Guidehouse

Memorandum

To: **Omy Garcia, Jean Gibson, Christina Pagnusat, WEC Energy Group; Victoria Nielson, AEG; Jarred Nordhus, Robyn Munici, Jim Heffron, Kat Benitez, Desiree Vasquez, Franklin Energy**

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

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

Date: **September 29, 2020**

Re: **Net-to-Gross Research Results from CY2018 and CY2019 for the Peoples Gas and North Shore Gas Home Energy Rebate Program**

EXECUTIVE SUMMARY

This memo presents our CY2019 free ridership and spillover research results for the Peoples Gas and North Shore Gas (PGL & NSG) Home Energy Rebate (HER) 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 targeted participants and trade allies who installed high efficiency furnaces to estimate a NTG for the HVAC equipment component of the HER Program. High efficiency furnaces account for 92% of program therm savings for HVAC equipment (excluding thermostats) for PGL and NSG. For free ridership, we did not survey the small remaining population of participants that installed boilers, tankless water heaters, or programmable thermostats. Participants installing any program measure were included in the spillover survey.

The evaluation team fielded the NTG surveys in Q2 2020. We completed telephone interviews with 100 participants who participated in the program between January and December 2018 to assess spillover and completed online surveys with 75 participants who participated in the program between June 2019 and December 2019 to assess free ridership. The team also completed telephone interviews with 45 trade allies who are active in the program to assess spillover and their perspective of participant free ridership.

These research results will inform Guidehouse's September 2020 recommendations to the Illinois Energy Efficiency Stakeholder Advisory Group (SAG) of NTG values to be used for the HVAC Equipment component this program in 2021 (as detailed at the end of this memo in Table 4).

Table 1 below provides a summary of the HER 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 HER HVAC Equipment

Measure	Free Ridership	Relative Precision @ 90% CI	Spillover
Participants	0.44	11.3%	0.02
Trade Allies	0.44	11.9%	0.05

Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2018 and CY2019 PGL & NSG Home Energy Rebate program participants and trade allies.

FREE RIDERSHIP AND SPILLOVER SURVEY DISPOSITION

The evaluation team conducted participant free ridership research using an online survey where we sent furnace participants a link to the survey in an email invitation. The evaluation team fielded the free ridership survey in Q2 of 2020 with 929 PGL and NSG CY2019 furnace participants with a valid email from a population of 1,316 furnace participants with a tracked "date installation complete" between June 1, 2019 and December 31, 2019. The surveyed furnace participants (491 for PGL and 438) for NSG were 71% of the sample period furnace population (713 for PGL and 603 for NSG). Seventy-five participants responded to the survey yielding an 8% response rate. An advance request to participate in the survey was sent in English and Spanish.

The evaluation team also completed a CATI spillover survey with 100 participants from a census of 2,080 CY2018 HVAC equipment participants. The counts for the completed participant surveys and sample design are outlined in Table 2.

After screening the participant responses, Guidehouse excluded 12 free ridership surveys from analysis because of insufficient data. We estimated free ridership from 63 responses. A detailed discussion of Guidehouse's analysis of free ridership responses that triggered consistency checks are 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 391 trade allies active in CY2019 with usable contacts, with additional outreach effort in July 2020. Forty-five trade allies completed the survey (a 12% response rate), and savings from these 45 trade allies represent 8% of CY2019 program savings for HVAC equipment.

Table 2 below presents the participant free ridership and spillover survey dispositions, and Table 3 presents the active trade ally free ridership and spillover survey dispositions.

Table 2. Participant Free Ridership and Spillover Research Survey Disposition

NTG Component	Utility	Number of Usable Contacts*	Target Completes	Number of Completes	Excluded from the Analysis	Analyzed Completes †
Participant Free Ridership						
	Peoples Gas	491	70	38	7	31
	North Shore Gas	438	70	37	5	32
	Overall Population	**929**	**140**	**75**	**12**	**63**
Participant Spillover		**2,080**	**100**	**100**		**100**

*Usable Contacts provides the number of participants with viable email addresses that were included in the free ridership samples or with viable telephone numbers for the spillover survey. The population of all furnace participants with an installation date between June 1, 2019 and December 31, 2019 was 1,316 – 713 for PGL and 603 for NSG.
† 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 PGL & NSG HER program participants.

