New York ISO
Independent System Operator

Via Electronic Portal

February 20, 2024

Hon. Michelle L. Phillips
Secretary to the Commission
New York State Public Service Commission
Empire State Plaza
Agency Building 3
Albany, New York 12223-1350
Email: secretary@dps.ny.gov

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

Dear Secretary Phillips:

In response to the New York State Public Service Commission's ("Commission's") *Notice Seeking Further Comment* issued in the above captioned proceeding on October 20, 2023, and the Commission's *Notice Extending Comment Period* issued in the above captioned proceeding on January 17, 2024, the New York Independent System Operator, Inc. hereby submits comments for consideration.

Respectfully submitted,
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CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Rensselaer, NY this 20th day of February 2024.

/s/ Alexander Morse

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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

COMMENTS OF THE NEW YORK INDEPENDENT SYSTEM OPERATOR, INC. IN RESPONSE TO THE OCTOBER 20, 2023 NOTICE SEEKING FURTHER COMMENT

The New York Independent System Operator, Inc. ("NYISO") respectfully submits these comments in response to the Notice Seeking Further Comment issued by the New York State Public Service Commission's ("PSC" or "Commission") on October 23, 2023.[1] The NYISO commends the PSC for issuing the Order Initiating Process Regarding Zero Emissions Target published May 18, 2023 ("Order")[2] and for continuing to solicit feedback through a technical conference and further comments.

New zero-emission technologies, or what the NYISO generally refers to as dispatchable emission-free resources ("DEFRs"),[3] will be critical to address the gap between the capabilities of existing renewable energy technologies and the energy and reliability needs required to support continuous electric system operation. Addressing this gap is essential to maintaining reliable electric service as we transition to the Zero-Emissions by 2040 Target.[4] The process established by the Commission, with issuance of its Order, is critical to determining next steps to

[1] Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Notice Seeking Further Comment, October 20, 2023.

[2] Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Order Initiating Process Regarding Zero Emissions Target, May 18, 2023; *see also*, Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Notice Extending Comment Period, June 28, 2023.

[3] *See* 2023-2032 Comprehensive Reliability Plan ("CRP"), A Report of the New York Independent System Operator, November 28, 2023, at pp. 75-79.

[4] *See* Order at p. 2 and pp. 11-12.

address this gap, to encourage development of generation resources that meet the zero-emission requirement, and to protect electric system reliability.[5] The NYISO looks forward to continuing to work with the PSC and DPS Staff on the efforts required to achieve the CLCPA objectives, while maintaining electric system reliability and the level of electric service that New Yorkers depend on.

The NYISO is committed to operating an electric system that provides reliable service 24 hours a day, 365 days a year, and to planning a reliable system for the future grid.[6] Any programs implemented to support the CLCPA must be compatible with the NYISO-administered wholesale electricity markets and keep the requirement to maintain the reliability of the electric system front and center. The Climate Action Council's Final Scoping Plan accurately notes, "[w]hile transitioning away from fossil fuel use, maintaining reliable access to power, whether through centralized or distributed energy sources, is crucial for maintaining good public health in our energy-dependent society."[7] Given the timeline and scope of the CLCPA mandates, wholesale markets are essential to maintain reliability and drive the necessary investment and innovation.

The NYISO offers these comments to further highlight the importance of developing sufficient dispatchable generation resources to comply with the CLCPA requirements, and to

[5] *See* Order at p. 12.

[6] The New York State Reliability Council ("NYSRC") conducts an annual probabilistic assessment to determine the Installed Reserve Margin ("IRM") required to maintain a "1-day-in-10-years" ("1-in-10") loss of load expectation ("LOLE"). The NYSRC rules and Northeast Power Coordinating Council ("NPCC") criteria define resource adequacy such that at any moment in time, the probability of the unplanned disconnection of firm electric load shall not exceed one occurrence in ten years, expressed as one day in ten years, or annually as maintaining a LOLE probability of 0.1.

[7] *See* New York State Climate Action Council Scoping Plan, Full Report December 2022, at p. 105.

encourage timely discussion on generation types that satisfy the CLCPA targets and the attributes that will be critical to maintaining electric system reliability.

