Guidehouse

Memorandum

To: **Randy Opdyke, Bruce Liu, Nicor Gas**

CC: **Jennifer Morris, David Brightwell, ICC Staff; Randy Gunn, Kevin Grabner, Laura Agapay-Read, Guidehouse**

From: **Michael Freed, Cherlyn Seruto, Christy Zook, Guidehouse**

Date: **September 2, 2020**

Re: **Net-to-Gross Research Results from CY2018 and CY2019 for the Nicor Gas Home Energy Efficiency Rebates Program**

EXECUTIVE SUMMARY

This memo presents our CY2019 free ridership and spillover research results for the Nicor Gas Home Energy Efficiency Rebates (HEER) Program using the Illinois TRM version 8.0 methodologies.[1] Our net-to-gross (NTG) and process research included three surveys: two for participating customers and one for trade allies (TAs) who participated in CY2018 or CY2019. This research was conducted with participants and trade allies who installed high efficiency furnaces.

The evaluation team fielded the NTG surveys in Q2 2020. We conducted telephone surveys with 100 participants who participated in the program between October 2018 and May 2019 to assess spillover and conducted telephone or online surveys with 511 participants who participated in the program between June 2019 and December 2019 to assess free ridership. The team also conducted telephone surveys with 95 trade allies who are active in the program to assess spillover and their perspective of participant free ridership.

These results will inform Guidehouse's September 2020 recommendations to the Illinois Energy Efficiency Stakeholder Advisory Group (SAG) of NTG values to be used for this program in 2021 (as detailed at the end of this memo in Table 7 and Table 8).

Table 1 below provides a summary of the HEER Program free ridership and spillover CY2019 research findings.

[1] Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 8.0, Volume 4: Cross-Cutting Measures and Attachments.

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Table 1. Net-to-Gross Research Results for HEER Furnace Measures (CY2018 and CY2019)

Measure	Free Ridership	Relative Precision @ 90% CI	Participant Spillover*	Active Trade Ally Spillover*
Participants				
Furnace, ≥95% AFUE	0.35	3.4%	0.00	--
Furnace, ≥97% AFUE	0.31	8.8%		--
Trade Allies	0.24	4.5%	--	0.02

* Spillover occurs at the program level.
Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2018 and CY2019 Nicor Gas Home Energy Efficiency Rebates program participants and trade allies.

FREE RIDERSHIP AND SPILLOVER SURVEY DISPOSITION

The evaluation team conducted participant free ridership research using a customer self-report approach through a computer-assisted telephone interviewing (CATI) mode and an online mode. Online survey respondents accessed the survey either through a link that appeared after they submitted their rebate application on apply.nicorgasrebates.com or through a link in an email invitation from Guidehouse. The evaluation team fielded the free ridership surveys in Q2 of 2020. From the 4,494 Nicor Gas CY2019 participants, 511 participants responded (an 11% response rate). Table 2 below details whether the evaluation team used a sample or census to contact participants for the free ridership research.

The evaluation team also completed a CATI spillover survey with 100 participants from a random sample of 2,500 CY2018 and CY2019 participants (from a population size of 6,502 participants). The counts for the completed participant surveys and sample design are outlined in Table 3.

After screening the participant responses, Guidehouse excluded 135 free ridership surveys from analysis because of insufficient data. We estimated free ridership from 376 responses. A detailed discussion of Guidehouse's analysis of free ridership responses that triggered consistency checks and of survey sample disposition is provided in the Appendix of this memo. All 100 completed spillover surveys were included in the spillover analysis.

The evaluation team fielded the trade ally survey via telephone in Q2 of 2020 with a census of 616 trade allies active in CY2019. Ninety-five trade allies completed the survey (a 15% response rate), and savings from these 95 trade allies represent 29% of CY2019 program savings.

Table 3 below presents the participant free ridership and spillover survey dispositions, and Table 4 presents the active trade ally free ridership and spillover survey dispositions.

Table 2. Number of Usable Participant Free Ridership Contacts

Furnace	Survey Mode	Census	Sample	Usable Contacts	Total Population
Furnace, ≥95% AFUE	Online	X		3,103	6,002
	Telephone		X	1,000	
Furnace, ≥97% AFUE	Online	X		268	536
	Telephone	X		123	

Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2019 Nicor Gas Home Energy Efficiency Rebate program participants.

