



Income Eligible Multi-Family Programs Impact Evaluation Report

**Energy Efficiency Plan: Program Year 2022
(1/1/2022-12/31/2022)**

Prepared for:

Peoples Gas and North Shore Gas

FINAL

May 5, 2023

Prepared by:

Swapnil Lotake
EcoMetric Consulting

Michael Frischmann
EcoMetric Consulting

Kyle McKenna
EcoMetric Consulting

Submitted to:

Peoples Gas
North Shore Gas
200 East Randolph Street
Chicago, IL 60601

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

Laura Agapay-Read
Associate Director
312.583.4178
laura.agapay.read@guidehouse.com

Charles Ampong
Associate Director
608.446.3172
charles.ampong@guidehouse.com

Disclaimer: This report was prepared by Guidehouse for Peoples Gas Light and Coke Company ("PGL") and North Shore Gas Company ("NSG") based upon information provided by PGL and NSG and from other sources. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Guidehouse nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

.

Table of Contents

1. Introduction	1
2. Multi-Family Income Eligible, PTA and IHWAP Program	1
2.1 Program Description.....	1
2.2 Program Savings Detail.....	5
2.3 Program Savings by Measure	5
2.4 Impact Analysis Findings and Recommendations.....	9
3. Public Housing Energy Savings (PHES) Program.....	16
3.1 Program Description.....	16
3.2 Program Savings Detail.....	17
3.3 Program Savings by Measure	17
3.4 Impact Analysis Findings and Recommendations.....	17
Appendix A. Impact Analysis Methodology	A-1
Appendix B. Impact Analysis Methodology	B-1
B.1 Income Eligible, PTA and IHWAP	B-1
B.2 Public Housing Energy Savings (PHES)	B-4

List of Tables, Figures, and Equations

Table 2-1. 2022 Volumetric Summary for PGL.....	2
Table 2-2. 2022 Installed Measure Quantities for PGL	2
Table 2-3. 2022 Volumetric Summary for NSG	4
Table 2-4. 2022 Installed Measure Quantities for NSG	4
Table 2-5. 2022 Annual Energy Savings Summary for PGL.....	5
Table 2-6. 2022 Annual Energy Savings Summary for NSG	5
Table 2-7. 2022 Annual Energy Savings by Measure for PGL.....	6
Table 2-8. 2022 Annual Energy Savings by Measure for NSG	8
Table 2-9. Verified Gross Savings Parameters.....	9
Table 2-10. Shell End Use Measures with Realization Rates	12
Table 2-11. Historical Realization Rates and NTG Values	15
Table 3-1. 2022 Volumetric Summary for PGL.....	16
Table 3-2. Installed Measure Quantities for PGL.....	16
Table 3-3. 2022 Annual Energy Savings Summary for PGL.....	17
Table 3-4. 2022 Annual Energy Savings by Measure for PGL.....	17
Table 3-5. Verified Gross Savings Parameters.....	18
Table 3-6. Historical Realization Rates and NTG Values	18
Table A-1. Custom Project Summary – IHWAP.....	A-1
Table B-1. Verified Cost Effectiveness Inputs – PGL.....	B-1
Table B-2. Verified Cost Effectiveness Inputs – NSG	B-3
Table B-3. Verified Cost Effectiveness Inputs – PGL.....	B-4

1. Introduction

This report presents the results of the impact evaluation of the Peoples Gas (PGL) and North Shore Gas (NSG) 2022 Income Eligible Multi-Family (MFIE) program and a summary of the energy impacts for the total program and broken out by relevant measure and program structure details. The appendices present the impact analysis methodology and Illinois total resource cost (TRC) inputs. Program Year 2022 covers January 1, 2022, through December 31, 2022.

The Income Eligible Multi-Family Program provides energy efficiency upgrades to customers in the PGL and NSG territories with incomes below 80% of the Area Median Income (AMI) level as defined by the geography or location of the building and/or the subsidy status and rent levels of the building. The programs offer assessments, direct installation of energy efficiency measures, rebates for replacement of inefficient equipment, technical assistance, and educational information.

There are four program paths offered to multi-family income eligible customers.

- The Income Eligible Multi-Family Savings (IEMS) path is jointly implemented with ComEd.
- The Multi-Family Income Eligible Partner Trade Ally (PTA) path is a non-joint offering, delivered by vetted Partner Trade Allies who are given larger rebate amounts to serve geographically income eligible customers with retrofit measures.
- The Income Eligible Retrofits Multi-Family (IER – MF) path is offered in partnership with the Illinois Home Weatherization Assistance Program (IHWAP) and is jointly implemented with ComEd and Nicor Gas.
- The Public Housing Energy Savings (PHES) path works with Public Housing Authorities (PHAs) in ComEd, Nicor Gas, PGL, and NSG territories to achieve electricity and natural gas savings.

The first three program paths are presented in section 2 of this report, and section 3 covers the PHES program.

2. Multi-Family Income Eligible, PTA and IHWAP Program

2.1 Program Description

The IEMS Program direct installs (DI) eligible natural gas measures, including in-unit (IU) and common area (CA) measures such as CA steam boiler, CA pipe insulation, steam boiler averaging controls, IU showerhead, IU aerator, and attic insulation and air sealing, among others.

The Partner Trade Ally (PTA) Program installs eligible natural gas measures, including controls for CA pipe insulation, boiler tune-up, steam boiler averaging controls, and domestic hot water circulation system.

