Guidehouse

Home Energy Efficiency Rebates Impact Evaluation Report

Energy Efficiency Plan Program Year 2020 (1/1/2020-12/31/2020)

Prepared for:

Nicor Gas

Final

June 14, 2021

Prepared by:

Cassandra Wright
Kevin Grabner
Guidehouse

Charles Ampong
Guidehouse

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

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1. Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2020 Home Energy Efficiency Rebates 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 2020 (PY2020) covers January 1, 2020 through December 31, 2020.

2. Program Description

The Nicor Gas Home Energy Efficiency Rebate (HEER) Program provides Nicor Gas customers with rebate incentives for purchasing high annual fuel utilization efficiency (AFUE) furnaces and boilers, and advanced thermostats. Participants may apply for the rebates themselves, or contractors may assist them in the rebate application process. Rebates are processed and sent to residential customers after installation of qualified measures. Members of the Nicor Gas Contractor Circle may offer rebates as instant discounts.

The program had 27,401 participants in 2020 and completed 27,855 projects as shown in Table 2-1.

Table 2-1. 2020 Volumetric Summary

Participation	2020
Participants *	27,401
Installed Projects †	27,855
Installed Measures	29,146

* Participants are defined as count of unique site addresses.
† Installed Projects are defined as count of unique project IDs.
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. 2020 Installed Measure Quantities

Measure	Quantity Unit	Installed Quantity
Advanced Thermostat - Manual Baseline	Each	6,374
Advanced Thermostat - Programmable Baseline	Each	8,048
Advanced Thermostat - Unknown Baseline	Each	590
Boilers, >95% AFUE <300 MBH	Each	198
Furnace, >95% AFUE	Each	12,748
Furnace, >97% AFUE	Each	1,188

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

3. Savings Summary

Table 3-1 summarizes the energy savings the HEER Program achieved by path in 2020.

Table 3-1. 2020 Annual Energy Savings Summary

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Advanced Thermostats	1,037,284	100%	1,033,232	NA‡	1,033,232
Boilers and Furnaces	2,746,989	99%	2,717,003	0.72	1,956,242
Total	**3,784,273**	**99%**	**3,750,235**	**0.80**	**2,989,474**

* 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_2020.
‡ The IL TRM v8.0 (*http://www.ilsag.info/technical-reference-manual.html*) algorithm for advanced thermostat savings is deemed to calculate net savings, so no NTG adjustment is applicable.
Source: Nicor Gas tracking data and Guidehouse team analysis.

4. Program Savings by Measure

The program includes six measures as shown in Table 4-1. High efficiency furnaces contributed the most savings.

Table 4-1. 2020 Annual Energy Savings by Measure

Program Management	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Advanced Thermostat - Manual Baseline	553,027	100%	550,551	NA‡	550,551
Advanced Thermostat - Programmable Baseline	444,082	100%	442,506	NA‡	442,506
Advanced Thermostat - Unknown Baseline	40,175	100%	40,175	NA‡	40,175
Boilers, >95% AFUE <300 MBH	47,829	100%	47,553	0.72	34,238
Furnace, >95% AFUE	2,434,798	99%	2,410,367	0.72	1,735,464
Furnace, >97% AFUE	264,362	98%	259,083	0.72	186,540
Total	**3,784,273**	**99%**	**3,750,235**	**0.80**	**2,989,474**

* 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_2020.
‡ The IL TRM v8.0 (*http://www.ilsag.info/technical-reference-manual.html*) algorithm for advanced thermostat savings is deemed to calculate net savings, so no NTG adjustment is applicable.
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 therm savings and realization rate findings by measure from our review. The realization rate is the ratio of the verified savings to the ex ante savings. Following Table 5-1, we provide 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. Table B-1 in 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. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Advanced Thermostat - Manual Baseline	Unit	86.76	86.37	100%	Nicor Gas Program Tracking Data (PTD*), Illinois TRM, v8.0†, Section 5.3.16
Advanced Thermostat - Programmable Baseline	Unit	55.18	54.98	100%	PTD, Illinois TRM, v8.0, Section 5.3.16
Advanced Thermostat - Unknown Baseline	Unit	68.09	68.09	100%	PTD, Illinois TRM, v8.0, Section 5.3.16
Boilers, >95% AFUE <300 MBH	Unit	240.17	240.17	100%	PTD, Illinois TRM, v8.0, Section 5.3.6
Furnace, >95% AFUE	Unit	191.02	189.08	99%	PTD, Illinois TRM, v8.0, Section 5.3.7
Furnace, >97% AFUE	Unit	222.53	218.08	98%	PTD, Illinois TRM, v8.0, Section 5.3.7

* Program Tracking Data (PTD) provided by Nicor Gas, extract dated January 31, 2021.
† State of Illinois Technical Reference Manual version 8.0 from http://www.ilsag.info/technical-reference-manual.html.

5.1.1 High Efficiency Boiler

The program installed combination boilers that do not have savings associated with hot water heating in the tracking data. The IL TRM v8.0 measure 5.3.17 identifies the inputs needed to calculate and verify water heating savings. The TRM example calculation estimates 63.4 therms per boiler for single-family home water heating savings.

> **Recommendation 1.** To claim additional savings from hot water heating, the program implementer track the TRM required inputs for combination boilers.

The tracking data describes two high efficiency boilers that the evaluation team identified to be furnaces based on the make and model number (projects: PRJ-2505493 and PRJ-2533286; respective model numbers: TM9Y060B12MP11 and S9V2B080D4PS). Therefore, the evaluation team changed this categorization in the final data and calculated savings based on furnace assumptions.

