Guidehouse
Outwit Complexity

Business Custom Rebates Program Impact Evaluation Report

Energy Efficiency Plan: Program Year 2023 (1/1/2023-12/31/2023)

Prepared for:

Nicor Gas Company

FINAL

June 10, 2024

Prepared by:

Hang Zhang
Guidehouse

Ryan Kroll
Driftless

Submitted to:

Nicor Gas Company
1844 Ferry Road
Naperville, IL 60563

Submitted by:

Guidehouse
150 N. Riverside Plaza, Suite 2100
Chicago, IL 60606

Contact:

Ted Walker
Partner
404.602.3463
ted.walker@guidehouse.com

Stu Slote
Director
802.526.5113
stu.slote@guidehouse.com

Laura Agapay-Read
Associate Director
312.583.4178
laura.agapay.read@guidehouse.com

Charles Ampong
Associate Director
608.446.3172
charles.ampong@guidehouse.com

Table of Contents

List of Tables, Figures, and Equations

1. Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2023 Business Custom Program. It presents a summary of the energy impacts for the total program and broken out by program structure and relevant measure details. The appendix presents the impact analysis methodology and cost-effectiveness input summary. The report covers program year 2023 projects from January 1, 2023 through December 31, 2023.

2. Program Description

The Business Custom Program provides Nicor Gas commercial and industrial (C&I) customers of with rebate incentives for the installation of cost-effective natural gas energy efficiency improvements that are not eligible for a prescriptive rebate under the Nicor Gas Business Energy Efficiency Rebate Program. The program targets large C&I private and public sector customers with more complex facilities that will benefit most from a custom offering during new equipment purchases, facility modernization, and industrial process improvements. The program provides audits and engineering studies to assist customers in understanding their efficiency opportunities by quantifying the estimated project costs, energy savings, and forecasted incentives. The Nicor Business Custom Program was implemented by CLEAResult in 2023.

The program staff work with both trade allies and decision-makers at facilities to identify and quantify efficiency opportunities. Interested customers must first submit a pre-approval application to the program which includes usage history and detailed calculations and specifications for the project. Program staff review the customer's initial reported savings and screen projects using an internal cost-benefit test. The Custom Program requires that a project's initial application be pre-approved prior to the start of the project. Prior to issuing an approval notice, pre-installation inspections are performed on almost all projects, especially for complex and high impact measures. After project completion, the customer submits a final application and receives the project rebate from the Custom Program.

Additionally, Nicor Gas continued the Nicor Gas non-joint Retro-Commissioning (NG-RCx) offering in 2023, assisting participants with low-cost and no cost tune-ups and adjustments to the operating systems, building controls, energy management systems and HVAC systems of existing buildings. In 2023, there was one NG-RCx project completed and claimed savings; this project was submitted in the custom path with a NTG value of 0.84.

The Business Custom program had 89 participants in 2023 and completed 89 Custom projects. One additional participant completed one Nicor Gas-RCx project. A total of 90 projects were completed in 2023, as shown in the Table 2-1.

Table 2-1. 2023 Volumetric Findings Detail

Participation	Private	Public	Total
Custom – Participants *	33	56	89
Custom – Projects †	33	56	89
Nicor-RCx – Participants *	1	0	1
Nicor-RCx – Projects †	1	0	1
Total	**34**	**56**	**90**

* Participants are defined as unique account names
† Installed Projects are defined as unique project IDs
Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.

3. Program Savings Detail

Table 3-1 summarizes the energy savings the Business Custom Program achieved by path in 2023.

Table 3-1. 2023 Annual Energy Savings Summary

Program Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Custom Private	1,589,050	99%	1,572,512	0.84	1,321,147
Custom Public	866,406	98%	853,231	0.85	725,054
Custom Subtotal	***2,455,456***	***99%***	***2,425,743***	***0.84***	***2,046,201***
RCx	62,845	100%	62,845	0.84	52,790
Total or Weighted Average	**2,518,301**	**99%**	**2,488,588**		**2,098,991**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† A deemed value. Available on the SAG web site: https://www.ilsag.info/evaluator-ntg-recommendations-for-2023/. Projects with NTG other than 0.84 include projects in disadvantaged communities designated sites (DAC) with an NTG of 1.0.
Source: Guidehouse evaluation team analysis.

