



# Home Energy Rebate Program Impact Evaluation Report

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

**Prepared for:**

**Peoples Gas and North Shore Gas  
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## 1. Introduction

This report presents the results of the impact evaluation of the Peoples Gas (PGL) and North Shore Gas (NSG) 2020 Home Energy Rebate Program. It presents a summary of the energy impacts for the total program and is broken out by relevant measure and program structure details. Appendix A presents the impact analysis methodology. Program year 2020 covers January 1, 2020 through December 31, 2020.

## 2. Program Description

The Home Energy Rebate Program provides rebates to PGL and NSG residential customers who make energy-saving improvements to their homes. The program is composed of two distinct offerings: 1) replacement of HVAC and other equipment, and 2) weatherization improvements. The HVAC and other equipment offering incentivizes customer-installed or contractor-installed energy efficient furnaces, boilers, and water heaters, as well as customer-installed programmable thermostats. The weatherization offering incentivizes trade ally installed home insulation measures, air sealing and duct sealing. Franklin Energy Services (Franklin Energy) implements both offerings for both utilities.

The PGL program had 1,204 participants in 2020 and completed 1,226 projects as shown in Table 2-1.

**Table 2-1. 2020 Volumetric Summary for PGL**

Participation	HVAC	Weatherization	Total
Participants *	1,095	109	1,204
Installed Projects †	1,117	109	1,226

\* Participants are defined as count of unique account numbers.

† Installed Projects are defined as count of unique project IDs.

Source: Peoples 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 for PGL**

Program Path	Measure	Quantity Unit	Installed Quantity
HVAC	Gas Water Heater - Indirect	Each	1
	Gas Water Heater - Tankless Whole House	Each	75
	High Efficiency Boiler	MBH	4,910
	High Efficiency Boiler -Two-in-One	Each	36
	High Efficiency Furnace	Each	959
	Programmable Thermostat - Furnace	Each	10
	Smart Thermostat	Each	102
Weatherization	Air Sealing	CFM	10,513
	Air Sealing with Attic Insulation	CFM	103,864
	Attic Insulation	Sq. Ft.	179,432
	Duct Sealing	CFM	996
	Wall Insulation	Sq. Ft.	25,020

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

The NSG program had 951 participants in 2020 and completed 963 projects as shown in Table 2-3.

**Table 2-3. 2020 Volumetric Summary for NSG**

Participation	HVAC	Weatherization	Total
Participants *	874	77	951
Installed Projects †	885	78	963

\* Participants are defined as count of unique account numbers.

† Installed Projects are defined as count of unique project IDs.

Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

Table 2-4 summarizes the installed measure quantities that are the basis for verified energy savings.

**Table 2-4. 2020 Installed Measure Quantities for NSG**

Program Category	Measure	Quantity Unit	Installed Quantity
HVAC	Gas Water Heater - Indirect	Each	2
	Gas Water Heater - Tankless Whole House	Each	32
	High Efficiency Boiler	MBH	2,404
	High Efficiency Boiler -Two-in-One	Each	10
	High Efficiency Furnace	Each	859
	Programmable Thermostat - Furnace	Each	1
	Smart Thermostat	Each	68
Weatherization	Air Sealing	CFM	12,598
	Air Sealing with Attic Insulation	CFM	73,524
	Attic Insulation	Sq. Ft.	140,962
	Duct Sealing	CFM	4,332
	Foundation Wall Insulation	Sq. Ft.	150
	Wall Insulation	Sq. Ft.	7,826

Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

### 3. Program Savings Detail

Table 3-1 summarizes the energy savings the PGL Home Energy Rebate Program achieved by path in 2020.

**Table 3-1. 2020 Annual Energy Savings Summary for PGL**

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
HVAC	229,616	100%	230,621	Equipment = 0.63 Smart Thermostat = NA	147,725
Weatherization	30,118	102%	30,632	Air Sealing with Attic Insulation = NA Air Sealing = 0.77 Duct Sealing = 0.87 Other Insulation = 0.79	29,617
<b>Total or Weighted Average</b>	259,734	101%	261,253	<b>0.68</b>	177,342

\* 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](https://www.ilsag.info/ntg_2020). NA indicates no NTG is applied to the TRM savings.

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

Table 3-2 summarizes the energy savings the NSG Home Energy Rebate Program achieved by path in 2020.

