Memorandum

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CC: Jeff Erickson, Neil Curtis, Natasha Herring, Parini Shah, Guidehouse

From: Amy Buege, Ethan Barquest, Sarah Ardell, Verdant Associates

Date: August 27, 2025

Re: ComEd Retail Online Appliance Rebate Component Net-to-Gross Research Results

1. Executive Summary

This memo presents findings from the first and second waves of surveying for the net-to-gross (NTG) study of the ComEd Retail Online Program, Appliance Rebate Component.[1] The program component's NTG values are derived from Free Ridership (FR) and Participant Spillover (SO) research and data gathered via web surveys with Appliance Rebate participants who received rebates on qualifying appliances in the last quarter of 2022 through the first quarter of 2025. The survey was designed in accordance with the Illinois Technical Reference Manual version 13.0 and the deviation memo submitted to SAG.[2]

NTG values are derived separately for four distinct measures sold through the Appliance Rebate Component (Table 1). One wave of surveys was conducted to assess participant SO, and two waves of surveys were conducted to assess participant FR. FR results in this memo are presented for wave 1 and wave 2 separately (for informational purposes), however the final recommended NTG values are based on an average of the FR results from the two waves. The final values will be used to inform Guidehouse's September 2025 recommendations to the Stakeholder Advisory Group (SAG) for the NTG values to be used for this program component in CY2026.

Table 1 summarizes the Appliance Rebate Component's FR, SO, and NTG findings based on participant feedback from each wave of NTG surveying, as well as the recommended combined values. Table 2 provides historical NTG estimates for the Appliance Rebate Component back to PY8.

[1] Note: Spray foam are not included in this memo and will be presented through a separate study and memo.
[2] Wave 1 and Wave 2 FR algorithms differ slightly. Both are included in the SAG Deviation memo dated March 6, 2025. https://www.ilsag.info/wp-content/uploads/Guidehouse_SAG_Deviation-Memo-on-Residential-Freeridership-Protocol-2025-03-06.docx

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Table 1. Net-to-Gross Research Results for Appliance Rebates

Measure	Survey Wave	Free Ridership	Participant Spillover	NTG Ratio
Air Purifier	Wave 1	0.30	0.08	0.78
Clothes Washer	Wave 1	0.60	0.08	0.48
Dehumidifier	Wave 1	0.43	0.08	0.65
Smart Thermostat*	Wave 1	0.35	NA	0.82
Air Purifier	Wave 2	0.41	0.08	0.67
Clothes Washer	Wave 2	0.63	0.08	0.45
Dehumidifier	Wave 2	0.40	0.08	0.66
Smart Thermostat*	Wave 2	0.33	NA	0.83
Air Purifier	Combined	0.36	0.08	0.72
Clothes Washer	Combined	0.62	0.08	0.46
Dehumidifier	Combined	0.42	0.08	0.66
Smart Thermostat*	Combined	0.34	NA	0.83

Note: Wave 1 surveys were conducted in November 2024 with ComEd customers who purchased program incentivized measures between Q4 2023 and Q1 2024. Wave 2 surveys were conducted in May 2025 with ComEd customers who purchased program incentivized measures between the Q4 of 2023 and Q1 2025.
** By formula: 1 – (Current Research FR * 0.5) + Non-part spillover. Participant spillover is included in gross savings estimates and not added to the NTG Ratio. Per IL TRM V13 page 220 out of 553, footnote 704.*
Source: Evaluation Team Analysis.

Table 2. Historical and Current Net-to-Gross Estimates for Appliance Rebates

Measure	CY2026	CY2024-CY2025	CY2019-CY2023	CY2018	PY9	PY8
Air Purifier	0.72	0.83	0.79	0.74	0.78	0.78
Clothes Washer	0.46	0.55	0.63	0.58	0.68	0.68
Dehumidifier	0.66	0.65	0.67	0.78	0.78	
Smart Thermostat	0.83	0.93	0.80 cooling 0.90 heating			

Source: Historical ComEd-NTG-Recommendations workbooks and evaluation team analysis.

