



Smart Grid Advanced Metering Annual Implementation Progress Report

**Submitted by:
Commonwealth Edison Company**

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EXCERPT
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VI. Voltage Optimization
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household (Group 5, above) and will supplement such reports if additional verifiable data becomes available from other entities, such as DCEO. In addition, ComEd will continue to administer assistance programs and will engage in education and outreach for low income customers. Low income customers are defined as those customers who participate in the Low Income Heating Assistance Program (“LIHEAP”), and the Residential Special Hardship Program. The previously utilized Percentage of Income Payment Plan (“PIPP”) program was suspended during 2015 due to the State of Illinois budget issues and ComEd did not run a CHA program in 2015.

In 2015 there were no further developments in acquiring data for Groups 2, 3, 4 or 6. As in 2015, in 2016 ComEd will continue to evaluate outreach to customers in need, where there is data to identify such customers, through alerts, enhanced messaging and payment arrangements.

V. DG MAPPING

In the June 2012 Order, the Commission determined that concerns raised by CUB and the ELPC about perceived barriers to the installation of DG needed to be addressed in a separate rulemaking. The Commission, however, directed ComEd to work with interested parties to implement their “request for a map showing where distributed generation would be good or bad.”⁵³ Following meetings with interested parties, ComEd posted a map tool on its website and notified interested parties on August 15, 2013 of the posting.⁵⁴ ComEd last updated the map on September 23, 2015, and plans to update the map once per year. ComEd will continue to consider more frequent updates if there is a large increase in DG interconnection activities in the future. An update will also be necessary if and when there is a change to the rules that govern the review and approval of DG interconnection requests for DG facilities with a nameplate capacity of up to 10 MVA.⁵⁵

VI. VOLTAGE OPTIMIZATION

A. Background

Voltage Optimization (“VO”) is a combination of Conservation Voltage Reduction (“CVR”) and Volt-VAR Optimization (“VVO”). These programs are intended to reduce end-use customer energy consumption and peak demand while also reducing utility distribution system energy losses. The ICC, in Docket No. 13-0495, stated that “A review of the record leads the Commission to believe that a VO feasibility study should be pursued and could in fact result in many direct and indirect benefits.” In accordance with ComEd’s 2014 AIPR, a Voltage Optimization Feasibility study was completed by Applied Energy Group (“AEG”) in December 2014. This Study was submitted as part of the 2015 AIPR filing.

⁵³ June 2012 Order at 50.

⁵⁴ <https://www.comed.com/customer-service/rates-pricing/interconnection/Pages/distribution-under-10000kva.aspx>.

⁵⁵ 83 Ill. Admin. Code Part 466 – Electric Interconnection of Distributed Generation Facilities.

The study recommended a VO validation project to demonstrate the proposed VO implementation strategies, verify estimated VO factors, and develop simplified VO Measurement & Verification procedures on ComEd's distribution system. As indicated in the 2015 AIPR filing, ComEd has been planning to conduct a VO validation project on one of its Distribution Substations. Additional details regarding the planned VO validation project are provided below.

B. ComEd Validation Project Approach

ComEd plans to implement a Validation Project for VO that should be fully functional by late 4th Quarter 2016 to validate the conclusions of the VO Feasibility Study conducted by AEG. This project will be conducted to measure and evaluate the extent of customer energy use reduction, the reduction in distribution system losses, operational challenges and other issues resulting from implementation of the VO Control application. The validation project will be implemented on a ComEd Substation that represents a complex transformer & bus configuration (Transformers with Load Tap Changers in a parallel configuration feeding a split ring type bus) regulating voltage on multiple feeder connections containing multiple customer types (Residential, Small Commercial & Industrial, and Large Commercial & Industrial).

A VO Control application is planned to monitor voltage at points between the substation and the last customer utilizing voltage readings from the substation bus, capacitor banks, and voltage regulators. VO Control is planned to also monitor feeder and substation transformer three phase average real and reactive powers. VO Control is planned to optimize both feeder capacitor and substation bus capacitor switching and minimize LTC operations. Substation Transformer LTC controls and switched feeder capacitors and feeder voltage regulators controls are planned to be operated by the VO control application to maintain customer voltage, as much as possible, within the lower half of the ANSI C84.1 Range A (service voltage) while maintaining a feeder power factor as close as possible to unity (100%). A Scheduling function is planned to be utilized for Measurements and Verification of the VO Control.

As part of the validation project, conditioning of the feeders is planned to be implemented to improve the voltage profile and minimize line losses. This could include the following:

- Balance loading on the feeder phases (phase balancing)
- Installation of mid-feeder voltage regulators with remote controls
- Installation of feeder capacitor banks with remote controls

The following are Goals & Objects for the VO Validation Project

- ✓ Analyze & Identify the technology requirements necessary to support VO system Implementation in managing the distribution voltage and devices from the substation to the customer service point.
- ✓ Evaluate the ability of a VO system to reduce customer energy use and reduce utility system losses
- ✓ Develop and Implement VO analysis training, operations, and maintenance materials
- ✓ Improve VAR management utilizing smaller capacitor banks under VO controls

- ✓ Monitor & Examine AMI voltage/loading data to understand operational impacts and determine any feeder conditioning requirements.
- ✓ Begin VO operations of the validation project in 2016. It is anticipated that data collected over a 12-month operating period will be sufficient to validate the assumptions and conclusions reached in the feasibility study. Additional data collection and evaluation for a period of up to 12 months may be necessary if unanticipated operational issues arise during the validation project.
- ✓ Assess and report learnings from the results of the validation project.

VO Validation Project Milestones & Timeline	End Date
VO Application	
Issue RFP for Voltage Optimization Vendor Application	Q1/2016
Evaluate/Select/Award Voltage Optimization Vendor Application	Q2/2016
Application Development with VO Vendor	Q2/2016
Voltage Optimization System Integration & Commissioning	Q4/2016
Substation/Feeder Design Phase	
Select Substations & Feeders for VO Pilot/Validation Deployment	Q2/2016
Develop PDs for Validation Substation & Feeder Enhancements	Q2/2016
Develop Engineering Designs for Substation & Feeder Enhancements	Q2/2016
Construction Phase	
Procure Major Materials (Capacitors, Regulators, Relays, & Controllers)	Q3/2016
Construct Substation & Feeder Enhancements	Q4/2016

C. Budget and Cost Recovery

A preliminary estimate of the cost of the validation project is \$4M, which, along with the costs of the feasibility study, ComEd intends to pay from general corporate funds and recover through the distribution formula rate. The recovery of the validation project costs will be addressed further in ComEd's 2016 Formula Rate Update proceeding.