

# Dynamic Reserves

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**ICAPWG/MIWG**

October 3, 2023

# Agenda

- **Background**
- **Tariff Review**
- **Next Steps**

# Background

# Previous Presentations

Title/Topic	Link
March 7, 2023 MIWG	<a href="https://www.nyiso.com/documents/20142/36639552/Dynamic%20Reserves%20-%2020230307%20MIWG_final.pdf/a29ccf5d-4c26-5cbf-0103-5bece7edb276">https://www.nyiso.com/documents/20142/36639552/Dynamic%20Reserves%20-%2020230307%20MIWG_final.pdf/a29ccf5d-4c26-5cbf-0103-5bece7edb276</a>
March 31, 2023 MIWG	<a href="https://www.nyiso.com/documents/20142/36828420/MIWG%20March%2031%20Dynamic%20Reserves%20Postings%20and%20LMP.pdf/81c35384-2438-1e03-e021-6e7ecc18f9d7">https://www.nyiso.com/documents/20142/36828420/MIWG%20March%2031%20Dynamic%20Reserves%20Postings%20and%20LMP.pdf/81c35384-2438-1e03-e021-6e7ecc18f9d7</a>
September 5, 2023 MIWG	<a href="https://www.nyiso.com/documents/20142/39768278/2%2020230905%20MIWG%20-%20Dynamic%20Reserves.pdf/d58e28ab-de87-7a86-4296-a8c21f7c764f">https://www.nyiso.com/documents/20142/39768278/2%2020230905%20MIWG%20-%20Dynamic%20Reserves.pdf/d58e28ab-de87-7a86-4296-a8c21f7c764f</a>
September 14, 2023	<a href="https://www.nyiso.com/documents/20142/40004830/20230914%20MIWG%20-%20Dynamic%20Reserves.pdf/a1c6d806-5b67-a8fc-9d04-a1669a926f54">https://www.nyiso.com/documents/20142/40004830/20230914%20MIWG%20-%20Dynamic%20Reserves.pdf/a1c6d806-5b67-a8fc-9d04-a1669a926f54</a>
September 18, 2023	<a href="https://www.nyiso.com/documents/20142/40044890/5%2020230918%20MIWG%20-%20Dynamic%20Reserves.pdf/0b1b7e63-737d-5bee-4abc-be65c234aa3b">https://www.nyiso.com/documents/20142/40044890/5%2020230918%20MIWG%20-%20Dynamic%20Reserves.pdf/0b1b7e63-737d-5bee-4abc-be65c234aa3b</a>
September 26, 2023	<a href="https://www.nyiso.com/documents/20142/40204141/4%2020230926%20MIWG%20-%20Dynamic%20Reserves.pdf/90e8c0b2-aeaf-0935-5c4e-bd260c948f3c">https://www.nyiso.com/documents/20142/40204141/4%2020230926%20MIWG%20-%20Dynamic%20Reserves.pdf/90e8c0b2-aeaf-0935-5c4e-bd260c948f3c</a>

# Current Progress

- **NYISO posted a partial draft of the revisions that will be required to MST Section 15.4 with the 9/26 MIWG meeting materials.**
  - These revisions will be reviewed today

# Draft Tariff Revisions

# Draft Tariff Revisions: Summary of Substantive Draft Tariff Revisions

- **NYISO has drafted proposed tariff revisions to certain, but not all, sections of MST 15.4**
- **MST 15.4.1**
  - Revised description of NYCA 10-Minute Spinning, 10-Minute Non-Synchronized, and 30-Minute Reserve Requirements
  - Revised description of Operating Reserves to describe Locational Operating Reserve Constraints, including definition of reserve constraints and definition of secured interfaces
- **MST 15.4.4**
  - Revised description of methods for determining location reserve and scarcity reserve requirement prices
  - Removed Section 15.4.4.2 to reflect changes to settlements for Suppliers of Operating Reserves Located on Long Island
- **MST 15.4.5 and MST 15.4.6**
  - Revised description of Day-Ahead Market and Real-Time Market Clearing Prices
- **MST 15.4.7**
  - Revised description of Operating Reserve demand curves
  - Further revisions to this section will be discussed in October

# Next Steps



# Next Steps

- **The deliverable for 2023 is Market Design Complete**
- **Timeline to completion of MDC**
  - Review market design elements and present additional examples at 10/10/23 MIWG
  - Discuss remaining outstanding market design elements and tariff at October MIWGs
  - Present MDC and tariff at November BIC

# Questions?

# Our Mission & 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

# Appendix: Foundation for Market Design Concepts

# Foundation for Market Design Concepts

## ■ Energy scheduling constraints are formulated as follows:

- $\sum Shift\ Factors * (Gen\ and\ Load\ Schedules) \leq Line\ Limit$ 
  - 'Line Limit' is based on the normal limit for a base case constraints and LTE or MTE limits for a post contingency constraints.
  - The associated shift factors for Generation and Load come from the Network Security Analysis (NSA) power flow tool.