The IHWAP installs eligible natural gas measures including air sealing, attic insulation, central domestic hot water plant, high efficiency boiler, bathroom aerator, showerhead, and wall insulation. Most of the IHWAP measures are labeled as custom measures, however the savings follow the Illinois statewide technical reference manual (IL-TRM) methodologies.

The IEMS and IHWAP program components are administered by ComEd, Peoples Gas, and North Shore Gas with the resulting savings distributed between the utilities based on an agreed upon term disposition. For all projects implemented in Peoples Gas and North Shore Gas territories, 50% of the savings are claimed by ComEd, with the remaining 50% claimed by Peoples Gas and North Shore Gas. For the IHWAP and PTA programs, no projects were installed in North Shore Gas territory in 2022. Thus, no savings were verified for North Shore Gas for these programs.

The PGL program had 708 participants in 2022, completed 5,312 projects and installed 45 measure types as shown in Table 2-1.

Table 2-1. 2022 Volumetric Summary for PGL

Participation	IHWAP	IEMS	PTA	Total
Participants *	2	695	11	708
Installed Projects †	8	5,293	11	5,312
Measure Types Installed	7	34	4	45

* Participants are defined as unique site addresses.

† Installed Projects are defined as unique Project IDs, excluding incentives and bonuses measures.

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. 2022 Installed Measure Quantities for PGL

Program Path	Measure	Quantity Unit	Installed Quantity
IHWAP	Air Sealing	Ln. Ft.	14,871
	Attic Insulation	Sq. Ft.	2,062
	Central Domestic Hot Water Plant – Custom	Each	4
	High Efficiency Boiler – Custom	Each	1
	IU Bathroom Aerator	Each	375
	IU Showerhead	Each	1
	Wall Insulation	Sq. Ft.	5,228
IEMS	Advanced Thermostat	Each	105
	Air Sealing	Ln. Ft.	262,376
	Attic Insulation	Sq. Ft.	861,843
	Averaging Controls	Capacity Controlled	1,198

Program Path	Measure	Quantity Unit	Installed Quantity
	Boiler Tune Up	MBH	237,689
	CA Bathroom Aerator	Each	20
	CA High Efficiency Furnace	Each	136
	CA Kitchen Aerator	Each	9
	CA Pipe Insulation	Ln. Ft.	61,285
	CA Standard Showerhead	Each	4
	CA Water Heater	Each	75
	Covers & Gap Sealers	Each	181
	Crawl Space Ceiling Insulation	Sq. Ft.	5,346
	DHW Circulation System	Per Unit	1,455
	DHW Storage Tank Insulation	Sq. Ft.	1,017
	Exhaust/Shut Off Damper	Each	2,382
	Foundation Insulation	Sq. Ft.	235
	High Efficiency Boiler	Each	110,822
	High Speed Clothes Washer	Each	16
	IU Bathroom Aerator	Each	1,406
	IU Handheld Showerhead	Each	539
	IU High Efficiency Furnace	Each	2,284
	IU Kitchen Aerator	Each	2,969
	IU Pipe Insulation	Ln. Ft.	363
	IU Shower Timer	Each	3,578
	IU Standard Showerhead	Each	2,205
	Linkageless Controls	Capacity Controlled	8,000
	Modulating Gas Clothes Dryer	Each	1
	Other Savings	Each	22,507
	Programmable Thermostat	Each	412
	Reprogrammable Thermostat	Each	141
	Steam Traps	Each	86,130
	Wall Insulation	Sq. Ft.	10,171
	Water Heater	Each	50
	Averaging Controls	Capacity Controlled	33
PTA	Boiler Tune Up	MBH	1,430
	CA Pipe Insulation	Sq. Ft.	3,429
	DHW Circulation System	Per Unit	87

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

The NSG program had 50 participants in 2022, completed 432 projects and installed 14 measure types as shown in Table 2-3.

Table 2-3. 2022 Volumetric Summary for NSG

Participation	IHWAP	IEMS	PTA	Total
Participants *	-	50	-	50
Installed Projects †	-	432	-	432
Measure Types Installed	-	14	-	14

* Participants are defined as unique site addresses.

† Installed Projects are defined as unique Project IDs, excluding incentives and bonuses measures.

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. 2022 Installed Measure Quantities for NSG

Program Path	Measure	Quantity Unit	Installed Quantity
IHWAP	-	-	-
	Air Sealing	Ln. Ft.	8,142
	Attic Insulation	Sq. Ft.	21,396
	CA Pipe Insulation	Ln. Ft.	5,575
	Covers & Gap Sealers	Each	54
	DHW Circulation System	Each	231
	DHW Storage Tank Insulation	Sq. Ft.	71
IEMS	IU Bathroom Aerator	Each	119
	IU Handheld Showerhead	Each	13
	IU Kitchen Aerator	Each	133
	IU Shower Timer	Each	653
	IU Standard Showerhead	Each	413
	Programmable Thermostat	Each	34
	Reprogrammable Thermostat	Each	8
	Water Heater	Per Unit	329
PTA	-	-	-

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

2.2 Program Savings Detail

Table 2-5 summarizes the energy savings the PGL IHWAP, IEMS, and PTA paths achieved in 2022.

