Guidehouse
Outwit *Complexity*

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CC: Elizabeth Horne, ICC; Jeff Erickson, Nishant Mehta, Christopher Frye, Guidehouse

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Date: September 7, 2023

Re: Net-to-Gross Research Results for the ComEd Instant Discounts Program - Final

1. Executive Summary

This memo presents findings from the net-to-gross (NTG) study of the ComEd Instant Discounts Program. The NTG results for this program are based on free ridership (FR) and spillover research gathered via web surveys with Instant Discounts Program purchasers to assess the participant perspective and web surveys with Instant Discounts Program distributors to assess the trade ally[1] perspective.

The NTG values were derived separately for the three primary measures sold through the program (LED bulbs, Linear LEDs [TLEDs], and LED fixtures). These results will inform Guidehouse's September 2023 recommendations to the Illinois Stakeholder Advisory Group (SAG) of NTG values to be used for this program in CY2024.

Table 1 summarizes the Instant Discount Program free ridership (FR) and participant spillover (SO) research findings based on the participant and trade ally research. These NTG ratios are blended values of the participant and trade ally NTG results. Table 2 below presents historical NTG estimates for LED bulbs, TLEDs and LED fixtures since CY2018. As this table shows the NTG for LED bulbs and TLEDs has continued to rise for CY2024 (based on both reductions in FR and increases in SO) and the NTG for LED fixtures has remained consistent.

Table 1. Net-to-Gross Research Results for Instant Discounts

Measure	Free Ridership	Participant Spillover	NTG Ratio*
LED Bulbs	0.25	0.19	0.95
Linear LEDs (TLEDs)	0.28	0.19	0.92
LED Fixtures	0.40	0.19	0.80

* Numbers may not sum due to rounding.

Source: Evaluation team analysis

[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).

Table 2. Historical Instant Discounts Net-to-Gross Estimates for LEDs

Measure	CY2024	CY2022/23	CY2021	CY2019/20	CY2018
LED Bulbs	0.95	0.84	0.72	0.83	0.78
Linear LEDs (TLEDs)	0.92	0.79	0.76	0.80	0.80
LED Fixtures	0.80	0.81	0.80	0.83	0.78

Source: Evaluation team analysis

2. Free Ridership and Spillover Research Sample Disposition

The participant and trade ally web surveys were fielded by Verdant Associates using Qualtrics web survey software. Two waves of survey invitations were emailed to Instant Discounts lighting purchasers who bought program incentivized LED bulbs, TLEDs, and LED fixtures in either the second half of 2022 (Wave 1) and the first quarter of 2023 (Wave 2). Links to web surveys were emailed to all Instant Discounts lighting distributors who sold program LED bulbs, TLEDs, or LED fixtures in CY2022. A census was conducted for both the participant and trade ally surveys. 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.

Across the two waves of participant surveys, 7,047 surveys were distributed to Instant Discounts purchasers, however 1,636 had an email address that was undeliverable. Of the 5,411 delivered surveys, 365 customers responded to the survey. During the data cleaning process 40 survey respondents were removed as they did not recall purchasing program bulbs and 51 survey respondents were removed as they did not complete the FR and spillover questions. This resulted in 274 survey responses being used in the NTG analysis.

Out of a census of 97 unique trade allies (distributors), we completed 64 web surveys representing 66% of the population of CY2022 program trade allies and accounted for 69% of CY2022 kWh savings. Table 3 presents the research sample disposition for the two categories of web surveys.

