



Income Qualified Single Family Programs Impact Evaluation Report

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

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Nicor Gas

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1. Introduction

The Nicor Gas Income Qualified Single-Family Program offers free weatherization for income-qualified customers in the Nicor Gas service territory and other energy saving measures through multiple paths. This report presents the results of the impact evaluation for the measures installed through the Contractor Channel, Single Family Bloomington-Normal Program (BNP) with kits (BNP SF), and the Kits Program (Kits), broken out by relevant measure and program structure details. A separate report presents energy savings for the measures installed through the Illinois Home Weatherization Assistance Program (IHWAP) that is joint with ComEd. The 2021 program year covers January 1, 2021 through December 31, 2021.

2. Program Description

The Income Qualified Single-Family Program had two implementation paths administered by Nicor Gas: (1) Contractor Channel, (2) BNP SF with kits. These paths included installation of water heating efficiency measures (faucet aerators, showerheads, gas water heaters); advanced and programmable thermostats; air sealing, attic, duct, and rim insulation; and high efficiency boilers and furnaces). The BNP SF path also offered energy savings kits of water efficiency and air sealant measures (reported as “Kit BN” in the Nicor Gas program tracking data). This kit included domestic hot water pipe insulation, a shower valve, a low-flow showerhead, low-flow kitchen and bathroom aerators, a shower timer, and air sealant materials (gaskets, foam tape, door sweeps and caulk).

Separately, the program provided an option of free energy savings kits of water efficiency or air sealant measures (reported as “Kit 2” and “Kit 4” in the Nicor Gas program tracking data). Kit 2 included low-flow showerheads (SH, 2 per kit), a kitchen aerator (KA), a shower timer (ST), and bathroom aerators (BA, 2 per kit). Kit 4 included 12 electrical switch/outlet gaskets, 1 door sweep, 30 linear feet of caulk, and 34 linear feet of weather stripping. The program provided one or two kits per customer depending on their request.

The program paths had 4,116 participants in 2021 and completed 4,635 projects as shown in Table 2-1.

Table 2-1. 2021 Volumetric Findings Detail

Participation	Contractor Channel	BNP SF	Kits	Total
Participants*	673	568	2875	4116
Projects†	1155	587	2893	4635
Advanced Thermostat	220	79	0	299
Duct Insulation and Sealing (Projects)	342	4	0	346
Furnace Tune-Up	94	1	0	95
Gas High Efficiency Boiler – Time of Sale (TOS)	7	1	0	8
Gas High Efficiency Furnace – TOS	51	17	0	68
Programmable Thermostat	12	0	0	12
Gas Water Heater – Early Replacement (ER)	0	7	0	7
Gas Water Heater – TOS	25	16	0	41
Hot Water (HW) Pipe Insulation	492	57	0	549
Low Flow Faucet Aerator – Bathroom	436	24	5206	5666
Low Flow Faucet Aerator – Kitchen	217	6	2603	2826
Low Flow Showerhead	510	20	5206	5736
Shower Timer	0	0	2603	2603
Air Sealing (Projects, Kit 4)	381	34	5603	6018
Attic Insulation (Projects)	334	42	0	376
Rim Insulation (Projects)	24	31	0	55
Wall Insulation (Projects)	0	7	0	7
Kit BNP	0	487	0	487

* Participants are defined as unique addresses

† Installed Projects are defined as unique VendorProjectIDs

‡ Kit BN included 3 linear feet (ln ft) of ½" DHW Pipe Insulation; 3 ln ft ¾" DHW Pipe Insulation; 1 Shower Valve; 1 Low Flow Showerhead; 1 Low Flow Bathroom Aerator; 1 Low Flow Kitchen Aerator; 1 Shower Timer; 12 Gaskets; 17' of Weatherstrip; 2 of 40" Door Sweep; and 30' of Rope Caulk.

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

3. Program Savings Detail

Table 3-1 through summarizes the energy savings the Income Qualified Single-Family Program achieved by path in 2021.