Table 3. Participant Free Ridership and Spillover Research Survey Disposition

NTG Component	Measure	Number of Usable Contacts*	Target Completes	Number of Completes†	Excluded from the Analysis	Analyzed Completes‡
Participant Free Ridership						
	Furnace, ≥95% AFUE	4,103	70	451	120	331
	Furnace, ≥97% AFUE	391	70	60	15	45
	Overall Population	**4,494**	**140**	**511**	**135**	**376**
Participant Spillover		**2,500**	**100**	**100**		**100**

*Usable Contacts provides the number of participants with viable telephone numbers or email addresses that were included in the free ridership samples.
† Number of Completes for the 95% or greater AFUE furnace exceeds the number of target completes because, after the online survey reached the quota for this measure (within two days), Nicor Gas requested we keep the 95% AFUE furnace survey in the field until we exhausted the sample or reached the target number of completes for the 97% AFUE furnace.
‡Analyzed Completes provides the response count used to develop the free ridership and spillover estimates. Analyzed Completes excludes responses that lacked required data (discussed in the Appendix below),
Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2018 and CY2019 Nicor HEER program participants.
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Table 4. Active Trade Ally Free Ridership and Spillover Research Survey Disposition

NTG Component	Number of Usable Contacts	Target Completes	Number of Completes	Excluded from the Analysis	Analyzed Completes†
Trade Ally Free Ridership and Spillover	616	115	95	13	82

† Analyzed Completes provides the count used to develop the free ridership and spillover estimates. Analyzed Completes excludes responses that failed consistency checks or lacked required data (discussed in the Trade Ally Results below).
Source: Guidehouse analysis of data from CATI surveys conducted with CY2019 Nicor Gas Home Energy Efficiency Rebate program trade allies.

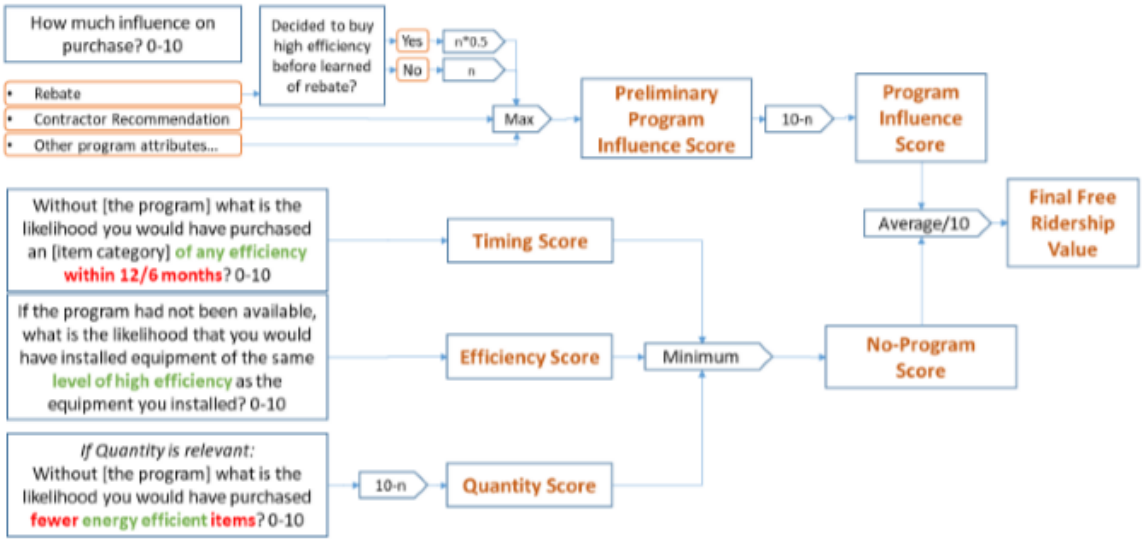
FREE RIDERSHIP AND SPILLOVER PROTOCOLS

The evaluation team applied the relevant free ridership and spillover guidance from the Illinois Technical Reference Manual Version 8.0 (TRM) as follows:

- Participant perspective rebate (with no audit): Section 4.4.1 Basic Method
- Trade ally perspective: Section 5 Cross-Sector Protocols

The following diagram describes the IL TRM v8.0 free ridership algorithm for residential prescriptive rebate with no audit programs (protocol 4.4) that Guidehouse used to calculate the free ridership for the HEER Program.

Figure 1. Residential Prescriptive Rebate (With No Audit) Free Ridership

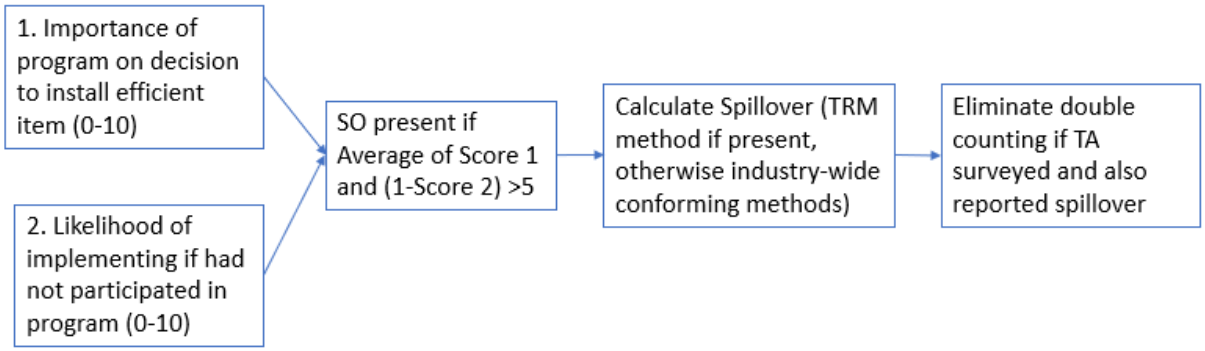


Source: Illinois TRM Version 8*, Volume 4. Cross-Cutting Measures and Attachments, final* October 17, 2019*, effective January 1st, 2020.*

