

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION



Reforming the Energy Vision
Demonstration Project Assessment
Report

Con Edison:
Clean Virtual Power Plant

November 20, 2015

INTRODUCTION

In an order issued February 26, 2015, the Commission directed the six large investor owned electric utilities to develop, and file initial demonstration projects, consistent with the guidelines adopted by the order, on or before July 1, 2015.¹ These projects are intended to demonstrate the potential of various aspects of the Reforming the Energy Vision (REV), the regulatory initiative launched by the Commission as part of Governor Cuomo's comprehensive energy strategy for New York.

As the Commission noted, the projects are intended to demonstrate new business models, i.e. new revenue stream opportunities for third parties and the electric utilities. In that regard, the projects will inform decision makers related to developing Distributed System Platform (DSP) functionalities, measure customer response to programs and prices associated with REV markets, and determine the most effective implementation of Distributed Energy Resources (DER). Further, as demonstration projects, they are intended to test new technology and approaches to assess value, explore options and stimulate innovation before committing to full scale implementation. Therefore, demonstration projects should also be designed to deliver observable results and actionable information within a reasonable timeframe. During the demonstrations, the projects will be assessed regularly by each utility. Lessons learned should be incorporated into the projects or as appropriate into the utilities' operations as expeditiously as reasonable.

¹ Case 14-M-0101, Reforming the Energy Vision, Order Adopting Regulatory Policy Framework and Implementation Plan (Issued February 26, 2015) (Track One Order).

DISCUSSION

Con Edison's Proposal

In compliance with the Commission's Track One Order, Consolidated Edison Company of New York, Inc. (Con Edison or the Company) filed its Clean Virtual Power Plant (VPP) demonstration project on July 1, 2015. Within its proposal, the Company describes how the VPP project integrates behind the meter solar and storage resources into the distribution grid by aggregating the installations at hundreds of residential homes to form a fleet of solar plus battery storage assets. The aggregation of a fleet of residential solar / storage systems into a virtual power plant creates the opportunity for Con Edison to harness an intermittent power source, and control it to provide distribution and transmission benefits. The demonstration will test the ability to utilize the on-site storage resources to serve multiple purposes, thereby maximizing their value. Specifically, it will test and measure how storage can be leveraged to provide network benefits to the grid, resiliency services to customers, and monetization value to the Company. The results will help inform rate design changes and the development of distribution-level markets.

There are many potential benefits that may be observed as a result of this project. The demonstration will test if the energy produced from the VPP can be used to reduce load during peak periods, and defer or avoid future capital investments. In addition, the Company claims that the VPP will provide customers with resiliency services in the event of an outage and is a cleaner alternative to the current gasoline backup generators used today. The Company expects to see load reduction, cost savings, and reliability benefits as a result of the project. In addition, the demonstration will identify new revenues streams for the Company. This will be done by using the VPP to provide firm capacity for participation and monetization in competitive

capacity and energy markets, e.g., New York Independent System Operator (NYISO) wholesale capacity markets, and demand response programs. In addition, it will explore the monetization of grid services by evaluating the potential for new revenue streams related to aggregation and operations of aggregated fleets of distributed energy resources.

The proposal contains a three-phase implementation schedule: First, Con Edison with its partner, SunPower, will provide a fully packaged solar plus storage solution to residential customers; second, Con Edison will integrate SunPower's Network Operations Center with Con Edison's Distribution Control Center; and third, Con Edison will test the role of these distributed energy resources in the wholesale and distribution market, as well as, in combination with alternative rate designs.

Department of Public Service Staff (Staff) Review

Staff has reviewed the demonstration project compliance filing for consistency with the Track One Order as well as the Commission's REV policy objectives and the Commission's demonstration project principles. The REV policy objectives are: enhanced customer knowledge and tools that will support effective management of the total energy bill; market animation and leverage of customer contributions; system wide efficiency; fuel and resource diversity; system reliability and resiliency; and reduction of carbon emissions.² The Commission's demonstration project principles defined in the Commission's Resolution on Demonstration Projects are: third party participation; new business models; customer/community engagement; identification of economic value; pricing and rate design; transactive grid; scalability; market rules and standards; system benefits; cost effectiveness; and

² Case 14-M-0101, Reforming the Energy Vision, Order Instituting Proceeding (issued April 25, 2014).

implementation with constructive feedback within reasonable timeframe.³ Staff has also evaluated the extent to which the demonstration project maintains a reasonable relationship between costs and estimated benefits, including demonstration value.

