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| ComEd Voltage Optimization Program Impact Evaluation Report  Energy Efficiency/Demand Response Plan:  Program Year 2024 (CY2024)  (1/1/2024-12/31/2024) | | |
| Prepared for:  ComEd  DRAFT  April 11, 2025 | | |
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# Introduction

This report presents the results of the impact evaluation of the Voltage Optimization (VO) program from the program year from January 1 to December 31, 2024 (CY2024). The program was designed to install hardware and software systems on a significant fraction of ComEd’s electric power distribution grid to achieve voltage and reactive power optimization (Volt/VAR optimization, or VVO). VVO is a smart grid technology that uses distributed sensors, two-way communications infrastructure, remote controls on substation transformer load tap changers and line capacitor banks, and integrating/optimizing software to flatten voltage profiles and lower average voltage levels on an electric power distribution grid.

Unlike energy efficiency programs that achieve savings by providing financial incentives to encourage customers to adopt energy efficient equipment or behavioral suggestions to encourage them to adopt no-cost energy-saving behaviors, the VO Program involves no direct customer engagement. Instead, savings are achieved by operating the voltage and reactive power controls on VO-enabled feeders and substations in a manner designed to maintain the voltages delivered to affected customers in the lower part of the allowable voltage range.[[1]](#footnote-2)

# Program Savings Detail

Table 1 summarizes the incremental energy and demand savings the VO Program achieved in CY2024.

Table 1. Total Annual Incremental Electric Savings - Total

| Savings Category | Units | Ex Ante Gross Savings\* | Program Gross Realization Rate | Verified Gross Savings\* | Program Net-to-Gross Ratio (NTG) | CY2022 Net Carryover Savings | CY2023 Net Carryover Savings | Verified Net Savings† |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Electric Energy Savings - Direct‡ | kWh | 99,942,516 | 0.99 | 98,627,900 | 1.00 | 0 | 0 | 98,627,900 |
| Electric Energy Savings -  Converted from Other Fuel§ | kWh | 0 |  | 0 | 1.00 | 0 | 0 | 0 |
| Electric Energy Savings - Indirect from Electrification (electrification baseline)|| | kWh | 0 |  | 0 |  | 0 | 0 | 0 |
| Total Electric Energy Savings# | kWh | 99,942,516 | 0.99 | 98,627,900 | 1.00 | 0 | 0 | 98,627,900 |
| Total Electric Energy Savings  Including Carryover# | kWh | 0 | 0.00 | 0 | 0.00 | 0 | 0 | 0 |
| Summer Peak\*† Demand Savings | kW | 17,478 | 0.99 | 17,275 | 1.00 | 0 | 0 | 17,275 |
| Summer Peak\*† Demand Savings   Including Carryover | kW | 0 | 0.00 | 0 | 0.00 | 0 | 0 | 0 |

N/A = not applicable (refers to a piece of data that cannot be produced or does not apply).

\* The “Ex Ante Gross Savings" and “Verified Gross Savings" in row one (Electric Energy Savings - Direct) and row seven (Summer Peak Demand Savings) exclude gross carryover savings from CY2022 and CY2023.

† The “Verified Net Savings” in row one (Electric Energy Savings - Direct) and row seven (Summer Peak Demand Savings) include net carryover savings from CY2022 and CY2023 for applicable programs.

‡ The Electric Energy Savings - Direct includes primary kWh savings from efficient measures (excluding electrification savings from both electrification and efficiency baseline), secondary kWh savings from wastewater treatment, and electric heating penalties.

§ Gas savings converted to kWh by multiplying Therms \* 29.31 (which is based on 100,000 Btu/Therm and 3,412 Btu/kWh). The evaluation team will determine which gas savings will be converted to kWh and counted toward ComEd's electric savings goal while producing the portfolio-wide Summary Report.

|| Electrification savings excluding direct efficiency savings. Calculated from net electric savings from increase in kWh consumption and decrease in gas consumption from electrification (kWh equivalent). This row calculates savings using electrification baseline. The next row (Electric Energy Savings – Indirect from Electrification (efficiency baseline)) calculates the portion of converted electrification savings to traditional efficiency electric savings using an efficiency baseline, which can be claimable towards ComEd’s electric savings goal (applied to only midstream programs).[[2]](#footnote-3) The evaluation team determined which electrification savings are allocated toward ComEd's electrification savings goal, and which portion of electrification are converted to traditional efficiency electric savings based on analysis of portfolio-wide verified savings.

# Total Electric Energy Savings is the sum of the Electric Energy Savings - Direct, Electric Energy Savings Converted from Other Fuel, Electric Energy Savings - Indirect from Electrification (electrification baseline), and Electric Energy Savings - Indirect from Electrification (efficiency baseline). Note: This row does not include carryover gross savings, but the next row (Total Electric Savings Including Carryover) includes carryover in the gross savings, for the purpose of recalculating the gross realization rate, including carryover savings (same for the peak demand savings).