2. Free Ridership and Spillover Disposition

The evaluation team developed a web survey to collect survey responses. Two distinct and personalized surveys were administered to participants depending on when they purchased and received a rebate for a qualifying Appliance Rebate measure. A single wave of SO surveys was sent to Appliance Rebate participants who received a rebate during the last quarter of 2022 and first half of 2023. The first wave of FR surveys was sent to customers who received a rebate in the last quarter of 2023 or the first half of 2024. The second wave of FR surveys were sent to customers who were not sampled from the first wave of FR surveys as well as those who received ComEd rebates in the first four months of 2025. If an individual participated during both the SO and FR time periods, they were only included in the FR survey sample to avoid causing survey fatigue and customer dissatisfaction.

1.1 Free Ridership disposition

In the first wave of FR surveys, a total of 10,000 surveys were distributed, however, 181 survey invitations bounced due to an undeliverable email address. Of the 9,819 FR surveys delivered, 644 customers responded and provided complete data for at least one measure that could be used in the FR analysis. An additional 207 surveys were dropped from the analysis for the following reasons:

- 66 respondents recalled the rebate but only responded to the question embedded in the email invitation ("Do you recall receiving a ComEd rebate?"),
- 55 respondents did not recall receiving the rebate,
- 86 respondents did not provide responses to the FR questions.

In the second wave of FR surveys, a total of 7,176 surveys were distributed, however, 128 survey invitations bounced due to an undeliverable email address. Of the 7,045 FR surveys delivered, 584 customers responded and provided complete data for at least one measure that could be used in the FR analysis. An additional 173 surveys were dropped from the analysis for the following reasons:

- 83 respondents recalled the rebate but only responded to the question embedded in the email invitation ("Do you recall receiving a ComEd rebate?"),
- 56 respondents did not recall receiving the rebate, and
- 34 respondents did not provide responses to the FR questions.

The response rate across the two FR survey waves was 8% (all survey responses), with 7% being used in the NTG analysis. Table 3 summarizes the FR survey disposition for respondents.

Table 3. Free Ridership Respondent Survey Disposition

Measure	Survey Wave	Survey Sample	Surveys Completed	Completed Survey Response Rate	Included in NTG Analysis
Air Purifier	Wave 1	983	86	9%	84
Clothes Washer	Wave 1	5,746	297	5%	253
Dehumidifier	Wave 1	1,983	218	11%	213
Smart Thermostat	Wave 1	1,716	110	7%	106
Air Purifier	Wave 2	1,066	114	11%	114
Clothes Washer	Wave 2	2,970	215	7%	176
Dehumidifier	Wave 2	1,102	135	12%	127
Smart Thermostat	Wave 2	2,038	176	9%	167
Air Purifier	Combined	2,049	200	10%	198
Clothes Washer	Combined	8,716	512	6%	429
Dehumidifier	Combined	3,085	353	11%	340
Smart Thermostat	Combined	3,754	286	8%	273
Total	**Combined**	**16,995**	**1,339**	**8%**	**1,128**

Note: Respondents who did not recall receiving a rebate from ComEd were excluded from the analysis. Respondents were surveyed for up to three measures in the first survey wave. As a result, individual measure counts will not sum to the total.
Source: Evaluation Team Analysis.

Table 4 summarizes the FR survey disposition by measure analyzed, rather than the individual purchaser for the FR survey (as is shown in Table 3 above). Given that some individuals purchased more than one measure of the same or different type, Table 4 presents the share of measure sales represented in the analysis from both survey waves combined.

Table 4. Free Ridership Survey Measure Representation

Measure	Measure Population	Share of Program Measures Represented by Analyzed Responses
Air Purifier	10,854	2%
Clothes Washer	19,997	2%
Dehumidifier	17,044	2%
Smart Thermostat	6,633	4%
FR – Overall Program	**54,528**	**2%**

Source: Evaluation Team Analysis.

