

Reliability and Market Considerations for a Grid in Transition:

Reliability Gap Assessment Potential Market Design Improvements

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Agenda

- **Background**
- **Reliability Gap Assessment**
- **Concepts for Addressing Potential Reliability Gaps:
Ancillary Services**
- **Next Steps**

Background

A Grid in Transition

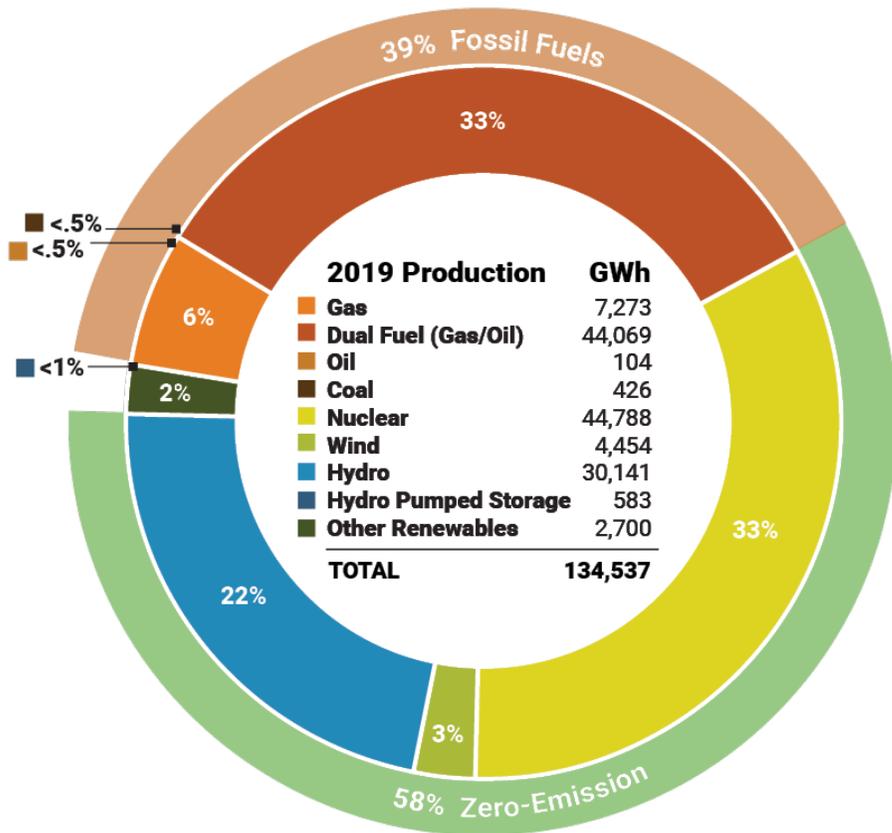
- The NYISO's competitive wholesale markets provide a framework for a changing grid
- The NYISO's Grid in Transition Report:
 - Describes emerging reliability and economic challenges facing New York's electricity sector
 - Identifies gaps to address
 - Proposes a path forward



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) Goals



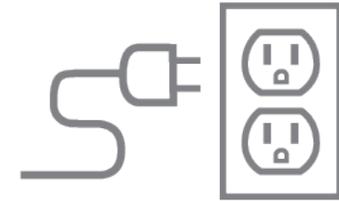
Renewables

**70%
by 2030**



Offshore Wind

**9,000 MW
by 2035**



Energy Efficiency

**185 trillion British Thermal
Units (BTU) reduction by 2025**

Zero-Emission
Electric Sector
by 2040



Distributed 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.

