

NYISO FERC Order No. 2222 Compliance – Part 3

Harris Eisenhardt

Market Design Specialist, New Resource Integration

ICAPWG

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Agenda

- **Background & Overview**
- **FERC Order No. 2222 Requirements – Part 3**
- **Operating Reserves for Heterogenous Aggregations**
- **Next Steps**

Background & Overview

- NYISO submitted its Order No. 2222 compliance filing on July 19, 2021 (Compliance Filing)
- FERC issued an Order on June 17, 2022, (June 2022 Order) accepting the Compliance Filing, and directing the NYISO to make over thirty additional tariff modifications to achieve compliance with Order No. 2222
- The NYISO is in the process of developing those additional tariff modifications and presenting to stakeholders as available before filing
- Today's discussion will review the third and final set of tariff modifications related to:
 - Metering and Telemetry System Requirements
 - Information and Data Requirements
 - Implementation Details
 - Coordination between the ISO, Aggregator, and Distribution Utility
- The NYISO presented Part 1 of the compliance obligations on August 29, 2022, followed by Part 2 on September 20, 2022 – today's presentation will review the remaining directives that will be addressed in NYISO's November 14, 2022, compliance filing.

Metering and Telemetry System Requirements

Meter Data Submission Details

- The June 2022 Order found that the NYISO did not specify the meter data submission deadline for Aggregations, nor which entity must submit the meter data.
- FERC directed NYISO to include in the Services Tariff a meter data submission deadline for settlement and specify which entity must submit meter data.
- The June 2022 Order also directed the NYISO to include in the Services tariff references to specific documents (e.g., the Revenue Metering Requirements Manual) that contain technical details related to metering.
- **The NYISO will revise Services Tariff Section 4.1.10.4 to include the following details:**
 - The Aggregation's Meter Authority shall be responsible for the submission of revenue quality meter data to the NYISO by 12PM the day following the service date
 - The Revenue Meter Requirements Manual and Aggregation Manual provide additional details regarding meter data submission

Reference to Supporting Documentation

- **The June 2022 Order found that NYISO does not comply with the requirement to include references to the specific documents that contain further technical details on telemetry requirements for Aggregations.**
- **NYISO will revise Services Tariff Section 4.1.10.4 to reference the following documents, which contain supporting details pertinent to telemetry requirements:**
 - Control Center Requirements Manual;
 - Direct Communications Manual;
 - Revenue Metering Requirements Manual; and
 - Accounting and Billing Manual

Meter Data Sharing Protocols

- **The June 2022 Order directed that, to the extent that the NYISO proposes that metering and telemetry data comes from or flows through distribution utilities, the NYISO must coordinate with distribution utilities and RERRAs to establish protocols for sharing metering and telemetry data, and that such protocols minimize costs and other burdens and address concerns raised with respect to privacy and cybersecurity.**
- **NYISO will revise Services Tariff Section 4.1.10.4 consistent with FERC's directives:**
 - NYISO does not require that Aggregation metering or telemetry data be shared with the applicable Distribution Utility
 - Per the NYISO's Control Center Requirements Manual, the NYISO will require a telemetry connection with each Aggregator's control center, providing data for each Aggregation, via the applicable Member System
 - The NYISO will offer an optional direct connection between the Aggregator and ISO in parallel with the Member System
 - The NYISO has evaluated cyber-secure telemetry services for Aggregators in order to provide cost-effective options for small resources while maintaining grid reliability

Information and Data Requirements

DER and Aggregation Data Requirements

- **The June 2022 Order directed NYISO to include in its tariff the information and data that an Aggregator must provide about the physical and operational characteristics of an Aggregation.**
- **The June 2022 Order further directed the NYISO to propose how the applicable information must be shared with the ISO and affected Distribution Utility.**

DER and Aggregation Data Requirements

- **NYISO will modify MST 4.1.10.7.1 to explain the procedural requirements for submitting the necessary information and data to the NYISO, and how this information will be made available to the applicable Distribution Utility.**
- **NYISO will modify MST 4.1.10.7.1 to include a comprehensive list of data required from an Aggregator about its Aggregation(s) and DER(s).**
 - This information shall be made available to the Distribution Utility in accordance with the Utility 60-Day Review of DER for safety and reliability, as required by Order No. 2222 and the June 2022 Order.