Table 2-5. 2022 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)
IHWAP	8,918	99%	8,840	1.00	8,840
IEMS	896,940	101%	903,820	1.00	903,820
PTA	25,137	100%	25,034	1.00	25,034
Total or Weighted Average	930,994	101%	937,694	1.00	937,694

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

† Net-to-Gross:-A deemed value. Available on the SAG web site: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/>.

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

Table 2-6 summarizes the energy savings the NSG IHWAP, IEMS and PTA paths achieved in 2022.

Table 2-6. 2022 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)
IEMS	27,006	102%	27,475	1.00	27,475
Total or Weighted Average	27,006	102%	27,475	1.00	27,475

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

† Net-to-Gross:-A deemed value. Available on the SAG web site: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/>.

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

2.3 Program Savings by Measure

The PGL program includes 45 measures as shown in Table 2-7. There is an additional Assessment/No savings measure included in the following table because a positive therm savings was reported for that measure. The Steam Traps and CA Pipe Insulation measures in the IEMS path contributed the most savings

Table 2-7. 2022 Annual Energy Savings by Measure for PGL

Program Management	Savings Category	Ex Ante Gross Savings (therms)	Verified Gross RR*	Verified Gross Savings (therms)	NTG†	Verified Net Savings (therms)
IHWAP	Air Sealing	4,748	100%	4,748	1.00	4,748
	High Efficiency Boiler – Custom	1,809	106%	1,924	1.00	1,924
	Central Domestic Hot Water Plant – Custom	1,141	113%	1,287	1.00	1,287
	Wall Insulation	364	100%	364	1.00	364
	IU Bathroom Aerator	342	100%	342	1.00	342
	Attic Insulation	173	100%	173	1.00	173
	IU Showerhead	2	100%	2	1.00	2
	Assessment/No Savings	339	0%	-	-	-
	IHWAP Subtotal		8,918	99%	8,840	1.00
IEMS	Steam Traps	275,363	100%	275,386	1.00	275,386
	CA Pipe Insulation	195,370	100%	195,403	1.00	195,403
	Attic Insulation	131,244	106%	139,248	1.00	139,248
	Air Sealing	57,444	99%	56,819	1.00	56,819
	Boiler Tune Up	55,690	100%	55,708	1.00	55,708
	DHW Circulation System	45,614	100%	45,614	1.00	45,614
	Averaging Controls	37,320	98%	36,592	1.00	36,592
	High Efficiency Boiler	34,396	100%	34,394	1.00	34,394
	IU Standard Showerhead	13,484	100%	13,483	1.00	13,483
	Other Savings	11,253	100%	11,253	1.00	11,253
	Programmable Thermostat	8,401	100%	8,402	1.00	8,402
	IU Shower Timer	6,841	99%	6,787	1.00	6,787
	IU Kitchen Aerator	3,866	106%	4,097	1.00	4,097
	IU Handheld Showerhead	3,296	100%	3,296	1.00	3,296
	Advanced Thermostat	3,215	100%	3,215	1.00	3,215
	Reprogrammable Thermostat	2,855	100%	2,855	1.00	2,855
	DHW Storage Tank Insulation	2,818	100%	2,818	1.00	2,818
	Linkageless Controls	2,525	100%	2,525	1.00	2,525
	IU High Efficiency Furnace	1,863	100%	1,863	1.00	1,863
	IU Bathroom Aerator	1,213	100%	1,213	1.00	1,213
Covers & Gap Sealers	689	100%	689	1.00	689	
Wall Insulation	589	99%	580	1.00	580	

Program Management	Savings Category	Ex Ante Gross Savings (therms)	Verified Gross RR*	Verified Gross Savings (therms)	NTG†	Verified Net Savings (therms)
	Crawl Space Ceiling Insulation	346	100%	346	1.00	346
	Water Heater	272	97%	263	1.00	263
	CA High Efficiency Furnace	256	100%	257	1.00	257
	Exhaust/Shut Off Damper	189	105%	198	1.00	198
	CA Water Heater	135	100%	135	1.00	135
	Modulating Gas Clothes Dryer	97	100%	97	1.00	97
	Foundation Insulation	84	100%	85	1.00	85
	CA Bathroom Aerator	68	100%	68	1.00	68
	CA Standard Showerhead	43	100%	43	1.00	43
	CA Kitchen Aerator	37	100%	37	1.00	37
	IU Pipe Insulation	35	100%	35	1.00	35
	High Speed Clothes Washer	29	60%	18	1.00	18
	IEMS Subtotal	896,940	101%	903,820	1.00	903,820
PTA	CA Pipe Insulation	16,891	100%	16,893	1.00	16,893
	DHW Circulation System	5,455	100%	5,455	1.00	5,455
	Averaging Controls	2,121	95%	2,016	1.00	2,016
	Boiler Tune Up	670	100%	670	1.00	670
	PTA Subtotal	25,137	100%	25,034	1.00	25,034
Total or Weighted Average		930,994	101%	937,694	1.00	937,694

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

† Net-to-Gross: A deemed value. Available on the SAG web site: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/>.

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

The NSG program includes 14 measures as shown in Table 2-8. The CA Pipe Insulation and Domestic Hot Water Circulation System measures contributed the most savings.

