

To: Peoples Gas and North Shore Gas
CC: Jennifer Morris, David Brightwell, ICC Staff; Randy Gunn, Kevin Grabner, Laura Agapay-Read, Guidehouse
From: Cher Seruto, Guidehouse
Date: 8/31/2020
Re: Net-to-Gross Research Results for Peoples Gas and North Shore Gas Business Prescriptive Program

EXECUTIVE SUMMARY

This memo presents the results of the net-to-gross (NTG) research for the Peoples Gas (PGL) and North Shore Gas (NSG) Business Prescriptive Program. Our NTG and process¹ research included the following two activities:

- A NTG and process research survey for 2018 and 2019 participating business customers, and
- A NTG and process research survey targeting trade allies (TAs) who participated in 2018 and 2019.

Participants and trade allies from both 2018 and 2019 program years were included for two reasons: the sample size of unique participants is small, therefore increasing the population increases the opportunity for higher confidence and precision in the results. Second, including the prior year (2018) allows for more time for spillover to have occurred.

This survey research did not include Public Sector Prescriptive projects, which accounted for approximately 16% of Prescriptive Rebate program savings in 2018 and 2019. A small number of Public Sector participants contribute a large portion of total Public Sector savings, and these customers participated in multiple programs (such as prescriptive and custom). We would like to reduce respondent fatigue by contacting them one time to represent all programs they participated in. We recommend the results for the business participants be used for the public sector until new research is completed, for reasons discussed below.

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 10).

Table 1. Net-to-Gross Research Results for All Business Prescriptive Measures

	FR	SO
Participants	0.27	0.11
Trade Allies	0.13	0.08
Weighted Results	0.22	Not Applicable

Source: Guidehouse analysis of data from surveys conducted with 2018-2019 Business Prescriptive program participants and trade allies.

FREE RIDERSHIP AND SPILLOVER SURVEY DISPOSITION

Guidehouse staff fielded the participant and trade ally surveys via a mixed-mode email and telephone strategy during Q3 of 2020. The Covid-19 pandemic had occurred prior to fielding therefore the evaluation team was able to a) modify the survey from outbound telephone calls to the mixed mode in an effort to reach contacts that due to Covid-19 might not be in their typical work location, and b) include questions regarding how Covid-19 may be affecting business and trade ally energy efficiency investments and work².

¹ Guidehouse will report process results in a separate document in Q3 of 2019.

² The Covid-19 questions are presented in a forthcoming process results document.

Of the 80 unique program participants with contact information, 20 responded to the attempted census survey for a 25% response rate. Responding participants represent 47% of savings achieved for the Business Prescriptive program in 2018-2019. Four TAs responded to the TA survey for a 36% response rate. The 4 TAs represent 38% of program savings in 2018-2019. Table 2 presents survey dispositions for the survey results.

Table 2. Survey Dispositions for All Measures

Category	Mode	Trade Ally Population	Participant Population	Total
Sample Population*	Total	11	80	91
	Email	10	78	88
	Phone	10	79	89
Erroneous Records	Total	3	24	27
	Email	1	8	9
	Phone	2	16	18
Declines	Total	1	12	13
	Email	N/A	N/A	N/A
	Phone	1	12	13
No Response	Total	11	105	116
	Email	7	63	18
	Phone	4	42	6
Completes	Total	4	20	24
	Email	3	15	18
	Phone	1	5	6
Response Rate	Total	36%	25%	26%
	Email	30%	19%	20%
	Phone	10%	6%	7%
% of Sample Savings Completes Represent		55%	55%	
% of Program Savings Completes Represent		38%	47%	-

*The population is the number of unique contacts with contact information from the 2018 and 2019 Business Prescriptive participation databases. While the participant sample was an attempted census, the sample savings and program savings are different due to participants without contact information not being included in the sample savings total. The total program savings denominator did not include the Public Sector. The trade ally sample targeted the most active firms that delivered over 90% of program savings.
Source: Guidehouse analysis

The measures represented by the 20 responding participants include (by count and percent of savings) steam traps (16, 90%), boiler tune-ups (5, 6%), high efficiency boilers (2, 3%), and water heaters and controls (2, 1%). By comparison, the program savings for 2018 and 2019 were steam traps (79%), boiler tune-ups (14%), high efficiency boilers (2%), and other measures (5%). Because steam trap projects can be relatively large, the sample has a higher percentage of steam trap savings than the population, however, non-steam trap measures were represented in the responses. The responding trade allies completed steam trap and boiler tune-up projects.

