



Energy Saving Kits Impact Evaluation Report

**Energy Efficiency Plan: Plan Year 2019
(1/1/2019-12/31/2019)**

**Presented to
Nicor Gas Company**

FINAL

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TABLE OF CONTENTS

- 1. Introduction 1
- 2. Program Description 1
- 3. Savings Summary 2
- 4. Program Savings by Measure 3
- 5. Impact Analysis Findings and Recommendations 5
 - 5.1 Impact Parameter Estimates 5
 - 5.2 Other Findings and Recommendations 5
- 6. Appendix 1. Impact Analysis Methodology 7
- 7. Appendix 2. Net-to-Gross 7
- 8. Appendix 3. Program-Specific Inputs for the Illinois TRC 8

LIST OF TABLES AND FIGURES

- Table 2-1. 2019 Volumetric Summary 1
- Table 2-2. 2019 Installed Measure Quantities 2
- Table 3-1. 2019 Annual Energy Savings Summary 2
- Table 4-1. 2019 Annual Energy Savings by Measure - Program Total 3
- Table 4-2. 2019 Annual Energy Savings Measure Detail 4
- Table 5-1. Verified Gross Savings Parameters 5
- Table 7-1. 2019 Gross Savings and Net-to-Gross Parameters for Kits 7
- Table 8-1. Total Resource Cost Savings Summary 8



1. INTRODUCTION

This report presents the results of the impact evaluation of the Nicor Gas 2019 Energy Saving Kits (ESK) program. It presents a summary of the energy impacts for the total program and broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology. Program year 2019 covers January 1, 2019, through December 31, 2019.

2. PROGRAM DESCRIPTION

The Nicor Gas ESK Program provides hot water and weatherization efficiency measures to assist customers in reducing their natural gas consumption. The offering targets customers through direct email, outreach events, targeted emails, Nicor Gas Energy Efficiency Program website promotions, and through financial heating assistance intake centers. The kits are free and are available to all Nicor Gas single family (SF) and multi-family (MF) residential customers upon request. There are three versions of the kits that contain water savings measures in different quantities (we abbreviate them as Kit 1, Kit 2 and Kit 3). New to the ESK Program in 2019 was the addition of a fourth kit (Kit 4) which contained weatherization measures designed to reduce space heating gas consumption. The weatherization measures include outlet and switch gasket covers, foam tape weatherstripping, v-seal weatherstripping, a self-adhesive door sweep, and a roll of rope caulk. Table 2-1 describes the composition of the kits. Customers may request one of either Kit 1, Kit 2, or Kit 3 plus up to two of Kit 4.

The program had 26,289 participants in 2019 and distributed 40,799 kits, as shown in the following table.

Table 2-1. 2019 Volumetric Summary

Kit	Quantity Distributed	Measure Composition*
Kit 1	449	1 SH, 2 BA, 1 KA, 1 ST
Kit 1 MF	83	
Kit 2	12,403	2 SH, 2 BA, 1 KA, 1 ST
Kit 2 MF	1,865	
Kit 3	181	1 SH, 1 BA, 1 KA, 1 ST
Kit 3 MF	27	
Kit 4	23,135	12 OSC, 17' FTW, 17'VSW, 1 DS, 30' RC
Kit 4 MF	2,656	
Total	40,799	

* SH = Showerhead, KA = Kitchen Aerator, BA = Bath Aerator, ST = Shower Timer, OSC = Outlet or Switch Cover, FTW = Foam Tape Weatherstrip, VSW = V-Seal Weatherstrip, DS = Door Sweep, RC = Rope Caulk

Source: Nicor Gas tracking data and Guidehouse team analysis.

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

**Table 2-2. 2019 Installed Measure Quantities**

Measure	Quantity Unit	Quantity
Bath Aerator	Each	29,808
Kitchen Aerator	Each	15,008
Showerhead	Each	29,276
Shower Timer	Each	15,008
Gaskets	Each	309,492
Foam Tape	Feet	438,447
V-Seal	Feet	438,447
Door Sweep	Each	25,791
Rope Caulk	Feet	773,730

Source: Nicor Gas tracking data and Guidehouse team analysis.

3. SAVINGS SUMMARY

Table 3-1 summarizes the energy savings the ESK program achieved by path in 2019. Most of the program savings came from the Kit 4 installations.