**Table 3-2. 2020 Annual Energy Savings Summary for NSG**

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
HVAC	193,302	100%	193,535	Equipment = 0.63 Smart Thermostat = NA	123,723
Weatherization	23,775	104%	24,608	Air Sealing with Attic Insulation = NA Air Sealing = 0.77 Duct Sealing = 0.87 Other Insulation = 0.79	23,392
<b>Total or Weighted Average</b>	217,077	100%	218,143	<b>0.67</b>	147,115

\* 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](https://www.ilsag.info/ntg_2020). NA indicates no NTG is applied to the TRM savings.

Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.

## 4. Program Savings by Measure

The PGL program includes 12 measures as shown in Table 4-1. The furnaces and boilers contributed the most savings.

**Table 4-1. 2020 Annual Energy Savings by Measure for PGL**

Program Path	Measure Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
HVAC	Gas Water Heater - Indirect	21	299%	62	0.63	39
	Gas Water Heater - Tankless Whole House	5,192	100%	5,192	0.63	3,271
	High Efficiency Boiler	8,205	100%	8,206	0.63	5,170
	High Efficiency Boiler -Two-in-One	8,954	113%	10,081	0.63	6,351
	High Efficiency Furnace	200,172	100%	200,151	0.63	126,095
	Programmable Thermostat - Furnace	349	100%	349	0.63	220
	Smart Thermostat	6,724	98%	6,579	NA	6,579
	<b>HVAC Subtotal</b>	<b>229,616</b>	<b>100%</b>	<b>230,621</b>	<b>0.64</b>	<b>147,725</b>
Weatherization	Air Sealing	930	99%	917	0.77	706
	Air Sealing with Attic Insulation	6,612	99%	6,526	NA	6,526
	Attic Insulation	18,375	102%	18,690	NA	18,690
	Duct Sealing	1,513	116%	1,755	0.87	1,527
	Wall Insulation	2,689	102%	2,744	0.79	2,168
	<b>Weatherization Subtotal</b>	<b>30,118</b>	<b>102%</b>	<b>30,632</b>	<b>0.97</b>	<b>29,617</b>
<b>PGL Total or Weighted Average</b>		<b>259,734</b>	<b>101%</b>	<b>261,253</b>	<b>0.68</b>	<b>177,342</b>

\* 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](https://www.ilsag.info/ntg_2020). NA indicates no NTG is applied to the TRM savings.

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

The NSG program includes 13 measures as shown in Table 4-2. The furnaces and boilers contributed the most savings.



**Table 4-2. 2020 Annual Energy Savings by Measure for NSG**

Program Path	Measure Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG †	Verified Net Savings (Therms)
HVAC	Gas Water Heater - Indirect	42	299%	125	0.63	78
	Gas Water Heater - Tankless Whole House	2,215	100%	2,215	0.63	1,396
	High Efficiency Boiler	4,225	100%	4,226	0.63	2,663
	High Efficiency Boiler -Two-in-One	2,487	113%	2,800	0.63	1,764
	High Efficiency Furnace	179,299	100%	179,280	0.63	112,947
	Programmable Thermostat - Furnace	35	100%	35	0.63	22
	Smart Thermostat	4,998	97%	4,854	NA	4,854
	<b>HVAC Subtotal</b>	<b>193,302</b>	<b>100%</b>	<b>193,535</b>	<b>0.64</b>	<b>123,723</b>
Weatherization	Air Sealing	1,114	99%	1,099	0.77	846
	Air Sealing with Attic Insulation	4,681	99%	4,619	NA	4,619
	Attic Insulation	11,999	101%	12,111	NA	12,111
	Duct Sealing	4,954	116%	5,746	0.87	4,999
	Foundation Wall Insulation	110	100%	110	0.79	87
	Wall Insulation	917	101%	922	0.79	729
	<b>Weatherization Subtotal</b>	<b>23,775</b>	<b>104%</b>	<b>24,608</b>	<b>0.95</b>	<b>23,392</b>
<b>NSG Total or Weighted Average</b>		<b>217,077</b>	<b>100%</b>	<b>218,143</b>	<b>0.67</b>	<b>147,115</b>

\* 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](https://www.ilsag.info/ntg_2020). NA indicates no NTG is applied to the TRM savings.