FREE RIDERSHIP AND SPILLOVER PROTOCOLS

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

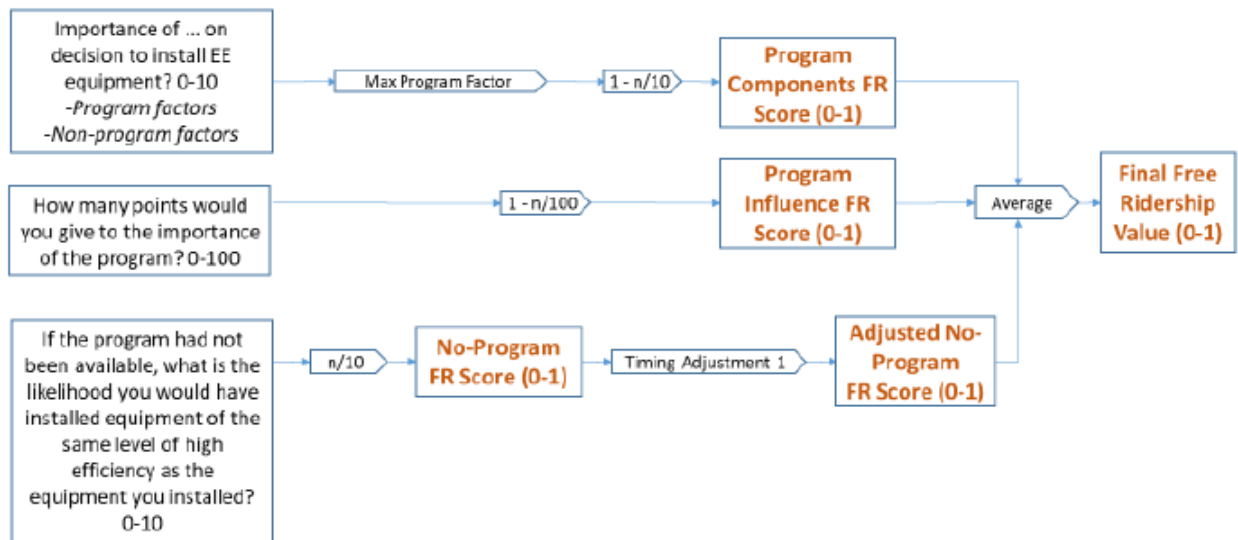
- Participant perspective: Section 3.1.1.1 Core Free Ridership Scoring Algorithm
- Trade ally perspective: Section 5 Cross-Sector Protocols

Guidehouse adjusted the wording of the core participant free ridership algorithm slightly for service-based upgrades (such as equipment tune-ups), though the scoring is the same for both equipment installations and service-based upgrades.

The evaluation team’s preferred algorithm specification is Core Free Ridership Algorithm 1, shown graphically below (Figure 1). The NTG findings discussed below are based on this version. The second option, Core Free Ridership Algorithm 2 (Figure 2) has also been considered. The rationale for selecting Algorithm 1 over Algorithm 2 is that Algorithm 1 provides for equal weighting of each of the three sub-scores, which represent different ways of determining program influence. In contrast, Algorithm 2 applies a 50% weight to the program’s effect on the timing of the project, which we believe is too high. Such a high weighting essentially discounts the effect of the other factors that drive program influence, which in our view is inappropriate.