Coordination between the ISO, Aggregator, and Distribution Utility

Distribution Utility Review Scope

- The June 2022 Order directed the NYISO to provide additional detail in its tariff to address the scope of the Distribution Utility review of DER safety and reliability.
- FERC noted that the Distribution Utility's review is limited to any incremental impacts that the utility has not previously considered during the interconnection study process for a DER.
- The NYISO will clarify in MST 4.1.10.7.1 that the Distribution Utility review of DER for safety and reliability shall be limited to impacts that were not previously considered by the Distribution Utility during the interconnection study process for the Resource, or in the Distribution Utility's prior evaluation (e.g., upon the DER's initial enrollment in the wholesale markets), if any.

DER and Aggregation Data Sharing

- **The June 2022 Order found that NYISO partially complies with the requirement that each RTO/ISO must share with Distribution Utilities any necessary information and data collected under Section IV.F of the final rule about the individual DER participating in an Aggregation.**
- **FERC directed NYISO to explain on compliance what data it will provide to the Distribution Utility to facilitate the review process so that the Commission may evaluate compliance with the coordination requirement noted above.**
 - FERC additionally encouraged NYISO to work with Distribution Utilities to identify a common set of data that all utilities require, noting its expectation that state and local interconnection processes provide the necessary information to inform distribution utility review
- **NYISO has coordinated with the Joint Utilities of New York to enhance its list of required information and data about individual DER and Aggregations to reflect all necessary attributes to support the Distribution Utility review of DER.**
- **NYISO will modify Services Tariff Section 4.1.10.7.1 to include a list of necessary data to be collected on enrollment of individual DER and Aggregations, which will be provided to the applicable Distribution Utility.**

NYISO Performance Penalties & Distribution Utility Instructions

- The June 2022 Order found that NYISO's tariff language lacked specificity regarding the existing non-performance penalties that would apply to an Aggregation when unable to meet its NYISO dispatch instruction due to Distribution Utility instruction.
- The NYISO will revise MST 4.1.10.7.2 to make reference to the applicable existing sections that document applicable penalties:
 - MST 5.12.12
 - MST 5.14.2
 - MST 15.3A
 - MST 23.4

Operational Data Exchange

- The June 2022 Order found that NYISO's tariff does not sufficiently address data flows and communication between NYISO, the Aggregator, and the Distribution Utility.
- FERC directed NYISO to revise its tariff to describe what data and information will be communicated and define more clearly the communication that will occur in this coordination process.
- FERC additionally encouraged NYISO to work with stakeholders to develop tariff language that identifies the data and information that should be shared to operate the system both reliably and efficiently, and the process under which this information will be shared.
- NYISO has coordinated with stakeholders to review the Aggregation Manual throughout 2022, which includes a description of operational coordination, data exchanges, and roles & responsibilities.
 - NYISO will incorporate information from the draft Aggregation Manual into Services Tariff Section 4.1.10.7.2

Implementation Details

Effective Date of Compliance

- The June 2022 Order was predicated on the NYISO's original effective date of Q4, 2022 for all requirements pertinent to Order No. 2222.
- The NYISO anticipates an effective date of Q2, 2023 for its 2019 DER market design.
- The NYISO anticipates an effective date of 2026 for its compliance with Order No. 2222.