1.2 Spillover disposition

A total of 10,000 SO surveys were distributed to customers in the spillover sample, with 252 survey invitations bouncing due to an undeliverable email address. Of the 9,748 SO surveys delivered, 415 customers provided complete responses that could be used in the SO analysis. An additional 272 surveys were not included in the analysis for the following reasons:

- 79 respondents recalled the rebate but only responded to the question embedded in the email invitation ("Do you recall receiving a ComEd rebate?"),
- 158 did not recall receiving a ComEd rebate for the incentivized measure,
- 35 their responses were otherwise incomplete.

This resulted in an SO survey response rate of 6% (all survey responses) and a completion rate of 4% (analyzed completes).

Table 5 summarizes the disposition of SO survey respondents. The measures presented represent the program measures(s) purchased by the respondents. SO is estimated on a program-level basis as opposed to a measure-level basis, as a result more measures were included in the SO analysis than the FR analysis.

Table 5. Spillover Respondent Survey Disposition

Measure	Survey Sample	Surveys Completed	Completed Survey Response Rate	Included in NTG Analysis
Air Purifier	778	67	9%	56
Clothes Washer	4,723	247	5%	161
Dehumidifier	942	79	8%	66
Electric Clothes Dryer	983	70	7%	61
Heat Pump Dryer	167	12	7%	11
Induction Cooktop	378	48	13%	45
Refrigerator	3,982	218	5%	144
Smart Thermostat	1,149	38	3%	38
Ventilation Fan	102	5	5%	5
Water Dispenser	44	3	7%	2
Total	**9,748**	**573**	**6%**	**415**

Note: Respondents who did not recall receiving a rebate from ComEd were excluded from the analysis. Respondents were surveyed for up to three measures. As a result, individual measure counts will not sum to the total.
Source: Evaluation Team Analysis.

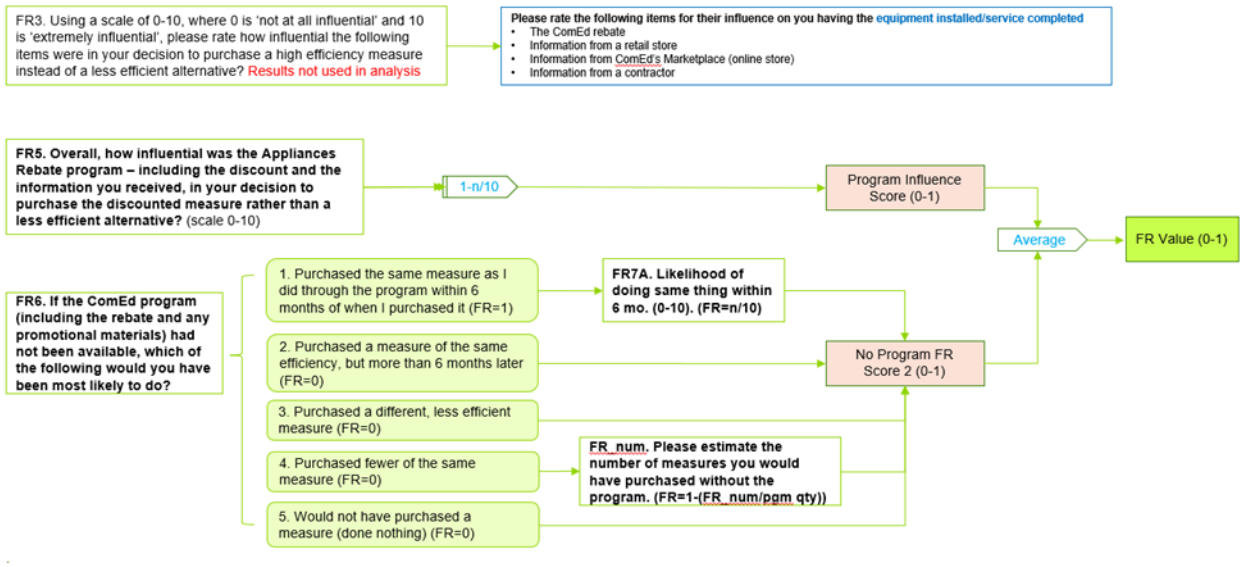
3. Free Ridership and Spillover Protocols

