Business Custom Incentive Program Impact Evaluation Report

Energy Efficiency Plan Year 2021 (1/1/2021-12/31/2021)

Prepared for:

Nicor Gas

Final

June 15, 2022

Prepared by:

Gabriela Gaitan
Guidehouse

Charles Ampong
Guidehouse

Ryan Kroll
Brian Uchtmann
John Flotterud
Bridget Pertzch
Driftless Energy

Submitted to:

Nicor Gas Company
1844 Ferry Road
Naperville, IL 60563

Submitted by:

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

Contact:

Ed Balbis
Partner
561.644.9407
ebalbis@guidehouse.com

Stu Slote
Director
802.526.5113
stu.slote@guidehouse.com

Kevin Grabner
Associate Director
608.616.5805
kevin.grabner@guidehouse.com

Table of Contents

List of Tables and Figures

1. Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2021 Custom Program. It presents a summary of the energy impacts for the total program and broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology. Program year 2021 covers January 1, 2021 through December 31, 2021.

2. Program Description

The Custom Program is targeted to the public sector and private sector commercial and industrial (C&I) customers of Nicor Gas. It provides customers with rebate incentives for the installation of cost-effective natural gas-related energy efficiency improvements that are not eligible for a prescriptive rebate under the Nicor Gas Business Energy Efficiency Rebate Program. The Custom 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 program targets large public sector and C&I customers with more complex facilities that will benefit most from a custom offering during new equipment purchases, facility modernization and industrial process improvements. The Custom Program was implemented in 2021 by CLEAResult.

The program staff work with both trade allies and decision-makers at facilities with natural gas use over 60,000 therms to identify and quantify efficiency opportunities at their facilities. Interested customers must first submit a letter of interest and a pre-approval application to the program. The initial application 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.

Additionally, Nicor Gas continued the Nicor Gas non-joint Retro-Commissioning (NG-RCx) offering in 2021, 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. The Custom program also offers feasibility studies and installation incentives for Combined Heat and Power (CHP) projects. In 2021, there were no Nicor Gas "Stand Alone" RCx and CHP projects claiming savings.

The Custom Program had 33 completed projects in 2021, as shown in Table 2-1. Two of the projects are Ground Source Heat Pump (GSHP) projects that were treated as certainty strata and evaluated separately.

Table 2-1. 2021 Volumetric Summary

	Private	Public	Total
Custom - Participants	12	21	33
Custom - Completed Projects, excluding Ground Source Heat Pumps (GSHP)	12	19	31
Projects, 2,500 - 7,500 Therms	*1*	*13*	*14*
Projects, > 7,500 Therms	*11*	*6*	*17*
Custom – Completed GSHP Projects	0	2	2

* 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. Savings Summary

Table 3-1 summarizes the energy savings the Custom Program achieved by path in 2021.

Table 3-1. 2021 Annual Energy Savings Summary

Program Sector	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Custom - Private	490,999	1.28	629,244	0.79	497,102
Custom - Public‡	256,606	1.28	328,855	0.79	259,796
Custom – Subtotal	***747,605***	***1.28***	***958,099***	***0.79***	***756,898***
Custom – Public GSHP	77,220	0.61	47,462	0.79	37,495
Total or Weighted Average	**824,825**	**1.22**	**1,005,561**	**0.79**	**794,393**

* 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/ntg_2021.
‡ Public subtotal does not include the two GSHP projects that were also in the public sector.
Source: Guidehouse evaluation team analysis.

