	2	2,441	1	987
	2	> 1,700 & < 5,100 therms	2	4,808	1	2,002

[36] Two projects were sampled as part of the Custom Incentives channel electric projects and Custom Incentives channel gas projects.

Wave	Sampling Stratum	Savings Range	Population of Projects		Completed Reviews	
			Count	Ex Ante Therms	Count	Ex Ante Therms
	3	> 5,100 & < 149,000 therms	5	83,371	4	53,868
	4	> 149,000	3	900,361	3	900,361
		Subtotal	12	990,981	9	957,218
CI2	1	< 4,800 therms	2	4,278	1	1,894
	2	> 4,800 & < 30,000 therms	2	29,878	2	29,878
	3	>30,000	2	99,362	2	99,362
		Subtotal	6	133,517	5	131,133
CI3	1	< 49,000 therms	22	262,337	2	25,602
	2	> 49,000 & < 166,200 therms	5	359,745	1	30,715
	3	> 166,200 & < 600,000 therms	1	194,795	1	194,795
	4	>600,000	1	601,847	1	601,847
		Subtotal	29	1,418,724	5	852,959
	Total		**47**	**2,543,221**[a]	**19**	**1,941,310**

[a] Note that this value is slightly higher than the ex ante therms value presented in Table 33. This is because one of the projects in the population produced negative gas savings. We excluded projects with negative savings from our sampling, so those negative gas savings are not reflected in the sampling approach.

To estimate the channel's verified savings, the evaluation team used the combined ratio adjustment method.[37] As described in Equation 1, 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 verified gross savings to the ex ante gross savings (the realization rate) to adjust the ex ante gross savings for the population of all 2022 Custom Incentives channel projects (N=104).

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

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

Precision Calculations

We calculated precision for our gross impact results by pooling the results from all waves of project reviews.[38] To calculate relative precision, the team first determined the variance in the sample and then calculated the standard error and confidence interval. Equation 5 through Equation 8 were used.

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

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 V10.0 Attachment B,[39] the evaluation team reviewed the ex ante measure life assumptions provided by the implementation team for sampled Custom Incentives channel projects in 2022 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 98 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.

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

Table 98. Custom Incentives Channel Measure Life Adjustment Due to Evaluation

Project Number	End Use	Measure Life		Rationale for Adjustment
		Ex Ante	Verified	
2100024	Custom HVAC	15.0	14.9	Multiple technologies with different lifetimes required a combined lifetime (weighted average)
2101009	Custom Industrial Process	23.0	20.0	Ex ante EUL is sourced from the Illinois TRM section on electric chillers that do not have VSDs. Verified value is from the section that includes VSD chillers.
2200035	Custom Lighting	10.0	5.8	Verified EUL was calculated by taking a 50,000-hour average lifetime divided by the annual operating hours. The ex ante and ex post values are approximately the same.
2200173	Custom Compressed Air	15.0	13.0	Changed source to VSD air compressor. Measure is fixed speed compressor, but EUL will be similar given that the compressor is not expected to cycle often
2200260	Custom Industrial Process	8.0	15.0	Custom Calcs

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 six New Construction Lighting projects.

The evaluation team completed desk reviews for the six sample 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 six 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 six projects chosen for the New Construction Lighting electric sample. The six reviews that we conducted account for 77.7% of the total ex ante gross New Construction Lighting electric energy savings. Table 99 presents details around the sample of projects chosen for the 2022 evaluation.

Table 99. 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
NCL	1	< 133 MWh	24	470	1	11
	2	> 133 MWh & < 388 MWh	7	997	1	75
	3	> 388 MWh & < 2,800 MWh	4	4,209	3	3,696

Wave	Sampling Stratum	Savings Range	Population of Projects		Completed Reviews	
			Count	Ex Ante MWh	Count	Ex Ante MWh
	4	> 2,800 MWh	1	2,831	1	2,831
Total			**36**	**8,508**	**6**	**6,614**

To estimate the channel's verified savings, the evaluation team used the combined ratio adjustment method.[40] As described in Equation 9, below, we calculated the gross realization rate based on the desk reviews for a stratified random sample of projects. We then used 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 2022 New Construction Lighting projects with savings (N=36).

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

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

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

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 10.0 Attachment B,[41] the evaluation team reviewed the ex ante measure life assumptions provided by the implementation team for sampled New Construction Lighting projects in 2022 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 100 provides a summary of Custom Initiative 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 100. New Construction Lighting Measure Life Adjustment Due to Evaluation

Project Number	End Use	Measure Life		Rationale for Adjustment
		Ex Ante	*Verified*	
2100154	New Construction Lighting	15.0	8.6	EUL of 50,000 hrs. 50,000/5,840 = 8.56
2101494	New Construction Lighting	14.0	14.0	Although the ex ante and verified measure lives appear the same within rounding, there are slight differences. The evaluation team calculated the verified measure life as follows: EUL = 50,000 hrs. 50,000/3580=13.97.

Net Impact Methodology

The evaluation team applied SAG-approved 2022 NTGRs to verified gross savings to calculate verified net savings. Table 101 outlines the SAG-approved NTGR values applied to verified gross savings to calculate verified net savings.

Table 101. SAG-Approved Custom Initiative NTGRs

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

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

Retro-Commissioning Initiative

Gross Impact Methodology - Retro-Commissioning Core Channel

The evaluation team examined RCx Core impacts to estimate a realization rate of savings between ex ante and verified gross savings. The evaluation team conducted engineering desk reviews and site visits for a census of projects to determine verified gross savings.

The engineering desk reviews consisted of a thorough examination of all available project documentation, including project reports, communications, equipment submittals, calculations, and any other project-specific data that were available to our team. The evaluation team also conducted virtual site visits to verify measure status and collect supplemental data, as needed.

Because the evaluation team reviewed all projects, there is no sampling error around impact evaluation results.

Measure Lives and Cumulative Persisting Annual Savings

In accordance with the methodology presented and discussed in the IL-TRM V10.0 Attachment B, the evaluation team reviewed the ex ante measure life assumptions provided by the implementation team for all Retro-Commissioning Initiative projects in 2022.

Table 102 provides a summary of the Retro-Commissioning Initiative project measure lives that were adjusted after evaluation.

Table 102. Retro-Commissioning Core Channel Measure Life Adjustment Due to Evaluation

Project Number	Channel	Measure Life		Rationale for Adjustment
		Ex Ante	Verified	
2200015	Large Facility RCx	8.8	8.6	IL-TRM V10.0 Attachment B - Retro-Commissioning
2200042	Industrial Refrigeration RCx	11.8	8.6	IL-TRM V10.0 Attachment B - Retro-Commissioning The evaluation team notes that the IL-TRM defined measure life for retro-commissioning was determined from a retro-commissioning study focusing primarily on traditional facility retro-commissioning and is likely not ideal to apply to industrial refrigeration projects. However, in the absence of a different, well-supported value, the evaluation team believes that this is the most appropriate to apply.

Gross Impact Methodology - Virtual Commissioning™ Channel

The evaluation team evaluated gross savings resulting from Virtual Commissioning™ in 2022 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 methodology 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 2022, after replicating Power TakeOff's models, the evaluation team ultimately modified the facility-level

models for 20 projects due to the exclusion of weather interaction terms 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. It is worth noting that not all projects had a full year of post-period data, which may increase the prediction error for the modeling results.

In addition to verifying the savings associated with Virtual Commissioning™, the evaluation team independently verified whether the individual project modeling results met the channel's guidelines with respect to model robustness. All projects that Power TakeOff claimed as part of the 2022 Virtual Commissioning™ 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.

Seven sites were missing dates specifying the end of a non-routine event (NRE), when IPMVP method three was used. Power TakeOff confirmed that the "reporting end date" should be used as the "end date" in these instances.

Modeling Approach

The evaluation team verified the electric savings results Power TakeOff claimed for Virtual Commissioning™ 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.