Below we present the FR and SO protocols used to estimate the NTG ratio for Appliance Rebate measures. The FR protocols changed between wave 1 and wave 2. At the time this research was being conducted the IL NTG Working Group was in active discussions to determine the best NTG methodologies and as such adjusted the recommended protocols. For both waves of surveys, the evaluation team employed the preferred protocols from the Working Group's discussions. Because these discussions had not yet led to a change in the TRM NTG algorithms, the protocols used by the evaluation team for Wave 1 and Wave 2 were documented in two deviation memos submitted to the IL SAG during the research time period as described below.

1.3 Participant Free Ridership Estimation

The FR algorithm used for Wave 1 of the research is outlined in Figure 1. This methodology was documented in a deviation memo submitted to the IL SAG on 10/30/2024. This memo outlined the evaluation team's plans to deviate from the IL TRM NTG method for the Retail Online program and the rationale for this deviation. The figure below was included in this deviation memo.

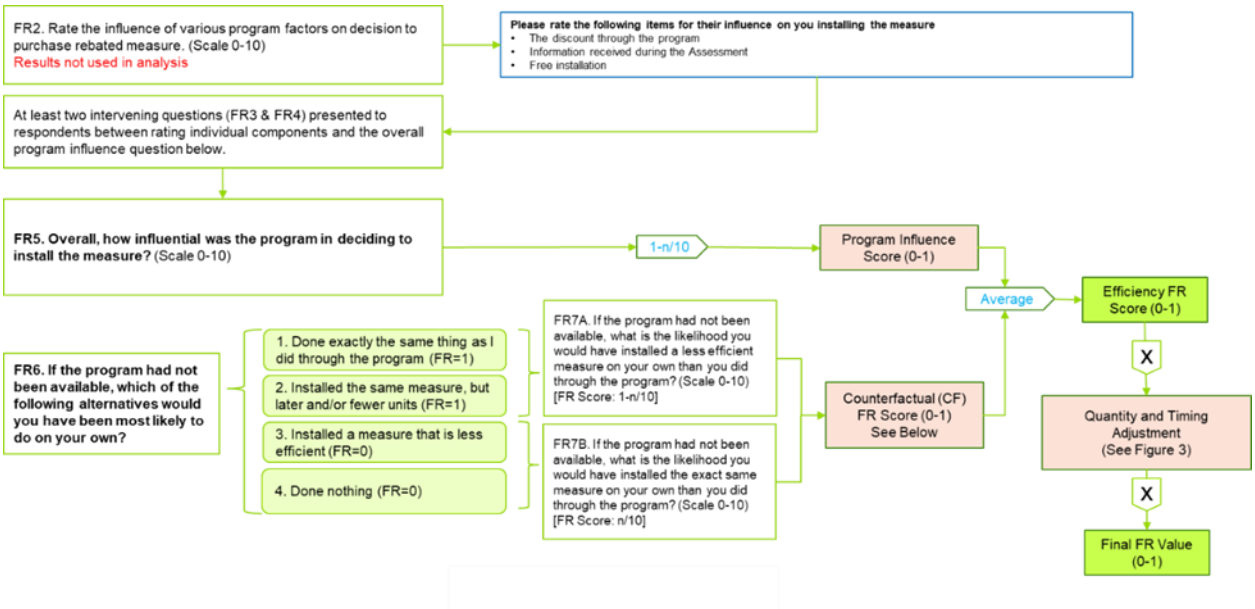
Figure 1. Free Ridership Algorithm – Wave 1 Survey