Table 2-8. 2022 Annual Energy Savings by Measure for NSG

Program Category	Savings Category	Ex Ante Gross Savings (therms)	Verified Gross RR*	Verified Gross Savings (therms)	NTG†	Verified Net Savings (therms)
IEMS	CA Pipe Insulation	9,431	100%	9,431	1.00	9,431
	DHW Circulation System	7,242	100%	7,242	1.00	7,242
	IU Standard Showerhead	2,525	100%	2,525	1.00	2,525
	Air Sealing	1,875	99%	1,855	1.00	1,855
	Attic Insulation	1,292	138%	1,781	1.00	1,781
	Water Heater	1,657	100%	1,656	1.00	1,656
	IU Shower Timer	1,249	99%	1,239	1.00	1,239
	Programmable Thermostat	815	100%	815	1.00	815
	Covers & Gap Sealers	206	100%	206	1.00	206
	DHW Storage Tank Insulation	197	100%	197	1.00	197
	IU Kitchen Aerator	173	106%	184	1.00	184
	Reprogrammable Thermostat	162	100%	162	1.00	162
	IU Bathroom Aerator	103	100%	103	1.00	103
	IU Handheld Showerhead	79	100%	79	1.00	79
Total or Weighted Average		27,006	102%	27,475	1.00	27,475

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

† Net-to-Gross: A deemed value. Available on the SAG web site: <https://www.ilsaq.info/evaluator-ntg-recommendations-for-2022/>.

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

2.4 Impact Analysis Findings and Recommendations

2.4.1 Impact Parameter Estimates

Table 2-9 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 are 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 2-9. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Advanced Thermostat	Each	Varies	Varies	100%	Illinois TRM, v10.0†, Section 5.3.16 and PTD*
Air Sealing	Ln. Ft.	Varies	Varies	99%	Illinois TRM, v10.0†, Section 5.6.1 and PTD*
Attic Insulation	Sq. Ft.	Varies	Varies	106%	Illinois TRM, v10.0†, Section 5.6.5 and PTD*
Averaging Controls	Capacity Controlled	Varies	61.09	98%	Illinois TRM, v10.0†, Section 4.4.36 and PTD*
Boiler Tune Up	MBH	0.47	0.47	100%	Illinois TRM, v10.0†, Section 4.4.2 and PTD*
CA Bathroom Aerator	Each	6.77	6.77	100%	Illinois TRM, v10.0†, Section 4.3.2 and PTD*
CA High Efficiency Furnace	Each	3.77	3.78	100%	Illinois TRM, v10.0†, Section 4.4.11 and PTD*
CA Kitchen Aerator	Each	8.15	8.15	100%	Illinois TRM, v10.0†, Section 4.3.2 and PTD*
CA Pipe Insulation	Ln. Ft.	Varies	Varies	100%	Illinois TRM, v10.0†, Section 4.4.14 and PTD*
CA Standard Showerhead	Each	21.63	21.63	100%	Illinois TRM, v10.0†, Section 4.3.3 and PTD*
CA Water Heater	Each	3.59	3.59	100%	Illinois TRM, v10.0†, Section 4.3.1 and PTD*
Central Domestic Hot Water Plant	Each	Varies	Varies	101%	Illinois TRM, v10.0†, Section 4.3.7 and PTD*
Covers & Gap Sealers	Each	7.62	7.62	100%	Illinois TRM, v10.0†, Section 4.4.38 and PTD*
Crawl Space Ceiling Insulation	Sq. Ft.	Varies	Varies	100%	Illinois TRM, v10.0†, Section 5.6.3 and PTD*

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
DHW Circulation System	Each	Varies	Varies	100%	Illinois TRM, v10.0†, Section 4.3.8 and PTD*
DHW Storage Tank Insulation	Sq. Ft.	5.54	5.54	100%	Illinois TRM, v10.0†, Section 4.3.12 and PTD*
Exhaust/Shut Off Damper	Each	0.16	0.17	105%	Illinois TRM, v10.0†, Section 4.4.23 and PTD*
Foundation Insulation	Sq. Ft.	Varies	Varies	100%	Illinois TRM, v10.0†, Section 5.6.2 and PTD*
High Efficiency Boiler	MBH	Varies	Varies	100%	Illinois TRM, v10.0†, Section 4.4.10 and PTD*
High Speed Clothes Washer	Each	3.68	2.21	60%	Illinois TRM, v10.0†, Section 4.8.5 and PTD*
IU Bathroom Aerator	Each	Varies	Varies	100%	Illinois TRM, v10.0†, Section 5.4.4 and PTD*
IU High Efficiency Furnace	Each	1.63	1.63	100%	Illinois TRM, v10.0†, Section 5.3.7 and PTD*
IU Handheld Showerhead	Each	12.23	12.23	100%	Illinois TRM, v10.0†, Section 5.4.5 and PTD*
IU Kitchen Aerator	Each	2.60	2.76	106%	Illinois TRM, v10.0†, Section 5.4.4 and PTD*
IU Pipe Insulation	Ln. Ft.	0.19	0.19	100%	Illinois TRM, v10.0†, Section 5.3.2 and PTD*
IU Shower Timer	Each	3.82	3.79	99%	Illinois TRM, v10.0†, Section 5.4.9 and PTD*
IU Showerhead	Each	3.97	3.97	100%	Illinois TRM, v10.0†, Section 5.4.5 and PTD*
IU Standard Showerhead	Each	12.23	12.23	100%	Illinois TRM, v10.0†, Section 5.4.5 and PTD*
Linkageless Controls	Capacity Controlled	0.63	0.63	100%	Illinois TRM, v10.0†, Section 4.4.21 and PTD*
Modulating Gas Clothes Dryer	Each	193.30	193.32	100%	Illinois TRM, v10.0†, Section 4.8.4 and PTD*
Other Savings	Each	1.00	1.00	100%	N/A
Programmable Thermostat	Each	Varies	Varies	100%	Illinois TRM, v10.0†, Section 5.3.11 and PTD*
Reprogrammable Thermostat	Each	40.50	40.50	100%	Illinois TRM, v10.0†, Section 5.3.11 and PTD*
Steam Traps	Each	Varies	Varies	100%	Illinois TRM, v10.0†, Section 4.4.16 and PTD*

