



CURRENT MARKET INITIATIVES RELEVANT TO RELIABILITY

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The guiding principle for development of market rules at the NYISO is that Markets are consistent with and reinforce Reliability rules. The following current market design activities provide opportunities for application of this principle and may be of interest to the NYSRC.

Preparing the Capacity Market for the Grid in Transition

Capacity markets exist to provide efficient incentives for attracting resources needed to satisfy the resource adequacy requirements of the system. In New York, the Installed Capacity Market has performed this role well and has provided strong signals for developers to make investment or retirement decisions while maintaining a reliable resource fleet.

As the resource mix transitions to one more dependent on resources that rely on the sun or wind to produce energy or resources with energy limitations, each resources' contribution to reliability also evolves. Historically, for each MW of installed capacity, that MW could also be depended upon to provide grid operators with dispatch control to manage transmission constraints. With intermittent and energy limited resources, this one-to-one relationship no longer exists.

The resource adequacy contribution of resources that has limited energy and/or dispatch capabilities, such as being intermittent or having limited energy/fuel storage capabilities, is also very dependent on the diversity and performance of the resource mix. For example, as more solar generation is added to the grid the peak load shift to non-daylight hours therefore making it less valuable to resource adequacy.

The NYISO believes that improving the robustness of Capacity Requirements to support Reliability, evolving the Methods for Measuring Reliability, and enhancing Capacity Accreditation Measures are key to the future success of the Installed Capacity Market as we navigate the transition of resource mix.

- **Methods for Measuring Reliability** - Improve the resource adequacy tools and models to account for the evolving critical reliability time periods, changing load shapes and load variability, new technology operation such as energy storage, and consideration of regional conditions that may inhibit shared assistance.
- **Reform Capacity Accreditation Rules** - Expand on the principles established with Expanding Capacity Eligibility and Tailored Availability Metric to all resources; and
- **Capacity Requirements support Reliability** - Improve handling of the assumptions between the IRM and LCR setting processes and consider *Valuing Transmission Security* which will explore additional requirements based on the resource mix's impact on transmission security considerations.

These improvements are part of a larger effort, the NYISO's Grid in Transition, which is a multi-faceted approach that focuses on i) aligning competitive markets and New York State clean energy objectives, ii) valuing resource and grid flexibility, and iii) improving capacity market valuation. By addressing the improvements above, the NYISO believes its Installed Capacity Market will continue to provide robust market signals that promote efficient decision making by developers in support of maintaining a reliable grid.

FERC accepted the NYISO's capacity accreditation proposal in 2022. The NYISO continues to work with stakeholders on marginal accreditation and related process changes, as well as evaluate whether additional risks, incremental to the risks already considered in the IRM setting process, to resource availability should be considered in establishing accreditation factors. The NYISO provided a capacity accreditation primer to the NYSRC in October to highlight the concepts, work done to date, additional work planned, and next steps. Stakeholders approved the updated marginal accreditation related process. The NYISO has started working with stakeholders and the NYSRC on enhancements to the representation of certain resource classes in GE MARS. In 2023, these enhancements included:

- Consideration and modeling of natural gas delivery constraints.
- Improvements to demand response modeling.
- Revisiting order of dispatch and/or deployment of resources and use of interchange/emergency assistance.
- Consideration of resources' notification and/or startup time in determining resource availability.
- Capturing of correlated non-fuel-related derates in resource capabilities from impacts such as water temperature, humidity, and air temperature.
- Consideration resource's trip risk or availability at maximum output and/or output with emergency reconfiguration; and
- Consideration of improvements to LFU modeling/treatment.

The enhancements for consideration in 2024 include:

- **Capturing of correlated non-fuel-related derates and outages in resource capabilities from impacts of peak weather conditions.**
- **Consideration of a resource's NERC reported minimum and maximum operating temperatures in Resource Adequacy and marginal reliability value assessments; and**
- **Consideration of unit size on marginal reliability value. (Updated)**

Efficient Markets for a Grid in Transition

The NYISO will assess the impacts of de-carbonization goals on the current NYISO markets from the high penetration of low carbon or carbon-free resources and consider whether market enhancements and/or new market products or changes to the existing market structure will be necessary to meet the anticipated reliability needs.