Following Power TakeOff's process, 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. Model specifications also differed depending on whether there was an NRE, or if weather interactions were included.[42] Power TakeOff estimated hourly models for 44 facilities and daily models for 6 facilities.

Although Power TakeOff only used weather interactions in one of the models, the evaluation team decided to add weather interactions to the model specifications of 20 projects that had a weather-sensitive intervention (i.e., HVAC set point or scheduling adjustments), at least ten months of post-period data, and for which the combined effect of the interacted terms was statistically significant. 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 uncertainty because the model was not able to train on a full range of temperature data after the intervention was initiated. This may increase the prediction error of the model.

[42] Power TakeOff included weather interactions in one model in 2022.

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 and Non-Routine Adjustment (NRA) Interactions

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

Equation 17. Regression Model Considering Time, Weather, and NRA Interactions

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

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 is 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:

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

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.

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

Normalized Gross Annual Savings

To verify gross annual savings resulting from the Virtual Commissioning™ channel, the evaluation team first estimated the hourly model for 44 facilities and daily model for six 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. The following equations show how we calculated the gross annual savings in detail.

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 that do not include an NRA (Equation 14 and Equation 15) will not include NRA terms.

Equation 18. Hourly Predicted Baseline Period Electricity Consumption

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

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 14 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 and Equation 16) will not include that interaction.

Equation 19. Hourly Predicted Reporting Period Electricity Consumption

$$E_R(i) = \sum_{j=1}^{7\times24} \hat{\beta}_j HOW_j(i) + \hat{H}(i) + \hat{C}(i) + \alpha_j Change(i) + \left(\sum_{j=1}^{7\times24} \beta_j HOW_j(i) * \alpha_j Change(i) \right) + \left(\left(\hat{H}(i) + \hat{C}(i) \right) * \alpha_j Change(i) \right)$$

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 NRA (Equation 14 and Equation 15) will not include NRA 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 and Equation 16) will not include that interaction.

Equation 20. Daily Predicted Baseline Period Electricity Consumption

$$E_B(i) = \hat{\beta}_0 + \sum_{j=1}^{7} \hat{\beta}_j W_j(i) + \hat{H}(i) + \hat{C}(i) + NRA(i) + \left(\sum_{j=1}^{7} \beta_j W_j(i) * NRA(i) \right) + \left(\left(\hat{H}(i) + \hat{C}(i) \right) * \mathrm{NRA}(i) \right)$$

Equation 21. Daily Predicted Reporting Period Electricity Consumption

$$E_R(i) = \hat{\beta}_0 + \sum_{j=1}^{7} \hat{\beta}_j W_j(i) + \hat{H}(i) + \hat{C}(i) + \alpha_j Change(i) + \left(\sum_{j=1}^{7} \beta_j W_j(i) * \alpha_j (Change(i) \right) + \left(\left(\hat{H}(i) + \hat{C}(i) \right) * \alpha_j Change(i) \right)$$

Non-Routine Events

Power TakeOff identified several types of NRE that occurred at participating sites in 2022, including shutdowns associated with the COVID-19 pandemic, school closures, and other variations in building operating schedules.

Both teams handled these NREs in accordance with the IPMVP NRE guidelines[43] 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.[44] All of the projects met the savings uncertainty criteria.

Detailed Project Savings

Table 103 presents the results of the gross savings analysis for the 50 Virtual Commissioning™ projects completed in 2022. These results represent model outputs before any cross-program participation adjustment was applied to the ex ante or verified project-level savings. Realization rates for individual projects range from 84% to 106% for electric savings. All projects met model uncertainty thresholds in 2022.

Table 103. 2022 Virtual Commissioning™ Annual Savings by Project

Project ID	Ex Ante Gross kWh	Verified Gross kWh	Gross Realization Rate
a1C1Q000000a9hRUAR *	139,041	146,474	105%
a1C1Q000000a9hWUAR *	67,490	71,108	105%
a1C1Q000000gx06UAB *	344,694	341,290	99%
a1C1Q000000gx08UAB *	35,877	36,815	103%
a1C1Q000000gx0AUAR	39,111	39,048	100%
a1C1Q000000gx0BUAR *	32,875	33,067	101%
a1C1Q000000gx0CUAR *	174,053	164,466	94%
a1C1Q000000gx0EUAR *	99,020	94,257	95%
a1C1Q000000N0i7UAD	44,105	42,708	97%
a1C1Q000000N0iqUAD *	24,143	23,779	98%
a1C1Q000000N0izUAD *	138,689	146,276	105%
a1C1Q000000rbe2UAB *	100,375	106,644	106%
a1C1Q000000rbe3UAB *	19,686	20,530	104%
a1C1Q000000rbe5UAB	43,168	43,606	101%
a1C1Q00000P4ma6UAB *	21,327	17,915	84%
a1C1Q00000P4ma9UAB *	168,128	146,234	87%
a1C1Q00000P4maBUAR *	9,383	9,447	101%
a1C1Q00000PaVDjUAN	533,990	531,230	99%
a1C1Q00000PaVDlUAN	65,029	65,443	101%

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

Project ID	Ex Ante Gross kWh	Verified Gross kWh	Gross Realization Rate
a1C1Q00000PaVDuUAN	186,797	187,556	100%
a1C1Q00000PjDYSUA3	18,442	18,838	102%
a1C1Q00000PjDYUUA3	18,144	18,485	102%
a1C1Q00000PjDZ3UAN	8,172	8,219	101%
a1C1Q00000PjDZGUA3	40,457	41,379	102%
a1C1Q00000PjDZKUA3	129,633	129,742	100%
a1C1Q00000PNibnUAD *	462,352	465,917	101%
a1C1Q00000PNibpUAD	108,554	109,593	101%
a1C1Q00000PNibqUAD *	24,532	23,095	94%
a1C1Q00000PNibtUAD	44,552	44,947	101%
a1C1Q00000PNibuUAD *	28,154	25,028	89%
a1C1Q00000PNibvUAD *	431,711	397,612	92%
a1C1Q00000PNibwUAD	76,438	76,471	100%
a1C1Q00000PNibxUAD *	254,729	237,736	93%
a1C1Q00000PNibzUAD	95,943	96,971	101%
a1C1Q00000PNic0UAD	273,159	273,049	100%
a1C1Q00000PtIThUAN	87,181	88,965	102%
a1C1Q00000PtITQUA3	113,854	113,638	100%
a1C1Q00000Q21NQUAZ	44,178	44,751	101%
a1C1Q00000Q21NRUAZ	52,648	52,831	100%
a1C1Q00000Q21P9UAJ	29,793	29,904	100%
a1C1Q00000Q21VpUAJ	126,199	125,921	100%
a1C1Q00000Q21VqUAJ	31,061	30,962	100%
a1C1Q00000QaaPeUAJ *	67,428	67,602	100%
a1C1Q00000QaaPpUAJ	46,129	45,988	100%
a1C1Q00000QBHebUAH	79,436	79,181	100%
a1C1Q00000QBHenUAH	105,354	105,092	100%
a1C1Q00000QBHerUAH	67,367	68,327	101%
a1C1Q00000QBHexUAH	277,804	277,420	100%
a1C1Q00000QBHf5UAH	47,675	47,710	100%
a1C1Q00000QBHfgUAH	50,282	50,213	100%
Total	**5,528,341**	**5,463,478**	**99%**

*Evaluation team model included weather interactions.

Table 104 shows the model goodness-of-fit metrics that Power TakeOff and the evaluation team produced for the 50 Virtual Commissioning™ projects.

