



Home Energy Rebates Impact Evaluation Report

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

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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) 2021 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 2021 covers January 1, 2021 through December 31, 2021.

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. In 2021, ComEd processed rebates for advanced thermostats and PGL and NSG reimbursed ComEd for the gas portion (“ComEd Marketplace”), removing the need for participants to complete separate rebate applications for gas and electric.

The PGL program had 6,610 participants in 2021 and completed 6,629 projects as shown in Table 2-1.

Table 2-1. 2021 Volumetric Summary for PGL

Participation	HVAC	Weatherization	ComEd Marketplace	Total
Participants *	785	348	5,477	6,610
Installed Projects †	785	353	5,491	6,629

* 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. 2021 Installed Measure Quantities for PGL

Program Path	Measure	Quantity Unit	Installed Quantity
HVAC	Gas Water Heater - Indirect	Each	11
	Gas Water Heater - Tankless Whole House	Each	54
	High Efficiency Boiler	MBH	4,986
	High Efficiency Boiler -Two-in-One	Each	27
	High Efficiency Furnace	Each	786
	Programmable Thermostat - Furnace	Each	12
	Smart Thermostat	Each	219
Weatherization	Air Sealing	CFM	33,281
	Air Sealing with Attic Insulation	CFM	121,725
	Attic Insulation	Sq. Ft.	194,646
	Duct Sealing	CFM	1,910
	Foundation Wall Insulation	Sq. Ft.	270
	Residential Gas Kit	Each	222
	Wall Insulation	Sq. Ft.	20,015
ComEd Marketplace	Advanced Thermostats	Each	5,391

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

The NSG program had 2,290 participants in 2021 and completed 2,303 projects as shown in Table 2-3.

Table 2-3. 2021 Volumetric Summary for NSG

Participation	HVAC	Weatherization	ComEd Therm Marketplace	Total
Participants *	822	134	1,334	2,290
Installed Projects †	831	134	1,338	2,303

* 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. 2021 Installed Measure Quantities for NSG

Program Category	Measure	Quantity Unit	Installed Quantity
HVAC	Gas Water Heater - Indirect	Each	4
	Gas Water Heater - Tankless Whole House	Each	34
	High Efficiency Boiler	MBH	1,076
	High Efficiency Boiler -Two-in-One	Each	5
	High Efficiency Furnace	Each	789
	Programmable Thermostat - Furnace	Each	7
	Programmable Thermostat - Boiler	Each	1
	Smart Thermostat	Each	172
Weatherization	Air Sealing	CFM	11,925
	Air Sealing with Attic Insulation	CFM	67,782
	Attic Insulation	Sq. Ft.	132,998
	Duct Sealing	CFM	2,466
	Residential Gas Kit	Each	56
	Wall Insulation	Sq. Ft.	3,841
ComEd Marketplace	Advanced Thermostat	Each	1,303

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 2021.

Table 3-1. 2021 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	197,578	103%	202,997	Equipment = 0.74 Smart Thermostat = 0.90	152,527
Weatherization	33,165	100%	33,166	Air Sealing with Attic Insulation = 0.88 Air Sealing = 0.77 Attic Insulation = 0.89 Duct Sealing = 0.87 Other Insulation = 0.79	27,888
ComEd Marketplace	428,452	108%	462,778	Smart Thermostat = 0.90	416,501
Total or Weighted Average	659,195	106%	698,941	0.85	596,916

* 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: 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 2021.

Table 3-2. 2021 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	187,330	100%	187,335	Equipment = 0.74 Smart Thermostat = 0.90	140,565
Weatherization	16,873	100%	16,873	Air Sealing with Attic Insulation = 0.88 Air Sealing = 0.77 Attic Insulation = 0.89 Duct Sealing = 0.87 Other Insulation = 0.79	14,532
ComEd Marketplace	100,124	107%	106,990	Smart Thermostat = 0.90	96,291
Total or Weighted Average	304,327	102%	311,198	0.81	251,388

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

4. Program Savings by Measure

The PGL program includes 14 measures as shown in Table 4-1. The furnaces and boilers contributed the most savings.

