

Reliability and Market Considerations for a Grid in Transition

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Agenda

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

Background

A Grid in Transition

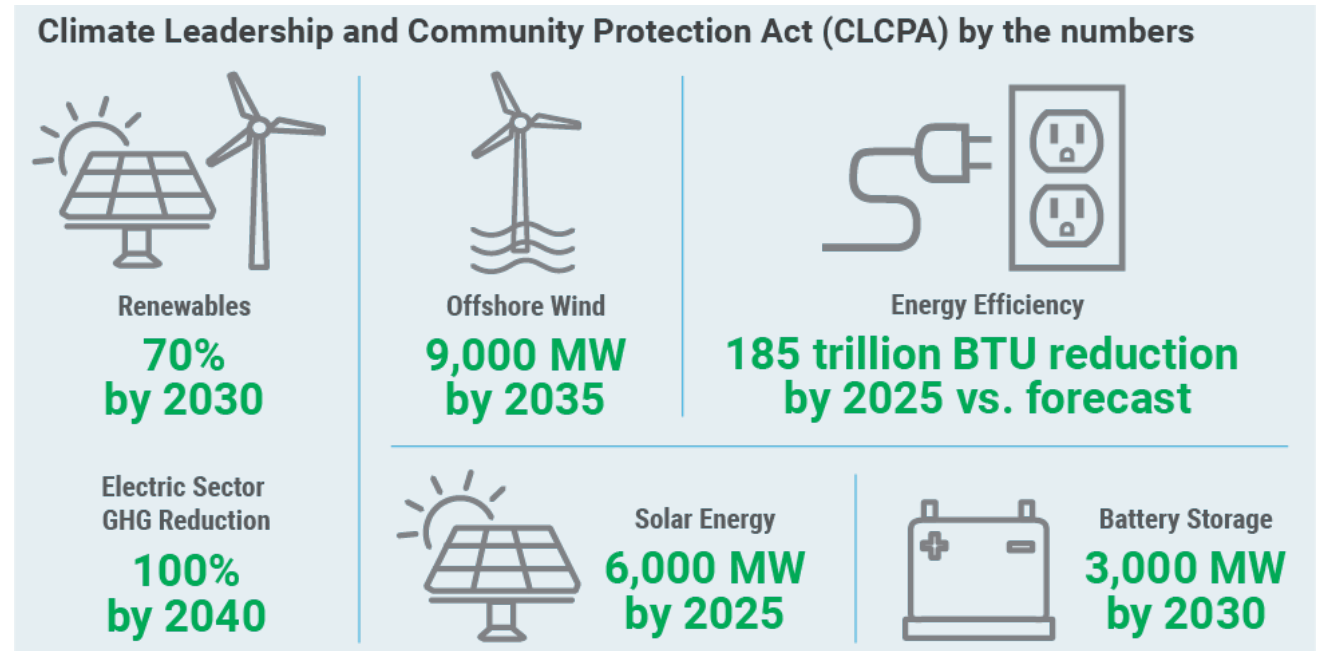
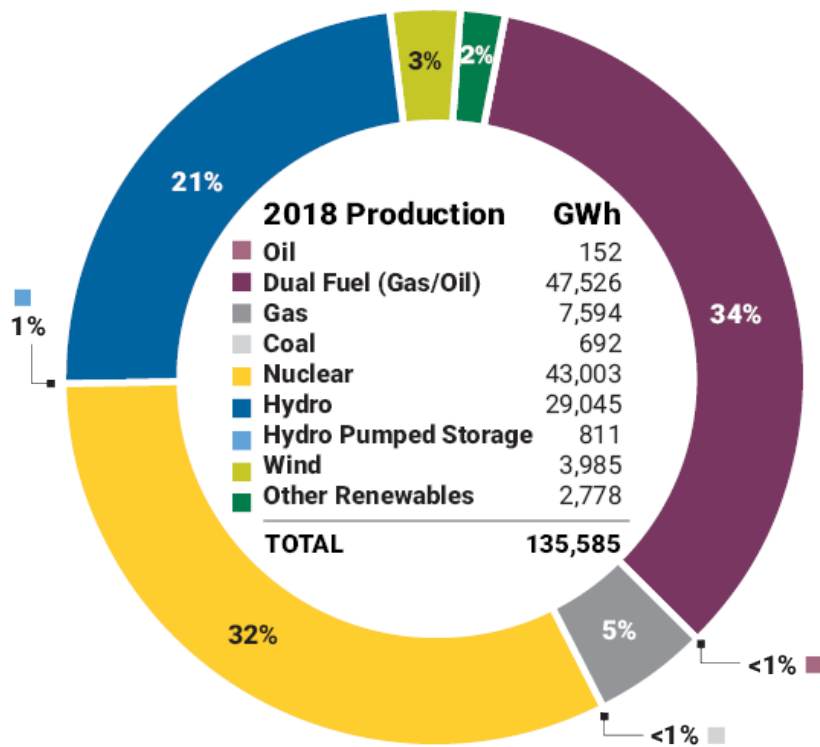
- The NYISO's competitive wholesale markets provide a framework for a changing grid
- The NYISO's Grid in Transition Report:
 - Describes emerging reliability and economic challenges facing New York's electricity sector
 - Identifies gaps to address
 - Proposes a path forward



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.