Table 3-1. 2021 Annual Energy Savings Summary

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
BNP SF (incl Kits)	37,102	100%	37,101	1.00	37,101
Contractor Channel SF	121,890	100%	121,889	1.00	121,889
Kits	261,505	100%	261,490	1.00	261,490
Total or Weighted Average	420,497	100%	420,480	1.00	420,480

* 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/ntg_2021.

Source: Guidehouse evaluation team analysis

4. Program Savings by Measure

The four program paths included 16 measures and 3 kit offerings, as shown in the following three tables. The Contractor Channel (Table 4-1) and BNP SF (Table 4-2) had realization rates of 99%. The Kits (Table 4-3) had realization rate of 100%. The Contractor Channel and Kits contributed the most program savings.

Table 4-1. 2021 Annual Energy Savings by Measure – Contractor Channel

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
HVAC	Advanced Thermostat	16,607	100%	16,607	1.00	16,607
HVAC	Duct Insulation and Sealing	4,547	100%	4,547	1.00	4,547
HVAC	Furnace Tune-Up	4,941	100%	4,941	1.00	4,941
HVAC	Gas High Efficiency Boiler - TOS	252	100%	252	1.00	252
HVAC	Gas High Efficiency Furnace - TOS	8,183	100%	8,183	1.00	8,183
HVAC	Programmable Thermostat	780	100%	780	1.00	780
Hot Water	Gas Water Heater - TOS	621	100%	621	1.00	621
Hot Water	HW Pipe Insulation	4,262	100%	4,262	1.00	4,262
Hot Water	Low Flow Faucet Aerator - Bathroom	392	100%	392	1.00	392
Hot Water	Low Flow Faucet Aerator - Kitchen	1,859	100%	1,859	1.00	1,859
Hot Water	Low Flow Showerhead	1,493	100%	1,493	1.00	1,493
Shell	Air Sealing	20,158	100%	20,157	1.00	20,157
Shell	Attic Insulation	57,772	100%	57,772	1.00	57,772
Shell	Rim Insulation	23	100%	23	1.00	23
Total or Weighted Average		121,890	100%	121,889	1.00	121,889

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

Table 4-2. 2021 Annual Energy Savings by Measure – BNP SF

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
HVAC	Advanced Thermostat	5,408	100%	5,408	1.00	5,408
HVAC	Duct Insulation and Sealing	2,222	100%	2,222	1.00	2,222
HVAC	Furnace Tune-Up	242	100%	242	1.00	242
HVAC	Gas High Efficiency Boiler - TOS	146	100%	146	1.00	146
HVAC	Gas High Efficiency Furnace - TOS	1,563	100%	1,563	1.00	1,563
Hot Water	Gas Water Heater - ER	320	100%	320	1.00	320
Hot Water	Gas Water Heater - TOS	838	100%	838	1.00	838
Hot Water	HW Pipe Insulation	318	100%	318	1.00	318
Hot Water	Low Flow Faucet Aerator - Bathroom	32	100%	32	1.00	32
Hot Water	Low Flow Faucet Aerator - Kitchen	74	100%	74	1.00	74
Hot Water	Low Flow Showerhead	86	100%	86	1.00	86
Shell	Air Sealing	1,249	100%	1,248	1.00	1,248
Shell	Attic Insulation	2,045	100%	2,045	1.00	2,045
Shell	Rim Insulation	278	100%	278	1.00	278
Shell	Wall Insulation	57	100%	57	1.00	57
Hot Water, Shell	Kit BN	22,224	100%	22,224	1.00	22,224
Total or Weighted Average		37,102	100%	37,101	1.00	37,101

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

Table 4-3. 2021 Annual Energy Savings by Measure – Kits

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG	Verified Net Savings (Therms)
Hot Water	Kit 2	62,655	100%	62,645	1.00	62,645
Shell	Kit 4	198,850	100%	198,845	1.00	198,845
Total or Weighted Average		261,505	100%	261,490	1.00	261,490