Table 3. 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	391	70	45	4	41

* Usable Contacts provides the number of trade allies with viable telephone numbers from a population of 414 active trade allies.
† 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 PGL & NSG Home Energy Rebate program trade allies.

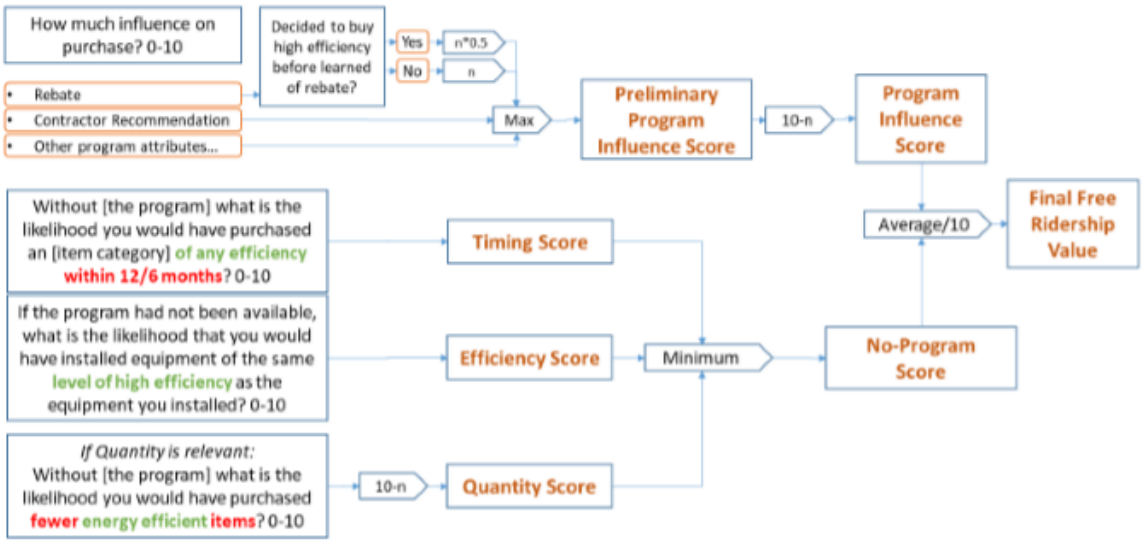
FREE RIDERSHIP AND SPILLOVER PROTOCOLS

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 HER Program.

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

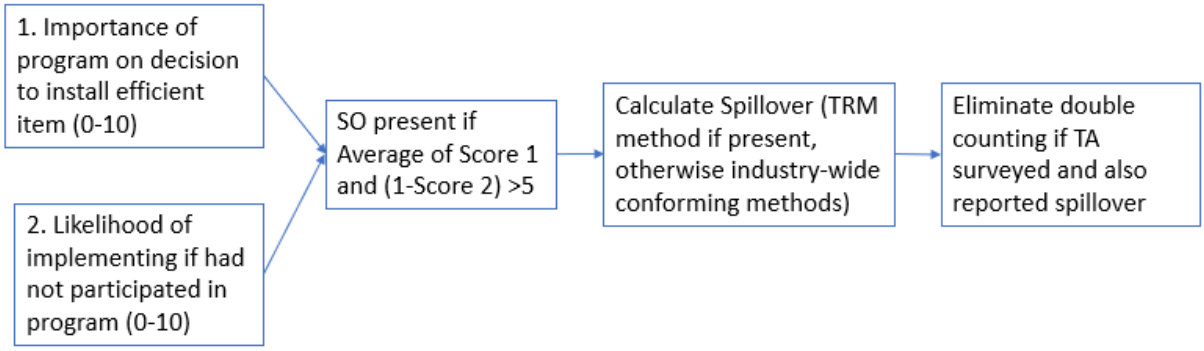


Source: Illinois TRM Version 8*, Volume 4. Cross-Cutting Measures and Attachments, final* October 17, 2019*, effective January 1st, 2020.*

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 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] 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.