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Wall Insulation	Sq. Ft.	Varies	Varies	99%	Illinois TRM, v10.0†, Section 5.6.4 and PTD*
Water Heater	Each	Varies	Varies	100%	Illinois TRM, v10.0†, Section 4.3.1 and 4.3.7 and PTD*

* Program Tracking Data (PTD) provided by Peoples Gas and North Shore Gas; extract dated January 30, 2022.

† State of Illinois Technical Reference Manual version 10.0 from <http://www.ilsaq.info/technical-reference-manual.html>.

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

2.4.2 Findings and Recommendations

The evaluation team developed findings and recommendations based on the 2022 evaluation, organized by measure type in the following sections.

2.4.2.1 IHWAP – Heating Plant Improvement and Install New Hot Water Heating Plant

Finding 1. Two High Efficiency Boiler measures calculated therm savings considering (1 – Baseline Boiler Efficiency/Efficient Boiler Efficiency). The evaluation team calculated savings using (Efficient Boiler Efficiency/Baseline Boiler Efficiency – 1), per Illinois Statewide Technical Reference Manual (IL-TRM) v10.0. The resulting realization for these measures was 106%.

Recommendation 1. Calculate therm savings for High Efficiency Boiler measures consistently based on IL-TRM v10.0 section 4.4.10.

Finding 2. The Tracking Data reported a blank quantity for the heating plan improvement measure. The evaluation team considered a quantity of 1 for the claimed ex ante savings and the verified savings calculation.

Recommendation 2. Ensure that there are no blank quantities present for measures in the program Tracking Data.

Finding 3. The domestic hot water plant measures used 54°F as the value for incoming water temperature from well or municipal system per IL-TRM v9.0. The measures also used the square root of tank volume divided by four to calculate standby loss. The verified savings used 50.7°F as the incoming water temperature and the square root of tank volume to calculate standby loss per IL-TRM v10.0 section 4.3.7. The resulting realization rate was 113%.

Recommendation 3. For Central Domestic Hot Water Plants projects, use the appropriate temperature for the incoming water temperature from well or municipal system per the appropriate version of IL-TRM. Also, calculate standby loss using the formula including square root of tank volume per the IL-TRM.

2.4.2.2 IHWAP – Bathroom Aerator Custom Incentive

Finding 4. Project #09781406 had a double entry of the ex ante savings for the bathroom aerator. The measure description “Bathroom Aerator Custom Incentive” is an incentive-based

entry that should not have any associated savings. The verified savings is updated to zero them because there are no gas savings associated with this measure.

Recommendation 4. Claim no savings for incentive entries in the tracking data to avoid double counting of ex ante savings.

2.4.2.3 IEMS – Shell Insulation Measures

Finding 5. Seven Shell Insulation measures utilized 2019 and 2021 Tracking Data to calculate weighted average pre- and post-insulation R-values. The verified savings was updated to use the actual R-value of the projects from the tracking data to calculate weighted average values. Table 2-10 shows the measures and associated realization rates.

Table 2-10. Shell End Use Measures with Realization Rates

Measure Name	Realization Rate
MF IE-Attic Insulation – Existing R-11-14 – Final R-49+-IEMS 22	120%
MF IE-Attic Insulation – Existing R-1-3 – Final R-49+-IEMS 22	213%
MF IE-Attic Insulation – Existing R-15-19 – Final R-49+-IEMS 22	140%
MF IE-Attic Insulation – Existing R-4-6 – Final R-49+-IEMS 22	226%
MF IE-Attic Insulation – Existing R-7-10 – Final R-49+-IEMS 22	168%
MF IE-Foundation Insulation-Existing R-0 – Final R-13-15-IEMS 22	101%
MF IE-Wall Insulation – Existing R-0 – Final R-13-15-IEMS 22	99%

Recommendation 5. Use the current year program data to calculate the pre- and post-insulation R-values for Attic, Foundation, and Wall Insulation measures.

2.4.2.4 IEMS – Exhaust/Shutoff Damper for Boiler/Furnace

Finding 6. The ex ante calculations for the Common Areas Shut Off Damper for Space Heating Boilers or Furnaces measure used the equivalent full load hours (EFLH) for heating of multi-family high-rise (1,540) and office mid-rise (1,629) buildings to calculate an average value of 1,584.5 hours. The evaluation used the average value of multi-family high-rise (1,540) and multi-family mid-rise (1,782) buildings which is 1,661, per IL-TRM v10.0 Section 4.4, which resulted in a gas realization rate of 105%.

