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STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 15-E-0302 - Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard.

CASE 14-M-0101 - In the Matter of Reforming the Energy Vision

COMMENTS OF NRG ENERGY, INC.

By notice issued on May 26, 2016 regarding the agenda for a technical conference on the topic of energy storage, the New York Public Service Commission ("Commission") invited written comments 'addressing aspects and implications of energy storage' in these proceedings. NRG Energy, Inc. ("NRG") provides the following comments and recommendations to assist the Commission in crafting an effective approach to expanding the use of energy storage in New York's energy system, to augment and balance the increasing proportion of variable renewable resources needed to meet Clean Energy Standard ("CES") goals, and to achieve the system-wide efficiency, asset utilization and resiliency objectives of REV.

I. Introduction

NRG supports the State's initiative to substantially increase its reliance on renewable energy as contemplated in the CES proceeding. As a complement to those renewable resources, effective use of distributed and large-scale energy storage will be a critical element to the success of that renewable energy future, to provide firming and system load balancing to the grid. NRG

anticipates that the low-carbon system of the future will rely on four primary resource types: (1) significant amounts of variable renewables (such as wind and solar) to provide a base quantity of energy; (2) a large amount of storage (including chemical, thermal and mechanical, both grid-connected and behind the meter); (3) pervasive load management through smart devices and multiple control systems managing aggregations of DERs; and (4) a complement of highly flexible gas-fired resources to balance load and supply as needed.

The CES proceeding is considering procurement methods and models to enable the significant expansion of renewable energy sources in the state, and NRG recommends that this proceeding likewise be viewed as a means to begin meaningful deployment of energy storage. As the state approaches a 50% share of the energy mix coming from largely intermittent renewables, the ability to store energy when it is available from the sun and wind and use it later when customers need it will be critical to managing both cost and reliability. Storage should be developed alongside the renewables that will make up the State's 50% renewables target.

NRG makes three primary recommendations and suggestions. *First*, NRG recommends that the State implement a procurement mechanism, either associated with the CES renewable procurements or as a stand-alone mechanism, to affirmatively add energy storage resources to New York's system over the next decade. This will create positive momentum and develop real-world experience that will propel New York to the forefront of storage deployment, and provide significant benefits in enabling the system to integrate and maximize the value of the procured renewable energy projects.

Second, the State should direct the utilities, stakeholders and NYISO to focus on revising rules (both utility and NYISO tariffs) that are specifically applicable to energy storage that will facilitate interconnections, participation in local system benefit programs and participation in wholesale markets. Presently, the rules generally require a 'force fit' of storage resources into rules intended for demand response or generation resources, and should be reformed to increase

efficiency and effectiveness of storage deployment and operation.

Third, the State should institute a proceeding to examine whether the theoretical access to 'multiple revenues streams' is in fact possible. As noted in the literature surrounding energy storage and as stated by virtually every speaker at the May 26 Technical Conference, energy storage assets will need access to multiple revenue streams to be cost-effective. The review and revision of tariff rules must address the practical steps and changes needed to enable energy storage to fully access all appropriate sources of value, in both the distribution and bulk power systems.

II. Background on NRG

NRG is the largest independent power producer in the U.S. with over 50,000MW of diverse resources – powered by solar, wind, nuclear, gas, coal, oil and cogeneration – and is one of the nation's largest competitive retail energy suppliers, with roughly three million retail customers. NRG is an active participant in the New York markets, with conventional generation, retail energy services, distributed solar in operation, as well as microgrid, distributed energy management platform and energy storage projects in development. NRG is leading a customer-driven change in the U.S. energy industry by delivering cleaner and smarter energy choices, while building on the strength of the nation's largest and most diverse competitive power portfolio. A Fortune 200 company, we create value through reliable and efficient conventional generation while driving innovation in solar and wind power, electric vehicle ecosystems, carbon capture technology and customer-centric energy solutions.

NRG is committed to lowering the carbon intensity of electricity production, as well as increasing the deployment of renewable and other clean generation technologies in distributed settings. NRG also supports enabling greater customer empowerment and a more efficient and resilient grid, as being entirely consistent with New York State's Reforming the Energy Vision ("REV") initiative.

III. Storage Project Procurement

NRG recognizes the challenge before the State to significantly reduce emissions of greenhouse gases in the electric sector, as well as in other sectors of the economy, including transportation and buildings. Ultimately, the transportation and building sectors will need to be substantially electrified, which increases the pressure on the electric sector to begin making meaningful progress toward a low-carbon profile. As such, NRG recommended in the CES proceeding that the Commission implement a program of renewable energy procurements using a bundled PPA structure.[1]

Likewise, since energy storage will need to be a significant factor in the future low-carbon electric system, NRG recommends that the Commission direct the utilities, or an appropriate state agency (e.g., NYPA, NYSERDA) to establish a multi-year program of procurements, with the objective of deploying at least 2GW of energy storage capability across the state by 2025.

The Commission should consider including storage as a project component in the procurements for renewable energy projects under the CES to evaluate the benefits of joint renewable/storage projects. The Commission should also consider a stand-alone procurement for storage, perhaps with additional preference given for projects that either co-locate with renewables or specifically incorporate control systems to balance and respond to system needs, including the operations of local or remote renewable facilities, or that are located at existing power plant sites.

Energy storage's benefits are not limited to their peak demand impact. Storage can also provide energy savings based on time-differentiated prices, ancillary services at the local and/or bulk system level, and important reliability and resiliency services if properly configured. As such, it will be important to quantify and evaluate the full range of services that storage solutions can provide, based on the specifics of the type of storage, controls and integration with generation and/or customer loads proposed in each case.

