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From: Mike Frischmann, EcoMetric Consulting, Trace O'Rorke, Guidehouse

Date: August 31, 2023

Re: ComEd Multifamily Upgrades Program, Market Rate (MFMR) Component Net-To-Gross Research - Final

1. Executive Summary

Guidehouse surveyed Multifamily Upgrades Program, Market Rate Component (MFMR) participants to assess free ridership and spillover as part of our Net-to-Gross (NTG) research. The evaluation team administered an online survey to research free ridership (FR) and spillover (SO) for property managers and building owners who participated in the MFMR component¹.

The evaluation team fielded an online survey with an invitation emailed to every participant who generated savings through an MFMR project. The FR sample included projects completed between October 2022 through March 2023, and the SO sample included participants from March 2021 through March 2022.

These results will inform Guidehouse's September 2023 recommendations to the stakeholder advisory group (SAG) of NTG values to be used for this program in CY2024.

Guidehouse received 18 completes for the FR and SO survey combined. The number of completes resulted in NTG ratios which were not statistically significantly different from those researched with PY9 and 2018 participants. Additionally, the low number of completes resulted in precision levels which exceeded 10% at the 90% confidence level.

However, the savings weighted average free ridership from the CY2022 and CY2023 participants (0.20) was similar to the overall free ridership from PY9 and CY2018 participants (0.22). Guidehouse understands the MFMR component will continue to offer similar measures and services in CY2024 as it did during CY2018. Therefore, the evaluation team combined the FR and SO results from the two research efforts by weighting the FR and SO values by the number of respondents from each survey. Table 1 summarizes the recommended MFMR

¹ The MF Upgrades program also includes the income qualified Public Housing, Low Income, and IHWAP program components which are not included in this research effort.



component NTG values, which are the results of weighting the PY9-2018 and CY2021-CY2022 research efforts described further in Section 5.

Table 1. MFMR CY2024 Net-to-Gross Recommendations

Measure	FR	Participant SO	NTG
Advanced Power Strip (Tier 1)	0.12	0.03	0.91
Advanced Power Strip (Tier 2)	0.20	0.03	0.83
Advanced Thermostat	NA	NA	0.80 [Cool] 0.90 [Heat]
Bathroom Faucet Aerator	0.00	0.03	1.03
Beverage and Snack Control	0.20	0.03	0.83
Controls (in unit)	0.20	0.03	0.83
DWH Pipe Insulation	0.20	0.03	0.83
Fluorescent Delamping (common area)	0.20	0.03	0.83
LED Exit Sign	0.20	0.03	0.83
LED Linear (common area)	0.15	0.03	0.88
LED Omnidirectional	0.31	0.03	0.72
LED Specialty	0.21	0.03	0.82
Occupancy Sensor Lighting Control	0.20	0.03	0.83
Other, Direct Installed in Common Area	0.20	0.03	0.83
Other, Direct Installed in Unit	0.20	0.03	0.83
Programmable Thermostat (comprehensive)	0.19	0.03	0.84
Programmable Thermostat (direct install)	0.19	0.03	0.84
Reprogram Thermostat	0.19	0.03	0.84
Showerhead	0.00	0.03	1.03
Kitchen Faucet Aerator	0.00	0.03	1.03

Note: FR values for advanced thermostats, bathroom aerators, faucet aerators, and showerheads are from the IL TRM v11. Advanced thermostat savings were calculated using a consumption analysis which already considers FR and participant SO. The savings for aerators and showerheads uses a market baseline which accounts for FR.

Source: Evaluation team analysis 2023

2. Free Ridership and Spillover Survey Disposition

The evaluation team conducted an online survey with an invitation emailed to 58 participant property managers for the free ridership survey, and 56 participant property managers for the spillover survey. In total, Guidehouse received 18 completed surveys from participants (11 FO and 7 SO).

Guidehouse conducted a detailed review and analysis of all completed surveys, including consistency checks. Table 2 reports survey disposition for FR and SO question batteries for the MFMR component. Table 3 reports the research survey disposition and response rate.

Table 2. Free Ridership And Spillover Survey Disposition

Survey Type	Population	Sample	Target Completes	Actual Completes	Analyzed Completes	Share of Population Represented by Analyzed Completes
FR Survey	84	58	32	19.0%	11	16.5%
SO Survey	85	56	31	12.5%	7	8.3%
Total	169	114	63	15.8%	18	

Source: Evaluation team analysis 2023

Table 3. Survey Disposition

Response Disposition	FR	SO	Total
Participants in sample	58	56	114
Excluded: Non-response	47	49	96
Excluded: Triggered and Failed Consistency Check	0	NA	0
Total of Excluded Responses	47	49	96
Analyzed Sample	11	7	18
Response Rate	19%	13%	16%

Source: Evaluation team analysis 2023; response rate based on analyzed sample relative to participants in sample.

