



Income Eligible Gas Kits Impact Evaluation Report

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

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) 2021 Income Eligible Gas Kits Programs. It presents a summary of the energy impacts for the total program and 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

In November 2019, PGL began mail distribution of a free kit of self-installation energy saving measures. Contents of the kit include a showerhead, faucet aerators, weatherstripping, switch and outlet gaskets, water heater setback instructions, shower timer, window film kits, and water heater pipe insulation. The kits are being distributed to customers that have been verified as LIHEAP grant recipients and therefore validated as Income Eligible.

The PGL program distributed 17,521 kits in 2021 and included nine different types of measures as shown in Table 2-1.

Table 2-1. 2021 Volumetric Summary for PGL

Participation	Total
Number of Kits Distributed (9 measures per kit)	17,521

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

Table 2-2 summarizes the distributed measure quantities of the nine measures included in each kit that are the basis for verified energy savings.

Table 2-2. 2021 Distributed Measure Quantities for PGL

Measure	Quantity Unit	Quantity per Kit	Total Quantity Distributed
Low-Flow Kitchen Aerator	Unit	1	17,521
Low-Flow Bathroom Aerator	Unit	1	17,521
Low-Flow Showerhead	Unit	1	17,521
Shower Timer	Unit	1	17,521
Pipe Insulation	Linear Feet	3	52,563
Weather-stripping	Linear Feet	17	297,857
Outlet and Switch Gaskets	Unit	20	350,420
Window Kit	Square Feet	90.4	1,583,898
Water Heater Temperature Setback	Card	1	17,521

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

The NSG program distributed 1,539 kits in 2021 and included nine different types of measures as shown in Table 2-3.

Table 2-3. 2021 Volumetric Summary for NSG

Participation	Total
Number of Kits Distributed (9 measures per kit)	1,539

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

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

Table 2-4. 2021 Distributed Measure Quantities for NSG

Measure	Quantity Unit	Quantity per Kit	Total Quantity Distributed
Low-Flow Kitchen Aerator	Unit	1	1,539
Low-Flow Bathroom Aerator	Unit	1	1,539
Low-Flow Showerhead	Unit	1	1,539
Shower Timer	Unit	1	1,539
Pipe Insulation	Linear Feet	3	4,617
Weather-stripping	Linear Feet	17	26,163
Outlet and Switch Gaskets	Unit	20	30,780
Window Kit	Square Feet	90.4	139,126
Water Heater Temperature Setback	Card	1	1,539

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

3. Program Savings Detail

Table 3-1 summarizes the PGL Income Eligible Gas Kits Program energy savings 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)
Income Eligible Gas Kits	627,778	105%	659,273	1.00	659,273

* 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 Illinois 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 NSG Income Eligible Gas Kits Program energy savings 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)
Income Eligible Gas Kits	55,142	105%	57,909	1.00	57,909

* 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 Illinois SAG web site: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021/>

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

4. Program Savings by Measure

The PGL program includes nine measures as shown in Table 4-1. The Window Kit and Weather-stripping measures contributed the most savings. The largest adjustment to savings occurred for the Outlet and Switch Gasket measure, where ex ante per unit savings was based on an incorrect input value.

Table 4-1. 2021 Annual Energy Savings by Measure for PGL

Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
Low-Flow Kitchen Aerator	22,759	100%	22,781	1.00	22,781
Low-Flow Bathroom Aerator	9,903	99%	9,824	1.00	9,824
Low-Flow Showerhead	110,878	93%	102,989	1.00	102,989
Shower Timer	54,111	100%	54,195	1.00	54,195
Pipe Insulation	27,033	79%	21,278	1.00	21,278
Weather-stripping	126,458	100%	126,458	1.00	126,458
Outlet and Switch Gaskets	57,315	200%	114,629	1.00	114,629
Window Kit	201,738	100%	201,738	1.00	201,738
Water Heater Temp. Setback	17,584	31%	5,381	1.00	5,381
Total or Weighted Average	627,778	105%	659,273	1.00	659,273

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

The NSG program includes nine measures as shown in Table 4-2. The Window Kit and Weather-stripping measures contributed the most savings. The largest adjustment to savings occurred for the Outlet and Switch Gasket measure, where ex ante per unit savings was based on an incorrect input value.