Participant Spillover Estimation

Participant spillover is documented by the following process (Figure 2):

Figure 2. Participant Spillover Protocol



Source: Guidehouse Illustration of Illinois TRM Version 8.0

The participant spillover telephone survey asked respondents if they had installed any additional natural gas saving measures since participating in the Home Energy Efficiency Rebate Program. Guidehouse included eight questions[2] to identify spillover candidates, followed by additional modules to estimate savings from qualifying upgrades[3]. These questions addressed three general aspects, paraphrased below:

1. Since participating in the program, did you make additional energy efficiency improvements that were not rebated by a utility program?
2. How much influence did your participation in the program have on your making additional energy efficiency improvements?
    a. On a zero to ten scale, where zero is not at all important and ten is extremely important, how important was your participation in the Home Energy Efficiency Rebate program on your decision to make additional energy efficiency improvements outside of a utility program? [Attribution Score 1.]
    b. If you had not participated in the Home Energy Efficiency Rebate program, how likely is that you would have made additional energy efficiency improvements? Please use a zero to ten scale, where zero means that you definitely would not have made additional energy efficiency improvements and ten means that you definitely would have made them? [Attribution Score 2.]
3. What were details of the energy efficiency improvements (equipment, efficiency level, quantity, etc.)?

The evaluation attributed spillover to the Home Energy Efficiency Rebate Program if the following condition is met: the average of Attribution Score 1 and (10 minus Attribution Score 2) must exceed 5.0.[4]

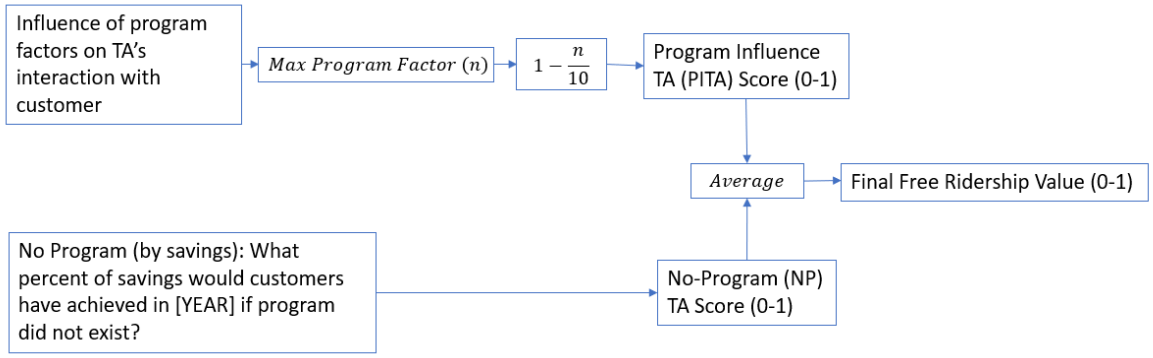
[2] Respondents do not answer all 8 questions – follow-up questions are skipped depending on earlier responses.
[3] The four modules are Water Heating, HVAC, Weatherization, and Other.
[4] The spillover methodology is guided by NTG protocols in the Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 8.0, Volume 4: Cross-Cutting Measures and Attachments.

Trade Ally Free Ridership Estimation

Version 8.0 of the TRM does not specify an approach for measuring the trade ally perspective of participant free ridership, though Guidehouse proposes that an approach be developed for future versions of the TRM. For this study, Guidehouse developed the following method to assess participant free ridership from a trade ally perspective. We designed the method to align with the approach of the TRM's participant free ridership algorithms, it and includes the following trade ally perspectives, as diagrammed in Figure 3:

- An estimate of the program's influence on the Trade Ally (the PITA score)
  - Influence of program factors on TA's interaction with customer
- A No-Program (NP) score: Trade Allies estimate the percent of savings their customers would have achieved if the program did not exist.

Figure 3. Trade Ally Free Ridership Protocol

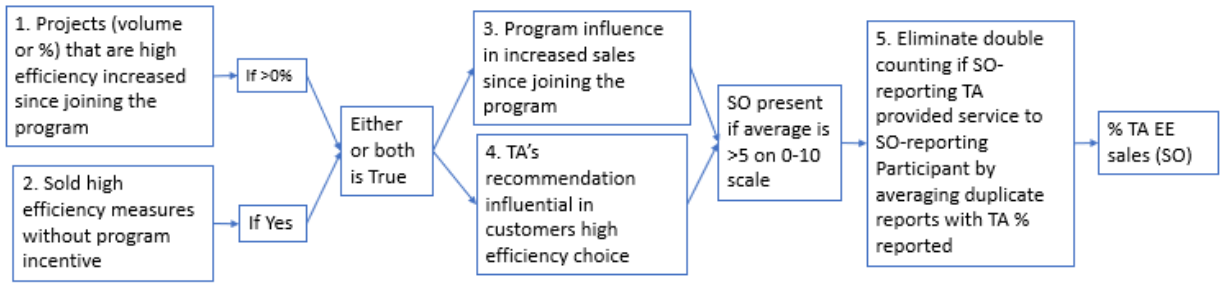


Source: Guidehouse 2020 (image and content)