Figure 1. Core Free Ridership Scoring Algorithm 1 – Participants

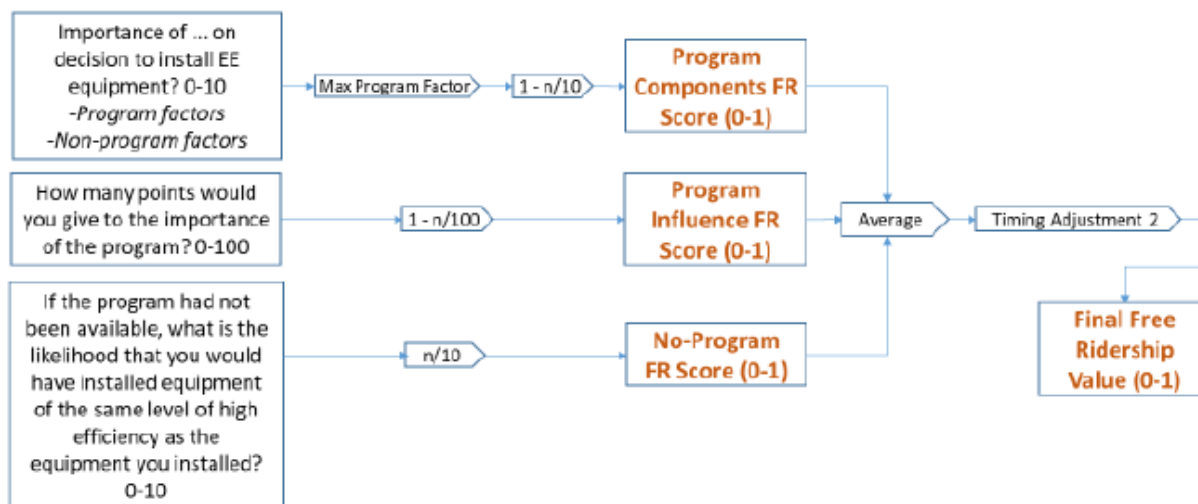
$$(\text{Program Components FR Score} + \text{Program Influence FR Score} + (\text{No-Program FR Score} * \text{Timing Adjustment 1})) / 3$$



Source: Illinois TRM Version 8.0, Volume 4 Figure 3-1

Figure 2. Core Free Ridership Scoring Algorithm 2 – Participants

$$\frac{[(\text{Program Components FR Score} + \text{Program Influence FR Score} + \text{No-Program FR Score}) / 3] * \text{Timing Adjustment 2}}$$