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 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 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 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]

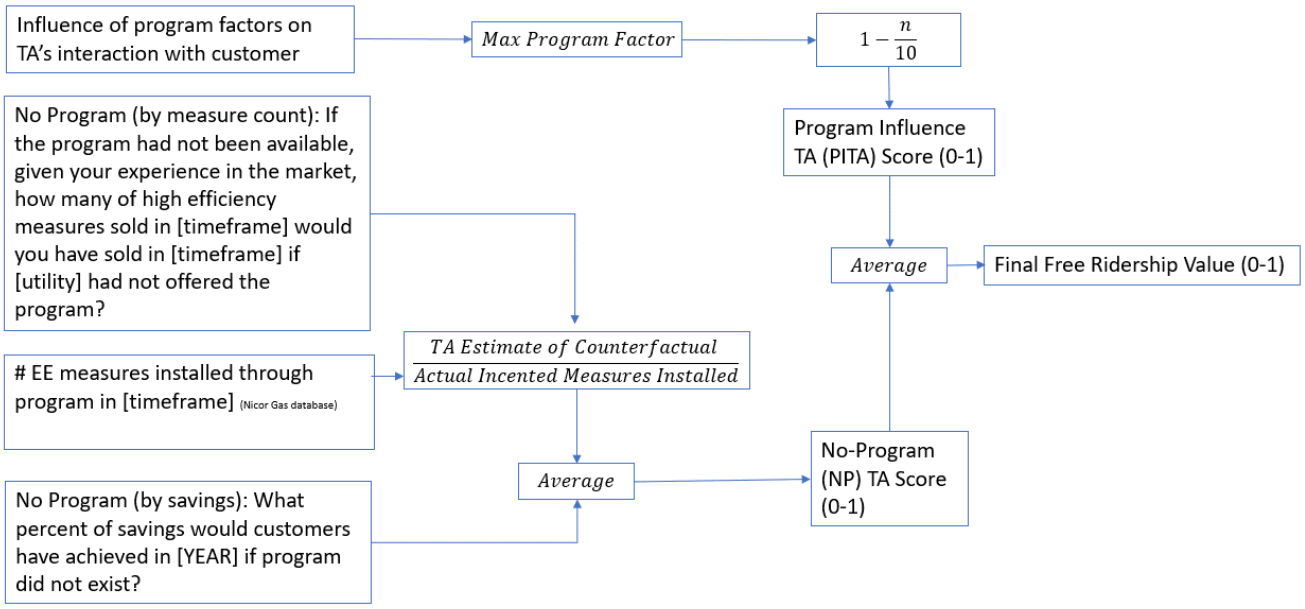
Trade Ally Free Ridership Estimation

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.

[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.

Figure 3. Trade Ally Free Ridership Protocol

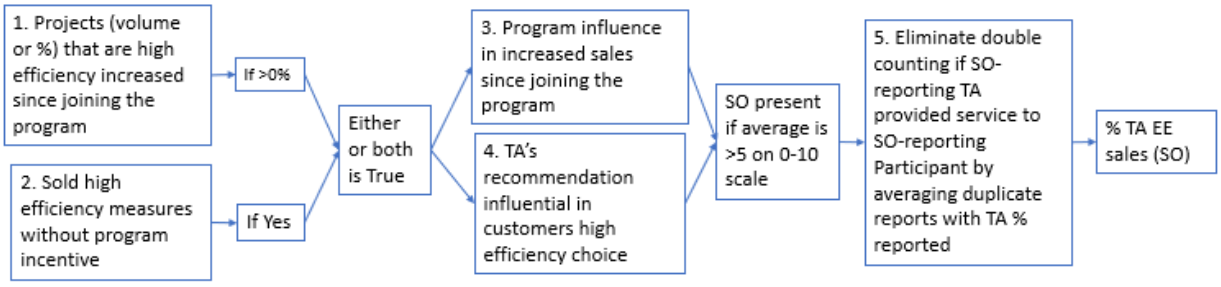


Source: Guidehouse 2020 (image and content)

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

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

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

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

COMBINING PARTICIPANT AND TRADE ALLY FREE RIDERSHIP

Participant free ridership as reported by trade allies and participants with >95% AFUE furnaces is 0.44. While the IL TRM does recommend utilizing a triangulation approach[5] to combine participant and trade ally results, this is not necessary when the values are the same.

FINAL NTG RESULTS AND RECOMMENDATIONS

Table 4 summarizes Guidehouse's recommendations for the HVAC Equipment measures of the Home Energy Rebate Program to be used in CY2021 based on our NTG research results with CY2018 and CY2019 participants, CY2019 active trade allies, and on our prior research for spillover from inactive trade allies.