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

5. Impact Analysis Findings and Recommendations

5.1 Impact Parameter Estimates

Table 5-1 and Table 5-2 show the unit therm savings and realization rate findings by measure from our review. Following Table 5-1 and Table 5-2, we provide findings and recommendations, including discussion of measures with realization rates other than 100%. 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 – Contractor Channel

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Advanced Thermostat	Each	75.49	75.49	1.00	TRM, v9.0†, Section 5.3.16 and tracking data*
Duct Insulation and Sealing	Each	13.3	13.3	1.00	TRM, v9.0, Section 5.3.4 and tracking data
Furnace Tune-Up	Each	52.56	52.56	1.00	TRM, v9.0, Section 5.3.13 and tracking data
Gas High Efficiency Boiler - TOS	Each	35.97	35.97	1.00	TRM, v9.0, Section 5.3.6 and tracking data
Gas High Efficiency Furnace - TOS	Each	160.45	160.45	1.00	TRM, v9.0, Section 5.3.7 and tracking data
Programmable Thermostat	Each	64.98	64.98	1.00	TRM, v9.0, Section 5.3.11 and tracking data
Gas Water Heater - TOS	Each	24.85	24.85	1.00	TRM, v9.0, Section 5.4.2 and tracking data
HW Pipe Insulation	Linear Feet	0.88	0.88	1.00	TRM, v9.0, Section 5.4.1 and tracking data
Low Flow Faucet Aerator - Bathroom	Each	0.9	0.9	1.00	TRM, v9.0, Section 5.4.4 and tracking data
Low Flow Faucet Aerator - Kitchen	Each	8.56	8.56	1.00	TRM, v9.0, Section 5.4.4 and tracking data
Low Flow Showerhead	Each	2.93	2.93	1.00	TRM, v9.0, Section 5.4.5 and tracking data
Air Sealing	Projects	52.91	52.91	1.00	TRM, v9.0, Section 5.6.1 and tracking data
Attic Insulation	Square Feet	0.19	0.19	1.00	TRM, v9.0, Section 5.6.5 and tracking data
Rim Insulation	Square Feet	0.05	0.05	1.00	TRM, v9.0, Section 5.6.6 and tracking data

* Program Tracking Data (PTD) provided by Nicor Gas; extract dated January 28, 2022.

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

Table 5-2. Verified Gross Savings Parameters – BNP SF

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Advanced Thermostat	Each	68.46	68.46	1.00	TRM, v9.0, Section 5.3.16 and tracking data
Duct Insulation and Sealing	Each	555.49	555.49	1.00	TRM, v9.0, Section 5.3.4 and tracking data
Furnace Tune-Up	Each	242.46	242.46	1.00	TRM, v9.0, Section 5.3.13 and tracking data
Gas High Efficiency Boiler - TOS	Each	145.79	145.79	1.00	TRM, v9.0, Section 5.3.6 and tracking data
Gas High Efficiency Furnace - TOS	Each	91.94	91.94	1.00	TRM, v9.0, Section 5.3.7 and tracking data
Gas Water Heater - ER	Each	45.67	45.67	1.00	TRM, v9.0, Section 5.4.2 and tracking data
Gas Water Heater - TOS	Each	52.37	52.37	1.00	TRM, v9.0, Section 5.4.2 and tracking data
HW Pipe Insulation	Linear Feet	0.88	0.88	1.00	TRM, v9.0, Section 5.4.1 and tracking data
Low Flow Faucet Aerator - Bathroom	Each	1.33	1.33	1.00	TRM, v9.0, Section 5.4.4 and tracking data
Low Flow Faucet Aerator - Kitchen	Each	12.30	12.30	1.00	TRM, v9.0, Section 5.4.4 and tracking data
Low Flow Showerhead	Each	4.29	4.29	1.00	TRM, v9.0, Section 5.4.5 and tracking data
Air Sealing	Projects	36.73	36.72	1.00	TRM, v9.0, Section 5.6.1 and tracking data
Attic Insulation	Square Feet	0.05	0.05	1.00	TRM, v9.0, Section 5.6.5 and tracking data
Rim Insulation	Square Feet	0.11	0.11	1.00	TRM, v9.0, Section 5.6.6 and tracking data
Wall Insulation	Square Feet	0.09	0.09	1.00	TRM, v9.0, Section 5.6.4 and tracking data
Kit BN	NA	45.63	45.63	1.00	TRM, v9.0, Program Calculator, and tracking data