Table 104. 2022 Virtual Commissioning™ Model Goodness-of-Fit Metrics by Project

Project ID	Adjusted R-Squared		CV(RMSE)		NMBE		Savings Uncertainty	
	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff
a1C1Q000000a9hRUAR *	0.84	0.83	14.50%	14.85%	0.00%	0.00%	1.19%	11.59%
a1C1Q000000a9hWUAR *	0.72	0.71	16.76%	17.13%	0.00%	0.00%	1.67%	5.95%
a1C1Q000000gx06UAB *	0.68	0.68	19.36%	19.38%	0.00%	0.00%	3.06%	12.77%
a1C1Q000000gx08UAB *	0.82	0.81	15.08%	15.37%	0.00%	0.00%	2.29%	4.60%
a1C1Q000000gx0AUAR	0.87	0.87	15.90%	15.91%	0.00%	0.00%	2.07%	4.44%
a1C1Q000000gx0BUAR *	0.92	0.92	13.58%	13.59%	0.00%	0.00%	1.35%	2.21%
a1C1Q000000gx0CUAR *	0.70	0.67	23.35%	24.68%	0.00%	0.00%	2.98%	5.94%
a1C1Q000000gx0EUAR *	0.86	0.85	17.43%	17.66%	0.00%	0.00%	3.91%	6.70%
a1C1Q000000N0i7UAD	0.75	0.75	15.72%	15.95%	0.00%	0.00%	19.97%	26.41%
a1C1Q000000N0iqUAD *	0.88	0.88	10.90%	11.03%	0.00%	0.00%	1.83%	3.82%
a1C1Q000000N0izUAD *	0.85	0.85	16.98%	17.00%	0.00%	0.00%	10.41%	19.77%
a1C1Q000000rbe2UAB *	0.79	0.76	16.09%	17.49%	0.00%	0.00%	1.57%	4.69%
a1C1Q000000rbe3UAB *	0.85	0.84	17.45%	17.75%	0.00%	0.00%	12.81%	16.34%
a1C1Q000000rbe5UAB	0.72	0.72	22.83%	22.84%	0.00%	0.00%	3.74%	6.83%
a1C1Q00000P4ma6UAB *	0.78	0.77	22.06%	22.37%	0.00%	0.00%	5.72%	8.72%
a1C1Q00000P4ma9UAB *	0.90	0.89	7.79%	8.22%	0.00%	0.00%	2.82%	6.32%
a1C1Q00000P4maBUAR *	0.79	0.79	15.21%	15.23%	0.00%	0.00%	14.27%	22.72%
a1C1Q00000PaVDjUAN	0.83	0.83	10.90%	10.90%	0.00%	0.00%	2.86%	10.42%
a1C1Q00000PaVDlUAN	0.80	0.80	19.40%	19.40%	0.00%	0.00%	3.09%	17.43%
a1C1Q00000PaVDuUAN	0.87	0.87	9.80%	9.80%	0.00%	0.00%	2.96%	5.79%
a1C1Q00000PjDYSUA3	0.76	0.76	24.90%	24.90%	0.00%	0.00%	7.64%	16.76%
a1C1Q00000PjDYUUA3	0.59	0.58	20.79%	20.91%	0.00%	0.00%	15.94%	20.24%
a1C1Q00000PjDZ3UAN	0.85	0.85	12.30%	12.30%	0.00%	0.00%	8.07%	24.89%
a1C1Q00000PjDZGUA3	0.82	0.81	21.15%	21.44%	0.00%	0.00%	18.23%	19.01%
a1C1Q00000PjDZKUA3	0.81	0.81	12.84%	12.81%	0.00%	0.00%	1.43%	6.95%
a1C1Q00000PNibnUAD *	0.79	0.78	14.53%	14.73%	0.00%	0.00%	1.43%	2.88%
a1C1Q00000PNibpUAD	0.69	0.69	22.50%	22.61%	0.00%	0.00%	14.75%	19.06%

Project ID	Adjusted R-Squared		CV(RMSE)		NMBE		Savings Uncertainty	
	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff	Opinion Dynamics	Power TakeOff
a1C1Q00000PNibqUAD *	0.89	0.89	17.83%	17.90%	0.00%	0.00%	7.36%	14.38%
a1C1Q00000PNibtUAD	0.80	0.80	10.73%	10.70%	0.00%	0.00%	2.19%	3.19%
a1C1Q00000PNibuUAD *	0.72	0.72	13.30%	13.41%	0.00%	0.00%	2.25%	2.98%
a1C1Q00000PNibvUAD *	0.84	0.83	11.84%	12.19%	0.00%	0.00%	2.13%	5.04%
a1C1Q00000PNibwUAD	0.91	0.91	7.67%	7.67%	0.00%	0.00%	0.92%	2.12%
a1C1Q00000PNibxUAD *	0.81	0.81	20.40%	20.50%	0.00%	0.00%	3.15%	11.34%
a1C1Q00000PNibzUAD	0.76	0.76	19.71%	19.82%	0.00%	0.00%	14.27%	19.73%
a1C1Q00000PNic0UAD	0.79	0.79	18.50%	18.51%	0.00%	0.00%	1.52%	2.89%
a1C1Q00000PtIThUAN	0.89	0.89	11.32%	11.29%	0.00%	0.00%	2.63%	8.43%
a1C1Q00000PtITQUA3	0.75	0.75	24.31%	24.32%	0.00%	0.00%	1.58%	12.58%
a1C1Q00000Q21NQUAZ	0.41	0.40	23.73%	23.79%	0.00%	0.00%	4.24%	7.93%
a1C1Q00000Q21NRUAZ	0.81	0.81	21.67%	21.69%	0.00%	0.00%	3.39%	7.67%
a1C1Q00000Q21P9UAJ	0.87	0.87	18.42%	18.42%	0.00%	0.00%	3.44%	10.95%
a1C1Q00000Q21VpUAJ	0.61	0.61	22.45%	22.45%	0.00%	0.00%	3.29%	8.60%
a1C1Q00000Q21VqUAJ	0.72	0.72	20.94%	20.94%	0.00%	0.00%	1.09%	6.58%
a1C1Q00000QaaPeUAJ *	0.93	0.92	9.50%	9.64%	0.00%	0.00%	1.35%	3.18%
a1C1Q00000QaaPpUAJ	0.80	0.80	19.92%	19.93%	0.00%	0.00%	2.21%	5.82%
a1C1Q00000QBHebUAH	0.83	0.83	14.21%	14.26%	0.00%	0.00%	0.75%	2.32%
a1C1Q00000QBHenUAH	0.77	0.77	19.74%	19.75%	0.00%	0.00%	1.76%	5.08%
a1C1Q00000QBHerUAH	0.86	0.86	18.11%	18.12%	0.00%	0.00%	6.90%	12.86%
a1C1Q00000QBHexUAH	0.86	0.86	21.08%	21.10%	0.00%	0.00%	1.06%	2.62%
a1C1Q00000QBHf5UAH	0.65	0.65	24.89%	24.88%	0.00%	0.00%	6.00%	9.84%
a1C1Q00000QBHfgUAH	0.75	0.75	11.16%	11.17%	0.00%	0.00%	0.74%	3.01%

*Evaluation team model included weather interactions.

Uplift from Other AIC Initiatives

The savings analysis for the Virtual Commissioning™ channel considers energy savings that resulted from energy-efficient actions taken through other AIC Business Program initiatives. The evaluation team identified six Virtual Commissioning™ participants that completed projects through other AIC Business Program initiatives after they began participating in the Virtual Commissioning™ offering in 2022.[45] In four 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 Virtual Commissioning™ channel at the corresponding site. In one instance, the participation date was close enough to the end of the year that both Power TakeOff and the evaluation team elected to trim the post-period data rather than adjust for savings from cross-participation. In the final instance, participation in the other Business Program initiative occurred on the final day of the year and thus did not require adjustment. Table 105 summarizes the projects completed through other AIC Initiatives and the associated verified gross electric savings.

