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Highview Power Comments on the NYISO 'Grid in Transition' Whitepaper

Highview Power is a New York-based designer and developer of long-duration energy storage systems and a member of the NYISO ICAP Working Group. We appreciate the opportunity to comment on the whitepaper 'Grid in Transition' ('the whitepaper'). We also commend the NYISO for proactively assessing options for tackling the many challenges arising from transitioning to a low-carbon energy system. Overall, we comment on three aspects in the whitepaper: 1) modelling the ability of the NYISO market to provide revenue sufficiency and investment signals for new assets; 2) capacity market enhancements and; 3) reactive power management, voltage control and inertia.

Future revenue sufficiency

The whitepaper sets out to model the future revenue streams of 11 technologies to understand whether the NYISO energy markets can be expected to incentivize new investment. We note that for the current revenue streams (presented on pg.31, Figure 8) the modelling uses Li-ion battery costs and systems specifications even in the case of 8-hour storage. The whitepaper states that *"A detailed quantitative assessment of future market revenues and revenue sufficiency should be undertaken… taking into consideration state policies, the design of existing and new market products, and resource costs"* (pg. 33-34).

Considering the significant uncertainties of modelling future outcomes, it is not a given that Li-ion will be the dominant storage technology in the future, especially at longer durations. NYISO should therefore also model the future revenue streams for 8-hour energy storage using the resource costs and system specifications of those technologies that are designed to provide long duration storage (e.g. thermo-mechanical and thermal storage). These technologies have a significantly lower cost per kWh of storage capacity and should be analyzed as part of a range of technologies that will be required to balance the future grid mix.

Enhancements to the capacity market

The sub-optimal outcomes of the current ICAP framework raised by Potomac Economics in the 2018 'State of the Market' report[1] suggests that NYISO should prepare to make fundamental changes to the ICAP program. We support the transition to a Locational Marginal Pricing of Capacity (C-LMP) framework that establishes nodal pricing for capacity, incorporates local planning criteria and constraints and that more accurately reflects the locational marginal reliability value of capacity. As the reliability of the NYISO power grid increasingly depends on intermittent and duration limited resources it is crucial that the actual marginal value of these technologies to reliability is reflected in the ICAP pricing mechanism. While the NYISO made a step in the right direction by

[1] https://www.nyiso.com/documents/20142/2223763/2018-State-of-the-Market-Report.pdf/b5bd2213-9fe2-b0e7-a422-d4071b3d014b?t=1557344025932

Urban Future Lab
370 Jay Street – 7th Floor
Brooklyn, NY 11201

T +1 (800) 584-0253
E info@highviewpower.com
W www.highviewpower.com

establishing new capacity ratings for duration-limited resources, these capacity ratings should depend on the generation mix and the network constraints in the specific areas on which a technology is located.

Reactive power, voltage management and inertia

We agree with the NYISO that increased deployment of non-synchronous technologies in New York (e.g. inverter-based batteries, generation technologies and Demand Side Response) may increase the difficulty of effectively managing voltage levels. These issues will become more apparent on specific areas on the network as voltage management is a locational issue, specifically related to the supply and demand of active and reactive power on that location. In the same vein as NYISO is considering locational pricing of capacity, the whitepaper should also consider investigating the locational value of voltage management which would depend on the specific type of network assets, generation and demand at a location. There is precedence for these types of markets, most notably in the UK where the National Grid is now procuring for reactive power services on a locational basis; above and beyond the minimum requirements stipulated in the Grid Code.

When considering the challenges of managing voltage in areas of low system strength, NYISO should also consider the different capabilities of synchronous and non-synchronous technologies in providing effective voltage management. Since non-synchronous generation is not electro-mechanically synchronized to the grid, they rely on control loops to mimic the behavior of synchronous generation. These control loops work by measuring network conditions and responding, but are susceptible to distortions during transient events, which can actually lead to exacerbation of voltage deviations. This can lead to further system instability via a feedback mechanism between the control system and the network. This problem is being studied in Texas[2], where this challenge is emerging, and may become more relevant in NYISO as we move towards a 70% RPS.

Finally, we note NYISO's comment that, *"System inertia and interconnection frequency response is unlikely to be a concern in the short and medium term due to the large amounts of synchronized resources on the Eastern Interconnection, but may eventually become problematic."* (pg. 37). This will only hold true if states in the Eastern Interconnection adopt less ambitious renewable targets than New York. In the case of aggressive renewable legislation in surrounding states, the drop in synchronous inertia levels on the network may lead to difficulties in managing frequency earlier than the NYISO expects.

Conclusion

In conclusion, we commend NYISO for undertaking such a comprehensive review of the issues emerging from the current transition to a low carbon power system and we look forward to working with NYISO to help shape the scope of work for the whitepaper further.

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2 http://www.ercot.com/content/wcm/lists/144927/Dynamic_Stability_Assessment_of_High_Penertration_of_Renewable_Generatio....pdf

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