



Public Housing Energy Savings Impact Evaluation Report

**Energy Efficiency Plan: Plan Year 2019
(1/1/2019-12/31/2019)**

**Presented to
Nicor Gas Company**

FINAL

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1. INTRODUCTION

This report presents the results of the impact evaluation of the Nicor Gas 2019 Public Housing Energy Savings (PHES) 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 2019 covers January 1, 2019 through December 31, 2019.

2. PROGRAM DESCRIPTION

The PHES Program works with Public Housing Authorities (PHAs) in ComEd and gas utility service territories to achieve electric and gas savings. The PHA itself is the program participant, though the residents of the properties are directly impacted by the program through in-unit and common area upgrades. In 2019, the program provided direct installation measures to residential units, including LEDs and gas-saving measures such as faucet aerators and programmable thermostats. The program also incented common area and outdoor lighting, envelope upgrades, furnace replacements, and refrigeration upgrades.

The PHES Program had 59 participants from Nicor Gas in 2019 that completed 256 projects as shown in the following table.

Table 2-1. 2019 Nicor Gas PHES Volumetric Summary

Participation	Total
Participants *	59
Installed Projects †	256
Air Sealing (Projects)	101
Attic Insulation (Projects)	106
Basement Sidewall Insulation (Projects)	20
Gas High Efficiency Furnace	143
Gas High Efficiency Boiler	3
Low Flow Showerhead	41
Low Flow Faucet Aerator – Bathroom	21
Low Flow Faucet Aerator – Kitchen	93
Programmable Thermostat	24
Gas Water Heater	47

* Participants are defined as unique utility IDs

† Installed Projects are defined as unique project IDs

Source: Nicor Gas tracking data February 7, 2020 and Guidehouse team analysis.

3. SAVINGS SUMMARY

Table 3-1 summarizes the energy savings the PHES program achieved in CY2019 for Nicor Gas.

Table 3-1. 2019 PHES Annual Energy Savings Summary for Nicor Gas

	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
PHES	105,189	104%	109,613	1.00	109,613

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

† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source:

Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

Source: Nicor Gas tracking data February 7, 2020 and Guidehouse team analysis.

4. PROGRAM SAVINGS BY MEASURE

The program includes 10 natural gas saving measures as shown in the following table. The air sealing and gas high efficiency furnace measures contributed the most savings.

Table 4-1. 2019 PHES Annual Energy Savings by Measure for Nicor Gas

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Shell	Air Sealing	43,747	100%	43,747	1.00	43,747
HVAC	Gas High Efficiency Furnace	30,879	100%	30,879	1.00	30,879
Shell	Attic Insulation	13,070	146%	19,046	1.00	19,046
HVAC	Gas High Efficiency Boiler	7,934	100%	7,934	1.00	7,934
Shell	Basement Sidewall Insulation	4,183	100%	4,184	1.00	4,184
Hot Water	Gas Water Heater	3,135	52%	1,621	1.00	1,621
HVAC	Programmable Thermostat	972	100%	972	1.00	972
Hot Water	Low Flow Aerator - Kitchen	732	100%	732	1.00	732
Hot Water	Low Flow Showerhead	464	100%	464	1.00	464
Hot Water	Low Flow Aerator - Bathroom	34	100%	34	1.00	34
NA	Unit Assessment‡	39	0%	0	1.00	0
Total		105,189	104%	109,613	1.00	109,613

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

† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value.

‡ The "Unit Assessment" is not an energy saving measure. It documents the walk-through assessment for a building, and therm savings for measures that may be installed as a result of the assessment are accounted for under the measure names for the installed equipment. See the finding in Section 5.1.4.

Source: Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

Source: Nicor Gas tracking data February 7, 2020 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 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 percent. Appendix 1 provides a description of the impact analysis methodology.