Staff concludes that the VPP project will enable Con Edison to explore how to utilize DER to create a more efficient, and resilient distribution grid. In addition, the VPP will develop and test several new utility revenue streams. Further, there are several unquantified, qualitative benefits that will be assessed within this project, including the Company's ability to aggregate residential distributed energy resources into a reliable source of energy, and testing customers' willingness to pay for resiliency services. Therefore, as documented in the August 3, 2015 letter from Staff, Con Edison's VPP demonstration project complies with the requirements of the Commission's Track One Order, and the utility will file the implementation plan with the Secretary within the next thirty days.

REV OBJECTIVES ADDRESSED

System Wide Efficiency

With the rapid innovation in DER technology, Staff thinks that the opportunity for utilities to increase system wide efficiency has become more prevalent. In its filing, Con Edison noticed the increased adoption of photovoltaic (PV) systems among its residential customers, but recognized the power production from these PV systems tended to be intermittent and the peak generation hours of the distributed PV systems do not coincide with Con Edison's peak load hours, which typically occur after 5 PM. The VPP aims to solve this issue by utilizing

³ Case 14-M-0101, Reforming the Energy Vision, Memorandum and Resolution on Demonstration Projects (Issued December 12, 2014).

battery storage to smooth intermittency and allow for the dispatch of energy at peak times leading to greater system wide efficiency. As the demonstration matures, Con Edison will also evaluate means for optimizing the dispatch of the solar and storage systems to provide distribution and transmission level benefits, thereby further increasing system efficiency.

Fuel and Resource Diversity

Staff concludes that the VPP demonstration addresses fuel and resource diversity by examining how the Company can utilize solar energy to create a clean and renewable source of generation that will help to ensure the diversity in the supply of our fuel and resources. The VPP also integrates the use of energy storage through batteries, which allow the energy to be dispatched to the grid potentially at times when solar would not be generating. Most significantly by aggregating smaller DERs to act as a singular unit, the VPP will test the ability of DER to participate in the wholesale markets and offset the dispatching of fossil fuel based units to provide the required service.

System Reliability and Resiliency

Assurance of a secure, reliable and resilient electric system remains critical to the development of New York State's economy. Staff determines that the VPP will demonstrate the ability for DER to provide a reliable, localized source of both capacity and energy at the distribution level. In addition, an integrated solar plus battery system will demonstrate customers' willingness to purchase resiliency services that will be available in the event of a utility outage.

Reduction of Carbon Emissions

The 2015 New York State Energy Plan indicated a long-term statewide goal of reducing total carbon emissions. As previously stated, the VPP demonstration will test the ability of clean DER to be dispatched, or even be relied upon for

resiliency purposes during a utility outage, instead of a fossil fuel based resource, thus reducing carbon emissions. To the extent the VPP proves successful and continues to grow in size beyond initial targets (MWs and/or MWhs), greater emission savings could be realized.

COMMISSION DEMONSTRATION RESOLUTION PRINCIPLES

New Utility Business Models

Con Edison will be testing a new business model by working with its partner SunPower to offer a cost-effective solar and energy storage solution to residential customers and develop an advanced control platform to aggregate the distributed systems into a single, dispatchable capacity and energy resource. As the filing describes, SunPower, consistent with its current business practices, will target the highest-value customers and create personalized solar combined with storage proposals for residential customers; the offering will provide customers with the benefits of solar generation and resiliency services. The VPP demonstration will test the creation of several new revenue streams (discussed below) and value for Con Edison and its ratepayers.

Customer/Community Engagement

Con Edison's filing focused on its forward looking outreach plans. As detailed in the filing, customer outreach and community engagement is an inherent part of this demonstration project and the project implementation plan will include a status check point specifically related to outreach with appropriate metrics and strategic actions. As described in its filing, Con Edison will use a four step outreach approach to engage customers utilizing a combination of direct mail, social media, media relations, call center, and website. First, the Company will create awareness of the program for all customers and internal employees, in particular the consumer service

representatives. Second, Con Ed will generate interest in the program by focusing on the direct benefits to customers. Third, they will drive participation in the program by highlighting previous success stories. Finally, they will initiate participation with follow up customer service and resource information. In conjunction with Con Edison's outreach strategy, SunPower will deploy several methods to target prospective customers including: online advertising, direct mail, cold calls, localized media outreach, retail partnerships, customer referral platform, phone and in-house consultation, and project information booths at regional events. SunPower using advanced analytics will target the customers that can create the greatest value. In addition, to keep customers engaged and motivated, a web-based customer portal will be established by SunPower. The portal will provide customers enhanced insights, choice, and control over their energy consumption. Staff concludes that these efforts will be effective in getting customers engaged with the VPP demonstration.

