Guidehouse
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Income Eligible Multi-Family and Public Housing Programs Impact Evaluation Report

Energy Efficiency Plan: Program Year 2023 (1/1/2023-12/31/2023)

Prepared for:

Nicor Gas Company

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1. Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2023 Income Eligible Multi-Family (MFIE) program. The MFIE program includes the Retrofits, Healthy Homes, Assessments, and Energy Saving Kits program paths. The report presents a summary of the energy impacts for the total program and relevant measure and program structure details. The second section of the report presents impact results for the Public Housing Energy Savings (PHES) program. The appendix presents the impact analysis methodology. Program year 2023 covers January 1, 2023 through December 31, 2023.

2. Multi-Family Income Eligible Program

2.1 Program Description

The Nicor Gas Income Eligible Multi-Family Program offers products and energy saving measures for income-eligible customers in multi-family dwellings within the Nicor Gas service territory. The 2023 Retrofits, Healthy Homes, and Assessments and Energy Savings Kits (ESK) paths included direct installation of water heating efficiency measures (faucet aerators, showerheads, shower timer, gas water heaters), high efficiency boilers, advanced thermostats, programmable and reprogrammable thermostats, attic insulation, basement insulation, pipe insulation, air sealing, floor insulation, furnace, boiler controls, boiler tune-ups, and efficiency kits.

The ESK program path provided an option of free energy savings kits with water efficiency or air sealant measures (reported as Kit 1 MF, Kit 2 MF, and Kit 4 MF in the Nicor Gas tracking data):

- Kit 1 MF included one low flow showerhead (SH), one kitchen aerator (KA), and two bathroom aerators (BA).
- Kit 2 MF included two SH, one KA, one shower timer (ST) and two BA.
- Kit 3 MF included one SH, one KA, one ST, and one BA.
- Kit 4 MF included 12 electrical switch/outlet gaskets, one door sweep, 30 linear feet of rope caulk, 17 feet of v-seal weatherstripping, and 17 feet of closed-foam weatherstripping.

The program had 924 participants in 2023 and completed 5,630 projects, as shown in Table 2-1.

Table 2-1. 2023 MFIE Program Volumetric Findings Detail

Participation	Retrofits	HH MF	Assessment	Energy Savings Kits	Total
Participants *	292	1	3	626	924
Installed Projects †	4,999	2	3	626	5,630
Measure Types Installed	20	8	3	9	40

* Participants are defined as unique Building Account Numbers.
† Installed Projects are defined as unique number of Vendor Project IDs.
Source: Nicor 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. 2023 MFIE Program Installed Measure Quantities

Program Category	Program Path	Measure	Quantity Unit	Installed Quantity
Multi-Family Income Eligible	Retrofits	Attic Insulation	Sq Ft	657,955
		Air Sealing	Ln Ft	516,505
		Pipe Insulation	Ln Ft	32,249
		Shower Timer	Each	4,370
		Basement/Sidewall Insulation	Sq Ft	2,684
		Faucet Aerator - Kitchen (IU)	Unit	2,401
		Showerhead (IU)	Unit	2,302
		Faucet Aerator - Bathroom (IU)	Unit	1,513
		Programmable Thermostat	Unit	1,306
		Controls for Domestic Hot Water	Unit	1,143
		Cover and Gap Sealers for AC	Unit	661
		Wall Insulation	Sq Ft	648
		Advanced Thermostat	Unit	462
		High Efficiency Boiler	Unit	405
		Thermostatic Radiator Valves	Unit	316
		Steam Boiler Averaging Controls	Unit	169
		Boiler Reset Controls	Unit	121
		Steam Trap	Unit	84
		Water Heater	Unit	23
		Reprogrammable Thermostat	Unit	3
	Assessment	Faucet Aerator - Kitchen (IU)	Unit	1
		Programmable Thermostat	Unit	1
	Healthy Homes	Attic Insulation	Sq Ft	976
		Wall Insulation	Sq Ft	600
		Advanced Thermostat	Unit	1
		Air Sealing	Ln Ft	1
		Duct Sealing	Unit	1
		Faucet Aerator - Bathroom (IU)	Unit	1
		Faucet Aerator - Kitchen (IU)	Unit	1

Program Category	Program Path	Measure	Quantity Unit	Installed Quantity
		Showerhead (IU)	Unit	1
	Energy Saving Kits	Kit 1 MF	Each	1
		Kit 2 MF	Each	417
		Kit 3 MF	Each	4
		Kit 4 MF	Each	193

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

2.2 Program Savings Detail

Table 2-3 summarizes the energy savings the Multi-family Income Eligible Program achieved by Retrofits, Assessment, Healthy Homes, and Energy Savings Kits paths in 2023.

