Guidehouse
Outwit *Complexity*

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Re: Net-to-Gross Research Results for the ComEd Small Business Program - Final

1. Executive Summary

This memo presents findings from the net-to-gross (NTG) study of the ComEd Small Business Program. The NTG results for this program are based on the NTG algorithms specified in the Illinois Technical Reference Manual (TRM) version 11.0 and rely on free ridership (FR) and spillover (SO) research gathered via an online survey. The survey was administered to two populations, including Small Business Program purchasers to assess the participant perspective, and with Small Business Program Energy Efficiency Service Providers (EESPs) to assess the trade ally[1] perspective. The participant and trade ally free ridership surveys covered participants in the CY2022 program. The participant spillover survey covered customers who participated in CY2021 and first half of CY2022, and the trade ally spillover covered qualified respondents that generated savings in CY2022.

Table 1 summarizes the Small Business Program FR and SO research findings based on the participant and trade ally research. It also includes results from past research for kits. The NTG ratio of 0.94 for all measures except thermostats and kits is a blended value of the participant and trade ally NTG results. The NTG ratio of 0.99 for thermostats is based on a formula using the researched value for other measures.[2] Guidehouse expects to recommend to the Illinois Stakeholders Advisory Group (SAG) these values be used for this program in CY2024.

[1] In this memo we use the terms "trade ally" to refer to the distributors who help deliver the program. ComEd also refers to these distributors as Energy Efficiency Service Providers (EESP).

[2] The equation for thermostats is: 1 – (current research free ridership * 0.5) + nonparticipant spillover. Details are provided in the Appendix.

Table 1. Net-to-Gross Research Results for Small Business Program

Program Measure	Free Ridership	Spillover	NTG Ratio*
All measures except thermostats and kits	0.11	0.05	0.94
Thermostats †			0.99
Kits ‡			0.94

* Numbers may not sum due to rounding.
† By formula: 1 – (current research free ridership * 0.5) + nonparticipant spillover
‡ Values from previous research.
Source: Evaluation team analysis

2. Free Ridership and Spillover Research Sample Disposition

The participant and EESP web surveys were fielded by Guidehouse using Qualtrics web survey software. Two waves of survey invitations were emailed to Small Business customers who bought program incentivized measures in either the 12 months of CY2022 (Wave 1) and the first quarter of 2023 (Wave 2). Links to web surveys were emailed to all Small Business EESP who sold program measures in CY2022. To maximize survey response rates, ComEd emailed all participants and trade allies included in the survey samples prior to survey launch to alert them of the data collection activity and request their cooperation completing the survey. After the first survey emailing for each wave, two additional reminders were emailed to encourage completion of the web survey.

Table 3 presents the sample disposition for the two categories of web surveys.

Table 2. Free Ridership Sample Disposition

Category	Sample of Unique Participants	Target Completes	Actual Completes	Analysed Completes	Response Rate	Respondent Share of Program Savings (kWh)
Participant	1,980	100	92	92	5%	6%
Trade Ally	75	36	38	38	51%	60%

Source: Evaluation team analysis

Table 3. Spillover Sample Disposition

Category	Sample of Unique Participants	Target Completes	Actual Completes	Made Additional Efficiency Improvements	Qualified for Spillover	Share of Program Savings Represented by Qualified Spillover Participant
Participant	2576	100	126	16	10	1%
Trade Ally	75	36	38	8	8	25%