Table 105. Summary of Projects Completed through Other AIC Initiatives

Project ID	Source of Cross-Participation	Verified Gross Savings	Verified Gross Savings from Cross-Participation	Verified Gross Savings Adjusted for Cross-Participation
a1C1Q00000ON0izUAD	Instant Incentives	146,276	13,856	132,420
a1C1Q00000PaVDIUAN	Instant Incentives	65,443	74,486	0
a1C1Q00000PNibxUAD	Instant Incentives	237,736	7,334	230,402
a1C1Q00000PNibwUAD	SBDI	76,471	48,590	27,881
a1C1Q00000PtITQUA3	SBDI	113,638	N/A	113,638
a1C1Q00000PNibuUAD	Standard HVAC for Business	25,028	N/A	25,028

Measure Lives and Cumulative Persisting Annual Savings

The evaluation team applied an EUL of 7.3 for Virtual Commissioning™ based on the most recent available Illinois-specific research.[46]

Net Impact Methodology

The evaluation team applied SAG-approved 2022 NTGRs to the verified gross savings to calculate verified net savings. Table 106 outlines the SAG-approved NTGR values applied to verified gross savings to calculate verified net savings.

Table 106. 2022 SAG-Approved Retro-Commissioning Initiative NTGRs

Channel	Electric NTGR	Gas NTGR
Large Facilities RCx	0.940	0.940
Industrial Refrigeration RCx	0.820	0.820

[45] Power TakeOff identified cross-participation in four of the same projects as the evaluation team and in two additional projects that the evaluation team did not, as we found the cross-participation date preceded participation in Virtual Commissioning™. Finally, the evaluation team identified cross-participation for one project that Power TakeOff did not.

[46] Harris, J. and Maoz, K. "ComEd EUL Research CY2020 Commercial Behavioral and Operations and Maintenance Measures EUL Values Delphi Panel Final Outcomes." (Memo provided to ComEd). 2020. Accessed at: https://www.ilsag.info/wp-content/uploads/ComEd-EUL-Research-CY2020-Final-Outcomes-Virtual-Delphi-Panel-2020-12-18.pdf

Channel	Electric NTGR	Gas NTGR
Virtual Commissioning™	0.930	N/A

Streetlighting Initiative

Gross Impact Methodology

The evaluation team calculated verified savings for the Streetlighting Initiative by applying savings algorithms from the IL-TRM V10.0. The team leveraged initiative tracking data such as fixture quantity, baseline fixture wattage and type, and LED wattage to inform savings assumptions. In a number of cases, detailed in Section 3.4.3, the evaluation team made manual adjustments to applied baseline wattages based on our review and judgement. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V10.0. Table 107 lists the measures in the Streetlighting Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2022 evaluation.

Table 107. Streetlighting Initiative Measures Evaluated

IL-TRM Measure Name	IL-TRM Measure	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 V10.0 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.[47]

In cases where LED streetlights replaced existing, functional MV fixtures,[48] 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 V10.0.

At the time of the baseline adjustment, it is assumed that the existing MV streetlighting would have been replaced with HPS streetlighting of roughly equivalent lumen output but different wattage. The IL-TRM V10.0 does not provide guidance on equivalencies between HPS and MV fixtures; therefore, we used an equivalency table jointly developed by the Illinois evaluation teams, and agreed upon with AIC, presented in Table 108 below to determine equivalencies.[49] System wattages are used in all cases to best represent actual system energy consumption, but lamp wattages are provided for ease of review.

[47] All evaluated streetlights in 2022 were determined to be under standard operation.
[48] Or, as detailed in Section 3.4.3, MH fixtures.
[49] This equivalency table has been submitted as a measure update for IL-TRM V11.0.

Table 108. Mercury Vapor to High Pressure Sodium Lamp and System Wattage Equivalencies

MV Lamp Watts	MV System Watts	HPS Lamp Watts	HPS System Watts
100	125	50	66
175	205	100	138
250	290	100	138
400	455/469[a]	250	295
1000	1075	400	465

[a] All 400W MV lamps are used in 469W fixtures in AIC applications.

Net Impact Methodology

The evaluation team applied SAG-approved 2022 NTGRs to the verified gross savings to calculate verified net savings. Table 109 outlines the SAG-approved NTGR values applied to verified gross savings to calculate verified net savings.

Table 109. 2022 SAG-Approved Streetlighting Initiative NTGRs

Channel	Electric NTGR
Municipality-Owned Streetlighting	0.690
Utility-Owned Streetlighting	1.000

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 V10.0. The team leveraged information from the initiative tracking data such as primary heating and cooling type, LED wattage, LED lamp type, equivalent full load hours (EFLH), project location (e.g., for weather-dependent variables), building type, cooling equipment Btuh, CEER and product class, quantity of units (window ACs, exterior doors, electrical outlets, etc.), linear feet of cracks and air gaps, and quantity of units installed to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V10.0 and V11.0. Table 110 lists the measures in the Small Business Initiative, their corresponding IL-TRM entry, and whether or not TRM errata were applied to the measure in the 2022 evaluation.

Table 110. Small Business Initiative Measures Evaluated

IL-TRM Measure Name	IL-TRM Measure	Errata Applied?
Fluorescent Delamping	4.5.2	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
Lighting Controls	4.5.10	No errata present for this measure
Automatic Door Closer for Walk-In Coolers and Freezers	4.6.1	No errata present for this measure
Beverage and Snack Machine Controls	4.6.2	No errata present for this measure
Door Heater Controls for Cooler or Freezer	4.6.3	No errata present for this measure

IL-TRM Measure Name	IL-TRM Measure	Errata Applied?
Electronically Commutated Motors (ECM) for Walk-in and Reach-in Coolers / Freezers	4.6.4	No errata present for this measure
Evaporator Fan Control for Electrically Commutated Motors	4.6.6	No errata present for this measure
C&I Air Sealinga	4.8.27	No errata present for this measure
C&I Air Sealing (RACs)a	4.8.27	No errata present for this measure

a The evaluation team used Measure 4.8.27 from IL-TRM V11.0 to estimate savings from air sealing and sealing around RAC installations because IL-TRM V10.0 does not include a prescriptive air sealing measure characterization.

Measure Lives and Cumulative Persisting Annual Savings

For the SBDI channel evaluation, the evaluation team applied measure lives and mid-life adjustments from the IL-TRM V10.0.

The evaluation team reviewed the ex ante measure life assumptions provided by the implementation team for the prescriptive measures evaluated as part of the SBEP channel impact evaluation. Measure lives were adjusted in accordance with the IL-TRM V11.0. Table 111 provides a summary of the measure life adjustments that were made as part of the evaluation. All other ex ante measure lives were appropriately applied.

Table 111. Small Business Energy Performance Channel Measure Life Adjustment due to Evaluation

Evaluation Measure Category	IL-TRM Measure	Ex Ante Measure Life	Verified Measure Life	Reason for Adjustment
Air Sealing	4.8.27	13	20	IL-TRM V11.0 deems an EUL of 20 years for this measure type.
Air Sealing (RACs)	4.8.27	5	20	IL-TRM V11.0 deems an EUL of 20 years for this measure type.

Net Impact Methodology

The evaluation team applied SAG-approved 2022 NTGRs to the verified gross savings to calculate verified net savings. Table 112 outlines the SAG-approved NTGR values applied to verified gross savings to calculate verified net savings.

Table 112. 2022 SAG-Approved Small Business Initiative NTGRs

Channel	Electric NTGR	Gas NTGR
SBDI	0.891	N/A
SBEP	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 V10.0. The team leveraged information from the initiative tracking data such as primary heating and cooling type, the delivery mechanism (e.g., midstream, direct install), 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 V10.0. Table 113 lists the measures in the Midstream Lighting channel, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2022 evaluation.