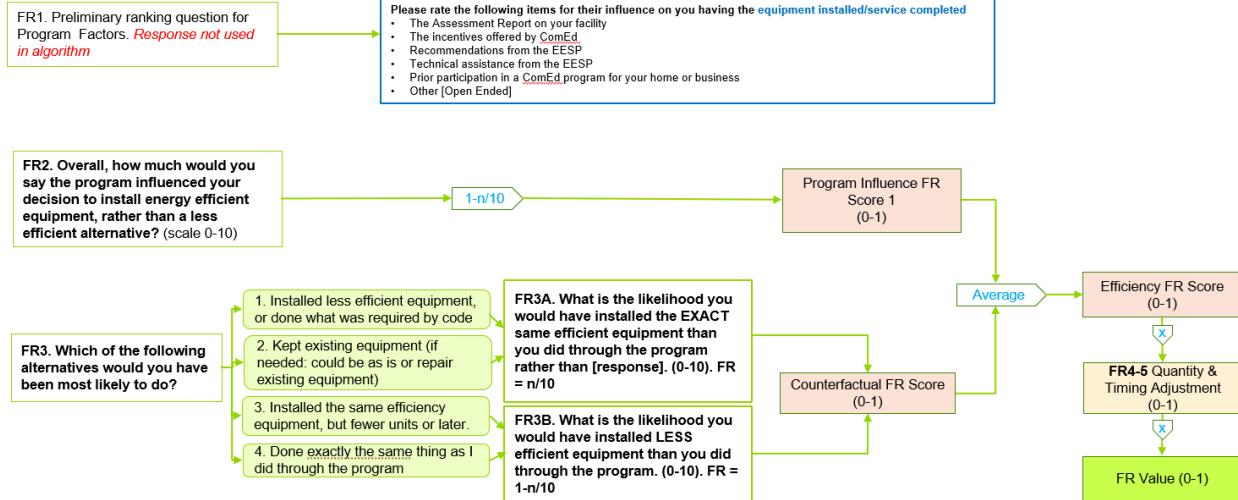
The sample for the 2023 research (84) was smaller than the previous research (390). However, the 2023 response rate of 16% was less than half of the 35% response rate from the previous research. Guidehouse also received low response rates with other 2023 Illinois multifamily research, which may indicate low general availability of property managers.

3. Free Ridership and Spillover Protocols

3.1 Participant Free Ridership Estimation

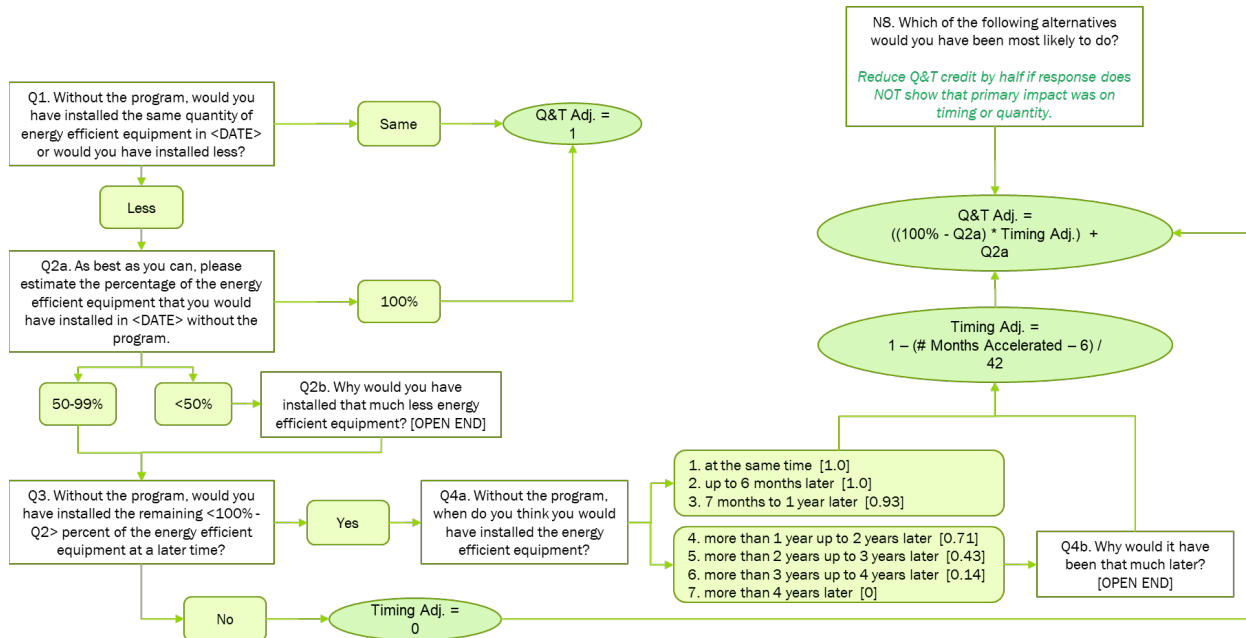
The evaluation team applied the SAG NTG Working Group Consensus Core Non-Residential Algorithm, established in May 2023 to guide the FR research. This protocol includes two critical elements, the first being the core free ridership calculation, shown in Figure 1. The core non-residential protocol also includes timing and quantity adjustment factors. The methods the evaluation team used to determine any quantity and timing adjustments are shown in Figure 2.