Source: Evaluation team analysis

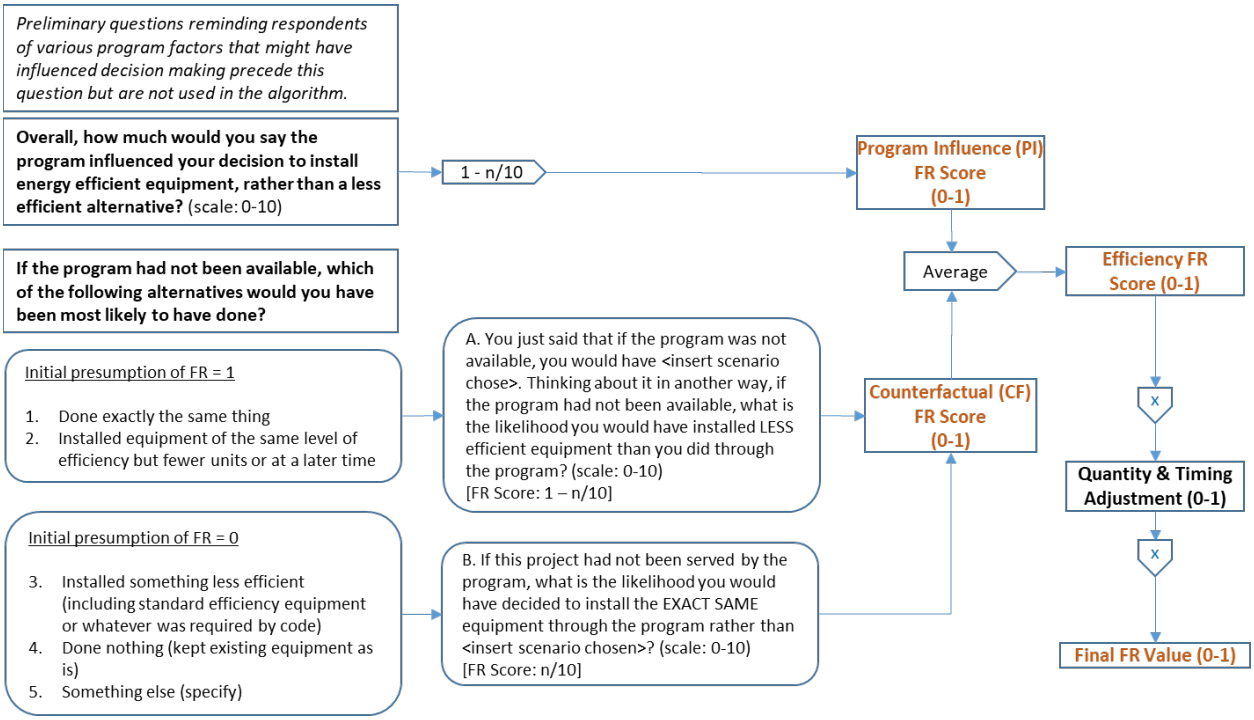
3. Free Ridership and Spillover Protocols

The evaluation team applied the participant FR, SO, and trade ally protocols from the TRM v11.0, developed by the Illinois SAG NTG Working Group. The results from the two sets of surveys were combined using the methodology laid out in TRM v11.0 Section 5.1, "Combining Participant and Trade Ally Free Ridership Scores."

3.1 Participant Free Ridership Estimation

Figure 1 describes the Core Free Ridership Algorithm for participant FR developed by the Illinois SAG NTG Working Group that the evaluation team used to calculate FR for the Small Business participant surveys.

Figure 1. Small Business Core Free Ridership Algorithm

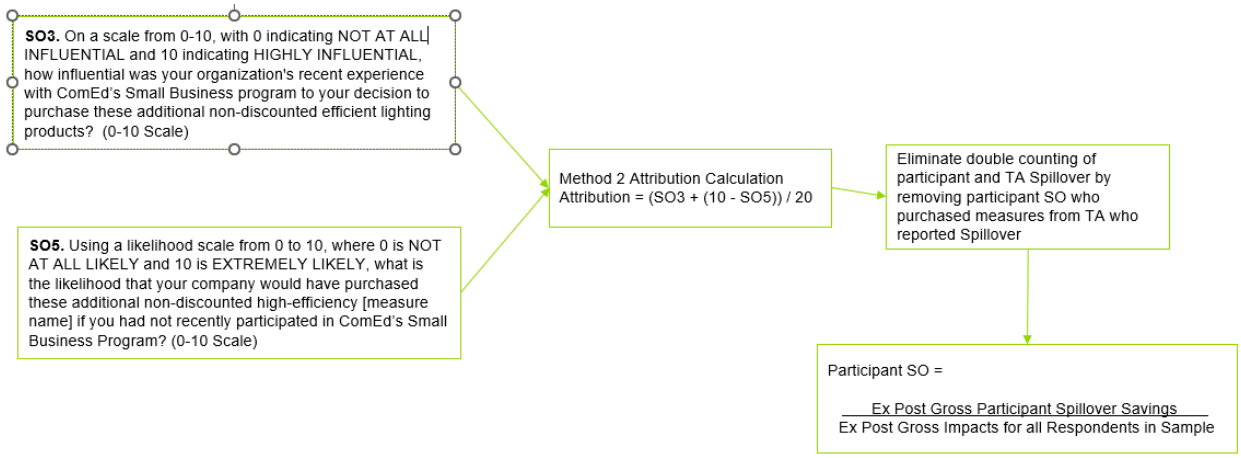


Source: Guidehouse interpretation of SAG NTG WG Consensus of participant Core FR algorithm applied to distributors, Fall 2022