Key areas for consideration:

- a) Understanding the additional resource flexibility that will be necessary to balance the intermittent nature of weather dependent resources; and
- b) Ensuring resources are responsive to operational instructions.

The NYISO is considering a broad spectrum of market product and structural enhancements that may be necessary to incent market participants to meet the reliability needs anticipated with the Climate Leadership and Community Protection Act (CLCPA). The CLCPA includes 70% renewable generation by 2030 and carbon neutral electricity by 2040, 6,000 MWs of solar by 2025, 6,000 MWs of energy storage by 2030, 9,000 MWs of offshore wind by 2035, and 185 trillion BTU electricity reduction through energy efficiency. The NYISO has completed its simulation of potential market conditions and initiated discussions on possible reforms with stakeholders. Based upon these discussions, and input from the stakeholders, the NYISO has identified a series of initiatives to prepare for balancing intermittency and variability and managing energy limited resources. The NYISO produced a whitepaper on “Reliability and Market Considerations for a Grid in Transition,” which identifies the needs for additional resource flexibility and responsiveness to balance the output from large penetrations of weather dependent resources. The NYISO evaluated and presented system ramping and other flexibility needs of the grid to determine whether additional market products should be developed to continue to support reliable grid operations as the resource mix and electric load profiles continue to transition in support of a decarbonized economy as part of its *Balancing Intermittency* effort. A white paper on the analysis and findings was shared with the NYISO stakeholders in 2022. Discussions with stakeholders have begun focused on consideration of new ancillary service products that will support sustained ramps, studying the existing and near future regulation needs, and consideration of ancillary service pricing that continues to support reliability as the fleet transitions. (Current)

Other efforts underway in this area are included in the NYISO Project Plan.

Dynamic Reserves: The NYISO procures fixed quantities of reserves in specified regions across the state. For example, the NYCA-wide reserve requirement is based on the largest single source contingency, which today is statically defined as 1,310 MW. Operationally, the largest contingency could change based on the current commitment of generation. Additionally, the static modeling of reserves, specifically locational requirements, does not optimally account for the real-time transmission flows and available transmission capability that could be used to deliver reserves from a more cost-effective reserve region. Dynamic Reserves is a novel approach that will explore more efficient scheduling of operating reserves based on system conditions and transmission system capability. This will not only allow for appropriate reserves to be procured to cover the largest source contingency that could potentially occur under the current system conditions but will also allow for more reserves to be scheduled in cost-effective regions. The NYISO issued a report on its findings regarding the feasibility of incorporating a dynamic reserves approach into its energy market software and recommended next steps on December 14, 2021. The NYISO is working with stakeholders to evaluate capturing forecast uncertainty risks into the dynamic reserves design. NYISO finalized a Market Design Concept Proposal in 2022 and continues to work on completing the design with tariff provisions. **Stakeholder’s unanimously supported the concept at the December 2023 BIC and support NYISO’s continued efforts to test and finalize the tariff.** (Updated)

Balancing Intermittency: The NYISO procures Operating Reserves in specified regions across the state to facilitate reliability when contingencies occur. Contingency based Operating Reserves are critical to supporting reliability. The Balancing Intermittency project has further identified a need for grid balancing between the

Day-Ahead Market and the Real-Time Market. The 2023 Balancing Intermittency project (a) adjusted Regulation Requirements to align with current balancing needs (this was deployed in 2023) and (b) proposed a concept to procure additional Operating Reserves to ensure sufficient Real-Time energy is available to balance deviations in intermittent resource output and load between Day-Ahead and Real-Time (i.e., forecasting error). These reserves will be procured locationally to align with the locational nature of balancing needs (e.g., onshore wind is concentrated in Zones A-E, therefore additional reserves to manage onshore wind uncertainty will be procured in the NYCA reserve region). The 2024 project will complete the design and draft tariff, with a proposed deployment of the first phase in 2025. Additional project phases will explore whether additional ancillary service products or characteristics are also necessary to support the Grid in Transition. A comprehensive Market Design Concept proposal was discussed with stakeholders in November 2023. (Current).

