



---

REV Demonstration Project:  
Clean Virtual Power Plant

2016 2Q Quarterly Progress Report

---

**Dated: July 29, 2016**

## Table of Contents

<b>1.0</b>	<b>Executive Summary</b> .....	<b>2</b>
1.1	Program Achievements.....	2
1.2	Cybersecurity And Personally-Identifiable Information Protection.....	2
1.3	Accounting Procedure Established.....	2
1.4	Costs, Benefits, And Operational Savings.....	2
1.5	Clean Virtual Power Plant.....	3
<b>2.0</b>	<b>Clean Virtual Power Plant – Quarterly Progress</b> .....	<b>4</b>
2.1	Demonstration Highlights.....	4
2.1.1	Since Previous Quarter – Major Tasks Completion.....	4
2.1.2	Activities Overview.....	4
2.1.3	Key Metrics.....	4
2.1.4	Next Quarter Forecast.....	4
2.1.5	Checkpoints/Milestone Progress.....	5
2.1.6	Planned Activities For Q3.....	5
2.1.6.1	Customer Acquisition Will Begin. Various Price Points Will Be Tested And The Average Monthly Resiliency Fee That Customers Sign Up For Will Be Reported. ....	5
2.1.6.2	FDNY And DOB Approvals Required Before Installation Can Proceed. ....	6
2.1.6.3	Phase Ii: A Beta, One-Way Scada Communication Link Will Be Established.....	6
2.1.7	Changes To Project Design.....	6
2.2	Work Plan & Budget Review.....	6
2.2.1	Phase Progress.....	6
2.2.1.1	Updated Work Plan.....	7
2.2.1.2	Updated Budget.....	7
2.3	Conclusion.....	7
2.3.1	Lessons Learned.....	7
2.3.2	Recommendations.....	8
2.4	Included Appendices.....	8

---

## **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 (the 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 (the 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 2nd quarter of 2016, Con Edison focused on the implementation of the Project.

### **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. Con Edison will execute the project in partnership with SunPower.

In Q2 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.

The Project team finalized and approved the Project's marketing plan, and SunPower dealers will begin offering the product to qualified Con Edison customers in the third quarter of 2016.

---

## **2.0 CLEAN VIRTUAL POWER PLANT – QUARTERLY PROGRESS**

---

### **2.1 DEMONSTRATION HIGHLIGHTS**

#### **2.1.1 Since Previous Quarter – Major Tasks Completion**

- Project Contracts signed April 29, 2016
- Marketing Plan Approved
- Press Release Issued
- SCADA Design Timeline Finalized
- Continued Permitting Discussions with FDNY

#### **2.1.2 Activities Overview**

The team completed Phase 0, Demonstration Planning, with the execution of project contracts with SunPower, as well as finalization of the Marketing Plan and Homeowner Energy Storage Agreements (the contract that customers will sign to participate in the program).

Phase 1, Installation of Solar plus Battery Storage, began in Q1 of 2016 with the preliminary marketing materials being produced. In this quarter, these materials have been finalized and approved for use to promote and market the program to potential customers. Phase 1 will continue in Q3 with customer acquisition and permitting. No installations are expected in Q3.

Phase 2, SCADA Integration, also began concurrently with Phase 1 in Q1 of 2016. The overall communication design was completed and approved in Q1. With those approvals in place, the details of integration were finalized in this quarter, with installation scheduled to begin in Q3 and testing to begin in Q4.

Phase 3, Market Participation, will begin after the successful commissioning of Solar Integration System (SIS) units.

#### **2.1.3 Key Metrics**

Measurement of key outcomes will not be reported until Q3 2016 when SunPower Dealers begin to offer the Sunverge SIS to qualified customers. This metric will include how many customers signed up for the program, and the average monthly resiliency fee.










#### **2.1.4 Next Quarter Forecast**

In Q3 2016, SunPower will begin offering potential new solar customers, who qualify for the Clean VPP program, the Sunverge SIS for a fixed monthly resiliency fee. To test how much customers are willing to pay, a key lesson learned for this project, an “early bird” special will be offered to customers at a lower monthly cost. As customers commit to participate in the Project, the price for new customers will increase in




increments. The total number of customers that sign up for the Project, as well as the average monthly contract price, will be reported in all future quarterly reports within Phase I.

It is anticipated that the beta SCADA link will be installed with limited functionality by the end of Q3.

### 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 Q3

**2.1.6.1 Customer Acquisition will begin. Various Price Points will be tested and the average monthly resiliency fee that customers sign up for will be reported.**

**Status:** Green

**Expected Target by Phase 1 Midpoint:** Approximately 150 customers will have signed up for the program. The average monthly price will be reported.

**Solutions/strategies in case of results below expectations:** A fundamental hypothesis of the Project is residential customers are willing to pay for resiliency services from a battery coupled with solar, and willing to host the equipment on their property. 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.