Recommendation 6. Use the appropriate building type’s equivalent full load hours for heating per the appropriate version of IL-TRM.

2.4.2.5 IEMS – High Speed Clothes Washer

Finding 7. The ex ante calculations for the Common Areas High Speed Clothes Washer measure used the retained moisture content reduction from replacing a low extraction speed washer of 25%. The verified savings was updated to use 15% per IL-TRM v10.0 section 4.8.5, which resulted in a gas realization rate of 60%.

Recommendation 7. Use the appropriate retained moisture content reduction from replacing a low extraction speed washer per the appropriate version of IL-TRM.

2.4.2.6 IEMS – In Unit Kitchen Aerator

Finding 8. The ex ante calculations for the measure In-Unit Gas Kitchen Aerator used a value of energy per gallon of hot water supplied by gas (EPG_Gas) of 0.005 therms/gal for multifamily homes for an Unknown aerator location from IL-TRM v10.0 Section 5.4.4. The verified savings used the value of 0.0053 therms/gal for kitchens because the measure name notes the installation location, which resulted in a gas realization rate of 106%.

Recommendation 8. For Kitchen Aerator measures, use the correct value for energy per gallon of hot water supplied by gas for kitchens per the appropriate version of IL-TRM v10.0 section 5.4.4.

2.4.2.7 IEMS – In Unit Shower Timer

Finding 9. The EPG_Gas for showerhead per IL-TRM v10.0 Section 5.4.5 is 0.0063 therms/gallon and per IL TRM v10.0 Section 5.4.9 is 0.00625 therms/gallon. The ex ante calculations for the in-unit gas shower timer measure used 0.0063 therms/gallon. The evaluation team updated the verified savings using the 0.00625 therms/gallon listed in IL-TRM v10.0 section 5.4.9. This adjustment results in a gas realization rate of 99%.

Recommendation 9. Calculate savings for the In Unit Shower Timer measures using consistent methodology and parameters with IL-TRM Section 5.4.9.

2.4.2.8 IEMS – Water Heater

Finding 10. The ex ante calculations for the Common Areas Medium Draw Water Heater measure with an UEF>0.64 used 30 gallons as the capacity to calculate annual hot water consumption. However, the ex ante calculations assumed the baseline efficiency for a 60 gallon unit.. The verified savings used a consistent value of 30 gallons to choose the baseline efficiency and determine annual water consumption, which resulted in a gas realization rate of 65% for UEF>0.64.

Recommendation 10. Use the actual value of the hot water heater storage tank capacity when calculating the estimated annual hot water consumption and the uniform energy factor for the baseline water heaters.

2.4.2.9 IEMS – Air Sealing Door Sweep

Finding 11. 166 units in the Tracking Data out of the total quantity of 406 reported zero therm savings for the Air Sealing Door Sweep measure. Other units for this measure reported positive savings. The verified savings also did not include savings for these units. This measure is a subcategory of the Air Sealing measure and makes up 1% of the Air Sealing measure savings.

Recommendation 11. Ensure savings calculations are completed for all quantities listed for this measure. If no savings should be claimed for a project, it should be marked differently than other projects in the tracking data.

2.4.2.10 IEMS – 1-Pipe and 2-Pipe Steam Averaging Controls

Finding 12. The tracking data reported two unique per unit values for two Averaging Controls measures. The tracking data reported 61.09 therms and 64.26 therms. The verified savings calculated per unit values based on measure level inputs and the IL-TRM (Section 4.4.36) algorithm is 61.09 therms. This adjustment resulted in an overall realization rate of 98% for 1-Pipe Steam Averaging Controls and 99% for 2-Pipe Steam Averaging Controls measures.

Recommendation 12. Ensure that all the per unit savings values are calculated consistently according to IL-TRM (Section 4.4.36) in the tracking data.

2.4.3 Historical Realization Rates and NTG Values

Table 2-11 shows the historical gross realization rates and NTG values for the IEMS, PTA and IHWAP Programs. The NTG values shown are a savings weighted average from the various measures and deemed NTGs that vary by measure and program path.

Table 2-11. Historical Realization Rates and NTG Values

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
2018 – IEMS	97%	100%	1.00	1.00
2018 – IHWAP	37%	89%		
2019 – IEMS	101%	100%	1.00	1.00
2019 – IHWAP	114%	92%		
2020 – IEMS	101%	100%		
2020 – PTA	100%	104%	1.00	1.00
2020 – IHWAP	96%	100%		
2021 – IEMS	101%	No Projects		
2021 – PTA	100%	No Projects	1.00	1.00
2021 – IHWAP	85%	101%		
2022 – IEMS	101%	102%		
2022 – PTA	100%	No Projects	1.00	1.00
2022 – IHWAP	99%	No Projects		

Source: Guidehouse evaluation research.

3. Public Housing Energy Savings (PHES) Program

3.1 Program Description

The PHES Program works with Public Housing Authorities (PHAs) in ComEd, Nicor Gas, PGL, and NSG territories to achieve electricity and natural gas savings. The PHA itself is the program participant, though the residents of the properties are directly affected by the program through in-unit and common area upgrades. Gas savings opportunities included steam trap repair and replacement, room air conditioner (AC) covers and gap sealing, and boiler tune-ups.

The program had 3 participants in 2022, completed 9 projects and installed 2 measure types as Table 3-1 shows.