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.

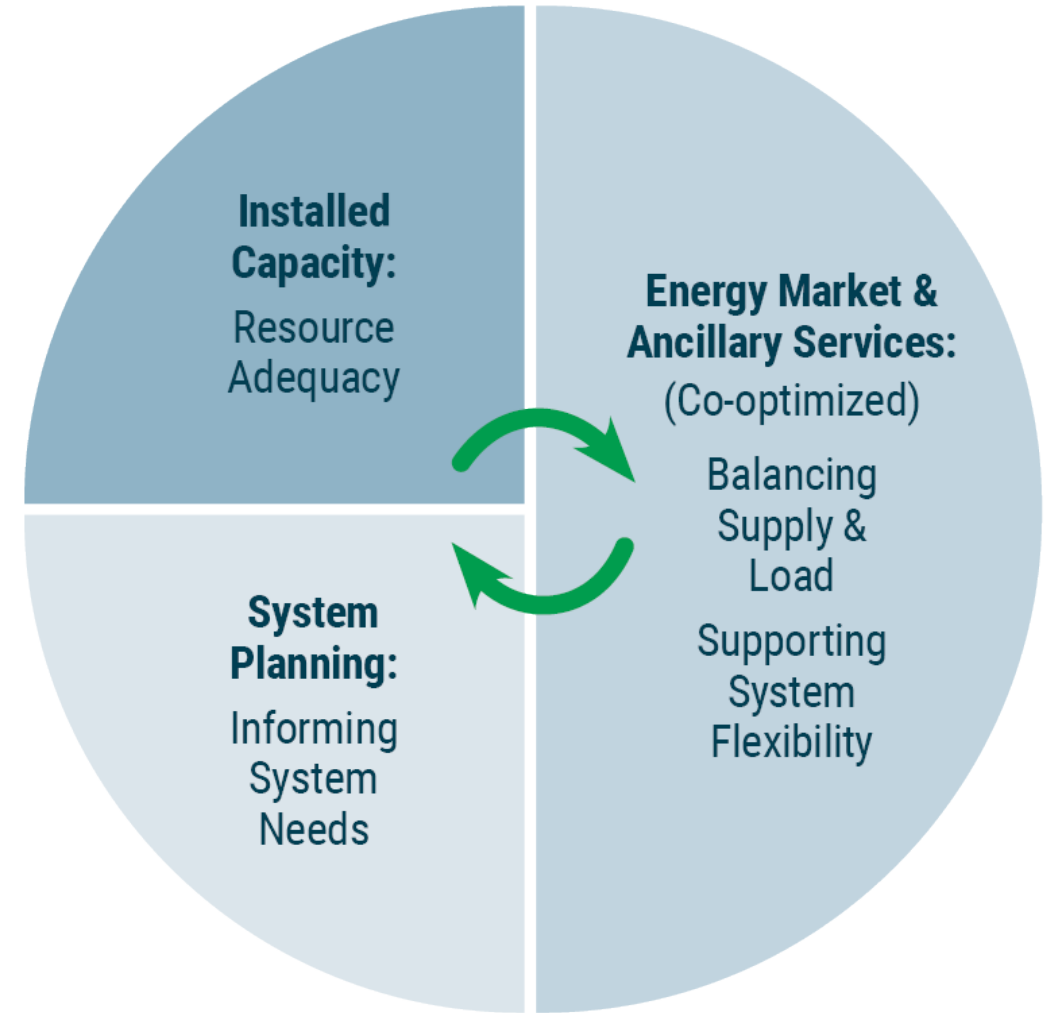


Reliability Challenges

- 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

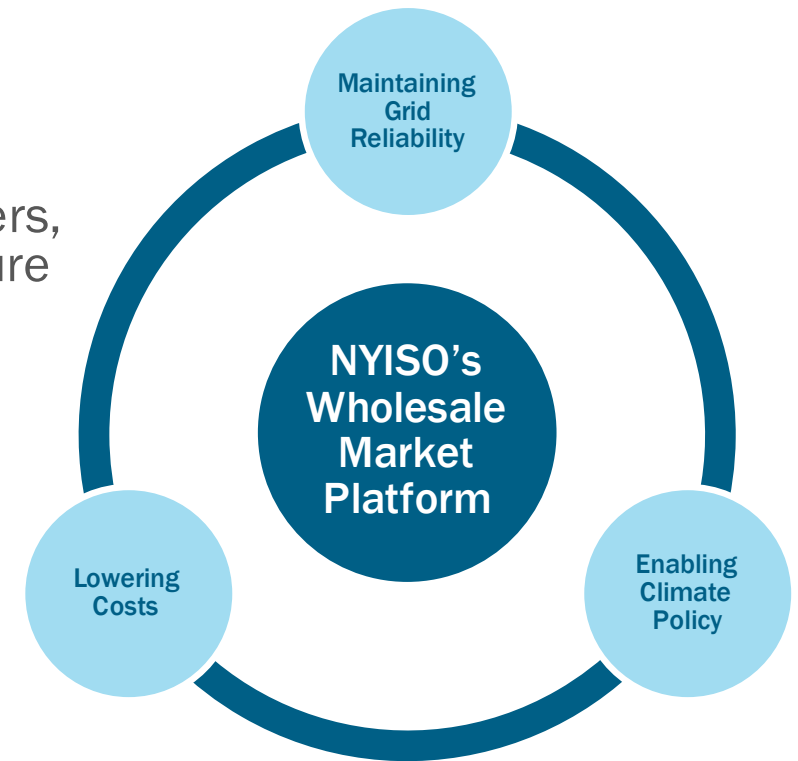
A Grid in Transition - Role of Markets

- **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

- **Today's presentation will address high-level market design improvements recommended in the Reliability Gap Assessment**
- **The NYISO is planning two future, additional presentations which will provide:**
 - An in-depth analysis of the market design components addressed today (tentatively planned for May 2020)
 - An overview of recommendations related to NYISO's Operations processes (by the end of Q2 2020)

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

- **The Reliability Gap Assessment identified high-level, potential market design concepts for existing and potential 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**
 - This presentation will provide an overview of each market design recommendation and the reliability gaps it would potentially address

Potential Concepts for Addressing Reliability Gaps

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 ten and/or thirty-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	

Regulation and Frequency Response Improvements

■ Potential Market Design improvements

- Increasing statewide regulation procurement requirements
- Investigate benefits of separate “up” and “down” service
- Investigate the potential for new resource types to supply frequency response capability

■ Identified reliability gap

- Maintain Ability to Balance Load and Generation
- Maintain Frequency Response Capabilities

Regulation and Frequency Response Improvements (continued)

■ Potential benefits

- Regulation is currently used as a secondary role to the Real-Time Dispatch to balance net load variation in real time, this dependency will likely increase with more intermittent supply online
- Increased reliance on regulation to balance net load variation will potentially require more regulating capability to be scheduled
- During times of low energy prices, higher-cost thermal resources may be scheduled above their minimum generation level in order to provide both regulation up or down service. Developing separate “up” and “down” services could potentially be cost-effective during times of low energy prices, such that thermal resources can be scheduled a minimum generation levels to solely provide regulation “up”, and more cost-effective resources can be scheduled to provide regulation “down”
- Frequency response will become more of a reliability issue with more intermittent supply, and existing procedures for scheduling, committing, and modeling of resources that can provide response may need to be adjusted

Operating Reserves Improvements

■ Potential Market Design improvements

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

■ 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 (continued)

■ Potential benefits