Source: Deviation memo submitted to SAG, October 30, 2024

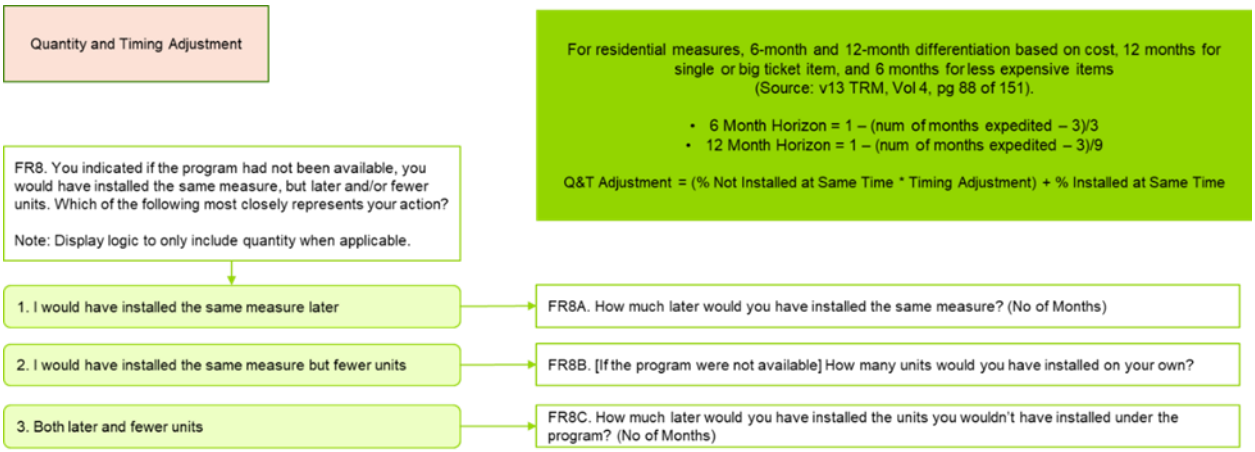
The FR algorithm used for Wave 2 of the research is outlined in Figure 2 and Figure 3 below. This methodology was documented in a second deviation memo submitted to the IL SAG on 3/6/2025. This memo outlined the evaluation team's plans to deviate from the IL TRM NTG method for the Retail Online program and the rationale for this deviation. The figures below were included in this deviation memo.

Figure 2. Free Ridership Algorithm – Wave 2 Survey



Source: Deviation memo submitted to SAG, March 6, 2025

Figure 3. Residential Free Ridership Quantity and Timing Adjustment –Wave 2 Survey



Source: Deviation memo submitted to SAG, March 6, 2025

1.4 Participant Spillover Estimation

The evaluation team calculated SO based on the methodology outlined in IL TRM v12. For a purchase to be considered spillover it must meet the following criteria:

1. Be a high efficiency measure
2. Not rebated by ComEd
3. Purchase decision must have been strongly influenced (spillover score > 5) by the Appliance Rebate component of the Retail Online Program

If these three criteria were met, participant spillover was calculated as dictated in the IL TRM using the following steps:

1. Calculate spillover savings for each surveyed participant installing an efficient measure not rebated through the program where the Spillover Score is greater than 5.
2. Calculate the total program savings for the surveyed participant population (regardless of whether they reported any spillover purchases).
3. Calculate the spillover percentage estimate as: Spillover Percentage Estimate = Sum of Spillover kWh savings / Sample Evaluated Program kWh savings.

4. Detailed NTG Results

The following section details NTG calculations and results for the Appliance Rebate Component.

1.5 Free Ridership Component Scores

Free Ridership (FR), program influence score (PI) and counterfactual score (CF) were calculated in alignment with deviation memos submitted to the IL SAG (Figure 1- Figure 3). Table 6 outlines the average PI

score, CF score, and FR score for each of the four measures researched as part of the Appliance Rebate component NTG surveying effort.