Table 3. Free Ridership and Spillover Research Sample Disposition

Category	Delivered Population	Sample	Actual Completes	Response Rate	Respondent Share of Program Savings (kWh)
Participant	5,411	Census	274	5%	4%
Trade ally	97	Census	64	66%	69%

Source: Evaluation team analysis

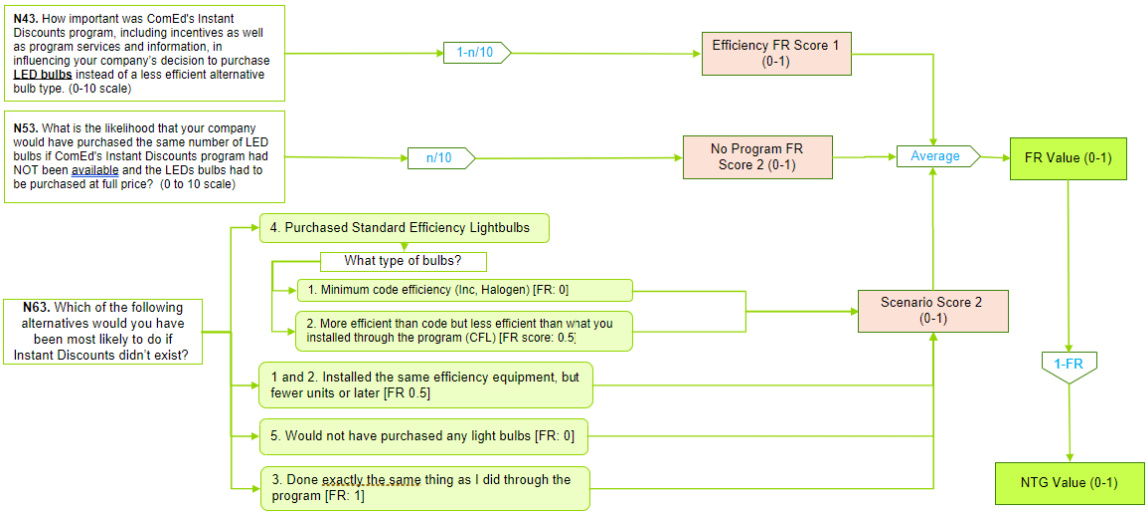
3. Free Ridership and Spillover Protocols

The evaluation team applied the participant FR protocols developed by the Illinois SAG NTG Working Group. The results from the two waves of surveys were combined using bulb type (LED, TLED, LED fixtures) energy savings weights that represented the proportion of the Instant Discounts Program year that the survey responses represented. Trade ally FR and participant and trade ally spillover were calculated using the protocols from the TRM v11.0. The team combined participant and trade ally perspectives on FR via 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 Instant Discounts participant surveys.

Figure 1. Instant Discounts Core Free Ridership Algorithm*



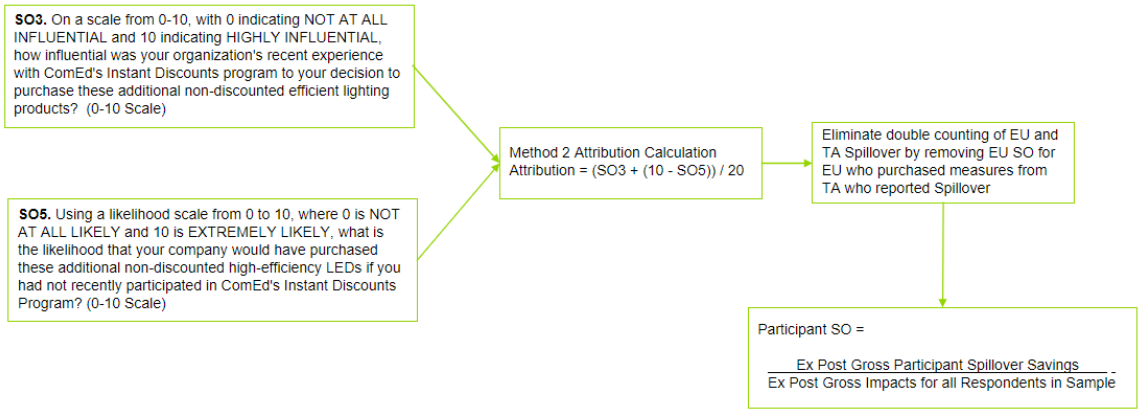
*Example given for LED bulbs

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

3.2 Participant Spillover Estimation

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

Figure 2. TRM v11.0 Section 3.2.1, "Core Non-Residential Participant Spillover Protocol"