Table 2-3. 2023 MFIE Program Annual Energy Savings Summary

Program Category	Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Multi-Family Income Qualified	Retrofits	919,822	100%	918,168	1.00	918,168
	Assessment	83	100%	83	1.00	83
	Healthy Homes	669	101%	678	1.00	678
	Energy Savings Kits	15,680	102%	16,076	1.00	16,076
Total or Weighted Average		**936,254**	**100%**	**935,005**	**1.00**	**935,005**

Note: Totals may not sum due to rounding.
* 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-2023/**.
Source: Guidehouse evaluation team analysis.

2.3 Program Savings by Measure

The program includes 25 measures as shown in Table 2-4. The Pipe Insulation and Air Sealing measures of the Retrofits path contributed the most savings.

Table 2-4. 2023 MFIE Program Annual Energy Savings by Measure

Program Category	Program Path	Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Multi-Family Income Eligible	Retrofits	Pipe Insulation	228,035	112%	256,150	1.00	256,150
		Boiler Reset Controls	87,751	113%	99,528	1.00	99,528
		Air Sealing	204,750	100%	204,669	1.00	204,669
		Programmable Thermostat	66,594	79%	52,895	1.00	52,895
		Attic Insulation	115,442	85%	98,506	1.00	98,506
		Controls for Domestic Hot Water	56,242	100%	56,242	1.00	56,242
		High Efficiency Boiler	35,323	99%	34,933	1.00	34,933
		Advanced Thermostat	33,283	68%	22,733	1.00	22,733
		Showerhead (IU)	28,508	100%	28,500	1.00	28,500
		Steam Trap	17,586	100%	17,586	1.00	17,586

Program Category	Program Path	Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
		Shower Timer	16,580	100%	16,579	1.00	16,579
		Steam Boiler Averaging Controls	9,896	95%	9,408	1.00	9,408
		Faucet Aerator - Kitchen (IU)	6,809	100%	6,791	1.00	6,791
		Cover and Gap Sealers for AC	5,302	121%	6,393	1.00	6,393
		Thermostatic Radiator Valves	3,686	100%	3,686	1.00	3,686
		Basement/Sidewall Insulation	555	65%	358	1.00	358
		Faucet Aerator - Bathroom (IU)	2,592	100%	2,593	1.00	2,593
		Storage Water Heater	655	66%	434	1.00	434
		Reprogrammable Thermostat	160	76%	122	1.00	122
		Wall Insulation	72	88%	63	1.00	63
		Retrofits Subtotal	***919,822***	***100%***	***918,168***	***1.00***	***918,168***
	Assessment	Programmable Thermostat	80	100%	80	1.00	80
		Faucet Aerator - Kitchen (IU)	4	100%	4	1.00	4
		Assessment Subtotal	***83***	***100%***	***83***	***1.00***	***83***
	Healthy Homes	Attic Insulation	420	100%	420	1.00	420
		Advanced Thermostat	67	100%	67	1.00	67
		Duct Sealing	47	120%	57	1.00	57
		Air Sealing	39	100%	39	1.00	39
		Wall Insulation	75	100%	75	1.00	75
		Faucet Aerator - Kitchen (IU)	13	100%	13	1.00	13
		Showerhead (IU)	6	100%	6	1.00	6
		Faucet Aerator - Bathroom (IU)	3	100%	3	1.00	3
		Healthy Homes Subtotal	***669***	***101%***	***678***	***1.00***	***678***
		Kit 1 MF	20	107%	21	1.00	21

Program Category	Program Path	Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
	Energy Savings Kits	Kit 2 MF	11,296	103%	11,675	1.00	11,675
		Kit 3 MF	66	124%	82	1.00	82
		Kit 4 MF	4,298	100%	4,297	1.00	4,297
		Energy Savings Kits Subtotal	***15,680***	***102%***	***16,076***	***1.00***	***16,076***
Total or Weighted Average			**936,254**	**100%**	**935,005**	**1.00**	**935,005**

* 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-2023/**.
Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.

