



Public Housing Energy Savings Impact Evaluation Report

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

Prepared for:

Nicor Gas

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Prepared by:

Zac Hathaway
Opinion Dynamics

Mahsa Safari
Opinion Dynamics

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 impact evaluation results from the Nicor Gas 2021 Public Housing Energy Savings (PHES) Program. It presents a summary of the gas impacts for the total program by measure. The appendix presents the impact analysis methodology. Program year 2021 covers January 1, 2021 through December 31, 2021.

2. Program Description

The PHES Program works with public housing authorities (PHAs) in ComEd, Nicor Gas, Peoples Gas (PGL), and North Shore Gas (NSG) territories to achieve electric and gas savings. The PHAs themselves are the program participants, though the residents of the properties are directly affected by the program through in-unit and common area upgrades. Gas savings opportunities included both heating and water heating equipment upgrades and envelope measures (attic insulation, air sealing, and room AC covers/gap sealer. The program also included gas saving direct install measures, such as low-flow faucet aerators, shower timers, and programmable thermostats

The program had 20 participants in 2021 and completed 42 projects as shown in Table 2-1.

Table 2-1. 2021 Volumetric Findings Detail

Participation	Total
Participants *	20
Installed Projects †	42
Measure Type	11
Programmable Thermostat	11
Air Sealing	17
Low Flow Aerator - Kitchen	12
AC Cover and Gap Sealer	13
Furnace	13
Attic Insulation	17
Showerhead	6
Boiler Tune Up	8
Low Flow Aerator - Bath	8
Storage Water Heater	6
Shower Timer	3

* Participants are defined by the unique account number variable in the tracking data.

† Installed Projects are defined by unique Project IDs in the tracking data and measure type.

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. 2021 Installed Measure Quantities

End Use Type	Research Category	Quantity Unit	Installed Quantity
HVAC	Programmable Thermostat	Each	109
Envelope	Air Sealing	Linear Feet	9,494
Hot Water	Low Flow Aerator - Kitchen	Each	259
HVAC	AC Cover and Gap Sealer	Each	280
HVAC	Furnace	Each / MBH input	13 / 739
Envelope	Attic Insulation	Square Feet	39,554
Hot Water	Showerhead	Each	144
HVAC	Boiler Tune Up	Each / MBH input	8 / 4,040
Hot Water	Low Flow Aerator - Bath	Each	203
Hot Water	Storage Water Heater	Each	14
Hot Water	Shower Timer	Each	80

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

3. Program Savings Detail

Table 3-1 summarizes the gas savings the Nicor Gas PHES Program achieved in 2021.

Table 3-1. 2021 Annual Gas Savings Summary

End Use Type	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
HVAC	8,800	113%	9,905	1.00	9,905
Envelope	5,749	100%	5,748	1.00	5,748
Hot Water	4,509	85%	3,835	1.00	3,835
Total or Weighted Average	19,058	102%	19,488	1.00	19,488

* 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-2021>. Source: Guidehouse evaluation team analysis.

4. Program Savings by Measure

The PHES Program provided 11 measure types to customers in 2021, and savings are shown in Table 4-1.

Table 4-1. 2021 Annual Gas Savings by Measure

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
HVAC	Programmable Thermostat	4,255	100%	4,255	1.00	4,255
Envelope	Air Sealing	4,062	94%	3,808	1.00	3,808
Hot Water	Low Flow Aerator - Kitchen	2,199	69%	1,524	1.00	1,524
HVAC	AC Cover and Gap Sealer	2,011	155%	3,116	1.00	3,116
HVAC	Furnace	1,811	100%	1,810	1.00	1,810
Envelope	Attic Insulation	1,687	115%	1,940	1.00	1,940
Hot Water	Showerhead	1,441	100%	1,441	1.00	1,441
HVAC	Boiler Tune Up	723	100%	723	1.00	723
Hot Water	Low Flow Aerator - Bath	303	100%	303	1.00	303
Hot Water	Storage Water Heater	284	100%	284	1.00	284
Hot Water	Shower Timer	283	100%	283	1.00	283
Total or Weighted Average		19,058	102%	19,488	1.00	19,488

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

5. Impact Analysis Findings and Recommendations

5.1 Impact Parameter Estimates

The evaluation team calculated verified gas savings by applying the impact algorithm sources found in the Illinois Statewide Technical Reference Manual v9.0 (TRM v9.0) and Errata.¹ The team leveraged program tracking data to inform savings assumptions — for example insulation R-values. For savings calculation inputs not in the tracking data, the evaluation team relied on default assumptions from the TRM v9.0.

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 the table, 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

Research Category	Unit	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Programmable Thermostat	Each	39.04	39.03	100%	Illinois TRM, v9.0 † and Errata, Section 5.3.11. and Program Tracking Database (PTD*)
Air Sealing	Linear Feet	0.43	0.40	94%	TRM, v9.0 and Errata, Section 5.6.1 and PTD
Low Flow Aerator - Kitchen	Each	8.49	5.89	69%	TRM, v9.0 and Errata, Section 5.4.4 and PTD
AC Cover and Gap Sealer	Each	7.18	11.13	155%	TRM, v9.0 and Errata, Section 4.4.38 and PTD
Furnace	Each	139.27	139.26	100%	TRM, v9.0 and Errata, Section 5.3.7 and PTD
Attic Insulation	Sq. Ft.	0.04	0.05	115%	TRM, v9.0 and Errata, Section 5.6.5 and PTD
Showerhead	Each	10.00	10.00	100%	TRM, v9.0 and Errata, Section 5.4.5 and PTD
Boiler Tune Up	Each	90.43	90.42	100%	TRM, v9.0 and Errata, Section 4.4.2 and PTD
Low Flow Aerator - Bath	Each	1.49	1.49	100%	TRM, v9.0 and Errata, Section 5.4.4 and PTD
Storage Water Heater	Each	20.27	20.27	100%	TRM, v9.0 and Errata, Section 5.4.2 and PTD
Shower Timer	Each	3.54	3.54	100%	TRM, v9.0 and Errata, Section 5.4.9 and PTD