Effective Date of Operating Reserves Revisions

- The June 2022 Order found that NYISO must propose an effective date by which it will allow DERs to provide all the ancillary services they are technically capable of providing through a heterogeneous Aggregation
- FERC's instruction presents a concern if it requires the NYISO to permit a heterogeneous Aggregation to simultaneously provide both synchronous and non-synchronous, or both 10-minute and 30-minute, Operating Reserves
- Depending on what FERC requires, achieving this directive could require a significant restructuring of the NYISO's market software
- The NYISO has requested rehearing of this obligation, and clarification from FERC about the intended scope of the requirement
 - If FERC responds favorably to the NYISO's clarification request, then NYISO expects it would be able to satisfy this requirement when it implements the rules to comply with the remainder of Order No. 2222 expected in 2026
 - If FERC interprets the requirement in a manner that is inconsistent with the NYISO's market design, then it will take the NYISO several years beyond 2026 when the remaining rules to comply with Order No. 2222 are expected to be implemented
- FERC intends to issue an order addressing the NYISO's Request for Clarification or, in the Alternative, Rehearing at its October 20 Open Meeting
- The NYISO has appealed this aspect of FERC's decision to the D.C. Circuit Court of Appeals
- The NYISO will propose one or several effective dates in its compliance filing addressing the implementation of Operating Reserves. The proposed effective dates will depend on the Commission's instructions addressing what is necessary for the NYISO to achieve compliance

September 20 ICAPWG Feedback

Feedback and Revisions

- **The NYISO received comments on its draft revisions to MST 4.1.10, OATT 25, and OATT 32.**
 - Accompanying ministerial revisions are included in the draft tariff posted with today's meeting materials

Operating Reserves for Heterogenous Aggregations of DER

Operating Reserve Service

Operating Reserves

- **Operating reserves protect the reliability of the system by providing backup generation in the event that the NYISO experiences a real-time power contingency**
 - The amount of reserves procured is determined by considering various reliability requirements. These reliability requirements require a combination of 10-minute reserve products to replace lost capacity following a contingency, and 30-minute reserve products to restore the 10-minute products
 - Reserve procurement should adhere to NYSRC (New York State Reliability Council) rules, NERC (North American Electric Reliability Corporation) requirements, and NPCC (Northeast Power Coordinating Council) requirements
- **Reserves are location-dependent, requiring procurement of reserve quantities within specific regions**
 - There are total 5 reserve regions including NYCA. Some reserve regions are nested within other reserve regions
 - The region specific requirement ensures that the operating reserve is properly geographically located such that transmission constraints do not limit the ability to deliver reserves

Operating Reserves (Cont.)