3.2 Participant Spillover Estimation

Guidehouse calculated participant spillover based on TRM v11.0 Section 3.2.1, "Core Non-Residential Participant Spillover Protocol," summarized in Figure 2.

Figure 2. Core Non-Residential Participant Spillover Protocol

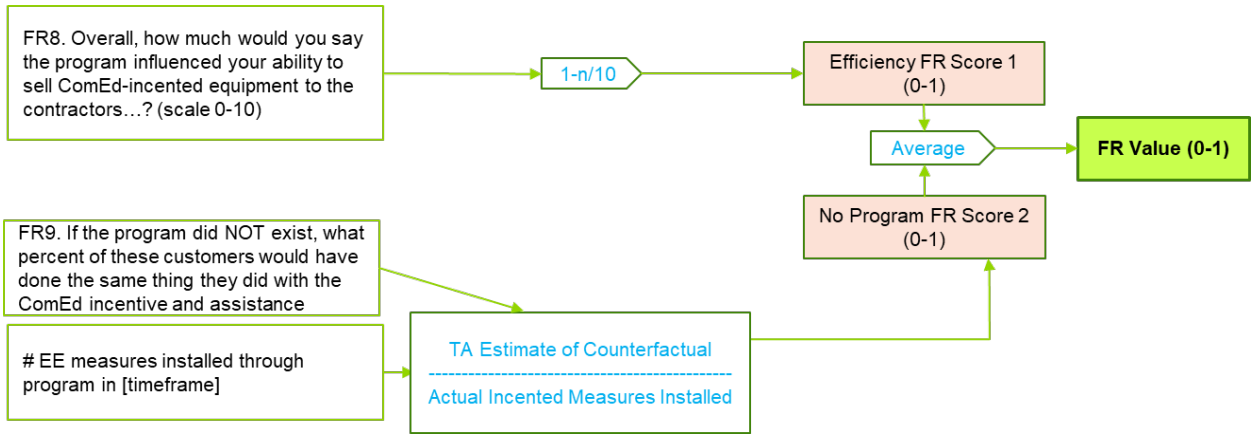


Source: Evaluation team representation of Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 11.0, Volume 4: Cross-Cutting Measures and Attachments

3.3 Trade Ally Free Ridership Estimation

TRM v11.0 does not specify an approach for measuring the trade ally perspective of participant FR. For this study, Guidehouse used the following method to assess participant FR from a trade ally perspective. This methodology is summarized in Figure 3 below.

Figure 3. Trade Ally Free Ridership Protocol

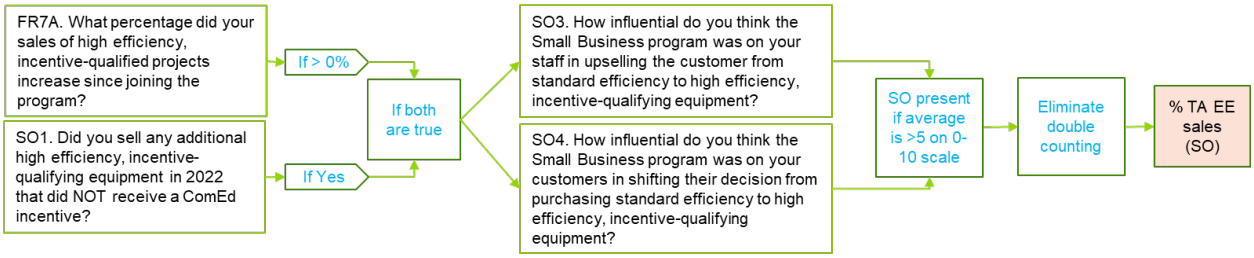


Source: Guidehouse interpretation of SAG NTG WG Consensus of participant Core FR algorithm applied to distributors, Fall 2022

3.4 Trade Ally Spillover Estimation

The evaluation team quantified the trade ally's perspective of participant spillover using the methodologies laid out in IL TRM v11.0. We assessed trade ally spillover by estimating the increase in sales of high efficiency lighting measures that are influenced by the program but not rebated, as Figure 4 shows.