4. Program Savings by Measure

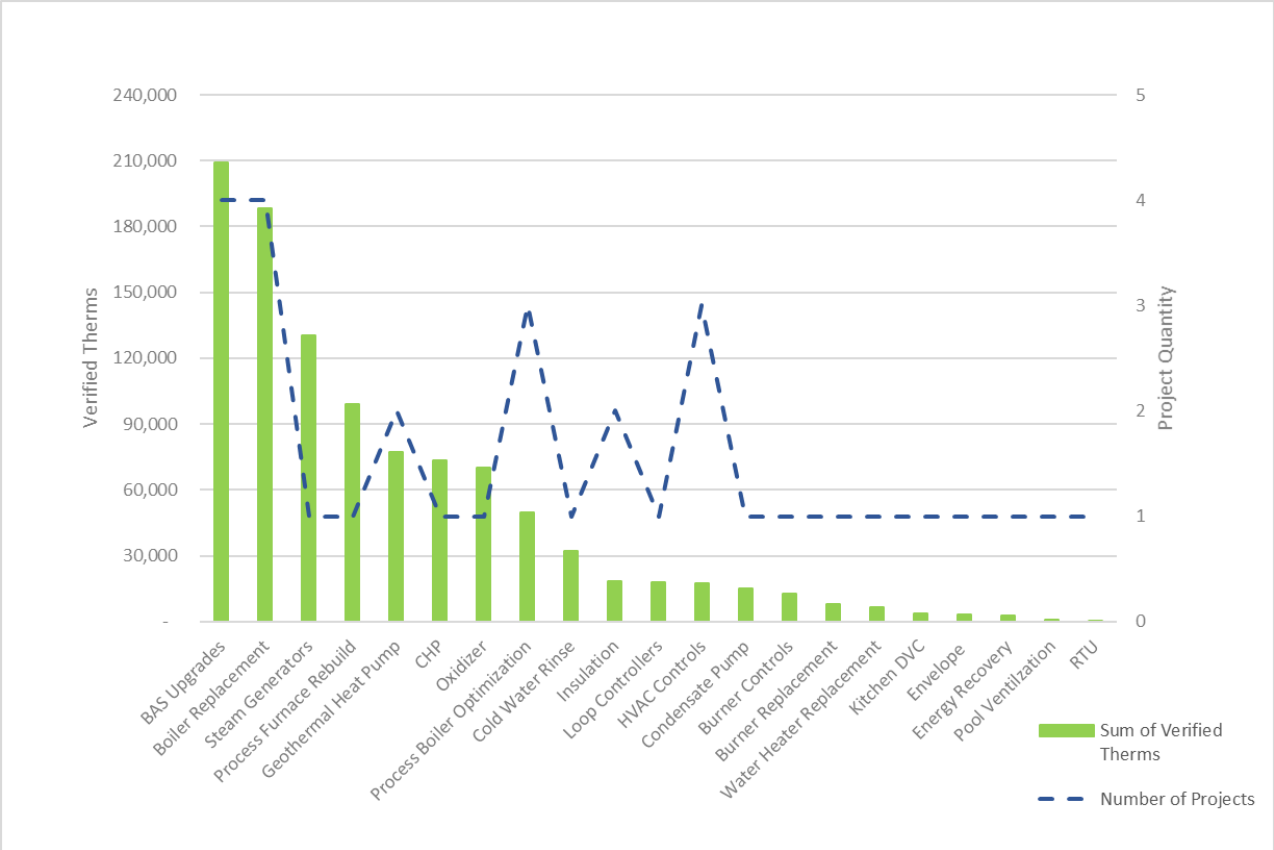
The Custom Program identifies measures as less than or greater than 7,500 therms, as shown in Table 4-1. The Custom Program projects are further broken down by project type (i.e., technology) in Figure 4-1. Large energy saving projects for process boiler optimization and process improvements provided the majority of program savings, while projects involving controls adjustments were the most common.

Table 4-1. 2021 Annual Energy Savings by Size

Program Sector	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
Private	Custom > 7,500 therms	488,333	1.28	625,827	0.79	494,403
Private	Custom 2,500-7,500 therms	2,666	1.28	3,416	0.79	2,699
Private Subtotal		*490,999*	*1.28*	*629,243*	*0.79*	*497,102*
Public	Custom > 7,500 therms	217,991	1.28	279,368	0.79	220,701
Public	Custom 2,500-7,500 therms	38,615	1.28	49,487	0.79	39,095
Public Subtotal		*256,606*	*1.28*	*328,855*	*0.79*	*259,796*
Public GSHP		77,220	0.61	47,462	0.79	37,495
Total or Weighted Average		**824,825**	**1.22**	**1,005,561**	**0.79**	**794,393**

Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.

Figure 4-1. Verified Gross Savings by Custom Project Type



Source: Nicor Gas tracking data and Guidehouse team analysis.