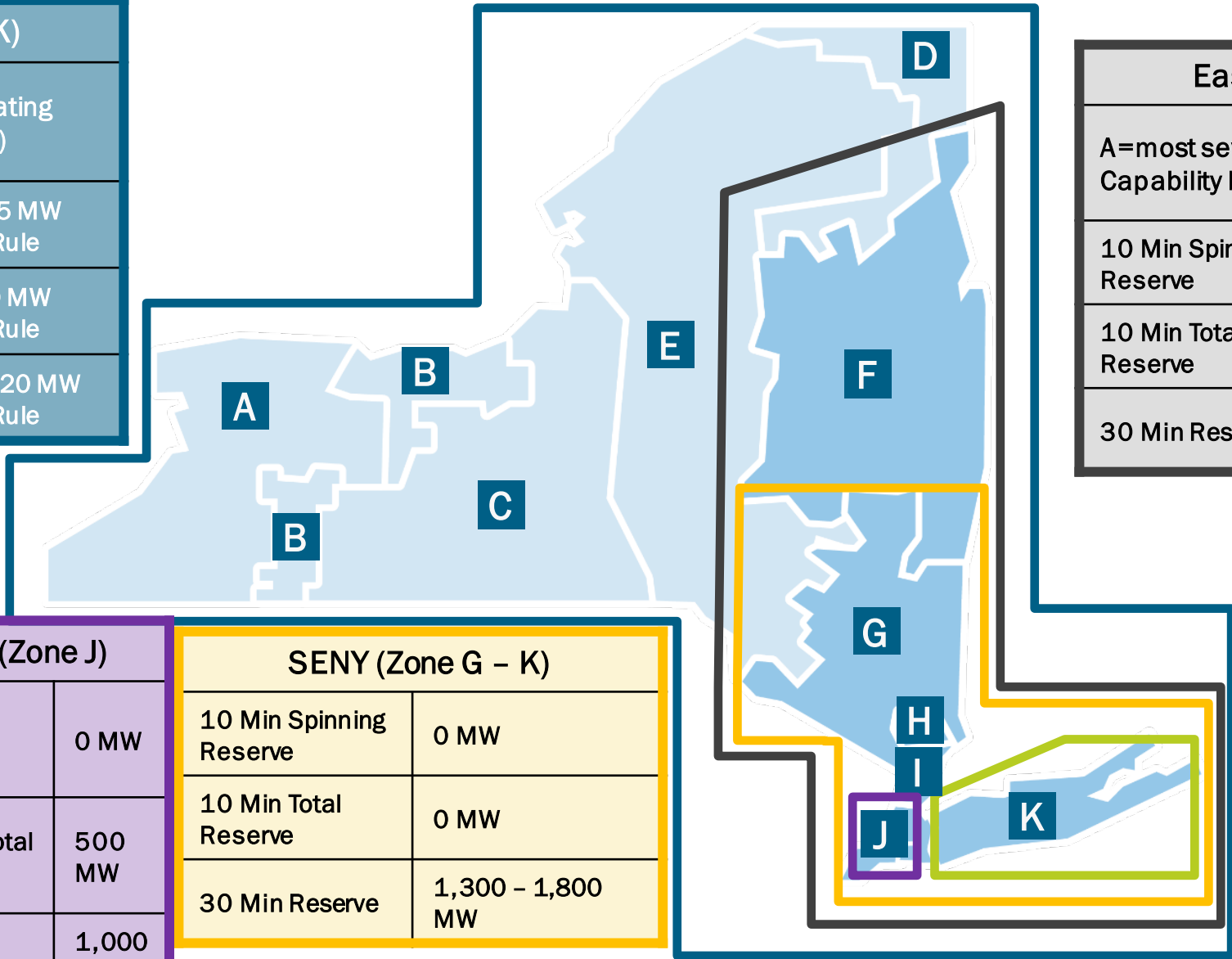
- **NYISO procures 3 types of Operating reserves:**
 1. 10-minute Spinning Reserves
 - Can be provided by qualified resources that are synchronized to the grid and can change output level within 10-minutes
 2. 10-minute total reserves
 - Can be provided by qualified resources that can be started, synchronized, and loaded within 10-minutes and resources that are synchronized to the grid and can change output level within 10-minutes
 3. 30-minute Reserve (spinning and non-synchronized)
 - Can be provided by qualified resources that
 - Are currently synchronized and can change output level within 30-minutes; or
 - Can be started, synchronized, and loaded within 30-minutes
- **Reserve providers submit bids in DAM for eligible reserve products**
 - Providers receive the reserve clearing price when scheduled for reserves
 - Providers receive the real-time LBMP when converted from reserves to energy
- **Self – Committed Fixed and ISO – Committed Fixed Generators are not eligible to provide any kind of operating Reserves**

Current Operating Reserve Requirements

NYCA (Zone A - K)	
A=most severe NYCA Operating Capability Loss (1,310 MW)	
10 Min Spinning Reserve	½ A=655 MW NYSRC Rule
10 Min Total Reserve	A=1,310 MW NYSRC Rule
30 Min Reserve	2xA=2,620 MW NYSRC Rule