Figure 1. Core Non-Residential Free Ridership Overview



Source: SAG NTG Working Group Redline Core Non-Residential Algorithm, Winter 2023

Figure 2. Quantity and Timing Adjustment Overview

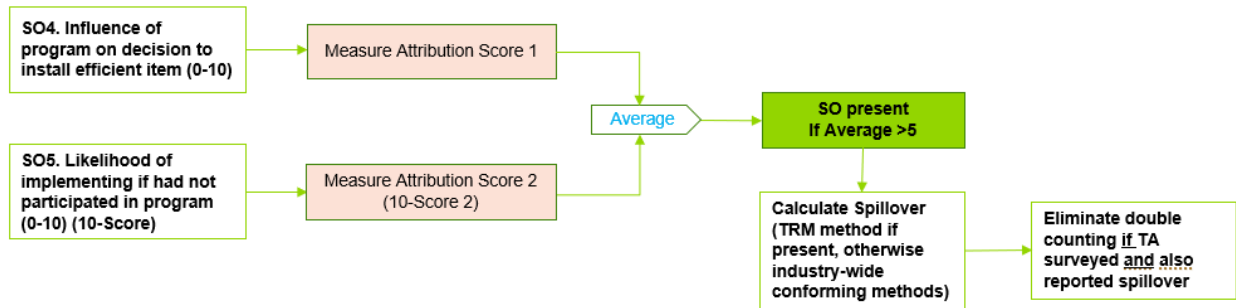


Source: SAG NTG Working Group Redline Core Non-Residential Algorithm, Winter 2023

3.2 Participant Spillover Estimation

The evaluation team applied the Illinois Technical Reference Manual (TRM) Version 11.0 (TRM v11) to guide the SO research.

Figure 3. Non-Residential Spillover Protocol from TRM v11



Source: Core Non-Residential Participant Spillover Protocol, IL TRM v11 Section 3.2.1.

4. Detailed NTG Results

4.1 Free Ridership Consistency Check Analysis

To address the possibility of conflicting responses, the TRM specifies consistency checks that ask participants open ended questions to address a program’s influence. This survey included an open-ended question to address the possibility of conflicting responses. The survey asked this question to all participants:

“Please describe in your own words any influence that the ComEd Multi-Family Program had on your decision to install the <MEASURE> project at your facility.”

The TRM recommends using the responses to the open-ended questions to resolve inconsistencies in the closed-ended numeric program influence and counterfactual scores. Two respondents gave responses that triggered the TRM method consistency check². In both cases, Guidehouse reviewed the verbatim responses and did not make any modifications to the respondents scores. The verbatim responses indicated that the program did have some influence but did not clearly resolve the counterfactual responses. Based on these verbatims, Guidehouse did not make any participant level score adjustments to the responses.

4.2 Free Ridership Component Scores

Guidehouse applied the non-residential core free ridership protocol which was revised by the SAG NTG working group in May 2023. Table 4 shows the savings weighted average component scores following the protocol in Figure 1 and Figure 2. The overall free ridership value was calculated as the savings weighted average of each participants FR value.

² Both respondents triggered the Program Component/No Program consistency check where the respondent rated the likelihood of installing absent the program at 7 or higher, and rated the influence of the program 7 or higher.

Table 4. Free Ridership Component Scores

Savings Type	Program Influence Score	Counterfactual Score	Efficiency Score	Quantity and Timing Adjustment	Free Ridership Value
kWh and kW	0.01	0.43	0.22	0.69	0.20

Note: The sample was not designed to separate energy (kWh) and demand (kW) free ridership values, therefore Guidehouse applied the free ridership value to both savings types. For ComEd program measures producing both therm and kWh savings, Guidehouse recommends applying the FR values resulting from the gas FR surveys done for this program.

Source: Evaluation team analysis 2023.

4.3 Spillover Estimation

Guidehouse attributed a respondent's savings from non-rebated energy efficiency improvements to the MFMR component if the following condition was met: the respondent's average of Attribution Score 1 and (10 minus Attribution Score 2) must exceed 5.0.

Of the 7 spillover survey respondents, 2 installed additional energy efficient equipment, and both indicated that participating in the Multi-Family Upgrades program had some influence on them to make these additional purchases. However, both customers indicated very high likelihood that they would have made similar improvements without the program. As such, the average attribution score for all potential spillover measures did not exceed 5.0, resulting in no participant spillover.

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

FR values are summed with SO to determine the NTG values. The sample was not designed to measure NTG at the measure level, so Guidehouse assigned the program level NTG to each measure. Advanced thermostats, faucet aerators, and showerheads have FR values specified within the respective measures of the TRM. Table 5 summarizes the FR and SO from CY2021 and CY2022 participant research and deemed TRM v11 values.

Table 5. Free Ridership and Participant Spillover for MFMR Component

Measure	FR	Participant SO	NTG	FR Source
All Other Measures	0.20	0.00	0.80	2021 and 2022 FR Survey
Advanced Thermostat	NA	NA	0.80 [Cool] 0.90 [Heat]	2022 SAG Consensus
Bathroom Faucet Aerator	0.00	0.00	1.00	TRM V11
Showerhead	0.00	0.00	1.00	TRM V11
Kitchen Faucet Aerator	0.00	0.00	1.00	TRM V11

Note: The All Other Measures values in this table are based on new research only, and are not combined with previous NTG research.

Source: TRM V11 and Evaluation team analysis 2023

4.4.1 Free Ridership Sources

Illinois TRM version 11.0 specifies that faucet aerators and showerheads should have free ridership set at zero when estimating gross savings using the TRM specified baseline average water flow rate. Faucet aerators and showerheads may receive a spillover adjustment. The Multifamily Upgrades Program MFMR component leverages the TRM for ex ante savings calculations, thus Guidehouse maintained this free ridership rate in the NTG ratio for this measure.

Advanced thermostats also have a stipulated free ridership rate, based on SAG consensus. The TRM v11 (Section 5.3.16) specifies that since the TRM savings were developed using a consumption analysis, they are net with respect to participant spillover and between net and gross with respect to free ridership.

4.4.2 Confidence and Precision Analysis

The program-level free ridership values, along with precision estimates, are shown below in Table 6. Relative precision of the new research only (at 90% confidence interval) is 47.3% for all measures. The low relative precision is driven by the low number of completed surveys.