2.4 Impact Analysis Findings and Recommendations

The overall realization rate for the Multi-Family Income Eligible program was 100% for therms in 2023.

2.4.1 Impact Parameter Estimates

Table 2-5 shows the per-unit therm savings and realization rate findings by measure from the evaluation team's review. The realization rate is the ratio of the gross verified savings to the ex ante savings. Following Table 2-5 are findings and recommendations, including discussion of all measures with realization rates more or less than 100%. Appendix A provides a description of the impact analysis methodology.

Table 2-5. 2023 MFIE Program Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Advanced Thermostat	Unit	Varies	Varies	68%	Illinois TRM, v11.0†, Section 5.3.16 and PTD*
Air Sealing	Ln Ft	Varies	Varies	100%	Illinois TRM, v11.0†, Section 5.6.1 and PTD*
Attic Insulation	SQ FT	Varies	Varies	86%	Illinois TRM, v11.0†, Section 5.6.5 and PTD*
Basement/Sidewall Insulation	SQ FT	0.21	0.13	65%	Illinois TRM, v11.0†, Section 5.6.2 and PTD*
Boiler Reset Controls	Unit	Varies	Varies	113%	Illinois TRM, v11.0†, Section 4.4.4 and PTD*
Boiler Tune Up	Unit	Varies	Varies	100%	Illinois TRM, v11.0†, Section 4.4.2 and PTD*

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Controls for Domestic Hot Water	Unit	62.70	62.70	100%	Illinois TRM, v11.0†, Section 4.3.8 and PTD*
Cover and Gap Sealers for AC	Unit	Varies	Varies	123%	Illinois TRM, v11.0†, Section 4.4.38 and PTD*
Duct Sealing	Unit	47.15	56.58	120%	Illinois TRM, v11.0†, Section 5.3.4 and PTD*
Faucet Aerator - Bathroom (IU)	Unit	Varies	Varies	100%	Illinois TRM, v11.0†, Section 5.4.4 and PTD*
Faucet Aerator - Kitchen (IU)	Unit	Varies	Varies	100%	Illinois TRM, v11.0†, Section 5.4.4 and PTD*
Furnace Tune Up	Unit	Varies	Varies	99%	Illinois TRM, v11.0†, Section 5.3.13 and PTD*
High Efficiency Boiler	Unit	Varies	Varies	99%	Illinois TRM, v11.0†, Section 4.4.10 and PTD*
Kit 1 MF	Each	20.05	21.38	107%	PTD, Guidehouse research
Kit 2 MF	Each	Varies	Varies	103%	PTD, Guidehouse research
Kit 3 MF	Each	Varies	Varies	124%	PTD, Guidehouse research
Kit 4 MF	Each	Varies	Varies	100%	PTD, Guidehouse research
Pipe Insulation	Ln Ft	Varies	Varies	112%	Illinois TRM, v11.0†, Section 4.4.14 and PTD*
Programmable Thermostat	Unit	Varies	Varies	79%	Illinois TRM, v11.0†, Section 5.3.11 and PTD*
Reprogrammable Thermostat	Unit	Varies	Varies	76%	Illinois TRM, v11.0†, Section 5.3.11 and PTD*
Shower Timer	Unit	3.79	3.79	100%	Illinois TRM, v11.0†, Section 5.4.9 and PTD*
Showerhead (IU)	Unit	Varies	Varies	100%	Illinois TRM, v11.0†, Section 5.4.5 and PTD*
Steam Boiler Averaging Controls	Unit	Varies	61.09	95%	Illinois TRM, v11.0†, Section 4.4.36 and PTD*
Steam Trap	Unit	209.36	209.36	100%	Illinois TRM, v11.0†, Section 4.4.16 and PTD*
Thermostatic Radiator Valves	Unit	Varies	Varies	84%	Illinois TRM, v11.0†, Section 5.3.19 and PTD*
Wall Insulation	SQ FT	Varies	36.13	94%	Illinois TRM, v11.0†, Section 5.6.4 and PTD*
Water Heater	Unit	Varies	Varies	36%	Illinois TRM, v11.0†, Section 4.3.1 and PTD*

* Program Tracking Data (PTD) provided by Nicor Gas, extract dated January 30, 2024.
† State of Illinois Technical Reference Manual version 11.0 from **http://www.ilsag.info/technical-reference-manual.html**.
Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.

