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Scaling Renewable Energy

October 2, 2020

Via Electronic Mail: PublicPolicyPlanningMailbox@nyiso.com

New York Independent System Operator
10 Krey Boulevard
Rensselaer, New York 12144

Re: Request for Proposed Transmission Needs Being Driven by Public Policy Requirements for the 2020- 2021 Transmission Planning Cycle

To Whom It May Concern:

Anbaric Development Partners, LLC (Anbaric) provides these comments in response to the NYISO's August 3, 2020 Request for Proposed Transmission Needs Being Driven by Public Policy Requirements for the 2020-2021 Transmission Planning Cycle.

Anbaric has identified two transmission needs driven by recently-enacted New York State statutes: transmission necessary to meet the statutory goal of deploying 9,000 MW of offshore wind by 2035 and transmission necessary to deliver upstate renewables to downstate load centers to meet the statutory goals of deploying greater amounts of renewable energy, reducing greenhouse gases, and moving towards the carbon-free production of electricity. For each transmission need, we identify below the supporting Public Policy requirements, the criteria for the evaluation of transmission solutions to that need, and how the construction of transmission will fulfill the Public Policy requirement(s).

Need #1: Transmission to meet the 9,000 MW mandate for offshore wind

I. Public Policy Requirements driving the need for transmission

On July 18, 2020 Governor Cuomo signed the Climate Leadership and Community Protection Act (CLCPA) that among other things, codified the offshore wind generation mandate of 9,000 MW by 2035, 70% renewable energy by 2030, and 100% carbon-free electricity by 2040.[1] Offshore wind generation will be a large contributor to meeting these latter two goals.

Given the limitations of the current New York transmission system, compliance with the statutory CLCPA offshore wind, renewable energy, and carbon reduction goals will require new and upgraded transmission infrastructure. In recognition of this, New York State enacted the Accelerated Renewable Energy Growth and Community Benefit Act in 2020 to establish new transmission investment priorities to facilitate the achievement of state policy goals.[2] As described in Part III below, the State's transmission infrastructure investments will include on-shore upgrades as well as offshore transmission systems to bring that electricity to the terrestrial grid.

[1] Chapter 106 of the laws of 2019.
[2] Chapter 58 (Part JJJ) of the laws of 2020.

Nine thousand megawatts would be 23% of the New York Control Area's current generating capability, and when built, will be a dramatic shift in where and how New York generates its electricity. Currently, power typically flows from upstate toward NYC (Zone J) and LI (Zone K). The introduction of 9,000 MW directly into the congested Zones J and K will have a dramatic effect on power flows and thus the transmission needed to ensure that NYS meets its statutory goals under the CLCPA. The incremental approach of the NYISO interconnection process was not designed to accommodate such a rapid, far-reaching transition in the sourcing of the State's electric generation. The urban nature of the region creates complex routing challenges, including the presence of other utilities in desired rights-of-way, shipping and navigational uses of desired marine rights-of-way, environmental, and social sensitivities that unless planned for, threaten the State's ability to meet the mandates of the CLCPA.

II. Criteria for the evaluation of transmission solutions to that need

Proposed transmission projects designed to meet this need should:

1) Make optimal use of points of interconnection (POI) in the electrical grid. Transmission projects should inject the maximum amount of power at each POI while minimizing the associated upgrade costs. Transmission projects should also anticipate geographic and environmental barriers between the coastline and the substation which limit the routes that can reach a given substation.
2) Enable, rather than preclude, the growth of the offshore wind industry. Preference should be given to designs that can be scaled and facilitate the inclusion of future resources and the creation of an "open access" transmission system.
3) Encourage competition among offshore generators by providing access to multiple Wind Energy Areas and leases within those areas.[3]
4) Demonstrate cost effectiveness in delivering offshore resources ($/MWh).
5) Demonstrate feasibility, including the ability to interconnect the project(s) to the NYISO grid, permit the project(s), finance the project(s), deliver on the bid price, and construct the project(s).
6) Maximize system reliability and resilience, including ability to continue to deliver zero-carbon power in the event of N-1 transmission events.
7) Minimize environmental impacts.
8) Minimize curtailments so that New York consumers get the most benefit for renewable resource investments without the need to overbuild offshore renewables.
9) Rank higher if they also address the needs created by the retirement of fossil generation to meet the legislated zero-carbon power system, including by utilizing grid-based storage or other innovative solutions that can provide ancillary services as well.

[3] This type of competition has resulted in zero-subsidy offshore wind tenders in Europe.

III. How the construction of transmission will fulfill the Public Policy Requirement(s).

The construction of planned, open-access transmission systems will result in reduced curtailments, reduced upgrade costs, lower environmental impacts, increased reliability and a grid configured to boost competition over the long term.

Anbaric commissioned The Brattle Group and Pterra (assisted by ABB) to conduct in-depth studies of what the New York Bulk Power System will require to integrate 9,000 MW of offshore wind generation by 2035. The report, *Offshore Wind Transmission: An Analysis of Options for New York* (http://ny.anbaric.com/webinar/)[4] identified challenges in reaching the 9,000 MW goal and identified important results created by constructing a planned, open-access transmission system.

