

Reliability and Market Considerations for a Grid in Transition

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February 4, 2020

Agenda

- Background
- A Grid in Transition: Energy Market Enhancements
- Next Steps: Ongoing Energy Market Enhancements

Topic	Working Group Date	Stakeholder Notification Deadline	Materials Due for Internal Review	Materials Posted
Energy Market Enhancements	2/4/2020	1/21/2020	1/27/2020	1/30/2020
Capacity Market Enhancements	3/6/2020	2/21/2020	2/27/2020	3/3/2020
Reliability and Market Considerations	3/26/2020	3/12/2020	3/18/2020	3/23/2020
Interregional Coordination	5/11/2020	4/27/2020	5/1/2020	5/6/2020
Future of Fossil Generation, Implications of a Carbon Neutral Grid	June 2020	TBD	TBD	TBD

Background

A Grid in Transition

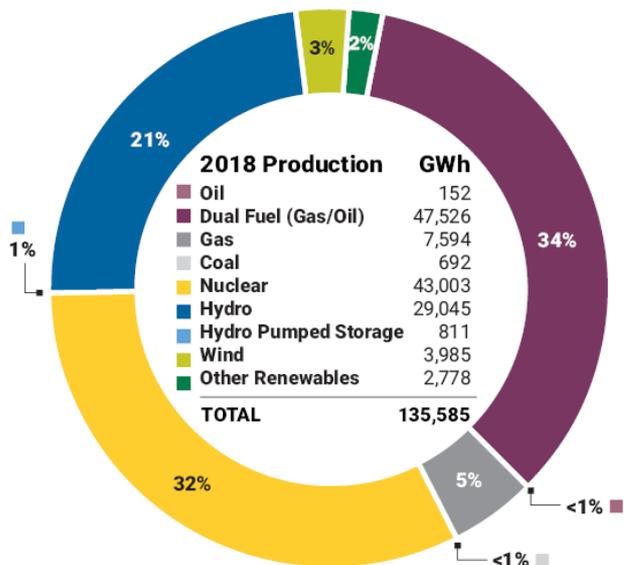
- The NYISO's competitive wholesale markets provide a framework for a changing grid
- The NYISO's Grid in Transition Report:
 - Describes emerging reliability and economic challenges facing New York's electricity sector
 - Identifies gaps to address
 - Proposes a path forward



The Reliability and Market Considerations for a Grid in Transition report was published on December 20, 2019, and can be viewed here: <https://www.nyiso.com/documents/20142/2224547/Reliability-and-Market-Considerations-for-a-Grid-in-Transition-20191220%20Final.pdf/61a69b2e-0ca3-f18c-cc39-88a793469d50>

A Grid in Transition - Clean Energy Goals

- New York's clean energy goals are reshaping the grid.



Climate Leadership and Community Protection Act (CLCPA) by the numbers



Renewables
**70%
by 2030**



Offshore Wind
**9,000 MW
by 2035**



Energy Efficiency
**185 trillion BTU reduction
by 2025 vs. forecast**

Electric Sector
GHG Reduction
**100%
by 2040**



Solar Energy
**6,000 MW
by 2025**



Battery Storage
**3,000 MW
by 2030**

A Grid in Transition - Reliability Considerations

- New York's decarbonization policies are creating new challenges to meet NYISO's mission to support a reliable and economically efficient electric system.