The HVAC equipment path of the 2019 Home Energy Rebate Program offers rebates for furnaces, boilers, tankless water heaters, and programmable thermostats, however the program is dominated by furnaces. Furnaces, the target of this free ridership survey, comprise 92% of HVAC equipment therm savings, and we recommend applying the furnace free ridership results to all HVAC Equipment rebated through the program (excluding smart thermostats).

The spillover measures reported for participants and trade allies did not overlap, therefore the spillover results are additive. The seven participants with spillover reported installing water heaters, wall insulation and new windows. The active trade ally respondents were mechanical heating and air conditioning contractors that participated with furnaces and boilers. The inactive trade allies sold furnaces and boilers, and their spillover estimate does not overlap with either participants or active trade allies.

[5] TRM section 5.1

Table 4. Summary of Free Ridership, Spillover, and NTG Research Results for the HER Program HVAC Equipment

Measure	FR	PSO	ATSO	IATSO*	NTG
HVAC Equipment	0.44	0.02	0.05	0.11	0.74

* 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 for HVAC Equipment.
NTG = 1 – FR + PSO + ATSO + IATSO
Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2018 and CY2019 PGL & NSG Home Energy Rebate Program participants and trade allies.

APPENDIX A - DETAILED NTG RESULTS

Free Ridership Consistency Check Analysis

Participant Results

Of the 75 participants who responded to the participant free ridership survey, Guidehouse excluded responses of 2 respondents from the free ridership calculation due to failing the initial program participation screening question asked in the free ridership survey. Of the remaining 73 respondents, 26 (15 PGL and 11 NSG) 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 10 (7 PGL and 3 NSG responses) exclusions due to inconclusive influence explanations.

The statistics described above are summarized in the table below, Guidehouse surveyed 75 free ridership participants of which 12 (7 PGL and 5 NSG) responses were excluded for missing or inconsistent data. Guidehouse's recommended free ridership estimates are based on the remaining 63 responses.

Table 5. Free Ridership Survey Disposition for Furnace, >95% AFUE

Measure Response Disposition	PGL	NSG	Total
Total Number of Raw Responses	**38**	**37**	**75**
Excluded: Non-response	0	2	2
Excluded: Triggered and Failed Consistency Check	7	3	10
Total of Excluded Responses	**7**	**5**	**12**
Analyzed Sample	**31**	**32**	**63**
Included in Analyzed Sample: Triggered and Passed Consistency Check	8	8	16

Source: Guidehouse analysis of data from CATI and online surveys conducted with CY2019 PGL & NSG Home Energy 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 consistency checks based on the ***participant*** guidance in the IL TRM (Max Program Factor and No-Program both $\geq$ 7 or both $\leq$ 3). In addition to the four responses that triggered the consistency check, reviewers independently examined all 45 trade ally numeric and verbatim responses to ensure verbatim response consistency with each component score. 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 4 responses excluded due to their open-ended response indicating incomprehension.

As summarized in the tables below, Guidehouse surveyed 45 trade allies of which four were excluded. The following free ridership estimate is based on the remaining 41 responses.

Table 6. Trade Ally Free Ridership Consistency Check Disposition

Category	Count	**Percent**
Total Number of Raw Responses	**45**	**100%**
Excluded: Non-response	**0**	**0%**
No Consistency Check Trigger	**41**	**91%**
Consistency Check Trigger	**4**	**9%**
Modified	**32**	**71%**
Excluded: Triggered and Failed Consistency Check	*4*	*9%*
Modified: Excluded NP (count) Component Score	*13*	*29%**
Modified: Excluded NP (savings) Component Score	*15*	*33%**
No Change	***22***	***44%***
Final Count Included Responses	**41**	**86%**

* Modifications are not additive as some respondents received modification to two component scores.
Source: Guidehouse Analysis

The resulting savings weighted value of trade ally perspective of participant free ridership is 0.44.

Spillover Estimation

Participant Results

Of the 100 survey respondents, 25 reported that they installed additional energy efficient equipment without rebates, and 14 of them indicated that participating in the HER Program influenced them to make these additional purchases. Guidehouse determined that eight of those 14 had spillover averaged attribution scores greater than five, however, one participant installed an air conditioner (an electric-only measure) which we did not include when calculating spillover savings. The remaining seven participants reported installing water heaters, wall insulation and new windows as shown in Table 7 below[6].