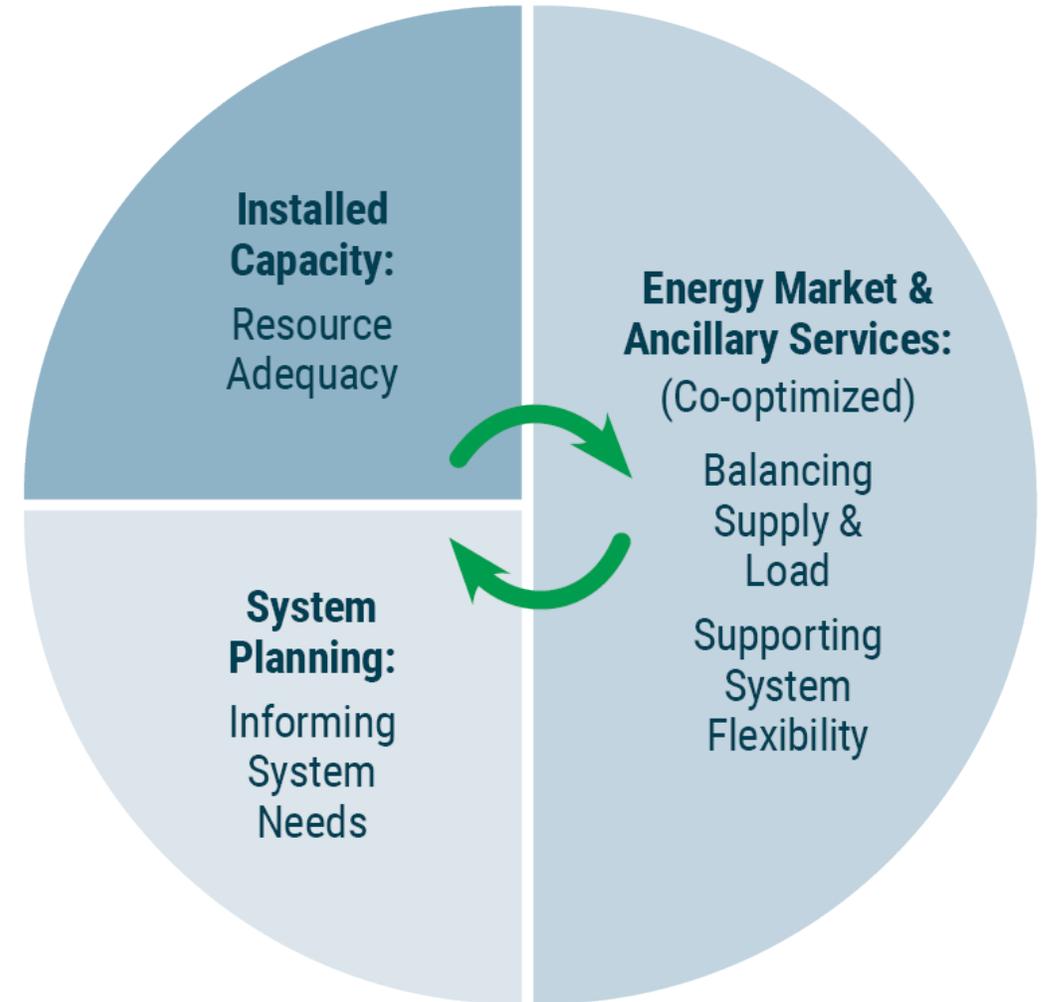


Reliability Challenges

- 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



Reliability Gap Assessment

Reliability Gap Assessment

- **The Reliability and Market Considerations for a Grid in Transition (Grid in Transition) white paper* includes a Reliability Gap Assessment (The full assessment is in Appendix B and a high level discussion is available starting on page 20)**
- **The NYISO presented the high-level market design improvements recommended in the Reliability Gap Assessment at the April 14 ICAP/MIWG and also reviewed recommendations related to NYISO's Operations processes at the June 10 ICAP/MIWG**
- **Today's presentation is the first of several more in-depth discussions on the market design improvement recommendations.**
 - The goal is to get feedback on the recommendations from stakeholders and move towards incorporating the market design improvements into the Master Plan for 2022 and beyond.
 - Key questions for stakeholders are
 - Is there anything missing in the Gap Assessment?
 - What should be the immediate focus and what should be done later?