Table 6. Free Ridership and Relative Precision at 90% Confidence Level

Component	FR Value	Relative Precision (%)	FR (Low)	FR (Mean)	FR (High)
MFMR	0.20	47.3	0.00	0.18	0.45

Note: FR values were determined at the program component level.

Source: Evaluation team analysis 2023

5. Final NTG Results and Recommendations

The low number of completes from CY2022 and CY2023 participants resulted in precision levels which exceeded 10% at the 90% confidence level (actual was 47.3%). Due to the low response rate, Guidehouse considered two options with how to recommend NTG values for CY2024:

1. Utilize the older research from PY9 and 2018 participants.
2. Combine the research from the two studies to provide a blended value.

Guidehouse believes combining the two surveys is the best path forward. The savings weighted average free ridership from the CY2022 and CY2023 participants (0.20) was similar to the overall free ridership from PY9 and CY2018 participants (0.22). Guidehouse understands the MFMR component will continue to offer similar measures and services in CY2024 as it did during CY2018. Adding in the new sample, while small, will allow the NTG ratios to reflect more recent market or property manager preferences, while still leveraging a statistically significant sample of program participants.

To combine the two survey results, Guidehouse weighted the results of each survey by the number of completed responses. The free ridership and spillover values each had their own weights, since the number of responses varied for each NTG component across the two studies. Table 7 presents the number of responses from each of the two surveys, as well as the

corresponding weight. The weight for each measure was calculated as the number of respondents from the given year, divided by the total quantity of responses from both years.

Table 7. FR Survey Weights

Measure	Total Respondents	2018 Respondents	2018 Weight	2023 Respondents	2023 Weight
Advanced Power Strip (Tier 1)	35	24	0.69	11	0.31
Advanced Power Strip (Tier 2)	35	24	0.69	11	0.31
Advanced Thermostat	NA	NA	NA	NA	NA
Bathroom Faucet Aerator	NA	NA	NA	NA	NA
Beverage and Snack Control	94	83	0.88	11	0.12
Controls (in unit)	94	83	0.88	11	0.12
DWH Pipe Insulation	94	83	0.88	11	0.12
Fluorescent Delamping (common area)	94	83	0.88	11	0.12
LED Exit Sign	94	83	0.88	11	0.12
LED Linear (common area)	19	8	0.42	11	0.58
LED Omnidirectional	37	26	0.70	11	0.30
LED Specialty	36	25	0.69	11	0.31
Occupancy Sensor Lighting Control	94	83	0.88	11	0.12
Other, Direct Installed (common area)	94	83	0.88	11	0.12
Other, Direct Installed in Unit	94	83	0.88	11	0.12
Programmable Thermostat (Comprehensive)	19	8	0.42	11	0.58
Programmable Thermostat (Direct Install)	19	8	0.42	11	0.58
Reprogram Thermostat	19	8	0.42	11	0.58
Showerhead	NA	NA	NA	NA	NA
Kitchen Faucet Aerator	NA	NA	NA	NA	NA

Note: FR values for advanced thermostats, bathroom aerators, faucet aerators, and showerheads are from the IL TRM v11. Advanced thermostat savings were calculated using a consumption analysis which already considers FR and participant SO. The savings for aerators and showerheads uses a market baseline which accounts for FR.

Source: Evaluation team analysis 2023

Guidehouse calculated the weighted FR value by multiplying the weights from Table 7 by the researched FR value from each year. Table 8 shows the FR values, weights, and the resulting weighted FR value based on the two research studies.

Table 8. Weighted FR Value

Measure	2018 FR Value	2018 Weight	2023 FR Value	2023 Weight	Weighted FR Value
Advanced Power Strip (Tier 1)	0.09	0.69	0.2	0.31	0.12
Advanced Power Strip (Tier 2)	0.2	0.69	0.2	0.31	0.20

Measure	2018 FR Value	2018 Weight	2023 FR Value	2023 Weight	Weighted FR Value
Advanced Thermostat	NA	NA	NA	NA	NA
Bathroom Faucet Aerator	0	NA	0	NA	0.00
Beverage and Snack Control	0.2	0.88	0.2	0.12	0.20
Controls (in unit)	0.2	0.88	0.2	0.12	0.20
DWH Pipe Insulation	0.2	0.88	0.2	0.12	0.20
Fluorescent Delamping (common area)	0.2	0.88	0.2	0.12	0.20
LED Exit Sign	0.2	0.88	0.2	0.12	0.20
LED Linear (common area)	0.07	0.42	0.2	0.58	0.15
LED Omnidirectional	0.36	0.70	0.2	0.30	0.31
LED Specialty	0.21	0.69	0.2	0.31	0.21
Occupancy Sensor Lighting Control	0.2	0.88	0.2	0.12	0.20
Other, Direct Installed in Common Area	0.2	0.88	0.2	0.12	0.20
Other, Direct Installed in Unit	0.2	0.88	0.2	0.12	0.20
Programmable Thermostat (Comprehensive)	0.18	0.42	0.2	0.58	0.19
Programmable Thermostat (Direct Install)	0.17	0.42	0.2	0.58	0.19
Reprogram Thermostat	0.17	0.42	0.2	0.58	0.19
Showerhead	0.0	NA	0.0	NA	0.00
Kitchen Faucet Aerator	0	NA	0.0	NA	0.00

Note: FR values for advanced thermostats, bathroom aerators, faucet aerators, and showerheads are from the IL TRM v11. Advanced thermostat savings were calculated using a consumption analysis which already considers FR and participant SO. The savings for aerators and showerheads uses a market baseline which accounts for FR.