East (Zone F - K)	
A=most severe NYCA Operating Capability Loss (1,310 MW)	
10 Min Spinning Reserve	¼ A=330 MW NERC, NPCC Rule
10 Min Total Reserve	1,200 MW NYSRC Rule
30 Min Reserve	1,200 MW NERC, NPCC 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



NYC (Zone J)	
10 Min Spinning Reserve	0 MW
10 Min Total Reserve	500 MW
30 Min Reserve	1,000 MW

SENY (Zone G - K)	
10 Min Spinning Reserve	0 MW
10 Min Total Reserve	0 MW
30 Min Reserve	1,300 - 1,800 MW

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

Reserve Pricing

- **Each reserve product (location and product type) produces a shadow price for procurement of the reserve product.**
 - The shadow price is the cost to procure one additional MW of the reserve product in question.
 - The shadow price includes any lost opportunity cost a resource may incur when being scheduled to provide reserves rather than to produce energy.
 - The maximum shadow price value is capped based on the pricing values of the operating reserve demand curves
- **The NYISO's market pricing renders resources indifferent between providing reserves or energy.**
 - Shadow prices cascade in the calculation of reserve clearing prices, ensuring that resources are compensated for the value provided to the grid.

Maximum Reserve Shadow Prices (based on ORDCs)

Reserve Product	NYCA	EAST	SENY	NYC	LI
SPIN	S.P.3 = \$775/MWh	S.P.6 = \$40/MWh	S.P.9 = \$40/MWh (0 MW requirement)	S.P.12 = \$25/MWh (0 MW requirement)	S.P.15 = \$25/MWh (0 MW requirement)
10 Total	S.P.2 = \$750/MWh	S.P.5 = \$775/MWh	S.P.8 = \$40/MWh (0 MW requirement)	S.P.11 = \$25/MWh	S.P.14 = \$25/MWh
30	S.P.1 = \$40, \$100, \$175, \$225, \$300, \$375, \$500, \$625, \$750/MWh	S.P.4 = \$40/MWh	S.P.7 = \$40, \$500/MWh	S.P.10 = \$25/MWh	S.P.13 = \$25/MWh

Reserve Clearing Price Calculations

Reserve Product	NYCA	EAST	SENY	NYC	LI
SPIN	S.P.1 + S.P.2 + S.P.3	S.P.1 + S.P.2 + S.P.3 + S.P.4 + S.P.5 + S.P.6	S.P.1 + S.P.2 + S.P.3 + S.P.4 + S.P.5 + S.P.6 + S.P.7 + S.P.8 + S.P.9	S.P.1 + S.P.2 + S.P.3 + S.P.4 + S.P.5 + S.P.6 + S.P.8 + S.P.9 + S.P.10 + S.P.11 + S.P.12	S.P.1 + S.P.2 + S.P.3 + S.P.4 + S.P.5 + S.P.6 + S.P.7 + S.P.8 + S.P.9 + S.P.13 + S.P.14 + S.P.15
10 Total	S.P.1 + S.P.2	S.P.1 + S.P.2 + S.P.4 + S.P.5	S.P.1 + S.P.2 + S.P.4 + S.P.5 + S.P.7 + S.P.8	S.P.1 + S.P.2 + S.P.4 + S.P.5 + S. P.7 + S.P.8 + S.P.10 + S.P.11	S.P.1 + S.P.2 + S.P.4 + S.P.5 + S.P.7 + S.P.8 + S.P.13 + S.P.14
30	S.P.1	S.P.1 + S.P.4	S.P.1 + S.P.4 + S.P.7	S.P.1 + S.P.4 + S.P.7 + S.P.10	S.P.1 + S.P.4 + S.P.7 + S.P.13