* <https://www.nyiso.com/documents/20142/9869531/Reliability%20and%20Market%20Considerations%20for%20a%20Grid%20in%20Transition%20-%2020191220%20Final.pdf/7846db9c-9113-a85c-8abf-1a0ffe971967>

A Grid in Transition - Reliability Considerations

- **The Grid in Transition Report identified the following areas of future reliability gaps:**

- 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

Reliability Gap Assessment: Market Design Improvements

- **In April, we reviewed the high-level, potential market design concepts for existing and future components of NYISO's wholesale energy markets:**
 - Ancillary service products:
 - Regulation and frequency response
 - Operating reserves
 - Energy market mechanics:
 - Improvements to RTM and DAM
 - Improvements to RT load forecasting
 - Interchange/transactions
- **These suggestions each address one or more of the reliability gaps and we provided the following table to help map identified gaps and market design concepts.**

Ancillary Services Improvements

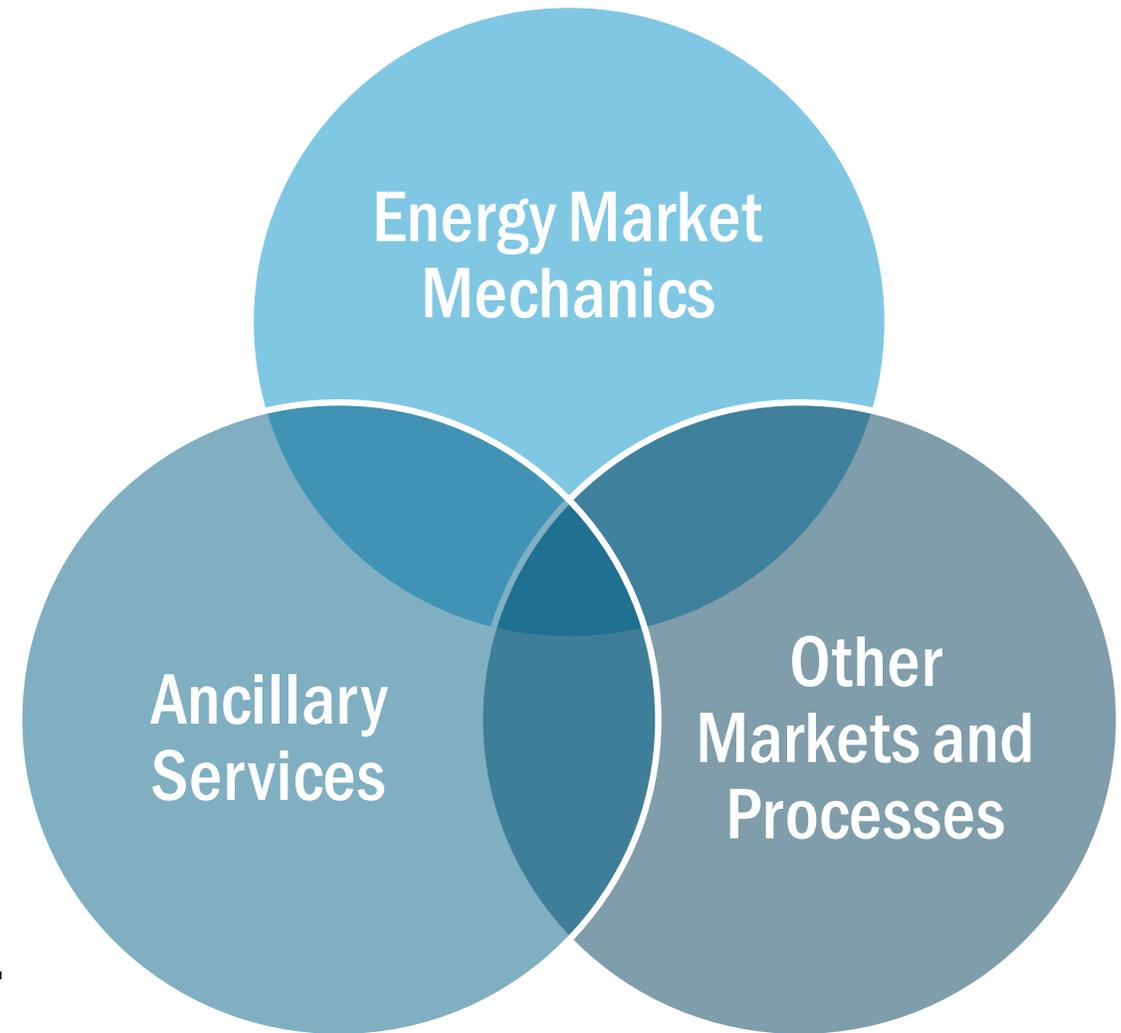
Identified Gap	Ancillary Services Products					
	Regulation and Frequency Response			Operating Reserves		
	Increasing statewide regulation procurement requirements	Investigate benefits of separate regulation “up” and “down” service	Investigate the potential for new resource types to supply frequency response capability	Increasing statewide 10- and/or 30-minute operating reserve requirements	Increasing locational ten and/or thirty-minute operating reserve requirements	Evaluate the sustainability of 10-minute and 30-minute reserves
Maintain Ability to Balance Load and Generation	X	X		X		
Maintain Ten-Minute Operating Reserves				x		X
Maintain Total Thirty-Minute Operating Reserves				x		x
Maintain Ability to Meet Daily Energy Requirements				x		
Maintain Reliable Transmission Operations				x	x	
Maintain Frequency Response Capability			x			

