New York ISO
Independent System Operator

NYISO Dynamic Reserves

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NYISO Reserves

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NYISO Reserves

- **The NYISO procures several types of contingency Reserves in its Day-Ahead (DAM) and Real-Time (RTM) markets to meet NYCA-wide and locational Reserve requirements**
  - These requirements, or Reserve targets, are set via reliability rules and are relatively static
- **The NYISO's current Reserve procurement and pricing methodologies do not, to the fullest extent possible, reflect the locational value of Reserves**
  - 1 MW of Reserves counts as 1MW of relief towards the associated locational/statewide reserve requirement, regardless of the Reserve Supplier's physical location
  - Reserves are priced at the zonal level

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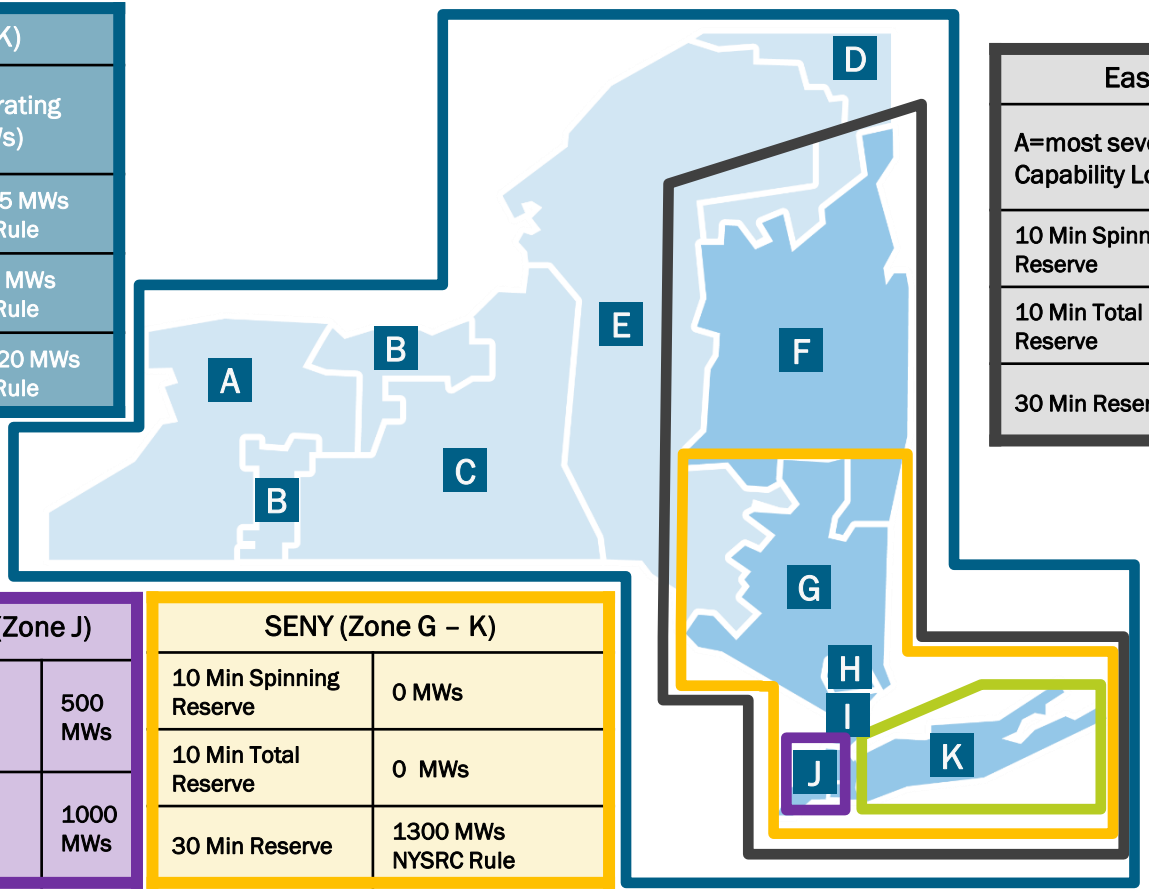
Existing Static Requirements

NYCA (Zone A – K)	
A=most severe NYCA Operating Capability Loss (1310 MWs)	
10 Min Spinning Reserve	½ A=655 MWs NYSRC Rule
10 Min Total Reserve	A=1310 MWs NYSRC Rule
30 Min Reserve	2xA=2620 MWs NYSRC Rule

A	WEST
B	GENESE
C	CENTRL
D	NORTH
E	MHK VL
F	CAPITL
G	HUD VL
H	MILLWD
I	DUNWOD
J	N.Y.C.
K	LONGIL



East (Zone F – K)	
A=most severe NYCA Operating Capability Loss (1310 MWs)	
10 Min Spinning Reserve	¼ A=330 MWs NERC, NPCC Rule
10 Min Total Reserve	1200 MWs NYSRC Rule
30 Min Reserve	1200 MWs NERC, NPCC Rule

NYC (Zone J)	
10 Min Total Reserve	500 MWs
30 Min Reserve	1000 MWs

SENY (Zone G – K)	
10 Min Spinning Reserve	0 MWs
10 Min Total Reserve	0 MWs
30 Min Reserve	1300 MWs NYSRC Rule

Long Island (Zone K)	
10 Min Spinning Reserve	0 MWs
10 Min Total Reserve	120 MW NERC, NPCC Rule
30 Min Reserve	270 – 540 MWs Max limits NYSRC Rule

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Dynamic Reserves – Justification

