

Expanding Capacity Eligibility: NYISO Operations' Experience

Aaron Markham
Director, Grid Operations

ICAPWG/MIWG

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Purpose of Today's Discussion

- Review NYISO Operations' experience operating the NY bulk power system on peak days in relation to the market design proposal to expand capacity eligibility for resources with energy duration limitations

Overview

- **NYISO's market design to compensate resources based on the reliability value provided allows Grid Operations to maintain reliability as the resource mix changes**
- **The periodic review proposed will reflect system changes and will benefit from further insights and experience from Grid Operations**

NYISO Grid Operations on Peak Days

- Grid Operations on peak days requires maintaining reliability under expected and unexpected system conditions consistent with reliability criteria
- Key variables and actions include:
 - Expected peak load and duration
 - Over and under forecast of load
 - Over and under forecast of intermittent resources
 - Changing weather conditions (e.g., thunderstorms)
 - Forced outages of generators
 - Forced outages of transmission equipment
 - Fuel uncertainties
 - Coordination with the TOs
 - Coordination with the external areas
 - Notification & activation of SCRs
 - Modifying ELR schedules
 - Scheduling supplemental generation
 - Emergency operating steps

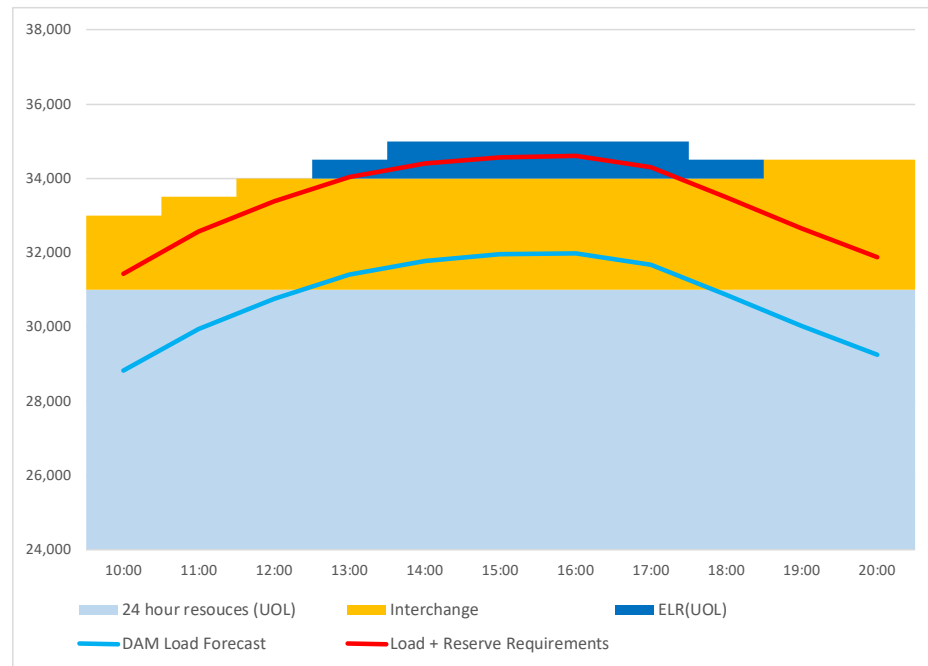
Current Grid Operations

Current Grid Operations on a Peak Day

- The following slides illustrate a representative peak day and actions Grid Operations takes to maintain reliability starting with Day-Ahead Market posting, system changes after the Day-Ahead Market posting, and additional system changes during the Operating Day
 - Majority of the current resources can run for 24 hours, if needed
 - E.g., combined cycle units, steam turbine units, gas turbine units
 - There are a smaller number of duration limited resources, such as SCRs and ELRs, which are only available for few hours in a day (i.e., four hours or more)
 - This representative example assumes 1200 MW of SCR and 1000 MW of ELR

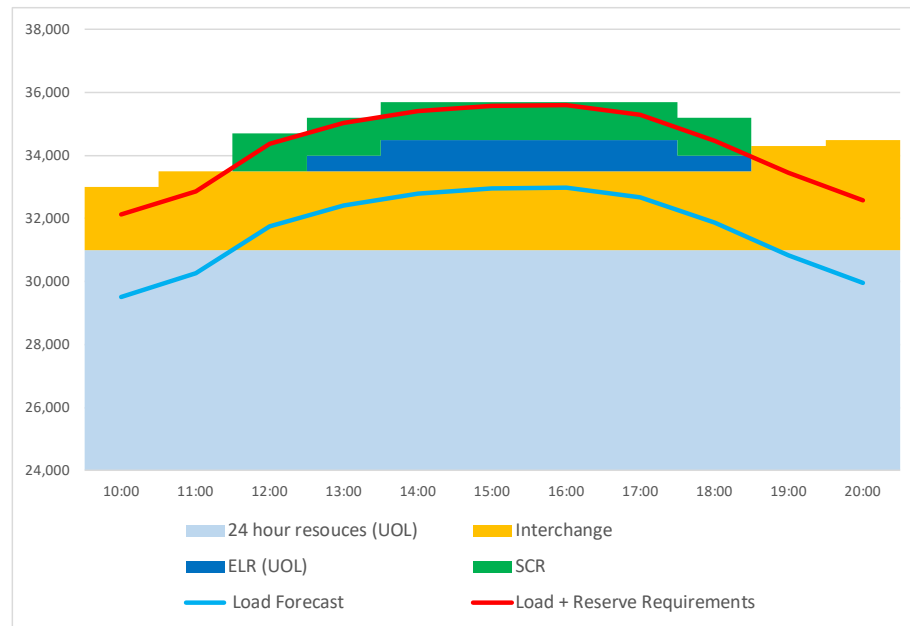
Current Grid Operations: Day-Ahead Commitments