Table 113. Midstream Initiative Measures Evaluated

IL-TRM Measure Name	IL-TRM Measure	Errata Applied?
Combination Oven	4.2.1	No errata present for this measure
Commercial Solid and Glass Door Refrigerators & Freezers	4.2.2	No errata present for this measure
Commercial Steam Cooker	4.2.3	No errata present for this measure
Conveyor Oven	4.2.4	No errata present for this measure
ENERGY STAR Convection Oven	4.2.5	No errata present for this measure
ENERGY STAR Dishwasher	4.2.6	No errata present for this measure
ENERGY STAR Fryer	4.2.7	No errata present for this measure
ENERGY STAR Hot Food Holding Cabinets	4.2.9	No errata present for this measure
Ice Maker	4.2.10	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	Errata applied
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	Errata applied
LED Bulbs and Fixtures	4.5.4	Errata applied

Measure Lives and Cumulative Persisting Annual Savings

For prescriptive measures, the evaluation team applied measure lives and mid-life adjustments from the IL-TRM V10.0.

Net Impact Methodology

The evaluation team applied SAG-approved 2022 NTGRs to the verified gross savings to calculate verified net savings. Table 114 outlines the SAG-approved NTGR values applied to verified gross savings to calculate verified net savings.

Table 114. 2022 SAG-Approved Midstream Initiative NTGRs

Channel	Measure	Electric NTGR	Gas NTGR
Lighting	LED Fixtures and Lamps	0.913	0.913
HVAC	Advanced Thermostats	0.880	0.880
	Air Conditioners & Heat Pumps	0.890	N/A
	Heat Pump Water Heaters	0.890	N/A
	Other Measures	0.800	0.800
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 SBEP channels produced quantifiable propane and/or non-AIC natural gas impacts in 2022.

Gas Penalties

By agreement with SAG,[50] AIC is not penalized for gas penalties resulting from the installation of efficient prescriptive measures that create an increase in energy usage, when considering savings for goal attainment purposes. 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 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

[50] Treatment of interactive effects is consistent with a draft SAG policy agreement on this topic. The draft agreement is no longer available on the SAG website but can be provided by the evaluation team on request. SAG is currently working to finalize the draft agreement.

operating 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 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 penalties were calculated using algorithms from the IL-TRM V10.0 (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 V10.0 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 V10.0.

Standard Initiative

Additional Fossil Fuel Impacts

Five projects completed through the Standard Core channel produced non-AIC gas savings in 2022. The ex ante gross, verified gross, and verified net therm savings produced through the projects are summarized in Table 115.

Table 115. 2022 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)
HVAC	2,301	100%	2,301	0.426	980
SE	31,695	100%	31,695	0.675	21,394
Total	**33,995**	**100%**	**33,995**	**0.658**	**22,374**

In 2022, AIC converted these savings to CPAS for the purposes of goal attainment. Those conversion-related savings are presented separately in Appendix C.

Gas Penalties

Table 116 presents gas penalties not reported in the body of the report for the Standard Initiative.

Table 116. 2022 Standard Initiative Gas Penalties

Channel	Measure	Therms
Core	LED Fixtures	-432,673
	Lighting Controls	-13,548
	Delamping	-11,760
Online Store	LED Bulb	-6,540
	Lighting Controls	-1,585
	Bundle	-1,374
	Back to Work Bundle	-22
	Exit Sign	-9
Total Gas Penalties		**-467,511**

Secondary Electric Savings for Water Supply and Wastewater Treatment

Table 117 presents water savings and secondary electric savings for the Standard Initiative.

Table 117. 2022 Standard Initiative Secondary Electric Savings

Channel	Measure	Gallons	Conversion Factor	Secondary Electric Savings (kWh)
Core	ENERGY STAR Dishwasher	106,653	5,010 kWh/gal[a]	534
	Ozone Laundry	2,215,291		11,099
	High Efficiency Pre-Rinse Spray Valve	3,853,699		19,307
	Steam Trap Repair/Replacement	5,221,798	2,571 kWh/gal[a]	13,425
Total Savings		**11,397,441**		**44,365**

[a] Source: IL-TRM V10.0. There is a different conversion factor for the STRR measure than the rest of the measures because STRRs do not discharge water into the wastewater system and therefore only produce water supply impacts. Other measures impact both the water supply and wastewater treatment and therefore produce greater secondary electric savings.

Total Impacts for Cost-Effectiveness

Table 118 presents the final total 2022 Standard Initiative verified gross impacts to be used in the cost-effectiveness analysis, adjusted for additional fossil fuel impacts, gas penalties, and secondary electric savings.

Table 118. 2022 Standard Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms (AIC)	Therms (Non-AIC)	Water (Gal)
Verified Gross Impacts for Goal Attainment	47,081,167	1,368,266	N/A	N/A
Gas Penalties	N/A	-467,511	N/A	N/A
Water Savings	N/A	N/A	N/A	11,397,441
Secondary Electric Savings	-44,365	N/A	N/A	N/A
Additional Fossil Fuel Impacts	N/A	N/A	22,374	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**47,036,802**	**900,755**	**22,374**	**11,397,441**

Custom Initiative

Additional Fossil Fuel Impacts

Three Custom Incentives projects produced non-AIC gas savings in 2022 and a fourth produced propane savings. The ex ante gross, verified gross, and verified net therm savings produced through these projects are summarized in Table 119 and Table 120.

Table 119. 2022 Custom Incentives Channel 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	743,732	88%	653,881	0.800	523,105
Total	**743,732**	**88%**	**653,881**	**0.800**	**523,105**

Table 120. 2022 Custom Incentives Channel Propane Savings

Channel	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Custom Incentives	211	88%	186	0.800	148
Total	**211**	**88%**	**186**	**0.800**	**148**

In 2022, AIC converted these savings to CPAS for the purposes of goal attainment. Those conversion-related savings are presented separately in Appendix C.

Gas Penalties

No measures delivered through the Custom Initiative produced quantifiable gas penalties in 2022.

Secondary Electric Savings for Water Supply and Wastewater Treatment

No measures delivered through the Custom Initiative produced quantifiable secondary electric savings in 2022.

Total Impacts for Cost-Effectiveness

Table 121 presents the final total 2022 Custom Initiative verified gross impacts to be used in the cost-effectiveness analysis, adjusted for additional fossil fuel impacts.

Table 121. 2022 Custom Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms (AIC Gas)	Therms (Non-AIC Gas)	Therms (Propane)	Water (Gal)
Verified Gross Impacts for Goal Attainment	33,218,387	1,731,269	N/A	N/A	N/A
Gas Penalties	N/A	N/A	N/A	N/A	N/A
Water Savings	N/A	N/A	N/A	N/A	0
Secondary Electric Savings	N/A	N/A	N/A	N/A	N/A
Additional Fossil Fuel Impacts	N/A	N/A	523,105	148	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**33,218,387**	**1,731,269**	**523,105**	**148**	**0**

Retro-Commissioning Initiative

Gas Penalties

No measures delivered through the RCx Initiative produced quantifiable gas penalties in 2022.

Secondary Electric Savings for Water Supply and Wastewater Treatment

No measures delivered through the RCx Initiative produced quantifiable secondary electric savings in 2022.

Total Impacts for Cost-Effectiveness

Table 122 presents the final total 2022 RCx Initiative verified gross impacts to be used in the cost-effectiveness analysis, adjusted for gas penalties and secondary electric savings.

Table 122. 2022 RCx Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms	Water (Gal)
Verified Gross Impacts for Goal Attainment	7,092,477	56,097	N/A
Gas Penalties	N/A	N/A	N/A
Water Savings	N/A	N/A	0
Secondary Electric Savings	N/A	N/A	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**7,092,477**	**56,097**	**0**

Streetlighting Initiative

Gas Penalties

Because all measures installed through the Streetlighting Initiative in 2022 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 in 2022 produced water savings.

Total Impacts for Cost-Effectiveness

Table 123 presents the final total 2022 Streetlighting Initiative verified gross impacts to be used in the cost-effectiveness analysis, adjusted for gas penalties and secondary electric savings.