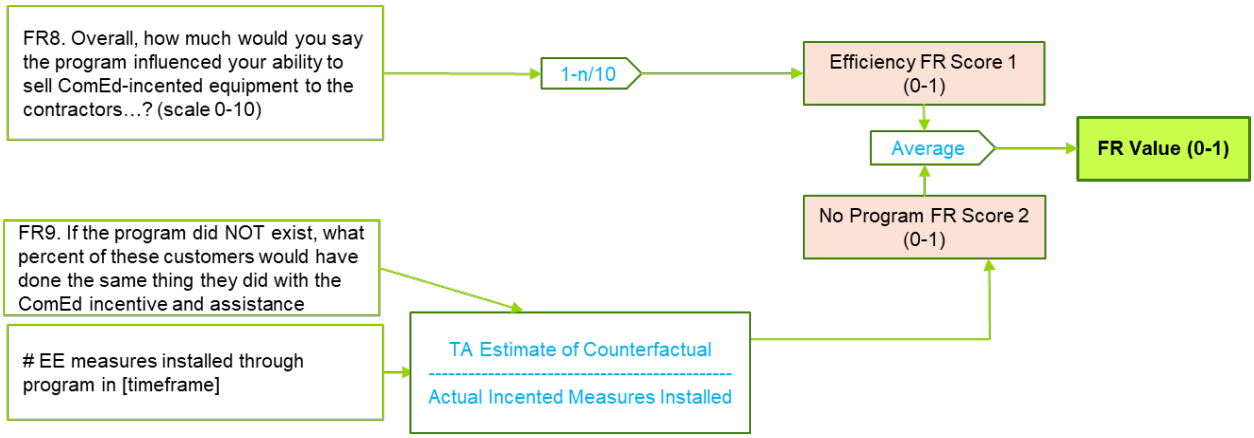


Source: Evaluation team representation of Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 11.0, Volume 4: Cross-Cutting Measures and Attachments

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

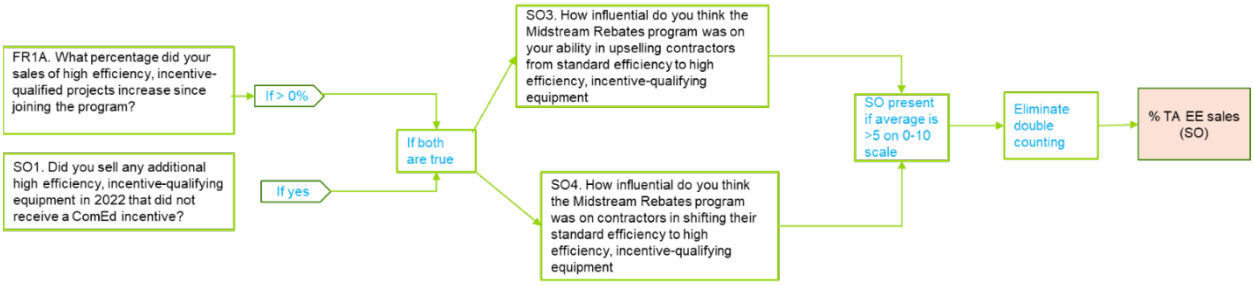


Source: Guidehouse interpretation of SAG NTG WG Consensus of participant Core FR algorithm applied to distributors, Fall 2022

3.4 Trade Ally Spillover Estimation

Verdant 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, 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.

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

3. Develop the spillover ratio for sampled trade allies by summing individual trade ally spillover savings and dividing that total by Instant Discount 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 Instant Discount 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 Instant Discount 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 each program measure researched (LED, TLED and LED fixtures). Table 4 below presents the measure-level FR estimates and the relative precision of the estimates for the two populations. As this table shows, participant-based FR estimates were similar across measures (ranging from 0.32 to 0.38), while trade ally-based estimates showed greater variance (ranging from 0.19 to 0.41). All FR estimates indicated a low to

moderate level of Free Ridership (0.19 to 0.41) and the maximum difference between the participant and trade ally FR estimates was 0.13 for LED bulbs.