2.4.2 Findings and Recommendations

The evaluation team developed findings and recommendations based on the 2023 evaluation, which are organized by path type in the following sections.

2.4.2.1 Retrofits Path

Finding 1. The ex ante savings for the Programmable Thermostat (DI) MF-IU measure leveraged either an AnnualThermConsumption of 1,487.18 therms or FurnaceHeatingLoad of 1,005 therms. The evaluation team used 1,005 therms, per the Illinois Statewide Technical Reference Manual v11.0 (IL-TRM)[1], as the gas heating consumption for all thermostat measures, consistent with the IL-TRM and previous evaluation guidance. The assumptions in the IL-TRM appear to be developed from single family furnace data.

> **Recommendation 1.** Use the gas heating consumption value of 1,005 therms following the guidance in the IL-TRM. Ensure that savings are calculated using consistent inputs for a measure. Nicor Gas could facilitate adding boiler gas consumption options to the IL-TRM during the next TRM update process.

Finding 2. There are 14 out of 111 total line items where the realization rate is not equal to 100%. The analysis was updated to reflect the fact that the TRM deemed value of R + 3 was already included in the pre- and post-install values for the insulation in the tracking data. Three of the 14 line items have a pre-install value of 2, which leads the evaluation team to believe that some of the other values in the tracking data did not add the deemed R + 3 as well.

> **Recommendation 2.** Review the savings algorithm and the inputs being used in the savings calculation for attic insulation and ensure the minimum insulation levels are included per the IL-TRM (Section 5.6.5).

Finding 3. The reported per-unit Therm savings for In-Unit AC Cover and Gap Sealer (DI) do not match with the values reported in the *DeemedThermSavings* column in the program tracking data. The evaluation team verified the *DeemedThermSavings column was* consistent with the IL-TRM, and leveraged these values as the verified savings for this measure.

> **Recommendation 3.** Review the savings algorithm and the inputs used in the program data and ensure these values match the inputs and algorithms from the IL-TRM (Section 4.4.38).

Finding 4. For Common Areas (CA) Steam Boiler Averaging Controls measure, the ex ante savings used a boiler efficiency of 61.6%, consistent for in-unit existing boilers. The evaluation team used a boiler efficiency of 64.8%, consistent with multifamily low pressure boilers.

[1] In this report, unless stated otherwise, IL-TRM refers to version 11.0 (v11.0)

Recommendation 4. Cross-check the appropriate boiler efficiency for the steam boiler averaging controls measure, consistent with the IL-TRM (Section 4.4.36).

Finding 5. For one instance for the Air Sealing – Door Sweep – DI measure (PID-2023.02.10-158845), the program data reported therm savings for an Air Sealing – Weatherstripping measure instead of a Door Sweep measure. These findings led to an overall realization rate of 99.96% for Air Sealing.

Recommendation 5. Use the correct Climate Zone for calculating savings. Report therm savings consistent with the measure name.

Finding 6. There were inconsistencies within the program data for pipe insulation measures. The technical inputs for heat loss values were not consistent with the measure name in the program data. Table 2-6 provides a summary of the instances where inconsistencies were observed. The evaluation team used the technical inputs to determine the verified savings, which resulted in higher savings overall for pipe insulation measures.

Table 2-6. 2023 MFIE Program Instances with different Pipe Insulation Heat Loss values

Bare Pipe Heat Loss	Insulated Pipe Heat Loss	Reported Pipe Insulation Measure	Verified Pipe Insulation Measure	Number of Instances
59.515	12.225	Pipe Insulation, DHW Small <=1.25"	Pipe Insulation, DHW Medium 1.26-2"	3
187.125	36.287	Pipe Insulation, Steam Med 2.1" to 5"	Pipe Insulation, Steam Small 1" to 2"	11
		Pipe Insulation, Steam Med Fitting		8
		Pipe Insulation, Steam Med Valve		6
411.183	64.472	Pipe Insulation, Steam Small 1" to 2"	Pipe Insulation, Steam Med 2.1" to 5"	1
717.9	114.8	Pipe Insulation, Steam Med 2.1" to 5"	Pipe Insulation, Steam Large 5.1" to 8"	3
		Pipe Insulation, Steam Med Fitting		2
		Pipe Insulation, Steam Med Valve		1
1024.1	154.733	Pipe Insulation, Steam Med 2.1" to 5"	Pipe Insulation, Steam X-Large Fitting	1
		Pipe Insulation, Steam Med Valve		1

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

Recommendation 6. Ensure all inputs and measure names are consistent in the program data, and that the technical inputs and reported savings are aligned.