Table 123. 2022 Streetlighting Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms	Water (Gal)
Verified Gross Impacts for Goal Attainment	23,168,351	0	N/A
Gas Penalties	N/A	N/A	N/A
Water Savings	N/A	N/A	0
Secondary Electric Savings	N/A	N/A	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**23,168,351**	**0**	**0**

Small Business Initiative

Additional Fossil Fuel Impacts

One project completed through the SBEP channel produced propane savings. The ex ante gross, verified gross, and verified net therm savings produced through this project are summarized in Table 124.

Table 124. 2022 Small Business Energy Performance Channel Propane Savings

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Air Sealing	351	100%	351	0.891	312
Total	**351**	**100%**	**351**	**0.891**	**312**

In 2022, AIC converted these savings to CPAS for the purposes of goal attainment. Those conversion-related savings are presented separately in Appendix C.

Gas Penalties

Table 125 presents gas penalties not reported in the body of the report for the Small Business Initiative.

Table 125. 2022 Small Business Initiative Gas Penalties

Channel	Measure	Therms
SBDI	LED Bulbs and Fixtures	-683,297
	Fluorescent Delamping	-19,660
	Lighting Controls	-4,557
	Exit Signs	-3,494
Total Gas Penalties		**-711,009**

Secondary Electric Savings for Water Supply and Wastewater Treatment

No measures delivered through the Small Business Initiative produced secondary electric savings in 2022.

Total Impacts for Cost-Effectiveness

Table 126 presents the final total 2022 Small Business Initiative verified gross impacts to be used in the cost-effectiveness analysis, adjusted for gas penalties and secondary electric savings.

Table 126. 2022 Small Business Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms (Gas)	Therms (Propane)	Water (Gal)
Verified Gross Impacts for Goal Attainment	76,097,393	21,238	N/A	N/A
Gas Penalties	N/A	-711,009	N/A	N/A
Water Savings	N/A	N/A	N/A	N/A
Secondary Electric Savings	N/A	N/A	N/A	N/A
Additional Fossil Fuel Impacts	N/A	N/A	351	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**76,097,393**	**-689,771**	**351**	**0**

Midstream Initiative

Gas Penalties

Table 127 presents gas penalties not reported in the body of the report for the Midstream Initiative.

Table 127. 2022 Midstream Channel Gas Penalties

Channel	Measure	Therms
Lighting	Linear LED	-254,819
	Mogul LED	-47,682
	Specialty LED	-17,395
HVAC	Heat Pump Water Heater	-61
Total Gas Penalties		**-319,956**

Secondary Electric Savings for Water Supply and Wastewater Treatment

Table 128 presents water savings and secondary electric savings for the Midstream Initiative.

Table 128. 2022 Midstream Initiative Secondary Electric Savings

Channel	Measure	Gallons	Conversion Factor	Secondary Electric Savings (kWh)
Food Service	Dishwasher	292,784	5,010 kWh/million gal[a]	1,467
	Steam Cooker	712,238	2,571 kWh/million gal[a]	1,831
Total Savings		**1,005,022**		**3,298**

[a] Source: IL-TRM V10.0.

Total Impacts for Cost-Effectiveness

Table 129 presents the final total 2022 Midstream Initiative verified gross impacts to be used in the cost-effectiveness analysis, adjusted for gas penalties and secondary electric savings.

Table 129. 2022 Midstream Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms	Water (Gal)
Verified Gross Impacts for Goal Attainment	24,032,093	54,594	N/A
Gas Penalties	N/A	-319,956	N/A
Water Savings	N/A	N/A	1,005,022
Secondary Electric Savings	-3,298	N/A	N/A
Final Verified Gross Impacts for Cost-Effectiveness	**24,028,795**	**-265,362**	**1,005,022**

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 CPAS spreadsheet for additional detail as needed.

Table 130 provides CPAS for the 2022 Business Program through 2047 at the initiative level. Lifetime savings for the 2022 Business Program through 2048 are 2,914,920 MWh.

Table 130. 2022 Business Program CPAS and WAML

Initiative	Initiative-Level WAML	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)												
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Standard	12.8	47,081	0.840	39,561	39,561	39,557	39,527	38,458	38,344	38,151	37,932	37,834	34,357	28,571	22,729	20,445
Custom	14.3	33,218	0.786	26,110	26,110	26,110	26,110	26,098	25,662	25,603	25,593	25,511	24,397	23,623	23,620	22,261
Retro-Commissioning	7.6	7,092	0.917	6,507	6,507	6,507	6,507	6,507	6,507	6,507	3,044	936	0	0	0	0
Streetlighting	20.0	23,168	0.994	23,031	23,031	23,031	21,572	21,572	21,572	21,572	21,572	21,572	21,572	21,572	21,572	21,572
Small Business	12.8	76,097	0.891	67,803	67,803	67,392	65,396	63,775	62,761	61,873	61,355	60,771	59,007	57,698	44,745	23,495
Midstream	14.3	24,032	0.910	21,870	21,870	21,870	21,870	21,420	21,400	21,347	20,737	20,737	20,736	20,730	20,371	19,992
Midstream - Carryover	14.4	7,117	0.857	6,098	6,098	6,098	6,098	5,950	5,942	5,925	5,726	5,726	5,726	5,724	5,724	5,724
SBEP (propane conversion)	20.0	10	0.891	9	9	9	9	9	9	9	9	9	9	9	9	9
Custom Incentives (gas conversion - AIC therms)	14.1	12,167	0.800	9,733	9,733	9,733	9,733	9,733	9,733	9,733	9,733	9,733	8,858	8,825	8,825	8,825
Custom Incentives (gas conversion - non-AIC therms)	13.8	19,159	0.800	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327
Custom Incentives (propane conversion)	25.7	5	0.800	4	4	4	4	4	4	4	4	4	4	4	4	4
Standard - Core (gas conversion)	14.7	996	0.658	656	656	656	656	656	656	656	656	656	656	627	627	627
2022 Portfolio CPAS		**250,144**	**0.866**	**216,708**	**216,708**	**216,294**	**212,808**	**209,510**	**207,916**	**206,708**	**201,689**	**198,816**	**190,648**	**182,710**	**163,554**	**138,281**
Expiring 2022 Portfolio CPAS				**0**	**0**	**415**	**3,485**	**3,299**	**1,593**	**1,209**	**5,018**	**2,873**	**8,168**	**7,939**	**19,155**	**25,274**
Expired 2022 Portfolio CPAS				**0**	**0**	**415**	**3,900**	**7,199**	**8,792**	**10,001**	**15,019**	**17,892**	**26,060**	**33,999**	**53,154**	**78,428**

Table 133. 2022 Business Program CPAS and WAML (Continued)

Initiative	Initiative-Level WAML	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)												
				2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Standard	12.8	47,081	0.840	19,166	18,921	324	324	324	324	324	267	267	267	0	0	0
Custom	14.3	33,218	0.786	17,397	11,207	3,917	2,047	2,037	2,037	1,915	1,853	1,848	1,437	286	113	36
Retro-Commissioning	7.6	7,092	0.917	0	0	0	0	0	0	0	0	0	0	0	0	0
Streetlighting	20.0	23,168	0.994	21,572	21,572	21,572	21,572	21,572	21,572	21,572	0	0	0	0	0	0
Small Business	12.8	76,097	0.891	20,517	19,558	129	129	129	129	129	0	0	0	0	0	0
Midstream	14.3	24,032	0.910	19,992	15,959	28	14	14	14	14	0	0	0	0	0	0
Midstream - Carryover	14.4	7,117	0.857	5,724	4,564	0	0	0	0	0	0	0	0	0	0	0
SBEP (propane conversion)	20.0	10	0.891	9	9	9	9	9	9	9	0	0	0	0	0	0
Custom Incentives (gas conversion - AIC therms)	14.1	12,167	0.800	5,625	4,102	1,886	475	475	475	475	475	268	0	0	0	0
Custom Incentives (gas conversion - non-AIC therms)	13.8	19,159	0.800	7,254	2,924	1,230	88	88	88	88	88	88	88	88	88	59
Custom Incentives (propane conversion)	25.7	5	0.800	4	4	4	4	4	4	4	4	4	4	4	4	3
Standard - Core (gas conversion)	14.7	996	0.658	627	627	0	0	0	0	0	0	0	0	0	0	0
2022 Portfolio CPAS		**250,144**	**0.866**	**117,887**	**99,447**	**29,100**	**24,662**	**24,652**	**24,652**	**24,530**	**2,687**	**2,475**	**1,796**	**378**	**205**	**97**
Expiring 2022 Portfolio CPAS				**20,393**	**18,441**	**70,347**	**4,438**	**10**	**0**	**122**	**21,843**	**212**	**679**	**1,419**	**173**	**108**
Expired 2022 Portfolio CPAS				**98,821**	**117,262**	**187,609**	**192,047**	**192,056**	**192,056**	**192,179**	**214,021**	**214,233**	**214,912**	**216,331**	**216,504**	**216,611**
WAML	**13.8**															