Active Trade Ally Spillover Estimation

Guidehouse estimated spillover that occurs among active trade allies according to the TRM v8.0. We assessed active trade ally spillover by estimating the increase of sales of high efficiency products or services that are not rebated, as shown below in Figure 4.

Figure 4. Trade Ally Spillover Protocol



Source: Guidehouse illustration of Illinois TRM Version 8.0

The process to calculate trade ally spillover contains multiple steps (as defined in the TRM):

1) Calculate the percent of an individual trade ally's high efficiency equipment sales that received an incentive

$$= \frac{\%\ of\ Total\ Sales\ that\ are\ HE,\ \ received\ incentive}{(\%\ of\ Total\ Sales\ that\ are\ HE, received\ incentive + HE\ \%\ that\ did\ NOT\ receive\ incentive)}$$

2) Calculate the energy savings of the high efficiency equipment sales that did not receive an incentive

$$= \frac{\sum TA\ savings\ from\ Program\ Database}{1)\ \%\ of\ TA's\ HE\ Sales\ that\ received\ an\ incentive} - \sum TA\ savings\ from\ Program\ Database * Size\ Adjustment$$

3) Develop the spillover ratio for sampled trade allies by summing individual trade ally spillover savings and dividing that total by program-tracked savings achieved by the sampled trade allies
4) Develop spillover savings for the population of active trade allies by applying the spillover ratio from step 3 to all program savings associated with active trade allies
5) Develop the overall spillover ratio for active trade allies by dividing the trade ally spillover estimate from step 4 by total program savings

$$= \frac{4)\ Total\ TA\ tracked\ program\ savings * 3) \frac{2)\ \sum_1^n TA\ reported\ spillover\ savings}{\sum_1^n TA\ sample\ tracked\ program\ savings}}{5)\ Total\ Program\ Savings}$$

COMBINING PARTICIPANT AND TRADE ALLY FREE RIDERSHIP

Participant free ridership as reported by trade allies is 0.24, while the free ridership as reported by participants is 0.35 for ≥95% AFUE Furnace and 0.31 for ≥97% AFUE Furnace.

Combining Participant and Trade Ally Results. Guidehouse calculated a weighted average of the participant and trade ally free ridership utilizing the triangulation approach[5] shown in Table 5 to arrive at one recommended free ridership score for each furnace measure. Guidehouse rated the survey data on three aspects: accuracy, validity, and representativeness, using a scale of 0 to 10 where 10 means "extremely so" and 0 means "not at all".

Table 5. Free Ridership Triangulation Weighting Approach for ≥95% AFUE Furnace

Free Ridership Triangulation Data and Analysis	≥95% AFUE Furnace Participants	Trade Allies
How likely is this approach to provide an accurate estimate of free ridership?	6	7
How valid is the data collected/analysis?	5	5
How representative is the sample?	8	7
Average Score	6.3	7.0
Sum of Averages	13.3	13.3
Weight	**0.475**	**0.525**

Source: Guidehouse analysis

[5] TRM section 5.1

Guidehouse arrived at the accuracy score based on our understanding of the difference between participant and trade ally knowledge of the marketplace and the likelihood of customers choosing that level of furnace efficiency without the program: we rate the trade ally data as slightly more accurate than the participant data. We assigned identical validity scores to both populations. We based the representativeness score on the relative precisions at 90% confidence interval, sample sizes, and the fact that the participant population (homeowners) is more homogeneous than the trade ally population (which includes large multi-state businesses and individuals). These weights were subsequently applied to the researched free ridership values for the participants and trade allies, respectively, and the weighted values summed:

≥95% AFUE FURNACE

$$Free\ Ridership = (Participant\ FR) * (Participant\ Weight) + (TA\ FR) * (TA\ Weight)$$
$$= 0.35 * 0.475 + 0.24 * 0.525$$
$$= 0.29$$

For furnaces with AFUE greater than 95%, Guidehouse recommends using the weighted free ridership estimate of 0.29 achieved through this triangulation of 0.35 reported by the participants and 0.24 reported by trade allies. The triangulation weighting reflects the trade allies' greater understanding of the market.

For furnaces with AFUE greater than 97%, Guidehouse recommends using the weighted free ridership estimate of 0.27 achieved through this triangulation of 0.31 reported by the participants and 0.24 reported by trade allies. The triangulation weighting reflects the trade allies' greater understanding of the market. Table 6 shows how we rated the ≥97% AFUE furnace survey data on three aspects: accuracy, validity, and representativeness, using a scale of 0 to 10 where 10 means "extremely so" and 0 means "not at all".