Energy Market Mechanics Improvements

Identified Gap	Energy Market Mechanics				
	Investigating the need for ramping requirements in NYISO markets (including locational requirements)	Developing new capability for operator management of Energy Storage Resources	Improving the NYISO's Real-Time Energy Market Dispatch	Accounting for increased real-time load forecast uncertainty	Promoting more frequent interchange scheduling with neighboring regions
Maintain Ability to Balance Load and Generation	X		X	X	X
Maintain Ten-Minute Operating Reserves				X	X
Maintain Total Thirty-Minute Operating Reserves				X	X
Maintain Ability to Meet Daily Energy Requirements		X		x	
Maintain Reliable Transmission Operations	X			x	

Three main areas

- In addition to the two areas covered by the last presentation there are also recommendations on the capacity market and on resource adequacy and planning
- Within each area there are recommended enhancements and recommended metrics to track.
- Today's discussion is focused on Ancillary Services enhancements and market changes
- Future presentations will focus on other possible market design improvements



Schedule and what comes next

- **The expected schedule for the next two discussions is:**
 - Energy Market Mechanics enhancements and market changes:
ICAP/MIWG Tuesday July 7
 - This includes the items related to DAM, RTC, and RTD
 - Other Markets and Processes enhancements and market changes:
ICAP/MIWG Thursday July 23
 - This includes such items as Resource Adequacy and Planning, Reactive Supplier Requirement, and Voltage Support Requirements
- **After that we will be looking at tracking, metrics and developing a plan for moving forward.**

Concepts for Addressing Potential Reliability Gaps: Ancillary Services

Operating Reserves Improvements

■ Identified reliability gaps

- Maintain Ability to Balance Load and Generation
- Maintain Ten-Minute Operating Reserves
- Maintain Total Thirty-Minute Operating Reserves
- Maintain Ability to Meet Daily Energy Requirements
- Maintain Reliable Transmission Operations

Operating Reserves Improvements (Cont.)

- **Potential Market Design improvements**
 - Increasing statewide 10- and/or 30-minute operating reserve requirements

Operating Reserves Improvements (Cont.)

- **Potential Market Design improvements**
 - Increasing statewide 10- and/or 30-minute operating reserve requirements
 - Increasing locational thirty-minute total operating reserve requirements

Operating Reserves Improvements (Cont.)

■ Potential Market Design improvements

- Increasing statewide 10- and/or 30-minute operating reserve requirements
- Increasing locational thirty-minute total operating reserve requirements
- Evaluate the sustainability of 10-minute and 30-minute reserves

Operating Reserves Improvements (Cont.)

