



**To:** Nicor Gas

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**Date:** October 6, 2021

**Re:** Nicor Gas Energy Saving Kits Program 2020 NTG Research Results

## Executive Summary

The Nicor Gas Energy Saving Kits (ESK) Program net-to-gross (NTG) research asked both free ridership (FR) and spillover (SO) questions in two surveys: the free ridership survey was offered to recent participants from PY2020 and PY2021, and the spillover survey was offered to participants from PY2019 and PY2020, allowing time for spillover to develop. The FR survey was sent to and focused on participants who received the weatherization kits<sup>1</sup>, while the SO was sent to participants who received any of the kit content types. Guidehouse crafted the participant survey questions following the free ridership protocol algorithm recently developed from the Illinois Technical Reference Manual version 9.0 (TRM v9.0)<sup>2</sup> by the Illinois Stakeholder Advisory Group (SAG) NTG Working Group. The surveys were fielded by Guidehouse.

These results will inform Guidehouse’s September 2021 recommendations to SAG about NTG values to be used for this program in 2022.

Table 1 summarizes the Energy Saving Kits Program FR and SO 2020 research findings.

**Table 1. Net-to-Gross Research Results for 2020 ESK Program**

Population	Free Ridership	Sample Relative Precision @90% CI*	Participant Spillover
PY2020 and PY2021 Participant, Weatherization Kits	0.19	2%	NA
PY2019 and PY2020 Participants, All Kit Types	NA	NA	0.10

\* Both free ridership and spillover samples were a census attempt.  
Source: Guidehouse

<sup>1</sup> The ESK program also offers kits with water saving measures, but since the Illinois TRM deems a free ridership of value zero for showerheads and faucet aerators, we did not include those participants in the FR survey.

<sup>2</sup> State of Illinois Technical Reference Manual version 9.0 from <http://www.ilsag.info/technical-reference-manual.html>.

## Program Description

The Nicor Gas ESK Program provides hot water saving and weatherization efficiency measures that reduce customer natural gas consumption. The offering targets customers through direct email, outreach events, targeted emails, and Nicor Gas Energy Efficiency Program website promotions. 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 kit versions containing water saving measure combinations (abbreviated Kit 1, Kit 2, and Kit 3). The free ridership for faucet aerators and showerheads is deemed at zero by TRM v9.0, and water saving kits are not affected by this FR research.

A fourth kit combination (Kit 4) was introduced in 2019 and includes weatherization measures for gas space heating reduction. Customers may request one of either Kit 1, Kit 2, or Kit 3 and up to two of Kit 4. The weatherization measures in Kit 4 are:

- 12 outlet and switch gasket covers
- 17 feet of foam tape weatherstripping
- 17 feet of v-seal weatherstripping
- One 30-foot roll of rope caulk
- One self-adhesive door sweep

Recipients of all kit types were included in the SO survey, and the researched SO values will be applied to all four kits.

## Free Ridership and Spillover Sample and Survey Disposition

The participant surveys were fielded online by Guidehouse during the second and third quarters of 2021. The free ridership sample was developed from the population of recent ESK participant contacts across PY2020 and PY2021 who ordered weatherization kits between August 1, 2020 and February 28, 2021. Out of 6,000 unique participant contacts, we attempted contact with all. Of the 746 participants who took the survey, 504 recalled receiving the kit and reported that they installed the measures<sup>3</sup>. We eliminated 69 surveys because they did not answer the verbatim questions<sup>4</sup> and 82 surveys because the verbatim responses were inconsistent with responses to the counterfactual scenario or timing questions. Our FR result is based on 353 complete surveys<sup>5</sup>. See Appendix B for additional information on sample selection.

Free ridership survey respondents were asked to focus on one of the five measures delivered in the kit to avoid survey fatigue. Responses focused on outlet and switch gasket covers (25%), foam tape weatherstripping (20%), v-seal weatherstripping (20%), rope caulk (15%), and door sweep (20%).

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<sup>3</sup> Includes those who reported the measures were installed and are still installed, and those who reported the measures were installed but later removed.

<sup>4</sup> The verbatim consistency check question asked, "Please describe in your own words if you would have purchased and installed [measure type] if the free weatherization kit was not given to you?" We removed from the sample we analyzed all responses that did not answer the question; this includes null answers, nonsensical answers (i.e., "I," "Vyvyvy," "Dnshehdhs"), and unresponsive answers (i.e., "Cost," "Prevented draft, room warmer," "this is a ridiculous question").