4. Program Savings by Measure

The Custom Program categorizes measures based on savings into two groups of less than or greater than 7,500 therm savings, as shown in Table 4-1.

Table 4-1. 2023 Annual Energy Savings by Measure

Program Category	Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private	Custom 2,500-7,500 therms	61,473	101%	62,283	0.84	52,555
	Custom > 7,500 therms	1,527,577	99%	1,510,229	0.84	1,268,592
Private Subtotal		**1,589,050**	**99%**	**1,572,512**	**0.84**	**1,321,147**
Public	Custom 2,500-7,500 therms	127,767	101%	129,339	0.88	113,595
	Custom > 7,500 therms	738,639	98%	723,892	0.84	611,459
Public Subtotal		**866,406**	**98%**	**853,231**	**0.85**	**725,054**
Custom Subtotal		**2,455,456**	**99%**	**2,425,743**	**0.84**	**2,046,201**
RCx		62,845	100%	62,845	0.84	52,790
Total or Weighted Average		**2,518,301**	**99%**	**2,488,588**		**2,098,991**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† A deemed value. Available on the SAG web site: https://www.ilsag.info/evaluator-ntg-recommendations-for-2023/. Projects with NTG other than 0.84 include projects in disadvantaged communities designated sites (DAC) with an NTG of 1.0.
Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.

Large energy saving projects include Regenerative Thermal Oxidizer (RTO), Boiler Replacement, Controls Upgrade, and Air Handling Unit (AHU). More details of the 2023 Custom Program savings by measure are provided in Table 4-2.

Table 4-2. 2023 Annual Energy Savings by Measure

Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Air Handling Unit (AHU)	141,241	97%	136,991	0.84	115,073
Automated Logic Controls (ALC)	7,707	102%	7,868	1.00	7,868
Building Automation System (BAS)	20,604	101%	20,844	0.84	17,509
BAS Metasys System Upgrade / AHU	25,478	102%	26,011	0.84	21,849
BAS Project	4,395	102%	4,487	0.84	3,769
BAS Upgrade	3,118	102%	13,392	0.84	11,249
BAS with Demand Control Ventilation (DCV)	7,234	102%	27,803	0.87	24,235
BAS, Burner and Controls replacement	47,532	93%	44,434	0.84	37,325
Boiler	32,330	102%	32,903	0.84	27,639
Boiler and controls	8,715	102%	8,897	0.84	7,474
Boiler Descaling	2,472	99%	2,443	0.84	2,052
Boiler Plant Upgrade	12,223	102%	12,479	0.84	10,482

Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Boiler Replacement	231,363	95%	20,509	0.84	185,464
Boiler Replacement, Hot Water Reset	5,620	102%	5,737	0.84	4,819
Boiler Upgrade	38,198	93%	35,709	0.84	29,995
Building Air Handlers	21,519	102%	21,969	0.84	18,454
Burner and Controls	5,101	102%	5,208	0.84	4,374
Burner Control Upgrade	1,511	99%	1,493	0.84	1,254
Burner Replacement	33,043	102%	33,734	0.84	28,336
Burner Replacement & Variable Frequency Drive (VFD)	146,177	100%	146,121	0.84	122,742
Burner Retrofit	45,024	102%	45,965	0.84	38,611
Burner Upgrade	37,040	102%	37,800	0.84	31,752
Combined Heat and Power (CHP) - Damper Control Replacement	62,845	100%	62,845	0.84	52,790
Condensate Return & Insulation & boiler replacement	6,880	102%	7,024	0.84	5,900
Controls	8,421	102%	18,698	0.84	15,707
Controls Upgrade	212,131	97%	205,912	0.84	172,966
Deaerator (DA) Tank with Insulation	527	99%	521	0.84	437
Equipment Replacement	6,162	102%	6,291	0.84	5,284
Garage Door Curtain	7,763	102%	7,925	0.84	6,657
Grain Dryer Replacement	3,478	99%	3,437	0.84	2,887
Heating Replacement /Retrofit	1,717	99%	1,697	0.84	1,425
HVAC Upgrade	98,186	102%	99,983	0.90	89,579
HVAC Upgrade & BAS	31,481	102%	32,139	0.84	26,997
HVAC Upgrade and Roof	35,707	102%	36,454	0.84	30,621
Insulation	24,178	102%	24,683	0.84	20,734
Laundry Facility	90,400	93%	84,509	0.84	70,987
Linkageless Controls	1,530	99%	1,512	0.84	1,270
Multiport Relief Valve	124,997	93%	116,851	0.84	98,155
New Construction (NC) Condensing Boilers	5,437	102%	5,551	0.84	4,663
New Burners and High Efficiency (HE)	3,069	99%	3,033	0.84	2,548
New Ovens and Recuperative Oxidizers	160,750	100%	160,688	0.84	134,978
New Roof	3,771	99%	3,727	0.84	3,130
Natural Gas Heat Pump (NGHP)	9,010	101%	9,073	0.91	8,228
Pool Heating Unit Replacement	5,247	102%	5,357	0.84	4,500
Refractory rebuild and Tune Up	20,951	102%	1,389	0.84	17,967
Reverse Osmosis (RO) System	7,853	102%	8,017	0.84	6,734

Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Roofing, Insulation	19,354	102%	19,759	0.84	16,597
Roofing, RTU Upgrade	3,148	99%	3,111	0.84	2,613
Regenerative Thermal Oxidizer (RTO)	636,717	100%	636,473	0.84	534,637
Roof Top Units (RTUs)	4,458	102%	4,551	0.84	3,823
Tankless Water Heaters	4,488	102%	4,582	0.84	3,849
Total or Weighted Average	**2,518,301**	**99%**	**2,488,588**		**2,098,991**

† A deemed value. Available on the SAG web site: https://www.ilsag.info/evaluator-ntg-recommendations-for-2023/. Projects with NTG other than 0.84 include projects in disadvantaged communities designated sites (DAC) with an NTG of 1.0.
Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.

5. Impact Analysis Findings and Recommendations

5.1 Impact Parameter Estimates

Table 5-1 shows the realization rate and data sources from our evaluation review. The realization rate is the ratio of the verified savings to the ex ante savings. Following Table 5-1 are findings and recommendations, including discussion of all measures with realization rates above or below 100%. Appendix A provides a description of the impact analysis methodology. Appendix B provides brief findings for all sampled projects. Appendix C shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report.

Table 5-1. 2023 Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Custom Measures	Project	Vary	Vary	99%	Project File Review*, Monthly Billing Data, Illinois TRM v11.0†, Site Specific Verification‡
Nicor Gas-RCx Measures	Project	Vary	Vary	100%	Project File Review*, Monthly Billing Data, Site Specific Verification‡

* Program Tracking Data (PTD) provided by Nicor Gas, extract dated January 30, 2024.
† State of Illinois Technical Reference Manual version 11.0 from **http://www.ilsag.info/technical-reference-manual.html**.
‡ Project files and monthly billing data provided by Nicor Gas. Where conducted, on-site or telephone interview data collected by Guidehouse.

5.2 Findings and Recommendations

The evaluation team found the largest deviations from ex ante savings are in Boiler Replacement and Upgrade, Building Automation System (BAS), Laundry Facility, and AHU measures. The evaluation team sampled and reviewed projects in two waves as these were

completed during the program year 2023 (PY2023) and provided findings to Nicor Gas using summary results trackers. Key findings and recommendations are summarized below.