Improve Duct Firing Modeling: Increased intermittent resource penetration leads to variability and uncertainty in scheduling such resources. Any enhancements to market models which improve or eliminate other uncertainties can help balance the system. This effort will evaluate market software enhancements that are required to reflect the operating characteristics of a combined cycle generator in the duct-firing range. This enhancement is intended to enable more efficient scheduling of a combined-cycle resource for both energy and operating reserves. Furthermore, this enhancement could provide additional flexibility to the RTD to make cost effective dispatch decisions by more accurately reflecting the operating characteristics of such resources. The NYISO presented a concept proposal to stakeholders that includes improved ramp modeling and the potential to limit reserve availability while the generator is operating its duct firing capabilities. In 2024 NYISO will work to finalize the software requirements for this functionality. (Updated)

Fast Start Pricing Enhancement: NYISO identified a minor enhancement to fast-start pricing rules to align Supplier's schedules in the DAM with Supplier's physical operating characteristics. This enhancement is expected to decrease the potential for infeasible energy and reserve schedules on certain fast start resources (current rules result in rare instances of Suppliers receiving infeasible schedules). NYISO discussed this enhancement at MIWG and will bring the enhancement to BIC and MC in Q1 2024 (Updated).

Demand Curve Reset

This periodic review of the ICAP Demand Curves, for use in May 2025 through August 2029, seeks to ensure that the capacity market continues to efficiently support reliability and send accurate, transparent price signals. Every four years, the NYISO, along with its stakeholder community, conducts a comprehensive review to determine the parameters used in establishing the Installed Capacity (ICAP) Demand Curves. This process is referred to as the demand curve reset (DCR). As required by the tariff, the study includes an examination of potential peaking unit technologies and the financial parameters assumed in the construction and operation of that unit, along with an estimate of the projected net revenue earned in the Energy and Ancillary Service markets, to determine unit with the "lowest fixed costs and highest variable costs among all other units' technology that are economically viable" that serves in establishing values for each of the ICAP Demand Curves. The quadrennial DCR is mandated by the NYISO's tariff. The DCR is a resource intensive process for both the NYISO and stakeholders that has a significant impact on the market as a whole. The independent consultant has begun and had a kickoff with stakeholders at the August 24, 2023 ICAPWG. Discussions with stakeholders have continued and will continue throughout 2024. (Current)

Distributed Energy Resources

To support the integration of Distributed Energy Resources (DER) into NYISO markets NYISO staff engaged Market Participants in the development of a DER Participation Model. The NYISO's model enables Aggregations of DER to receive compensation for performance in the Energy, Ancillary Services and Capacity Markets.

Key areas for consideration:

- a) Managing the volume of Resources interacting with the NYISO.
- b) Modeling DER in IRM and long-term planning studies.
- c) Evaluating the ability of limited duration Resources to satisfy resource adequacy needs;
- d) Capturing the impact of behind the meter resources in Load Forecasting and other system models.
- e) Ensuring Aggregations are responsive to operational instructions; and
- f) Establishing requirements and expectations in the NYISO wholesale markets for resources that wish to simultaneously participate in retail market programs.

The NYISO collaborated with Stakeholders to develop a DER Participation Model supporting DER integration into the wholesale markets. Stakeholders approved the market design in 2019 and FERC accepted the proposed design and accompanying tariff language in 2020. The NYISO worked with stakeholders on finalizing the implementation details for the model from 2020 to 2023, including revising NYISO manuals, user guides and training materials. The NYISO also completed the necessary software integration and deployments to support the model and is awaiting a final Order from FERC in response to an update to the model that the NYISO filed in 2023. The NYISO commenced Aggregator Market Participant registration in 2023 and is prepared to release market and operator training materials coincident with model implementation. Once the final Order from FERC is received NYISO will enable the ability for DER enrollment into Aggregations which could begin as early as February, 2024, with subsequent Aggregation market participation commencing as early as April 2024.