Table 4-2. 2021 Annual Energy Savings by Measure for NSG

Research Category	Ex Ante Gross Savings (Therms)	Verified Gross RR	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
Low-Flow Kitchen Aerator	1,999	100%	2,001	1.00	2,001
Low-Flow Bathroom Aerator	870	99%	863	1.00	863
Low-Flow Showerhead	9,739	93%	9,046	1.00	9,046
Shower Timer	4,753	100%	4,760	1.00	4,760
Pipe Insulation	2,375	79%	1,869	1.00	1,869
Weather-stripping	11,108	100%	11,108	1.00	11,108
Outlet and Switch Gaskets	5,034	200%	10,069	1.00	10,069
Window Kit	17,720	100%	17,720	1.00	17,720
Water Heater Temp. Setback	1,545	31%	473	1.00	473
Total or Weighted Average	55,142	105%	57,909	1.00	57,909

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 therms savings and realization rate findings by measure. The realization rate is the ratio of the verified savings to the ex ante savings. The verified gross savings realization rates are calculated by comparing verified savings determined by the evaluation team with the ex ante therm savings provided in the tracking database and the per unit savings numbers provided in the Master Measure Database (MMDB)¹ file. Following Table 5-1, 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. 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 Per Kit	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Low-Flow Kitchen Aerator	One	1.30	1.30	100%	Illinois TRM, v9.0†, Section 5.4.4 and PTD*
Low-Flow Bathroom Aerator	One	0.57	0.56	99%	Illinois TRM, v9.0, Section 5.4.4 and PTD
Low-Flow Showerhead	One	6.33	5.88	93%	Illinois TRM, v9.0, Section 5.4.5 and PTD
Shower Timer	One	3.09	3.09	100%	Illinois TRM, v9.0, Section 5.4.9 and PTD
Pipe Insulation	3 Lin. Ft.	1.54	1.21	79%	Illinois TRM, v9.0, Section 5.4.1 and PTD
Weather-stripping	17 Lin. Ft.	7.22	7.22	100%	Illinois TRM, v9.0, Section 5.6.1 and PTD
Outlet and Switch Gaskets	20	3.27	6.54	200%	Illinois TRM, v9.0, Section 5.6.1 and PTD
Window Kit	90.4 Sq. Ft.	11.51	11.51	100%	Illinois TRM, v9.0, Section 5.6.1 and PTD
Water Heater Temperature Setback	Card	1.00	0.31	31%	Illinois TRM, v9.0, Section 5.4.6 and PTD
Overall Kit Package	Kit	35.83	37.63	105%	

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

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

The PGL and NSG total ex ante energy savings of 627,778 therms and 55,142 therms, respectively, provided in the program tracking data do not match the savings of 632,975 therms and 54,255 therms provided in the 2021 portfolio summary scorecard².

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

² Summary Report Realized Savings 2021.xlsx (Provided by Franklin Energy on February 17, 2021).

Recommendation 1. Ensure the year-end portfolio savings summary matches the energy savings provided in the year-end program tracking data and resolve any discrepancies ahead of delivering final tracking data for evaluation.

5.1.1 Low-Flow Bathroom Aerator

The ex ante energy savings use weighted average energy per gallon of water (EPG) gas and faucets per household (FPH) values that are calculated using an assumption that 69.17% of the houses that received the kits are Single-Family (SF) and the remaining 30.83% are Multi-Family (MF). The Illinois Technical Reference Manual (TRM) v9.0 deems a SF and MF split of 69.00% and 31.00%. This rounding difference results in a 99% realization rate.

Recommendation 2. Use the SF and MF splits deemed in the Illinois TRM for weighting the EPG gas and FPH values. This recommendation is similar to one from PY2020.

5.1.2 Low-Flow Showerhead

The ex ante energy savings use weighted average EPG gas values that are calculated using an assumption that 76% of the houses that received the kits are Single Family and the remaining 24% are Multi-Family. The TRM v9.0 deems a SF and MF split of 69% and 31%.

Recommendation 3. Use the SF and MF splits deemed in the TRM for weighting the EPG gas value for showerheads. This recommendation is similar to one from PY2020.

The ex ante energy savings use a throttling factor of 0.95 to determine the GPM Low value of the measure. The TRM v9.0 does not use a throttling factor to calculate the energy savings.

Recommendation 4. Use the TRM GPM Low value and do not use a throttling factor when calculating the showerhead energy savings.

5.1.3 Pipe Insulation

The ex ante calculation uses an ISR of 0.53 from secondary research. The TRM v9.0 deems an ISR of 0.56 for kits distribution.

Recommendation 5. Use an ISR of 0.56 for pipe insulation described in TRM v9.0, Section 5.4.1. This recommendation is similar to one from PY2020.

The ex ante calculation uses an R-value of 3.15 for the installed insulation. The verified calculation uses an R-value of 5.70 for the installed insulation based on the description provided in the kit content.

Recommendation 6. Use an R-value of 5.70 for the installed insulation based on the measure description provided in the kit content.