COMMENTS

A. Identifying Technologies and Criteria That Will Satisfy the Zero-Emissions by 2040 Target

The time is right to start identifying technologies and generation types that will satisfy the zero-emission definition. At the same time, it is critical to not be overly restrictive when identifying technologies and generation types. Criteria that describe how a generation technology could demonstrate and qualify as a zero-emission resource must also be developed to allow, and encourage, exploration of new technologies to supply the electric grid and satisfy the Zero-Emissions by 2040 Target. Developers of new and existing technologies need to understand what generation types or generating technology will qualify as zero-emission.

The New York power grid currently relies on a variety of generation technologies, providing numerous energy attributes and reliability attributes, to maintain a reliable power grid. However, many of the necessary characteristics and reliability services are largely provided by fossil-based, emitting generation. As such, the New York generating fleet has sufficient operational flexibility to respond to dispatch signals, run for long periods of time, and use multiple fuel sources to support reliability.[8] To achieve the Zero-Emissions by 2040 Target, significant quantities of new resources, which satisfy the zero-emission definition, and provide the necessary energy and reliability attributes, will be required to support a reliable electric system. Development of existing and emerging zero-emission electricity supply will be required. Table 1 below includes a number of technologies that the NYISO would consider to potentially

[8] The generating fleet's access to multiple fuel sources allows alternate fuels to support electric generation when a fuel source is unavailable or a fuel type is priced out of the market.

qualify as carbon-free or zero-emissions resources and highlights some of the attributes needed for reliability. Many of the generation technologies listed exist today and collectively supply New Yorkers with reliable electric service 24 hours a day, 365 days a year.

Table 1: Energy and Reliability Attributes of Various Supply Technologies[9]

		2023 NYCA Summer Capacity (MW)	Energy Attributes						Other Reliability Attributes			
			Carbon Free[10]	Dependable Fuel Source	Non-Energy Limited	Dispatchable	Quick start	Flexible	Multi start	Inertial Response	Dynamic Reactive control	High Short Circuit current
Technology	Fossil	25,667	No	Yes[11]	Yes	Yes	Yes[12]	Yes	Yes	Yes	Yes	Yes
	Hydro	4,265	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Pumped Hydro	1,407	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Hydrogen Fuel Cell	0	Yes	Yes[13]	Yes	Yes	Yes	Yes	Yes	No	Yes	No
	Hydrogen Combustion	0	Yes	Yes[13]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Nuclear	3,305	Yes	Yes	Yes	No	No	No	No	Yes	Yes	Yes
	Modular Nuclear	0	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes
	Battery	0	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
	Solar	154	Yes	No	No	No[14]	Yes	Yes	Yes	No	Yes	No
	Wind	2,051	Yes	No	No	No[14]	Yes	Yes	Yes	No	Yes	No
	Demand Response[15]	1,234	Yes[16]	Yes	No	No	No	Yes	No	No	No	No
	Synchronous Condenser[17]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	Yes	Yes

[9] *See* Figure 39 of the CRP. Many of these attributes are discussed further on page 8 below.

[10] Final definition pending a PSC order defining "zero-emissions" resources.

[11] Firm fuel contract or dual fuel capable.

[12] Simple cycle turbines.

[13] Contingent on ability to manufacture and transport hydrogen at scale required for power generation.

[14] Resources are energy limited or have intermittent fuel sources which limits their operational capability.