* Program Tracking Data (PTD) provided by Nicor Gas; extract dated January 28, 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 Contractor Channel Findings and Recommendations

Overall, the evaluation team determined that the implementer accurately calculated the energy savings for the Contractor Channel program component. The evaluation team developed two recommendations for consideration for the 2022 program. Table 5-3 presents the measure-level realization rates and program savings percentages.

Table 5-3. Contractor Channel Measure Level Realization Rates

Measure	Realization Rate	Percentage of Verified Savings*
Attic Insulation	1.00	48%
Air Sealing	1.00	17%
Advanced Thermostat	1.00	14%
Gas High Efficiency Furnace - TOS	1.00	7%
Furnace Tune-Up	1.00	4%
HW Pipe Insulation	1.00	4%
Duct Insulation and Sealing	1.00	3%
Low Flow Faucet Aerator - Kitchen	1.00	2%
Low Flow Showerhead	1.00	1%
Programmable Thermostat	1.00	1%
Gas Water Heater – TOS	1.00	1%
Low Flow Faucet Aerator - Bathroom	1.00	<1%
Gas High Efficiency Boiler - TOS	1.00	<1%
Rim Insulation	1.00	<1%

*Percentage of program total savings for that measure

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

5.2.1.1 Rim Insulation R_{new} values

For the following measures, R_{new} in the tracking data is equal to R_{old} (both have values of 5): MEA-2021.08.18-250192, MEA-2021.08.20-250287, MEA-2021.08.23-250314, MEA-2021.09.09-254310. This results in verified savings of 0 for these four measure installations. Guidehouse learned this was caused by a data translation error, and the R_{new} for these four measure installations was 8, matching the other rim insulation measures, resulting in a realization rate of 100%.

Recommendation 1. Ensure that the input values for post-installation conditions are entered correctly and that ex ante calculation results match tracked input values.

5.2.2 BNP SF Recommendations and Findings

Overall, the evaluation team determined that the implementer accurately calculated the energy savings for the BNP SF program component. Table 5-4 presents the measure-level realization rates and program savings percentages.

Table 5-4. BNP SF Measure Level Realization Rates

Measure	Realization Rate	Percentage of Verified Savings*
Kit BN	1.00	61%
Advanced Thermostat	1.00	15%
Attic Insulation	1.00	6%
Duct Insulation and Sealing	1.00	5%
Gas High Efficiency Furnace - TOS	1.00	4%
Air Sealing	1.00	3%
Gas Water Heater - TOS	1.00	2%
Gas Water Heater - ER	1.00	1%
HW Pipe Insulation	1.00	1%
Rim Insulation	1.00	1%
Furnace Tune-Up	1.00	1%
Gas High Efficiency Boiler - TOS	1.00	<1%
Low Flow Showerhead	1.00	<1%
Low Flow Faucet Aerator - Kitchen	1.00	<1%
Wall Insulation	1.00	<1%
Low Flow Faucet Aerator - Bathroom	1.00	<1%

*Percentage of program total savings for that measure

Source: Nicor Gas tracking data and Guidehouse evaluation team analysis

5.2.3 Kits Channel Findings and Recommendations

5.2.3.1 Kit 4 Findings

The ex ante savings for Kit 4 are currently calculated using deemed savings values from Section 5.6.1 of the TRM for an average climate zone (CZ) calculated as a weighted average of CZ 1 Rockford (30%), CZ 2 Chicago (60%) and CZ 3 Springfield (10%). The verified savings are calculated using the same weighted average values. The tracking data includes climate zone information for a majority of the customers, but others are blank. Guidehouse found that ex ante savings based on the weighted average of climate zones matched the savings from reported climate zones within less than one percent.