Source: North Shore 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. 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 A provides a description of the impact analysis methodology. Appendix B provides 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)*
Gas Water Heater - Indirect	Each	20.79	62.28	299%	IL TRM v8.0† - Section 5.4.2
Gas Water Heater - Tankless Whole House	Each	69.22	69.23	100%	IL TRM v8.0 - Section 5.4.2
High Efficiency Boiler	MBH	1.67	1.67	100%	IL TRM v8.0 - Section 5.3.6
High Efficiency Boiler - Two-in-One	Each	248.73	280.02	113%	IL TRM v8.0 - Section 5.3.17
High Efficiency Furnace	Each	208.73	208.71	100%	IL TRM v8.0 - Section 5.3.7
Programmable Thermostat - Furnace	Each	34.89	34.89	100%	IL TRM v8.0 - Section 5.3.11
Smart Thermostat	Each	68.87	68.87	98%	IL TRM v8.0 - Section 5.3.16
Air Sealing	CFM	0.09	0.09	99%	IL TRM v8.0 - Section 5.6.1
Air Sealing with Attic Insulation	CFM	0.06	0.06	99%	IL TRM v8.0 - Section 5.6.1
Attic Insulation	Sq. Ft	0.09	0.10	101%	IL TRM v8.0 - Section 5.3.5
Duct Sealing	CFM	0.61	0.70	116%	IL TRM v8.0 - Section 5.3.4
Duct Sealing unconditioned	CFM	1.52	1.76	116%	IL TRM v8.0 - Section 5.3.4
Foundation Wall Insulation	Sq. Ft	0.73	0.73	100%	IL TRM v8.0 - Section 5.6.3
Wall Insulation	Sq. Ft	0.11	0.11	102%	IL TRM v8.0 - Section 5.6.4

\* Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas, extract dated February 1, 2021.

† State of Illinois Technical Reference Manual version 8.0 from <http://www.ilsag.info/technical-reference-manual.html>.

## 5.2 Findings and Recommendations

### 5.2.1 High Efficiency Two-in-One Boiler

The ex ante savings for Two-in-One Boilers is lower than the verified savings because the ex ante savings does not account for the 93% time of sale and 7% early replacement split for the HVAC portion of the savings.

**Recommendation 1.** Update the algorithm to include the 93% time of sale and 7% early replacement assumption for the Two-in-One Boilers measure.

### 5.2.2 Indirect Water Heater

There is only one indirect water heater measure installation in the tracking data. The Home Energy Rebate Program information shows a minimum Annual Fuel Utilization Efficiency (AFUE) requirement of 88% for this measure. The heat source for indirect water heaters is provided by gas-fired boilers, whose efficiency is measured in AFUE and not Uniform Energy Factor (UEF), the assumption used in ex ante savings calculations.

**Recommendation 2.** For the indirect water heater measure, use the minimum AFUE required by the program instead of the Uniform Energy Factor (UEF) for the efficient case input variable in ex ante savings calculations. These two values are not equal. The evaluation team considers 88% to be a better estimate for efficiency than the 64% that the 2020 MMDB file uses.

### 5.2.3 Smart Thermostat

Four projects (6882575, 6900623, 6897044, 6552694) claim savings for two thermostats with a single account number and address. According to the Illinois Technical Reference Manual (TRM) v8.0, “installations of multiple thermostats per home does not accrue additional savings.”

**Recommendation 3.** Ensure only one thermostat is claimed per household according to the TRM.

### 5.2.4 Air Sealing with and without Attic Insulation

Ex ante savings differ from verified savings for all air sealing projects. The Heating Degree Day (HDD) input incorrectly uses cooling projects to create a weighted average (this can be seen in the MMDB file).

**Recommendation 4.** For air sealing projects, update ex ante calculations to reference heating projects to create the HDD weighted average.

### 5.2.5 Attic Insulation, Wall Insulation, & Foundation Insulation Measures

Ex ante savings differ slightly from verified savings for insulation projects, as shown in Table 5-1. The ex ante savings uses a weighted average based on completed projects for pre-retrofit

and post-retrofit R-values. The verified savings uses a simple average based on the bins listed in each measure name.

**Recommendation 5.** For insulation projects, track the project-specific pre and post installation R-values in the database, and use those values to calculate verified savings. If the project-specific R values are not tracked, use a simple average to calculate verified savings.

### 5.2.6 Duct Sealing

Ex ante savings differ from verified savings for all duct sealing projects. Guidehouse used MMDB file inputs for capacity and heating equipment efficiency. Verified savings agrees with MMDB file, but the MMDB file savings does not agree with reported ex ante savings for this measure.

**Recommendation 6.** For the duct sealing measure, use the MMDB file to calculate ex ante savings.

## 5.3 Historical Realization Rates and Net-To-Gross (NTG) Values

Table 5-2 shows the historical gross realization rates and NTG values for the Home Energy Rebate Program. Beginning in GPY4, the NTG values shown are a savings weighted average from the various measures and deemed NTGs that vary by measure and program path.