Finding 1. For Boiler Replacement projects NGPS-20-03, NG-22-44, HVAC Upgrade projects NGPS-23-23 and NGPS-21-51, HVAC Upgrade & BAS project NGPS-21-50, AHU Project NGPS-23-15, and BAS, Burner and Controls Replacement project NGPS-23-10, the ex ante savings were based on utility data analysis. The evaluation team included additional utility data from the evaluation period to the analysis and adjusted the heating balance temperatures applied in the analysis. The updates resulted in increases and decreases in savings for different projects, with the RRs ranging from 70% to 122%.

Recommendation 1a. When conducting a utility data analysis to calculate project savings, utilize utility data through the most recent billing period, if possible, to allow maximum coverage of the post installation period.

Recommendation 1b. When determining the heating balance temperatures in a utility data analysis, apply the common approach of determining the heating balance temperatures by achieving the minimum residual in the model. However, the results from this approach should be reviewed and updated when necessary, e.g., when the resultant summer usages for the post installation and the baseline cases are considerably different and unexpected. In this scenario, Guidehouse recommends manually updating and optimizing the heating balance temperatures based on actual summer usages from the utility data.

Finding 2. Project NGPS-22-16 was the first phase of a multiple phase project (BAS Metasys System Upgrade). For the verified savings, additional utility data during the evaluation period was added to the utility data analysis, and the data applicable for use in the analysis was refined to be before October of 2023. This period covered only the time period before the start of the second phase of this multiple phase projects. Future phase project savings will be used to true up the total project savings. Based on the updates, the project RR is 27%.

Recommendation 2. Notify the evaluation team when each phase of a multiple phase project is submitted so all phases of the project can be tracked and evaluated consistently across the project timeline, allowing savings to be handled correctly to account for impact of different phases.

Finding 3. For Laundry Facility project NG-22-10, the verified annual laundry production was about 10% lower than the ex ante predicted laundry production. The savings was updated using a full building utility data analysis normalized based on post installation daily laundry production and resulted in a RR of 83%.

Recommendation 3. Continue to enhance data collection and document references for key input and parameters. If a key input or parameter cannot be determined during the ex ante review, consider conducting customer interviews to address data gaps,

allowing additional time period for data collection, and/or applying a safety factor to account for potential variances due to the uncertainty in used values.

Finding 4a. For Boiler Upgrade project NGPS-22-10, the ex ante calculator inputs needed revisions, e.g. the baseline boiler efficiency was incorrectly based on combustion efficiency. With edits to the inputs, the project savings are more than 10% of the building consumption. The evaluation team incorporated additional months of post installation data which allowed using a utility data regression analysis to quantify savings. Also, the verified savings calculator excluded data before August of 2021 to focus on more recent operations and avoid COVID impacts, which also improved the R-square of the regression. The RR of this project is 179%.

Finding 4b. For Boiler Replacement project NGPS-22-02, the ex ante calculator inputs needed revisions; e.g. the baseline boiler efficiency was incorrectly based on combustion efficiency, and the installed equipment thermal efficiency did not match the provided cutsheet. With edits to these inputs, the project savings are more than 10% of the building consumption. The evaluator used a custom utility data regression model to quantify savings. The analysis was focused on the heating season data to address the differences between summer and winter gas consumptions. The RR of this project is 209%.

Recommendation 4. When a project savings exceeds the threshold of 10%[1] of the building usage and when the project key assumptions and inputs cannot be obtained or verified, use a utility consumption data analysis to true up the claimed energy savings.

Finding 5. For Boiler Replacement project NGPS-22-03, additional data from the evaluation period was added to the savings analysis. The summer and winter operations have different patterns in this building. As a result, the verified calculation handled the summer and winter calculations individually with different Heating Degree Days (HDDs). The RR of this project is 80%.

Recommendation 5. When conducting a utility data analysis to calculate project savings, if the summer and winter gas consumptions are considerably different, use individual models for summer and winter for better savings accuracy.

