REV Demonstration Project:
Clean Virtual Power Plant

2016 4Q Quarterly Progress Report

Dated: January 30, 2017

Table of Contents

1.0 EXECUTIVE SUMMARY

Consolidated Edison Company of New York, Inc. ("Con Edison" or the "Company") submits this quarterly report on the progress of the Clean Virtual Power Plant REV demonstration project ("Project") it is implementing as part of the Reforming the Energy Vision ("REV") proceeding, as required by the *Order Adopting Regulatory Policy Framework and Implementation Plan*, issued by the New York State Public Service Commission ("Commission") on February 26, 2015.

1.1 PROGRAM ACHIEVEMENTS

On July 1, 2015, Con Edison submitted the Project for approval by Department of Public Service Staff ("DPS Staff"); on November 20, 2015 DPS Staff approved the Project. Con Edison filed an implementation plan for the Project on December 11, 2015. In the first two quarters of 2016, Con Edison and SunPower finalized and signed the Virtual Power Plant Development Agreement for the marketing, installation, and commissioning of the systems, along with the SCADA integration. Concurrently, a 20 year O&M agreement was executed for the ongoing maintenance of all installed systems, and the Project's marketing plan was finalized. In Q3, SCADA integration work begun, with a successful initial test of the communications protocol translator successful in Q4.

1.2 CYBERSECURITY AND PERSONALLY-IDENTIFIABLE INFORMATION PROTECTION

Consistent with corporate instructions and Commission policy related to cybersecurity and the protection of personally-identifiable information ("PII"), each partner agreement executed for the implementation of the Project includes specific protections related to cybersecurity and PII. Assurance of this protection is critical in encouraging customers to sign up with new and innovative services offered by utilities. Additionally, because the Project has operational cybersecurity implications, the Project will incorporate industry best practices related to cybersecurity into the Project's design where appropriate.

1.3 ACCOUNTING PROCEDURE ESTABLISHED

On February 16, 2016, in Case 15-E-0229, Con Edison filed an accounting procedure for the accounting and recovery of all REV demonstration project costs. This accounting procedure establishes a standardized framework that will govern how the Company categorizes and allocates the costs of the REV demonstration projects, and will facilitate analyzing each project to determine the overall financial benefits of the program to customers.

1.4 COSTS, BENEFITS, AND OPERATIONAL SAVINGS

Budget information for all of the Company's REV demonstration projects is being filed confidentially with the Commission, concurrently with the filing of this document. All

costs filed are incremental costs needed to implement the projects. To date, no tax credits or grants have been available to reduce the net costs of the projects, but Con Edison will take advantage of such offsetting benefits when they are available. Due to the early stage of implementation for the Project, there are no operational savings to report at this time.

1.5 CLEAN VIRTUAL POWER PLANT

The Project is designed to demonstrate how aggregated fleets of solar and energy storage assets in hundreds of residential dwellings can collectively provide network benefits to the grid, resiliency services to customers, monetization value to Con Edison, and results that will help inform future rate design and development of distribution-level markets.

In Q4 of 2016, the Project: suspended all marketing activities as we work with the FDNY for a full technology approval; and continued the development of the Communications Protocol Translator needed for SCADA communications, with a successful internal test of the software.

.

2.0 CLEAN VIRTUAL POWER PLANT – QUARTERLY PROGRESS

2.1 DEMONSTRATION HIGHLIGHTS

2.1.1 Since Previous Quarter – Major Tasks Completion

- Protocol Translation Client and Server for SCADA connection installed and successfully tested.
- Beta DNP Index established for initial communication tests

2.1.2 Activities Overview

The Project Team has been working with the FDNY since the end of 2015 to satisfy all of its requirements for approval for deployment of the battery units for this endeavor. The team is pleased that a "Letter of No Objection" was issued in September for one installation in Queens, which is a major milestone for battery projects in New York City as the first such letter for lithium ion batteries. The team will continue to work with the FDNY for a full Technology Approval for all installations. Due to the concerns of marketing without full FDNY approval, the sales effort has been put on hold until that is obtained. This has resulted in a delay to the Project.

Phase 2, SCADA Integration, began concurrently with Phase 1 in Q1 of 2016. The overall communication design was completed and approved in Q1 and the details of integration, along with an updated schedule, were finalized in Q2. In the past quarter, a data index was established for the beta protocol translator, which includes day-ahead dispatch input/outputs and a general map for future expansion of use cases. Server hardware was ordered and installed in Con Edison's test environment used for all SCADA applications prior to being put into use in the production environment. The first version of the software was delivered by Sunverge in early October and has passed initial tests.