## ■ This formulation would be extended for Operating Reserves subject to successful integration into NYISO BMS software

- NYISO has identified approximately 20 lines which make up key interfaces across NYCA and factor into reserve area definitions, for which NYISO would monitor for post-contingency limits
- New reserve constraints need to be modeled similarly to the transmission constraint and validated within the market software:  $\sum Shift\ Factors\ (Gen,\ Load,\ and\ Reserves) \leq Line\ Limit$
- Reserve shift factors are negative in the above equation so that only resources which would provide relief for the constraint would be evaluated
- The 'Line Limit' and reserve product would be based on the projected overload and timing requirements to restore the flows on the facility, after the contingency
- The shift factors used to calculate the reserve constraints are based on the appropriate constraints operating requirements

# Generator Shift Factor Approach: Defining Locational Reserve Constraints

- **The locational reserve requirements (except for NYCA) would need to reflect the post-contingency system conditions as defined by reliability criteria:**
  - **Loss of Transmission:** The constraint would be evaluated for each monitored transmission element or interface<sup>1</sup> (e.g., Central-East)
    - **10-Minute Total Reserves:** Transmission elements must be below applicable limits<sup>2</sup> within 15 minutes following a single transmission contingency
      - [Post-Contingency Energy Flow – 10-Minute Reserves] ≤ Applicable Limits
    - **30-Minute Total Reserves:** Transmission elements must be below Normal Transfer Criteria within 30 minutes following two transmission contingencies
      - [Post-Contingency Energy Flow – 30-Minute Reserves] ≤ Normal Transfer Criteria

1: The only interface that would be evaluated would be Central-East. All other transmission elements would be monitored individually.

2: An applicable limit for different constraints based on reliability criteria or system topology. For example, 1) reserve constraints for voltage conditions across the East interface would be based on Central East – Voltage Collapse maximum transfer capability and 2) reserve constraints for thermal conditions in NYC may be based on actual flows over LTE limits and 3) reserve constraints for thermal conditions in Long Island may be based on post contingency flows for the next contingency over LTE limits.

# Generator Shift Factor Approach: Defining Locational Reserve Constraints (continued)

- **The locational reserve requirements (except for NYCA) would need to reflect the post-contingency system conditions as defined by reliability criteria:**
  - **Loss of Generation:** The constraint would be evaluated for each monitored transmission element or interface against the loss of each generator
    - **10-Minute Total Reserves:** Transmission elements must be below applicable limits within 15 minutes following the loss of a generator
      - [Post- Generator Contingency Energy Flow – 10-Minute Reserves\*] <= Applicable Limits
    - **30-Minute Total Reserves:** Transmission elements must be below Normal Transfer Criteria within 30 minutes following the loss of two generators
      - [Post- Generator Contingency Energy Flow – 30-Minute Reserves\*] <= Normal Transfer Criteria
  - **Loss of Generation and Transmission:** This constraint would be evaluated for each monitored transmission against the loss of a generation and transmission element
    - **30-Minute Total Reserves:** [Post-Contingency Energy Flow – 30-Minute Reserves\*] <= Normal Transfer Criteria
    - **N-1 Transmission flow and loss of largest effective unit** ( $\text{Gen\_MW} * \text{N-1\_SF}$ ) for 30T requirement

\* Not counting Reserves on the lost unit

# Generator Shift Factor Approach: Defining NYCA Reserve Constraints

- **Transmission flows and limits are only used in determining the reserve distribution within the NYCA**
  - NPCC and NYSRC rules require the NYISO to procure reserves in NYCA to cover the largest capability loss; therefore, the determination of the reserve requirement for NYCA does not consider transmission from external control areas
- **Nodal transmission security will determine distribution of the requirement**
  - All Reserve providers will have a shift factor of “unity” towards NYCA requirement
- **The proposed reserve constraints for NYCA would be:**
  - 10-Minute Spin: Equal to one-half of the NYCA 10-Minute Total requirement
  - 10-Minute Total: Equal to the output of most severe contingency (*i.e.*, largest generator schedule)
  - 30-Minute Total: Equal to the output of the Largest Generator + Second Largest Generator +  $\max(0, (\text{Forecast} - \text{Bid}))$ 
    - Basing the requirement on the combined output of the largest and second largest generators meets the NYSRC requirement for 30-Minute reserves. The NYSRC requirements state that: 1) NYISO must have enough 30-Minute Reserves equal to one-half of the 10-Minute Reserve requirement (*i.e.*, one-half of the capability of the largest generator; and 2) NYISO must restore 10-Minute reserves within 30 minutes of a contingency<sup>1</sup>
    - NYISO’s use of a multiplier of 2\*largest generator is an approximation of this requirement. Calculating the reserve requirement based on the capability of the largest and second largest contingency would allow NYISO to have enough reserves to restore flows and 10-Minute reserves within 30 minutes
    - The Forecast-Bid Load component is a Day-Ahead Market construct only

1: <https://www.nysrc.org/wp-content/uploads/2023/07/RRC-Manual-V46-final.pdf>