

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION



Reforming the Energy Vision
Demonstration Project Assessment
Report

National Grid: Distributed
System Platform Demonstration
Project

July 15, 2016

INTRODUCTION

In an order issued February 26, 2015, the Commission directed the six large investor owned electric utilities to develop and file initial demonstration project proposals 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 (DERs). 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

National Grid's Proposal

In compliance with the Commission's Track One Order, Niagara Mohawk Power Corporation d/b/a National Grid (National Grid or the Company) filed its Distributed System Platform Demonstration Project (DSP Project) proposal on July 1, 2015. Department of Public Service Staff (Staff) determined the filing represented a relevant and innovative REV demonstration project; however, further development was required in order for the project to comply with the Commission's Order. On June 17, 2016, National Grid filed a revised REV Demonstration Project for the Distributed System Platform reflecting a change in scope of the project and addressing the additional information and clarifications requested by Staff, thereby replacing the original proposal.

National Grid's DSP Project proposes to establish a localized, small-scale DSP² in the Buffalo Niagara Medical Campus (BNMC) area. BNMC (an organization made up of 14 member institutions and approximately 100 public and private companies) has an existing portfolio of DERs with a capacity greater than 34 MW, and BNMC is currently evaluating increasing this capacity by an additional 20 MW through natural gas engine and turbine generators, PV, and battery energy storage. The large amount of DERs in this area makes it an ideal candidate for a test DSP functionalities that would enable the BNMC member organizations to monetize existing DERs and incentivize investment in additional DER units. This DSP project would be developed and

² As defined in the Commission's REV Track One Order, the Distributed System Platform or DSP is "an intelligent network platform that will provide safe, reliable and efficient electric services by integrating diverse resources to meet customers' and society's evolving needs."

installed in consultation and cooperation with the BNMC, and would consist of a centralized DSP, as well as a number of privately managed points of control (POC) that will have the ability to control privately owned DERs. To develop the DSP, National Grid is partnering with Opus One Solutions (Opus One), which has developed a real-time operating system that is suitable for smart grid operation. As a partner, Opus One is cost-sharing the development of the software with an in-kind contribution valued at \$2 million. This project is an extension of National Grid's existing collaboration with the BNMC member institutions. The BNMC member institutions previously worked with National Grid to develop an Energy Innovation Plan in 2011 and 2012 (the Plan), and currently work with National Grid on the implementation of the initiatives identified within the Plan.

The purpose of the DSP Project is to provide a platform that allows information about the status of the distribution system to be shared with the owners of DERs, allowing them to monetize their DERs by providing services to the distribution grid. The platform will have access to data from National Grid's Distribution Services (Supervisory Control and Data Acquisition, Outage Management System, and others) and Enterprise Services (Forecasting, Weather, Metering, and others), and will be able to use this data to transmit price signals to DER installations. Each DER will be connected to a POC. The POC will directly control each DER connected to it, and will use the platform to receive pricing information on the value of DER services to the grid and advertise connected DER availability and willingness to provide services. Each POC will be administered by a member institution owning DER assets, and will communicate with the platform and each member's DER portfolio. Depending upon the information received from the DSP

and each DER owner's willingness to supply, the POC will dispatch DERs as appropriate. Although the initial project intends for the POCs and DERs to be controlled by the same entity, in the future it will be possible for a POC to control DER owned by a third party, allowing monetization of the POC investment.

The DSP project will be implemented in three phases. The first phase, lasting three months, will be the development of a financial model to test the cost effectiveness of a variety of DER types and whether pricing models engage DER owners to participate in the DSP market. The financial model will use an LMP+D+E approach, where 'LMP' will use the NYISO Day Ahead Market Zonal LBMP Zone-A as its base. "D" refers to distribution delivery value, which is the value that DERs can provide to the distribution system, and such value will be evaluated in this project.³ "E" refers to external or societal value that may be provided by DERs that are not captured in in LMP or D. However, in order to simplify the hypotheses tested and subsequent analyses, the project does not intend to evaluate a specific value of E.

Phase 2, lasting nine months, will be the technology development phase that will enable National Grid to act as the DSP and dispatch system status information and communicate pricing signals to POCs that are based on the financial model developed in Phase 1. This phase will also see the development of the POCs themselves, including establishing the ability to receive and transmit information to the DSP. Finally, phase 3 which is expected to last 15 months, will be the field

³ Developments and insights on the LMP+D approach within the demonstration project will both be informed by and contribute to the Commission's on-going Value of Distributed Energy Resources Proceeding, Case 15-E-0751.

demonstration, where the local DSP and a number of POCs will be deployed and operated to determine if the financial model results in DER participation.

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.⁴ The Commission's demonstration project principles defined in the Commission's Resolution on Demonstration Projects are: customer/community engagement; identification of economic value; pricing and rate design; transactive grid; scalability; market rules and standards; system benefits; cost effectiveness; and implementation with constructive feedback within a reasonable timeframe.⁵ Staff has also evaluated the extent to which the demonstration project maintains a reasonable relationship between costs and estimated benefits, including demonstration (learning) value.