Phase 3, Market Participation, will begin after the successful commissioning of SIS units.

2.1.3 Key Metrics

During Phase I, the only metric to be reported is the total number of customers signed up for the program during the quarter; due to marketing activity suspension, no customers were acquired in Q4.

2.1.4 Next Quarter Forecast

In Q1 of 2017, Con Edison and SunPower will continue to work with the FDNY for a technology approval specific to all installations for this Project, which will all use identical Lithium Ion Batteries systems, the Sunverge SIS.

The SCADA integration work will continue with two-way testing of Sunverge's Protocol Translation Client software. Operator screens and VPP functionality will

continue to be designed and built with the goal to bring a beta version of the VPP into the Control Centers in Q2 of 2017.

2.1.5 Checkpoints/Milestone Progress

Checkpoint/Milestone	Timing	Status
Planning and Contract Negotiations	Phase 0 End	Complete
Residential Design and Installation: Resiliency Pricing	Phase 1 Quarterly	
Demonstrate System Control through SCADA Link	Phase 2 Quarterly	
Market Participation	Phase 3 Midpoint / End	

Legend

On Schedule	Delayed w/out Major Impact	Delayed or Stopped – Project Goals Impacted

2.1.6 Planned Activities for Q1 2017

2.1.6.1 Resiliency Pricing: Customer acquisition will test various price points and the average monthly resiliency fee that customers sign up for will be reported after all customers are acquired.

Status: **Red – Customer Acquisition has fully stopped, pending FDNY approval.**

Expected Target by Phase 1 Midpoint: Original estimates expected approximately 150 customers would have signed up for the program by the end of Q2 2017. Since all marketing has been put on hold, this target will not be met.

Solutions/strategies in case of results below expectations: A fundamental hypothesis of the Project is that residential customers are willing to pay for resiliency services from a battery coupled with solar, and willing to host the equipment on their property. After marketing resumes we will reevaluate how much time is needed to get to our targets. If enough customers do not sign up for the Project, this hypothesis will be proven incorrect and the Project may be terminated. There are termination clauses in the contract with SunPower that allow for this event. If an insufficient number of customers have signed up for the Project six months after contract execution, the Project can be terminated with minimal penalty. Due to delays, the Company has extended this deadline.

2.1.6.2 FDNY and DOB approvals required before installation can proceed.

Status: **Red – Timeline remains unclear.**

Expected target by end of Q1: More clarity on the timeline for approval should be achieved by the end of Q1.

Solutions/strategies in case of results below expectations: FDNY approvals are required for these systems to be installed at host customers' homes. We continue to work with the FDNY with safety as our top priority. As such, if the approvals are not acquired there is a provision in the contract language allowing the Company to cancel the Project at very little cost to Con Edison; all but a program fee will be returned. This limits Con Edison's customers' liability to pay for systems before they have been approved for installation. The Company has extended this deadline to allow more time for the FDNY to approve the technology.

2.1.6.3 Phase II: A Beta, one-way SCADA communication link will be established

Status: Green

Expected target by Phase 2 midpoint: Beta software will be installed in the testing environment of Con Edison's Distribution Control Center SCADA system. After successful testing, full communication will be implemented.

Solutions/strategies in case of results below expectations: If the beta software requires more time to test and implement than scheduled, less time will be available in 2017 to demonstrate the capabilities of the system to control center operators. However this will have minimal impact to the overall project schedule, as 2017 will have continuous iterative SCADA design throughout the year.

If the software requires a full overhaul and redesign, the Phase II timeline could be significantly impacted.

2.1.7 Changes to Project Design

The Project team will continue to seek FDNY approval in Q1. After such approvals are obtained, Con Edison will work with SunPower on a new digital marketing campaign designed to raise awareness of the Project to drive sales.

2.2 WORK PLAN & BUDGET REVIEW

2.2.1 Phase Progress

After FDNY approval, Phase I will continue through 2017 with the acquisition of all customers and the installation of all SIS units.

Phase 2 began in Q1 with the preliminary SCADA architecture design, which was finalized in Q2. In Q3 a more detailed DNP3 Index was developed and the first version of a protocol translator was successfully tested in Q4. Phase 2 will continue through 2017 as an iterative process to improve the VPP control and functionality.

Phase 3 will begin after the first SIS unit is commissioned.