Table 6. Free Ridership Triangulation Weighting Approach for ≥97% AFUE Furnace

Free Ridership Triangulation Data and Analysis	≥97% AFUE Furnace Participants	Trade Allies
How likely is this approach to provide an accurate estimate of free ridership?	6	7
How valid is the data collected/analysis?	5	5
How representative is the sample?	7	7
Average Score	6	7
Sum of Averages	13	13
Weight	**0.462**	**0.538**

Source: Guidehouse analysis

FINAL NTG RESULTS AND RECOMMENDATIONS

Table 7 summarizes Guidehouse's recommendations for the furnace measures of the HEER program to be used in CY2021 based on our NTG research results with CY2019 participants and active trade allies and on our prior research for spillover from inactive trade allies.

Table 7. Summary of Free Ridership, Spillover, and NTG Research Results for the HEER Program Furnaces

Measure	FR	PSO	ATSO	IATSO*	NTG
Furnace, ≥95% AFUE	0.29	0.00	0.02	0.11	0.84
Furnace, ≥97% AFUE	0.27				0.86

* Inactive Trade Ally Spillover from Navigant research in GPY2 for PGL & NSG.
FR = Free Ridership; PSO = Participant Spillover; ATSO = Active Trade Ally Spillover; IATSO = Inactive Trade Ally Spillover. Spillover was researched at the program level.
NTG = 1 – FR + PSO + ATSO + IATSO
Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2018 and CY2019 Nicor Gas Home Energy Efficiency Rebates Program participants and trade allies.

For HEER boilers with AFUE ≥95%, Guidehouse recommends using the same NTG values for the ≥95% AFUE Furnace in CY2021; for advanced thermostats no NTG value is needed because the impact evaluation yields a net savings value for this measure. Table 8 summarizes this below.

Table 8. Summary of Free Ridership, Spillover, and NTG Research Results for the HEER Program Advanced Thermostat and Boiler Measures

Measure	FR	PSO	ATSO	IATSO*	NTG
Advanced Thermostat†	NA	NA	NA	NA	NA
Boilers, ≥95% AFUE <300 MBH	0.29	0.00	0.02	0.11	0.84

* Inactive Trade Ally Spillover from Navigant research in GPY2 for PGL & NSG.
† The impact evaluation of advanced thermostat yields a net savings value – no NTG adjustment is needed.
FR = Free Ridership; PSO = Participant Spillover; ATSO = Active Trade Ally Spillover; IATSO = Inactive Trade Ally Spillover. Spillover was researched at the program level.
NTG = 1 – FR + PSO + ATSO + IATSO
Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2018 and CY2019 Nicor Gas Home Energy Efficiency Rebates Program participants and trade allies.

Guidehouse also analyzed whether free ridership according to survey mode (online or telephone) or rebate application mode (participant-submitted rebate application or trade ally-submitted instant discount) would be different. Guidehouse found that there was no significant difference between free ridership results by survey mode for either type of furnace. However, we did find a significant difference in free ridership results by rebate application mode for the 95% or greater AFUE furnace. Appendix B provides a discussion of these results.

Based on these results, Guidehouse recommends the following for this program:

1) Evaluators field participant free ridership surveys exclusively online (instead of by telephone) **but only if trade allies are required to collect participants' email addresses** (even if the trade ally is the one who submits the rebate application form). This way all participants can be included in online surveys which will improve precision.

2) Implementers track who submits the rebate application form in the tracking data as some respondents did not know to state whether they or their trade ally submitted the rebate application form.

APPENDIX A - DETAILED NTG RESULTS

Free Ridership Consistency Check Analysis

Participant Results

Of the 511 participants who responded to the participant free ridership survey, Guidehouse excluded responses of 74 respondents from the free ridership calculation due to non-response on required free ridership scoring data. Of the remaining 437 respondents, 138 (124 95% AFUE and 14 97% AFUE furnaces) triggered consistency checks. These respondents answered questions indicating that the program was highly influential to their decision to install a high efficiency furnace through the program and that they were highly likely to have made the same decision toward high efficiency absent the program. The analysis of inconsistent responses involved having two reviewers independently examine these respondents' numeric responses and their responses to open-ended probing questions which were triggered by their inconsistent numeric responses. When responses to the open-ended follow-up questions were not provided, the reviewers analyzed all open-ended responses for that respondent. We excluded a response from the free ridership calculation if both reviewers found that the open-ended response was inconsistent with the numeric responses. This resulted in a total of 61 (51 95% AFUE and 10 97% AFUE furnaces) exclusions due to inconclusive influence explanations.

The statistics described above are summarized in the table below, Guidehouse surveyed 511 free ridership participants of which 135 (120 95% AFUE and 15 97% AFUE furnaces) were excluded for missing or inconsistent data. Guidehouse's recommended free ridership estimates are based on the remaining 376 responses.