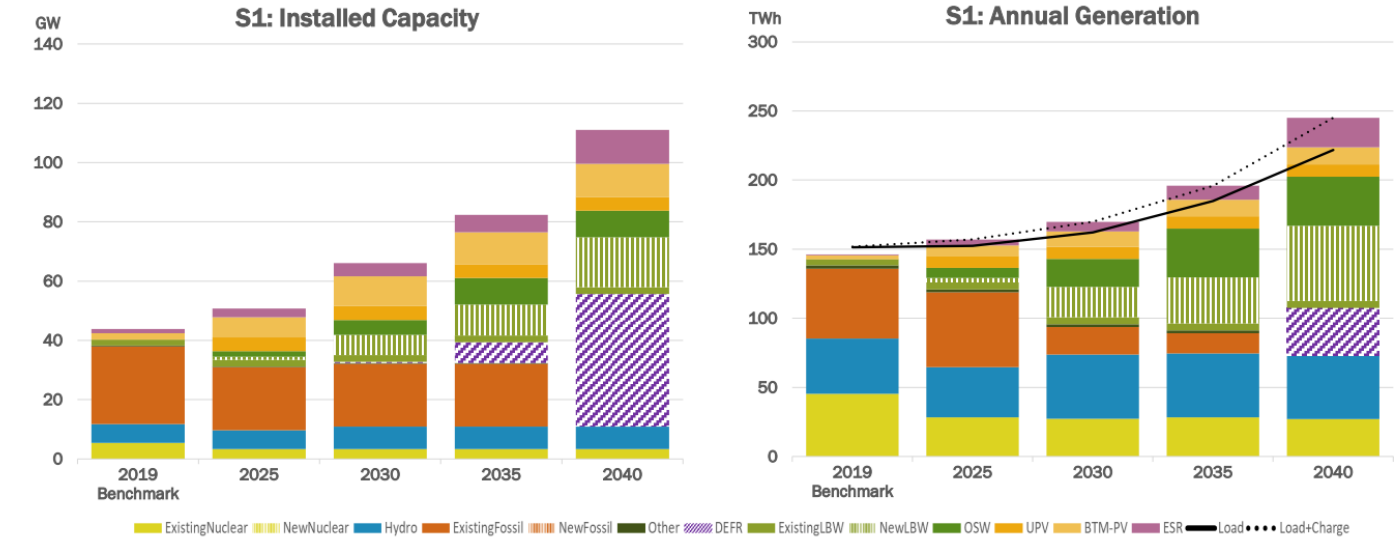
[15] Demand response participating in SCR or EDRP programs.

[16] Provided demand reduction is achieved through curtailing electrical consumption or by increasing carbon-free generation source.

[17] Synchronous condensers do not provide energy.

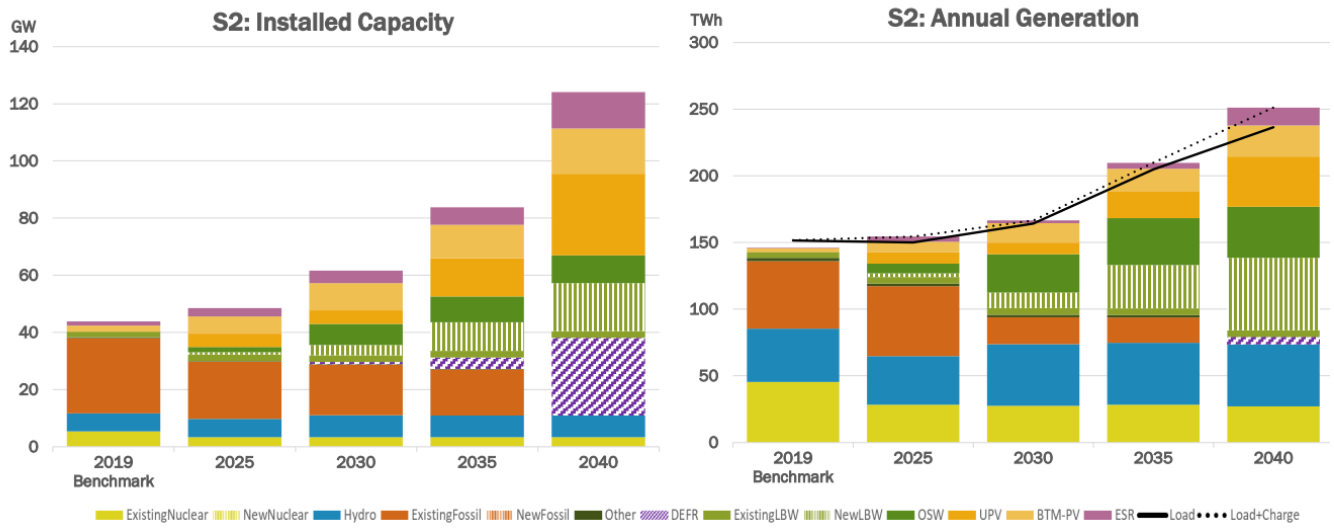
Hydrogen fuel cells, hydrogen combustion, modular nuclear, and battery storage could all be integrated into the electric supply system to replace certain attributes provided by fossil generation and support the zero-emission target. Irrespective of the actual resource mix, substantial quantities of zero-emission dispatchable resources, or DEFRs, will be required to fully replace all of the attributes provided by fossil generation and to meet the minimum statewide and locational resource requirements when intermittent generation is unavailable. The NYISO analyzed two distinct scenarios, documented in The Outlook,[18] to illustrate generation portfolios that could meet the State's policy objectives. Both scenarios include a significant quantity of DEFRs, which primarily operate to meet peak capacity needs rather than energy needs, as shown in the figures below.