Table 3-1. 2022 Volumetric Summary for PGL

Participation	Total
Participants *	3
Installed Projects †	9
Measure Types Installed	2

* Participants are defined as unique site addresses.

† Installed Projects are defined as unique project IDs.

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

Table 3-2 summarizes the installed measure quantities that are the basis for verified energy savings.

Table 3-2. Installed Measure Quantities for PGL

Program Category	Program Path	Measure	Quantity Unit	Installed Quantity
Multifamily Upgrades	PHES	Covers & Gap Sealers	Each	891
		Steam Traps	Each	82

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

3.2 Program Savings Detail

Table 3-3 summarizes the energy savings the PGL PHES Program achieved in 2022.

Table 3-3. 2022 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)
PHES	11,978	100%	11,976	1.00	11,976
Total or Weighted Average	11,978	100%	11,976	1.00	11,976

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

† Net-to-Gross: A deemed value. Available on the SAG web site: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/>.

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

3.3 Program Savings by Measure

The PHES Program provided two types of measures to PGL customers in 2022 as Table 3-4 shows.

Table 3-4. 2022 Annual Energy Savings by Measure for PGL

Program Management	Savings Category	Ex Ante Gross Savings (therms)	Verified Gross RR*	Verified Gross Savings (therms)	NTG†	Verified Net Savings (therms)
PHES	Covers & Gap Sealers	3,392	100%	3,392	1.00	3,392
	Steam Traps	8,585	100%	8,584	1.00	8,584
Total or Weighted Average		11,978	100%	11,976	1.00	11,976

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

† Net-to-Gross: A deemed value. Available on the SAG web site: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2022/>.

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

3.4 Impact Analysis Findings and Recommendations

The PHES program achieved a 100% RR during 2022. The evaluation team was able to review all tracking data, and the verified savings matched the ex ante savings. Based on the evaluation team's review, there were no recommendations for 2022.

3.4.1 Impact Parameter Estimates

The evaluation team leveraged PGL program tracking data and referenced the ComEd joint PHES Program database to determine the input variables for savings calculations. For savings calculation inputs not in the tracking data, the team relied on default assumptions and the

savings algorithm from the Illinois Statewide Technical Reference Manual v10.0 (TRM v10.0). 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 3-5. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Covers & Gap Sealers	Each	7.62	7.62	100%	Illinois TRM, v10.0†, Section 4.4.38 and PTD*
Steam Traps	Each	209.4	209.4	100%	Illinois TRM, v10.0†, Section 4.4.16 and PTD*

* Program Tracking Data (PTD) provided by Peoples Gas; extract dated January 30, 2022.

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

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

3.4.2 Historical Realization Rates and NTG Values

Table 3-6 shows the historical gross realization rates and NTG values for the PHES Program since the first program year of utility administration (2018).

Table 3-6. Historical Realization Rates and NTG Values

Program Year	PGL Verified Gross RR	NSG Verified Gross RR	PGL NTG	NSG NTG
2018	97%	82%	1.00	1.00
2019	101%	100%	1.00	1.00
2020	102%	No Projects	1.00	No Projects
2021	104%	No Projects	1.00	No Projects
2022	100%	No Projects	1.00	No Projects

Source: Guidehouse evaluation research.

Appendix A. Impact Analysis Methodology

The evaluation team used the same impact methodology for each component. Verified gross savings were determined for each program measure by:

- Reviewing the savings algorithm inputs in the measure workbook for agreement with the IL-TRM v10.0 and IL-TRM Errata, where applicable.
- Validating the savings algorithm was applied correctly.
- Cross-checking per-unit savings values in the program tracking data with the verified values in the measure workbook or in Guidehouse’s calculations if the workbook did not agree with the IL-TRM v10.0.
- Multiplying the verified per-unit savings value by the quantity reported in the tracking data. The team calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a NTG ratio. In Program Year 2022, NTG estimates used to calculate the net verified savings were based on past evaluation research and defined by a consensus process through the Illinois SAG.
- Guidehouse sourced methodologies and assumptions from the Illinois IL-TRM v10.0 and the final 2022 tracking data.

For the custom projects, an in-depth application review was performed by a Guidehouse engineer to assess the engineering methods, parameters and assumptions used to generate all ex ante impact estimates. The evaluator reviewed project documentation in application forms and supporting documentation from the applicant. Table A-1 provides a summary of M&V results for the custom projects reviewed by Guidehouse.

Table A-1. Custom Project Summary – IHWAP

Project ID	Measure Description	Ex Ante Gross Savings (therms)	Verified Gross RR*	Verified Gross Savings (therms)	Summary of Adjustment
13262296	Heating Plant Improvement	673	106%	715	Updated the formula used for calculating percentage increase in Efficiency
9959224	Install new hot water	572	106%	608	
10053662	heating plant	565	106%	600	
9959224	Install New DHW Plant	640	113%	722	Updated Inlet water temperature and Standby loss formula used
10053662		501	113%	565	

Source: Peoples Gas tracking data and evaluation team analysis.