Table 9. Free Ridership Survey Disposition for High Efficiency Furnace Measures

Measure Response Disposition	Furnace, > 95% AFUE	Furnace, > 97% AFUE	Total
Total Number of Raw Responses	**451**	**60**	**511**
Excluded: Non-response	69	5	74
Excluded: Triggered and Failed Consistency Check	51	10	61
Total of Excluded Responses	**120**	**15**	**135**
Analyzed Sample	**331**	**45**	**376**
Included in Analyzed Sample: Triggered and Passed Consistency Check	73	4	77

Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2019 Nicor Gas Home Energy Efficiency Rebate Program participants.

Trade Ally Results

Though the TRM does not include a protocol to estimate trade ally perspective of participant free ridership, the evaluation team conducted automated consistency checks based on the ***participant*** guidance in the IL TRM (Max Program Factor and No-Program both $\geq$ 7 or both $\leq$ 3). As shown in Table 10 below, 47% of responses did not trigger a consistency check, while 53% did. For the responses that triggered a consistency check, two reviewers independently examined the respondents' numeric and verbatim responses. The reviewers analyzed all open-ended responses for respondents if their responses to the open-ended follow-up consistency check questions were not

provided. Guidehouse excluded responses from the free ridership calculation if both reviewers found that the open-ended responses were inconsistent with the numeric responses. This resulted in a total of 10 responses excluded due to inconclusive explanations.

As summarized in the tables below, Guidehouse surveyed 95 trade allies of which 10 were excluded for missing or inconsistent data. The following free ridership estimate is based on the remaining 82 responses

Table 10. Trade Ally Free Ridership Consistency Check Disposition

Category	Count	Percent
Total Number of Raw Responses	**95**	**100%**
Excluded: Non-response	**3**	**3%**
No Consistency Check Trigger	**45**	**47%**
Consistency Check Trigger	**50**	**53%**
Excluded: Triggered and Failed Consistency Check	*10*	*11%*
Final Count Included Responses	**82**	**86%**

Source: Guidehouse Analysis

Guidehouse's data review and consistency check analysis resulted in the removal of 13 responses. The final trade ally analysis includes the remaining 82 responses. The resulting savings weighted value of trade ally perspective of participant free ridership is 0.24.

Spillover Estimation

Participant Results

Of the 100 survey respondents, eleven reported that they installed additional energy efficient equipment without rebates, and four of them indicated that participating in the HEER Program influenced them to make these additional purchases. Guidehouse determined that one of those four had spillover averaged attribution scores greater than five. This participant installed a thermostat. The respondent did not clarify whether the thermostat was advanced, therefore the analysis took the average savings from a new programmable thermostat and an advanced thermostat to develop the participant's quantifiable natural gas savings,[6] shown in Table 11 below.

Table 11. Reported Energy Savings for Spillover Respondent

Measure Installed	Spillover therms	Total Spillover
Advanced Thermostat	52.62	<0.01

Source: Guidehouse analysis of data from CATI spillover telephone surveys conducted with CY2019 Home Energy Efficiency Rebate Program participants

The therm savings from this thermostat amounted to 0.2% of program savings for the 100 respondents. Because the 100 were selected as a simple random sample, their spillover savings rate (0.002) is representative of the population of CY2019 program participants.

[6] Electric-saving spillover actions are not credited to the natural gas spillover.

Active Trade Ally Results

Of the 95 responding active trade allies, 48 reported that they installed more energy efficient natural gas equipment since joining the HEER program. Of these 48, three respondents passed the screening criteria for spillover. The estimated savings from these three respondents following the IL TRM protocol results in the following TA spillover rate (Table 12).

Table 12. Active Trade Ally Spillover Research Results

Category	Spillover (therms)	Total Respondent Savings (therms)	Active Trade Ally Spillover Ratio	Respondents Contributing to Spillover
Trade Allies	20,085	790,359	0.02	3

Source: Guidehouse analysis of CY2019 TA survey data.

APPENDIX B – SURVEY AND REBATE APPLICATION MODE AND FREE RIDERSHIP

Guidehouse analyzed whether the modes (online versus telephone) in which the free ridership survey was fielded or the rebate application was submitted would correlate with different free ridership results. We found that the survey modes did not have significantly different free ridership results (for both furnace types), as shown in Table 13. However, we did find a significant difference in free ridership results by rebate application mode for the 95% or greater AFUE furnace (see Table 14). Free ridership for participants whose trade ally submitted the rebate application form is lower than that of those with self-submitted rebate application forms for the 95% or greater AFUE furnace (for which we have a significant sample size). Guidehouse also found that 22 respondents answered "Don't Know" to the question "Did you apply for the rebate or did you receive an instant rebate from the trade ally (i.e. the trade ally submitted the rebate application)?" in the free ridership survey.

Based on these results and findings, Guidehouse recommends that evaluators field free ridership surveys exclusively online, but only if trade allies are required to collect participant' email addresses even if the trade ally is the one who submits the rebate application form. This way all participants can be included in online surveys which will improve precision. We also recommend the implementer track who submits the rebate application in the tracking data.