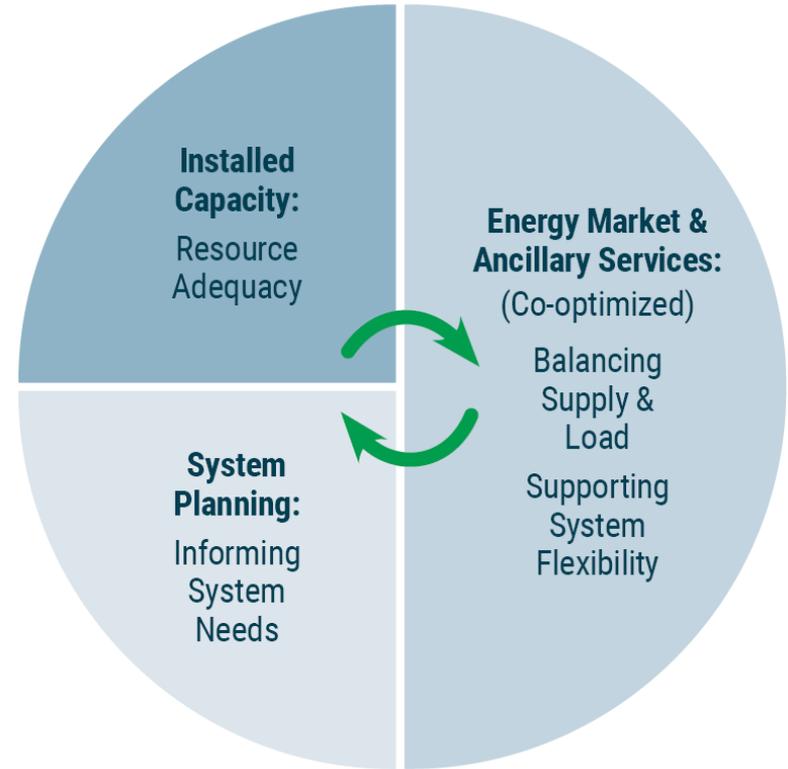


Reliability Challenges

- Balance Supply & Demand
- Maintain Ten-Minute Operating Reserves
- Maintain Total Thirty-Minute Operating Reserves
- Manage Daily Energy Needs
- Secure Transmission Operations with Congestion Management
- Coordinate System Restoration and Black Start
- Manage Voltage Support
- Maintain Frequency Response
- Maintain Resource Adequacy
- Coordinate Supply Outages

A Grid in Transition - Role of Markets

- **The NYISO supports reliability through three complementary markets for energy, ancillary services, and capacity.**
 - Each addresses distinct reliability needs through competitive market pricing that benefits New York consumers while reducing costs.
 - Together, energy, ancillary services, and capacity market revenues provide economic signals for new investment, retirement decisions, and participation by demand response providers.



A Grid in Transition – Path Forward

- **The NYISO’s wholesale markets can serve as an effective platform for achieving New York State environmental objectives.**
 - Through active engagement with stakeholders and policymakers, the NYISO is developing design improvements to meet the future challenges expected to arise with high levels of intermittent renewable and distributed energy resources.
- **The plan includes a set of market design enhancements that work together coherently and efficiently to satisfy New York’s changing grid reliability needs.**
 - Nine areas of market design opportunities across three main points of focus (discussed on the next slide) require immediate attention and are recommended for implementation in the next five years, through 2024.



A Grid in Transition – The Plan

- Carbon Pricing
- Comprehensive Mitigation Review
- DER Participation Model
- Energy Storage Participation Model

Aligning Competitive Markets and New York State Clean Energy Objectives



- Enhancing Energy & Shortage Pricing
 - Ancillary Services Shortage Pricing
 - Constraint Specific Transmission Shortage Pricing
 - Enhanced Fast Start Pricing
- Review Energy & Ancillary Services Product Design
 - More Granular Operating Reserves
 - Reserve Enhancements for Constrained Areas
 - Reserves for Resource Flexibility

Valuing Resource & Grid Flexibility



- Enhancements to Resource Adequacy Models
- Revise Resource Capacity Ratings to Reflect Reliability Contribution
 - Expanding Capacity Eligibility
 - Tailored Availability Metric
- Capacity Demand Curve Adjustments

Improving Capacity Market Valuation



Background: Grid in Transition Discussion

- **Based on stakeholder feedback, the NYISO is proposing the following discussion topics:**
 - *Today:* Energy Market Enhancements
 - Capacity Market Enhancements
 - Reliability and Market Considerations
 - Interregional Coordination
 - Future of Fossil Generation
 - Implications of a Carbon Neutral Grid
- **The format of these discussions is as follows:**
 - A discussion is scheduled approximately once a month during ICAPWG/MIWG
 - The NYISO will kickoff the discussion of the specific topic
 - Stakeholders will then have the opportunity to present
- **Stakeholders are asked to notify the NYISO 10 business days prior to the working group date if they would like to present along with a brief outline of the key topics they wish to discuss**
 - Stakeholders are asked to submit materials for NYISO review 6 business days prior to the working group meeting
 - Materials will be posted 3 business days prior to the working group meeting, consistent with existing procedures

Energy Market Enhancements

Role of Markets: Energy Markets

- NYISO's market design is structured to allow resources to compete to provide reliability services while maintaining revenue adequacy for needed resources
- The energy and ancillary services markets provide the primary incentive for units to perform in real time and respond to rapidly changing system conditions
- The identified energy market enhancements outlined in the Grid in Transition report will provide appropriate price signals to integrate new technologies and enable New York State's policy objectives