Table 7. Reported Energy Savings for Spillover Respondent

Measure Installed	Number of Respondents	Spillover therms	Total Spillover
Water Heater	5	176.2	
Wall Insulation	1	78.5	
New Windows	1	6.8	
Total	**7**	**261.5**	**0.02**

Source: Guidehouse analysis of data from CATI spillover telephone surveys conducted with CY2018 Home Energy Rebate Program participants

The therm savings from these measures amounted to 2% of program savings for the 100 respondents. Because the 100 were selected through a census, their spillover savings rate (0.02) is representative of the population of CY2018 program participants.

Active Trade Ally Results

Of the 45 responding active trade allies, 20 reported that they installed more energy efficient natural gas equipment since joining the HER program. Of these 20, 15 respondents passed the screening criteria for spillover, and 9 provided sufficient information to be able to calculate spillover per the TRM guidelines. The trade ally respondents were mechanical heating and air conditioning contractors that participated with furnaces and boilers. The estimated savings from these respondents following the IL TRM protocol results in the following TA spillover rate (Table 8).

Table 8. Active Trade Ally Spillover Research Results

Category	Spillover (therms)	Total TA Respondent Savings (therms)	Projected Spillover Savings to TA Population (therms)	Active Trade Ally Spillover Ratio	Respondents Contributing to Spillover
Trade Allies	4,374	25,686	51,879	0.05	9

Source: Guidehouse analysis of CY2019 TA survey data.