Our analyses found that following the NYISO's minimum interconnection standard for the full 9,000 MW buildout, without additional onshore upgrades, would result in curtailments of approximately 18%. Curtailments were found to be heavily dependent on overall sequencing and optimal utilization of POIs for the full 9,000 MW. Optimal use of POIs and proper sequencing would only be achieved by planning the build out of transmission – the incremental approach of generation-centric RFPs will not result in an optimally planned transmission system. We further note that these findings may be conservative, as the study did not address must-run cogeneration units such as Con Ed East River or the Brooklyn Navy Yard. Inclusion of these must-run units would further curtail offshore wind.

Curtailments reduce the amount of electricity delivered to the on-shore grid. Reductions of this 18% magnitude would be exceedingly costly and would threaten realization of four objectives of the CLCPA: a) 85 percent Reduction in GHG Emissions by 2050, b) 100 percent Carbon-free Electricity by 2040, c) 9,000 MW of offshore wind by 2035 and d) 70 percent Renewable Energy by 2030.

To address the curtailments, Anbaric evaluated certain terrestrial transmission upgrades (beyond those required by the minimum interconnection standard) to determine whether they would reduce curtailments. These upgrades were effective – in some cases increasing the output of an offshore wind generator by 20% with a single transmission upgrade. Such transmission upgrades beyond those required by the minimum interconnection standard would not be identified by the Interconnection Study process and are the type of projects the PPTPP was intended to identify and implement.

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[4] The study:

- Screened 22 POIs for solo injection capability, utilizing load flow modeling data from NYISO. Screened POIs were those reasonably proximate to existing and proposed BOEM Wind Energy Areas.
- Selected the optimal POIs based on these criteria and tested a number of possible interconnection sequences to determine optimal sequencing options. Assumptions included: a) all 9,000 MW will interconnect into Zones J & K and b) each injection is impacted by prior injection.
- Iterated sequencing scenarios to determine the optimal sequence resulting in the most efficient use of POIs and lowest SUF and SDU costs.
- Performed Production Modeling of the multiple sequences to determine how offshore wind interacts with fulfilling load-serving requirements meeting demand, impact on other supply resources simulating grid operation and dispatch based on 9,000 MW of offshore wind and an assumed 8760 wind resource curve in 2035.

The results of this study demonstrated that POI selection and the sequencing of interconnection had a significant impact on SUF and SDU costs.

Our analyses found geographic-specific transmission needs necessary to help NYS fulfill the goals of the CLCPA. In general, they fit into two broad categories:

1. *Unbottling Long Island and Staten Island*

Our analysis shows that priority investments in new transmission cables to move surplus offshore wind energy from Long Island to New York City, the Hudson River Valley, and elsewhere upstate would effectively reduce curtailments of offshore wind energy on high wind, low demand days. Similarly, bolstering the interconnection between Staten Island and the rest of New York City and upstate would open up the 345 kV substations at Fresh Kills and Goethals as strong points of interconnection for offshore wind, easing the pressure on threading cables through the Narrows and Upper Bay of New York Harbor.

Our analysis is corroborated by LIPA in its recent filing to the NYPSC[5], where it identifies the following transmission needs to deliver offshore wind energy:

a) The need to increase the export capability of the LIPA-Con Edison interface, connecting Zone K to Zones I and J.

b) The need to upgrade the existing 138 kV transmission "backbone" between Ruland Road and East Garden City substations to 345 kV to enable full deliverability of the offshore wind unforced capacity across LIPA's system.

2. *Maximizing offshore wind transmission through the Narrows*

A striking example of a transmission need driven by a Public Policy Requirement is the cable approach route through the Narrows to reach POIs in New York Harbor. Analysis by Intertek, incorporated into the report by The Brattle Group referenced previously found that:

- Major constraints to routing through the Narrows include the limited width of suitable seabed, federal navigation projects (shipping channels and anchorages), cable spacing requirements, and competing uses. All potential routes are also heavily constrained by navigational aspects in the Upper Bay of New York Harbor, primarily the inner harbor anchorages and federal navigational channels.
- In The Narrows and Upper Bay, maximal transmission capacity in the available space may be achieved by using HVDC technology to connect clusters of OSW farms to a grid that has been extended offshore.
- Given the constraints in the Upper Bay, it is likely that only four cable routes could access New York Harbor. Those routes could be occupied by two HVAC offshore wind projects, or four cables carrying about 1,600 MW total. Alternatively, four HVDC transmission systems could deliver up to 5,600 MW through the Narrows.

[5] LIPA letter of July 30, 2020 in relation to PSC Case 18-E-0623 - In the Matter of New York Independent System Operator, Inc.'s Proposed Public Policy Transmission Needs for Consideration for 2018.

- Not utilizing The Narrows effectively risks limiting the ability to cost-effectively route offshore wind transmission into New York City and meet climate and clean energy mandates without large costs or delays.