Finding 6. For Boiler Replacement project NGPS-20-14 and Boiler Plant Upgrade project NG-22-11, certain savings components were removed as follows: for NGPS-20-14, the reset savings was already included in the improved boiler efficiency; for NG-22-11, the 2% blowdown saving should only apply to the steam boiler and not the hot water heaters. The updated RRs for these two projects are 42% and 96%, correspondingly.

[1] IPMVP Core Concepts, Efficiency Valuation Organization, Section 5.5.1 Option C: Whole Facility – General, page 25. Discuss the necessity for conducting regression analysis when a 10% building usage consumption is exceeded.

Recommendation 6. Enhance the engineering review quality control process for projects with multiple improvements under the same project scope to confirm the claimed savings components are appliable for the project.

Finding 7. For Roofing Insulation project NG-22-22, the proposed absorptance and sol-air equation did not reflect the project details accurately and were updated in the verified savings calculator. The updated RR is 109%.

Recommendation 7. Enhance the engineering review QC process for projects to ensure the inputs and parameters match the project implementation details.

Finding 8. For Burner Replacement & VFD project NG-22-16, the ex ante data included cold-mix asphalt in December. This batch was sold in the last week of December, but produced over five weeks in November. The evaluation team updated this December data point and distributed it to the weeks in November. This update led to a minor impact to savings, and the project RR is approximately 100%.

Recommendation 8. Review the dataset used in savings analysis for outliers and exclude or account for these outliers.

Finding 9. For Burner Upgrade project NG-22-07, the metered data and the utility history usage data show different heating loads. The evaluation team increased the load share for Boiler #2 to match the utility data and resulted in a RR of 106%.

Recommendation 9. Refer to utility data to true up the estimates for equipment percentage load.

Appendix A. Impact Analysis Methodology

The 2023 evaluation involved retrospective adjustments to ex ante gross savings on custom measure variables of projects installed in 2023. The program implementor, CLEAResult, provided documentation of project applications, savings, and supplemental documents. The evaluation team verified project eligibility and savings based on engineering review, billing data review, and site-specific verification of a sample of projects in the programs. The evaluation team designed the sample sizes to provide a 90/10 confidence and relative precision level for program-level gross savings verification.

The Nicor Gas-RCx project was selected for review as an individual stratum and reviewed as a census. Other custom projects were randomly selected through a stratified sample design at the tracking record level using the population gross therm savings determined from program tracking data. Strata were defined by project size, based on gross energy savings boundaries that placed about one-third of program-level savings into each stratum. The bottom 2% of savings were placed in stratum 4 and not included in the final sample draw. The RR of the sampled custom projects was applied to stratum 4. Table A-1 shows a profile of the sample selection.

Table A-1. 2023 Profile of Gross Impact Sample for Custom Projects

	Population Summary			Sample Summary		
Program	Sampling Strata	Number of Projects (N)	Ex Ante Gross Savings (therms)	n	Ex Ante Gross Savings (therms)	Sampled % of Population (% therms)
Business Custom	1	3	943,644	3	943,644	100%
	2	8	689,896	7	564,899	82%
	3	57	773,772	13	229,043	30%
	4	21	48,144	0	-	0%
	RCx	1	62,845	1	62,845	100%
TOTAL or Weighted Average		**90**	**2,518,301**	**24**	**1,800,431**	**71%**

Source: Guidehouse evaluation team analysis.

Table A-2 presents the strata-level verified gross realization rates and statistical precision values at 90% confidence for the Custom Program.

Table A-2. 2023 Gross Therm Realization Rates and Relative Precision at 90% Confidence

Program Sector	Sampling Strata	Relative Precision + or - %	Mean RR	Standard Error
Business Custom	1	0%	100%	0.00
	2	7%	93%	0.03
	3	17%	102%	0.10
	4	NA	NA	NA
	RCx	0%	100%	0.00
Custom Total RR (90/10)		7%	99%	0.04

Source: Guidehouse analysis

Engineering Review of Project Files

For each selected project, an in-depth application review is performed to assess the engineering methods, parameters and assumptions used to generate all ex ante impact estimates. For each measure in the sampled project, engineers estimated verified gross savings based on their review of documentation and engineering analysis.