Table 6. Free Ridership Component Scores

Measure	Survey Wave	Average Program Influence Score	Average Counterfactual Score	Free Ridership
Air Purifier	Wave 1	0.24	0.37	0.30
Clothes Washer	Wave 1	0.43	0.76	0.60
Dehumidifier	Wave 1	0.29	0.56	0.43
Smart Thermostat*	Wave 1	0.29	0.42	0.35
Air Purifier	Wave 2	0.27	0.55	0.41
Clothes Washer	Wave 2	0.50	0.75	0.63
Dehumidifier	Wave 2	0.24	0.56	0.40
Smart Thermostat*	Wave 2	0.21	0.47	0.33
Air Purifier	Combined	0.26	0.46	0.36
Clothes Washer	Combined	0.47	0.76	0.62
Dehumidifier	Combined	0.27	0.56	0.42
Smart Thermostat*	Combined	0.25	0.44	0.34

** By formula: 1 – (Current Research FR * 0.5) + Non-part spillover. Participant spillover is included in gross savings estimates and not added to the NTG Ratio. Per IL TRM V13 page 220 out of 553, footnote 704.*
Source: Evaluation Team Analysis.

The evaluation analysis found that Smart Thermostat FR varied by the price paid purchasers after the rebate (based on program tracking data), as shown in Figure 4 and Figure 5. To ensure the FR scores accurately reflect the population of Appliance Rebates participants, average FR component scores were weighted by the ratio of Smart Thermostats purchased by survey respondents to the total quantity sold through the program in each price category during the FR analysis time period.

Figure 4. Smart Thermostat Free Ridership by Price Paid After Rebate – Wave 1

Note: Error bars represent +/- 1 Standard Error

Source: Evaluation team research

Figure 5. Smart Thermostat Free Ridership by Price Paid After Rebate – Wave 2

Note: Error bars represent +/- 1 Standard Error
Source: Evaluation team research

1.6 Spillover Estimation

Table 7 displays the additional energy efficiency improvements that respondents made due to the influence of the program. Analysis of the survey response data found 20 respondents that made 43 SO qualifying improvements (defined as high efficiency purchases that were not incentivized and were influenced by the ComEd program). To ensure the SO respondent data accurately reflects the population of Appliance Rebate participants, SO values were weighted by the ratio of the quantity of program measures purchased by all survey respondents to the quantity of program measures sold through the program during the SO analysis time period. If a survey respondent purchased more than one program measure, the program measure with the higher unit energy savings (UES) was used to weight the respondent (this was necessary since SO was estimated on a program-level basis rather than on a measure-by-measure basis). Table 7 shows the 43 qualifying spillover measures purchased by respondents and the sum of the weighted savings from these 43 measures is 223,808 kWh. Dividing these spillover savings by the program savings for the entire surveyed population resulted in a participant spillover rate of 0.08.

Table 7. Spillover Research Results by Measure

Measure	Number of Purchasers	Total Quantity Purchased	Spillover kWh (UES)
Advanced power strips	5	11	63
Air conditioner - central	2	2	208
Air sealing - sealing	4	4	131
Air sealing – door sweep	2	2	36
Clothes dryer	2	2	93
Clothes washer	1	1	140
Dishwasher	2	2	29
Faucet aerator	1	1	0
Freezer	1	1	77
Furnace	1	1	0
Insulation	1	1	15
LED light bulbs or fixtures	4	52	44
Low-flow showerhead	5	5	25
Refrigerator	5	5	57
Smart thermostat	4	4	13
Water heater (including HPWH)	3	3	693
Total Weighted Spillover			**223,808**
Total Weighted Program Savings			**2,961,040**
Spillover Rate			**0.08**

Note 1: The only faucet aerator was installed in a home with a gas water heater, yielding 0 kwh savings per IL TRM v12
Note 2: One respondent reported a spillover purchase of an air source heat pump. However, the evaluation team is unable to confirm whether the customer received a rebate through ComEd's Residential Midstream Program. As such, they were excluded from the analysis.
Source: Evaluation Team Analysis.

1.7 Free Ridership and Spillover to Create Program Net-to-Gross Ratio

Table 8 summarizes the evaluation team's preliminary findings for the Appliance Rebate component based on research presented in this memo. NTG is calculated as 1 – FR + SO.

