

# 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

**FINAL**

April 7, 2025

Prepared by:

Carly Olig  
Guidehouse

Isaiah Westphalen  
Guidehouse

**Submitted to:**

ComEd  
2011 Swift Drive  
Oak Brook, IL 60523

**Submitted by:**

Guidehouse Inc.  
150 N. Riverside Plaza, Suite 2100  
Chicago, IL 60606

**Contact:**

Charles Maglione, Partner  
703.431.1983

[cmaglione@guidehouse.com](mailto:cmaglione@guidehouse.com)

Jeff Erickson, Director  
608.616.4962

[jeff.erickson@guidehouse.com](mailto:jeff.erickson@guidehouse.com)

Carly Olig, Director  
608.616.4810

[carly.olig@guidehouse.com](mailto:carly.olig@guidehouse.com)

This report was prepared by Guidehouse for ComEd. The work presented in this report represents Guidehouse's professional judgment based on the information available at the time this report was prepared. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Guidehouse nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

# Table of Contents

<b>Introduction .....</b>	<b>1</b>
<b>Program Savings Detail .....</b>	<b>1</b>
<b>Cumulative Persisting Annual Savings .....</b>	<b>3</b>

# List of Tables

Table 1. Total Annual Incremental Electric Savings - Total .....	1
Table 2. CPAS – Electric .....	3

# 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.<sup>1</sup>

# 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	100,125,553	1.00	99,924,803	1.00	0	0	99,924,803
Electric Energy Savings - Converted from Other Fuels§	kWh	0	N/A	0	1.00	0	0	0
Electric Energy Savings - Indirect from Electrification (electrification baseline)	kWh	0	N/A	0	N/A	0	0	0
Total Electric Energy Savings#	kWh	100,125,553	1.00	99,924,803	1.00	0	0	99,924,803
Total Electric Energy Savings Including Carryover#	kWh	0	0.00	0	0.00	0	0	0
Summer Peak*†† Demand Savings	kW	17,530	1.01	17,732	1.00	0	0	17,732
Summer Peak*†† Demand Savings Including Carryover	kW	0	0.00	0	0.00	0	0	0

<sup>1</sup> 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.

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).<sup>2</sup> 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*

---

<sup>2</sup> 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.”

# Cumulative Persisting Annual Savings

Table 2 shows 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**

Savings Category	Verified Gross Savings (kWh)	Lifetime Net Savings (kWh)†	CPAS Verified Net kWh Savings												
			2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028		
CY2024 Program Total Contribution to CPAS	99,924,803	1,498,872,043									99,924,803	99,924,803	99,924,803	99,924,803	99,924,803
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	985,977,646	985,977,646
Program Total CPAS	99,924,803	1,498,872,043	66,014,049	250,055,552	466,051,868	737,003,608	916,985,992	985,977,646	1,085,902,449	1,085,902,449	1,085,902,449	1,085,902,449	1,085,902,449	1,085,902,449	
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	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
CY2024 Program Total Contribution to CPAS	99,924,803	99,924,803	99,924,803	99,924,803	99,924,803	99,924,803	99,924,803	99,924,803	99,924,803	99,924,803	0	0	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	1,085,902,449	1,085,902,449	1,085,902,449	1,085,902,449	1,019,888,400	835,846,897	619,850,581	348,898,841	168,916,457	99,924,803	0	0	0
CY2024 Program Incremental Expiring Savings§	0	0	0	0	0	0	0	0	0	0	99,924,803	0	0
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	0	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	99,924,803	0	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.”<sup>3</sup> 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

<sup>3</sup> See Measure 6.2.1, Volume 4, Version 12.0 of the IL-TRM.