[1] Case 15-E-0302, Comments of NRG Energy, Inc., April 22, 2016.

Procuring energy storage pursuant to a long-term contract with a credit-worthy counterparty such as a utility or state agency will enable the necessary financing to get projects built and operating in the state. These operating projects will provide invaluable experience to drive the next generation of storage technology and integration into system operations. The requisite contracts will allow project developers to achieve low cost financing of projects and decrease equity contributions, which allows for more renewables development per dollar of at-risk capital. These contracts will further provide the highest probability that contracted projects will actually be built. Indeed, the Energy Storage Mandate in California is seeking 1,325MW of energy storage, and the procurements have been very well-subscribed and projects are proceeding to contract award and construction. NRG is participating in all phases of this proceeding and is implementing 26.5MW of distributed storage pursuant to these procurements. A similar model could significantly accelerate the development of storage in New York.

IV. Market Rules for Storage

Other than large-scale pumped storage hydro-electric stations, energy storage on the electric system has generally been viewed as a novelty item, so tariff rules have never been written to clearly and unambiguously address the unique requirements and capabilities of energy storage. As costs continue to come down and storage becomes more of a central part of the electric grid, both the utilities and the NYISO should have rules that apply specifically to storage facilities to make interconnections and operations more efficient and less prone to misunderstandings and one-off negotiated outcomes. This is not to say that storage should have preferential treatment compared to generation or demand response, but that project developers should not be forced to navigate and interpret rules and requirements that do not address the unique characteristics of storage.

The Commission should direct that utilities and other stakeholders undertake a review of utility interconnection and service classification tariffs to implement storage-specific rules. The Commission should also encourage the NYISO to continue its efforts to reform its tariffs to better

address storage, and to direct staff to participate in these discussions to ensure that storage can be efficiently deployed and operated according to clear and effective rules.

V. Access to Multiple Revenue Streams

Multiple revenue streams are necessary to make storage cost-effective and to properly compensate the many aspects of value that storage can deliver, as discussed in literature regarding storage in electric systems. Depending on where the storage asset is located and how it is configured, these revenue streams could include payments from the customer - for the self-sufficiency, resiliency, price certainty afforded by the storage asset, or as a share of energy bill savings. Other revenues may come from providing local grid support services, either for the deferral of transmission and distribution investment costs, or as reactive support, for example. The NYISO markets also offer potential revenues, to the extent the storage asset can contribute capacity, energy or ancillary services, whether directly for larger systems, or through some kind of aggregation for behind-the-meter assets. Because of the multiple operating modes of most energy storage assets, grid-connected storage assets should be able to access capacity payments, energy arbitrage between high- and low-price periods, and ancillary service revenues such as frequency regulation and operating reserves. Even if the asset cannot provide all of these services simultaneously, i.e., at exactly the same moment, it is reasonable to expect that a storage asset might participate in energy arbitrage between early morning hours and afternoon peak, be available as operating reserves or economic dispatch during the other hours of the day consistent with the obligations of a capacity resource, provide frequency response in virtually all hours around its then-current state-of-charge target, or to provide some of these services on weekdays vs. weekends, or summer vs. winter, for example. The flexibility of many energy storage technologies makes them uniquely situated to operate in different modes at different times, and the rules should enable such operations to ensure the assets can provide their maximum value to the system at any given time.

While there is broad agreement that these revenue streams are needed and should be

available, the rules do not currently provide the necessary flexibility for storage assets to be compensated consistent with the range of services they can provide. The rule review recommended above should focus specifically on ensuring that storage assets can access all of the revenue streams associated with the flexibility and multiple services storage can provide.

VI. Utility Ownership of Storage

In the REV Order Adopting Regulatory Policy Framework and Implementation Plan ("Track 1 Order"),[2] the Commission ruled that utility ownership of energy storage, as with all DER, should be limited to certain defined situations, such as where the storage was integral to utility distribution system operations and reliability, and in REV Demonstration Projects. NRG supports the Commission's position that utility-owned storage should not be allowed, as a general rule. Just as with DER and the large-scale renewables being discussed in the CES proceeding, there is no convincing evidence or policy rationale supporting utility ownership of storage. Third parties are highly engaged in developing storage applications, and are well-equipped to provide the capital necessary to deploy the significant amounts of storage that will be needed to complement and enable the ambitious clean energy goals of the state.

VII. Wholesale Market Impacts

The Commission should also carefully consider how storage resources with long-term contracts interact with the NYISO's wholesale markets. As NRG noted in the CES proceeding, in order to reach the 50 by '30 renewable energy goal, New York will need an estimated 15,000 – 25,000MWs (nameplate) of new clean capacity. NRG does not have a view on how much storage will be needed, but we believe the 2GW target suggested above is a 'no regrets' amount of storage to get started over the next decade.

Simply adding that amount of capacity into the NYISO ICAP market, as if it had no cost,

[2] Case 14-M-0101, *Order Adopting Regulatory Policy Framework and Implementation Plan*, February 26, 2015, pp. 68-69.

would significantly distort the capacity market price signal for both existing and new generators that rely on the ICAP market to remain in business or to make new investment decisions. Thus, if the Commission does not directly address the appropriate treatment of contracted resources in the NYISO markets, it risks creating significant dislocation in the existing generation market, which would potentially lead to expensive reliability-must-run contracts and ultimately undermines reliability and increases ratepayer costs.

Thank you for considering these comments in formulating a path forward to make energy storage a meaningful part of the New York energy system.

Respectfully submitted,
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