Table 13. Free Ridership Results by Survey Mode

Furnace Type	Survey Mode	Average FR Score	Number of Respondents	Significant Difference	T-test Value
Furnace, ≥95% AFUE	Email	0.35	274	No	0.21
	Telephone	0.34	57		
Furnace, ≥97% AFUE	Email	0.33	33	No	0.65
	Telephone	0.27	12		

Source: Guidehouse analysis of CY2019 participant survey data.

Table 14. Free Ridership Results by Rebate Application Mode

Furnace Type	Rebate Application Submission Mode	Average FR Score	Number of Respondents	Statistically Significant Difference	T-test Value
Furnace, ≥95% AFUE	Self-Applied	0.37	249	Yes	2.21
	Trade Ally*	0.29	82		
Furnace, ≥97% AFUE	Self-Applied	0.30	30	No	-0.33
	Trade Ally*	0.33	15		

*22 respondents answered "Don't Know" when asked if they applied for the rebate or if they received an instant discount from the trade ally. Guidehouse lumped these responses with the trade ally responses.
Source: Guidehouse analysis of CY2019 participant survey data.

APPENDIX C - HEER NTG HISTORY

	HOME ENERGY EFFICIENCY REBATE
GPY1	**NTG** 0.69 **Free-ridership** 37% **Spillover** 6% **Method:** Evaluation research consisting of customer self-report data from 74 program participants and 53 participating trade allies.
GPY2	**NTG** 0.69 **Free-ridership** 37% **Spillover** 6% **Method:** SAG deemed based on GPY1 research.
GPY3	**NTG** 0.79 **Free-ridership** 37% **Spillover** 16% **Method:** SAG deemed based on GPY1 research and spillover adjustment of 0.10.
GPY4	**NTG** 0.79 **Free-ridership** 37% **Spillover** 16% **Method:** NTG values for GPY4 were deemed using values from GPY3, and reported in Table 14 of the Nicor Gas filed Energy Efficiency Plan for GPY4-GPY6.
GPY5	**NTG** 0.79 **Free-ridership** 37% **Spillover** 16% **Method:** No new research. Values based on GPY1 (free-ridership and spillover) and GPY3 (spillover adder).
GPY6	**NTG** 0.79 **Free-ridership** 37% **Spillover** 16% **Method:** No new research. Values based on GPY1 (free-ridership and spillover) and GPY3 (spillover adder). Program NTG value of 0.79 may be used for an "HVAC Saves" furnace quality installation pilot/program.
2018 (GPY7)	**Home Energy Efficiency Rebates (all measures, excluding Duct Sealing, Air Sealing, and Insulation Measures)** **NTG:** 0.68 This NTG value is not recommended for air sealing, insulation, or duct sealing. **Free ridership:** 0.45 **Method**: Value is from GPY5 evaluation telephone survey research conducted with 100 GPY4 HEER Program participants. The FR result is based on applying TRM v6.0 NTG methodologies. The overall program FR value uses GPY4 HEER Program verified gross savings to weight measure category free ridership: AFUE 95 (FR=0.40, weight=69%); AFUE 97 (FR=0.44, weight=14%); other measures in survey (FR is not based on enough responses to report statistically significant results at the measure level, weight = 17%). Program measures that were not researched were assigned the overall FR average. Guidehouse described our concerns with the TRM v5.0 NTG algorithm and offered an alternative approach in an August 23, 2016 memo. Our alternative was not adopted for TRM v6.0, but the approach that did make it into TRM v6.0 addresses what we believed were weaknesses of TRM v5.0 and produces results similar to our August 23 recommended alternative. Guidehouse recommends the algorithm in TRM v6.0 over the

