ComEd Voltage Optimization Program CY2021 Evaluation Plan

Introduction

The ComEd Voltage Optimization (VO) Program comprises ComEd's plan to install hardware and software systems on a significant portion of its electric power distribution grid to achieve voltage and reactive power optimization (volt-var optimization, or VVO) over the 2018-2025 time frame. VVO is a smart grid technology that uses distributed sensors, two-way communications infrastructure, remote controls on substation transformer load-tap changers (LTCs) and capacitor banks, and integrating and optimizing software to flatten voltage profiles and lower average voltage levels on an electric power distribution grid. ComEd is working with an automation-optimization hardware and software vendor[1] to implement the VO Program on selected parts of its distribution grid over the 2018-2025 period. This Evaluation Plan covers the fourth year (CY2021) of the planned VO Program roll-out and is based on the program description provided in ComEd's 2018-2021 Portfolio Plan[2] as well as ongoing discussions with ComEd's VO implementation team.

The primary objective of the VO Program CY2021 evaluation will be to verify the net impacts of VO on the feeders on which it is installed and commissioned in CY2021 using the method described in the Illinois Technical Reference Manual (TRM V9.0), which is consistent with the CY2019 and CY2020 evaluations.[3] The program evaluation will include a variety of data collection and analysis activities, including those shown in Table 1.

Table 1. Evaluation Approaches

Tasks	CY2021
Program Tracking Data Review	X
ComEd Staff Interviews*	X
Data Collection –SCADA Data from VO Substations/feeders†	X
Impacts – Measure Net Savings Impact of VO in Affected Feeders	X

* These activities will be in the context of ongoing bi-weekly meetings with the VO implementation team.
† SCADA data will be collected for feeders on which VO is installed during CY2021 and will be used to measure impacts.

Coordination

Ameren Illinois is implementing a similar program and Guidehouse will coordinate with the Ameren evaluation, as well as with ICC staff, on issues relevant to measurement and verification of VO impacts.

Evaluation Research Topics

The evaluation will answer the following key researchable questions:

[1] Open Systems International (OSI) of Medina, Minnesota.
[2] "Commonwealth Edison Company's 2018-2021 Energy Efficiency and Demand Response Plan," June 30, 2017, pp. 192-195.
[3] IL-TRM V9.0, vol. 4, measure 6.2.1 pp. 23-30 (https://ilsag.s3.amazonaws.com/IL-TRM_Effective_010121_v9.0_Vol_4_X-Cutting_Measures_and_Attach_09252020_Final.pdf).

Impact Evaluation

1. What are the program's incremental and cumulative persistent annual verified energy savings?
2. What are the program's coincident peak demand reductions?
3. What voltage reductions did the program achieve?

Process and Net-to-Gross Research

Guidehouse will not do a formal process evaluation of this program. To the extent that we identify opportunities for improvement through the normal course of our research, we will report them to ComEd. The VO Program requires no actions by any affected ComEd customers, so net and gross impacts are identical; thus, net-to-gross research is not required.

Evaluation Approach

ComEd, Ameren Illinois, Guidehouse, Opinion Dynamics, Illinois Commerce Commission (ICC) staff, and interested stakeholders proposed an approach that was accepted by the Illinois Energy Efficiency Stakeholder Advisory Group (SAG) for inclusion in the TRM V9.0. The CY2021 evaluation will follow this approach.

Table 2 below summarizes the evaluation tasks for CY2021.

Table 2. Core Data Collection Activities, Sample, and Analysis

Activity	Target	Target Completes CY2021	Timeline	Notes
ComEd Staff Interviews*	ComEd Program Management	1	Ongoing	This activity will be in the context of ongoing bi-weekly meetings with the ComEd VO team.
Program Tracking Data Review	Tracking system	Census	Ongoing	This activity is completed throughout the year based on monthly data transfer from ComEd
SCADA data from VO substations/feeders	SCADA system	Census	Ongoing	This activity is completed throughout the year based on monthly data transfer from ComEd
Impact*	Calculation using TRM-based method	Census	February 1 - March 14, 2022	

ComEd Staff Interviews

The evaluation team will interview the ComEd program staff confirming our understanding of the nuances needed for the CY2021 evaluation. This will occur in the context of our ongoing bi-weekly meetings with the ComEd VO team.

Program Tracking and SCADA Data Review

The evaluation team will perform regular reviews of the program tracking and SCADA system data throughout the year. This review is needed due to the volume of data involved in our evaluation and allows us to identify any missing or problematic data and receive updated data as needed throughout the year.

Gross and Verified Net Impact Evaluation

Guidehouse will calculate the annualized gross energy savings and summer coincident peak demand savings separately for each VO-enabled feeder as described in the TRM V9.[4] Throughout the year, Guidehouse will review data transfers from ComEd and produce QC memos to ensure the transfer has worked properly and Guidehouse has the best available data. We will continue to have bi-weekly meetings with ComEd and ICC staff to discuss, document, and resolve any issues or concerns as they arise throughout the year.

Since the VO Program will require no actions by any affected ComEd customers, net and gross impacts are identical.

Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Guidehouse will report ex post gross and ex post net savings for the program and the CPAS in CY2021 will be calculated along with the total CPAS.

Data Requirements

Table 3 shows the data Guidehouse will need for the CY2021 evaluation. Data transfers should be kept consistent with CY2020 unless otherwise discussed.

Table 3. Data Requirements for CY2021 VO Evaluation

Data Source	Information Required for CY2021 Feeders
Substation SCADA System	• Feeder
	• Substation
	• Date / times stamp (30-minute intervals)
	• Voltage (at substation bus)
	• Real power (MW or MWh)*
	• Weather data (temperature, humidity, wind speed)†
Other	• VO control status
	• Static feeder characteristics

* Where power (MW) data collection has not yet been established, best available data from the feeder line measurement devices (e.g., amps) should be considered.
† Guidehouse will acquire required observed weather data from area NOAA weather stations.

[4] Ibid.

Evaluation Schedule

Table 4 below provides the schedule for key deliverables and data transfer activities for the CY2021 evaluation. Adjustments will be made, as needed, as evaluation activities progress.

Table 4. Schedule – Key Deadlines

Activity or Deliverable	Responsible Party	Date Delivered
Periodic team meetings and ComEd staff interview	ComEd, Guidehouse, ICC staff	Bi-weekly, as needed
Ongoing data deliveries to Guidehouse	ComEd	Monthly, Jan 2021-Feb 2022
Data QC memos	Guidehouse	Following each data delivery
Final CY2021 evaluation data (Jan 2020 – Dec 2021) delivered to Guidehouse	ComEd	January 30, 2022
Final CY2021 evaluation data (Jan 2022) delivered to Guidehouse	ComEd	February 18, 2022
Draft CY2021 summary report to ComEd and SAG	Guidehouse	March 14, 2022
Comments on draft	ComEd and SAG	April 4, 2022
Revised draft by Guidehouse	Guidehouse	April 11, 2022
Comments on redraft	ComEd and SAG	April 18, 2022
Final summary report to ComEd and SAG	Guidehouse	April 25, 2022