Figure 4. Trade Ally Spillover Protocol



Source: Guidehouse diagram of Trade Ally Spillover Research from IL TRM v 11.0

The process to calculate spillover from the trade ally perspective includes the following steps (as defined in the TRM v11.0, Volume 4, Section 5.2.1):

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

$$\text{\% of TA's High Efficiency Sales that Received Incentive} = \frac{\text{\% High efficiency that DID receive a program incentive}}{\text{\% High efficiency that DID receive a program incentive + \% High efficiency that did NOT receive a program incentive}}$$

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

$$\text{Spillover Savings} = \frac{\text{Savings from Program Database}}{\text{\% of TA's High Efficiency Sales that Received Incentive}} - \text{Savings from Program Database} * \text{Size Adjustment (if applicable)}$$

Guidehouse believes the TRM algorithm (2) above needs a parenthesis added to the subtraction part, after which the adjustment factor is multiplied. We believe the algorithm was intended to be as follows, as was used in this research analysis. Therefore, we recommend the following to the SAG for consideration.

$$Savings\ of\ Non-Incented\ High\ Efficiency\ Equipment = \left(\frac{Savings\ from\ Program\ Database}{\%\ of\ TA's\ High\ Efficiency\ Equipment\ that\ Received\ Incentive} - Savings\ from\ Program\ Database\right) * Size\ Adjustment$$

3. Develop the spillover ratio for sampled trade allies by summing individual trade ally spillover savings and dividing that total by Small Business 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 Small Business 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 Small Business Program savings.

4. Participant and Trade Ally Free Ridership Results

Using the protocols detailed above and data collected during the participant and trade ally surveys, FR estimates were calculated for the Small Business Program participants and trade allies. Table 4 below presents the FR estimates and the relative precision of the estimates. As this table shows, participant-based FR estimates varied across strata, ranging from 0.12 to 0.16 with a weighted average of 0.13. The trade ally-based FR estimates were relatively lower, ranging from 0.06 to 0.12 with a weighted average value of 0.09. The difference between the participant and trade ally overall FR estimates was 0.04. The combined weighted FR value was 0.11 (see page 7 for details of combined participant and trade ally FR estimate).

Table 4. Participant and Trade Ally Free Ridership Research Results

Population	Strata	Free Ridership	Relative Precision @90% CI
Participant	Large	0.132	8%
	Medium	0.156	8%
	Small	0.121	3%
Overall Participant FR		**0.132**	**3%**
Trade Ally	Large	0.100	3%
	Medium	0.061	5%
	Small	0.122	5%
Overall Trade Ally FR		**0.092**	**3%**
Combined Results		**0.109**	**3%**

Source: Evaluation Team Analysis

4.1 Free Ridership Consistency Check Analysis

The evaluation team checked for consistency in free rider responses. Respondents were asked to describe in their own words any influence that the ComEd Small Business Program had on their decision to implement the measures at their facilities, or what they would have done if the program, and its technical assistance and financial incentives, did not exist (see Figure 1).

According to the IL TRM v12.0, Attachment A, Section 3.1.1.1.4 (Page 23), a program Influence/Counterfactual consistency check is triggered when either of the following conditions are met:

A Program Influence/Counterfactual consistency check is triggered when either of the following conditions are met:

1) The Program Influence FR Score is greater than 0.7 AND the Counterfactual FR Score is less than 0.3.

OR

2) The Program Influence FR Score is less than 0.3 AND the Counterfactual FR Score is greater than 0.7.

For respondents that failed the consistency checks, the evaluation team reviewed the verbatim responses to determine the weight of the program influence against the counterfactual responses and timing adjustments to arrive at a free ridership score.

The evaluation team determined that 11 of the 92 participant respondents failed the consistency check, which triggered a detailed review of the verbatim responses. Nine out of the 11 respondents gave answers to the verbatim question that were inconsistent with their Counterfactual score. As a result, and in accordance with the TRM, the evaluation team removed the Counterfactual score from the calculation (which means the Program Influence scores drove the free ridership score (since the respondents mentioned verbatim that program incentives were key for installing their projects).