Table 4-1. 2021 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	229	100%	229	0.74	169
	Gas Water Heater - Tankless Whole House	3,738	100%	3,738	0.74	2,766
	High Efficiency Boiler	8,041	100%	8,041	0.74	5,950
	High Efficiency Boiler -Two-in-One	6,714	113%	7,561	0.74	5,595
	High Efficiency Furnace	163,998	103%	168,570	0.74	124,742
	Programmable Thermostat - Furnace	419	100%	419	0.74	310
	Smart Thermostat	14,439	100%	14,439	0.90	12,995
	HVAC Subtotal	197,578	103%	202,997	0.75	152,527
Weatherization	Air Sealing	2,943	100%	2,943	0.77	2,266
	Air Sealing with Attic Insulation	7,749	100%	7,749	0.88	6,819
	Attic Insulation	10,278	100%	10,278	0.89	9,147
	Duct Sealing	2,307	100%	2,307	0.87	2,007
	Foundation Wall Insulation	97	100%	97	0.79	77
	Residential Gas Kit	8,168	100%	8,169	0.77	6,290
	Wall Insulation	1,623	100%	1,623	0.79	1,282
Weatherization Subtotal	33,165	100%	33,166	0.84	27,888	
ComEd Marketplace	Advanced Thermostats	428,452	108%	462,778	0.90	416,501
PGL Total or Weighted Average		659,195	106%	698,941	0.85	596,916

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. 2021 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	83	100%	83	0.74	61
	Gas Water Heater - Tankless Whole House	2,354	100%	2,354	0.74	1,742
	High Efficiency Boiler	1,882	100%	1,882	0.74	1,393
	High Efficiency Boiler -Two-in-One	1,400	100%	1,400	0.74	1,036
	High Efficiency Furnace	169,209	100%	169,214	0.74	125,218
	Programmable Thermostat - Furnace	244	100%	244	0.74	181
	Programmable Thermostat - Boiler	52	100%	52	0.74	39
	Smart Thermostat	12,106	100%	12,106	0.90	10,895
	HVAC Subtotal	187,330	100%	187,335	0.75	140,565
Weatherization	Air Sealing	1,054	100%	1,054	0.77	812
	Air Sealing with Attic Insulation	4,315	100%	4,314	0.88	3,796
	Attic Insulation	6,971	100%	6,971	0.89	6,204
	Duct Sealing	2,240	100%	2,240	0.87	1,949
	Residential Gas Kit	2,060	100%	2,061	0.77	1,587
	Wall Insulation	233	100%	233	0.79	184
	Weatherization Subtotal	16,873	100%	16,873	0.86	14,532
ComEd Marketplace	Advanced Thermostats	100,124	107%	106,990	0.90	96,291
NSG Total or Weighted Average		304,327	102%	311,198	0.82	251,388