Table 5-1. 2019 PHES Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)*
Air Sealing	Linear Feet	Varies	Varies	100%	Illinois TRM, v7.0†, Section 5.6.1, Nicor Gas Program Tracking Data (PTD), and IC Supplemental Data (ICSD)
Gas High Efficiency Furnace	Each	Varies	Varies	100%	Illinois TRM, v7.0, Section 5.3.7 and PTD
Attic Insulation	Square Feet	Varies	Varies	146%	Illinois TRM, v7.0, Section 5.6.5, PTD and ICSD
Gas High Efficiency Boiler	Each	2644.68	2644.68	100%	Illinois TRM, v7.0, Section 5.3.6 and PTD
Basement Sidewall Insulation	Square Feet	Varies	Varies	100%	Illinois TRM, v7.0, Section 5.6.2 and PTD
Gas Water Heater	Each	Varies	Varies	52%	Illinois TRM, v7.0, Section 5.4.2, PTD and ICSD
Programmable Thermostat	Each	40.50	40.50	100%	Illinois TRM, v7.0, Section 5.3.11 and PTD
Low Flow Aerator - Kitchen	Each	7.87	7.87	100%	Illinois TRM, v7.0, Section 5.4.4 and PTD
Low Flow Showerhead	Each	11.32	11.32	100%	Illinois TRM, v7.0, Section 5.4.5 and PTD
Low Flow Aerator - Bathroom	Each	1.64	1.64	100%	Illinois TRM, v7.0, Section 5.4.4 and PTD

* Program Tracking Data (PTD) provided by Nicor Gas, extract dated February 7, 2020. Implementation Contractor Supplemental Data (ICSD) provided by Elevate Energy, February 13, 2020.

† State of Illinois Technical Reference Manual version 7.0 from <http://www.ilsag.info/technical-reference-manual.html>.

5.1.1 Air Sealing Finding

The evaluation team identified six “Air Sealing” measures which had less than 100 percent realization rates when verified using data in the Nicor Gas provided tracking data spreadsheet. After comparing these measures to implementation contractor (IC) supplemental data¹, five of these measures were found to be listed as “IU AC Cover and Gap Sealer CAP” and one listed as “CA Door Weatherstrip Gas Heat PRE”. The variables provided in the IC data, in conjunction with the IL TRM v7.0, allowed Guidehouse to verify savings. The tracking data spreadsheet provided by Nicor Gas documenting ex ante assumptions lists these measures as “Air Sealing” and does not include all variable inputs needed to verify savings.

¹ Elevate Energy, “2019 PHES measure data ChaNell 2020-02-13”, provided February 13, 2020.

Table 5-2. Air Sealing Measures Missing Variables

Vendor ProjectID	MeasureIDIC	IC Measure Name
PID-2019.08.15-47463	MEA-2019.08.15-93354	CA Door Weatherstrip Gas Heat PRE
PID-2020.01.15-64423	MEA-2020.01.15-140427	IU AC Cover and Gap Sealer CAP
PID-2020.01.15-64423	MEA-2020.01.15-140428	IU AC Cover and Gap Sealer CAP
PID-2020.01.15-64423	MEA-2020.01.15-140429	IU AC Cover and Gap Sealer CAP
PID-2020.01.15-64423	MEA-2020.01.15-140426	IU AC Cover and Gap Sealer CAP
PID-2020.01.15-64423	MEA-2020.01.15-140425	IU AC Cover and Gap Sealer CAP

Source: Nicor Gas tracking data February 7, 2020, IC data February 13, 2020, and Guidehouse team analysis.

Recommendation 1. Guidehouse recommends Nicor Gas update the tracking data to reflect an accurate measure name and include measure variables needed to evaluate savings.

5.1.2 Attic Insulation Finding

The evaluation team verified savings for attic insulation measures using tracking data values and IL TRM v7.0 deemed inputs when appropriate. The verified savings calculated by Guidehouse resulted in realization rates that range from 58 to 179 percent. The evaluation team did not find a trend or factor which resulted in these realization rates. Additionally, the evaluation team checked pre and post installation R values against the IC supplemental data to confirm inputs. We determined that the verified savings were consistent with the tracking inputs but could not reproduce the back-calculation of the ex ante savings.

Recommendation 2. Guidehouse recommends Nicor Gas check the tracking data inputs for the attic insulation savings calculation for all measure installations.