Source: Evaluation team analysis 2023

Guidehouse completed the same weighting process to determine the recommended SO value. The quantity of SO respondents determined the weight for each SO value, shown in Table 9. The final weighted SO value is shown in Table 10.

Table 9. SO Survey Weights

2018 Respondents	2018 Weight	2023 Respondents	2023 Weight	Total Respondents
65	0.78	18	0.22	83

Source: Evaluation team analysis 2023

Table 10. Weighted SO Value

2018 SO	2018 Weight	2023 SO	2023 Weight	Weighted SO
0.0324	0.78	0.000	0.22	0.025

Source: Evaluation team analysis 2023

Table 11 shows the recommended measure level NTG values for the MFMR component, which are the summation of the FR values from Table 8 and the SO values from Table 10.

Table 11. Recommended CY2024 NTG Values for MFMR Component

Measure	FR	Participant SO	NTG	NTG Source
Advanced Power Strip (Tier 1)	0.12	0.03	0.91	1,2
Advanced Power Strip (Tier 2)	0.20	0.03	0.83	1,2
Advanced Thermostat	NA	NA	0.80 [Cool] 0.90 [Heat]	3
Bathroom Faucet Aerator	0.00	0.03	1.03	3
Beverage and Snack Control	0.20	0.03	0.83	1,2
Controls (IU)	0.20	0.03	0.83	1,2
DWH Pipe Insulation	0.20	0.03	0.83	1,2
Fluorescent Delamping (CA)	0.20	0.03	0.83	1,2
LED Exit Sign	0.20	0.03	0.83	1,2
LED Linear (CA)	0.15	0.03	0.88	1,2
LED Omnidirectional	0.31	0.03	0.72	1,2
LED Specialty	0.21	0.03	0.82	1,2
Occupancy Sensor Lighting Control	0.20	0.03	0.83	1,2
Other, Direct Installed in Common Area	0.20	0.03	0.83	1,2
Other, Direct Installed in Unit	0.20	0.03	0.83	1,2
Programmable Thermostat (Comprehensive)	0.19	0.03	0.84	1,2
Programmable Thermostat (Direct Install)	0.19	0.03	0.84	1,2
Reprogram Thermostat	0.19	0.03	0.84	1,2
Showerhead	0.00	0.03	1.03	3
Kitchen Faucet Aerator	0.00	0.03	1.03	3

Note: FR values for advanced thermostats, bathroom aerators, faucet aerators, and showerheads are from the IL TRM v11. Advanced thermostat savings were calculated using a consumption analysis which already considers FR and participant SO. The savings for aerators and showerheads uses a market baseline which accounts for FR.

Source: Evaluation team analysis 2023

The following sources are referenced in Table 11.

1. Net-to-Gross Research Results for ComEd Multi-Family Market Rate Program PY9 and CY2018. https://www.ilsag.info/wp-content/uploads/ComEd_Multi-Family_Market_Rate_CY2018_NTG_Results_Memo_2018-09-12_Final.pdf
2. FR and SO survey of CY2021 and CY2022 participating property managers conducted by Guidehouse in 2023.

3. Illinois TRM v.11.0. Bathroom aerators, kitchen aerators, and showerheads are deemed to have zero FR. Advanced thermostat NTG is set by the SAG NTG working group as the savings are between gross and net.

5.1 MF Upgrades Program – MFMR Component NTG History

The NTG values recommended for CY2024, are similar to those used for the of the MF Upgrades Program MFMR component since CY2020. The complete history of MF Upgrades Program NTG values are shown in Table 12.

Table 12 MF Upgrades Program – MFMR Component NTG History

MF Upgrades – MFMR Component (a.k.a. Multifamily Market Rate)	
EPY1	<p>NTG 0.80 Free-Ridership n/a Spillover n/a Method: ComEd planning documents. (No EMV NTG analysis).</p>
EPY2	<p>Program NTG 0.88 Measure Specific: CFLs NTG 0.81 CFLs Free Ridership 27% CFLs Spillover 18% Water Efficient Showerheads NTG 0.93 Water Efficient Showerheads Free Ridership 9% Water Efficient Showerheads Spillover 2% Water Efficient Aerators NTG 0.94 Water Efficient Aerators Free Ridership 6% Water Efficient Aerators Spillover 0% Method: Participant Self-Report. CATI telephone survey with 75 participating tenants (90/9).</p>
EPY3	<p>Program NTG 0.90 Measure Specific: CFLs NTG 0.81 CFLs Free Ridership 20% CFLs Spillover 1% Water Efficient Showerheads NTG 0.93 Water Efficient Showerheads Free Ridership 7% Water Efficient Showerheads Spillover 0% Water Efficient Aerators NTG 0.94 Water Efficient Aerators Free Ridership 6% Water Efficient Aerators Spillover 0% Method: Participant self-report. CATI telephone survey with 140 participating tenants (90/10).</p>

MF Upgrades – MFMR Component (a.k.a. Multifamily Market Rate)