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	20.79	100%	IL TRM v9.0† - Section 5.4.2
Gas Water Heater - Tankless Whole House	Each	69.23	69.23	100%	IL TRM v9.0 - Section 5.4.2
High Efficiency Boiler - HW	MBH	1.76	1.76	100%	IL TRM v9.0 - Section 5.3.6
High Efficiency Boiler - Steam	MBH	0.12	0.12	100%	IL TRM v9.0 - Section 5.3.6
High Eff. Boiler -Two-in-One (PGL)	Each	248.65	280.02	113%	IL TRM v9.0 - Section 5.3.17
High Eff. Boiler -Two-in-One (NSG)	Each	280.00	280.02	100%	IL TRM v9.0 - Section 5.3.17
High Efficiency Furnace (PGL)	Each	208.73	214.47	103%	IL TRM v9.0 - Section 5.3.7
High Efficiency Furnace (NSG)	Each	214.47	214.47	100%	IL TRM v9.0 - Section 5.3.7
Programmable Thermostat - Boiler	Each	51.64	51.64	100%	IL TRM v9.0 - Section 5.3.11
Programmable Thermostat - Furnace	Each	34.89	34.89	100%	IL TRM v9.0 - Section 5.3.11
Smart Thermostat Base Manual SF (PGL/NSG)	Each	102.51	102.51	100%	IL TRM v9.0 - Section 5.3.16
Smart Thermostat Base Manual SF (ComEd Marketplace)	Each	92.26	102.51	111%	IL TRM v9.0 - Section 5.6.16
Smart Thermostat Base Manual Condo (PGL/NSG)	Each	66.63	66.63	100%	IL TRM v9.0 - Section 5.6.16
Smart Thermostat Base Manual Condo (ComEd Marketplace)	Each	59.97	66.63	111%	IL TRM v9.0 - Section 5.6.16
Smart Thermostat Base Prog SF (PGL/NSG)	Each	71.36	71.36	100%	IL TRM v9.0 - Section 5.6.16
Smart Thermostat Base Prog SF (ComEd Marketplace)	Each	64.22	71.36	111%	IL TRM v9.0 - Section 5.6.16
Smart Thermostat Base Prog Condo (PGL/NSG)	Each	46.38	46.38	100%	IL TRM v9.0 - Section 5.6.16

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)*
Smart Thermostat Base Prog Condo (ComEd Marketplace)	Each	41.74	46.38	111%	IL TRM v9.0 - Section 5.6.16
Smart Thermostat Baseline Unknown SF (PGL/NSG)	Each	85.42	85.42	100%	IL TRM v9.0 - Section 5.6.16
Smart Thermostat Baseline Unknown SF (ComEd Marketplace)	Each	76.88	85.42	111%	IL TRM v9.0 - Section 5.6.16
Smart Thermostat Baseline Unknown Condo (PGL/NSG)	Each	55.52	55.52	100%	IL TRM v9.0 - Section 5.6.16
Air Sealing	CFM	0.09	0.09	100%	IL TRM v9.0 - Section 5.6.1
Air Sealing with Attic Insulation	CFM	0.06	0.06	100%	IL TRM v9.0 - Section 5.6.1
Attic Insulation	Sq. Ft	0.04	0.04	100%	IL TRM v9.0 - Section 5.3.5
Duct Sealing	CFM	0.70	0.70	100%	IL TRM v9.0 - Section 5.3.4
Duct Sealing unconditioned	CFM	1.76	1.76	100%	IL TRM v9.0 - Section 5.3.4
Foundation Wall Insulation	Sq. Ft	0.72	0.72	100%	IL TRM v9.0 - Section 5.6.3
Residential Gas Kit	Each	36.80	36.80	100%	IL TRM v9.0
Wall Insulation	Sq. Ft	0.11	0.11	100%	IL TRM v9.0 - Section 5.6.4

* Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas; extract dated February 1, 2022.

† State of Illinois Technical Reference Manual version 9.0 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 in the MMDB is lower than the verified savings because the MMDB ex ante savings does not account for the 93% time of sale (TOS) and 7% early replacement (ER) split for the HVAC portion of the savings. Guidehouse verified that the ex ante calculation applied the percent TOS/ER split to NSG measures appropriately so we calculated a 100% verified gross savings realization rate for NSG. However, the PGL savings generated a 113% realization rate because the ex ante gross savings were the same as provided in the MMDB without the TOS/ER split applied.

Recommendation 1. Ensure consistency in calculating the savings for PGL and NSG. Update the MMDB savings algorithm to include the 93% time of sale and 7% early replacement assumption for the Two-in-One Boiler measure.