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

APPENDIX C – HOME ENERGY REBATE NTG HISTORY

	RESIDENTIAL PROGRAM HOME ENERGY REBATE
GPY1	**Peoples Gas: NTG 0.72; Free ridership 0.28; Participant Spillover 0.00** **North Shore Gas: NTG 0.67; Free ridership 0.33; Participant Spillover 0.00** **Method and Source**: Evaluation research consisting of GPY1 participating customer self-reports and participating trade ally interviews. For Peoples Gas: 68 NTG interviews completed from a population of 1,363 participants. For North Shore Gas: 71 NTG interviews completed from a population of 991 participants. No quantifiable participant spillover was found from customer self-reports. Significant qualitative evidence of spillover was found from 30 trade ally interviews, but was not quantified.
GPY2	**Peoples Gas: NTG** 0.82; **Deemed Free ridership 0.**28; **Non-Participant Spillover:** 0.10 **North Shore Gas: NTG** 0.80; **Deemed Free ridership 0.**33; **Non-Participant Spillover:** 0.13 **Method and Source**: Spillover results for GPY2 based on evaluation research to estimate spillover from non-participating trade allies. 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 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 program, but had never participated. Free-ridership for GPY2 was deemed from GPY1 evaluation research based on SAG consensus. Evaluation did not research free-ridership in GPY2.
GPY3	**Peoples Gas: NTG** 0.82; **Deemed Free ridership 0.**28; **Non-Participant Spillover:** 0.10 **North Shore Gas: NTG** 0.80; **Deemed Free ridership 0.**33; **Non-Participant Spillover:** 0.13 **Method and Source**: Deemed by SAG consensus from GPY1 and GPY2 evaluation research.
GPY4	**Peoples Gas: NTG** 0.82; **Deemed Free ridership 0.**28; **Non-Participant Spillover:** 0.10 **North Shore Gas: NTG** 0.80; **Deemed Free ridership 0.**33; **Non-Participant Spillover:** 0.13 **Method and Source**: Deemed by SAG consensus. Values from GPY1 and GPY2 evaluation research.
GPY5	**Peoples Gas and North Shore Gas:** **NTG 0.81; Free ridership 0.30; Participant Spillover 0.00; Non-Participant Spillover: 0.11** **Method and Source**: A single value was developed for both PGL and NSG programs based on weighting GPY4 values 60% PGL to 40% NSG. Weighting based on GPY5 planning values.
GPY6	**Peoples Gas and North Shore Gas:** **NTG 0.81; Free ridership 0.30; Participant Spillover 0.00; Non-Participant Spillover: 0.11** **Method and Source**: A single value was developed for both PGL and NSG programs based on weighting GPY4 values 60% PGL to 40% NSG, no changes for GPY6.
2018 (GPY7)	**For all program measures except Duct Sealing, Air Sealing, and Insulation** **NTG:** 0.64 **Free ridership:** 0.49 **Method**: Value is from GPY5 evaluation on-line survey completed with 119 GPY5 HER Program participants. The FR result is based on applying the TRM v6.0 NTG methodologies. Overall program FR value uses GPY5 HER Program verified gross savings to weight measure category free ridership: AFUE 95+ (FR=0.48, weight=75%); programmable thermostats (FR=0.64, weight=11%); other measures in survey (FR is not based on enough responses to report statistically significant results at the measure level, weight = 14%). Program measures that were not researched were assigned the overall FR average. This NTG value is not recommended for air sealing, insulation, or duct sealing. Navigant 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. Navigant recommends the algorithm in TRM v6.0 over the algorithm in TRM v5.0 to estimate free ridership for residential prescriptive rebate programs. A Navigant memo dated December 30, 2016 provides further discussion. **Participant Spillover:** 0.02 **Method**: The PSO value is from GPY5 evaluation telephone survey research conducted with 100 GPY4 Nicor Gas 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. Navigant re-examined our survey responses applying a threshold of 5.0, but no additional gas spillover was found. A Navigant memo dated December 16, 2016 provides further discussion. Navigant recommends the PSO value from the Nicor Gas study for PGL & NSG. The last participant spillover study for the PGL & NSG HER Program was conducted in GPY1, where evidence of PSO was found, but it was not quantified. **Non-Participant Spillover**: 0.11 **Method**: Non-participant spillover value for 2018 (GPY7) is based on GPY2 evaluation research conducted for Peoples Gas and North Shore Gas 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. **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 (Navigant, 3/25/2014). Results for Nicor Gas for the weatherization component were: FR=0.10. No recommendation was made for spillover. The GPY5 HER FR research did not have a representative mix of duct sealing, air sealing and insulation measures, which contribute significant portions of the PGL & NSG program savings. Navigant concludes the GPY5 overall HER Program NTG (0.64) is not reasonable for duct sealing, air sealing, and insulation. Duct sealing, air sealing, and insulation FR and PSO research is planned for the first half of 2017. Navigant 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 Rebate (HVAC and other equipment, excluding Smart Thermostats, Duct Sealing, Air Sealing, and Insulation Measures)** **NTG: 0.63; Free Ridership: 0.49; Participant Spillover: 0.01; Non-Participant Spillover: 0.11** **Method:** FR and PSO: 2017 Survey of 74 GPY6 HVAC/Other Equipment participants and 60 participating trade allies. Memo: Net-to-Gross Research Results from GPY6 for the Peoples Gas and North Shore Gas Home Energy Rebate Program, Navigant, 5/26/17 NPSO: 2013 Survey of 59 non-participating trade allies. Residential Prescriptive Rebate Program GPY2 Evaluation Report, Navigant, 2/10/14 **Home Energy Rebate - Duct Sealing, Air Sealing, and Insulation Measures** **NTG: 0.73 to 0.78, measure-level and program-level values described below**