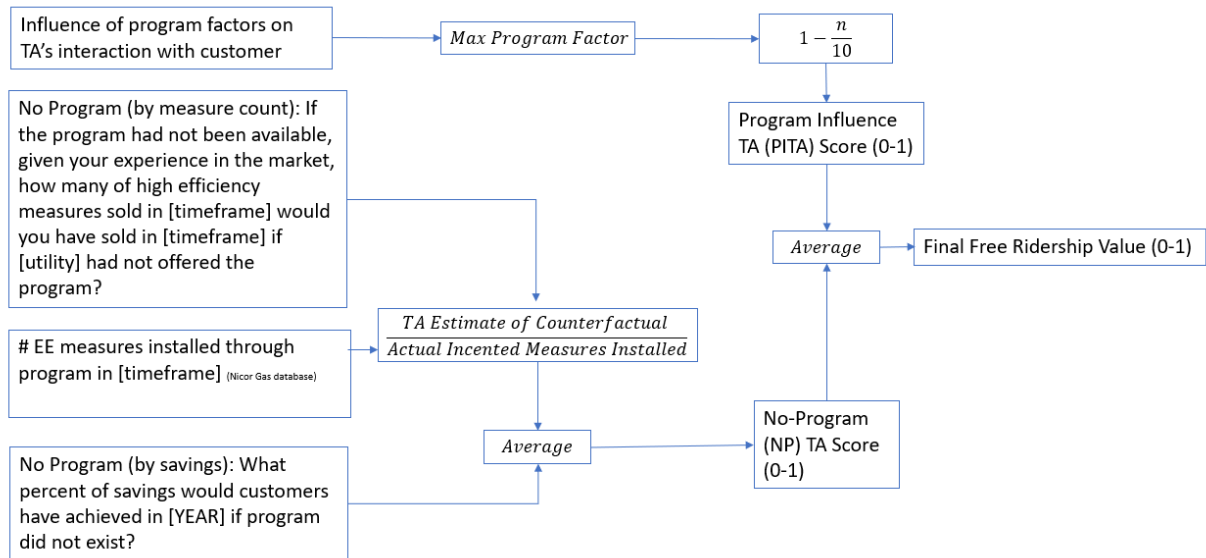


Source: Illinois TRM Version 8.0, Volume 4 Figure 3-2

Version 8.0 of the TRM does not specify an approach for measuring trade ally perspective of 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 free ridership from a trade ally perspective. We designed the method to align with the triangulation approach of the TRM's participant free ridership algorithms. This 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)
 - The influence of program factors on the ability of the trade ally to sell the energy efficient service or product to the customer
 - The influence of the program on any sales or stock increases of energy efficient equipment OR the influence of the program on the customer decision
- A No-Program (NP) score: The estimate of the number of energy efficient items the trade ally would have installed or serviced absent the program
 - A certainty factor adjusts the weight of the No-Program score (compared to the PITA score) when calculating the final free ridership value

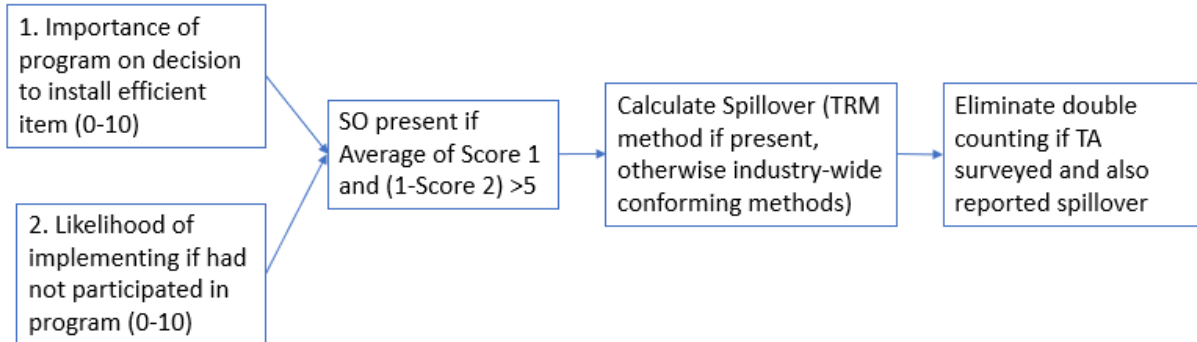
Figure 3. Trade Ally Free Ridership Protocol



Source: Guidehouse 2020 (image and content)

Guidehouse assessed spillover according to the TRM, which specifies protocols for participant and trade ally spillover. Participant spillover is documented by the following process (Figure 4):

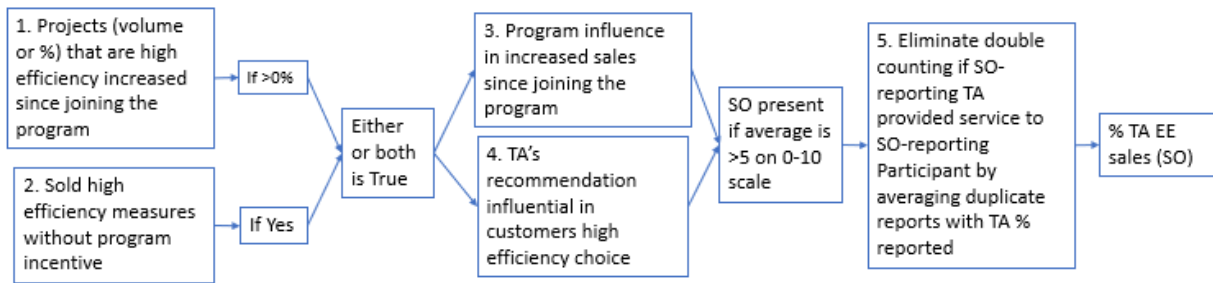
Figure 4. Participant Spillover Protocol



Source: Guidehouse representation of Illinois TRM Version 8.0 protocol

Trade ally spillover is assessed by estimating the increase of sales of high efficiency products or services that are not rebated, as shown below in Figure 5.