Staff concludes that the DSP Project will enable National Grid to gain crucial experience in operating a DSP and transitioning to a new business model where utilities provide

⁴ Case 14-M-0101, Reforming the Energy Vision, Order Instituting Proceeding (issued April 25, 2014).

⁵ Case 14-M-0101, Reforming the Energy Vision, Memorandum and Resolution on Demonstration Projects (Issued December 12, 2014).

value-added services to customers connected to the grid. There are several hypotheses that will be assessed within this project: whether the value of DERs can be successfully monetized; how elastic customers' supply of DER-provided electricity is and how willing customers are to participate in the DSP project; and whether the DSP will be able to provide an incentive for customer investment in new DERs. Staff finds these questions to be relevant and valuable to the REV proceeding, and as documented in the June 22, 2016 letter from Staff, National Grid's DSP Project now 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

Market Animation and Leverage of Customer Contributions

One of the primarily goals of REV is to animate the market for electricity and related services and increase the grid's leveraging of private capital. This goal is the core of the demonstration project. By establishing a platform that has the ability to monitor system status and convey pricing data to DER providers (through POCs), Staff finds that National Grid's DSP Project will animate the market for services provided by DERs; consequently leveraging customer contributions of capital at the distribution level and encouraging the DER market itself. Each POC operated by the member institutions of the BNMC will be connected to DERs that are privately financed. The DSP will then communicate with these POCs to leverage the DERs for the benefit of the system while allowing DER owners to monetize existing DER installations, and at the same time incenting new DER investment. DER owners will be able to utilize their DERs

for resiliency purposes, and/or sell DER services into the DSP in reaction to pricing signals from the DSP.

System Wide Efficiency

There is substantial opportunity for improvement of system efficiency within the BNMC area with more than 34 MW of installed DERs. National Grid reports the area has 28 MW of diesel engine generators and 1 MW of DR. Institutions in the BNMC are also evaluating adding some 19 MW of natural gas engine and turbine generators, 1 MW of PV, and 150 kW (600 kWh) of battery storage.⁶ While these DERs are primarily used individually for resiliency purposes, Staff believes that the DSP demo will enable these resources to be used collectively during blue-sky days to optimize grid operations, as well as providing resiliency and reliability service when needed.⁷ Staff believes that being able to provide these services will allow owners of DERs to better monetize their investments (above and beyond individual institutional resiliency) and thus encourage investment in incremental DERs.

COMMISSION DEMONSTRATION RESOLUTION PRINCIPLES

Third Party Participation, Partnerships, and Cost Effectiveness

Demonstration projects should provide benefit to ratepayers, both qualitatively and quantitatively, as compared to business as usual costs while leveraging third party capital to the greatest extent possible. Staff finds that National Grid's DSP Project leverages several sources of funding and

⁶ See page 1 of National Grid's "Proposed REV Demonstration Project Revised Scope: Distributed System Platform".

⁷ National Grid notes that peak demand was 30 MW in 2015, less than the amount of installed DER in the area.

private capital. The project builds upon existing DER investments, and in-kind capital from their partner Opus One. Staff expects that the project will generate substantial benefits in the form of system efficiencies and learning in excess of the costs of the project. Additionally, National Grid has been coordinating with entities to structure this project to work in parallel to the efforts underway to establish a microgrid at the BMNC.⁸

One of the primary challenges in implementing REV is the establishment of the DSP. This DSP Project will be an important step in implementing the DSP concept statewide, and will provide valuable insight into the establishment, maintenance, and value proposition of a DSP. Staff expects that the results of this demonstration project will inform the creation of the State's DSPs.

National Grid has contracted with Opus One to help develop the DSP and corresponding POC application interface. Opus One has developed a real-time operating system intended for smart grids. This real-time operating system is designed to interface with DERs while utilizing data from a variety of sources such as supervisory control and data acquisition (SCADA), meters, and analytical services. Opus One will subcontract and report to National Grid, and will contribute approximately \$2 million in in-kind capital. Although Opus One will report directly to National Grid, it will also be an active participant and interact directly with the other BNMC member institutions while developing the DSP and POCs.

⁸ Work on developing a microgrid in the area has been partially funded by NYSERDA PON 2715 and the New York Prize Micro-grid Competition. See NYSERDA Feasibility Study "BNMC Community Micro-grid, Stage 1 - Feasibility Study Report," released in March 2016.

National Grid is also working with many BNMC member institutions on the project: Buffalo Niagara Medical Campus, Inc., Hauptman-Woodward Medical Research Institute, Kaleida Health, Roswell Park, and the University at Buffalo, State University of New York. Currently, Roswell Park Cancer Institute, University at Buffalo, and Kaleida Health have the largest number of potential DERs that may interface with the DSP during the phase 3 field deployment.