Table 8. Appliance Rebate Free Ridership and Participant Spillover Final Results

Measure	Free Ridership	Relative Precision	Participant Spillover	NTG
Air Purifier	0.36	0.08	0.08	0.72
Clothes Washer	0.62	0.03	0.08	0.46
Dehumidifier	0.42	0.05	0.08	0.66
Smart Thermostat*	0.34	0.07	NA	0.83

** By formula: 1 – (Current Research FR * 0.5) + Non-part spillover. Participant spillover is included in gross savings estimates and not added to NTG Ratio. Per IL TRM V13 page 220 out of 553, footnote 704.*
Source: Evaluation Team Analysis.

5. Appliance Rebate Program NTG History

Program Year	NTG History
EPY8	**Clothes Washer** = 0.68 based upon ComEd PY5 Evaluation Report **Refrigerator** = 0.86 based upon MA 2012 Home Energy Services Evaluation **Air Purifier** = 0.78 based upon Ameren IL Residential EE Product s PY5 **Learning Thermostats** = 0.90 Navigant researched value for Residential Programs **Freezers** = 0.86 based upon MA 2012 Home Energy Services Evaluation for refrigerators **Heat Pump Water Heater** = 0.86 based upon Ameren IL Res EE Products PY5 **Clothes Dryer** = 0.68 based upon ComEd Clothes Washer PY5 Evaluation Report
EPY9	**Clothes Washer = 0.68** – based upon ComEd PY5 Evaluation Report **Refrigerator = 0.86** – based upon MA 2012 Home Energy Services Evaluation **Air Purifier = 0.78** – based upon Ameren IL Residential EE Products PY5 **Learning Thermostats** = 0.90 – Navigant researched value for Residential Programs **Freezers = 0.86** – based upon MA 2012 Home Energy Services Refrigerator Evaluation **Heat Pump Water Heater = 0.86** – based upon Ameren IL Res EE Products PY5 **Clothes Dryer = 0.68** – based upon ComEd Clothes Washer PY5 Evaluation Report **Dehumidifier = 0.78** – based upon Ameren PY4 researched value of 0.78 **Advanced Power Strips = 0.86** – Ameren primary research in PY4 **Dishwasher = 0.92** – based upon recent CO study **Pool Pump = 1.00** – based upon recent CO study **Bathroom Exhaust Fan = 0.80** – default value (secondary research didn't support a recommendation) **Water Cooler = 0.80** – default value (secondary research didn't support a recommendation) **Window AC = 0.80** – default value (secondary research didn't support a recommendation) NTG Source: Based upon EPY8 Recommendations for existing measures and secondary research for new measures.

Program Year	NTG History
CY2018	**Clothes Washer = 0.58** **Refrigerator = 0.57** **Air Purifier = 0.74** **Freezers = 0.54** **Heat Pump Water Heater = 0.74** **Clothes Dryer = 0.62** **Bathroom Exhaust Fan = 0.66** **Water Cooler = 0.83** **Window AC = 0.63** **Dehumidifier = 0.78** – based upon Ameren PY4 researched value of 0.78 **Advanced Power Strips = 0.86** – Ameren primary research in PY4 **Dishwasher = 0.80** – default value **Pool Pump = 0.80** – default value **Learning Thermostats =** NA. The savings value in the IL TRM is based on regression analysis on consumption data and thus is a net savings number. NTG Source: Based upon EPY8 participant self-report survey unless noted otherwise.
CY2019-CY2023	**NTG Clothes Washer:** 0.62, FR 0.42 **NTG Refrigerator:** 0.61, FR 0.43 **NTG Air Purifier:** 0.78, FR 0.26 **NTG Freezers:** 0.58, FR 0.46 **NTG Heat Pump Water Heater:** 0.78, FR 0.26 **NTG Clothes Dryer:** 0.66, FR 0.38 **NTG Bathroom Exhaust Fan:** 0.70, FR 0.34 **NTG Water Cooler:** 0.87, FR 0.17 **NTG Window AC:** 0.67, FR 0.37 **Dehumidifier = 0.78** – based upon Ameren PY4 researched value of 0.78 **Advanced Power Strips = 0.86** – Ameren primary research in PY4 **Dishwasher = 0.80** – default value **Pool Pump = 0.80** – default value **Advanced Thermostats =** NA. The savings value in the IL TRM is based on regression analysis on consumption data and thus is a net savings number. SO: 0.04 (clothes washer, refrigerator, air purifier, freezers, heat pump water heater, clothes dryer, bathroom exhaust fan, water cooler, window AC) NTG Source: SO based upon EPY8 participant self-report survey; FR based upon EPY8 unless noted otherwise.