	Method: FR and PSO: 2017 Survey of 86 GPY6 Air Sealing, Duct Sealing, and Insulation participants and 60 participating trade allies. Memo: Net-to-Gross Research Results from GPY6 for the Peoples Gas and North Shore Gas Home Energy Rebate Program, Navigant, 5/26/17 **All scenarios of Air Sealing plus Attic Insulation Installed in the Same Project (with or without additional measures installed in the same project)** **Method**: Applies only in scenarios where air sealing and attic insulation are installed at the same time, and only if the savings for natural gas heating are estimated using the Illinois TRM Version 7.0, Section 5.6.1 (Air Sealing) and Section 5.6.5 (Ceiling/Attic Insulation) adjustment factor of 72% that was derived from air sealing and insulation research by Navigant (2018). See Navigant (2018) ComEd and Nicor Gas Air Sealing and Insulation Research Report. The 72% adjustment factor was derived from a gas consumption data regression analysis with an experimental design that does not require further net savings adjustment. **Either NTG Approach Option 1 or Option 2 are acceptable.** **NTG Application Approach Option 1: Measure-level NTG values for air sealing, duct sealing, and insulation** a. All scenarios of Air Sealing plus Attic Insulation Installed in the Same Project (with or without additional measures installed in the same project) NTG: Use 72% TRM savings adjustment factor and no further NTG adjustment b. Air Sealing and Insulation Measures: Measure-level NTG value of 0.73 applies to any single measure or combined set of air sealing and insulation measures, alone or in combination with other measures installed in the same project, EXCLUDING the net savings for air sealing and attic insulation installed in the same project (those net savings are always calculated separately): NTG 0.73 Free ridership 28% Spillover 1% c. Duct Sealing Measures. Measure-level NTG value of 0.78 for duct sealing applies only if the measure level NTG of 0.73 is used for air sealing (w/o attic insulation) and other insulation measures. NTG 0.78 Free ridership 23% Spillover 1% **NTG Application Approach Option 2: Program-level NTG value for air sealing, duct sealing, and insulation measures** a. All scenarios of Air Sealing plus Attic Insulation Installed in the Same Project (with or without additional measures installed in the same project) NTG: Use 72% TRM savings adjustment factor and no further NTG adjustment b. Duct Sealing, Air Sealing and Insulation Measures, Program-level NTG value of 0.75 applies to all DS/AS/I measures, alone or in combination, EXCLUDING the net savings for air sealing and attic insulation installed in the same project (those net savings are always calculated separately): NTG 0.75 Free ridership 26% Spillover 1%
2020	**Home Energy Rebate (HVAC and other equipment, excluding Smart Thermostats, Duct Sealing, Air Sealing, and Insulation Measures)** **NTG: 0.63; Free Ridership: 0.49; Participant Spillover: 0.01; Non-Participant Spillover: 0.11**

	Method: FR and PSO: 2017 Survey of 74 GPY6 HVAC/Other Equipment participants and 60 participating trade allies. Memo: Net-to-Gross Research Results from GPY6 for the Peoples Gas and North Shore Gas Home Energy Rebate Program, Navigant, 5/26/17 NPSO: 2013 Survey of 59 non-participating trade allies. Residential Prescriptive Rebate Program GPY2 Evaluation Report, Navigant, 2/10/14 **All scenarios of Air Sealing plus Attic Insulation Installed in the Same Project (whether or not additional measures are installed in the same project)** **Method**: Applies only in scenarios where air sealing and attic insulation are installed at the same time, and only if the savings for natural gas heating are estimated using the Illinois TRM Version 8.0, Section 5.6.1 (Air Sealing) and Section 5.6.5 (Ceiling/Attic Insulation) adjustment factor of 72% that was derived from air sealing and insulation research by Navigant (2018). See Navigant (2018) ComEd and Nicor Gas Air Sealing and Insulation Research Report. The 72% adjustment factor was derived from a gas consumption data regression analysis with an experimental design that does not require further net savings adjustment. **Home Energy Rebate - Air Sealing (without adding attic insulation), Insulation Measures (excluding attic insulation), and Duct Sealing** **NTG: Measure-level values described below** **Method:** FR: Navigant research of free ridership from a telephone survey administered to ComEd EPY9/GPY6 and CY2018 Weatherization Rebates Program participants that were joint with PGL, NSG and Nicor Gas. Navigant conducted the net-to-gross (NTG) research in Fall 2018 with EPY9/GPY6 and CY2018 participants and in Spring 2019 with only CY2018 duct sealing participants. Analyzed completes: Attic Insulation (61), Air Sealing (68), Duct Sealing (79). Wall insulation FR is a weighted average value, applied to other insulation measures. Survey was fuel neutral and used TRM v7.0 protocols. Navigant recommended updating older gas research with these newer joint values, described in Navigant memo to ComEd July 19, 2019. PSO: 2017 Survey of 86 GPY6 Air Sealing, Duct Sealing, and Insulation participants and 60 participating trade allies. Memo: Net-to-Gross Research Results from GPY6 for the Peoples Gas and North Shore Gas Home Energy Rebate Program, Navigant, 5/26/17 a. Air Sealing (conducted without adding attic insulation): NTG 0.77 Free ridership 24% Spillover 1% b. Insulation measures, excluding ceiling/attic insulation, including Wall, Floor Above Crawlspace, Basement Sidewall; Rim/Band Joist: NTG 0.79 Free ridership 22% Spillover 1% c. Duct Sealing Measures: NTG 0.87 Free ridership 14% Spillover 1%