Recommendation 2. Review final data in a pivot table to help identify this type of equipment categorization error. Grouping data by make and model numbers can flag errors.

5.1.2 High Efficiency Furnace

Two furnaces were associated with incorrect climate zones, resulting in incorrect ex ante savings. The projects associated with this error are PRJ-2608063 and PRJ-2608704.

Recommendation 3. The Implementer ensure the proper climate zone is associated with each address by mapping zip codes to a climate zone.

Furnace input capacity and efficiency data did not match the certified capacity and efficiency in the Air-conditioning, Heating & Refrigeration (AHRI) database. Furnaces make up the largest amount of program savings, and the evaluation team corrected 1,039 input capacities and 43 efficiencies. We created a pivot table with furnace make, model and average input capacity per model number, which enables the evaluation team to efficiently identify possible inconsistencies in entries by model number and incorrect entries. We compared the capacity found within the model number to the average actual capacity and created a flag if there was more than a 10 MBtu/h difference. Table 5-2 and Table 5-3 show a sample of projects with adjusted capacities or efficiencies.

Recommendation 4. The Implementer create a pivot table as a quality control tool to identify sources of error in data entry.

Table 5-2. Sample of Projects with Adjusted Capacities

Project ID	Manufacturer	Model	Reported Capacity (Mbtu/h)	Verified Nominal Capacity (Mbtu/h)
PRJ-2472337	Airease	A96US2V070B12S-*	88	66
PRJ-2472338	Lennox	EL296UH110XV48C-*	132	110
PRJ-2512205	Lennox	ML296UH070XV36B-*	88	66
PRJ-2533304	Lennox	EL296UH070XV36B-*	88	66
PRJ-2541386	Lennox	EL196UH090XE48C-*	44	88
PRJ-2557516	Airease	A96US2V070B12S-*	88	66
PRJ-2582643	Lennox	SLP98UH110XV60C-*	132	110
PRJ-2729681	Lennox	ML196UH090XE36C-*	44	88

Source: Nicor Gas tracking data and Guidehouse team analysis.

Table 5-3. Sample of Projects with Adjusted Efficiencies

Project ID	Manufacturer	Model	Reported AFUE	Verified AFUE
PRJ-2472355	Lennox	SLP98UH090XV48C-*	0.987	0.982
PRJ-2472999	Lennox	SLP98UH090XV36C09	0.987	0.981
PRJ-2473015	Lennox	SLP98UH090XV48C-*	0.987	0.982
PRJ-2475951	Lennox	SLP98UH090XV36C-*	0.987	0.981
PRJ-2475978	Lennox	SLP98UH090XV48C-*	0.987	0.982
PRJ-2476071	Lennox	SLP98UH090XV48C-*	0.987	0.982
PRJ-2476334	Lennox	SLP98UH090XV36C-*	0.987	0.981
PRJ-2484379	Lennox	SLP98UH090XV48C-*	0.987	0.982

Source: Nicor Gas tracking data and Guidehouse team analysis.

5.1.3 Advanced Thermostat

Two zip codes were recorded incorrectly in addresses associated with advanced thermostats. The evaluation team used the actual zip code to determine the climate zone. We corrected the zip code in the tracking data for projects PRJ-2558196 and PRJ-2561852. The gross savings realization rate remained at 100% for this measure.

> **Recommendation 5.** Ensure data is entered consistently and correctly by conducting a quality control review of the tracking data.

There were 49 projects that had installed multiple advanced thermostats in a home, and Nicor Gas claimed therms for each of 105 total thermostats installed. TRM v8.0 deems savings for advanced thermostats on a per home basis, regardless of the number of thermostats installed per home. Guidehouse removed 4,052 gross therms from verified savings associated with 28 advanced thermostats with a manual baseline, and 28 advanced thermostats with a programmable baseline.

> **Recommendation 6**. Ensure that savings for only one thermostat is claimed per home, consistent with the TRM savings methodology.

Appendix A. Impact Analysis Methodology

Guidehouse determined verified gross savings for each program measure by conducting a tracking system review. Guidehouse used the Illinois TRM v8.0[1] methodology to calculate verified gross savings. Guidehouse calculated verified net energy savings by multiplying the verified gross savings estimates by a deemed net-to-gross ratio (NTG). In 2020, the NTG estimates used to calculate the net verified savings were based on past evaluation research and defined by a consensus process through SAG.[2]

[1] Available on the SAG web site: http://www.ilsag.info/technical-reference-manual.html

[2] A deemed value. Available on the SAG web site: https://www.ilsag.info/ntg_2020.

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. 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 B-1. Verified Cost Effectiveness Inputs

Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Advanced Thermostat - Manual Baseline	Unit	6,374	11.0	553,027	550,551	550,551
Advanced Thermostat - Programmable Baseline	Unit	8,048	11.0	444,082	442,506	442,506
Advanced Thermostat - Unknown Baseline	Unit	590	11.0	40,175	40,175	40,175
Boilers, >95% AFUE <300 MBH	Unit	200	25.0	47,829	47,553	34,238
Furnace, >95% AFUE	Unit	12,746	20.0	2,434,798	2,410,367	1,735,464
Furnace, >97% AFUE	Unit	1,188	20.0	264,362	259,083	186,540
Total or Weighted Average			**17.6**	**3,784,273**	**3,750,235**	**2,989,474**

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