<sup>5</sup> That is: 504 – 69 – 82 = 353 surveys

The spillover sample was developed from the population of ESK participant contacts across PY2019 and PY2020 who ordered any type of kit between September 1, 2019 and March 31, 2020. We attempted contact with all 29,311 unique participant contacts and completed 1,610 surveys representing 5% of the sample. Table 2 presents dispositions for each survey.

**Table 2. Free Ridership and Spillover Survey Dispositions**

Category	Sampling Frame	Sample	Actual Completes	Response Rate
Participants, Free Ridership	6,000	Census	746	12%
Participants, Spillover	29,311	Census	1,610	5%

*Source: Guidehouse 2021 NTG Research*

## Free Ridership and Spillover Protocols

The evaluation team applied the relevant FR protocol participant algorithm recently developed from the Illinois TRM by the Illinois SAG NTG Working Group and SO protocols from TRM v9.0.

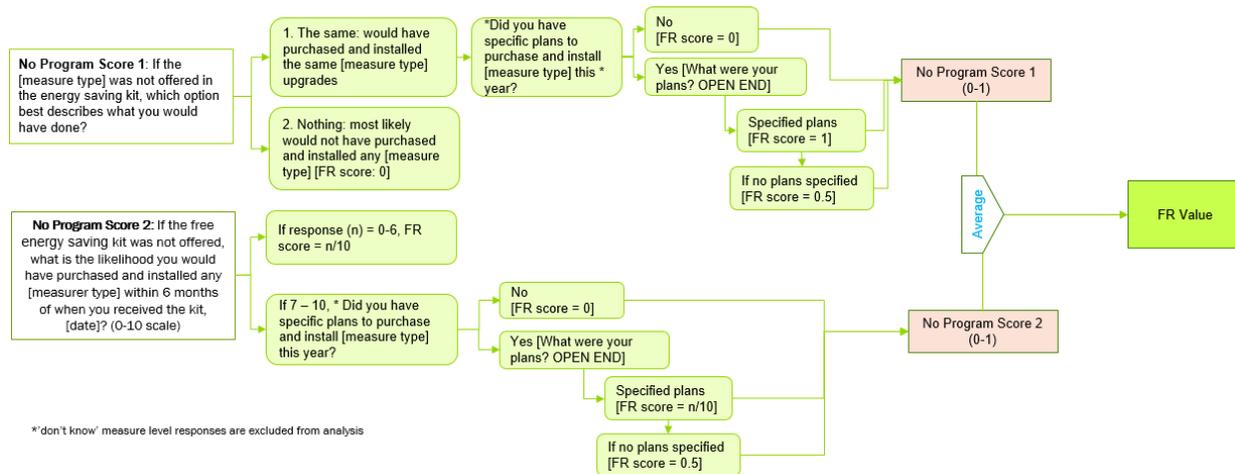
## Participant Free Ridership Estimation

Figure 1 describes the Illinois SAG NTG Working Group algorithm that Guidehouse used to calculate the FR for the Energy Saving Kit Program. The questions and analysis are based on the TRM v9.0 Study-Based Free Ridership algorithm, with updates based on the Illinois SAG NTG Working Group consensus in 2020<sup>6</sup>.

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<sup>6</sup> Guidehouse used the Working Group version based on our evaluation comparing algorithm results to verbatim responses. While the Working Group version was tested in 2021 on PY2020 Commercial & Industrial offerings, the results observed were clearly closer to the verbatim responses. The WG version was so beneficial that it would have been wrong to not apply them to the Residential sector as well. A comparison of the results is detailed in Appendix D.

**Figure 1. Energy Savings Kit Free Ridership Overview**



Source: Guidehouse adjustment of TRM v9.0 Study-Based Free Ridership Score Overview, with updates based on Illinois SAG NTG Working Group consensus in 2020.

The resulting No Program Score 1 and No Program Score 2 are offered in Table 3.

**Table 3 Weatherization Kit No Program Scores**

Population	No Program Score 1	No Program Score 2	Free Ridership
PY2020 and PY2021 Participant, Weatherization Kits	0.11	0.26	0.19

Source: Guidehouse 2021 NTG Research

Table 4 Weatherization Kit Free Ridership by Measure offers the free ridership by measure for the Weatherization Kits.

**Table 4 Weatherization Kit Free Ridership by Measure**

Weatherization Kit Measure	Sample Relative Precision @90% CI*	Free Ridership
Outlet & Switch Gasket Covers	2%	0.16
Rope Caulk	3%	0.17
V-Seal Weatherstripping	2%	0.19
Foam Tape Weatherstripping	2%	0.22
Door Sweep	2%	0.22

Source: Guidehouse 2021 NTG Research

Guidehouse evaluated the survey results for methods to reduce free ridership, with recommendations in Appendix C.

