



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 on May 10, 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 changes in December 2022. The NYISO has started working with stakeholders and the NYSRC on enhancements to the representation of certain resource classes in GE MARS. These enhancements for 2023 include:

- 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. (Current)

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 continues to evaluate 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 *2023 Balancing Intermittency* effort. The NYISO has presented its findings from its ramping analysis to stakeholders and continues to analyze the flexibility needs of the future power system. A white paper on the analysis and findings was shared with the NYISO stakeholders in December 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 December 2022 and continues to work on completing the design with tariff provisions in 2023. (Current)

Constraint Specific Transmission Shortage Pricing: Currently, the NYISO’s software accounts for the energy that can flow from one location to the next on the bulk electric system by accounting for transmission facility and line limits. The current transmission pricing logic relaxes certain transmission constraints assigned a zero value constraint reliability margin (CRM) without using a graduated pricing

mechanism to resolve it. A 2018 study concluded that enhancements to the current transmission constraint pricing logic would be beneficial. Constraint Specific Transmission Shortage Pricing aims to develop a new pricing construct, under which transmission demand curve prices will increase with the severity of transmission overloads including extension of a graduated pricing mechanism to internal facilities that are currently assigned a zero value CRM. Additionally, it would enable the new graduated transmission demand curves (GTDC) to provide relief for flows on each facility in a quantity that matches the associated CRM. This would result in fewer occurrences of constraint relaxation and increased use of a graduated transmission demand curve mechanism to establish pricing values for shortages that exceed applicable CRM values. This project seeks to ensure that the cost of meeting transmission constraints is better reflected in locational prices. Improved pricing outcomes can assist to incentivize investment in resources and transmission in locations which would benefit the system. The NYISO finalized its proposal with stakeholders and completed its development of requirements to support implementation of the design. Implementation is expected in the second half of 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. (Current)

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. **(new)**

Distributed Energy Resources

To ensure NYISO markets are capable of integrating Distributed Energy Resources (DERs) in greater numbers and to provide clarity as to how they can realize value for their services, NYISO staff has engaged Market Participants in the development of a DER program.

Key areas for consideration:

- a) Managing the volume of resources interacting with the NYISO;
- b) Modeling distributed resources in IRM and long-term planning studies;
- c) Evaluating limited duration resources ability to satisfy resource adequacy needs;
- d) Capturing the impact of behind the meter resources in Load Forecasting and other system models;
- e) Ensuring resources 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 and stakeholders developed a DER Participation Model to support resource integration into the wholesale markets. Stakeholders approved the market design in 2019 and FERC accepted the proposal in January 2020. The NYISO expected to implement the DER participation model by the end of 2022 but continues to work with all stakeholders on finalizing its implementation details for the planning DER implementation which is expected in mid-2023. **The NYISO has commenced DER Aggregation registration and is on track with market and operator training.** DER enrollment into DER Aggregations is planned to begin summer 2023 with DER Aggregation market participation beginning as early as Fall 2023.

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 subject to an additional filing and** expects to implement any remaining rules 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 is engaging stakeholders on market rules to support hybrid storage integration, and has developed two options, referred to as the Hybrid Co-located Model and the Hybrid Aggregation Model.

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 Hybrid Co-located Model will allow energy storage resources (ESRs) and intermittent renewable power resources (IPRs) behind the same point of interconnection participate in the wholesale market as an individual ESR and IPR while respecting any point of interconnection injection or withdrawal limitation. The Hybrid Aggregation Model will focus on a model where the ESR is aggregated with other resources behind the same point of interconnection where the resources will participate in the wholesale market as a single generic dispatchable resource. The market design for the Hybrid Co-located Model was approved by stakeholders and filed with the FERC on January 28, 2021. FERC approved the Hybrid Co-located Model on March 30, 2021. Implementation of the Hybrid Co-located Model is planned for mid-December 2021. The NYISO has begun discussions with its stakeholders on the Hybrid Aggregation Model design which will continue throughout 2022. The NYISO has requested clarification from NPCC on the treatment of energy production of a resource when reserves from that same resource is converted to energy. Today, the NYISO believes the energy from the converted reserves should be considered as incremental to the base energy already being provided, however, the NYISO understands that may not be the same treatment across the US. The NYISO presented a proposed set of use cases for hybrid resource on May 11, 2022 which covers hybrid resources consisting of storage and intermittent resources, storage and limited control run of river resources, and storage and combustion turbines. Stakeholders approved the full market design for these specific hybrid resource use cases in December 2022. Implementation of the rules is expected by the end of 2025. (Current)

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 has begun more detailed market design discussions with its stakeholders. (Current)