■ Potential Market Design improvements

- Increasing statewide 10- and/or 30-minute operating reserve requirements
- Increasing locational thirty-minute total operating reserve requirements
- Evaluate the sustainability of 10-minute and 30-minute reserves
- **Consider more sloped/continuous demand curves**

Operating Reserves Improvements (Cont.)

■ Potential Market Design improvements

- Increasing statewide 10- and/or 30-minute operating reserve requirements
- Increasing locational thirty-minute total operating reserve requirements
- Evaluate the sustainability of 10-minute and 30-minute reserves
- Consider more sloped/continuous demand curves
- **Expand provider eligibility**

Operating Reserves Improvements (Cont.)

■ Potential Market Design improvements

- Increasing statewide 10- and/or 30-minute operating reserve requirements
- Increasing locational thirty-minute total operating reserve requirements
- Evaluate the sustainability of 10-minute and 30-minute reserves
- Consider more sloped/continuous demand curves
- Expand provider eligibility
- **Replacement of reserves**

Operating Reserves Improvements (Cont.)

■ Potential Market Design improvements

- Increasing statewide 10- and/or 30-minute operating reserve requirements
- Increasing locational thirty-minute total operating reserve requirements
- Evaluate the sustainability of 10-minute and 30-minute reserves
- Consider more sloped/continuous demand curves
- Expand provider eligibility
- Replacement of reserves
- **Dynamic reserve modeling**

Operating Reserves Improvements (Cont.)

■ Potential Market Design improvements

- Increasing statewide 10- and/or 30-minute operating reserve requirements
- Increasing locational thirty-minute total operating reserve requirements
- Evaluate the sustainability of 10-minute and 30-minute reserves
- Consider more sloped/continuous demand curves
- Expand provider eligibility
- Replacement of reserves
- Dynamic reserve modeling
- **Enhanced reserve pricing**

Operating Reserves Improvements (Cont.)

- **Are there additional potential improvements that we should consider?**
- **Current and proposed market design efforts**
 - Ancillary Services Shortage Pricing, Reserves for Resource Flexibility, More Granular Operating Reserves, Reserve Enhancements for Constrained Areas (proposed project)
- **What should be the next focus and what should be done later?**

Regulation and Frequency Response Improvements

- **Identified reliability gaps**
 - Maintain Ability to Balance Load and Generation
 - Maintain Frequency Response Capabilities

Regulation and Frequency Response Improvements (Cont.)

- **Potential Market Design improvements**
 - Increasing statewide regulation procurement requirements

Regulation and Frequency Response Improvements (Cont.)

- **Potential Market Design improvements**
 - Increasing statewide regulation procurement requirements
 - Investigate benefits of separate “up” and “down” service

Regulation and Frequency Response Improvements (Cont.)

- **Potential Market Design improvements**
 - Increasing statewide regulation procurement requirements
 - Investigate benefits of separate “up” and “down” service
 - Investigate the ability to use regulation to meet sustained imbalances up or down without large ACE imbalances

Regulation and Frequency Response Improvements (Cont.)

- **Potential Market Design improvements**
 - Increasing statewide regulation procurement requirements
 - Investigate benefits of separate “up” and “down” service
 - Investigate the ability to use regulation to meet sustained imbalances up or down without large ACE imbalances
 - Requirements for providing regulation

Regulation and Frequency Response Improvements (Cont.)

■ Potential Market Design improvements

- Increasing statewide regulation procurement requirements
- Investigate benefits of separate “up” and “down” service
- Investigate the ability to use regulation to meet sustained imbalances up or down without large ACE imbalances
- Requirements for providing regulation
- Investigate the potential for new resource types to supply frequency response capability

Regulation and Frequency Response Improvements (Cont.)

- Are there additional potential improvements that we should consider?
- What should be the nearer-term focus and what should be done later?

Next Steps

Next Steps:

- **We encourage stakeholders to provide comments on the Market Design Improvements identified in the Reliability Gap Assessment as well as on any additional potential improvements that should be considered.**
- **The next topic for discussion will be the Energy Market Mechanics improvements identified in the Reliability Gap Assessment (scheduled for the July 7 ICAP/MIWG)**

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