**Table 5-2. Historical Realization Rates and NTG Values**

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
GPY1 (2011-2012)	100%	100%	0.72	0.67
GPY2 (2012-2015)	101%	102%	0.82	0.80
GPY3 (2013-2014)	100%	100%	0.82	0.80
GPY4 (2014-2015)	101%	100%	0.82	0.80
GPY5 (2015-2016)	99%	100%	0.81	0.81
GPY6 (2016-2017)	100%	100%	0.89	0.84
2018	101%	102%	0.92	0.86
2019	100%	100%	0.90	0.77
2020	101%	100%	0.68	0.67

*Source: Guidehouse evaluation research.*

## Appendix A. Impact Analysis Methodology

The evaluation team conducted a tracking database review for the Home Energy Rebate Program. The evaluation team reviewed the tracking data to verify the completeness and accuracy of the tracking system data to identify any issues that would affect the impact evaluation of the program. We compared the tracking system savings input assumptions to the MMDB<sup>1</sup> that documents the implementer's approach to compliance with the Illinois Technical Reference Manual (TRM) v8.0<sup>2</sup>. Guidehouse compared the final savings values with the TRM and cross referenced those numbers with the savings algorithms listed in the MMDB.

Guidehouse determined verified gross savings for each program measure by multiplying the verified per-unit savings value by the quantity reported in the tracking data, when applicable. Guidehouse calculated verified net energy savings by multiplying the verified gross savings estimates by a deemed net-to-gross (NTG) ratio. In 2020, the NTG estimates used to calculate the net verified savings were based on past evaluation research and deemed by a consensus process through the Illinois Stakeholder Advisory Group (SAG).

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<sup>1</sup> File name: 2020 MMDB – Res and MF, produced by Franklin Energy.

<sup>2</sup> 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 and Table B-2 show 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 – PGL**

Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Gas Water Heater - Indirect	Each	1	13.0	21	62	39
Gas Water Heater - Tankless Whole House	Each	75	13.0	5,192	5,192	3,271
High Efficiency Boiler	MBH	4,910	25.0	8,205	8,206	5,170
High Efficiency Boiler -Two-in-One	Each	36	21.5	8,954	10,081	6,351
High Efficiency Furnace	Each	959	20.0	200,172	200,151	126,095
Programmable Thermostat - Furnace	Each	10	18.0	349	349	220
Smart Thermostat	Each	102	11.0	6,724	6,579	6,579
Air Sealing	CFM	10,513	20.0	930	917	706
Air Sealing with Attic Insulation	CFM	103,864	20.0	6,612	6,526	6,526
Attic Insulation	Sq. Ft	179,432	20.0	18,375	18,690	18,690
Duct Sealing	CFM	996	20.0	1,513	1,755	1,527
Wall Insulation	Sq. Ft	25,020	20.0	2,689	2,744	2,168
<b>Total or Weighted Average</b>			<b>19.8</b>	<b>259,734</b>	<b>261,253</b>	<b>177,342</b>

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

**Table B-2. Verified Cost Effectiveness Inputs – NSG**

Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Gas Water Heater - Indirect	Each	2	13.0	42	125	78
Gas Water Heater - Tankless	Each	32	13.0	2,215	2,215	1,396
Whole House						
High Efficiency Boiler	MBH	2,404	25.0	4,225	4,226	2,663
High Efficiency Boiler -Two-in-One	Each	10	21.5	2,487	2,800	1,764
High Efficiency Furnace	Each	859	20.0	179,299	179,280	112,947
Programmable Thermostat - Furnace	Each	1	18.0	35	35	22
Smart Thermostat	Each	68	11.0	4,998	4,854	4,854
Air Sealing	CFM	12,598	20.0	1,114	1,099	846
Air Sealing with Attic Insulation	CFM	73,524	20.0	4,681	4,619	4,619
Attic Insulation	Sq. Ft	140,962	20.0	11,999	12,111	12,111
Duct Sealing	CFM	4,332	20.0	4,954	5,746	4,999
Foundation Wall Insulation	Sq. Ft	150	20.0	110	110	87
Wall Insulation	Sq. Ft	7,826	20.0	917	922	729
<b>Total or Weighted Average</b>			<b>19.8</b>	<b>217,077</b>	<b>218,143</b>	<b>147,115</b>

Source: North Shore Gas tracking data and Guidehouse evaluation team analysis.