Consistent with the FERC approved DER market design, the NYISO filed its compliance with FERC Order 2222 on July 19, 2021. On June 17, 2022, FERC accepted the NYISO's compliance of Order 2222 subject to further revisions as directed by the Commission. The NYISO filed its updated compliance of Order 2222 on November 14, 2022, which FERC subsequently accepted on April 20, 2023, and expects to implement remaining rules pertaining to Operating Reserves eligibility for heterogenous DER Aggregations, necessary to fully comply with Order 2222, by the end of 2026.(Updated)

Hybrid Storage Resources

Interest in opportunities for hybrid resources to participate in wholesale markets is growing. The NYISO has engaged stakeholders on market rules to support hybrid storage integration and has developed two options, referred to as, the Hybrid Co-located Model (CSR) and the Hybrid Aggregated Storage Resource Model (HSR).

Key areas for consideration:

- a. Evaluating the ability of Hybrid Resources to satisfy resource adequacy needs.
- b. Modeling Hybrid resources in IRM and long-term planning studies.

- c. Understanding the resource flexibility contribution of Hybrid Resources.
- d. Consideration of Hybrid Resources capabilities to meet operating reserve requirements; and
- e. Ensuring resources are responsive to operational instructions.

The CSR Model currently allows an Energy Storage Resource (ESR) and a Wind or Solar Intermittent Power Resource (IPR) behind the same point of interconnection to participate in the wholesale market as an individual ESR and IPR while respecting any point of interconnection injection or withdrawal limitation. Newly proposed updates to the model in 2022 will also allow a landfill gas IPR or a limited control run-of-river hydro resource (LCRoR) to co-locate with an ESR as a CSR. The HSR Model will allow an ESR to aggregate with IPRs and/or LCRoR resources behind the same point of interconnection to participate in the wholesale market as a single dispatchable resource. The market design for the CSR Model was approved by stakeholders and filed with the FERC on January 28, 2021. FERC approved the CSR Model on March 30, 2021 and was implemented in December 2021. Stakeholders approved the market design for the HSR model and the accompanying 2022 proposed updates to the CSR model in December 2022. The NYISO is currently working with stakeholders to make additional updates that will allow other Generator types such as steam units to co-locate with an ESR and participate as a CSR. The NYISO plans to file the associated tariff revisions for the HSR model and the CSR model updates in 2024. Implementation of the CSR model updates is expected by the end of 2024 and the HSR model by the end of 2025. (Updated)

Internal Controllable Lines

Currently, there are no internal controllable lines in operation within the NYCA. However, state and local initiatives such as New York City Local Law 97 and Tier 4 REC procurements provide incentives for developers to deliver renewable generation to constrained areas using high voltage direct current (HVDC) lines. On September 20, 2021, Governor Hochul announced selection of two new HVDC lines delivering clean energy into NYC. Clean Path NY (CPNY), a 1300MW HVDC line that will connect Frasier Substation in upstate NY to Rainey Substation in NYC, and Champlain Hudson Power Express (CHPE), a 1250MW HVDC line that will create a new interconnection from Quebec to Astoria Energy Center in Queens, NY.

This effort is intended to facilitate the scheduling and pricing of internal controllable lines, such as CPNY, within the wholesale energy market while supporting the state and local programs. The NYISO has completed concept discussions and is working through more detailed market design and tariff discussions with its stakeholders. NYISO stakeholders voted to approve the Market Design in November 2023. In 2024 NYISO will work to finalize the software requirements for this functionality. (Updated)

2024 Project Prioritization

Annually, the NYISO in collaboration with its market participants develop and prioritize the project work that will be undertaken for the following year. This process generally starts in late winter and ends with the approval of the budget by the NYISO Board of Directors in November. To date, the NYISO has developed a full list of projects, ranked them for stakeholder consideration, and stakeholders have also scored these projects. The NYISO cannot feasibly take on every project, so this process is designed to take in all feedback before developing a proposed project list. Once the list is proposed, additional discussions with stakeholders will take

place to gather any additional feedback before finalizing the project list that is used in developing the 2024 NYISO budget. The NYISO provided a proposed project budget for 2024 on August 9, 2023, and a final project budget proposal at the August 30, 2023 Budget and Priorities Working Group. **The NYISO Board of Directors approved the 2024 project list. (Updated)**