Project Candidate Template

1 Dispatchability and Fast Inertial Response Product Requested by New York Power Authority

1.1 Problem / Opportunity

The purpose of this project is to study the need for market products to address system needs given the changing resource mix, electrification of the grid, and evolving load profiles as we transform New York's electric grid as mandated by the Climate Leadership and Community Protection Act (CLCPA). Given the mandate for the State to achieve a 70% renewable energy supply mix by 2030; and a 100% clean electricity supply mix by 2040 the available technologies to meet these goals are primarily non-dispatchable, weather-dependent, intermittent resources, challenging the reliable operation of the grid with their inherent variability and uncertainty of output. This project will help the NYISO and stakeholders study, identify and implement market products necessary to sustain and incent generator attributes necessary to maintain reliability while promoting the achievement of reaching the State's policy goals codified in the CLCPA.

1.2 Project Objective(s) & Anticipated Deliverable(s)

This project will be to perform a study to assess the need for new products to provide economic incentives to sustain or attract generation attributes including but not limited to: generator dispatchability; ramping reserves; a fast (near-immediate) ramping product; a premium fast ramping product for generators capable of large (>500MW) inertial response capable of addressing natural events, e.g. wind-lull and cloud events, fast and slow responding reserves; and, other products as identified in the study to provide operational capabilities,safety margins and overall system reliability and appropriate compensation mechanisms that appropriately value such attributes. If demonstrated to be valuable, a market product(s) would be promoted as the next phase of this project for implementation.

1.3 Project Justification

With the State's codified CLCPA goals, intermittent resources will soon be the pre-eminent generating resource powering New Yorks electric grid. New York's power grid was developed with large central-station fossil generation where dispatchablility, quick ramping, frequency regulation, long-duration output, and near-immediate inertial response and other capabilities were available to maintain reliability and in quick response to a signal from the TO/NYISO Control Room. As the grid transforms into becoming the cleaner and greener energy form of energy New Yorkers value, the high penetrations of non-dispatchable weather-dependent resources raise the issue of exactly how to balance intermittency on the system.

Numerous recent studies conducted by the NYISO and others conclude that we will need to replace the fossil generation mandated by public policy to retire. Currently these studies state that this fossil generation will be replaced inlarge part by dispatchable emissions-free resources (DEFRs). What technology will be employed by these new DEFRs, and therefore what generator attributes they will have that are capable of addressing high levels of intermittency is not known. This means that in the near-term it is likely that the NYISO will increasingly rely upon the existing DEFRs on the system, specifically NYPA's large hydro resources, to balance increasing intermittency on the system to maintain reliabity. The only alternative to NYPA's large hydro resources for large flexible emissions-free power-on-demand- are the upstate nuclear units, which are not designed to to ramp up or down – and in fact have very little variability in their operational output in order to avoid expensive damage to their facilities.

Current NYISO market products, reimbursement mechanisms and market rules do not fully consider the excessive wear and tear (which significantly reduces unit life-expectancy) that these large expensive units already endure, and will likely increase. The current practice cannot go on

indefinitely. NYPA's large hydro resources, which are relied upon by the NYISO operationally, and consumers for its DEFR status and low-cost energy must be valued appropriately for their essential electrical and economic attributes.

The NYISO has proposed addressing the need to balance intermittency by developing Operating Reserve products. This study would distinguish the important differences between operating reserves, which enables the ISO to respond to unanticipated outages, and ramping reserves, which serve a separate and distinct purpose of managing generation variability and uncertainty in net load. This distinction is drawn in the NYISO Grid in Transition (GIT)report, which explained that the quantity of a ramping product that is needed would "depend[] on the magnitude of the potential variations in intermittent resource output … rather than on the size of potential generation or transmission contingencies.

As an example of the need to expand the NYISOs focus beyond operating reserve products, in a recent Brattle paper[1] Dr's Spee and Newell suggest setting demand curves for ramping capability "to account for the declining probability of lost load due to lack of ramping at each level of reserve, times the value of lost load," which is similar to the NYISO MMU's proposal for determining the maximum price the ISO should be willing to pay for 30-minute reserve. In contrast, the GIT Report asserts, "The energy market cost of resources providing ramp capability would ideally be taken into account in scheduling additional ramp capability, as resources scheduled to provide additional ramp capability would be dispatched for energy much more often than spinning reserves will be activated following contingencies." Taken together these conclusions highlight the fact that the price at which energy is offered is much more important for a provider of ramping reserve than for a provider of operating reserve underscores the desirability of separating the need for operating reserve from the need for ramping capability.

This project seeks to to perform a study to assess the need for new products to provide economic incentives to sustain or attract generation attributes including but not limited to: generator dispatchability; ramping reserves; a fast (near-immediate) ramping product; a premium fast ramping product for generators capable of large (>500MW) inertial response capable of addressing natural events, e.g. wind-lull and cloud events, fast and slow responding reserves; and, other products as identified in the study to provide operational capabilities,safety margins and overall system reliability and appropriate compensation mechanisms that appropriately value such attributes. If demonstrated to be valuable, a market product(s) would be promoted as the next phase of this project for implementation.

[1] Dr. Kathleen Spees and Dr Samuel Newell, Principals of the Brattle Group, "Modernizing Electricity Market Design Efficiently Managing Net Load Variability in High-Renewable Systems: Designing Ramping Products to Attract and Leverage Flexible Resources" submitted by NYSERDA as an attachment to their "Post-Technical Conference Comments on Modernizing Electricity Market Design, held by the Federal Energy Regulatory Commission (FERC) (Docket No. AD21-10-000).