Figure 5. Trade Ally Spillover Protocol



Source: Guidehouse representation of Illinois TRM Version 8.0

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

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

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

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

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

- 3) Develop the spillover ratio for sampled trade allies by summing individual trade ally spillover savings and dividing that total by program-tracked savings associated with 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

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

DETAILED NTG RESULTS

Free Ridership Consistency Check Analysis

Trade Ally Results

The evaluation team manually checked numeric free ridership responses for consistency with verbatim responses and found all to be consistent (for each respondent). Thus, of the four responding trade allies, no responses were removed from the analysis. All four trade allies provided an estimate of sales absent the program. Therefore Guidehouse calculated the final Trade Ally Free Ridership value by averaging the Program Influence and No Program scores as described in Figure 3.

Table 3: Trade Ally Researched Free Ridership Findings, by Free Ridership Sub-Score

Category	PITA Score	NP Score	Free Ridership
Trade Ally Free Ridership (n=4)	0.00	0.27	0.13

Source: Guidehouse team analysis.

Participant Results

Of the 20 participant completes, six triggered consistency checks. To evaluate these inconsistent responses, we reviewed all related open-ended responses and numeric responses. Of the six inconsistent responses, we determined that one needed no adjustment because their verbatim response was consistent with their numeric responses. Of the remaining five, we excluded the No-Program score for all and one of the five we also excluded the PI score thereby using only the Program Component Score. In this case the verbatim stated the program was influential in allowing the participant to get funding from investors to make the project happen and allowed them to add additional energy efficiency measures that were not initially budgeted. This verbatim response seemed to demonstrate high program influence that was more in line with the given PC score than the PI and the NP scores. In general, the inconsistent responses reflected confusion with the NP question. Table 4 summarizes our participant free ridership consistency check (CC) analysis results.

Table 4. Free Ridership Consistency Check Disposition for Participants

Participant Response Disposition	Total
Measure installations covered by interviews	20
Triggered Consistency Check:	6
Evaluated to Require no Exclusion	1
Evaluated to Exclude PC Score	0
Evaluated to Exclude PI Score	1
Evaluated to Exclude NP Score	5
Removed from Analysis	0

Source: Guidehouse analysis of data from surveys conducted with 2018 & 2019 Peoples Gas / North Shore Gas Business Prescriptive Program participants and trade allies. The Exclusions do not sum to 6 because one participant had two exclusions (NP and PI).

To obtain the program-level free ridership, the project-level free ridership values were weighted by ex-ante term savings. The results of our analysis, showing free ridership subcomponent scores, are included in Table 5 below.

Table 5: Researched Free Ridership Findings, by Free Ridership Sub-Score

Category	PC Score	PI Score	NP Score	Timing-Adjusted NP Score	Free Ridership
Raw Results	0.05	0.49	0.43	0.42	0.31
Post CC Adjustment	0.05	0.47	0.30	0.29	0.27

Source: Guidehouse analysis of data from surveys conducted with 2018 & 2019 Peoples Gas / North Shore Gas Business Prescriptive Program participants and trade allies.

Spillover Estimation

Three of the four trade allies passed the criteria for potential presence of spillover, however only one of the three gave quantifiable sales data of high efficiency equipment sold without an incentive. The quantification of this one TA's data results in a trade ally spillover ratio of 0.08 (122,987 gross therms, steam traps).