5. Impact Analysis Findings and Recommendations

5.1 Impact Parameter Estimates

Table 5-1 shows the unit therm savings and realization rate findings by measure from Guidehouse's review. The realization rate is the ratio of the verified gross savings to the ex ante savings. Following the table, we provide findings and recommendations, including discussion of sampled measures with realization rates above or below 100%. Appendix A provides a description of the impact analysis methodology, and 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. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Custom Measures	Vary	Vary	Vary	128%	Project File Review, Monthly Billing Data, Verification*, TRM v9.0†
Custom GSHP Measures	Vary	Vary	Vary	61%	Project File Review, Monthly Billing Data, Verification*, TRM v9.0

* Program Tracking Data (PTD) provided by Nicor Gas; extract dated January 28, 2022. Project files and monthly billing data provided by Nicor Gas. Verification, including telephone interviews with customer contacts, performed by Driftless Energy and Guidehouse.
† Source of inputs for some non-site-specific data. State of Illinois Technical Reference Manual version 9.0 from http://www.ilsag.info/technical-reference-manual.html.
Source: Nicor Gas tracking data and Guidehouse team analysis.

5.2 Findings and Recommendations

Guidehouse found the largest deviation from ex ante savings in GSHPs, high efficiency boiler projects, and combustion controls. Guidehouse sampled and reviewed projects in waves as they were completed during the program year and provided findings to Nicor Gas in monthly calls and summary results spreadsheets. Key findings and recommendations are summarized below:

Finding 1. GSHP projects that are implemented as joint electric and gas projects have savings split between the electric and gas utilities. Guidehouse verified that no electrical savings were claimed by ComEd and estimated verified savings assigning all net heating savings to the gas utility. The TRM v9 specifies that heating gas savings should be reduced for GSHP projects to account for the increased electric usage of heat pumps, converted to equivalent therms. The ex ante analysis did not account for any offset electrical savings, significantly decreasing the realization rate.

Recommendation 1. Include the electrical heat pump offset in GSHP analysis.

Finding 2. The steam boiler projects NG-20-33 and NG-20-21 were evaluated using additional months of post-installation gas usage and production data for the verified measure analysis that was available to evaluators but was not available when the implementer finalized the project, and customer interviews. The resulting regressions identified lower gas usage for the efficient measures and resulted in greater verified savings.

Finding 3. Combustion controls project NG-20-28 ex ante savings were estimated using a safety factor of 50%. Guidehouse reviewed the project files and savings methodology and did not find need or justification for retaining the safety factor. Guidehouse removed the safety factor.

> **Recommendation 2.** Prior to recording final ex ante savings, consider whether safety factors added to calculations during the early stages of a project are still justified, based on final installation conditions.

Appendix A. Impact Analysis Methodology

The 2021 evaluation involved retrospective adjustments to ex ante gross savings on custom measure variables of all projects installed in 2021. CLEAResult provided documentation of project applications and savings. Guidehouse verified project eligibility and savings based on engineering review, billing data review, and site-specific verification of a sample of program measures. Guidehouse designed the sample sizes to provide a 90/10 confidence and relative precision level for program-level gross savings verification.

The evaluation team conducted site-specific research to verify project savings. Public Sector and C&I projects, excluding GSHPs, 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 including a certainty strata for three projects that made up 50% of the total therm savings. The bottom 5% of savings were placed in strata three and not included in the final sample draw. The GSHP projects were placed in a separate population and reviewed as a census. Table A-1 shows a profile of the sample selection.

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

	Population Summary			Sample Summary		
Program Sector	**Sampling Strata**	**Number of Projects (N)**	**Ex Ante Gross Savings (Therms)**	**n**	**Ex Ante Gross Savings (Therms)**	**Sampled % of Population (% Therms)**
C&I and Public Sector Custom	Certainty (C)	3	332,994	3	332,994	100%
	1	6	262,350	4	160,942	61%
	2	9	117,507	5	75,659	64%
	3	13	34,744	0	0.00	-
TOTAL (Excl. GSHP)		**31**	**747,605**	**12**	**459,595**	**76%**
Custom Public GSHP	Custom GSHP	2	77,220	2	77,220	100%
TOTAL CUSTOM		**33**	**824,825**	**14**	**782,051**	**78%**

Source: Guidehouse evaluation team analysis.

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

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

Program Sector	Strata	Relative Precision +or-%	Mean RR	Standard Error
C&I and Public Sector Custom, Excluding GSHPs	C	NA	132%	0.00
	1	27.0%	135%	0.16
	2	0.0%	100%	0.00
	3	0.0%	127%	0.00
Custom Total RR (90/10)		**7.0%**	**128%**	**0.05**

Source: Guidehouse analysis

A.1 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 (ex post) 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 TRM v9.0 as a source of inputs for some non-site-specific data.

A.2 On-Site Data Collection

No on-site surveys were completed during 2021 due to the COVID-19 pandemic. Telephone interviews with customer site representatives were 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 Custom Program sample.