Heterogenous Aggregation Example

Operating Reserves in Practice – Aggregations

- **The NYISO’s revised market design will enable an Aggregation of heterogenous DER, with differing individual capabilities, to provide the services they are qualified to provide in an Aggregation, within the bounds of NYISO’s software capabilities and consistent with applicable reliability standards.**
- **An Aggregation’s reserve award is a function of its operating characteristics and the NYISO’s nested Reserve design, co-optimized unit commitment and economic dispatch, and system needs.**
 - The NYISO simultaneously co-optimizes Energy, 10-minute synchronous Reserves, 10-minute Non-Synchronous Reserves, 30-Minute Reserves, and Regulation Service in its SCUC, RTC and RTD market software
 - The NYISO’s nesting of Reserves by location and type permits higher quality Reserves products to be used to address the need for lower quality Reserves products while minimizing as-bid production costs.
 - The market software also considers physical limitations on each resource's capability. For example, an Aggregation with available MWs but limited ramp capability may be awarded a 10-minute reserve schedule consistent with its ability to ramp over 10 minutes and may also be awarded a 30-minute reserve schedule based on its ability to continue to ramp from minute 10 to minute 30 (i.e., 20 minutes).

Aggregation Operating Reserve Categories

- An Aggregation's ability to provide operating reserves will be classified as any one of the following:
 - Synchronized Capable: The Aggregation can provide synchronized reserves (10- or 30-minute)
 - Non-synchronized Capable: The Aggregation cannot provide synchronized reserves, but it can provide 10-minute non-synchronized and/or 30-minute reserves
 - 30-minute Capable: The Aggregation cannot provide synchronized reserves or 10-minute non-synchronized reserves, but it can provide 30-minute reserves
 - Not Capable: The Aggregation cannot provide Operating Reserves

Example

■ Consider ‘Aggregation A’:

- a 5 MW (20 MWh) ESR that is capable of providing up to 5 MW of synchronous 10-minute Operating Reserves;
- a 10 MW wind turbine, an Intermittent Power Resource that is not eligible to provide Operating Reserves in the New York Control Area;
- a 5 MW gas turbine that can start-up in 10 minutes or less, and that is capable of providing up to 5 MW of 10-minute non-synchronous Operating Reserves; and
- a 5 MW gas turbine that can start-up in more than 10 minutes but less than 30 minutes, and that is capable of providing up to 5 MW of 30-minute Operating Reserves.

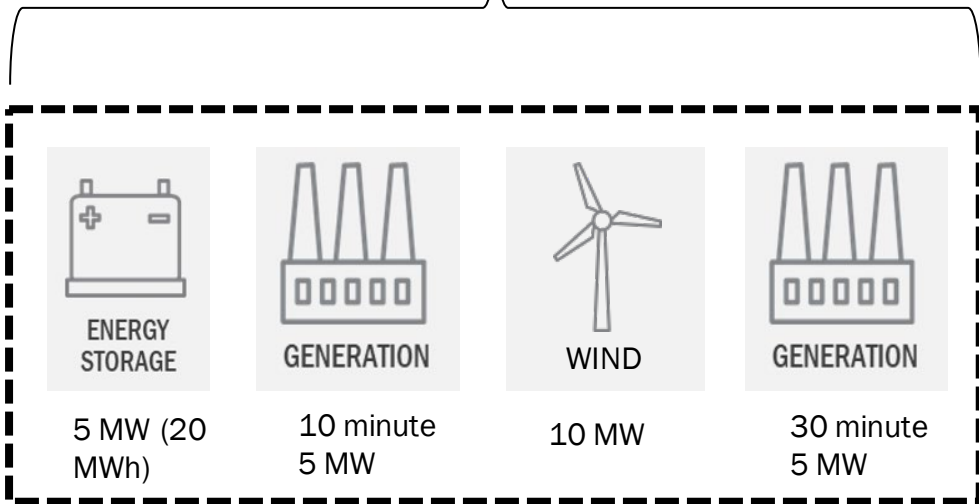
Example

- **Aggregation A will be required to select, during registration, the operating reserve products it can provide based on the characteristics of its comprising DER.**
 - The NYISO's revised proposal will allow a heterogenous Aggregation to provide a service if only some of its DER can provide that service – this is an enhancement to the previously accepted 2019 market design
- **The Aggregation will fall into one of the four categories described on slide 30 – its declaration must either be for synchronous or non-synchronous reserves, but not both.**
 - For more information on the dynamics of reserve products in the NYISO market software, please refer to the September 20 ICAPWG presentation here: [NYISO FERC Order No. 2222 Compliance – Part 2](#)