- One day prior to Operating Day 11:00
 - Load forecast for the Operating Day indicates top peak load hours between HB 13 – HB 18, load variation within these hours is ~1,100 MW
 - Day-Ahead Market posting identifies resource commitments to meet the forecasted load and Operating Reserve requirements for the next Operating Day
 - ELR units are committed for 500 MW to 1000 MW between HB 13 and HB 18



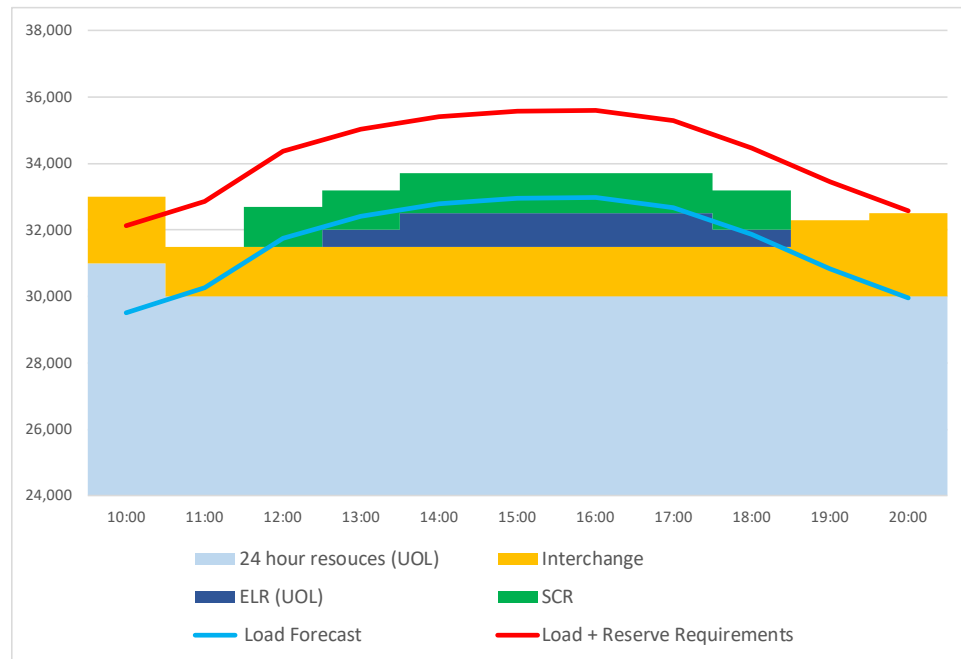
Current Grid Operations: System Changes after Day-Ahead Market Posting

- **One day prior to Operating Day 12:30**
 - Updated Load forecast for the Operating Day indicates that the load during the peak hour will be 1000 MW higher than originally forecasted
 - Imports from the neighboring control areas (i.e., interchange) is expected to be 500 MW less due to conditions in the external area
- **One day prior to Operating Day 13:00**
 - Grid Operations sends day-ahead advisory notice to the SCRs for the Operating Day HB 12 – HB 18 for 1200 MW to meet the load and operating reserve requirements. SCRs are expected to respond for the duration of the event. However, performance will be measured based on their top 4 performance hours.



Current Grid Operations: Real-Time System Changes

- **Operating Day 9:00**
 - Grid Operations issues the 2 hour notice to call SCR resources HB 12 - HB 18
- **Operating Day 11:00**
 - A TLR cuts 1000 MW of imports from the neighboring control areas (i.e., interchange)
 - A 1000 MW unit trips
- **Operating Day 12:00 – 18:00**
 - Operating reserve shortages
 - System load served without interruption because today's resource mix has sufficient energy to supply for the duration required