Deemed using EPY2 values:
Program NTG 0.83
Measure Specific:
CFLs NTG 0.81
Water Efficiency Measures (Aerators + Showerheads) NTG 0.93
Verification Method: Applied EPY2 evaluation findings according to NTG Framework.
EPY4 Research Findings:
Program NTG 0.97
CFLs NTG 0.98
Water Efficiency Measures (Aerators + Showerheads) NTG 0.92
Water Efficient Showerheads NTG 0.91
Water Efficient Aerators NTG 0.93
Research Method: Participant self-report. CATI telephone survey with participating decision-makers (37 property managers)

SAG Consensus:

Multi-Family – Lighting	0.81
Multi-Family – Water Measures	0.93

SAG Consensus:

Multi-Family – CFLs	0.98
Multi-Family – Showerhead	0.92
Multi-Family – Common Areas	0.80

Evaluation used EPY4 research findings:
Program NTG 0.98
CFLs NTG 0.98
Water Efficient – Showerheads NTG 0.92
Water Efficient – Bath Aerators NTG 0.94
Water Efficient – Kitchen Aerators NTG 1.00
Other measures: 0.95 (programmable thermostats and water temperature turndown)

Participant spillover: Comprehensive spillover is in the estimated NTG. Other measures: No participant spillover is likely for any measures given the program approach and program theory.

Nonparticipant spillover: No nonparticipant spillover is likely for any measures given the program approach and program theory.

Research Method: Participant self-report. CATI telephone survey with participating decision-makers (37 property managers).

For EPY7 comprehensive projects, Navigant recommends a NTGR of 0.95. These are new measures, and Navigant’s research indicates that the target market for this program is unlikely to install these measures without the existence of the program, similar to PY4 ComEd Small Business Energy Savings program evaluation research findings.

For EPY7 CFL direct install Free-Ridership, Navigant recommends the PY4 evaluation research finding NTGR of 0.98, based on survey self-report data from participating property managers. Navigant recommends the PY4 values for each of the water efficient measures (showerheads, bath aerators and kitchen aerators).

MF Upgrades – MFMR Component (a.k.a. Multifamily Market Rate)

Recommendation (based upon PY7 NTG recommended values):
NTG Direct Install CFLs and LED Lighting: 0.98
NTG Hot Water Measures (showerhead, bath aerators, kitchen aerator): 0.92, 0.94 and 1.00
NTG Unit Measures: 0.95
NTG Common Areas Measures: 0.95
NTG Thermostat: 0.90

EPY8

EPY6 research on thermostat NTG was based on secondary research. There was no EPY6 research for other measures, thus the evaluation team recommends using the EPY7 values – see detail above for EPY7.

NTG Direct Install CFLs: 0.98
 NTG Hot Water Measures (showerhead, bath aerators, kitchen aerator): 0.92, 0.94 and 1.00
 NTG Unit Measures: 0.95
 NTG Common Areas Measures: 0.95
 NTG Thermostat: 0.90
 FR DI CFL: 0.02
 FR Hot Water Measures: 0.08, 0.06 & 0.0, showerhead, bath & kitchen aerators, respectively
 FR Unit: 0.05
 FR Common Areas: 0.05
 FR Thermostats (based upon evaluation secondary research)
 SO Was not found in this program.

EPY9

NTG Source:
 PY7 SAG consensus values (no new research)

NTG Direct Install CFLs: 0.98
 NTG Hot Water Measures (showerhead, bath aerators, kitchen aerator): 0.92, 1.00 and 1.00
 NTG Unit Measures: 0.95
 NTG Common Areas Measures: 0.95
 NTG Thermostat: 0.90
 FR DI CFL: 0.02
 FR Hot Water Measures: 0.08, 0.00 & 0.0, showerhead, bath & kitchen aerators, respectively
 FR Unit: 0.05
 FR Common Areas: 0.05
 FR Thermostats (based upon evaluation secondary research)
 SO Was not found in this program.

CY2018

NTG Source:
 For faucet aerators: TRM version 6.0 specifies that the free ridership for faucet aerators be set at zero when estimating gross savings using the TRM specified baseline average water flow rate. For all other measures: PY7 SAG consensus values (no new research)

MF Upgrades – MFMR Component (a.k.a. Multifamily Market Rate)

NTG Direct Install CFLs: Not active CY2019
NTG Direct Install LED: 0.84
NTG Hot Water Measures (showerhead, bath aerators, kitchen aerator): 1.00
NTG Programmable and Reprogram Thermostat: 0.90
NTG Other Unit Measures: 0.95
NTG Common Areas: 0.95

FR Hot Water Measures: 0.0
FR Unit: 0.05
FR Common Areas: 0.05
CY2019 FR Thermostats (based upon evaluation secondary research)

SO was not found in this program.

NTG Source:

For DI LED: HEA PY9 participating customer survey

For faucet aerators and showerheads: TRM version 7.0 specifies that the free ridership for faucet aerators and showerheads be set at zero when estimating gross savings using the TRM specified baseline average water flow rate.