5.1.3 Gas Water Heater Finding

The evaluation team found that five gas water heater measures were claimed as early replacement measures in ex ante savings estimates. Guidehouse utilized IC supplementary data and back-calculated this assumption. However, these measures have less than 100 percent realization rates when compared to Nicor Gas ex ante savings and 100 percent realization rate when compared to the IC ex ante savings.

Furthermore, two gas water heater measure were calculated as early replacement measures in the Nicor Gas ex ante savings estimates but had different post installation efficiency values than the IC data. These measures (MEA-2019.12.03-123960 & MEA-2019.12.03-123959) had lower verified realization rates for the Nicor Gas dataset and close to 100 percent realization rates compared to IC ex ante savings.

Table 5-3. Gas Water Heater Measures Savings

MeasureIDIC	Nicor Gas Gross Ex Ante Savings (Therms)	IC Gross Ex Ante Savings (Therms)	Verified Savings (therms)	Verified Realization Rate	IC Data Realization Rate
MEA-2019.12.03-123961	34.18	29	28.78	84%	100%
MEA-2020.01.15-140445	34.18	29	28.78	84%	100%
MEA-2020.01.15-140446	34.18	29	28.78	84%	100%
MEA-2020.01.15-140444	1812.35	1272	1271.86	70%	100%
MEA-2020.01.15-140443	34.18	29	28.78	84%	100%
MEA-2019.12.03-123960	1096.89	172	196.22	18%	114%
MEA-2019.12.03-123959	88.94	39	37.82	43%	97%

Source: Nicor Gas tracking data February 7, 2020, Elevate tracking data February 13, 2020, and Guidehouse team analysis.

Recommendation 3. Guidehouse recommends Nicor Gas reconcile gas water heater data with the IC to confirm pre-installation and post-installation efficiency values. Additionally, Guidehouse recommends that Nicor Gas identify early replacement measures within the tracking data.

5.1.4 Unit Assessment Finding

The evaluation team found one “Unit Assessment” (MEA-2019.08.02-88979) that claimed 39 ex ante therm savings. The “Unit Assessment” documents the walk-through assessment for a building but energy savings for measures that may be installed are accounted for under the specific measure names (e.g., showerhead, faucet aerator, etc.), not under the unit assessment. Guidehouse confirmed with the implementation contractor that the claimed therms for the unit assessment was an incorrect data entry and should have been zero, and we set the verified savings to zero.

6. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

Guidehouse followed algorithms outlined in the IL TRM v7.0 to calculate verified gross savings for the PHES program. The evaluation team verified that these algorithms and appropriate deemed input parameters were correctly applied and validated custom parameters that were used. The ex ante tracking data source was an extract provided by Nicor Gas on February 7, 2020. Guidehouse calculated verified net savings by multiplying verified gross savings by a NTG of 1.00.

7. APPENDIX 2. PROGRAM-SPECIFIC INPUTS FOR THE ILLINOIS TRC

Table 7-1 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of drafting 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 7-1. 2019 PHES TRC Inputs for Nicor Gas

End Use Type	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Shell	Air Sealing	Square Feet	106,878	20	43,747	43,747	43,747
HVAC	Gas High Efficiency Furnace	Each	143	20	30,879	30,879	30,879
Shell	Attic Insulation	Square Feet	239,751	20	13,070	19,046	19,046
HVAC	Gas High Efficiency Boiler	Each	3	25	7,934	7,934	7,934
Shell	Basement Sidewall Insulation	Square Feet	36,358	20	4,183	4,184	4,184
Hot Water	Gas Water Heater	Each	47	13	3,135	1,621	1,621
HVAC	Programmable Thermostat	Each	24	8	972	972	972
Hot Water	Low Flow Aerator - Kitchen	Each	93	10	732	732	732
Hot Water	Low Flow Showerhead	Each	41	10	464	464	464
Hot Water	Low Flow Aerator - Bathroom	Each	21	10	34	34	34
NA	Unit Assessment	Each	142	NA	39	0	0
Total				19.9	105,189	109,613	109,613

Source: Nicor Gas tracking data February 7, 2020 and Guidehouse team analysis.