Table 3-1. 2019 Annual Energy Savings Summary

Program Path	Ex Ante Gross Savings (Therms)*	Verified Gross RR†	Verified Gross Savings (Therms)	NTG‡	Verified Net Savings (Therms)
Kit 1	7,440	100%	7,440		7,174
Kit 1 MF	1,589	100%	1,589		1,542
Kit 2	298,540	100%	298,498	Aerators = 1.00	291,141
Kit 2 MF	54,066	100%	54,072	Showerheads = 1.00	53,016
Kit 3	2,894	100%	2,894	Others = 0.84	2,786
Kit 3 MF	488	100%	488		473
Kit 4	821,061	100%	821,039		689,673
Kit 4 MF	94,261	100%	94,259		79,177
Total	1,280,340	100%	1,280,279	NA	1,124,982

NA = Not applicable

* Ex ante savings reported in the tracking data and in Table 3-1 are claimed at the kit level so ex ante savings presented at the measure level in subsequent tables below do not sum exactly to the program total due to rounding differences. Table 3-1 ex ante savings by kit differs by 37 therms compared with ex ante savings by measure shown in other tables in the report.

† Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings. Minor differences in the per kit savings, due to rounding, cause the minor differences in ex ante and verified gross savings.

‡ Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

Source: Nicor Gas tracking data and Guidehouse team analysis.



4. PROGRAM SAVINGS BY MEASURE

The program includes nine measure types, as shown in the following table. The new weatherization measures contributed the most savings in 2019, with rope caulk being the largest single measure. Low flow showerheads provided the second most gas savings.

Table 4-1. 2019 Annual Energy Savings by Measure - Program Total

Research Category	Ex Ante Gross Savings (Therms)*	Verified Gross RR†	Verified Gross Savings (Therms)	NTG‡	Verified Net Savings (Therms)
Bath Aerator	19,242	100%	19,242	1.00	19,242
Kitchen Aerator	78,211	100%	78,211	1.00	78,211
Showerhead	212,222	100%	212,222	1.00	212,222
Shower Timer	55,306	100%	55,306	0.84	46,457
Gaskets	101,359	100%	101,241	0.84	85,042
Foam Tape	185,437	100%	185,537	0.84	155,851
V-Seal	185,437	100%	185,537	0.84	155,851
Door Sweep	163,515	100%	163,493	0.84	137,335
Rope Caulk	279,574	100%	279,490	0.84	234,771
Total	1,280,303	100%	1,280,279	NA	1,124,982

NA = Not applicable

* Ex ante savings are claimed at the kit level, so measure level ex ante savings do not sum exactly to the program total due to rounding.

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

‡ Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

Source: Nicor Gas tracking data and Guidehouse team analysis.

Table 4-2 provides additional details of the measure savings based on kit type.

**Table 4-2. 2019 Annual Energy Savings Measure Detail**

Research Category	Quantity Distributed	Ex Ante Gross Savings (Therms)*	Verified Gross RR†	Verified Gross Savings (Therms)	NTG‡	Verified Net Savings (Therms)
Bath Aerators SF	25,885	15,114	100%	15,114	1.00	15,114
Bath Aerators MF	3,923	4,127	100%	4,127	1.00	4,127
Kitchen Aerators SF	13,033	68,308	100%	68,308	1.00	68,308
Kitchen Aerators MF	1,975	9,903	100%	9,903	1.00	9,903
Showerhead x1 SF	630	4,066	100%	4,066	1.00	4,066
Showerhead x1 MF	110	933	100%	933	1.00	933
Showerhead x2 SF	24,806	173,026	100%	173,026	1.00	173,026
Showerhead x2 MF	3,730	34,197	100%	34,197	1.00	34,197
Shower Timer SF	13,033	48,317	100%	48,317	0.84	40,586
Shower Timer MF	1,975	6,989	100%	6,989	0.84	5,871
Gaskets	309,492	101,359	100%	101,241	0.84	85,042
Foam Tape	438,447	185,437	100%	185,537	0.84	155,851
V-Seal	438,447	185,437	100%	185,537	0.84	155,851
Door Sweep	25,791	163,515	100%	163,493	0.84	137,335
Rope Caulk	773,730	279,574	100%	279,490	0.84	234,771
Total	2,075,007	1,280,303	100%	1,280,279	NA	1,124,982

NA = Not applicable

* Ex ante savings are claimed at the kit level, so measure level savings do not sum exactly to the program total due to rounding.

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

‡ Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source:

Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.xlsx, which is to be found on the Illinois SAG web site: <http://ilsag.info/net-to-gross-framework.html>.

Source: Nicor Gas tracking data and Guidehouse team analysis.



5. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

The Guidehouse team determined verified gross savings for each measure by conducting a tracking system review. The Guidehouse team used the Illinois TRM v7.0 methodology to calculate verified gross savings. The evaluation team’s verified gross savings calculation uses non-rounded input values for per-kit unit therm savings. In contrast, Nicor Gas rounds ex ante per-kit gross savings to two digits after the decimal point. These rounding differences cause minor differences in total therms for the program (less than 0.1%) and are not an error by Nicor Gas.

5.1 Impact Parameter Estimates

Table 5-1 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. The evaluation team determined that all ex ante savings estimates used by Nicor Gas were consistent with the methodology outlined in the Illinois TRM v7.0. Measures for Kits 1 – 3 have different unit savings according to SF/MF building type.

Table 5-1. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)
Bath Aerators SF	Each	0.58	0.58	100%	Illinois TRM, v7.0†, Section 5.4.4 and Nicor Gas Program Tracking Data (PTD*)
Bath Aerators MF	Each	1.05	1.05	100%	Illinois TRM, v7.0, Section 5.4.4 and PTD
Kitchen Aerators SF	Each	5.24	5.24	100%	Illinois TRM, v7.0, Section 5.4.4 and PTD
Kitchen Aerators MF	Each	5.01	5.01	100%	Illinois TRM, v7.0, Section 5.4.4 and PTD
Showerhead x1 SF	Each	6.45	6.45	100%	Illinois TRM, v7.0, Section 5.4.5 and PTD
Showerhead x1 MF	Each	8.48	8.48	100%	Illinois TRM, v7.0, Section 5.4.5 and PTD
Showerhead x2 SF	Each	6.98	6.98	100%	Illinois TRM, v7.0, Section 5.4.5 and PTD
Showerhead x2 MF	Each	9.17	9.17	100%	Illinois TRM, v7.0, Section 5.4.5 and PTD
Shower Timer SF	Each	3.71	3.71	100%	Illinois TRM, v7.0, Section 5.4.9 and PTD
Shower Timer MF	Each	3.54	3.54	100%	Illinois TRM, v7.0, Section 5.4.9 and PTD
Gaskets	Each	0.33	0.33	100%	Illinois TRM, v7.0, Section 5.6.1 and PTD
Foam Tape	Feet	0.42	0.42	100%	Illinois TRM, v7.0, Section 5.6.1 and PTD
V-Seal	Feet	0.42	0.42	100%	Illinois TRM, v7.0, Section 5.6.1 and PTD
Door Sweep	Each	6.34	6.34	100%	Illinois TRM, v7.0, Section 5.6.1 and PTD
Rope Caulk	Feet	0.36	0.36	100%	Illinois TRM, v7.0, Section 5.6.1 and PTD

* Program Tracking Data (PTD) provided by Nicor Gas, extract dated January 30, 2020.

† State of Illinois Technical Reference Manual version 7.0 from <http://www.ilsag.info/technical-reference-manual.html>.

5.2 Other Findings and Recommendations

Finding 1. The evaluation team observed that savings for showerheads and faucet aerators were tracked at the Kit level with a 0.84 NTG ratio applied to gross savings. In 2019 and 2020, the NTG ratio for showerheads and aerators is 1.00. The difference in 2019 was approximately 50,000 net therms higher with the 1.00 NTG ratio applied. Since shower timers have a NTG ratio 0.84, the weighted NTG ratio for all kit measures was 0.976. The SAG NTG deeming



process for 2021 begins with evaluator recommendations for 2021 being sent on September 1, 2020. Guidehouse will consider recommending a common NTG value for all water saving kits.

Recommendation 1. The evaluation team recommends that the deemed NTG ratio of 1.00 be used for tracking 2020 net savings from showerhead and faucet aerator measures. When weighting the savings from Kit 1, Kit 2, and Kit 3, the average NTG ratio was 0.976 in 2019.

Finding 2. The evaluation team observed that savings for Kit 1 and Kit 3 were tracked with a measure life of 8.00 years and Kit 2 was tracked with a measure life of 9.00 years, for a weighted average life of 9.0 years for all three Kits. For 2019, the evaluation team calculated a weighted measure life 8.3 years for Kit 1, 8.8 years for Kit 2, and 8.2 years for Kit 3. Since Kit 2 dominates the savings, the average measure life for all three Kits was 8.8 years.

Recommendation 2. The evaluation team recommends that Nicor Gas track savings for Kit 1, Kit 2, and Kit 3 using measure life results from 2019 findings.