- **A Changing Grid**
  - New York CLCPA targets 70% renewable by 2030, zero-emission by 2040
  - Large, intermittent resources highlight static reserve requirement shortfalls
- **2021 RECA Study highlighted the need for optimization of reserves requirements**
  - Current static requirements would not always meet local or regional reliability requirements in the context of the future grid
- **Dynamic Reserves will enable NYISO to determine the least-cost generation and reserves mix to meet load, based on current system conditions**
  - The Dynamic Reserves formulation allows the software to determine the appropriate trade-offs between energy and reserve schedules in a constrained area utilizing transmission headroom

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Dynamic Reserves

- **The NYISO's Dynamic Reserves enables:**
  - Dynamic NYCA-wide and Locational Reserves
  - Utilization of Resource Shift Factors in Reserve scheduling/pricing
  - Tying local reserve requirements to local post-contingency transmission constraints
  - Procurement of Forecast Reserves in the DAM
- **Ultimately, Dynamic Reserves will bring Reserve scheduling more in-line with Energy scheduling**

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Establishing Dynamic NYCA-wide Requirements

- **Dynamic NYCA-wide RTM and DAM reserve requirements will be reflective of the largest and second largest statewide supply contingency in each market interval**
  - Determination of large contingency status is done by evaluating each individual Resource's combined Energy and Ancillary Services schedules, or by net interchange across relevant interties
- **The formulae used to establish these requirements in each interval are as follows:**
  - NYCA 10-Minute Spin Requirement =
    - ½ the largest supply contingency in the NYCA
  - NYCA 10-Minute Total Requirement =
    - The largest supply contingency in the NYCA
  - NYCA 30-Minute Total Requirement =
    - The largest supply contingency in the NYCA + Second largest supply contingency + max(0,(Forecast Load – Scheduled Load))
      - The max function is only included in the NYCA 30-Minute Total Requirement in the DAM
- **This approach ensures that statewide Reserve targets reflect current or anticipated grid conditions**

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Forecast Reserves

- **Dynamic Reserves will introduce new DAM Reserve constraints that will allow NYISO to secure Energy and Operating Reserves to the NYISO's DAM Forecast Load**
  - The forecast reserve constraints will, at least-cost, procure additional 30-Minute Reserves or reserve transmission headroom to ensure sufficient energy exists in real time to serve NYISO DAM Forecast Load – i.e. Forecast Reserves
  - The amount of Forecast Reserves procured in the DAM is equal to the greater of NYISO's Forecast Load minus Scheduled Load, or zero

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Locational Reserves - Secured Facilities for Reserves

- **The NYISO has identified key transmission elements that will need to be secured for post-contingency conditions under Dynamic Reserves**
  - The NYISO will initially model lines which make up key interfaces across the NYCA and factor into existing reserve area definitions on which the post-contingency power flows will be modeled and managed using Locational Operating Reserve Constraints (LORCs)
  - This effectively allows the NYISO to sunset the locational reserve area methodology described on slide 4, in favor of securing individual lines with Reserves/Energy post-contingency

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Utilization of Resource Shift Factors

- **Dynamic Reserves will utilize individual Resource shift factors for Reserve scheduling**
  - Allows the optimization to predict the impact of post-contingency Reserve deployment on post-contingency flows across secured transmission facilities
  - Ultimately, the optimization will schedule more reserves on Resources whose Shift Factors show that are more effective in addressing specific post-contingency constraints
- **Utilization of Resource Shift Factors enables the calculation of a nodal Locational Marginal Operating Reserve Price (LMORP)**
  - The LMORP is comprised of a marginal statewide Reserves price component and a reserve congestion price component
  - The LMORP better reflects the locational value of a Generator's Reserves compared to zonal pricing, resulting in more efficient market outcomes

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Establishing Dynamic Locational Requirements

- **NYISO will integrate Locational Operating Reserve Constraints (LORCs) into its DAM and RT optimization models that determine local reserve requirements to meet reliability criteria following N-1 and N-1-1 contingencies**
  - The solving of LORCs results in a set of Reserve schedules that ensure post-contingency flows across secured transmission facilities will respect the facility's post-contingency limits and overload timing requirements, considering Energy supplier, Reserve supplier, and Load shift factors and schedules

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Balancing Intermittency

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Balancing Intermittency

- The Balancing Intermittency project focuses on addressing forecast uncertainty in renewables and load.
- NYISO proposes to procure (through its DAM and RT markets) operating reserves to address these forecast uncertainties when and where they occur ("Uncertainty Reserve Requirement").
- NYISO proposes the Uncertainty Reserve Requirement will be additive with existing contingency reserve requirements, to deal with forecast uncertainties for every hour of the day for DA and RT markets and for every reserve region before the Day Ahead Market run.
- The components of the Uncertainty Reserve Requirements would be Net Load (Load net of BTM Solar), Land Based Wind, Offshore Wind, and FTM Solar.

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Conclusion

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Fitting the Pieces Together

- Dynamic Reserves creates a more adaptable contingency reserve procurement and sizing process that will reflect changing system conditions throughout an operating day, in each DAM and RTM interval
- Dynamic Reserves creates Forecast Reserves, which modify the NYCA-wide 30-minute Total Reserve Requirement when Forecast Load exceeds Scheduled Load in the DAM
- Balancing Intermittency will result in the procurement of additional contingency Reserves (Uncertainty Reserves) in the DAM and RTM to account for Load and Intermittent Renewable forecast errors

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Our Mission and Vision

Mission

Ensure power system reliability and competitive markets for New York in a clean energy future

Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

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Appendix

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Additional Resources

- Dynamic Reserves 2024 Business Issues Committee Presentation
- 2021 RECA Report
- Balancing Intermittency 2024 Business Issues Committee Presentation