Identification of Economic Value

As the Commission noted in the Track One Order, demonstration projects should allocate economic value between the utility, customers, and third parties. Through the VPP demonstration, Con Edison will develop and evaluate the following new utility revenue streams and sources of value: value of firm solar capacity in demand response or wholesale markets; development of system benefits from coordinated dispatch of VPP assets; and revenues as the distribution service platform provider. Staff concludes that the VPP demonstration will provide value to customers by providing a clean source of energy, resiliency services in the event of an outage, and insight into how energy is consumed in their home, as well as recommendations for how to control their energy consumption. Finally, SunPower will see value in the form of a resiliency

payment from customers for the use of the solar panels combined with battery units.

Third Party Participation

Con Edison will partner with SunPower to integrate residential behind the meter storage resource into the distribution grid. As described in the filing, SunPower is an experienced solar technology provider that delivers high efficiency solar cells and solar panels. SunPower will provide project financing, engineering, procurement, and construction services. In addition, it will handle customer acquisition, site inspection, design, and installation services. Con Edison, for the duration of the demonstration project, will own and operate the fleet of energy storage assets.

Pricing and Rate Design

The demonstration project will test the willingness of customers to pay for access to solar generation with battery storage, thereby allowing some level of resiliency during outage events. The demonstration project plans to test three different pricing options: resiliency payment as a percentage of expected solar savings; resiliency payment as a percentage of current electric bill; and resiliency payment as a dollar value. Regardless of the pricing option the customer chooses, the offering will be structured so that their total monthly energy bill will be either equivalent to or less than their current bill. In addition, the demonstration project will provide useful information related to rate design. The deployment of customer-sited solar plus storage assets enables Con Edison to test how different rate designs, via shadow billing, may be used to incent customer behavior. For example, time of use tariffs that align the cost of generating energy to customer bills or demand charges for the capacity of the battery system will be tested.

Transactive Grid

Staff believes that the VPP demonstration project will test real time operation of dynamic load and the use of other advanced distribution system components. The VPP demonstration project will include the establishment of communications from SunPower's Network Operations Center (NOC) to each customer's energy storage system. In addition, communication in the form of data transfer and VPP control between Con Edison's Distribution Control Center and the NOC will be established. Once established, Con Edison will be capable of dispatching the VPP to meet system needs and test how distributed energy resources can be aggregated to participate in the energy markets.

Scalability

The demonstration project is designed to be 1.8 MW of inverter capacity and 4.0 MWh of stored energy capacity to allow the VPP to readily integrate into existing markets. Staff concludes that the demonstration project will test Con Edison's ability to become a distribution service platform provider and has the potential to be scaled to include additional third party vendors and single participants (homeowners that purchase their own equipment and want to participate in the market). The platform could eventually be scaled in size to optimize both customer and distribution grid benefits, by providing access to markets for new and existing products and services.

System Benefits

Staff concludes that the VPP demonstration will test the creation of system benefits in the form of improved system efficiency and resiliency. The VPP will test if controllable solar/storage combinations can be a reliable source of energy and capacity that can be used to meet peak network demand and have the potential to defer or avoid capital investment in the transmission and distribution system, which is a benefit for all

customers. In addition, the demonstration will test the ability of the VPP to provide resiliency value by delivering a cleaner and simpler alternative to customers in the event of a utility outage.

Cost Effectiveness

Demonstration projects should provide benefit to ratepayers, both qualitatively and quantitatively as compared to costs. In addition, the projects to the extent possible should leverage third party capital. The VPP will develop and test new utility revenue streams and create other sources of value. In addition, the project will result in a more efficient, resilient, and "greener" distribution grid. The project will examine whether selling the firm capacity captured by the VPP to the wholesale market and demand response programs is a viable revenue stream. The project will require investments in the energy storage systems and several operating and maintenance costs including: fees for development and implementation of the program, operation of the VPP, and integration of the VPP into Con Edison's Distribution Control Center. The residential solar systems deployed during the demonstration project will be financed through customer lease agreements and SunPower, resulting in no cost to Con Edison.

Due to the price of storage batteries, Con Edison does not anticipate to generate a profit during the demonstration period. Staff believes that the opportunity to examine the long term financial viability of this new business model is itself valuable. Although, as the price of battery storage decreases, the value of capacity and resiliency increases. Con Edison, based on the cost of storage relative to the value of the energy in the wholesale market, forecasts the VPP to be a viable business model by 2021. There are also several unquantified, qualitative benefits associated with the demonstration project. For example, testing the ability to aggregate residential

distributed energy resources into a reliable source of energy, measuring customer's willingness to pay for resiliency services, and measuring environmental benefits in the form of reduced carbon emissions. The implementation plan will include measuring, monitoring, and reporting on the actual benefits and costs both qualitatively and quantitatively.