The evaluation team found no inconsistencies in the verbatim responses for the trade ally free ridership and so did not adjust scores for that calculation.

5. Combining Participant and Trade Ally Free Ridership

Guidehouse calculated a combined participant and trade ally FR estimate utilizing the triangulation approach outlined in IL TRM v11.0 (Section 5.1 Volume 4). This approach calculated a weighted average of the participant and trade ally FR results using the weighting approach shown in Table 5 below.

This approach rates the participant and trade ally survey data on three aspects: accuracy, validity, and representativeness, using a scale where 100% means "extremely so" and 0% means "not at all."

1. **Accuracy**: How likely is the approach to provide an accurate estimate of FR?
    a. We calculated the participant and trade ally portions (50% and 50%, respectively) based on a comparison of the relative precision (RP) associated with the participant and trade ally FR estimates. Each share was calculated as: Participant or Trade Ally RP/sum of (Participant RP + Trade Ally RP)
2. **Validity**: How valid are the data collected and analysis?
    a. We assigned the participant portion a score of 80% because we followed the TRM approach. However, the 5% response rate may have produced some nonresponse bias.
    b. We assigned the trade ally portion a score of 80% because we followed the TRM approach. The response rate was very high at 51%, and the responses are quantitative estimates that rely on best estimates covering an entire program year made at the time the survey was completed.
3. **Representativeness**: How representative is the sample?
    a. We assigned the participant portion a score of 6%, which is the percentage of Small Business Program savings represented by the participants who responded to the participant survey.
    b. We assigned the trade ally portion a score of 60%, which is the percentage of program savings represented by the trade allies who responded to the trade ally survey.

Table 5. Free Ridership Triangulation Weighting Approach for Small Business Program

Free Ridership Triangulation Data and Analysis	Participant	Trade Ally
How likely is this approach to provide an accurate estimate of free ridership?	50%	50%
How valid is the data collected/analysis?	80%	80%
How representative is the sample?	6%	60%
Average Score	45%	63%
Sum of Averages	109%	
Weight	42%	58%

Source: Evaluation Team analysis

Applying these participant and trade ally weights to the FR estimates yields the blended FR estimates shown in the equation below.

$$\begin{aligned} &Free\ Ridership \\ &\quad = (Participant\ FR) * (Participant\ Weight) + (EESP\ FR) * (EESP\ Weight) \\ &\quad = 0.132 * 0.42 + 0.092 * 0.58 \\ &\quad = 10.9\% \end{aligned}$$

The evaluation team used this formula to combine the 13.2% (0.132) participant free ridership with the 9.2% (0.092) service provider free ridership to produce the combined free ridership of 10.9%.

6. Participant and Trade Ally Spillover Results

Of the 126 participant survey respondents included in the participant spillover analysis, 36 reported that they had installed additional energy efficient measures and of those, 16 indicated they had not received program incentives or influence. Of the 16, 10 passed the spillover screening criteria[3] and the evaluation team estimated gross energy savings from these non-rebated spillover measures at 72,395 kWh. The gross energy savings of the 126 participants who responded to the survey was 5,601,001 kWh, which resulted in a participant spillover rate of 1.3%.

Of the 38 trade allies included in the trade ally analysis, 13 reported selling additional non-program incented high efficiency lighting measures. Eight of these 13 passed all spillover screening criteria and the estimated gross energy savings from these non-rebated spillover measures was 5,769,111 kWh. The gross energy savings from the 38 trade allies who responded to the survey was 150,030,371 kWh which resulted in a trade ally spillover rate of 3.8%.

To ensure that spillover from the participant and trade ally sources did not lead to double counting, the evaluation team examined the data to exclude any reported spillover transactions from participants who purchased their measure from a trade ally who reported spillover. We found no participant who qualified for spillover was a customer of the qualified trade ally spillover respondents.

Table 7 presents the participant and trade ally spillover results, as well as the total spillover calculated, which is the sum of those results. This is then combined with the FR rate to estimate the NTG ratio.