Finding 7. For four out of 78 instances, the evaluation team could not replicate the ex ante savings for the Boiler Reset Controls measure. To determine verified savings, the evaluation team used the input capacity from the tracking data and the deemed savings factor and full load hours from the TRM.

Recommendation 7. Review the savings algorithm and inputs used in the savings calculation and ensure these values match the inputs and algorithms from the IL-TRM (Section 4.4.4 Boiler Lockout/Reset controls).

2.4.2.2 Healthy Homes Path

Finding 8. For the Duct Sealing measure, the evaluation team could not replicate the ex ante savings for this measure, based on the supplied program data.

Recommendation 8. Review the savings algorithm and the inputs used in the savings calculation and ensure these values match the inputs and algorithms from the IL-TRM (Section 5.3.4).

2.4.2.3 Energy Savings Kits

Finding 9. The ex ante savings for Kit 1 MF and Kit 2 MF differed between two separate values depending on the "ICName" in the program tracking data. The evaluation team understands that these kits contain the same measures, and since they are delivered within the same program, should have the same savings values. The evaluation team leveraged the kit level calculations provided by Nicor Gas during the mid-year evaluation to determine the verified savings.

Recommendation 9. Ensure that the same types of kits leverage the same ex ante savings values within the tracking data.

Finding 10. The ex ante gross therms for kit 3 in the end of year tracking database match the ex ante gross therms from the mid-year analysis, which Guidehouse verified to be incorrect. Nicor Gas and Guidehouse did a further analysis and established agreed upon results after the mid-year analysis, but the results do not reflect in Nicor Gas' end of year tracking data[2]

Recommendation 10. Ensure that all kit measures reflect the therms savings Nicor Gas and Guidehouse has agreed upon.

3. Public Housing Energy Savings

3.1 Program Description

The Public Housing Energy Savings (PHES) program works with Public Housing Authorities (PHAs) in ComEd, Nicor Gas, Peoples Gas (PGL), and North Shore Gas (NSG) territories to

[2] This measure was originally included in the tracking data for the Income Eligible Single Family program. Refer to Guidehouse email on 1/19/2024 regarding the IE Kits midyear savings analysis

achieve electricity and gas savings. The PHAs are the program participants, though the residents of the properties are directly affected by the program through in-unit and common area upgrades. Gas savings opportunities included space heating and water heating equipment upgrades and envelope measures (attic insulation, air sealing, and room AC covers/gap sealer). The program also included gas saving direct install measures, such as boiler and furnace tune up, high efficiency boilers, and water heaters.

The PHES program had 28 participants in 2023 and completed 35 projects as shown in Table 3-1.

Table 3-1. 2023 PHES Program Volumetric Findings Detail

Participation	Public Housing
Participants *	28
Installed Projects †	35
Measure Types Installed	8

* Participants are defined as unique Building Account Numbers.
† Installed Projects are defined as number of Vendor Project IDs.
Source: Nicor 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. 2023 PHES Program Installed Measure Quantities

Program Category	Program Path	Measure	Quantity Unit	Installed Quantity
PHES	Public Housing	Attic Insulation	Sq Ft	73,656
		Air Sealing	Ln Ft	17,109
		Assessment/No Savings	Unit	13,350
		Furnace Tune Up	Unit	720
		Cover and Gap Sealers for AC	Unit	715
		High Efficiency Boiler	Unit	76
		Storage Water Heater	Unit	76
		Boiler Tune Up	Unit	6

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

3.2 Program Savings Detail

Table 3-3 summarizes the energy savings the Multi-family Income Eligible Program achieved by the Public Housing path in 2023.

Table 3-3. 2023 PHES Program Annual Energy Savings Summary

Program Category	Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
PHES	Public Housing	49,953	102%	50,960	1.00	50,960
Total or Weighted Average		**49,953**	**102%**	**50,960**	**1.00**	**50,960**

* 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-2023/**.
Source: Guidehouse evaluation team analysis.