Reasonable Timeframe

The first phase of the demonstration project, customer participation and installation, is expected to begin in the fourth quarter of fiscal year 2015 and completed by the end of fiscal year 2016. Phase 2 of the demonstration project, which is the integration of the SunPower NOC with Con Edison's Distribution Control Center, will be launched on the completion of first phase and will be completed by June 2017. Finally, the third phase of the project, related to market participation and the testing of alternative rate design, will start in June 2017. Con Edison proposes the demonstration project continue until June 2018, Staff determines that this timeframe will give Con Edison and Staff ample time to assess and measure the demonstration project's multiple hypothesis and goals and therefore it is reasonable.

Market Rules and Standards

Staff concludes that the VPP demonstration project provides Con Edison with the opportunity to develop and test rules that can be used in the creation of competitive markets and integrate DSP products and services into the wholesale markets. Specifically, Con Edison expects to utilize the VPP demonstration project to gain insight into the market requirements related to monetizing distributed assets. As detailed in the filing, the third phase of the demonstration project aims to develop and test market rules related to the aggregation of DER to provide firm capacity for participation

and monetization in competitive capacity and energy markets, wholesale capacity markets, and demand response programs.

AREAS FOR FUTURE DEVELOPMENT

Milestones

Con Edison will test the new business model and potential revenue streams by collecting and analyzing various data. For example, Con Edison will measure and monitor: number of customers who register for the solar and storage offering; number installations completed and interconnected; ability to dispatch stored capacity into the transmission and distribution system; ability to bid energy from the VPP into the market; and ability to align customer's energy profile with alternative rate designs. For each test, acceptance or performance criteria will need to be developed and included in the implementation plan. The project milestones will be used as communication and quality control mechanisms, and to set expectations, share status information, and develop lessons learned. In addition, the milestones and checkpoints will be used to provide opportunities to evaluate the program and if appropriate, make changes. This is an essential activity to develop effective project recommendations to inform REV, and therefore the implementation plan will reflect detailed milestones and checkpoints.

New York Independent System Operator Engagement

Given that the VPP demonstration will focus on assessing if battery storage of solar can be aggregated and dispatched in accordance with the dispatch requirements of current or future competitive markets, Staff thinks that Con Edison should actively coordinate with the NYISO to evaluate rules and/or protocols for participation of the VPP in the wholesale market(s). Staff has facilitated initial meetings between the NYISO and the Company on this issue and the

implementation plan will reflect their continued engagement and discussions as the project implementation continues.

POTENTIAL LEGAL BARRIERS AND/OR
AREAS OF COMMISSION ACTION

Federal Energy Regulatory Commission (FERC) Order 745 Buyer-Side Mitigation Rules

The NYISO rules governing the participation of DERs may pose a potential barrier to VPP demonstration project. Currently, the FERC permits the NYISO to pay DERs for providing peak demand reduction; however, this may change with the outcome of a pending Supreme Court review.⁴ In addition, FERC recently ruled that a payment for distribution reliability could affect how a customer with a DER resource is allowed to bid into the NYISO capacity markets under its buyer side mitigation rules.⁵ While neither of these rules address renewable generation resources, they both could impact how Con Edison is able to monetize the VPP assets. Staff and Con Edison will work together to address these potential barriers to the demonstration project as it is implemented.

Utility Ownership of DER

Con Edison, as part of the demonstration project, proposes to purchase and own the battery storage units. The Commission stated that utility ownership of DER will only be allowed under certain circumstances one of which is "...a project is being sponsored for demonstration purposes."⁶ Therefore in this circumstance, Staff finds that such ownership is within the guidelines set by the Commission.

⁴ See, FERC v. Elec. Power Supply Ass'n, et al., cert. granted, 135 S.Ct. 2049, 191 L.Ed.2d 954, (U.S. 2015).

⁵ New York Independent System Operator, Inc., 150 FERC ¶ 61,208 (issued March 19, 2015).

⁶ Track One Order, p.70.

CONCLUSION

Staff has determined that the proposed VPP demonstration project complies with the appropriate policy objectives and resolution principles. Staff will work with Con Edison to develop a detailed implementation plan. The implementation plan will include a detailed schedule, budget, projected milestones with acceptance or performance criteria, and reporting requirements. Staff will also continue to discuss the areas of further development with Con Edison and the potential legal barriers. The implementation plan will incorporate the results of these discussions.

The implementation plan is expected to evolve and incorporate lessons learned or new developments within the scope of the project. The project implementation plan will be updated quarterly. The implementation plan and updates will be filed with the Secretary within thirty days.