Table 4. Participant Free Ridership Research Results

Measure	Population	Free Ridership	Relative Precision @90% CI
LED Bulbs	Participant	0.32	0.13
	Trade Ally	0.19	0.18
Linear LEDs (TLEDs)	Participant	0.33	0.10
	Trade Ally	0.24	0.15
LED Fixtures	Participant	0.38	0.19
	Trade Ally	0.41	0.13

Source: Evaluation Team Analysis

5. Combining Participant and Trade Ally Free Ridership

Verdant calculated a combined participant and trade ally FR estimate for each measure 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 (53% and 47%, 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 79%. While the response rate was very high at 66%, the responses provided by the trade ally portion are quantitative estimates that rely on best estimates covering an entire program year made at the time the survey was completed rather than historical record keeping.
3. **Representativeness**: How representative is the sample?
    a. We assigned the participant portion a score of 4%, which is the percentage of Instant Discounts Program savings represented by the participants who responded to the purchaser survey.
    b. We assigned the trade ally portion a score of 69%, which is the percentage of program savings represented by the trade allies who responded to the distributor survey.

Table 5. Free Ridership Triangulation Weighting Approach for Instant Discounts Program

Free Ridership Triangulation Data and Analysis	Participant	Trade Ally
How likely is this approach to provide an accurate estimate of free ridership?	55%	47%
How valid is the data collected/analysis?	80%	79%
How representative is the sample?	4%	69%
Average Score	46%	65%
Sum of Averages	111%	
Weight	41%	59%

Source: Evaluation Team analysis

Applying these participant and trade ally weights to the FR estimates yields the blended FR estimates shown in Table 6 below.

Table 6. Blended Free Ridership Results

Measure	Participant FR	Participant Weight	Trade Ally FR	Trade Ally Weight	Blended FR
LED Bulbs	0.32	41%	0.19	59%	0.25
Linear LEDs (TLEDs)	0.33	41%	0.24	59%	0.28
LED Fixtures	0.38	41%	0.41	59%	0.40

Source: Evaluation Team analysis

6. Participant and Trade Ally Spillover Results

Of the 274 participant survey respondents included in the participant spillover analysis, 82 reported that they had installed additional energy efficient lighting measures. Forty-five of these 82 passed the spillover screening criteria and the estimated gross energy savings from these non-rebated spillover measures was calculated to be 788,981 kWh. The gross energy savings of the 274 participants who responded to the survey was 8,314,981 kWh, which resulted in a participant spillover rate of 9.5% (excluding spillover captured by the trade ally respondents).

Of the 64 distributors included in the distributor analysis, 36 reported selling additional non-program incented high efficiency lighting measures. Sixteen of these 36 passed all spillover screening criteria and the estimated gross energy savings from these non-rebated spillover measures was 18,041,457 kWh. The gross energy savings from the 64 distributors who responded to the survey was 189,767,605 kWh, resulting in a distributor spillover rate of 9.5%.

Table 7 presents the participant and trade ally spillover results, as well as the total spillover calculated (additive) that is being applied to all research measures to estimate the NTG ratio.

Table 7. Participant Spillover Research Results

Population	Spillover Results
Participant Spillover	0.095
Trade Ally Spillover	0.095
Total Additive Spillover	0.19

Source: Evaluation Team Analysis

7. Final NTG Results and Recommendations

Table 8 summarizes Guidehouse's draft recommendations for the Instant Discounts Program to be used in 2024 based on the research presented in this memo.