Role of Markets: Energy Markets

- **To integrate new technologies that will enable New York State’s policy objectives, it is important to incent the necessary attributes to support a system compromised of a large percentage of intermittent resources**
 - Energy and ancillary services products and market pricing should be reflective of system conditions and operational needs
 - These attributes include quick start, cycling, fast ramping, and load following capabilities
- **The NYISO has several energy and ancillary services market efforts currently being pursued with support of its stakeholders, as well as several efforts which are being considered by NYISO and its stakeholders to study and prioritize in coming years**

Ongoing Energy Markets Efforts

■ Carbon Pricing

- The implementation of carbon pricing will be the most effective means to directly reflect and align the public policy goals with respect to evolving a zero carbon future into the markets
- NYISO continues to recommend internalizing the societal cost of carbon dioxide emissions via a \$/ton charge to participants in the energy and ancillary services markets

■ Enhanced Shortage Pricing

- Shortage pricing for energy and ancillary services is important to provide incentives for generating units to respond to real-time needs and to signal investment, by sending the appropriate signals when supply is short and unable to meet the reliability needs of the system
 - Real-time shortage pricing reflects varied and dynamic operational needs of the grid
- NYISO recommends enhancing energy and shortage pricing such that prices are consistent with grid reliability needs and risks as supply conditions tighten and with smoother demand curves.
- Ongoing efforts include: Ancillary Services Shortage Pricing, Constraint Specific Transmission Shortage Pricing, Enhanced Fast Start Pricing

