



Residential New Construction Program Impact Evaluation Report

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

Prepared for:

Nicor Gas

FINAL

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1. Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2023 Residential New Construction (RNC) program. A summary of the energy impacts for the total program and relevant measure and program structure details. The appendix presents the impact analysis methodology and Illinois total resource cost (TRC) inputs. Program year 2023 covers January 1, 2023, through December 31, 2023.

2. Program Description

The RNC program's objective is to obtain energy savings by increasing the energy efficiency of new construction single-family detached homes and townhomes. The program provides participating new home builders a financial incentive to either a) exceed state and local building code requirements regarding duct and air sealing, along with the installation of specific high-efficiency equipment, or b) install prescriptive high-efficiency equipment only.

The RNC program had 2,089 participants with 7,901 measures in 2023, as shown in Table 2-1.

Table 2-1. 2023 Volumetric Findings Detail

Participation	Residential New Construction	Total
Participants *	2,089	2,089
Installed Measures †	7,901	7,901

* Participants are defined as the total number of unique vendor project IDs.

† Installed Measures is the total quantity of measures installed.

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

Table 2-2 summarizes the installed measure quantities that are the basis for verified energy savings.

Table 2-2. 2023 Installed Measure Quantities

Program Category	Measure	Quantity Unit	Installed Quantity
Residential New Construction	Advanced Thermostat	Unit	2,023
	Air Sealing	Project	1,068
	Duct Insulation and Sealing	Project	1,068
	Gas High Efficiency Furnace >92% AFUE*	Unit	196
	Gas High Efficiency Furnace >95% AFUE*	Unit	1,893
	On Demand Water Heater	Unit	750
	Storage Water Heater	Unit	905
Total			7,903

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

3. Program Savings Detail

Table 3-1 summarizes the energy savings the RNC Program achieved in 2023.

Table 3-1. 2023 Annual Energy Savings Summary

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Residential NPSO ‡	Verified Net Savings (Therms)
Residential New Construction	654,383	100%	653,403	0.80/ 0.90‡	1.048	562,950
Total	654,383	100%	653,403			562,950

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† Net-to-Gross. A deemed value. Available on the SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2023/>.

‡ The net savings was multiplied by a residential non-participant spillover factor of 1.048. The program did not have any disadvantaged community (DAC) designated sites.

Source: Guidehouse evaluation team analysis.

4. Program Savings by Measure

The program includes seven measures as shown in Table 4-1. The Advanced Thermostat and Gas High Efficiency Furnace measures contributed the most savings.

Table 4-1. 2023 Annual Energy Savings by Measure

End-Use	Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG †	Residential NPSO ‡	Verified Net Savings (Therms)
HVAC	Gas High Efficiency Furnace >95% AFUE	263,154	100%	263,073	0.80	1.048	220,561
HVAC	Advanced Thermostat	144,442	100%	144,442	0.90	1.048	136,238
Shell	Air Sealing	80,507	100%	80,444	0.80	1.048	67,444
HVAC	Duct Insulation and Sealing	66,266	100%	66,266	0.80	1.048	55,557
Hot Water	On Demand Water Heater	53,665	100%	53,665	0.80	1.048	44,992
Hot Water	Storage Water Heater	27,068	97%	26,232	0.80	1.048	21,993
HVAC	Gas High Efficiency Furnace >92% AFUE	19,281	100%	19,281	0.80	1.048	16,165
Total		654,383	100%	653,403			562,950

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.

† Net-to-Gross. A deemed value. Available on the SAG (Stakeholder Advisory Group) web site: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2023/>.

‡ Residential NPSO. Residential non-participant spillover factor

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 unit therms savings and realization rate findings by measure from Guidehouse’s review. The realization rate is the ratio of the verified savings to the ex ante savings. Table 5-1 are findings and recommendations, including discussion of the measure with a realization rate other than 100%. Appendix A describes the impact analysis methodology. Appendix B 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)
Advanced Thermostat	Unit	71.4	71.4	100%	Illinois TRM v11.0 (TRM)† – Section 5.3.16
Air Sealing	Project	75.4	75.3	100%	TRM v11.0 – Section 5.6.1; Illinois Energy Conservation Code‡
Duct Insulation and Sealing	Project	62.0	62.0	100%	TRM v11.0 – Section 5.3.4; Illinois Energy Conservation Code
Gas High Efficiency Furnace >92% AFUE	Unit	98.4	98.4	100%	TRM v11.0 – Section 5.3.7
Gas High Efficiency Furnace >95% AFUE	Unit	139.0	138.9	100%	TRM v11.0 – Section 5.3.7
On Demand Water Heater	Unit	71.6	71.6	100%	TRM v11.0 – Sections 5.4.2 and 4.3.1
Storage Water Heater	Unit	29.9	29.0	97%	TRM v11.0 – Sections 5.4.2 and 4.3.1

* Program Tracking Data (PTD) provided by Nicor Gas, extract dated February 07, 2024.

† Illinois Statewide Technical Reference Manual version 11.0 from <http://www.ilsag.info/technical-reference-manual.html>.

‡ Illinois Energy Conservation Code, July 1, 2018. <https://www.ilga.gov/commission/jcar/admincode/071/07100600ZZ9996AR.html>

5.2 Findings and Recommendations

5.2.1 Air Sealing and Duct Insulation

Finding 1. The conditioned volume data in the participation data for project 239321 is 3,411 ft³, which could be a typographical error. This very low value result in a verified savings and realization rate unusually low as compared to similar projects. Nicor Gas provided a supplemental data that provided this input for the air sealing measure savings verification.