* Program Tracking Data (PTD) provided by Nicor Gas; extract dated January 28, 2022. Additional inputs provided by ComEd tracking data, dated January 30, 2022.

† State of Illinois Technical Reference Manual version 9.0 from <http://www.ilsag.info/technical-reference-manual.html>.

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

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

Finding 1. For all measure types, the Nicor Gas program tracking data did not include all necessary data to verify savings, such as heating efficiency (i.e., providing the correct NHeat value) and building type (i.e., number of floors and floor height). Verified savings calculations relied on data from the ComEd program tracking database for variables excluded from the Nicor Gas program tracking database. For projects that were not joint Nicor Gas-ComEd projects, we requested and received the missing data via email communication.

Recommendation 1. Include all necessary data in the Nicor Gas program tracking database to carry out gas savings calculations from the TRM v9.0.

Finding 2. For projects that have both air sealing and insulation measures, the combined verified savings equal ex ante savings. However, following the TRM algorithms for both measures, the realization rates are 94% for air sealing and 115% for insulation.

Recommendation 2. Follow the TRM algorithms in section 5.6.1 for air sealing and 5.6.5 for attic insulation.

Finding 3. Per the TRM (Section 4.4.38), floor height for room AC cover/gap sealer measures should be the number of floors times eight feet. The TRM does not advise to use actual floor height data, if available. In the program tracking data, floor height values are inconsistent with respect to how they relate to the actual number of floors in the building: In some cases, the total tracked floor height is eight feet, even though the building has multiple floors; in other cases, the tracked floor height is not eight feet but is greater than or less than the number of floors times eight feet. Ex ante uses the tracked value for floor height to estimate the therm savings while verified savings use the TRM approach of multiplying the number of floors by eight feet. This adjustment resulted in larger per unit savings for most records and an overall realization rate of 155% for this measure.

Recommendation 3. Per the TRM (Section 4.4.38), calculate and report therm savings for room AC cover/gap sealer measures using the tracked number of floors multiplied by eight feet.

Finding 4. The program tracking data contained three duplicate records for low flow aerator – kitchen measures. After confirming these as duplicates with Nicor Gas,² we excluded them from verified savings, resulting in a realization rate of 69% for this measure type. The realization rate for all other aerator measures was 100%.

Recommendation 4. Ensure that tracking data is free of duplicates.

² Duplicates are generally not identifiable in the tracking data as multiple records of the same measure at the same account number are common in this program.

Appendix A. Impact Analysis Methodology

The evaluation team calculated gross verified savings for the PHES Program by applying savings algorithms from the Illinois TRM v9.0³. The team determined verified gross savings for each program measure by:

- Reviewing the savings algorithm inputs in the measure workbook for agreement with the TRM v9.0 and TRM v9.0 Errata.
- Validating savings algorithms were applied correctly.
- Prioritizing project-specific information to inform savings calculations where the TRM v9.0 advises to use actual values. For variables where project information did not include project-specific actual values, the evaluation team relied on defaults from the TRM v9.0 and TRM v9.0 Errata.
- Cross-checking per-unit savings values in the tracking data with the verified values in the measure workbook or in the evaluation team's calculations if the workbook did not agree with the TRM v9.0.
- Multiplying the verified per-unit savings value by the quantity reported in the tracking data.

The evaluation team calculated verified net gas savings by multiplying the verified gross savings estimates by a net-to-gross (NTG) ratio of 1.0. For 2021, the PHES Program's NTG estimate was defined by a consensus process through the Illinois SAG.

³ Available on the SAG web site: <http://www.ilsag.info/technical-reference-manual.html>

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.

Table B-1. Verified Cost Effectiveness Inputs

End Use Category	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
HVAC	Programmable Thermostat	Each	109	16.0	4,255	4,255	4,255
Envelope	Air Sealing	Linear Feet	9,494	20.0	4,062	3,808	3,808
Hot Water	Low Flow Aerator - Kitchen	Each	259	10.0	2,199	1,524	1,524
HVAC	AC Cover and Gap Sealer	Each	280	5.0	2,011	3,116	3,116
HVAC	Furnace	Each	13	20.0	1,811	1,810	1,810
Envelope	Attic Insulation	Square Feet	39,554	20.0	1,687	1,940	1,940
Hot Water	Showerhead	Each	144	10.0	1,441	1,441	1,441
HVAC	Boiler Tune Up	Each	8	3.0	723	723	723
Hot Water	Low Flow Aerator - Bath	Each	203	10.0	303	303	303
Hot Water	Storage Water Heater	Each	14	13.0	284	284	284
Hot Water	Shower Timer	Each	80	2.0	283	283	283
Total or Weighted Average				14.1	19,058	19,488	19,488

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