Standard Initiative

Table 131 provides CPAS for the 2022 Standard Initiative through 2045. Lifetime savings for the Initiative are 495,537 MWh.

Table 131. 2022 Standard Initiative CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)											
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Core	12.9	43,770	0.828	36,256	36,256	36,254	36,245	36,166	36,102	35,968	35,878	35,870	32,426	26,761	21,767
Online Store	9.3	1,666	0.996	1,660	1,660	1,658	1,637	1,338	1,287	1,228	1,100	1,009	976	855	8
BOC	13.0	1,645	N/A	1,645	1,645	1,645	1,645	954	954	954	954	954	954	954	954
2022 CPAS		**47,081**	**0.840**	**39,561**	**39,561**	**39,557**	**39,527**	**38,458**	**38,344**	**38,151**	**37,932**	**37,834**	**34,357**	**28,571**	**22,729**
Expiring 2022 CPAS				**0**	**0**	**4**	**30**	**1,069**	**114**	**193**	**219**	**99**	**3,477**	**5,786**	**5,841**
Expired 2022 CPAS				**0**	**0**	**4**	**34**	**1,103**	**1,217**	**1,410**	**1,629**	**1,727**	**5,204**	**10,990**	**16,832**

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)											
				2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Core	12.9	43,770	0.828	19,484	19,159	18,914	324	324	324	324	324	267	267	267	0
Online Store	9.3	1,666	0.996	7	7	6	0	0	0	0	0	0	0	0	0
BOC	13.0	1,645	N/A	954	0	0	0	0	0	0	0	0	0	0	0
2022 CPAS		**47,081**	**0.840**	**20,445**	**19,166**	**18,921**	**324**	**324**	**324**	**324**	**324**	**267**	**267**	**267**	**0**
Expiring 2022 CPAS				**2,284**	**1,279**	**245**	**18,596**	**0**	**0**	**0**	**0**	**57**	**0**	**0**	**267**
Expired 2022 CPAS				**19,116**	**20,395**	**20,640**	**39,237**	**39,237**	**39,237**	**39,237**	**39,237**	**39,294**	**39,294**	**39,294**	**39,561**
WAML	**12.8**														

Table 132 provides CPAS for the 2022 Standard Initiative gas conversion through 2043. Lifetime savings for the conversion are 9,690 MWh.

Table 132. 2022 Standard Initiative Gas Conversion CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)																Lifetime Savings
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	
HVAC	10.0	67	0.426	29	29	29	29	29	29	29	29	29	29	0	0	0	0	0	0	0	287
SE	15.0	929	0.675	627	627	627	627	627	627	627	627	627	627	627	627	627	627	627	0	0	9,403
2022 CPAS		**996**	**0.658**	**656**	**656**	**656**	**656**	**656**	**656**	**656**	**656**	**656**	**656**	**627**	**627**	**627**	**627**	**627**	**0**	**0**	**9,690**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**29**	**0**	**0**	**0**	**0**	**627**	**0**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**29**	**29**	**29**	**29**	**29**	**656**	**656**	
WAML	**14.7**																				

Custom Initiative

Table 133 provides CPAS for the 2022 Custom Initiative through 2050. Lifetime savings for the Initiative are 372,933 MWh.

Table 133. 2022 Custom Initiative CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)												
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Custom Incentives	14.3	27,221	0.786	21,396	21,396	21,396	21,396	21,384	20,948	20,889	20,889	20,860	19,786	19,083	19,083	17,723
New Construction Lighting	14.1	5,997	0.786	4,714	4,714	4,714	4,714	4,714	4,714	4,714	4,704	4,651	4,611	4,540	4,537	4,537
2022 CPAS		**33,218**	**0.786**	**26,110**	**26,110**	**26,110**	**26,110**	**26,098**	**25,662**	**25,603**	**25,593**	**25,511**	**24,397**	**23,623**	**23,620**	**22,261**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**12**	**436**	**58**	**10**	**82**	**1,114**	**775**	**2**	**1,360**
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**12**	**448**	**506**	**516**	**599**	**1,713**	**2,487**	**2,489**	**3,849**

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)												
				2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Custom Incentives	14.3	27,221	0.786	12,864	9,970	3,917	2,047	2,037	2,037	1,915	1,853	1,848	1,437	286	113	36
New Construction Lighting	14.1	5,997	0.786	4,533	1,237	0	0	0	0	0	0	0	0	0	0	0
2022 CPAS		**33,218**	**0.786**	**17,397**	**11,207**	**3,917**	**2,047**	**2,037**	**2,037**	**1,915**	**1,853**	**1,848**	**1,437**	**286**	**113**	**36**
Expiring 2022 CPAS				**4,863**	**6,191**	**7,290**	**1,870**	**10**	**0**	**122**	**62**	**5**	**411**	**1,151**	**173**	**77**
Expired 2022 CPAS				**8,712**	**14,903**	**22,193**	**24,063**	**24,073**	**24,073**	**24,195**	**24,257**	**24,262**	**24,673**	**25,824**	**25,997**	**26,074**
WAML	**14.3**															

Table 134 provides CPAS for the 2022 Custom Initiative gas conversion through 2049. Lifetime savings for the conversion are 348,807 MWh.

Table 134. 2022 Custom Initiative Gas Conversion CPAS and WAML

Channel	WAML	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)													
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Custom Incentives (gas conversion - AIC therms)	14.1	12,167	0.800	9,733	9,733	9,733	9,733	9,733	9,733	9,733	9,733	9,733	8,858	8,825	8,825	8,825	5,625
Custom Incentives (gas conversion - non-AIC therms)	13.8	19,159	0.800	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	15,327	7,254
Custom Incentives (propane conversion)	25.7	5	0.800	4	4	4	4	4	4	4	4	4	4	4	4	4	4
2022 CPAS		**31,331**	**0.800**	**25,065**	**25,065**	**25,065**	**25,065**	**25,065**	**25,065**	**25,065**	**25,065**	**25,065**	**24,189**	**24,156**	**24,156**	**24,156**	**12,883**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**875**	**33**	**0**	**0**	**11,273**
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**875**	**908**	**908**	**908**	**12,181**

Channel	WAML	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)													
				2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Custom Incentives (gas conversion - AIC therms)	14.1	12,167	0.800	4,102	1,886	475	475	475	475	475	268	0	0	0	0	0	0
Custom Incentives (gas conversion - non-AIC therms)	13.8	19,159	0.800	2,924	1,230	88	88	88	88	88	88	88	88	88	59	0	0
Custom Incentives (propane conversion)	25.7	5	0.800	4	4	4	4	4	4	4	4	4	4	4	3	0	0
2022 CPAS		**31,331**	**0.800**	**7,030**	**3,121**	**567**	**567**	**567**	**567**	**567**	**360**	**92**	**92**	**92**	**62**	**0**	**0**
Expiring 2022 CPAS				**5,853**	**3,910**	**2,554**	**0**	**0**	**0**	**0**	**207**	**268**	**0**	**0**	**30**	**62**	**0**
Expired 2022 CPAS				**18,034**	**21,944**	**24,498**	**24,498**	**24,498**	**24,498**	**24,498**	**24,705**	**24,973**	**24,973**	**24,973**	**25,003**	**25,065**	**25,065**
WAML	**13.9**																

Retro-Commissioning Initiative

Table 135 provides CPAS for the 2022 Retro-Commissioning Initiative through 2031. Lifetime savings for the Initiative are 49,527 MWh.