Table 6. Spillover Research Results

Population	Spillover Results
Participant Spillover	0.013
Trade Ally Spillover	0.038
Total Spillover	0.051

Source: Evaluation Team Analysis

[3] Respondents who did not receive a rebate or received a rebate but not from ComEd and answers to the program influence and counterfactual questions resulted in a spillover score greater than 5.

7. Final NTG Results and Recommendations

The final NTG value is calculated as 1- free ridership + spillover, using savings-weighted values from participants and trade allies using the following formula:

$$NTG = 1 - [(Participant\ FR * Participant\ Weight) + (EESP\ FR * EESP\ Weight)] + Participant\ Spillover + EESP\ Spillover$$

The final, combined components of the NTG are shown in Table 8 . The table also shows recommended NTG values for the small business kits and thermostat measures.

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

Program Measure	Participant Free Ridership	Participant Spillover	Trade Ally Free Ridership	Trade Ally Spillover	NTG Ratio*
All measures except thermostats and kits	0.132	0.013	0.092	0.038	0.94
Thermostats †					0.99
Kits ‡					0.94

* Numbers may not sum due to rounding.
† By formula: 1 – (current research free ridership * 0.5) + nonparticipant spillover
‡ Values from previous research.

Source: Evaluation team analysis

APPENDIX A. Small Business NTG History

	Small Business Offer
EPY1	No Program
EPY2	No Program
EPY3	No Program
EPY4	**Retroactive application of NTG of 0.95** **Free-Ridership 5%** **Spillover 0%** **Method**: Customer self-report. 84 NTG surveys completed from a population of 181. Basic method of NTG analysis was used. No spillover was found. Customer participant self-reported Free-Ridership was 17 percent for ComEd. Individual trade ally responses to Free Ridership questions were weighted by their respective fuel-specific program savings contributions and combined for a fuel-specific overall Free-Ridership rate. This approach resulted in an evaluation estimate of 5 percent Free-Ridership for electric measures and was used to calculate the NTG of 0.95 for this ComEd program.
EPY5	SAG Consensus: • 0.90

	Small Business Offer
EPY6	SAG Consensus: • 0.95
EPY7	**NTG: 0.95** No new NTG research in PY5. **Free Ridership: 5%.** Customer self-report survey. **Participant Spillover: 0%** Customer and trade ally self-report survey. **Nonparticipant Spillover: 0%** Trade ally survey Three small participant spillover projects were included in the ComEd NTGR, but the impact (about 0.003 added) was not significant at the two-digit level. Trade allies provided anecdotal evidence of non-participant spillover for electric measures, but they did not provide enough information to quantify it.
EPY8	**Recommendation** (based on average of PY7 Participant Survey & PY4 TA Interviews): **NTG: 0.91** **Free-Ridership**: 0.11 (based upon average of PY7 Participant Survey of FR 0.16 and PY4 TA Interviews FR 0.05) **Participant Spillover: 0.02** (based upon PY7 SO research) **Nonparticipant spillover: 0.0**
EPY9	**NTG: 0.89** **Free-Ridership: 0.11** **Participant Spillover: 0.02** (based on PY7 SO Research) **Nonparticipant spillover: 0.0** **NTG Research Source**: PY 7 Research – Free-Ridership and Spillover: Participant and TA self-report, real-time approach **Free-Ridership: 0.11** – (based upon average of PY7 Participant Survey of FR 0.16 and PY4 TA Interviews FR 0.05) **Participant Spillover: 0.02** (based upon PY7 SO research) **Nonparticipant spillover: 0.0**
CY2018	**NTG: 0.91** **Free-Ridership**: 0.11 **Participant Spillover**: **0.02** (based on PY7 SO Research) **Nonparticipant spillover: 0.0** **NTG Research Source**: PY 7 Research – Free-Ridership and Spillover: Participant and TA self-report, real-time approach **Free-Ridership: 0.11** – (based upon average of PY7 Participant Survey of FR 0.16 and PY4 TA Interviews FR 0.05) **Participant Spillover: 0.02** (based upon PY7 SO research) **Nonparticipant spillover: 0.0**
CY2019	**NTG: 0.92**