For all other: PY7 SAG consensus values (no new research)

MF Upgrades – MFMR Component (a.k.a. Multifamily Market Rate)

NTG Direct Install CFLs: Not active CY2019

NTG LED Linear (Common Area): 0.96

NTG LED Omnidirectional: 0.67

NTG LED Specialty: 0.82

NTG Controls (In Unit): 0.83

NTG Fluorescent Delamping (Common Area): 0.83

NTG Hot Water Measures (showerhead, bath aerators, kitchen aerator): 1.03

NTG Programmable Thermostat (Direct Install): 0.86

NTG Programmable Thermostat (Comprehensive): 0.85

NTG Reprogram Thermostat: 0.86

NTG Advanced Power Strip (Tier 1): 0.94

NTG Advanced Power Strip (Tier 2): 0.83

NTG DWH Pipe Insulation: 0.83

NTG Other Measures, Direct Installed in Units: 0.83

NTG Common Areas: 0.83

FR LED Linear (Common Area): 0.07

FR LED Omnidirectional: 0.36

FR LED Specialty: 0.21

FR Controls (In Unit): 0.20

CY2020

FR Fluorescent Delamping (Common Area): 0.20

FR Hot Water Measures (showerhead, bath aerators, kitchen aerator): 0

FR Programmable Thermostat (Direct Install): 0.17

FR Programmable Thermostat (Comprehensive): 0.18

FR Reprogram Thermostat: 0.17

FR Advanced Power Strip (Tier 1): 0.09

FR Advanced Power Strip (Tier 2): 0.20

FR DWH Pipe Insulation: 0.20

FR Other Measures, Direct Installed in Units: 0.20

FR Common Areas: 0.20

SO All Measures: 0.03

NTG Source:

For LED FR: PY9 and CY2018 participating customer surveys

For faucet aerators and showerheads FR: TRM version 7.0 specifies that the free ridership for faucet aerators and showerheads be set at zero when estimating gross savings using the TRM specified baseline average water flow rate.

For Programmable Thermostat FR: PY9 and CY2018 participating customer surveys

For all other: Savings weighted average of measures studied in PY9 and CY2018 participating customer surveys

For All Measures SO: PY9 and CY2018 participating customer surveys

MF Upgrades – MFMR Component (a.k.a. Multifamily Market Rate)**Unchanged from CY2020**

NTG Direct Install CFLs: Not active CY2019

NTG LED Linear (Common Area): 0.96

NTG LED Omnidirectional: 0.67

NTG LED Specialty: 0.82

NTG Controls (In Unit): 0.83

NTG Fluorescent Delamping (Common Area): 0.83

NTG Hot Water Measures (showerhead, bath aerators, kitchen aerator): 1.03

NTG Programmable Thermostat (Direct Install): 0.86

NTG Programmable Thermostat (Comprehensive): 0.85

NTG Reprogram Thermostat: 0.86

NTG Advanced Power Strip (Tier 1): 0.94

NTG Advanced Power Strip (Tier 2): 0.83

NTG DWH Pipe Insulation: 0.83

NTG Other Measures, Direct Installed in Units: 0.83

NTG Common Areas: 0.83

FR LED Linear (Common Area): 0.07

FR LED Omnidirectional: 0.36

FR LED Specialty: 0.21

FR Controls (In Unit): 0.20

FR Fluorescent Delamping (Common Area): 0.20

FR Hot Water Measures (showerhead, bath aerators, kitchen aerator): 0

FR Programmable Thermostat (Direct Install): 0.17

FR Programmable Thermostat (Comprehensive): 0.18

FR Reprogram Thermostat: 0.17

FR Advanced Power Strip (Tier 1): 0.09

FR Advanced Power Strip (Tier 2): 0.20

FR DWH Pipe Insulation: 0.20

FR Other Measures, Direct Installed in Units: 0.20

FR Common Areas: 0.20

SO All Measures: 0.03

NTG Source:

For LED FR: PY9 and CY2018 participating customer surveys

For faucet aerators and showerheads FR: TRM version 7.0 specifies that the free ridership for faucet aerators and showerheads be set at zero when estimating gross savings using the TRM specified baseline average water flow rate.

For Programmable Thermostat FR: PY9 and CY2018 participating customer surveys

For all other: Savings weighted average of measures studied in PY9 and CY2018 participating customer surveys

For All Measures SO: PY9 and CY2018 participating customer surveys

CY2021

MF Upgrades – MFMR Component (a.k.a. Multifamily Market Rate)**Unchanged from CY2020 and CY2021**

NTG Direct Install CFLs: Not active CY2019

NTG LED Linear (Common Area): 0.96

NTG LED Omnidirectional: 0.67

NTG LED Specialty: 0.82

NTG Controls (In Unit): 0.83

NTG Fluorescent Delamping (Common Area): 0.83

NTG Hot Water Measures (showerhead, bath aerators, kitchen aerator): 1.03

NTG Programmable Thermostat (Direct Install): 0.86

NTG Programmable Thermostat (Comprehensive): 0.85

NTG Reprogram Thermostat: 0.86

NTG Advanced Power Strip (Tier 1): 0.94

NTG Advanced Power Strip (Tier 2): 0.83

NTG DWH Pipe Insulation: 0.83

NTG Other Measures, Direct Installed in Units: 0.83

NTG Common Areas: 0.83

FR LED Linear (Common Area): 0.07

FR LED Omnidirectional: 0.36

FR LED Specialty: 0.21

FR Controls (In Unit): 0.20

CY2022

FR Fluorescent Delamping (Common Area): 0.20

FR Hot Water Measures (showerhead, bath aerators, kitchen aerator): 0

FR Programmable Thermostat (Direct Install): 0.17

FR Programmable Thermostat (Comprehensive): 0.18

FR Reprogram Thermostat: 0.17

FR Advanced Power Strip (Tier 1): 0.09

FR Advanced Power Strip (Tier 2): 0.20

FR DWH Pipe Insulation: 0.20

FR Other Measures, Direct Installed in Units: 0.20

FR Common Areas: 0.20

SO All Measures: 0.03

NTG Source:

For LED FR: PY9 and CY2018 participating customer surveys

For faucet aerators and showerheads FR: TRM version 7.0 specifies that the free ridership for faucet aerators and showerheads be set at zero when estimating gross savings using the TRM specified baseline average water flow rate.