3.3 Program Savings by Measure

The program includes 7 measures as shown in Table 3-4. The Furnace Tune Up and Attic Insulation measures of the Public Housing path contributed the most savings.

Table 3-4. 2023 PHES Program Annual Energy Savings by Measure

Program Category	Program Path	Savings Category	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
PHES	Public Housing	Air Sealing	7,391	100%	7,391	1.00	7,391
		Furnace Tune Up	19,210	99%	19,031	1.00	19,031
		Cover and Gap Sealers for AC	6,982	124%	8,669	1.00	8,669
		Attic Insulation	11,386	96%	10,877	1.00	10,877
		Boiler Tune Up	2,197	100%	2,197	1.00	2,197
		High Efficiency Boiler	2,076	100%	2,083	1.00	2,083
		Storage Water Heater	712	100%	712	1.00	712
Total or Weighted Average			**49,953**	**102%**	**50,960**	**1.00**	**50,960**

Note: Totals may not sum due to rounding.
* 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-2023/**.
Source: Nicor Gas tracking data and Guidehouse evaluation team analysis.

3.4 Impact Analysis Findings and Recommendations

The overall realization rate for the PHES program was 102% for therms in 2023. The program level realization rate was driven mainly by the higher savings for the Cover and Gap Sealers for AC measure. The evaluation team developed three findings and recommendations based on the review of program data.

3.4.1 Impact Parameter Estimates

Table 3-5 shows the per-unit therm savings and realization rate findings by measure from our review. The realization rate is the ratio of the verified savings to the gross ex ante savings. Following Table 3-5 are findings and recommendations, including discussion of all measures with realization rates more or less than 100%. Appendix 1 provides a description of the impact analysis methodology.

Table 3-5. 2023 PHES Program Verified Gross Savings Parameter

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Air Sealing	Ln Ft	Varies	Varies	100%	Illinois TRM, v11.0†, Section 5.6.1 and PTD*
Attic Insulation	SQ FT	Varies	Varies	96%	Illinois TRM, v11.0†, Section 5.6.5 and PTD*
Cover and Gap Sealers for AC	Unit	Varies	Varies	124%	Illinois TRM, v11.0†, Section 4.4.38 and PTD*
Furnace Tune Up	Unit	Varies	Varies	99%	Illinois TRM, v11.0†, Section 5.3.13 and PTD*
High Efficiency Boiler	Unit	Varies	Varies	100%	Illinois TRM, v11.0†, Section 4.4.10 and PTD*
Water Heater	Unit	Varies	Varies	100%	Illinois TRM, v11.0†, Section 4.3.1 and PTD*

* Program Tracking Data (PTD) provided by Nicor Gas, extract dated January 30, 2024.

† State of Illinois Technical Reference Manual version 11.0 from **http://www.ilsag.info/technical-reference-manual.html**.

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

3.4.2 Findings and Recommendations

Finding 11. The reported per-unit Therm savings for In-Unit AC Cover and Gap Sealer (DI) do not match with the values reported in the *DeemedThermSavings* column in the program tracking data. The evaluation team verified the *DeemedThermSavings column was* consistent with the IL-TRM, and leveraged these values as the verified savings for this measure.

> **Recommendation 11.** Review the savings algorithm and the inputs used in the savings calculation and ensure these values match the inputs and algorithms from the IL-TRM (Section 4.4.38).

Finding 12. For the Attic Insulation measure, the evaluation team updated the analysis to reflect the fact that the TRM deemed R + 3 value for pre- and post-install has already been added to the tracking data values. Despite this update, the RR was under 100% and was the same value for each installation. The evaluation team could not determine what was driving the difference in savings as all of the inputs match.

Recommendation 12. Review the savings algorithm used in the savings calculation and ensure it matches the algorithm from the IL-TRM (Section 5.6.5).

Finding 13. For the Furnace Tune Up measure, the evaluation team could not replicate the ex ante savings. The program data included baseline unit efficiencies of either 0.925 or 0.8, and a post tune-up efficiency of 0.95. The ex ante savings are very close to the savings ranging from 0.925 to 0.95 furnace efficiency but do not align exactly (a difference of 3%). The evaluation team used 0.925 for the baseline efficiency, and 0.95 for the post tune-up efficiency for all instances of this measure.

Recommendation 13. Review the savings algorithm and the inputs used in the savings calculation and ensure these values match the inputs and algorithms from the IL-TRM (Section 5.3.13).