### **2.1.6.2 FDNY and DOB Approvals required before installation can proceed.**

**Status:** Green

**Expected Target by end of Q3:** FDNY to have the preliminary findings of a third-party laboratory test on safety information for various battery chemistries to aid in the approval process. Con Ed's R&D department has been working with the FDNY in a parallel effort to increase the availability of various battery storage technologies in our service territory. An outside laboratory has been hired to conduct various safety tests under the FDNY's direction. Con Edison believes this will help get additional battery storage technologies approved in the New York City area.

**Solutions/strategies in case of results below expectations:** FDNY approvals are required for these systems to be installed at host customers' homes. As such, if the approval process takes too long there is another provision in the contract language that will 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.

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

**Status:** Green

**Expected Target by Phase 2 Midpoint:** Communication architecture and beta software will be installed in the testing environment of Con Edison's Distribution Control Center SCADA system. After successful testing in Q3, full two-way communication will be implemented and tested.

**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**

There are no significant changes expected to the current program design.

## **2.2 WORK PLAN & BUDGET REVIEW**

### **2.2.1 Phase Progress**

Phase 0, Demonstration Planning, was completed in Q2. All contracts are finalized.

Phase 1 has begun with the Finalization of the Marketing Plan, and a press release issued on June 13<sup>th</sup>, 2016.

### 2.2.1.1 Updated Work Plan

Activity No.	Activity Description	Lead	2015		2016			
			Q3	Q4	Q1	Q2	Q3	Q4
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						
2.2.2	Sales	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 Task
  = In Progress Task
  = Not Started Task
  = New/Modified Task

### 2.2.1.2 Updated Budget

Budget information is being filed confidentially with the Commission.

## 2.3 CONCLUSION

### 2.3.1 Lessons Learned

After executing the contract documents in the first month of Q2 the team was able to flush out more detail for Phase 2 of the Project. Creating the first SCADA link to a third party control system presents many unique challenges, including communication protocol translation and database alignment, while keeping operator functionality as flexible as possible. It is clear that there is much work to be done to



standardize these types of connections to other third party DER providers in the future.

### **2.3.2 Recommendations**

Due to the complexity of the SCADA integration it was decided to develop a more simplistic beta version as a communication platform in 2016, and then build more functionality into the link in an iterative process throughout 2017. This approach allows for the communication architecture to be debugged and finalized before it is used for higher level functionality, simplifying the modes of failure to be tested during implementation.

Con Edison eagerly awaits the first data deliverable of this project in Q3: resiliency price points for residential customers. 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
<b>Milestone (Stage Gate to Next Phase)</b>	<p><i>Negotiations to be Completed</i></p> <ul style="list-style-type: none"> <li>• Sign Development Agreement</li> <li>• Sign Maintenance Services Agreement</li> <li>• Sign related agreements</li> </ul>	<p><i>Successfully Contract with Host Customers and build a 4.0 MWh Virtual Power Plant</i></p> <ul style="list-style-type: none"> <li>• Gain required market traction before the Guaranteed Marketing Deadline.</li> </ul>	<p><i>Build Control and Monitoring Platform for Regional Control Center Operators.</i></p> <ul style="list-style-type: none"> <li>• Cyber-secure communication architecture.</li> <li>• HMI Functionality</li> <li>• Engineering analysis through PI system</li> <li>• Control Center Customer satisfaction</li> </ul>	<p><i>Shadow a wholesale (NYISO) or distribution (DSP) market to demonstrate monetization of VPP assets</i></p> <ul style="list-style-type: none"> <li>• Calculate % of compliance</li> <li>• Calculate potential penalties during operating time</li> <li>• Determine price that can be offered for battery dispatchability</li> </ul>
<b>Key Elements</b>	<ul style="list-style-type: none"> <li>• Vendor Approved</li> <li>• Cybersecurity Plan</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Learn how much customers are willing to pay on a monthly basis for access to a battery during a grid outage.</li> <li>• Learn the tolerance customers have for hosting battery systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Work with GE to develop initial HMI screens</li> <li>• Iterative Process between SCADA design engineers and Control Center operators</li> <li>• Key takeaways to be learned for expansion for other 3<sup>rd</sup> party connections.</li> </ul>	<ul style="list-style-type: none"> <li>• Learn how much a distributed system can make in the markets</li> <li>• Learn operating costs of Con Edison</li> <li>• Calculate total risks</li> <li>• Calculate acceptable price to offer 3<sup>rd</sup> parties for dispatchability</li> </ul>
<b>DER Categories</b>	N/A	Solar Plus Storage	<ul style="list-style-type: none"> <li>• Cybersecurity</li> <li>• DSP Functionality</li> <li>• Scalability</li> </ul>	<ul style="list-style-type: none"> <li>• Solar Plus Storage</li> <li>• Market Design</li> <li>• DSP Functionality</li> <li>• Scalability</li> </ul>