Example

✓ "Dispatchable Resource" = Always Online

'Aggregation A'



- 'Aggregation A' is eligible to provide:

- Up to 5 MW Synchronous Reserves (10- or 30-minute) based on the capability of the ESR

OR

- Up to 10 MW 10-Minute Non-Synchronous Reserves based on the ESR and gas turbine

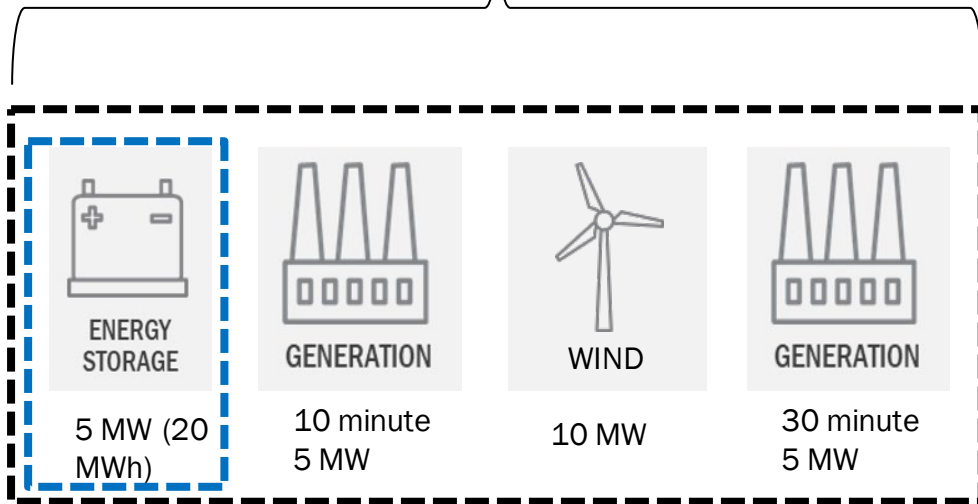
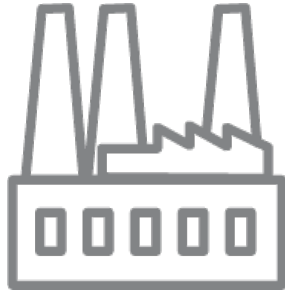
OR

- Up to 15 MW 30-Minute Non-Synchronous Reserves based on the ESR, 10-minute gas turbine, and 30-minute gas turbine

Example – Synchronized

✓ "Dispatchable Resource" = Always Online

'Aggregation A'