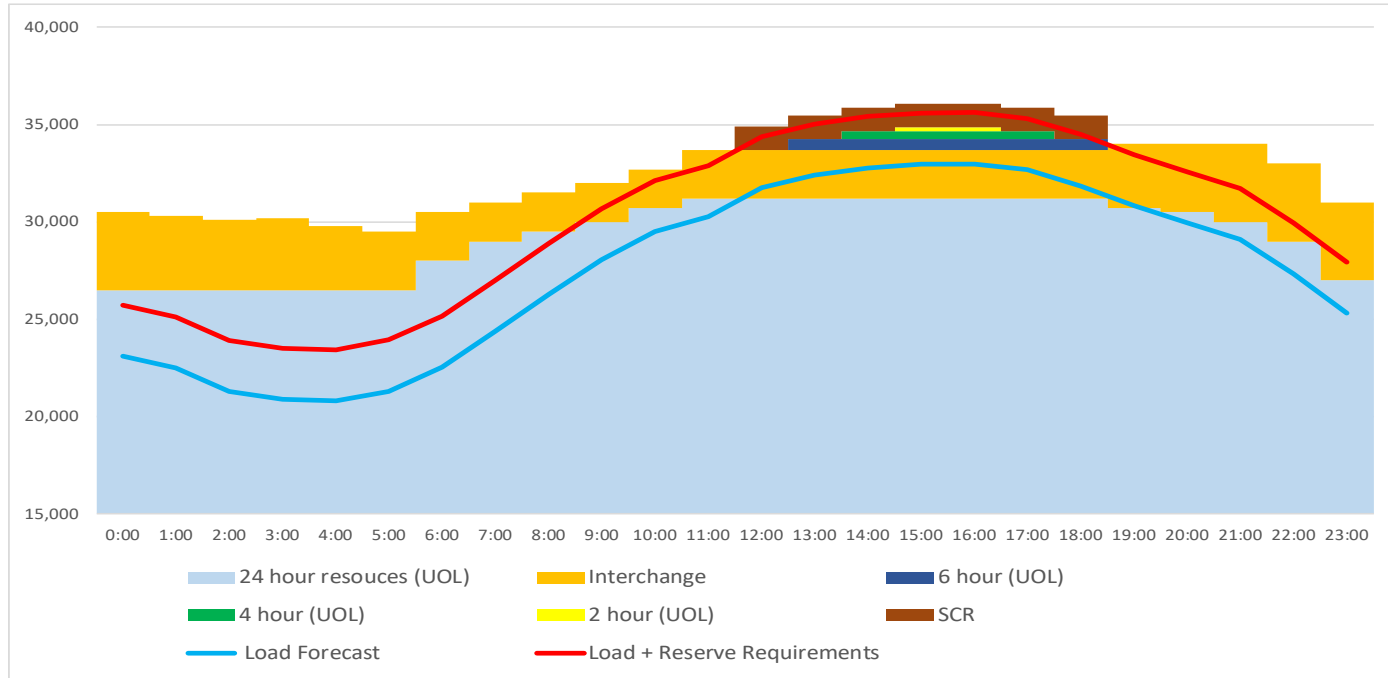


Future Grid Operations

Future Grid Operations on a Peak Day

- The following slide illustrates the same representative peak day showing the Day-Ahead Market results
 - This future condition assumes 1050 MW of resources with duration limitations (2-hour, 4-hour, and 6-hour resources) and 1200 MW of SCRs

Future Grid Operations on a Peak Day



Future Grid Operations: Additional Considerations

- To respond to changing system conditions after the Day-Ahead Market posting, Grid Operations will need to additionally consider energy duration limitations of resources (2-hour, 4-hour, and 6-hours) to meet peak conditions and maintain reliability
- The co-optimization of energy and ancillary services and the incentives for the resources with duration limitations will lead some of these resources to be scheduled as 10-minute reserves
 - Grid Operations expects that some of these resources, as reserve providers, will be deployed for Energy in response to unexpected real-time system conditions (e.g., contingencies not anticipated in DAM, local transmission constraints, etc.)
 - Grid Operations may have to rely on manual out-of-market actions to manage large amounts of these resources to meet daily energy needs if unexpected real-time conditions occur
- Since the number of resources with energy duration limitations is expected to increase, Grid Operations will need to consider the above factors to maintain reliability

Conclusion

- **NYISO Operations has provided input and review on the critical components of the DER market design proposal**
 - Peak Load Window – aligns well with NYISO Operations experience
 - Capacity Value Study – both the GE approach and the MMU approach are consistent with how NYISO Operations expects to deploy these resources
 - Resource Obligations – the combined testing, measurement, and verification rules along with the bidding obligations will help ensure these resources provide reliability value
 - Tiered Approach – recognizes that as the number of short duration resources increases substantially (1000 MW is a reasonable threshold), the value they bring to meet reliability changes
 - Periodic Review – necessary to keep the capacity values aligned with the reliability value as the system changes
- **Based on its review, NYISO Operations supports the comprehensive package of market design changes which position the NYISO to be able to maintain reliability**

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits 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



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