Figure 1: Scenario 1 Capacity and Generation Results.



[18] *See* 2021-2040 System & Resource Outlook ("The Outlook"), A Report of the New York Independent System Operator, September 22, 2022, at pp. 45-51.

Figure 2: Scenario 2 Capacity and Generation Results



By 2040, Scenario 1 (noted as S1 in the figures above) builds approximately 45 GW of DEFR generation capacity while Scenario 2 (noted as S2 in the figures above) builds approximately 27 GW. For reference, today's New York fossil fleet totals approximately 26 GW. The large amount of DEFR capacity in Scenario 1 is driven by a 35% higher peak load forecast than Scenario 2 despite having 13% lower annual energy demand in 2040. The projected DEFR build out could be equal to, or twice, the capacity of the current fossil fleet. These scenarios indicate that the future grid could require as much as approximately one third of energy production from resources that have yet to be developed and deployed. Both scenarios include significant DEFR capacity by 2035, but it is important to note that the lead time necessary for research, development, commercialization, permitting, and construction of DEFR power plants will require action much sooner if this timeline is to be achieved. The NYISO is currently engaged in its second biennial System & Resource Outlook report, to be released later this year, which will update and refine the prior twenty-year projections of system conditions for demand, generation, and transmission across the New York transmission system.

While certain existing technologies could contribute to a reliable electric system in the future and the zero-emission target, not all of the resources necessary, with the combination of attributes described, are commercially available at this time.

Long-duration, dispatchable emission-free resources will be critical to maintaining reliability as other zero-emission, intermittent resources, such as wind and solar, continue expanding on the electric grid. Zero-emission resources that provide the reliability attributes of synchronous generation and can be dispatched to provide both energy and capacity over long durations, will regularly be called upon when the output of intermittent resources is insufficient to meet demand. DEFRs may need to operate for extended periods of time (several days) during prolonged wind lulls, extreme cold snaps, heatwaves, or storms. DEFRs must have secure fuel and the capability to operate continuously under all conditions, *e.g.*, at night, when there is no wind, when there is too much wind, when temperatures are below the shutoff point for land-based wind, etc. During these events, continuous operation of DEFRs could be required to completely replace the energy lost from intermittent sources or depleted storage devices. This capability will become more important as New York integrates larger amounts of solar and wind resources and decommissions fossil-based generation consistent with the CLCPA.

Inverter-based resources ("IBRs"), such as wind and solar, do not have the technical capability to provide the same reliability attributes as the synchronous generators that are being decommissioned. The essential characteristics or reliability services provided on today's grid, in large part by fossil-based generation, do not need to be encapsulated in a singular DEFR or technology. In the aggregate, the system needs a collection of these reliability services to be reliable. To maintain reliability, DEFRs in the aggregate must, at a minimum, also provide the reliability attributes of the retiring fossil-based generation.