For Programmable Thermostat FR: PY9 and CY2018 participating customer surveys

For all other: Savings weighted average of measures studied in PY9 and CY2018 participating customer surveys

For All Measures SO: PY9 and CY2018 participating customer surveys

MF Upgrades – MFMR Component (a.k.a. Multifamily Market Rate)**Unchanged from CY2020, CY2021, and CY2022**

NTG Direct Install CFLs: Not active CY2019

NTG LED Linear (Common Area): 0.96

NTG LED Omnidirectional: 0.67

NTG LED Specialty: 0.82

NTG Controls (In Unit): 0.83

NTG Fluorescent Delamping (Common Area): 0.83

NTG Hot Water Measures (showerhead, bath aerators, kitchen aerator): 1.03

NTG Programmable Thermostat (Direct Install): 0.86

NTG Programmable Thermostat (Comprehensive): 0.85

NTG Reprogram Thermostat: 0.86

NTG Advanced Power Strip (Tier 1): 0.94

NTG Advanced Power Strip (Tier 2): 0.83

NTG DWH Pipe Insulation: 0.83

NTG Other Measures, Direct Installed in Units: 0.83

NTG Common Areas: 0.83

FR LED Linear (Common Area): 0.07

FR LED Omnidirectional: 0.36

FR LED Specialty: 0.21

FR Controls (In Unit): 0.20

CY2023

FR Fluorescent Delamping (Common Area): 0.20

FR Hot Water Measures (showerhead, bath aerators, kitchen aerator): 0

FR Programmable Thermostat (Direct Install): 0.17

FR Programmable Thermostat (Comprehensive): 0.18

FR Reprogram Thermostat: 0.17

FR Advanced Power Strip (Tier 1): 0.09

FR Advanced Power Strip (Tier 2): 0.20

FR DWH Pipe Insulation: 0.20

FR Other Measures, Direct Installed in Units: 0.20

FR Common Areas: 0.20

SO All Measures: 0.03

NTG Source:

For LED FR: PY9 and CY2018 participating customer surveys

For faucet aerators and showerheads FR: TRM version 7.0 specifies that the free ridership for faucet aerators and showerheads be set at zero when estimating gross savings using the TRM specified baseline average water flow rate.

For Programmable Thermostat FR: PY9 and CY2018 participating customer surveys

For all other: Savings weighted average of measures studied in PY9 and CY2018 participating customer surveys

For All Measures SO: PY9 and CY2018 participating customer surveys

NTG Advanced Power Strip (Tier 1)	0.91	
NTG Advanced Power Strip (Tier 2)	0.83	
NTG Advanced Thermostat	0.80 cooling, 0.90 heating	
NTG Bathroom Faucet Aerator	1.03	
NTG Beverage and Snack Control	0.83	
NTG Controls (in unit)	0.83	
NTG DWH Pipe Insulation	0.83	
NTG Fluorescent Delamping (common area)	0.83	
NTG LED Exit Sign	0.83	
NTG LED Linear (common area)	0.88	
NTG LED Omnidirectional	0.72	
NTG LED Specialty	0.82	
NTG Occupancy Sensor Lighting Control	0.83	
NTG Other, Direct Installed in Common Area	0.83	
NTG Other, Direct Installed in Unit	0.83	
NTG Programmable Thermostat (Comprehensive)	0.84	
NTG Programmable Thermostat (Direct Install)	0.84	
NTG Reprogram Thermostat	0.84	
NTG Showerhead	1.03	
NTG Kitchen Faucet Aerator	1.03	
FR Advanced Power Strip (Tier 1)	0.12	
FR Advanced Power Strip (Tier 2)	0.20	
FR Advanced Thermostat	0.80 cooling, 0.90 heating	
FR Bathroom Faucet Aerator	0.00	
FR Beverage and Snack Control	0.20	
FR Controls (in unit)	0.20	
CY2024 FR DWH Pipe Insulation	0.20	
FR Fluorescent Delamping (common area)	0.20	
FR LED Exit Sign	0.20	
FR LED Linear (common area)	0.15	
FR LED Omnidirectional	0.31	
FR LED Specialty	0.21	
FR Occupancy Sensor Lighting Control	0.20	
FR Other, Direct Installed in Common Area	0.20	
FR Other, Direct Installed in Unit	0.20	
FR Programmable Thermostat (Comprehensive)	0.19	
FR Programmable Thermostat (Direct Install)	0.19	
FR Reprogram Thermostat	0.19	
FR Showerhead	0.00	
FR Kitchen Faucet Aerator	0.00	

SO All Measures: 0.03

NTG Source:

For faucet aerators and showerheads FR: TRM version 11.0 specifies that the free ridership for faucet aerators and showerheads be set at zero when estimating gross savings using the TRM specified baseline average water flow rate.

For Advanced Thermostat FR: SAG consensus since TRM savings are between gross and net.

For all other: Respondent weighted average of measure level FR and overall SO studied from PY9 and 2018 participants, along with CY2021 and CY2022 participants.

For All Measures SO: Respondent weighted average of measure level FR and overall SO studied from PY9 and 2018 participants, along with CY2021 and CY2022 participants.

Note: CY2024 values are those recommended by Guidehouse within this memo. Final NTG values are subject to SAG approval.

Source: *Evaluation team analysis 2023*