5.2.2 High Efficiency Furnace

The ex ante savings for the High Efficiency Furnace measure in the MMDB is lower than the verified savings because the ex ante savings used 95.5% AFUE for the efficient measure while the verified savings is based on TRM v9.0 and uses a 96% AFUE. Guidehouse verified that the ex ante calculation applied the 96% AFUE to NSG measures appropriately so we calculated a 100% verified gross savings realization rate. However, the PGL savings generated a 103% realization rate because the ex ante gross savings were the same as provided in the MMDB, based on a 95.5% AFUE.

Recommendation 2. Ensure PGL and NSG are using the same inputs to calculate ex ante savings for High Efficiency Furnaces. Update the MMDB savings to reflect an AFUE of 96% for High Efficiency Furnaces.

5.2.3 ComEd Marketplace Advanced Thermostats

Ex ante savings for advanced thermostats in the ComEd Marketplace Therm Purchase sub-program used a heating savings ISR value of 90% for all measures. Advanced thermostat heating savings use an in-service rate (ISR) value of 100% according to the TRM v9 errata correction.

Recommendation 3. Update advanced thermostat savings to reflect a heating ISR value of 100%.

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
2021	106%	102%	0.85	0.81

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 MMDB¹ that documents the implementer's approach to compliance with the Illinois Technical Reference Manual (TRM) v9.0². 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 2021, 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).

¹ Franklin Energy Master Measure Database, Excel file 2021 MMDB - Res and MF, provided February 08, 2021.

² 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	11	13.0	229	229	169
Gas Water Heater - Tankless Whole House	Each	54	13.0	3,738	3,738	2,766
High Efficiency Boiler	MBH	4,986	25.0	8,041	8,041	5,950
High Efficiency Boiler -Two-in-One	Each	27	21.5	6,714	7,561	5,595
High Efficiency Furnace	Each	786	20.0	163,998	168,570	124,742
Programmable Thermostat - Furnace	Each	12	18.0	419	419	310
Smart Thermostat	Each	219	11.0	14,439	14,439	12,995
Smart Thermostat (ComEd Marketplace)	Each	5,391	11.0	428,452	462,778	416,501
Air Sealing	CFM	33,281	20.0	2,943	2,943	2,266
Air Sealing with Attic Insulation	CFM	121,725	20.0	7,749	7,749	6,819
Attic Insulation	Sq. Ft	194,646	20.0	10,278	10,278	9,147
Duct Sealing	CFM	1,910	20.0	2,307	2,307	2,007
Foundation Wall Insulation	Sq. Ft.	135	20.0	97	97	77
Residential Gas Kit	Each	222	20.0	8,168	8,169	6,290
Wall Insulation	Sq. Ft	20,015	20.0	1,623	1,623	1,282
Total or Weighted Average			13.9	659,195	698,941	596,916

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	4	13.0	83	83	61
Gas Water Heater - Tankless Whole House	Each	34	13.0	2,354	2,354	1,742
High Efficiency Boiler	MBH	1,076	25.0	1,882	1,882	1,393
High Efficiency Boiler -Two-in-One	Each	5	21.5	1,400	1,400	1,036
High Efficiency Furnace	Each	789	20.0	169,209	169,214	125,218
Programmable Thermostat - Furnace	Each	7	18.0	244	244	181
Programmable Thermostat - Boiler	Each	1	18.0	52	52	38
Smart Thermostat	Each	172	11.0	12,106	12,106	10,895
Smart Thermostat (ComEd Marketplace)	Each	1,303	11.0	100,124	106,990	96,291
Air Sealing	CFM	11,925	20.0	1,054	1,054	812
Air Sealing with Attic Insulation	CFM	67,782	20.0	4,314	4,315	3,797
Attic Insulation	Sq. Ft	132,998	20.0	6,971	6,971	6,204
Duct Sealing	CFM	2,566	20.0	2,240	2,240	1,949
Residential Gas Kit	Sq. Ft	56	20.0	2,060	2,061	1,587
Wall Insulation	Sq. Ft	3,841	20.0	233	233	184
Total or Weighted Average			16.5	304,327	311,198	251,388

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