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 v11.0 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 v11.0.
- Multiplying the verified per-unit savings value by the quantity reported in the tracking data. The team calculated verified net savings by multiplying the verified gross savings estimates by a NTG ratio. In Program Year 2023, 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 v11.0 and the final 2023 tracking data.

Appendix B. Program Specific Inputs for the Illinois TRC

B.1 Retrofits, Assessment, Healthy Homes, and Energy Savings Kits

Table B-1 shows 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 Table B-1 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. 2023 MFIE Program Verified Cost Effectiveness Inputs

Program Category	Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Multi-Family Income Eligible	Retrofits	Pipe Insulation	Ln Ft	32,249	15	228,035	256,150	256,150
		Boiler Reset Controls	Each	121	16	87,751	99,528	99,528
		Air Sealing	Ln Ft	516,505	20	204,750	204,669	204,669
		Programmable Thermostat	Each	1,306	16	66,594	52,895	52,895
		Attic Insulation	Sq Ft	657,955	20	115,442	98,506	98,506
		Controls for Domestic Hot Water	Each	1,143	15	56,242	56,242	56,242
		High Efficiency Boiler	Each	405	25	35,323	34,933	34,933
		Advanced Thermostat	Each	462	11	33,283	22,733	22,733
		Showerhead (IU)	Each	2,302	10	28,508	28,500	28,500
		Steam Trap	Each	84	6	17,586	17,586	17,586
		Shower Timer	Each	4,370	2	16,580	16,579	16,579
		Steam Boiler Averaging Controls	Each	169	20	9,896	9,408	9,408
		Faucet Aerator - Kitchen (IU)	Each	2,401	10	6,809	6,791	6,791
		Cover and Gap Sealers for AC	Each	661	5	5,302	6,393	6,393
		Thermostatic Radiator Valves	Each	316	15	3,686	3,686	3,686

Program Category	Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
		Basement/Side wall Insulation	Sq Ft	2,684	20	555	358	358
		Faucet Aerator - Bathroom (IU)	Each	1,513	10	2,592	2,593	2,593
		Storage Water Heater	Each	23	13	655	434	434
		Reprogrammable Thermostat	Each	3	2	160	122	122
		Wall Insulation	Sq Ft	648	20	72	63	63
	Assessment	Programmable Thermostat	Each	1	16	80	80	80
		Faucet Aerator - Kitchen (IU)	Each	1	10	4	4	4
	Healthy Homes	Attic Insulation	Sq Ft	976	20	420	420	420
		Advanced Thermostat	Unit	1	11	67	67	67
		Duct Sealing	Unit	1	20	47	57	57
		Air Sealing	Ln Ft	1	20	39	39	39
		Wall Insulation	Sq Ft	600	20	75	75	75
		Faucet Aerator - Kitchen (IU)	Each	1	10	13	13	13
		Showerhead (IU)	Each	1	10	6	6	6
		Faucet Aerator - Bathroom (IU)	Each	1	10	3	3	3
	Energy Savings Kits	Kit 1 MF	Each	1	8.6	20	21	21
		Kit 2 MF	Each	417	8.9	11,296	11,675	11,675
		Kit 3 MF	Each	4	8.5	65.6	81.6	81.6
		Kit 4 MF	Each	193	20	4,298	4,297	4,297
Total or Weighted Average					**16.2**	**936,254**	**935,005**	**935,005**

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

B.2 Public Housing Energy Savings

Table B-2 shows 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 Table B-2 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-2. 2023 PHES Program Verified Cost Effectiveness Inputs

Program Category	Program Path	Savings Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
PHES	Public Housing	Air Sealing	Ln Ft	17,109	20	7,391	7,391	7,391
		Furnace Tune Up	Each	720	3	19,210	19,031	19,031
		Cover and Gap Sealers for AC	Each	715	5	6,982	8,669	8,669
		Attic Insulation	Sq Ft	73,656	20	11,386	10,877	10,877
		Boiler Tune Up	Each	6	3	2,197	2,197	2,197
		High Efficiency Boiler	Each	76	25	2,076	2,083	2,083
		Storage Water Heater	Each	76	13	712	712	712
		Assessment/No Savings	Each	13,350	0	0	0	0
Total or Weighted Average					**9.7**	**49,953**	**50,960**	**50,960**

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