## Participant Spillover Estimation

Guidehouse calculated spillover based on TRM v9.0 Section 4.1.2, “[Residential] Participant Spillover,” summarized in Figure 2.

**Figure 2. TRM v9.0 Section 4.1.2 “Participant Spillover ”**



Source: Guidehouse Representation of TRM v9.0.

The online participant spillover survey asked respondents if they had installed any additional natural gas savings measures since participating in the ESK Program. Guidehouse included eight questions<sup>7</sup> to identify spillover candidates. These questions addressed three general aspects, paraphrased below:

Did you do any other energy efficiency improvements to your home that were not rebated by a utility since you received the energy saving kit?

1. How much influence did your participation in the program have on your making additional energy efficiency improvements?
  - a. How important was your experience with Nicor Gas' free energy-saving kits on making additional energy efficiency improvements on your own? Please rate on a scale of 0 to 10, where 0 is not at all important and 10 is extremely important? (Attribution Score 1)
  - b. If you had not received the energy-saving kit(s) or received information from Nicor Gas, how likely is it that you would have made this (these) additional energy-efficient improvement(s)? Please rate on a scale of 0 to 10 where 0 means you definitely would not have made the improvement and 10 means you definitely would have made the improvement even if you had not signed up for the energy-saving kit/s? (Attribution Score 2)
2. What were details of the energy efficiency improvements (equipment, efficiency level, quantity, etc.)?

The evaluation attributed spillover to the Kits Program if the following condition was met: the average of (Attribution Score 1) and (10 minus Attribution Score 2) exceeded 5.0.<sup>8</sup>

<sup>7</sup> Respondents do not answer all eight questions; follow-up questions are skipped depending on earlier responses.

<sup>8</sup> The spillover methodology is guided by NTG protocols in the Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 9.0, Volume 4: Cross-Cutting Measures and Attachments.

Of the 1,610 survey respondents, 526 reported that the Kit influenced them to make other energy efficient changes in their home. Of these, 195 passed all spillover screening criteria to qualify for spillover with one or more measures. The spillover spanned three end-use categories and multiple measures, as shown in Table 5.

**Table 5 Count of Reported Spillover Measures**

Category	Measure	Measure Count	Spillover Therms	Spillover Percent
Furnace Equipment and Operation				
	Thermostat, purchase/ install new programmable or smart thermostat	56	2,011	21%
	Operational, adjust thermostat schedule, settings, or furnace tune-ups	62	1,492	16%
	Duct sealing, sealing gaps and cracks	26	1,208	13%
	High Efficiency Furnace	16	931	10%
	Duct insulation	9	418	4%
	High Efficiency Boiler	4	304	3%
Weatherization				
	Insulation	38	941	10%
	Air Sealing	29	514	5%
	Additional Weatherstripping	70	161	2%
Water Heating Equipment				
	Additional Faucet Aerators	48	653	7%
	Additional High-Efficiency Shower Heads	38	384	4%
	High Efficiency or Tankless Water heater	12	242	3%
	Water Heater Pipe Insulation	52	108	1%
	Water Heater Temperature Setback	61	99	1%
Total*		521	9,467	100%

\*Rows may not sum to total due to rounding.

Source: Guidehouse 2021 NTG Research

Guidehouse engineers quantified 9,467 gross therm savings using TRM v 9.0 from the measures listed above in Table 5. The 1,610 responding participants saved 95,548 gross program therms, resulting in a participant spillover rate of 10%.

## Final NTG Results and Recommendations

Table 6 summarizes Guidehouse’s recommendations for the Nicor Gas Energy Saving Kits Program to be used in 2022 based on our NTG research results with 2019-2021 participants.

**Table 6. Summary of Free Ridership, Spillover, and NTG Research Results for the Energy Saving Kits Program**

Program Path	FR	PSO	NTG
Hot Water Saving Kits 1, 2, 3	0.00	0.10	1.10
Weatherization Kit 4	0.19	0.10	0.91

FR = Free Ridership; PSO = Participant Spillover.  $NTG = (1 - FR) + PSO$

Source: Guidehouse

Using the TRM v9, the participant free ridership for Weatherization ESK would have been 0.28.