To support this review, the implementation contractor provided project documentation in electronic format for each sampled project. Documentation included some or all scanned files of hardcopy application forms and supporting documentation from the applicant (invoices, measure specification sheets, and vendor proposals), pre-inspection reports and photos, post inspection reports and photos, and calculation spreadsheets.

The evaluation team used IL-TRM v11.0 as a source of inputs for certain non-site-specific data, e.g. in Regenerative Thermal Oxidizer project NG-23-32, Heat Loss Factor and Combustion intake air temperature are based on IL-TRM section 4.8.11; in Boiler Replacement project NGPS-20-14, Baseline Boiler Efficiency is based on IL-TRM section 4.4.10.

Onsite Data Collection

Onsite surveys were completed for 3 of the 24 custom projects sampled. Utility billing data was provided by Nicor Gas and analyzed for 13 of the 24 sampled projects. Telephone interviews with customer site representatives were also used to confirm equipment operating details and other relevant information.

.

Appendix B. Impact Analysis Supplemental Information

Table B-1 provides a summary of the Custom Program sample selection and verification approach. Table B-2 provides a summary of verification results for the selected samples.

Table B-1. Profile of 2023 Gross Impact Sample

Project ID	Program Sector	Ex Ante Gross Savings (therms)	Strata	Verification Approach	Measure
NG-23-32	Private	636,717	1	File Review	Regenerative Thermal Oxidizer (RTO)
NG-22-47	Private	160,750	1	File Review	New Ovens and Recuperative Oxidizers
NG-22-16	Private	146,177	1	File Review, Regression Model Review	Burner Replacement & Variable Frequency Drive (VFD)
NGPS-20-03	Public	143,192	2	File Review, Utility Data Analysis	Boiler Replacement
NG-21-08	Private	123,770	2	File Review, Utility Data Analysis	Controls Upgrade
NG-22-10	Private	90,400	2	File Review, Site Visit, Utility Data Analysis	Laundry Facility
NGPS-23-15	Public	83,676	2	File Review, Utility Data Analysis	Air Handling Unit (AHU)
NGPS-23-10	Public	47,532	2	File Review, Contractor Interview	Building Automation System (BAS), Burner and Controls replacement
NGPS-22-10	Public	38,198	2	File Review, Utility Data Analysis	Boiler Upgrade
NGPS-22-03	Public	38,131	2	File Review, Site Visit, Utility Data Analysis	Boiler Replacement
NGPS-23-23	Public	33,030	3	File Review, Utility Data Analysis	HVAC Upgrade
NGPS-22-16	Public	25,478	3	File Review, Utility Data Analysis	BAS Metasys System Upgrade / AHU
NG-22-07	Private	25,313	3	File Review, Utility Data Analysis	Burner Upgrade
NGPS-21-51	Public	23,547	3	File Review, Utility Data Analysis	HVAC Upgrade & BAS
NGPS-20-30	Public	21,519	3	File Review	Building Air Handlers
NG-22-22	Private	19,354	3	File Review	Roofing, Insulation
NG-22-44	Private	19,301	3	File Review, Utility Data Analysis	Boiler Replacement
NGPS-22-02	Public	15,219	3	File Review, Utility Data Analysis	Boiler Replacement
NG-22-11	Private	12,223	3	File Review	Boiler Plant Upgrade
NGPS-22-23	Public	12,054	3	File Review	Boiler
NG-22-52	Private	8,451	3	File Review	Burner Retrofit

Project ID	Program Sector	Ex Ante Gross Savings (therms)	Strata	Verification Approach	Measure
NGPS-21-50	Public	7,934	3	File Review, Utility Data Analysis	HVAC Upgrade & BAS
NGPS-20-14	Public	5,620	3	File Review	Boiler Replacement, Hot Water Reset
NGRCx-22-01	Private	62,845	RCx	File Review, Regression Model Review	Combined Heat and Power (CHP) - Damper Control Replacement

Source: Nicor Gas tracking data and Guidehouse team analysis.