Project 220397 has a zip code 60858, that does not correspond to any location in Illinois. To accurately quantify the savings, the evaluation team used the zip code 60585 associated with the address (according to the US Postal Services) in the participant report.

Recommendation 1a. Include the actual conditioned building volume data in the program participation report, and ensure the data contains the accurate conditioned volume data for each project.

Recommendation 1b. Ensure zip codes are listed correctly in the program participation database.

5.2.2 Gas High Efficiency Furnace

Finding 2. Two gas high efficiency furnace installations had a realization rate other than 100%. One of these measures have a realization rate less than 100%, and the other has a realization rate greater than 100%. The evaluation team was unable to identify a cause for the discrepancies in the realization rate for the measures which could be relevant to the information in the participant report. The verified savings calculations are based on the Illinois Statewide Technical Reference Manual (IL-TRM) version 11.0 and Nicor Gas RNC program tracking data.

Table 5-2. Gas High Efficiency Furnace Savings Discrepancies

VendorProjectID	EFLH	Input Capacity	AFUE_eff	AFUE_base	Verified Realization Rate
235281	976	98,000	95.0%	80.0%	54%
227466	976	80,000	96.0%	80.0%	200%

Source: Nicor Gas tracking data and Guidehouse evaluation team analysis; Illinois Statewide Technical Reference Manual version 11.0.

Recommendation 2. Perform quality control and confirm the input values used in ex ante savings calculations for furnaces are accurate and consistent with the claimed savings and provide all the input values in the tracking data.

5.2.3 Gas Storage Water Heaters

Finding 3a. Two projects with project IDs 229490 and 229561 have realization rate of 134.4%. Guidehouse could not duplicate the baseline UEFs used in the ex ante savings calculation. The verified savings calculations are based on the Illinois Statewide Technical Reference Manual (IL-TRM) version 11.0 and Nicor Gas RNC program tracking data.

Finding 3b. Twenty-Five projects with the IDs 214559, 217959, 220292, 222035, 222875, 229859, 214261, 214342, 214350, 216151, 216560, 220264, 220292, 221029, 222206, 222210, 227459, 229488, 229560, 231037, 234968, 235148, 235281, 236207, and 236818 have negative verified savings and evaluation set the savings to zero with 0% realization rate due to no improvement in the uniform energy factor rating (UEF) of the equipment compared to the baseline values.

Finding 3c. Six projects with the project IDs 214999, 218369, 219833, 224186, 227449, and 235584 have ex ante savings of zero in the participant report. The verified savings were set to zero with no savings realization rates.

Finding 3d. The storage water input capacity values were not provided in the participant report and additional data.

Overall, the storage water heater measure had a gross realization rate of 97%.

Recommendation 3a. Improve quality control of the input values used in the ex ante savings calculation for storage water heater and ensure they are consistent with the savings reported in the participation data.

Recommendation 3b. Review the UEF baseline with regards to the storage water heater capacity, gallons, and draw pattern and ensure the UEF improvement value results in verifiable ex ante savings in the participation data.

Recommendation 3c. Review measures with zero ex ante savings and confirm if savings should be claimed in the final participation data.

Recommendation 3d. Include storage water heater input capacity (btu/hr) field in the participant report where size is greater or less than 75,000 btu/hr. We need these values to establish the equipment's UEF baseline and avoid oversights when capacities exceed 75,000 BTU/hr.

Appendix A. Impact Analysis Methodology

Guidehouse followed algorithms outlined in the Illinois Technical Reference Manual (TRM) v11.0 to calculate verified gross savings for residential programs. The evaluation team verified that these algorithms and appropriate deemed input parameters were correctly applied and validated custom parameters that were used. Baseline assumptions were derived from the Illinois Energy Conservation Code¹ or the TRM.

Guidehouse calculated verified net savings by multiplying verified gross savings by a net-to-gross (NTG) of 0.90 for advanced thermostats and 0.80 for all other measures, and a residential non-participant spillover multiplier of 1.048 as deemed by the Illinois Stakeholder Advisory Group (SAG) for 2023.

¹ Illinois Energy Conservation Code, July 1, 2018.
<https://www2.illinois.gov/cdb/business/codes/IllinoisAccessibilityCode/Documents/2018%20Illinois%20Specific%20Amendments%20with%20Modifications%20Shown.pdf>

Appendix B. Program Specific Inputs for the Illinois TRC

Table B-1 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Currently, additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in Table B1 -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 B-1. 2023 Verified Cost Effectiveness Inputs

End-Use	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
HVAC	Advanced Thermostat	Each	2,023	11	144,442	144,442	136,238
Shell	Air Sealing	Project	1,068	20	80,507	80,444	67,444
HVAC	Duct Insulation and Sealing	Project	1,068	20	66,266	66,266	55,557
HVAC	Gas High Efficiency Furnace >92% AFUE	Each	196	20	19,281	19,281	16,165
HVAC	Gas High Efficiency Furnace >95% AFUE	Each	1,893	20	263,154	263,073	220,561
Hot Water	On Demand Water Heater	Each	750	13	53,665	53,665	44,992
Hot Water	Storage Water Heater	Each	905	13	27,068	26,232	21,993
Total or Weighted Average			7,903	17.1	654,383	653,403	562,950

Note: Totals may not sum due to rounding.

Note: The total for the Effective Useful Life is the weighted average.

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

The net savings were multiplied by a residential non-participant spillover factor of 1.048. The program did not have any disadvantaged community (DAC) designated sites.