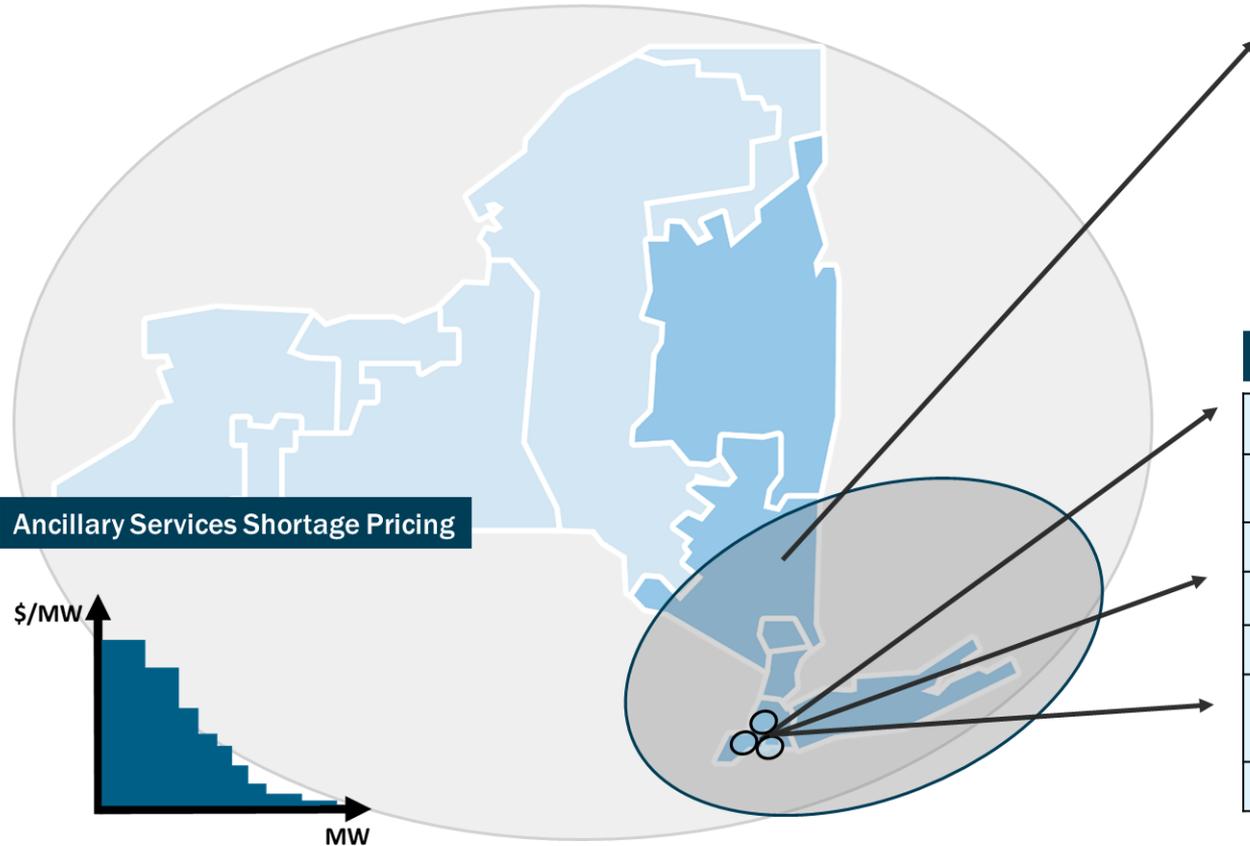
Ongoing Energy Market Efforts

- **Energy and Ancillary Services product designs**
 - NYISO recommends further analysis to evaluate whether today's ancillary services products will continue to support reliable operations and investment signals as the system evolves
 - As part of these efforts, NYISO will evaluate the need for new products and the potential for increasing current ancillary service requirements that would have the effect of providing incentives for more flexible reserves to be retained or attracted as a new entry
 - Ongoing efforts include: More Granular Operating Reserves, Reserve Enhancements for Constrained Areas, Reserves for Resource Flexibility

Ongoing Operating Reserves Efforts

- In 2020, NYISO will be continuing its efforts on three projects related to its Operating Reserves products
- **More Granular Operating Reserves**
 - Establish new reserve requirements to continue to support *locational needs in NYC load pockets* and signal that resources are necessary in these critical locations
- **Reserves for Resource Flexibility**
 - Increase existing reserve requirements to *support reliable UPNY/SENY transmission flows* and account for operational risk due to forecast uncertainty
- **Ancillary Services Shortage Pricing**
 - Update the operating reserve demand curves that enable energy and *ancillary service prices* to support reliable grid operations as more and more intermittent renewable resources are added to the grid

Ongoing Operating Reserves Efforts



Reserves for Resource Flexibility		
SENY (Zone G - K)		
Reserve Product	Quantity of Reserves (MW)	Demand Curve Value (\$/MWh)
30 Min Reserve	1300 MWs	\$500/MWh
	500 MWs	\$25/MWh

More Granular Operating Reserves		
Greenwood/Staten Island Load Pocket		
Reserve Product	Quantity of Reserves (MW)	Demand Curve Value (\$/MWh)
30 Min Reserve	250 MW	\$25/MWh
Astoria East Load Pocket		
30 Min Reserve	325 MW	\$25/MWh
Astoria West Queensbridge/ Vernon Load Pocket		
30 Min Reserve	225 MW	\$25/MWh

Potential Future Energy Markets Efforts

- **The following efforts are fairly well defined bodies of work that are being considered by NYISO and its stakeholders to study and potentially prioritize in the coming years:**
 - Evaluate forecasting approaches as intermittent wind and solar resources, electrification, and more dynamic load resources will make operational forecasting more challenging
 - Improved intertie scheduling for enhancing real-time system flexibility
 - Reevaluate fuel and energy security needs periodically going forward

Potential Future Energy Markets Efforts

- **The following efforts will require further investigation, discussion, and consideration before reaching a well defined scope:**
 - Engaging the demand side to balance intermittent supply and provide ancillary services
 - Evaluate changes to the energy market construct to improve incentives to encourage resource flexibility throughout the real-time scheduling horizon
 - Changes to the settlements of the energy and ancillary services markets to reflect impact of changing system conditions in real time
 - Changes to the time horizon or time intervals of the Day-Ahead and/or Real-Time Markets due to variability in the load shape from intermittent and renewable resources
- **More information, such as brief descriptions of this potential efforts, can be found starting on page 47 of the Grid in Transition Report**

Next Steps: Ongoing Energy Market Enhancements

Next Steps: Stakeholder Engagement

- **Ancillary Services Shortage Pricing**
 - Q1 2020: Discuss Market Design Concept Proposal
 - Q2 2020: Present Market Design Complete, seek stakeholder approval of proposed enhancements
- **Constraint Specific Transmission Shortage Pricing**
 - 2020/2021: Continue stakeholder discussions on proposed enhancements, complete consumer impact analysis
- **Enhanced Fast Start Pricing**
 - 2020: Present updates to manuals, guides, and training material
- **More Granular Operating Reserves**
 - 2020: Continue stakeholder discussions on proposed load pocket reserves and metrics on reserve audits and reserve pickup events, complete consumer impact analysis
- **Reserves for Resource Flexibility**
 - Q1 2020: Continue market design discussions, discuss consumer impact methodology
 - Q2 2020: Present Market Design Complete and consumer impact analysis, seek stakeholder approval of proposed enhancements

Questions?

Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