## Appendix A. Energy Saving Kit NTG History for Nicor Gas

Energy Saving Kits	
GPY1	<b>NA</b> <b>Launched in GPY3</b>
GPY2	<b>NA</b> <b>Launched in GPY3</b>
GPY3	<b>NTG 0.84</b> <b>Free ridership 16%</b> <b>Spillover 0%</b> <b>Method:</b> GPY3 program participant self-report data, drawn from analysis of 75 interviews.
GPY4	<b>NTG 0.84</b> <b>Free ridership 16%</b> <b>Spillover 0%</b> <b>Method:</b> NTG values for GPY4 were deemed and reported in Table 14 of the Nicor Gas filed Energy Efficiency Plan for GPY4-GPY6.
GPY5	<b>NTG 0.84</b> <b>Free ridership 16%</b> <b>Spillover 0%</b> <b>Method:</b> GPY3 program participant self-report data, drawn from analysis of 75 interviews.
GPY6	<b>NTG 0.84</b> <b>Free ridership 16%</b> <b>Spillover 0%</b> <b>Method:</b> No change to values from GPY5.
2018 (GPY7)	<b>All Measures Except Faucet Aerators:</b> <b>NTG: 0.84 ; Free Ridership: 0.16 ; Participant Spillover: 0.00</b> <b>Faucet Aerators:</b> <b>NTG: 1.00 ; Free Ridership: 0.00 ; Participant Spillover: 0.00</b> <b>Method:</b> For measures except faucet aerators: No new research; Retained GPY6 final value. For faucet aerators: TRM version 6.0 specifies that the free ridership for faucet aerators be set at zero when estimating gross savings using the TRM specified baseline average water flow rate.
2019	<b>All Measures Except Faucet Aerators and Showerheads:</b> <b>NTG: 0.84 ; Free Ridership: 0.16 ; Participant Spillover: 0.00</b> <b>Faucet Aerators and Showerheads:</b> <b>NTG: 1.00 ; Free Ridership: 0.00 ; Participant Spillover: 0.00</b> <b>Method:</b> For measures except faucet aerators and showerheads: No new research; Retained GPY7 final value. For faucet aerators and showerheads: TRM version 7.0 specifies that the free ridership for faucet aerators and showerheads be set at zero when estimating gross savings using the TRM specified baseline average water flow rate.
2020	<b>All Measures Except Faucet Aerators and Showerheads:</b> <b>NTG: 0.84 ; Free Ridership: 0.16 ; Participant Spillover: 0.00</b> <b>Faucet Aerators and Showerheads:</b> <b>NTG: 1.00 ; Free Ridership: 0.00 ; Participant Spillover: 0.00</b> <b>Method:</b> No new research.

### Energy Saving Kits

For all measures except faucet aerators and showerheads: No new research; Retained 2019 final value. NTG applies to weatherization measures distributed through this delivery method.

For faucet aerators and showerheads: TRM version 8.0 specifies that the free ridership for faucet aerators and showerheads be set at zero when estimating gross savings using the Residential Section of the TRM specified baseline average water flow rate.

2021

**Weatherization Measures :**

**NTG: 0.84 ; Free Ridership: 0.16 ; Participant Spillover: 0.00**

**Water Saving Measures:**

**NTG: 1.00 ; Free Ridership: 0.00 ; Participant Spillover: 0.00**

**Method:** No new research.

Weatherization Measures: NTG of 0.84 applies to weatherization measures distributed through this delivery method.

For Water Saving Measures: The IL TRM specifies that the free ridership for showerheads and aerators be set at zero when estimating gross savings using a baseline average flow rate that includes the effect of existing low flow fixtures. Consistent with EEE, Guidehouse recommends that shower timers (which account for a very small portion of the program) also be assigned a NTG of 1.00.

Source: Guidehouse

## Appendix B. Sample Selection for Analysis

Guidehouse analysis shows in Table 7 that the FR would not be affected by the removal of either the unresponsive or inconsistent responses from the data set of otherwise responsive survey data. The resulting FR is 0.19 simplified regardless.