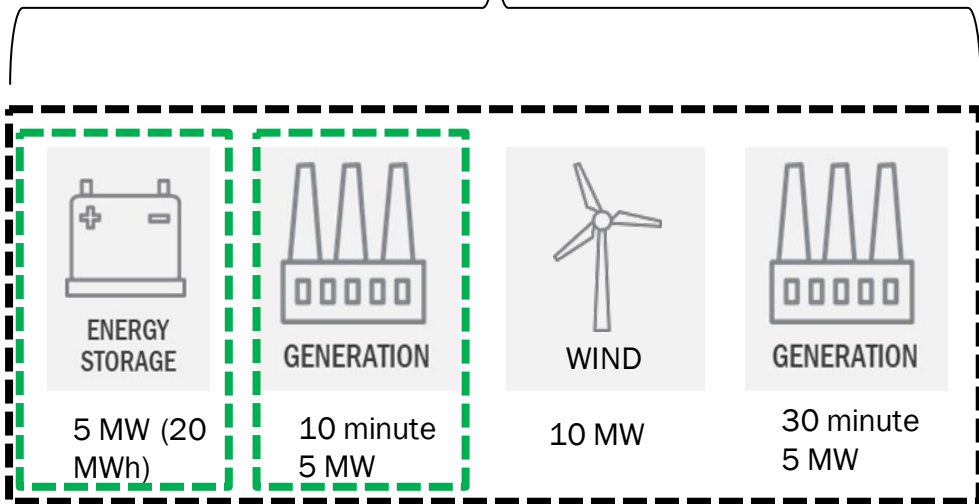


- Assume the ramp rate of the ESR is 1 MW/minute
- Assume an aggregate ramp rate of 1 MW/minute
- 'Aggregation A' is eligible to provide:
 - Up to 5 MW Synchronous Reserves (10- or 30-minute) based on the capability of the ESR

Example - 10-minute Non-synchronized

✓ "Dispatchable Resource" = Always Online

'Aggregation A'

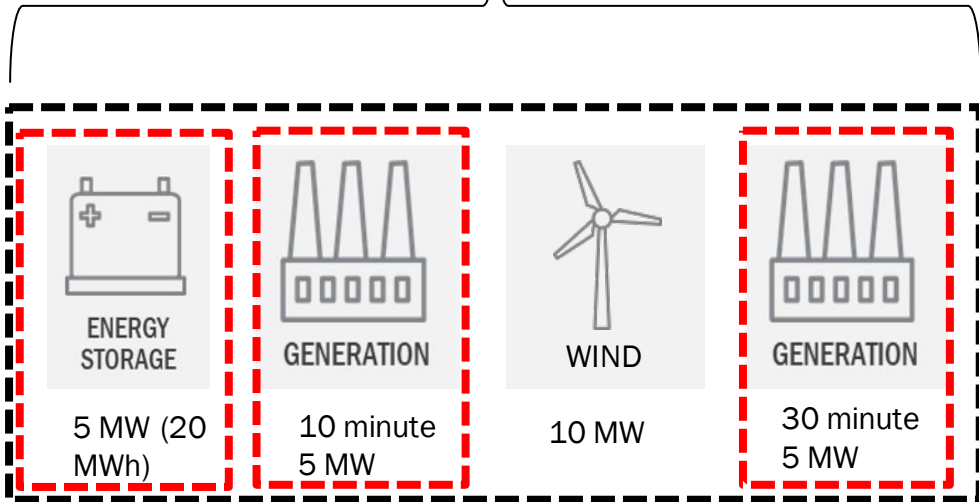


- Assume:
 - Ramp rate of the ESR is 1 MW/minute
 - Ramp rate of the 10-minute gas turbine is 0.5 MW/minute
- Assume an aggregate ramp rate of 1.5 MW/minute to provide 10-minute non-synchronized reserves
- 'Aggregation A' is eligible to provide:
 - Up to 10 MW 10-Minute Non-Synchronous Reserves based on the ESR and gas turbine

Example - 30-minute

✓ "Dispatchable Resource" = Always Online

'Aggregation A'



- Assume:
 - Ramp rate of the ESR is 1 MW/minute
 - Ramp rate of the 10-minute gas turbine is 0.5 MW/minute
 - Ramp rate of the 30-minute gas turbine is 0.25 MW/minute
- Assume an aggregate ramp rate of 1.75 MW/minute to provide 30-minute reserves
- 'Aggregation A' is eligible to provide:
 - Up to 15 MW 30-Minute reserves based on the ESR, 10-minute gas turbine, and 30-minute gas turbine

Next Steps

Next Steps

- **NYISO will file all applicable tariff revisions to comply with FERC's June 2022 Order on or before November 14, 2022.**
- **NYISO will note in its compliance filing an effective date for Order 2222.**

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

Questions?