Six participant survey respondents reported installing at least one non-rebated energy efficiency upgrade after participating in the program. Two of these passed the criteria for ranking the program as influential in their decision to install the item, however they were not able to provide sufficient details about the measures they installed for the evaluation team to be able to calculate savings.

Four participant survey respondents reported the following behavioral characteristics after participating in the program, which we have designated as an additional route to spillover: 1) changing steam trap monitoring policies as a result of their program participation, 2) replacing additional steam traps after program participation, and 3) they rated the program as highly influential in their reason to do so. As an additional consistency check, the evaluation team compared reported spillover steam trap replacements with the count of those replaced via the program in 2018, 2019, and 2020. One spillover respondent gave the identical numerical value of replaced steam traps as were rebated, therefore we removed this respondent from the spillover analysis. We concluded the respondent was confused and reported program-participating steam traps as part of the spillover line of questioning in error.³ The remaining three participants reporting steam trap replacement spillover account for 195,396 gross therms. The spillover ratio for these combined steam trap participant respondents is 0.11.

The participant and trade ally spillover estimates are not additive, because both referenced estimates represent steam trap spillover savings. To eliminate the potential double counting, we selected the participant estimate as the most representative of participant spillover.

Table 6. Spillover Research Results

Category	Spillover Gross Therms	Spillover Ratio	Respondents Contributing to Spillover
Participants	195,396	0.11	3
Trade Allies	122,987	0.08	1

Source: Guidehouse analysis of data from surveys conducted with 2018 & 2019 Peoples Gas / North Shore Gas Business Prescriptive Program participants and trade allies.

Free Ridership and Spillover for Measure Type NTG Ratio

Participant and Trade Ally Free Ridership Scores

Table 7 summarizes the confidence and precision results for free ridership for participants. Due to the small population size (80 unique participants), we contacted a census of participants and were not able to meaningfully stratify by public or private property type, or measure type. The results for the population met the 90/10 target (C/P = 90/7.5).

³ The number given was conspicuously unique and unlikely to be a coincidence. Other responses strongly suggest these were the rebated steam traps: importance of the rebate was 10, free ridership was 8%, and the respondent stated: "This amount would never have been taken care of without the rebate program to incentivize ownership."

Table 7. Confidence / Precision Results for Participants

Category	Precision at 90% Confidence Interval
Total Participant Population	7.5%

Source: Guidehouse analysis of data from surveys conducted with 2018 & 2019 Peoples Gas / North Shore Gas Business Prescriptive Program participants and trade allies.

Combining Participant and Trade Ally Free Ridership Scores

The TRM suggests trade ally perspectives of participant free ridership and spillover be combined with participant perspectives *where trade allies play a prominent role in delivering the energy efficiency measure and promoting the program*. Customers and trade allies do not always interact with the rebate program in the same way, however, we observed only about 5% of projects were described as “self-installed” without naming a trade ally.

All four trade allies responded to questions about the influence on the program on their ability to sell energy efficient products and services to their customers, and their responses are summarized by the resulting NTG score.

The TRM recommends the following triangulation weighting approach as a method to combine participant and trade ally perspectives of the free ridership present in the program.

We weighted the following items according to our analysis of the results:

1. How likely is the approach to provide an accurate estimate of free ridership?
 - a. We assigned the participant response a value of 70% because we followed the TRM approach which is considered the most appropriate approach at the time of development based on the IL NTG working group and SAG perspectives. However, the findings of our consistency check analysis indicate that some respondents do not understand the intent of the survey questions.
 - b. We assigned the trade ally a value of 40%, because the TRM does not currently contain a standardized approach for measuring free ridership from trade allies – this is a new approach in Illinois that has not been reviewed or refined yet through the NTG working group process.
2. How valid is the data collected / analysis?
 - a. We assigned the participant response a value of 70%, because we followed the TRM approach. However, there was sample frame bias due to the challenge of reaching and interviewing respondents during Covid-19. The three participants from 2018 may have recall bias for a survey fielded in Q3 2020 – their free ridership was slightly lower than the average for 2019 participants.
 - b. We assigned the trade ally results a value of 40%. Factors that lower this score are potential non-response bias and quantitative estimates from trade allies that rely on best estimates made at the time of the call rather than historical record keeping.
3. How representative is the sample?
 - a. We assigned the participant results a rank of 47%, because this is the amount of program savings represented by the responding participants.
 - b. We assigned the trade ally results a rank of 38%, because this is the amount of program savings represented by the responding trade allies.