New Utility Business Models

Staff believes that National Grid's proposal provides substantial opportunity for the Company to explore and learn about in new business models and explore alternative sources of revenue. National Grid has identified three potential new revenue streams in connection with the project, and intends to evaluate them throughout the implementation of the demonstration. The first potential revenue stream and new business model would be providing one-time data as a service about distribution optimization opportunities to DER owners and potential DER owners. The DSP (and by extension, National Grid) could charge a one-time or monthly fee for such data. The second revenue stream could be to charge for access to the DSP, and finally, National Grid may also collect a license fee to use the POC itself.

National Grid has also stated that if the project is successful, it believes there is the possibility of licensing the DSP and POC software and application program interface (API) to others. National Grid may then earn revenue by helping other areas and other utilities to create their own DSPs, and then interface these DSPs together for better system-wide efficiency, operation, and resiliency.

Customer and Community Engagement

Staff finds that National Grid's DSP Project will result in a significant amount of customer and community engagement. The project itself is an extension of an existing partnership between National Grid and the BNMC, called *energizeBNMC*. This partnership was created in 2011 when the BNMC approached National Grid for its expertise to help create a plan to meet the campus' energy and transportation needs. National Grid and its institutional member partners are in frequent communication concerning the project, existing DER investments, and potential future DER investments.

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. Staff finds that National Grid adequately identifies the streams of economic value to each of these groups. As mentioned above, the DSP will enable National Grid to enjoy a number of new revenue streams that it would not have otherwise been available. For DER providers (third parties), the ability to monetize DER investments will ensure that the pay-off period for these investments is shorter, and that the investments will bear less risk. Finally, customers (both DER owners and non-owners) will enjoy greater grid resiliency, as well as increased system efficiency at the distribution level.

Transactive Grid and Market Rules and Standards

The DSP Project provides the opportunity to develop and test rules that may lead to standards and market rules for the DSPs called for in the Track One Order. The local DSP will enable the transactive grid by allowing current grid customers

with onsite DER for personal resiliency purposes to provide services (including resiliency) to the grid. In order to achieve this, National Grid will have to evaluate a number of potential operating rules and standards. Additionally, National Grid intends to develop the DSP and POC application program interface (APIs) such that they can be deployed in the rest of New York, and the country; both in and outside of National Grid's service territory.

Scalability

In its proposal, National Grid identifies two ways in which the project may be scalable. First, once the DSP and POCs are developed, the use of a standardized API will allow them to be deployed into a wider geographic area, as well as able to interface with competing DSPs, as long as they utilize a compatible API. National Grid also believes that smaller DER owners may wish to utilize the POCs themselves as a platform to gain access to the larger DSP, in which case the larger POC owners will be able to monetize not only their DER investments, but their investments into the POC as well. This will allow more DER onto the DSP system, even when smaller DER owners are unable to finance a POC of their own.

System Benefits

The DSP Project has the potential to provide system benefits by allowing DER assets to react to system conditions, allowing DERs to provide a variety of services to the system to make it more reliable and efficient. National Grid expects that the DSP will be able to dispatch DER to provide both electricity supply to demand response. This may allow National Grid to delay or avoid future utility investment and potentially provide electricity to other customers at lower cost.

Reasonable Timeframe

Staff has determined that the DSP Project will be implemented within a reasonable timeframe. National Grid expects that the first phase (financial model development) will take three months, and the development of the DSP and POC will be completed nine months thereafter. The final phase, field deployment, will last 15 months, after which National Grid will evaluate the results to determine what aspects of the DSP Project should be integrated into its system-wide platform.

AREAS FOR FURTHER DEVELOPMENT

Milestones and Check Points

Closely following project progress to evaluate effectiveness and identify potential improvements is crucial to the success of REV demonstration projects. National Grid's DSP Project is an ambitious project, and the Company has defined a number of metrics it intends to report quarterly, including updates to the project's timeline, the project's current budget, and forecasted checkpoint and milestone progress. The Company has also defined metrics for success, which is loosely defined as "measured by its ability to support and inform the multiple functions of the DSP as described within the REV Track One Policy Order."⁹ While Staff supports National Grid's efforts to implement the DSP, it is crucial that pertinent and accurate data are collected while doing so to minimize DSP implementation costs statewide. Staff will work with the Company to create metrics to include in the project implementation plan that will be useful, quantitative, and practical to collect to aid in the

⁹ See page 15 of National Grid's "Proposed REV Demonstration Project Revised Scope: Distributed System Platform".

evaluation of the demonstration project itself, as well as helping implement similar DSPs statewide.

CONCLUSION

Staff has determined that the proposed demonstration project complies with the objectives set forth in Ordering Clause 4 of the Track One Order. Staff will continue working with National Grid to develop a detailed implementation plan, which will include a detailed schedule, budget, projected milestones and checkpoints, and reporting requirements. Staff will also continue to discuss the areas of further development with National Grid and identify any issues that may require Commission action. The implementation plan will incorporate the results of these discussions, and will be updated quarterly, incorporating lessons learned and new developments within the scope of the project. The implementation plan will be filed with the Secretary within thirty days.