Table 8. Summary of Free Ridership, Spillover, and NTG Research Results for the Instant Discounts Program

Measure	Free Ridership	Participant Spillover	Trade Ally Spillover	NTG
LED Bulbs	0.25	0.095	0.095	0.95
Linear LEDs (TLEDs)	0.28	0.095	0.095	0.92
LED Fixtures	0.40	0.095	0.095	0.80

NTG = 1 – FR + Participant Spillover + Trade Ally Spillover

Source: Evaluation Team analysis

APPENDIX A. Detailed NTG Results

A.1 Spillover Estimation

Spillover was calculated based on the data collected from participants (via the purchaser web surveys) and trade allies (via the distributor web surveys). To ensure that spillover from these two sources did not lead to double counting, the evaluation team excluded any reported spillover transactions from participants who purchased their bulbs from a lighting distributor who reported spillover.

Table 9 presents the number of participant and trade ally surveys completed, the number of survey respondents (of both types) that reported purchasing additional high efficiency lighting measures, the number of survey respondents (of both types) who met the spillover attribution threshold, the number of spillover measures for which savings were quantified, and the resulting spillover savings estimates. These two estimates were additive; thus, the overall spillover rate applied to estimate the final NTG estimate was 0.19.

Table 9. Spillover Research Results

Category	Surveys Completed	Respondents that Purchased/Sold Non-Program Lighting Measures	Respondents that Met Spillover Attribution	Spillover Rate
Participants	274	82	45	0.095
Trade Allies	64	36	16	0.095

Source: Evaluation team analysis

The evaluation team believes nonparticipant spillover is captured in the participant spillover results presented above (resulting from the distributor surveys). The Instant Discounts Program distributors include the majority of lighting distributors in the ComEd service territory. Thus, the estimate of spillover sales (non-incentivized high efficiency bulb sales that were influenced by the Instant Discounts Program) that these distributors provided encompassed bulbs sold to both participating and non-participating customers.

APPENDIX B. Instant Discounts NTG History

	Business Instant Discounts Program
PY1	NA No Program
PY2	NA No Program
PY3	NA Pilot Program – no data collection
PY4	**Retroactive application of NTG of 0.63** Free Ridership 0.39 Spillover 0.02 Method: Customer self-report. Fifty-one surveys completed from a population of about 5,000 (contact information available for only a small subset of participants). Eleven trade ally surveys were also conducted, resulting in an NTG of 0.56, but this result was not factored into the customer free ridership calculation.
PY5	Illinois SAG Consensus: • **Lighting: 0.74**
PY6	Illinois SAG Consensus: • **Lighting: 0.63**

	Business Instant Discounts Program
PY7	**NTG CFL: 0.64** (EPY4 and EPY5 weighted average. EPY5 CFL NTG is 0.66.) **NTG LED/HID: 0.70** **NTG Linear FL: 0.56** **NTG Other: 0.67** **Free Ridership:** CFLs 0.41; LEDs 0.38; Linear Fluorescents 0.47; Other 0.40. **Participant Spillover:** CFLs 0.07; LEDs 0.08; Linear Fluorescents 0.03; Other 0.07. **Nonparticipant Spillover:** Negligible. There are very few midstream lighting programs offered around the country and no research has been conducted on nonparticipant spillover for such a program. Given how this program is administered, it is likely that nonparticipant spillover would be very small. Source: PY5 participant and distributor self-report surveys. Notes: In PY5, Midstream Incentive Lighting was renamed BILD.
PY8	**Recommendation (based upon PY6 research):** **NTG CFL: 0.68**, Free Ridership: 0.39, Spillover: 0.07 **NTG LED/HID: 0.77**, Free Ridership: 0.30, Spillover: 0.07 **NTG Linear FL: 0.61**, Free Ridership: 0.45, Spillover: 0.07 **NTG Other: 0.67**, Free Ridership: 0.40, Spillover: 0.07 **NTG Research Sources:** 1. Customer self-report approach based on the end-user telephone surveys of 282 participants and in-depth interviews with nine BILD end-user participants. 2. Supplier self-reports based on in-depth interviews with program lighting distributors.
PY9	**NTG CFL:** 0.64, Free Ridership: 0.46, Spillover: 0.10 **NTG LED:** 0.78, Free Ridership: 0.32, Spillover: 0.10 **NTG Linear FL:** 0.75, Free Ridership: 0.35, Spillover: 0.10 **NTG Other:** 0.78, Free Ridership: 0.32, Spillover: 0.10 **NTG Research Sources:** PY7 Research – Free Ridership and Spillover: Customer self-report research via telephone and web surveys, plus web surveys sent to all participating distributors. Note: Recommended values are PY7 researched values (not 3-year averages).
CY2018	**NTG LED Lamps and Fixtures:** 0.78, Free Ridership: 0.32, Spillover: 0.10 **NTG Linear FL:** 0.75, Free Ridership: 0.35, Spillover: 0.10 **LED Exit Signs, Linear LED, Battery Chargers, and all "Other":** NTG of the default value of 0.80 until research can be done. **NTG Research Sources:** For LED Lamps and Fixtures and for Linear FL: PY7 Research – Free Ridership and Spillover: Customer self-report research via telephone and web surveys, plus web surveys sent to all participating distributors.