Finding 3. During 2019, Nicor Gas had 15,030 shipments of Kit 4 to single family or multi-family customers, totaling 25,791 kits. Based on 2019 data, 72 percent of Kit 4 participants received two Kit 4 kits or shipments. The TRM does not prohibit the number of kits, or the individual measures, which can be distributed to customers. However, distributing more than one kit may have an impact on the rate at which customers install all of the kit measures.

Recommendation 3. The evaluation team recommends that installation rate research be conducted with Kit 4 participants to validate that the in-service rates (ISRs) for weatherization measures in the TRM are appropriate for customers who receive two kits. Evaluation acknowledges that ISR research is planned for 2020/2021 program implementation and evaluation period.

Finding 4. The evaluation team observed that five different Vendor IDs appeared once in the participation file but showed a quantity of two "Kit 2" measures in the Nicor Gas tracking data. The ex ante energy savings reported by Nicor Gas shows savings for one kit. Nicor Gas tracks these participants as such to account for customers who order kits, but claim to not receive them. Guidehouse counted verified savings for a quantity of one kit for these projects.

Finding 5. The evaluation team observed that five different Vendor IDs appeared once in the participation file but showed a quantity of two "Kit 2" measures in the Nicor Gas tracking data. The ex ante energy savings reported by Nicor Gas shows savings for one kit. Nicor Gas tracks these participants as such to account for customers who order kits, but claim to not receive them. Guidehouse counted verified savings for a quantity of one kit for these projects.



6. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

Guidehouse determined verified gross savings for each program measure by conducting a tracking system review. Guidehouse checked that measure inputs matched deemed IL TRM (v7.0) inputs and validated custom inputs or adjusted as necessary. To be eligible, an IL TRM measure must meet the physical, operational, and baseline characteristics as defined in the applicable version of the IL TRM.¹ Verified gross realization rates are calculated by dividing the verified gross savings by the ex ante gross savings.

7. APPENDIX 2. NET-TO-GROSS

Nicor Gas in the course of the 2019 evaluation asked about deeming NTG at the kit level, which is how they track the savings. Since the SAG NTG process for 2019 and 2020 set consensus final NTG values at the measure level, the evaluation team could not change that approach. However, using 2019 kit data, and the 2020 approved NTG values, Guidehouse calculated an estimate for kit-level NTG values the program could use in the tracking data for 2020. The table below includes the estimated kit NTG values based solely on 2019 data.

Table 7-1. 2019 Gross Savings and Net-to-Gross Parameters for Kits

Kit Type	Gross Savings Per Kit	Net Savings Per Kit	Average NTG Per Kit
Kit 1	16.57	15.98	0.964
Kit 1 MF	19.14	18.57	0.970
Kit 2	24.07	23.47	0.975
Kit 2 MF	28.99	8.43	0.980
Kit 3	15.99	15.39	0.963
Kit 3 MF	18.09	17.52	0.969
Kit 4	35.49	29.81	0.840
Kit 4 MF	35.49	29.81	0.840

Source: Nicor Gas tracking data and Guidehouse team analysis.

¹ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 7.0 from <http://www.ilsag.info/technical-reference-manual.html>



8. APPENDIX 3. PROGRAM-SPECIFIC INPUTS FOR THE ILLINOIS TRC

Table 8-1 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of drafting 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.

Table 8-1. Total Resource Cost Savings Summary

Program Path	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (Therms)*	Verified Gross Savings (Therms)	Verified Net Savings (Therms)
Prescriptive	Bath Aerator	Each	29,808	10	19,242	19,242	19,242
Prescriptive	Kitchen Aerator	Each	15,008	10	78,211	78,211	78,211
Prescriptive	Showerhead	Each	29,276	10	212,222	212,222	212,222
Prescriptive	Shower Timer	Each	15,008	2	55,306	55,306	46,457
Prescriptive	Gaskets	Each	309,492	20	101,359	101,241	85,042
Prescriptive	Foam Tape	Feet	438,447	20	185,437	185,537	155,851
Prescriptive	V-Seal	Feet	438,447	20	185,437	185,537	155,851
Prescriptive	Door Sweep	Each	25,791	20	163,515	163,493	137,335
Prescriptive	Rope Caulk	Feet	773,730	20	279,574	279,490	234,771
Total			2,075,007	17	1,280,303	1,280,279	1,124,982

* Note ex ante gross therms calculated at the measure level do not sum exactly as the ex ante kit level gross therms reported in the tracking data and in Table 3-1 (37 therms lower) due to rounding differences.

Source: Nicor Gas tracking data and Guidehouse team analysis.