Appendix B. Impact Analysis Methodology

B.1 Income Eligible, PTA and IHWAP

Error! Reference source not found. B-1 and Error! Reference source not found. show the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Currently, 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

Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Verified Net Savings (therms)
IHWAP	Air Sealing	Ln. Ft.	14,871	20	4,748	4,748	4,748
	High Efficiency Boiler	Each	1	25	1,809	1,924	1,924
	Central Domestic Hot Water Plant	Each	4	15	1,141	1,287	1,287
	Wall Insulation	Sq. Ft.	5,228	20	364	364	364
	IU Bathroom Aerator	Each	375	10	342	342	342
	Attic Insulation	Sq. Ft.	2,062	20	173	173	173
	IU Showerhead	Each	1	10	2	2	2
IEMS	Steam Traps	Each	86,130	6	275,363	275,386	275,386
	CA Pipe Insulation	Ln. Ft.	61,285	15	195,370	195,403	195,403
	Attic Insulation	Sq. Ft.	861,843	20	131,244	139,248	139,248
	Air Sealing	Ln. Ft.	262,376	20	57,444	56,819	56,819
	Boiler Tune Up	MBH	237,689	3	55,690	55,708	55,708
	DHW Circulation System	Each	1,455	15	45,614	45,614	45,614
	Averaging Controls	Capacity Controlled	1,198	20	37,320	36,592	36,592
	High Efficiency Boiler	Each	110,822	25	34,396	34,394	34,394
	IU Standard Showerhead	Each	2,205	10	13,484	13,483	13,483
	Other Savings	Each	22,507	1	11,253	11,253	11,253
Programmable Thermostat	Each	412	16	8,401	8,402	8,402	

Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Verified Net Savings (therms)
	IU Shower Timer	Each	3,578	2	6,841	6,787	6,787
	IU Kitchen Aerator	Each	2,969	10	3,866	4,097	4,097
	IU Handheld Showerhead	Each	539	10	3,296	3,296	3,296
	Advanced Thermostat	Each	105	11	3,215	3,215	3,215
	Reprogrammable Thermostat	Each	141	2	2,855	2,855	2,855
	DHW Storage Tank Insulation	Sq. Ft.	1,017	15	2,818	2,818	2,818
	Linkageless Controls	Capacity Controlled	8,000	20	2,525	2,525	2,525
	CA High Efficiency Furnace	Each	2,284	20	1,863	1,863	1,863
	IU Bathroom Aerator	Each	1,406	10	1,213	1,213	1,213
	Covers & Gap Sealers	Each	181	5	689	689	689
	Wall Insulation	Sq. Ft.	10,171	20	589	580	580
	Crawl Space Ceiling Insulation	Sq. Ft.	5,346	20	346	346	346
	Water Heater	Each	50	15	272	263	263
	IU High Efficiency Furnace	Each	136	16.5	256	257	257
	Exhaust/Shut Off Damper	Each	2,382	15	189	198	198
	CA Water Heater	Each	75	15	135	135	135
	Modulating Gas Clothes Dryer	Each	1	14	97	97	97
	Foundation Insulation	Sq. Ft.	235	20	84	85	85
	CA Bathroom Aerator	Each	20	10	68	68	68
	CA Standard Showerhead	Each	4	10	43	43	43
	CA Kitchen Aerator	Each	9	10	37	37	37
	IU Pipe Insulation	Ln. Ft.	363	15	35	35	35

Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Verified Net Savings (therms)
PTA	High Speed Clothes Washer	Each	16	7	29	18	18
	CA Pipe Insulation	Sq. Ft.	3,429	15	16,891	16,893	16,893
	DHW Circulation System	Each	87	15	5,455	5,455	5,455
	Averaging Controls	Capacity Controlled	33	20	2,121	2,016	2,016
	Boiler Tune Up	Each	1,430	3	670	670	670
Total or Weighted Average				12.9	930,994	937,694	937,694

Source: Peoples Gas tracking data and evaluation team analysis.

Table B-2. Verified Cost Effectiveness Inputs – NSG

Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Verified Net Savings (therms)
IEMS	CA Pipe Insulation	Ln. Ft.	5,575	15	9,431	9,431	9,431
	DHW Circulation System	Each	231	15	7,242	7,242	7,242
	IU Standard Showerhead	Each	413	10	2,525	2,525	2,525
	Air Sealing	Ln. Ft.	8,142	20	1,875	1,855	1,855
	Attic Insulation	Sq. Ft.	21,396	20	1,292	1,781	1,781
	Water Heater	Each	329	15	1,657	1,656	1,656
	IU Shower Timer	Each	653	2	1,249	1,239	1,239
	Programmable Thermostat	Each	34	16	815	815	815
	Covers & Gap Sealers	Each	54	5	206	206	206
	DHW Storage Tank Insulation	Sq. Ft.	71	15	197	197	197
	IU Kitchen Aerator	Each	133	10	173	184	184
	Reprogrammable Thermostat	Each	8	2	162	162	162
	IU Bathroom Aerator	Each	119	10	103	103	103
	IU Handheld Showerhead	Each	13	10	79	79	79
Total or Weighted Average				14.4	27,006	27,475	27,475

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

B.2 Public Housing Energy Savings (PHES)

Error! Reference source not found. shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of producing this impact evaluation report. Currently, 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-3. Verified Cost Effectiveness Inputs – PGL

Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Verified Net Savings (therms)
PHES	Covers & Gap Sealers	Each	891	5	3,392	3,392	3,392
	Steam Traps	Each	82	6	8,585	8,584	8,584
Total or Weighted Average			973	5.7	11,978	11,976	11,976

Source: Peoples Gas tracking data and evaluation team analysis.