Appendix A. Impact Analysis Methodology

Guidehouse followed algorithms outlined in the Illinois Technical Reference Manual (TRM) v9.0¹ to calculate verified gross savings for the Income Qualified programs. The evaluation team verified that these algorithms and appropriate deemed input parameters were correctly applied and validated custom parameters that were used. Guidehouse calculated verified net savings by multiplying verified gross savings by a deemed NTG of 1.00.

¹ State of Illinois Technical Reference Manual version 9.0 from <http://www.ilsag.info/technical-reference-manual.html>

Appendix B. Program Specific Inputs for the Illinois TRC

Table B-1 through Table B-3 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 – Contractor Channel

End Use	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Hot Water	Gas Water Heater - TOS	Each	25	13.0	621	621	621
Hot Water	HW Pipe Insulation	Linear Feet	4,845	15.0	4,262	4,262	4,262
Hot Water	Low Flow Faucet Aerator - Bathroom	Each	436	10.0	392	392	392
Hot Water	Low Flow Faucet Aerator - Kitchen	Each	217	10.0	1,859	1,859	1,859
Hot Water	Low Flow Showerhead	Each	510	10.0	1,493	1,493	1,493
HVAC	Advanced Thermostat	Each	220	11.0	16,607	16,607	16,607
HVAC	Duct Insulation and Sealing	Each	342	20.0	4,547	4,547	4,547
HVAC	Furnace Tune-Up	Each	94	3.0	4,941	4,941	4,941
HVAC	Gas High Efficiency Boiler - TOS	Each	7	25.0	252	252	252
HVAC	Gas High Efficiency Furnace - TOS	Each	51	20.0	8,183	8,183	8,183
HVAC	Programmable Thermostat	Each	12	16.0	780	780	780
Shell	Air Sealing	Projects	381	20.0	20,158	20,157	20,157
Shell	Attic Insulation	Square Feet	304,320	20.0	57,772	57,772	57,772
Shell	Rim Insulation	Square Feet	504	20.0	23	23	23
Total or Weighted Average				17.5	121,890	121,889	121,889

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

Table B-2. Verified Cost Effectiveness Inputs – BNP SF

End Use	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
HVAC	Advanced Thermostat	Each	79	11.0	5,408	5,408	5,408
HVAC	Duct Insulation and Sealing	Each	4	20.0	2,222	2,222	2,222
HVAC	Furnace Tune-Up	Each	1	3.0	242	242	242
HVAC	Gas High Efficiency Boiler - TOS	Each	1	25.0	146	146	146
HVAC	Gas High Efficiency Furnace - TOS	Each	17	20.0	1,563	1,563	1,563
Hot Water	Gas Water Heater - ER	Each	7	13.0	320	320	320
Hot Water	Gas Water Heater - TOS	Each	16	13.0	838	838	838
Hot Water	HW Pipe Insulation	Linear Feet	363	15.0	318	318	318
Hot Water	Low Flow Faucet Aerator - Bathroom	Each	24	10.0	32	32	32
Hot Water	Low Flow Faucet Aerator - Kitchen	Each	6	10.0	74	74	74
Hot Water	Low Flow Showerhead	Each	20	10.0	86	86	86
Shell	Air Sealing	Projects	34	20.0	1,249	1,248	1,248
Shell	Attic Insulation	Square Feet	38,116	20.0	2,045	2,045	2,045
Shell	Rim Insulation	Square Feet	2,595	20.0	278	278	278
Shell	Wall Insulation	Square Feet	653	20.0	57	57	57
NA	Kit BN	Kit	487	17.2	22,224	22,224	22,224
Total or Weighted Average				16.6	37,102	37,101	37,101

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

Table B-3. Verified Cost Effectiveness Inputs – Kits

End Use	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Hot Water	Kit 2 (2 SH, 2 BA, 1 KA, 1 ST)	Kit	2,603	10.0	62,655	62,645	62,645
Shell	Kit 4 (12 gasket, 1 sweep, 30 LF caulk, 34 LF wx)	Kit	5,603	20.0	198,850	198,845	198,845
Total or Weighted Average			8,206	17.6	261,505	261,490	261,490

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