Program Year	NTG History
CY2024	**NTG Advanced Power Strips:** 0.82, Free Ridership: 0.24, Spillover: 0.06 **NTG Air Purifiers:** 0.83, Free Ridership: 0.23, Spillover: 0.06 **NTG Clothes Washers:** 0.55, Free Ridership: 0.51, Spillover: 0.06 **NTG Dehumidifiers:** 0.65, Free Ridership: 0.41, Spillover: 0.06 **NTG Electric Clothes Dryers:** 0.56, Free Ridership: 0.50, Spillover: 0.06 **NTG Refrigerators:** 0.55, Free Ridership: 0.51, Spillover: 0.06 **NTG Smart Thermostat:** 0.92, Free Ridership: 0.14, Spillover: 0.06 **NTG Ventilation Fan:** 0.66, Free Ridership: 0.40, Spillover: 0.06 **NTG Water Dispenser:** 0.69, Free Ridership: 0.37, Spillover: 0.06
CY2025	**NTG Advanced Power Strips:** 0.82, Free Ridership: 0.24, Spillover: 0.06 **NTG Air Purifiers:** 0.83, Free Ridership: 0.23, Spillover: 0.06 **NTG Clothes Washers:** 0.55, Free Ridership: 0.51, Spillover: 0.06 **NTG Dehumidifiers:** 0.65, Free Ridership: 0.41, Spillover: 0.06 **NTG Electric Clothes Dryers:** 0.56, Free Ridership: 0.50, Spillover: 0.06 **NTG Refrigerators:** 0.55, Free Ridership: 0.51, Spillover: 0.06 **NTG Smart Thermostat:** 0.93, Free Ridership: 0.14, Spillover: 0.06 **NTG Ventilation Fan:** 0.66, Free Ridership: 0.40, Spillover: 0.06 **NTG Water Dispenser:** 0.69, Free Ridership: 0.37, Spillover: 0.06 **NTG Air Sealing:** 0.8, Default Value **NTG Electric Clothes Dryer:** 0.8, Default Value **NTG Heat Pump Clothes Dryer:** 0.8, Default Value **NTG Induction Cooktop:** 0.8, Default Value **NTG Low Flow Showerhead:** 0.8, Default Value
CY2026	**NTG Advanced Power Strips:** 0.82, Free Ridership: 0.24, Spillover: 0.06 **NTG Air Purifiers:** 0.72, Free Ridership: 0.36, Spillover: 0.08 **NTG Clothes Washers:** 0.46, Free Ridership: 0.62, Spillover: 0.08 **NTG Dehumidifiers:** 0.66, Free Ridership: 0.42, Spillover: 0.08 **NTG Electric Clothes Dryers:** 0.56, Free Ridership: 0.50, Spillover: 0.06 **NTG Refrigerators:** 0.55, Free Ridership: 0.51, Spillover: 0.06 **NTG Smart Thermostat:** 0.83, Free Ridership: 0.34, Spillover: NA **NTG Ventilation Fan:** 0.66, Free Ridership: 0.40, Spillover: 0.06 **NTG Water Dispenser:** 0.69, Free Ridership: 0.37, Spillover: 0.06 **NTG Air Sealing:** 0.8, Default Value **NTG Spray Foam Insulation**: Determined by other 2025 research **NTG Electric Clothes Dryer:** 0.8, Default Value **NTG Heat Pump Clothes Dryer:** 0.8, Default Value **NTG Induction Cooktop:** 0.8, Default Value **NTG Low Flow Showerhead:** 0.8, Default Value

Source: https://www.ilsag.info/wp-content/uploads/ComEd-NTG-CY2025-Recommendations-Final-2024-09-25.xlsx and current research