The weighting values and results are summarized below in Table 8.

Table 8. Triangulation Weighting Approach for Non-Steam Trap Participant and TA Free Ridership Perspectives.

NTG Triangulation Data and Analysis	Participants	Trade Allies
1. How likely is this approach to provide an accurate estimate of free ridership?	70%	40%
2. How valid is the data collected / analysis?	70%	40%
3. How representative is the sample?	47%	38%
Average Score	62%	39%
Sum of Averages	101%	
Weight	61%	39%

Source: Guidehouse analysis of data from surveys conducted with 2018 & 2019 Peoples Gas / North Shore Gas Business Prescriptive Program participants and trade allies

The triangulation of participant and trade ally scores result in the following combined weighted free ridership value for the Business Prescriptive Program (Table 9).

Table 9. Free Ridership, Spillover, and Weighted Average Free Ridership

Sector	Participant Score	Trade Ally's Perspective of Participant Score	Weighted Average
Free Ridership	0.27	0.13	0.22
Spillover	0.11	0.08	Not applicable*

* Participant and trade ally spillover estimates are not additive or weighted. Instead, the results are reviewed for double counting and the most representative estimate is selected.

Source: Guidehouse analysis of data from surveys conducted with 2018 & 2019 Peoples Gas / North Shore Gas Business Prescriptive Program participants and trade allies.

Table 10 below summarizes our recommendations of NTG values for the Business Prescriptive program for 2021.

Table 10. Recommended NTG Values for Business Prescriptive Program

Measure Group	Free Ridership	Participant Spillover	Non-Participant Spillover*	NTG
All Measures	0.22	0.11	0.02	0.91

*http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Corrected_NTG_Values/PGL_NSQ_NTG_History_and_2019_Recommendations_Faucet_Aerator_and_Showerhead_Correction_2019-04-12.pdf. Non-participant spillover from GPY2 research consisted of interviews with five non-participating trade allies that identified quantifiable spillover. The spillover measures identified were furnace, boilers, boiler controls, and water heater measures, and the savings is relative to overall program participation. Since the 2018-2019 participant spillover is based on steam traps, we conclude there is no double counting.

Source: Guidehouse analysis

This survey research did not include Public Sector Prescriptive projects, which accounted for approximately 16% of Prescriptive Rebate program savings in 2018 and 2019. We plan to conduct a separate survey as 2020 research with the relatively small number of Public Sector participants that participate in multiple programs. We recommend the results for the business participants be used for the public sector until new research is completed, for the following reasons:

- Most of the 2018-2019 Public Sector savings (89%) are steam trap and boiler tune-up projects. Those measures are well covered by C&I participant results.
- The C&I participant results included federal government and non-profit institutions that face similar barriers and decision-making influences as the Public Sector (as defined by FEJA).
- Two of the four trade allies we interviewed for the C&I sector free ridership and spillover also completed projects in the Public Sector in 2018 and 2019.
- We want to exclude legacy DCEO projects and relationships from our research samples as they are not representative of utility-administered program delivery going forward. Public Sector customers participate in multiple programs, specifically Custom and Prescriptive Rebates, but are a small proportion of those program savings. A separate, dedicated, survey is more likely to accommodate their unique characteristics.
- A small number of Public Sector participants contribute a large portion of total Public Sector savings, and these customers participated in multiple programs (such as prescriptive and custom). We would like to reduce respondent fatigue by contacting them one time to represent all programs they participated in. For example, the City of Chicago, Chicago Transit Authority, and Chicago Public Schools accounted for 70% of the Public Sector savings in 2018 and 2019.

