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| Business Custom Rebates Program Impact Evaluation Report  Energy Efficiency Plan: Program Year 2023  (1/1/2023-12/31/2023) | | | | | | | |
| Prepared for:  Nicor Gas Company  DRAFT  April 29, 2024 | | | | | | | |
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# 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.

# 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.

# 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.*

# 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 Business Custom Rebates Program 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 |
| 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 |
| 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.

# Impact Analysis Findings and Recommendations

## 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 Business Custom Rebates Program 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.

## 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]](#footnote-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.

**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 toutility data to true up the estimates for equipment percentage load.

##### 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 Business Custom Rebates Program Profile of Gross Impact Sample for Custom Projects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Population Summary** | | | **Sample Summary** | | |
| **Program** | **Sampling Strata** | **Number of Projects (N)** | **Ex Ante Gross Savings** | **n** | **Ex Ante**  **Gross**  **Savings** | **Sampled % of Population** |
| **(therms)** | **(therms)** | **(% 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 Business Custom Rebates Program Gross Therm Realization Rates and Relative Precision at 90% Confidence

| **Program Sector** | **Sampling Strata** | **Relative Precision** | **Mean RR** | **Standard Error** |
| --- | --- | --- | --- | --- |
| **+ or - %** |
| 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.

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##### 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 Business Custom Rebates Program 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 |
| 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 Business Custom Rebates Program 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. |
| 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.

##### 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 Business Custom Rebates Program 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 |
| 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.*

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. [↑](#footnote-ref-1)