	Small Business Offer
	Free-Ridership: 0.10 - (based upon 46/54 participant/TA weighting from TRM v7 method applied to PY7 research) **Participant Spillover: 0.02** (based on PY7 SO Research) **Nonparticipant spillover: 0.0** **NTG Research Source**: Participant and TA self-report (real time) - FR & SO are based upon PY7 Participant Surveys and updated TA interviews (PY8)
CY2020	**NTG: 0.97** **Free-Ridership: 0.077** **Participant Spillover: 0.005** **Nonparticipant spillover: 0.04** **NTG Research Source:** CY2018 Participant self-report free ridership and spillover surveys.
CY2021	**Unchanged from CY2020** **NTG: 0.97** **Free-Ridership: 0.077** **Participant Spillover: 0.005** **Nonparticipant spillover: 0.04** **New for CY2021** **NTG Thermostats: 1.0** **Thermostat TRM savings is between net and gross so thermostat NTG defined as:** **1 – (free ridership * 0.5) + nonparticipant spillover** **NTG Research Source: CY2018** Participant self-report free ridership and spillover surveys.
CY2022	**NTG: 0.97 (All but Thermostat and Kits)** **NTG: 1.00 (Thermostat)** **NTG: 0.94 (SB Kits)** **Free ridership: 0.077 (All but Thermostat and Kits)** **Free ridership: (0.077)/2 (Thermostat)** **Free ridership: 0.19 (SB Kits)** **Participant Spillover: 0.005 (All but Thermostat)** **Spillover: 0.01 (Thermostat)** **Participant Spillover: 0.13 (SB Kits)** **Nonparticipant Spillover: 0.04 (All but Thermostat and Kits)** **Nonparticipant Spillover: 0.04 (Thermostat)** **Nonparticipant Spillover: N/A (SB Kits)**

	Small Business Offer
	Thermostats NTG: 1.00 **Thermostat TRM savings is between net and gross so thermostat NTG defined as: 1 – (free ridership * 0.5) + nonparticipant spillover** **NTG Research Source**: All including thermostats: CY2018 Participating customer survey **SB Kits:** CY2020 participating customer survey
CY2023	**NTG: 0.97 (All but Thermostat and Kits)** **NTG: 1.00 (Thermostat)** **NTG: 0.94 (SB Kits)** **Free ridership: 0.077 (All but Thermostat and Kits)** **Free ridership: (0.077)/2 (Thermostat)** **Free ridership: 0.19 (SB Kits)** **Participant Spillover: 0.005 (All but Thermostat)** **Spillover: 0.01 (Thermostat)** **Participant Spillover: 0.13 (SB Kits)** **Nonparticipant Spillover: 0.04 (All but Thermostat and Kits)** **Nonparticipant Spillover: 0.04 (Thermostat)** **Nonparticipant Spillover: N/A (SB Kits)** **Thermostats NTG: 1.00** **Thermostat TRM savings is between net and gross so thermostat NTG defined as: 1 – (free ridership * 0.5) + nonparticipant spillover** **NTG Research Source**: All including thermostats: CY2018 Participating customer survey **SB Kits:** CY2020 participating customer survey
CY2024	**NTG: 0.94 (All but Thermostat and Kits)** **NTG: 0.99 (Thermostat)** **NTG: 0.94 (SB Kits)** **Free ridership: participant (0.13), trade ally (0.09), the weighted combined value (0.11) (All but Thermostat) -** (based upon 42/58 participant/TA weighting from TRM v11 method applied to CY2022 research) **Free ridership: 0.11 * 0.5 (Thermostat)** **Free ridership: 0.19 (SB Kits)** **Participant Spillover: 0.01 (All but Thermostat and Kits)** **Spillover: 0.13 (SB Kits)** **Nonparticipant Spillover: 0.04 (All but Thermostat and Kits)**

	Small Business Offer
	Nonparticipant Spillover: 0.04 (Thermostat) **Nonparticipant Spillover: N/A (SB Kits)** **Thermostats NTG: 0.99** **Thermostat TRM savings is between net and gross, so thermostat NTG defined as: 1 – (free ridership * 0.5) + nonparticipant spillover** **NTG Research Source**: **All but Thermostat and Kits**: Participant and TA self-report (real time) - FR & SO are based upon CY2022 survey **Thermostats**: CY2018 Participating customer survey and CY2022 Participant survey **SB Kits**: CY2020 participating customer survey

Source: https://www.ilsag.info/wp-content/uploads/ComEd-NTG-CY2023-Recommendations-Final-2022-09-30.xlsx and current research