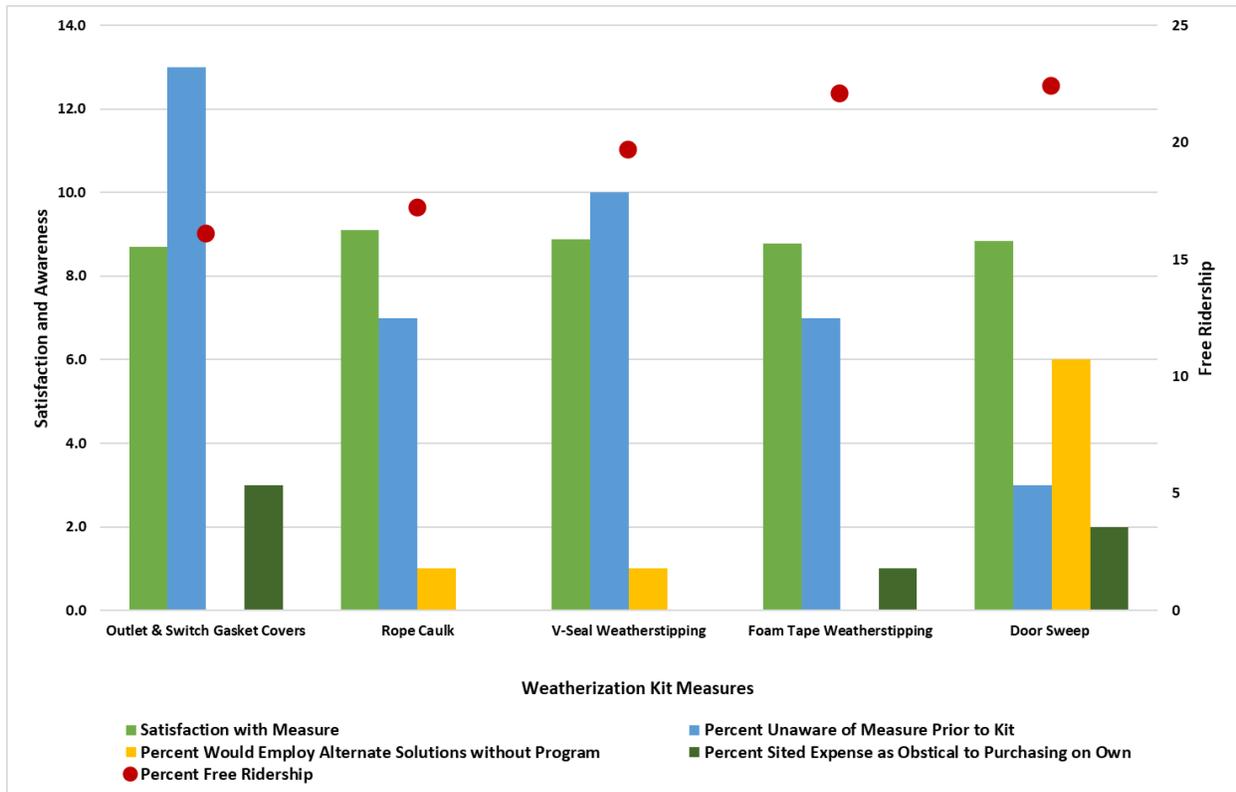
**Table 7. Summary of Free Ridership Results for Removed Responses**

Category of Response Removed from Analysis	Count	Remaining Sample	Resulting FR without Category
Unresponsive	69	435	0.187
Inconsistent	82	422	0.194
Both Unresponsive and Inconsistent	151	353	0.186

## Appendix C. Methods to Reduce Free Ridership

Guidehouse evaluated each measure for satisfaction and information respondents volunteered to the free ridership counterfactual questions detailing their actions in the absence of the program. Unawareness of the measure, measure expense, and alternative solutions were the most common reasons offered for not purchasing the measure on their own. Alternative solutions included filling gaps with newspaper and placing rolled towels under doors. The results of this analysis are shown in .

**Figure 3. Participant Reaction by Measure**



Source: Guidehouse 2021 NTG Research

This Guidehouse analysis suggests that free ridership may be reduced by offering energy efficient measures that participants are not familiar with.

## Appendix D. Comparison of TRM Free Ridership Algorithm to Working Group Algorithm

To calculate free ridership, we used the questions and approach from the TRM (Energy Saving Kits and Elementary Education Protocol in Section 4.7) and from the Working Group that are applicable to a residential kit program. We expected the Working Group approach to yield free ridership results closer to the free ridership reported in response to the open-ended question, “Please describe in your own words if you would have purchased and installed [measure type] if the free weatherization kit was not given to you?”.

To test this, two evaluators independently analyzed a random sample of 70 responses. This involved, per respondent, determining which free ridership result is closer to the free ridership

reported in the verbatim response. As shown in Table 8, for 74% of the responses, the Working Group free ridership is the better match to the verbatim (than the TRM result is).

**Table 8. Comparison to Verbatim Results**

Algorithm	Count	%
Working Group Matches Verbatim	52	74%
TRM Matches Verbatim	4	6%
Inconclusive (ambiguous or no verbatim)	14	20%

*Source: Guidehouse 2021 NTG Research*