2.2.1.1 Updated Work Plan

Activity No.	Activity Description	Lead	2015		2016				2017
			Q3	Q4	Q1	Q2	Q3	Q4	Q1
1.0	Phase 0 - Demonstration Planning								
1.1	Project Management	Con Edison/Sunpower							
1.1.1	Obtain Commission Approval	Con Edison							
1.1.2	Finalize Contracts	Con Edison							
1.1.2.1	Refine Scope of Work	Sunpower							
1.1.2.2	Draft Partnership Contract	Con Edison							
1.1.2.3	Draft Homeowner Contract	Sunpower							
2.0	Phase1 - Installation of Solar plus Battery Storage								
2.1	Project Management	Con Edison							
2.2	Customer Engagement	Sunpower							
2.2.1	Marketing	SunPower							
2.2.1.1	Con Edison Program Marketing	ConEdison/SunPower							
2.2.3	Customer Acquisition	Sunpower							
2.2	Financing	Sunpower							
2.2.1.1	Supply Chain	Sunpower							
2.2.1.2	Supply chain planning	Sunpower							
2.2.1.3	Design and Installation	Sunpower							
2.2.1.4	Engineering and design, including standard critical load	Sunpower							
2.2.3	Solar PV and storage systems installations and commissioning	Sunpower							
2.3	VPP Capacity Demonstration	Sunpower							
2.4	Solar PV and Storage Operations and Maintenance (O&M)	Sunpower							
3.0	Phase 2 - Demonstrate system control through Con Edison's control center applications								
3.1	Project Management	Con Edison							
3.1.1	Evaluate Project Rollout	Con Edison							
3.2	Design and Install Beta Communication Link	Con Edison/Sunpower							
3.2.1	Upgrade Con Edison's SCADA system	Con Edison							
3.2.2	Set VPP control parameters	Con Edison/Sunpower							
3.2.3	Establish One-Way SCADA Link	Con Edison							
3.2.4	Test Dispatch/System Integration	Con Edison/Sunpower							
3.2.5	Assess Risks	Con Edison							
3.2.6	Establish/Test Two-Way SCADA Link	Con Edison/Sunpower							
3.3	Iterative Design w/Operations to Finalize Functionality	Con Edison							
4.0	Phase 3 - Market Participation and Rate Design								

= Completed = In Progress = Not Started = Delayed = New/Modified

2.2.1.2 Updated Budget

Budget information is being filed confidentially with the Commission.

2.3 CONCLUSION

2.3.1 Lessons Learned

The Company expected that FDNY approvals for new technology would require detailed communications to satisfy FDNY's need for product safety and establish first responder procedures. While significant progress has been demonstrated with approval for one site, the process for full technology approval has taken longer than anticipated by the Project team.

2.3.2 Recommendations

The Project team will continue to work with the FDNY on first responder procedures for SIS installations.

After such approvals, Con Edison and SunPower will continue to implement the project as envisioned in the December 11, 2015 Implementation Plan.

2.4 INCLUDED APPENDICES

Appendix A: Clean Virtual Power Plant Description of Phases

Appendix A: Clean Virtual Power Plant Description of Phases

Phase	0. Demonstration Planning	1. Installation of Residential Systems	2. SCADA Integration	3. Market Participation and Rate Design
Milestone (Stage Gate to Next Phase)	*Negotiations to be Completed* • Sign Development Agreement • Sign Maintenance Services Agreement • Sign related agreements	*Successfully Contract with Host Customers and build a 4.0 MWh Virtual Power Plant* • Gain required market traction before the Guaranteed Marketing Deadline.	*Build Control and Monitoring Platform for Regional Control Center Operators.* • Cyber-secure communication architecture. • HMI Functionality • Engineering analysis through PI system • Control Center Customer satisfaction	*Shadow a wholesale (NYISO) or distribution (DSP) market to demonstrate monetization of VPP assets* • Calculate % of compliance • Calculate potential penalties during operating time • Determine price that can be offered for battery dispatch-ability
Key Elements	• Vendor Approved • Cybersecurity Plan •	• Learn how much customers are willing to pay on a monthly basis for access to a battery during a grid outage. • Learn the tolerance customers have for hosting battery systems.	• Work with GE to develop initial HMI screens • Iterative Process between SCADA design engineers and Control Center operators • Key takeaways to be learned for expansion for other 3rd party connections.	• Learn how much a distributed system can make in the markets • Learn operating costs of Con Edison • Calculate total risks • Calculate acceptable price to offer 3rd parties for dispatch-ability
DER Categories	N/A	Solar Plus Storage	• Cybersecurity • DSP Functionality • Scalability	• Solar Plus Storage • Market Design • DSP Functionality • Scalability