Table B-2. 2023 Summary of Sample Verification Results

Project ID	Program Sector	Measure Description	Gross Realization Rate	Summary of Adjustment
NG-23-32	Private	Regenerative Thermal Oxidizer (RTO)	100%	No Adjustment
NG-22-47	Private	New Ovens and Recuperative Oxidizers	100%	No Adjustment
NG-22-16	Private	Burner Replacement & Variable Frequency Drive (VFD)	100%	Allocated cold-mix asphalt sold in last week in December over five weeks in November when they were produced.
NGPS-20-03	Public	Boiler Replacement	70%	Included additional utility data and adjusted balance temperatures.
NG-21-08	Private	Controls Upgrade	100%	No Adjustment
NG-22-10	Private	Laundry Facility	83%	Updated calculation using utility data analysis based on daily laundry production.
NGPS-23-15	Public	Air Handling Unit (AHU)	86%	Included additional utility data and adjusted balance temperatures.
NGPS-23-10	Public	Building Automation System (BAS), Burner and Controls replacement	122%	Included additional utility data in custom analysis and adjusted HDD balance temperatures.
NGPS-22-10	Public	Boiler Upgrade	179%	Updated to use a regression analysis. Excluded data before August 2021 to focus on more recent operations and avoid COVID impact.
NGPS-22-03	Public	Boiler Replacement	80%	Included additional utility data and updated the analysis to use different balance temperatures for summer and winter seasons.
NGPS-23-23	Public	HVAC Upgrade	118%	Included additional utility data. Updated to a custom utility analysis to model summer and winter usages separately.

Project ID	Program Sector	Measure Description	Gross Realization Rate	Summary of Adjustment
NGPS-22-16	Public	BAS Metasys System Upgrade / AHU	27%	Updated analysis to exclude data after mid October 2023 to cover the correct post installation period for Phase 1 of this project.
NG-22-07	Private	Burner Upgrade	106%	Metered data show less load compared to annual utility history data. Boiler #2 load was adjusted to account for this difference.
NGPS-21-51	Public	HVAC Upgrade & BAS	102%	Included additional utility data and adjusted balance temperatures.
NGPS-20-30	Public	Building Air Handlers	100%	No Adjustment
NG-22-22	Private	Roofing, Insulation	109%	Adjusted proposed absorptance for white paint. Adjusted the sol-air equation to account for all hours.
NG-22-44	Private	Boiler Replacement	99%	Included additional utility data in the analysis.
NGPS-22-02	Public	Boiler Replacement	206%	Updated to use a custom utility data regression model.
NG-22-11	Private	Boiler Plant Upgrade	96%	Excluded the 2% blowdown savings applied to the hot water heater gas load.
NGPS-22-23	Public	Boiler	100%	No Adjustment
NG-22-52	Private	Burner Retrofit	100%	No Adjustment
NGPS-21-50	Public	HVAC Upgrade & BAS	117%	Included additional utility data. Removed summer savings from the analysis.
NGPS-20-14	Public	Boiler Replacement, Hot Water Reset	42%	Removed the reset savings since it's included under the boiler efficiency improvement. Adjusted load profile based on utility data.
NGRCx-22-01	Private	Combined Heat and Power (CHP) - Damper Control Replacement	100%	No Adjustment

Source: Nicor Gas tracking data and Guidehouse team analysis.

Appendix C. Program Specific Inputs for the Illinois TRC

Table C-1 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in Table C-1 and will be provided to the evaluation team later. Guidehouse will include annual and lifetime water savings and greenhouse gas reductions in the end of year summary report.