\*† The Peak Demand Savings are savings occurring at coincident Summer Peak period, defined as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, June through August. This definition is in accordance with PJM requirements.

Note: The program-level NTG values are calculated as Verified Net/Verified Gross. The program-level analysis typically used measure-level deemed NTG values, which are listed here: https://www.ilsag.info/evaluator-ntg-recommendations-for-2024.

Source: Evaluation team analysis

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# Cumulative Persisting Annual Savings

Table 2 show the cumulative persisting annual savings (CPAS) for the measures installed in CY2024. The electric CPAS across all measures installed in CY2024 is shown in Table 2.

Table 2. CPAS – Electric

|  | | | CPAS Verified Net kWh Savings | | | |  | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Savings Category | Verified Gross Savings (kWh) | Lifetime Net Savings (kWh)† | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| CY2024 Program Total Contribution to CPAS | 98,627,900 | 1,479,418,494 |  |  |  |  |  |  | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 |
| Historic Program Total Contribution to CPAS‡ |  |  | 66,014,049 | 250,055,552 | 466,051,868 | 737,003,608 | 916,985,992 | 985,977,646 | 985,977,646 | 985,977,646 | 985,977,646 | 985,977,646 | 985,977,646 |
| Program Total CPAS | 98,627,900 | 1,479,418,494 | 66,014,049 | 250,055,552 | 466,051,868 | 737,003,608 | 916,985,992 | 985,977,646 | 1,084,605,546 | 1,084,605,546 | 1,084,605,546 | 1,084,605,546 | 1,084,605,546 |
| CY2024 Program Incremental Expiring Savings§ |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 |
| Historic Program Incremental Expiring Savings|| |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Savings# |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 |

| Savings Category | Verified Gross Savings (kWh) | Lifetime Net Savings (kWh)† | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CY2024 Program Total Contribution to CPAS | 98,627,900 | 1,479,418,494 | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 | 98,627,900 | 0 |
| Historic Program Total Contribution to CPAS‡ |  |  | 985,977,646 | 985,977,646 | 985,977,646 | 985,977,646 | 919,963,597 | 735,922,094 | 519,925,778 | 248,974,038 | 68,991,654 |  |  |
| Program Total CPAS | 98,627,900 | 1,479,418,494 | 1,084,605,546 | 1,084,605,546 | 1,084,605,546 | 1,084,605,546 | 1,018,591,497 | 834,549,994 | 618,553,677 | 347,601,937 | 167,619,554 | 98,627,900 | 0 |
| CY2024 Program Incremental Expiring Savings§ |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 98,627,900 |
| Historic Program Incremental Expiring Savings|| |  |  | 0 | 0 | 0 | 0 | 66,014,049 | 184,041,503 | 215,996,316 | 270,951,740 | 179,982,384 | 68,991,654 | 0 |
| Program Total Incremental Expiring Savings# |  |  | 0 | 0 | 0 | 0 | 66,014,049 | 184,041,503 | 215,996,316 | 270,951,740 | 179,982,384 | 68,991,654 | 98,627,900 |
| Program Total Incremental Expiring Savings# |  |  | 0 | 0 | 0 | 0 | 66,014,049 | 184,041,503 | 215,996,316 | 270,951,740 | 179,982,384 | 68,991,654 | 0 |

Note: The 15-year EUL shown here aligns with IL-TRM v12.0 which also allows VO savings to be renewed every 15 years to a maximum of 50 years “after verifying that VO is still operational on the feeder in a manner consistent with the operation that led to the original TRM savings estimate.”[[3]](#footnote-4) This renewal is expected to apply to these feeders with a 15-year renewal in 2039, another 15-year renewal in 2054, and a 10-year renewal in 2064, for a total EUL of 50 years.

† Lifetime savings are the sum of CPAS savings through the EUL.

‡ Historical savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Yn-1 - CPAS Yn.

|| Historic incremental expiring savings are equal to Historic CPAS Yn-1 – Historic CPAS Yn.

# Program total incremental expiring savings are equal to current year total incremental expiring savings plus historic total incremental expiring savings.

Source: Evaluation team analysis

1. The bulk of the energy savings that occurs is expected to occur on the customer side of the meter, although additional savings are expected from reduced current flows along the full length of the affected circuits. [↑](#footnote-ref-2)
2. ComEd Electrification Policy Resolutions for 2024 Final Draft. “…the ComEd Energy Efficiency portfolio will use the Electric Point of Sale baseline set by the TRM, without applying the additional electrification ratios, to claim Energy Efficiency savings from heat-pump projects through midstream programs once either of the electrification caps has been reached.” [↑](#footnote-ref-3)
3. See Measure 6.2.1, Volume 4, Version 12.0 of the IL-TRM. [↑](#footnote-ref-4)