- Reserve resources may be needed to quickly balance unpredictable variations in intermittent resource output (due to wind speed or sun cover), predictable variations (morning and evening ramp), or other unexpected reductions in renewable generation
- During times of high intermittent resource output and low energy prices, fewer latent reserves may be available (as those resources may not have been scheduled for energy)
- Increasing spinning reserve requirements would ensure sufficient resources are available without requiring uneconomic thermal resources to be held at minimum generation levels during times of low energy prices; increasing 10- and 30-minute requirements would make more dispatch and ramp capability available
- Development of a dynamic reserve requirement would allow an accurate modeling of amount and location of reserves

■ 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)

Energy Market Mechanics Improvements

■ Potential Market Design improvements

- Developing new capability for operator management of Energy Storage Resources
- Improving NYISO's Real-Time Market and Day-Ahead Market Energy Processes
- Accounting for increased real-time load forecast uncertainty
- Promoting more frequent scheduling with neighboring regions
- Investigating the need for ramping requirements in NYISO markets

■ 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

Energy Market Mechanics Improvements (continued)

■ Potential benefits

- Ability for NYISO to track the energy balance of Energy Storage Resources over the operating day will become important as more storage resources become part of the resource mix and are relied upon for energy and reserves
- Reducing latency in load forecast will improve ability for RTD to quickly respond to real-time imbalances
- Modifying RTC to account for load forecast uncertainty will allow RTC to commit generation and schedule interchange to maintain sufficient ramp capability and allow RTD to effectively balance load and generation using a more accurate load forecast
- Reducing latency and increasing scheduling frequency with neighboring regions will help balance sustained variations in intermittent generation
- Locational (zonal) ramping products will become increasingly important for managing transmission congestion when operating under high levels of intermittent generation

■ Current and proposed market design efforts

- Energy Storage Resources, 5-Minute Transaction Scheduling

Next Steps

Next Steps: Stakeholder Engagement

- On May 11th, the NYISO will be presenting on Inter-Regional Coordination
- Stakeholders interested in presenting at a future working group meeting should contact Emily Conway at econway@nyiso.com and Ashley Ferrer at aferrer@nyiso.com
- As noted earlier, the NYISO is planning two future, additional presentations which will provide:
 - An in-depth analysis of the market design components addressed today (tentatively planned for May 2020)
 - An overview of recommendations related to NYISO's Operations processes (by the end of Q2 2020)

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