Table C-1. 2023 Verified Cost Effectiveness Inputs

Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
AHU	Project	3	15.0	141,241	136,991	115,073
ALC Controls	Project	1	15.0	7,707	7,868	7,868
BAS	Project	3	15.0	20,604	20,844	17,509
BAS Metasys System Upgrade / AHU	Project	1	15.0	25,478	26,011	21,849
BAS Project	Project	1	15.0	4,395	4,487	3,769
BAS Upgrade	Project	2	15.0	13,118	13,392	11,249
BAS with DCV	Project	2	15.0	27,234	27,803	24,235
BAS, Burner and Controls replacement	Project	1	15.0	47,532	44,434	37,325
Boiler	Project	3	25.0	32,330	32,903	27,639
Boiler and controls	Project	1	25.0	8,715	8,897	7,474
Boiler Descaling	Project	1	6.0	2,472	2,443	2,052
Boiler Plant Upgrade	Project	1	25.0	12,223	12,479	10,482
Boiler Replacement	Project	8	25.0	231,363	220,509	185,464
Boiler Replacement, Hot Water Reset	Project	1	25.0	5,620	5,737	4,819
Boiler Upgrade	Project	1	25.0	38,198	35,709	29,995
Building Air Handlers	Project	1	15.0	21,519	21,969	18,454
Burner and Controls	Project	1	21.0	5,101	5,208	4,374
Burner Control Upgrade	Project	1	20.0	1,511	1,493	1,254
Burner Replacement	Project	1	21.0	33,043	33,734	28,336
Burner Replacement & VFD	Project	1	21.0	146,177	146,121	122,742
Burner Retrofit	Project	3	21.0	45,024	45,965	38,611
Burner Upgrade	Project	3	21.0	37,040	37,800	31,752
CHP- Damper Control Replacement	Project	1	15.0	62,845	62,845	52,790
Condensate Return & Insulation & boiler replacement	Project	1	18.3	6,880	7,024	5,900
Controls	Project	2	15.0	18,421	18,698	15,707
Controls Upgrade	Project	6	15.0	212,131	205,912	172,966

Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
DA Tank with Insulation	Project	1	15.0	527	521	437
Equipment Replacement	Project	1	15.0	6,162	6,291	5,284
Garage Door Curtain	Project	1	5.0	7,763	7,925	6,657
Grain Dryer Replacement	Project	1	20.0	3,478	3,437	2,887
Heating Replacment/Retrofit	Project	1	25.0	1,717	1,697	1,425
HVAC Upgrade	Project	11	15.0	98,186	99,983	89,579
HVAC Upgrade & BAS	Project	2	15.0	31,481	32,139	26,997
HVAC Upgrade and Roof	Project	1	15.0	35,707	36,454	30,621
Insulation	Project	1	15.0	24,178	24,683	20,734
Laundry Facility	Project	1	7.0	90,400	84,509	70,987
Linkageless Controls	Project	1	20.0	1,530	1,512	1,270
Multiport Relief Valve	Project	1	10.0	124,997	116,851	98,155
NC Condensing Boilers	Project	1	25.0	5,437	5,551	4,663
New Burners and HE	Project	1	21.0	3,069	3,033	2,548
New Ovens and Recuperative Oxidizers	Project	1	20.0	160,750	160,688	134,978
New Roof	Project	3	20.0	3,771	3,727	3,130
NGHP	Project	2	15.0	9,010	9,073	8,228
Pool Heating Unit Replacement	Project	1	15.0	5,247	5,357	4,500
Refractory rebuild and Tune Up	Project	1	3.0	20,951	21,389	17,967
RO System	Project	1	20.0	7,853	8,017	6,734
Roofing, Insulation	Project	1	20.0	19,354	19,759	16,597
Roofing, RTU Upgrade	Project	1	15.0	3,148	3,111	2,613
RTO	Project	1	20.0	636,717	636,473	534,637
RTUs	Project	1	15.0	4,458	4,551	3,823
Tankless Water Heaters	Project	1	20.0	4,488	4,582	3,849
Total			**18.0**	**2,518,301**	**2,488,588**	**2,098,991**

** Verified gross therms shown by measure type are based on sample realization rates for the population times ex ante gross therms, and do not reflect individual projects.*
Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.