Table 135. 2022 Retro-Commissioning CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										Lifetime Savings
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	
Core	8.6	1,773	0.880	1,560	1,560	1,560	1,560	1,560	1,560	1,560	1,560	936	0	13,415
Virtual Commissioning™	7.3	5,319	0.930	4,947	4,947	4,947	4,947	4,947	4,947	4,947	1,484	0	0	36,112
2022 CPAS		**7,092**	**0.917**	**6,507**	**6,507**	**6,507**	**6,507**	**6,507**	**6,507**	**6,507**	**3,044**	**936**	**0**	**49,527**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3,463**	**2,108**	**936**	
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3,463**	**5,571**	**6,507**	
WAML	**7.6**													

Streetlighting Initiative

Table 136 provides CPAS for the 2022 Streetlighting Initiative through 2043. Lifetime savings for the Initiative are 435,821 MWh.

Table 136. 2022 Streetlighting Initiative CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Municipality-Owned Streetlighting	20.0	442	0.690	305	305	305	305	305	305	305	305	305	305	305
Utility-Owned Streetlighting	20.0	22,727	1.000	22,727	22,727	22,727	21,268	21,268	21,268	21,268	21,268	21,268	21,268	21,268
2022 CPAS		**23,168**	**0.994**	**23,031**	**23,031**	**23,031**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**
Expiring 2022 CPAS				**0**	**0**	**0**	**1,459**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Expired 2022 CPAS				**0**	**0**	**0**	**1,459**	**1,459**	**1,459**	**1,459**	**1,459**	**1,459**	**1,459**	**1,459**

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Municipality-Owned Streetlighting	20.0	442	0.690	305	305	305	305	305	305	305	305	305	0	0
Utility-Owned Streetlighting	20.0	22,727	1.000	21,268	21,268	21,268	21,268	21,268	21,268	21,268	21,268	21,268	0	0
2022 CPAS		**23,168**	**0.994**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**	**21,572**	**0**	**0**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**21,572**	**0**
Expired 2022 CPAS				**1,459**	**1,459**	**1,459**	**1,459**	**1,459**	**1,459**	**1,459**	**1,459**	**1,459**	**23,031**	**23,031**
WAML	**20.0**													

Small Business Initiative

Table 137 provides CPAS for the 2022 Small Business Initiative through 2043. Lifetime savings for the Initiative are 804,590 MWh.

Table 137. 2022 Small Business Initiative CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
SBDI	12.8	75,950	0.891	67,672	67,672	67,261	65,265	63,644	62,630	61,742	61,224	60,639	58,876	57,567
SBEP	19.8	147	0.891	131	131	131	131	131	131	131	131	131	131	131
2022 CPAS		**76,097**	**0.891**	**67,803**	**67,803**	**67,392**	**65,396**	**63,775**	**62,761**	**61,873**	**61,355**	**60,771**	**59,007**	**57,698**
Expiring 2022 CPAS				**0**	**0**	**411**	**1,996**	**1,621**	**1,014**	**889**	**518**	**584**	**1,764**	**1,309**
Expired 2022 CPAS				**0**	**0**	**411**	**2,407**	**4,028**	**5,041**	**5,930**	**6,448**	**7,032**	**8,796**	**10,105**

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
SBDI	12.8	75,950	0.891	44,613	23,366	20,388	19,429	0	0	0	0	0	0	0
SBEP	19.8	147	0.891	131	129	129	129	129	129	129	129	129	0	0
2022 CPAS		**76,097**	**0.891**	**44,745**	**23,495**	**20,517**	**19,558**	**129**	**129**	**129**	**129**	**129**	**0**	**0**
Expiring 2022 CPAS				**12,953**	**21,250**	**2,978**	**959**	**19,429**	**0**	**0**	**0**	**0**	**129**	**0**
Expired 2022 CPAS				**23,058**	**44,308**	**47,286**	**48,245**	**67,674**	**67,674**	**67,674**	**67,674**	**67,674**	**67,803**	**67,803**
WAML	**12.8**													

Table 138 provides CPAS for the 2022 Small Business Initiative propane conversion through 2043. Lifetime savings for the conversion are 6,247 MWh.

Table 138. 2022 Small Business Initiative Propane Conversion CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Air Sealing	20.0	10	0.891	9	9	9	9	9	9	9	9	9	9	9
2022 CPAS		**10**	**0.891**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Air Sealing	20.0	10	0.891	9	9	9	9	9	9	9	9	9	0	0
2022 CPAS		**10**	**0.891**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**9**	**0**	**0**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**0**
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**9**
WAML	**20.0**													

Midstream Initiative

Table 139 provides CPAS for the 2022 Midstream Initiative through 2043. Lifetime savings for the Initiative are 310,985 MWh.

Table 139. 2022 Midstream Initiative CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										
				2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lighting	14.4	23,028	0.913	21,029	21,029	21,029	21,029	20,581	20,560	20,508	19,898	19,898	19,898	19,892
HVAC	11.5	460	0.881	405	405	405	405	404	404	404	404	404	404	404
Food Service	12.5	544	0.800	435	435	435	435	435	435	435	435	435	433	433
2022 CPAS		**24,032**	**0.910**	**21,870**	**21,870**	**21,870**	**21,870**	**21,420**	**21,400**	**21,347**	**20,737**	**20,737**	**20,736**	**20,730**
Expiring 2022 CPAS				**0**	**0**	**0**	**0**	**449**	**21**	**52**	**610**	**0**	**2**	**6**
Expired 2022 CPAS				**0**	**0**	**0**	**0**	**449**	**470**	**522**	**1,132**	**1,132**	**1,134**	**1,140**

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)										
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Lighting	14.4	23,028	0.913	19,892	19,892	19,892	15,860	0	0	0	0	0	0	0
HVAC	11.5	460	0.881	46	46	46	46	13	0	0	0	0	0	0
Food Service	12.5	544	0.800	433	54	54	54	14	14	14	14	14	0	0
2022 CPAS		**24,032**	**0.910**	**20,371**	**19,992**	**19,992**	**15,959**	**28**	**14**	**14**	**14**	**14**	**0**	**0**
Expiring 2022 CPAS				**359**	**380**	**0**	**4,033**	**15,931**	**13**	**0**	**0**	**0**	**14**	**0**
Expired 2022 CPAS				**1,498**	**1,878**	**1,878**	**5,911**	**21,842**	**21,855**	**21,855**	**21,855**	**21,855**	**21,870**	**21,870**
WAML	**14.3**													

Appendix D. Custom Initiative Project Reports

This appendix is provided under a separate cover.

For more information, please contact:

Hannah Howard
Senior Vice President

510 214 0183 tel
hhoward@opiniondynamics.com

1000 Winter Street
Waltham, MA 02451

Opinion **Dynamics**

Boston | Headquarters

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

1000 Winter Street
Waltham, MA 02451

San Francisco Bay

510 444 5050 tel
510 444 5222 fax

1 Kaiser Plaza
Suite 445
Oakland, CA 94612

San Diego

858 270 5010 tel
858 270 5211 fax

1200 Prospect Street
Suite #G-100
La Jolla, CA 92037

Portland

503 287 9136 tel
503-281-7375 fax

1500 NE Irving Street
Suite #370
Portland, OR 97232