The vulnerabilities approaching New York City through The Narrows highlight a major transmission need. That need could be addressed by designing and constructing dedicated transmission infrastructure that maximizes the amount of offshore wind energy that can be transmitted through the Narrows in support of multiple offshore wind generators, thus ensuring that the appropriate share of the 9,000 MW goal is delivered directly to New York City at the lowest cost and with least disruption.

Need #2: Delivering upstate renewables to downstate load centers

I. Public Policy Requirements driving the need for transmission

As described above, the State's Climate Leadership and Community Protection Act (CLCPA) created mandates that individually and together require additional transmission to deliver land-based wind and solar energy to downstate load centers. These goals include:

- 85% Reduction in Greenhouse Gas Emissions by 2050;
- 100% Carbon-free Electricity by 2040;
- 70% Renewable Energy by 2030;
- 3,000 MW of Energy Storage by 2030; and
- 6,000 MW of Solar by 2025.

The NYISO's 2019 CARIS Report[6] studied the impact of transmission constraints on a potential renewable energy build out to achieve a 70% renewable energy mix, as required by the CLCPA. The primary purpose of the studies "70x30" scenario was to identify transmission constraints that may prevent the delivery of renewable energy resources needed to achieve the policy target.

Without rehashing the details of the CARIS Study, as they are well known to the NYISO, the analysis found that "four major pockets are observed in areas of land-based renewable resources: Western New York, North Country, Capital Region, and Southern Tier. In particular, North Country exhibits the highest level of curtailment by percentage, the highest curtailed energy by GWh, and the most frequent congested hours. These curtailments are generally due to lack of a strongly interconnected network to deliver power, at both bulk power and local system levels. Two additional pockets are observed in areas of offshore wind connecting to New York City (Zone J) and Long Island (Zone K) due to transmission constraints on the existing grid after the power is brought to shore."

II. Criteria for the evaluation of transmission solutions to that need

Proposed transmission projects designed to meet this need should:

[6] "2019 CARIS Report, Congestion Assessment and Resource Integration Study," A Report by the New York Independent System Operator, July 2020.

1) Make optimal use of points of interconnection (POI) in the electrical grid. Transmission projects should inject the maximum amount of power at each POI while minimizing the associated upgrade costs. Transmission projects should also anticipate geographic and environmental limitations which constrain the routes that can reach a given substation.
2) Enable, rather than preclude, future expansion of renewable resources. Preference should be given to designs that can be scaled and facilitate the inclusion of future resources.
3) Demonstrate their cost effectiveness of delivering renewable resources ($/MWh).
4) Demonstrate a proposal's feasibility, including the ability to interconnect the project(s) to the NYISO grid, permit the project(s), finance the project(s), deliver on the bid price and construct the project(s).
5) Maximize system reliability and resilience, including ability to continue to deliver zero-carbon power in the event of N-1 transmission events.
6) Minimize environmental impact.
7) Minimize curtailments so that New York consumers get the most benefit for renewable resource investments without the need to overbuild renewables.
8) Rank higher if they also address the needs created by the retirement of fossil generation to meet the legislated zero-carbon power system, including by utilizing grid-based storage or other innovative solutions that can provide ancillary services as well.

III. How the construction of transmission will fulfill the Public Policy Requirement(s).

The specific means of accomplishing New York's climate and clean energy public policy mandates will be via offshore wind, energy storage, and solar energy, totaling 18,000 MW of new resources interconnecting into the grid plus an unspecified amount of onshore wind. These statutorily required resources would sum to 43% of existing generation (41,341 MW). Change on this scale and in such a brief timeframe has never been undertaken before and requires commensurate transmission planning and solutions to upgrade and expand the grid to manage the integration of this quantity of new clean energy.

The NYISO's final 2019 CARIS report demonstrates this transmission need and how the construction of new transmission will fulfill the Public Policy Need. The following excerpt is from the CARIS 70x30 scenario Key Findings:

> *"The '70x30' scenario builds on the Base Case to model state-mandated policy goals. Results show that renewable generation pockets are likely to develop throughout the state as the existing transmission grid would be overwhelmed by the significant renewable capacity additions. In each of the five major pockets observed, renewable generation is curtailed due to the lack of sufficient bulk and local transmission capability to deliver the power. The results support the conclusion that additional transmission expansion, at both bulk and local levels, will be necessary to efficiently deliver renewable power to New York consumers."* (emphasis added)

The CARIS 2019 Final Study supports all the elements required for PPTP need for transmission in optimizing renewable resources to achieve the targets of the CLCPA. Anbaric recommends an approach similar to that done for our offshore wind study, that is, a planned version of CARIS. More specifically,

we would respectfully recommend an approach that: a) Determines the corridors providing the maximum benefit, b) prioritizes the sequencing of buildout of transmission, c) reviews and studies optimal POI's for new renewable resources, d) considers transmission solutions and other technologies (such as the role energy storage may play), and e) uses these steps to plan and build a grid that supports the CLCPA targets.

Thank you for providing this opportunity to comment on transmission needs being driven by public policy requirements for the 2020-2021 Transmission Planning Cycle.

Respectfully submitted,

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