	HOME ENERGY EFFICIENCY REBATE
	algorithm in TRM v5.0 to estimate free ridership for residential prescriptive rebate programs. A Guidehouse memo dated December 22, 2016 provides further discussion. **Participant Spillover:** 0.02 **Method**: The PSO value is from GPY5 evaluation telephone survey research conducted with 100 GPY4 HEER Program participants. The PSO result is based on applying the TRM v5.0 methodologies to identify spillover candidates, and estimating spillover savings using the Illinois TRM and Nicor Gas program data from GPY4. The TRM version 6.0 participant spillover methodology advises using a lower, more inclusive spillover threshold score of 5.0 rather than 7.0. Guidehouse re-examined our survey responses applying a threshold of 5.0, but no additional gas spillover was found. A Guidehouse memo dated December 16, 2016 provides further discussion. **Non-Participant Spillover**: 0.11 **Method**: Non-participant spillover value for 2018 (GPY7) is based on GPY2 evaluation research conducted for Peoples Gas (PGL) and North Shore Gas (NSG) to estimate spillover from non-participating trade allies. For statewide consistency, the methodology and survey instrument were derived from evaluation research completed for Ameren Illinois by Cadmus. For the spillover calculation, 59 interviews were conducted sampled from two groups of non-participating trade allies: 1) Trade allies that dropped out of the PGL or NSG program (so-called "drop out" trade allies): those who had participated in GPY1, but did not participate in GPY2; and 2) True non-participating trade allies - those who reported that they were aware of the PGL and NSG program, but had never participated. The value of 0.11 is a weighted average of 0.10 for Peoples Gas and 0.13 for NSG. Guidehouse recommends the NPSO value from GPY2 PGL & NSG research rather than the GPY1 Nicor Gas research value of 0.06 for these reasons: 1) the GPY2 methodology was consistent with evaluation research conducted for Ameren Illinois, 2) the GPY2 sample was slightly larger, and it was observed that trade allies overlap utility service territories, 3) GPY2 is the more recent study, and 4) it is logical that non-participants after the second program year better represent future non-participants than research conducted on a first-year population of a program ramping up. **Home Energy Efficiency Rebates (all measures, excluding Programmable Thermostats, Duct Sealing, Air Sealing, and Insulation Measures)** **NTG:** 0.72 **Free ridership:** 0.41 **Method**: Value is from GPY5 evaluation telephone survey research conducted with 100 GPY4 HEER Program participants. The FR result is based on applying TRM v6.0 NTG methodologies. The FR value shown excludes programmable thermostats from the NTG weighting. Results and weighting for furnaces: AFUE 95 (FR=0.40, wgt: 83%); AFUE 97 (FR=0.44, wgt: 17%). This NTG value may be used for an overall program NTG for measures excluding programmable thermostats, air sealing, insulation, and duct sealing (that is, for furnaces, boilers, tankless water heaters, and other space heating and water heating equipment). **Participant Spillover:** 0.02 (described above) **Non-Participant Spillover**: 0.11 (described above)

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	For Duct Sealing, Air Sealing, and Insulation **NTG:** 0.90 **Free ridership:** 0.10 **Spillover:** 0.00 **Method**: The free ridership value was taken from the "Home Energy Savings Program GPY2/EPY5 Evaluation Report" prepared for Nicor Gas and ComEd (Guidehouse, 3/25/2014). Results for Nicor Gas for the weatherization component were: FR=0.10. No recommendation was made for spillover. Guidehouse concludes the researched overall HEER Program NTG (either 0.68 or 0.72) is not reasonable for duct sealing, air sealing, and insulation. Duct sealing, air sealing, and insulation FR and PSO research is planned for Peoples Gas and North Shore Gas for the first half of 2017. Guidehouse may recommend updated free ridership and spillover values using data from the PGL & NSG Home Energy Rebate Program survey planned for the first half of 2017 if results are final prior to May 30, 2017.
2019	**Home Energy Eff Rebates - HEER** **NTG value IF Basic Programmable thermostats <u>are included</u> in rebates offered (excludes advanced thermostats)** **NTG:** 0.68 **Method**: No new research. Value retained from 2018 (GPY7). FR (Nicor Gas EM&V GPY5, 12/22/16 Guidehouse memo) & PSO (Nicor Gas EM&V GPY5, 12/16/16 Guidehouse memo); NPSO (PG & NSG GPY2). This NTG value does not cover air sealing, duct sealing, and insulation measures if rebated through the HEER Program. **Home Energy Eff Rebates - HEER** **NTG value IF Basic Programmable thermostats <u>are NOT included</u> in rebates offered (excludes advanced thermostats)** **NTG:** 0.72 **Method**: No new research. Value retained from 2018 (GPY7). FR (Nicor Gas EM&V GPY5, 12/22/16 Guidehouse memo) & PSO (Nicor Gas EM&V GPY5, 12/16/16 Guidehouse memo); NPSO (PG & NSG GPY2). This NTG represents the program if Nicor Gas removes basic programmable thermostats from the rebate offerings. This NTG value does not cover air sealing, duct sealing, and insulation measures if rebated through the HEER Program.

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2020	**Home Energy Eff Rebates - HEER** **NTG value IF Basic Programmable thermostats <u>are included</u> in rebates offered (excludes advanced thermostats)** **NTG:** 0.68 **Method**: No new research. Value retained from 2018 (GPY7). FR (Nicor Gas EM&V GPY5, 12/22/16 Guidehouse memo) & PSO (Nicor Gas EM&V GPY5, 12/16/16 Guidehouse memo); NPSO (PG & NSG GPY2). This NTG value does not cover air sealing, duct sealing, and insulation measures if rebated through the HEER Program. **Home Energy Eff Rebates - HEER** **NTG value IF Basic Programmable thermostats <u>are NOT included</u> in rebates offered (excludes advanced thermostats)** **NTG:** 0.72 **Method**: No new research. Value retained from 2018 (GPY7). FR (Nicor Gas EM&V GPY5, 12/22/16 Guidehouse memo) & PSO (Nicor Gas EM&V GPY5, 12/16/16 Guidehouse memo); NPSO (PG & NSG GPY2). This NTG represents the program if Nicor Gas removes basic programmable thermostats from the rebate offerings. This NTG value does not cover air sealing, duct sealing, and insulation measures if rebated through the HEER Program.