The fleet of resources must collectively maintain a balance of the attributes listed below:[19]

1. **Zero-emission/carbon free** (*i.e.*, the qualification criteria for the Zero-Emissions by 2040 Target);
2. **Dependable Fuel Sources** that allow these resources to be brought online when required and to operate based on system needs;
3. **Non-Energy Limited** and capable of providing energy for multiple hours and days regardless of weather, storage, or fuel constraints;
4. **Dispatchable** to follow instructions to increase or decrease output on a minute-to-minute basis;
5. **Quick-Start** to come online within 15 minutes;
6. **Flexibility** to be dispatched through a wide operating range with a low minimum output;
7. **Fast Ramping** to increase or reduce energy injections based on changes to net load, which may be driven by changes to load or intermittent generation output;
8. **Multiple starts** so resources can be brought online or switched off multiple times through the day as required based on changes to the generation profile and load;
9. **Inertial Response** and frequency control to maintain power system stability and arrest frequency decline post-fault;
10. **Dynamic Reactive Control** to support grid voltage; and
11. **High Short Circuit Current** contribution to ensure appropriate fault detection and clearance.

This list of attributes is not exhaustive because it depends on both the electrical needs of consumers and the characteristics of the generation fleet. New reliability needs may be identified as the grid continues to evolve. Resources with the necessary attributes, discussed above, must be significant in capacity to maintain the system's balance and stability.

B. Zero-Emission Generation Resources Must Participate in the NYISO-Administered Wholesale Markets

Wholesale electricity markets in New York are designed to meet the electricity needs of consumers in the most cost-efficient and reliable manner possible, even when the factors that influence those costs, like fuel, materials, and labor, put upward pressure on prices. The NYISO uses a competitive auction structure to establish the wholesale cost of electricity supplied to the

[19] *See* CRP at pp. 52 and 75-79. *See also*, NYISO's August 16, 2023 Comments in this proceeding, Case 15-E-0302, at pp. 7-11.

grid and to provide transparent signals to suppliers, consumers, developers, and policymakers of system needs. The NYISO-administered competitive wholesale electricity markets directly benefit customers by procuring electricity services to maintain grid reliability at least production cost.

Competitive wholesale electricity markets are an efficient and necessary element of achieving New York State's resource development and environmental goals. The wholesale electricity markets that the NYISO administers minimize total energy production costs to provide low-cost electricity to all New Yorkers based on the electricity suppliers that are available to reliably meet demand. These markets drive economic efficiency by selecting the least-cost mix of resources to meet consumer demand. Working effectively with state clean energy and environmental policies, wholesale electricity markets have led to a more economically efficient power system and significant environmental benefits. These markets are well designed to encourage the investment in new clean energy technologies that is essential to achieving clean energy objectives while maintaining grid reliability and economic efficiency. Therefore, eligible energy suppliers should be encouraged to participate in the wholesale markets as standalone resources or, for smaller resources, as components of a distributed energy resource.

To allow the markets to minimize the cost of supply, all eligible resource technologies that can support system needs, including zero-emission resources/DEFRs, renewable resources, storage resources, as well as any resources fueled by new technologies, and demand response must be encouraged to fully participate in the NYISO-administered wholesale electricity markets.[20] Efficient wholesale markets depend on competition among suppliers and transparent

[20] Price responsive load can also engage with the wholesale market be reducing consumption during high demand, and therefore high price, periods, even if the load does not receive an actual (direct) payment for reducing load.

price signals that accurately reflect system needs and the costs of available suppliers. The price signals in the NYISO-administered markets provide the foundation for economically efficient generation, transmission, storage, and demand response investment decisions in locations where the resources are needed. Wholesale electricity markets, with consistent and robust participation, will continue to provide cost efficiencies and strong investment signals while shifting that investment risk away from the consumer.

Importantly, zero-emission resources must possess the attributes discussed above and will have to fully participate in the NYISO-administered wholesale electricity markets for the system to serve increasing demand and evolving load patterns while reaping the greatest efficiency and reliability benefits. The New York statewide grid is projected to see significant increases in electricity demand attributable to electrification policies and economic development initiatives. In addition, it is expected to become a winter-peaking system in the mid-2030s. The competitive electricity markets must be utilized, and relied on, to make clear which operating attributes are needed, where they are needed, and when they are needed to provide the electricity that consumers demand.

CONCLUSION

The NYISO appreciates the PSC's consideration of these comments and looks forward to working with the PSC, DPS Staff, and NYSERDA to protect electric system reliability for all New Yorkers throughout the transitions envisioned by the CLCPA.

Sincerely,

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