	Business Instant Discounts Program
CY2019/ CY2020	**NTG LED Lamps and Fixtures:** 0.83, Free Ridership: 0.31, Spillover: 0.14 **NTG Linear FL:** 0.67, Free Ridership: 0:47, Spillover: 0.14 **LED Exit Signs, Linear LED, Battery Chargers, and all "Other":** NTG of the default value of 0.80 until research can be done. **NTG Research Sources:** For LED Lamps and Fixtures and for Linear FL: PY9 Research – Free Ridership and Spillover: Customer self-report research via purchaser surveys and participating distributor surveys.
CY2021	**NTG LED Lamps:** 0.72, Free Ridership: 0.43, Spillover: 0.15 **NTG Linear FL:** 0.67, Free Ridership: 0:48, Spillover: 0.15 **NTG Linear LED:** 0.76, Free Ridership: 0:39, Spillover: 0.15 **LED Fixtures, Exit Signs, Battery Chargers, and all "Other":** NTG of the default value of 0.80 until research can be done. **NTG Research Sources:** For LED Lamps, Linear LEDs, and Linear FL: CY2019 Research – Free Ridership and Spillover: Customer self-report research via purchaser surveys.
CY2022/ CY2023	**NTG LED Lamps:** 0.84, Free Ridership: 0.30, Spillover: 0.14 **NTG Linear FL:** 0.67, Free Ridership: 0:48, Spillover: 0.15 **NTG Linear LED:** 0.79, Free Ridership: 0:35, Spillover: 0.14 **NTG LED Fixtures:** 0.81, Free Ridership: 0:33, Spillover: 0.14 **Exit Signs, Battery Chargers, and all "Other":** NTG of the default value of 0.80 until research can be done. **NTG Research Sources:** For Linear FL: CY2019 Research – Free Ridership and Spillover: Customer self-report research via purchaser surveys. For LED Lamps, Linear LEDs, and LED Fixtures: CY2020/CY2021 Research – Free Ridership and Spillover: Customer self-report research via purchaser surveys and CY2020 Distributor surveys.
CY2024	**NTG LED Lamps:** 0.95, Free Ridership: 0.25, Spillover: 0.19 **NTG Linear LED:** 0.92, Free Ridership: 0:28, Spillover: 0.19 **NTG LED Fixtures:** 0.80, Free Ridership: 0:40, Spillover: 0.19 **Exit Signs, Battery Chargers, and all "Other":** NTG of the default value of 0.80 until research can be done. **NTG Research Sources:** For LED Lamps, Linear LEDs, and LED Fixtures: CY2022/CY2023 Research – Free Ridership and Spillover: Customer self-report research via purchaser surveys and CY2022 Distributor surveys.

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