APPENDIX 1: BUSINESS PRESCRIPTIVE NTG HISTORY

Source:

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Corrected_NTG_Values/PGL_NSQ_NTG_History_and_2019_Recommendations_Faucet_Aerator_and_Showerhead_Correction_2019-04-12.pdf

Business and Public Sector Programs Prescriptive Rebate

	NTG 0.43; Free ridership 0.57; Participant Spillover 0.00
GPY1	Method and Source: Evaluation research consisting of participating customer self-reports: 37 NTG interviews completed covering 40 projects from a population of 137 projects. No quantifiable participant spillover was found from customer self-reports. Customer participant self-reported free-ridership was 57 percent.
	NTG 0.63; Free ridership 0.41; Participant Spillover 0.02; Non-Participant Spillover 0.02
GPY2	Method and Source: Evaluation research consisting of GPY2 participating customer self-reports, GPY2 participating trade ally self-reports, and non-participating trade ally self-reports. Free-ridership of 41% and participant spillover of 0.1% from 58 participating customer NTG interviews completed covering 127 projects from a population of 793 projects. Participant spillover of 2% from 9 participating trade ally interviews. Nonparticipant spillover of 2% from 5 non-participating trade ally interviews.
	NTG 0.63; Free ridership 0.41; Participant Spillover: 0.02; Non-Participant Spillover: 0.02
GPY3	Method and Source: Deemed by SAG consensus from GPY2 evaluation research.
	NTG 0.58; Free ridership 0.45; Participant Spillover: 0.01; Non-Participant Spillover: 0.02
GPY4	Method and Source: Based on GPY2 evaluation research, with minor adjustments based on consideration of planned measure mix.
	NTG 0.63; Free ridership 0.41; Participant Spillover: 0.02; Non-Participant Spillover: 0.02
GPY5	Method and Source: Based on GPY2 evaluation research of the C&I Prescriptive Program, but with no adjustments for a forecasted measure mix.
	NTG: 0.79 Free ridership: 0.23 Participant Spillover: 0.00 Non-Participant Spillover: 0.02
GPY6	Method and Source: Evaluation research consisting of GPY4 participating customer self-reports, and GPY4 participating trade ally self-reports. Free-ridership of 23% and participant spillover of 0% from 21 participating customer NTG interviews completed from a population of 49 (a relative precision of $\pm 13\%$ at a 90% confidence level). Participant spillover of 0% from 8 participating trade ally interviews. Non-participant spillover of 2% from 5 non-participating trade ally interviews conducted in GPY2 as part of evaluation research.
2018 (GPY7)	NTG: 0.79 Method: No new research. Retained GPY6 final value.
2019	NTG: 0.79; Free Ridership 0.23; Non-participant Spillover: 0.02 Method: No new research. FR, PSO (IL EM&V GPY4), NPSO (IL EM&V GPY2)
2020	NTG: 0.79; Free Ridership 0.23; Non-participant Spillover: 0.02 Method: No new research. FR, PSO (IL EM&V GPY4), NPSO (IL EM&V GPY2)
	NTG: 0.91; Free Ridership 0.22; Spillover: 0.11; Non-participant Spillover: 0.02
2021	Method: Evaluation research consisting of 2018 and 2019 participating customer and trade ally self-reports. Free-ridership of 27% and participant spillover of 11% from 20 participating customer NTG interviews completed from a population of 80 (a relative precision of 7.5% at the 90% confidence level). Free Ridership of 13% and participant spillover of 8% from 4 participating trade ally interviews (representing 38% of program savings). Final free ridership value of 22% weighted average of 61% customer value and 39% trade ally value. The trade ally spillover of 8% was not applicable in preference for the 11% customer participant value (to exclude the potential for double counting). Non-participant spillover of 2% from 5 non-participating trade ally interviews conducted in GPY2 as part of evaluation research, no double counting with participant spillover due to different measure types.