The ex ante calculation uses a quantity of 6 feet per kit (two 3 feet pieces). The verified calculation uses a quantity of 3 feet per kit (one 3 feet piece) based on the description provided in the kit content.

Recommendation 7. Use a quantity of 3 feet based on the measure description provided in the kit content.

5.1.4 Outlet and Switch Gaskets

The ex ante savings are calculated using the incorrect ADJRxAirsealing value of 0.4. The TRM v9.0 deems a value of 0.8.

Recommendation 8. Use the ADJRxAirsealing value of 0.8 as deemed in the TRM v9.0. This recommendation is similar to one from PY2020.

5.1.5 Water Heater Temperature Setback

The ex ante energy savings uses an ISR of 0.34 from secondary research that assumes customers requested a kit before the kits were sent out. This is inconsistent with an unsolicited distribution approach. The TRM v9.0 deems an ISR of 0.10 for instructions provided in all other kit programs delivery method.

Recommendation 9. Use an ISR of 0.10 deemed in the TRM v9.0, Section 5.4.6 unless the program design is changed to send kits based on a customer's request.

The ex ante energy savings use a weighted average recovery efficiency (RE) gas value that is calculated using an assumption that 96.5% of the houses that received the kits are Single-Family (SF) and the remaining 3.5% are Multi-Family (MF). The TRM v9.0 deems a SF and MF split of 69.0% and 31.0%.

Recommendation 10. Use the SF and MF splits deemed in the TRM in effect each year for weighting the EPG gas value. This recommendation is similar to one from PY2020.

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

Table 5-2 shows the historical gross realization rates and NTG values for the Income Eligible Gas Kits Program.

Table 5-2. Historical Realization Rates and NTG Values

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
2019	100%	NA	1.00	1.00
2020	108%	108%	1.00	1.00
2021	105%	105%	1.00	1.00

NA = not applicable (refers to a piece of data that cannot be produced or does not apply)

Source: Guidehouse evaluation research

Appendix A. Impact Analysis Methodology

The evaluation team calculated gross verified savings for the Income Eligible Kits Program by applying savings algorithms from the Illinois Technical Reference Manual (TRM) v9.0³. The team determined verified gross savings for each program measure by:

- Reviewing the savings algorithm inputs in the MMDB measure workbook⁴ for agreement with the TRM v9.0 and TRM v9.0 Errata.
- Validating savings algorithms were applied correctly.
- Prioritizing kit-specific information to inform savings calculations where the TRM v9.0 advises to use actual values. For variables where kit-specific actual values were not available, the evaluation team relied on defaults from the TRM v9.0.
- 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, which is the NTG deemed by a consensus process through the Illinois Stakeholder Advisory Group (SAG).

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

⁴ Franklin Energy Master Measure Database, Excel file *2021 MMDB - Res and MF*, provided February 08, 2021.

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)
Low-Flow Kitchen Aerator	Unit	17,521	10.0	22,759	22,781	22,781
Low-Flow Bathroom Aerator	Unit	17,521	10.0	9,903	9,824	9,824
Low-Flow Showerhead	Unit	17,521	10.0	110,878	102,989	102,989
Shower Timer	Unit	17,521	2.0	54,111	54,195	54,195
Pipe Insulation	Linear Feet	52,563	15.0	27,033	21,278	21,278
Weather-stripping	Linear Feet	297,857	20.0	126,458	126,458	126,458
Outlet and Switch Gaskets	Unit	350,420	20.0	57,315	114,629	114,629
Window Kit	Square Feet	1,583,898	1.0	201,738	201,738	201,738
Water Heater Temperature Setback	Card	17,521	2.0	17,584	5,381	5,381
Total or Weighted Average			10.3	627,778	659,273	659,273

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)
Low-Flow Kitchen Aerator	Unit	1,539	10.0	1,999	2,001	2,001
Low-Flow Bathroom Aerator	Unit	1,539	10.0	870	863	863
Low-Flow Showerhead	Unit	1,539	10.0	9,739	9,046	9,046
Shower Timer	Unit	1,539	2.0	4,753	4,760	4,760
Pipe Insulation	Linear Feet	4,617	15.0	2,375	1,869	1,869
Weather-stripping	Linear Feet	26,163	20.0	11,108	11,108	11,108
Outlet and Switch Gaskets	Unit	30,780	20.0	5,034	10,069	10,069
Window Kit	Square Feet	139,126	1.0	17,720	17,720	17,720
Water Heater Temperature Setback	Card	1,539	2.0	1,545	473	473
Total or Weighted Average			10.3	55,142	57,909	57,909

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