Table B-1. Profile of 2021 Custom Gross Impact Sample

Project ID	Program Sector	Ex Ante Gross Savings (therms)	Strata	Verification Approach	Measure
NGPS-18-07	Public	132,237	C	File Review	Building Automation System (BAS) Upgrades
NG-20-33	Private	101,829	C	File Review	Steam Generators
NG-20-21	Private	98,928	C	File Review	Boiler Replacement
NG-20-28	Private	57,183	1	File Review	Combustion Controls
NG-21-25	Private	54,647	1	File Review	Oxidizer
NG-19-38	Private	24,987	1	File Review	Cold Water Rinse
NGPS-20-26	Public	24,125	1	File Review	Process Boiler Optimization
NG-19-18	Private	22,378	2	File Review	Boiler Replacement
NG-20-25	Private	21,402	2	File Review	Boiler Replacement
NGPS-20-64	Public	13,575	2	File Review	Insulation
NG-20-24	Private	11,767	2	File Review	Condensate Pump
NGPS-20-33	Public	6,537	2	File Review	Process Boiler Optimization
NGPS-20-07	Public	48,433	Custom GSHP	File Review	GSHP
NGPS-20-13	Public	28,787	Custom GSHP	File Review	GSHP

Source: Nicor Gas tracking data and Guidehouse team analysis.

Table B-2. 2021 Summary of Custom Program Sample Verification Results

Project ID	Program Sector	Measure Description	Gross Realization Rate	Summary of Adjustment
NGPS-18-07	Public	BAS Upgrades	100%	OK
NG-20-33	Private	Steam Generators	183%	Regression analysis on monthly usage identified lower post-installation usage.
NG-20-21	Private	Boiler Replacement	123%	Regression analysis on monthly usage identified lower post-installation usage.
NG-20-28	Private	Combustion Controls	200%	Removed the 50% safety factor.
NG-21-25	Private	Oxidizer	100%	OK
NG-19-38	Private	Cold Water Rinse	100%	OK
NGPS-20-26	Public	Process Boiler Optimization	100%	OK
NG-19-18	Private	Boiler Replacement	100%	OK
NG-20-25	Private	Boiler Replacement	100%	OK
NGPS-20-64	Public	Insulation	100%	OK
NG-20-24	Private	Condensate Pump	100%	OK
NGPS-20-33	Public	Process Boiler Optimization	100%	OK
NGPS-20-07	Public	GSHP	67%	Ex Ante savings did not account for offset electrical savings.
NGPS-20-13	Public	GSHP	52%	Ex Ante savings did not account for offset electrical savings

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 this table 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. Verified Cost Effectiveness Inputs - Custom

Measure	Units	Quantity	EUL	Ex Ante Gross Therms	Verified Gross Therms*	Verified Net Therms
Boiler Replacement	Project	4	25.0	146,769	188,093	148,593
Cold Water Rinse	Project	1	17.4	24,987	32,022	25,298
Condensate Pump	Project	1	10.0	11,767	15,080	11,913
Combustion Controls	Project	1	20.0	57,183	73,283	57,894
Steam Generators	Project	1	25.0	101,829	130,500	103,095
Burner Controls	Project	1	18.3	10,082	12,921	10,207
Process Furnace Rebuild	Project	1	17.4	77,152	98,875	78,111
Process Boiler Optimization	Project	3	19.5	38,640	49,519	39,120
Building Envelope	Project	1	20.0	2,666	3,417	2,699
Oxidizer	Project	1	20.0	54,647	70,033	55,326
BAS Upgrades	Project	4	15.0	163,070	208,984	165,097
HVAC Controls	Project	3	15.0	13,480	17,275	13,648
RTU	Project	1	15.0	412	528	417
Burner Replacement	Project	1	25.0	6,110	7,830	6,186
Energy Recovery	Project	1	25.0	2,227	2,854	2,255
Water Heater Replacement	Project	1	15.0	4,932	6,321	4,993
Loop Controllers	Project	1	15.0	13,890	17,801	14,063
Kitchen DVC	Project	1	20.0	2,847	3,649	2,882
Insulation	Project	2	15.0	14,403	18,458	14,582
Pool Ventilation	Project	1	17.4	512	656	518
GSHP	Project	2	25.0	77,220	47,462	37,495
Total or Weighted Average		**33**	**20.0**	**824,825**	**1,005,561**	**794,393**

* 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.