New York ISO
Independent System Operator

NYISO FERC Order No. 2222 Compliance – Part 2

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Agenda

- Background & Overview
- FERC Order No. 2222 Requirements – Part 2
- Operating Reserves for Heterogenous Aggregations of DER
- Next Steps

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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 will present the modifications to stakeholders as available before filing
- Today's discussion will review the second set of tariff modifications related to:
  - Locational Requirements
  - DER Interconnection
  - Modifications to List of Resources in Aggregation
  - Coordination between the ISO, Aggregator, and Distribution Utility
- The NYISO presented Part 1 of the compliance obligations on August 29, 2022, and anticipates making one additional presentation addressing the remaining compliance obligations in October.

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Locational Requirements

Transmission Node Identification and Update

- **The June 2022 Order directed the NYISO to include in the Services Tariff the criteria used to:**
  - Establish the set of Transmission Nodes in the NYCA at which individual distributed energy resources may aggregate; and
  - Review and, if needed, update the identified Transmission Nodes on an annual basis.
- **The NYISO will update Services Tariff Section 4.1.10.2 (Aggregation Electrical Location) to include criteria that will be evaluated in establishing Transmission Nodes**
  - These criteria were used during the initial identification of Transmission Nodes and will be the same criteria used in the annual reevaluation of the Transmission Nodes to determine whether updates are needed.

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Criteria Used for Transmission Node Selection

- The NYISO has worked with the New York utilities to identify (i) the criteria used to establish Transmission Nodes, and (ii) the initial set of Transmission Nodes (as described in the NYISO's November 19, 2021, Response to FERC's Data Request)
- The factors used to establish Transmission Nodes included:
  - (i) transmission and/or distribution system load pockets;
  - (ii) thermal limits of local transmission and distribution lines and protective equipment;
  - (iii) Distribution Utility and Member System footprints;
  - (iv) concentration of load relative to total average system load; and
  - (v) distribution system substation topology.
- Each distribution system also has its own unique characteristics and therefore Member Systems may also apply additional evaluation criteria based on the topology and conditions of that system

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Transmission Node Change Notification

- In its 2019 DER and Aggregation participation model, the NYISO proposed to publish any changes to the list of Transmission Nodes at least 90 days before the beginning of a Capability Year to allow Aggregators time to make any necessary changes to their Aggregations.
- The NYISO's Compliance Filing established a 60-day period for Distribution Utility review of new or modified DER. As described in comments on the Compliance Filing, the addition of the 60-day review period necessitates that the NYISO publish new/modified Transmission Nodes further in advance of the beginning of a Capability Year.
- The NYISO agreed with Commenters and the June 2022 Order directed the NYISO to modify section 4.1.10.2 of its Services Tariff to state that notice of changes to Transmission Nodes will be posted 150 days before the start of the Capability Year.
- The NYISO will revise Section 4.1.10.2 consistent with FERC's directive.

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DER Interconnection

Application of NYISO Small Generator Interconnection Procedures (SGIP)

- In Order No. 2222, the Commission declined to exercise jurisdiction over the interconnection of DER to distribution facilities where such interconnection is for the purpose of participating in RTO/ISO markets exclusively as part of a DER Aggregation
- NYISO's Order No. 2222 compliance filing proposed to modify OATT Attachment Z, Sections 32.1.1 and 32.5 to clarify that the Small Generator Interconnection Procedures (SGIP) do not apply to the interconnection of facilities participating in the ISO markets exclusively through an Aggregation.
- The NYISO's proposed tariff language did not specify that the DER interconnections not subject to the SGIP (that seek to interconnect solely to participate as an Aggregation) are only those interconnecting to distribution facilities. The June 2022 Order directed the NYISO to modify OATT Attachment Z to make clear that only those DER that propose to interconnect to distribution facilities for the purposes of participating in the wholesale markets through an Aggregation are not subject to the SGIP
- NYISO will revise OATT Attachment Z, Sections 32.1.1 and 32.5 consistent with FERC's directives

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ERIS and CRIS for DER

- The June 2022 Order found the language of Section 25.1.1 of Attachment S —which incorporates the SGIP by reference, and to which distribution-level Aggregations are exempt—creates an apparent inconsistency and requires clarification as to how such facilities obtain CRIS and ERIS.
- The definition of ERIS in section 25.1.2 of Attachment S refers only to a Large Generating Facility, Class Year Transmission Project, or Small Generating Facility.
- The June 2022 Order directed NYISO to: (1) revise OATT Attachment S and any other affected tariff provisions to resolve the apparent inconsistencies and ambiguities in its tariff or explain why such revisions are not necessary; and (2) identify and explains the relevant tariff provisions that codify the rules by which DERs that are not subject to the Small Generator Interconnection Procedures may obtain CRIS and ERIS.
- The NYISO will revise the definition of ERIS in OATT Attachment X and the applicability section of Attachment Z (section 32.1.1) to clarify that ERIS is a service applicable to DERs not subject to the SGIP deemed to be the MW amount of the generating facility's net seasonal capacity (in aggregate where it includes multiple energy production devices), as memorialized in the applicable interconnection agreement with the respective Connecting Transmission Owner
- The NYISO will revise OATT Attachment S (Sections 25.1.1 and 25.3.1) to clarify that distribution-level DER may obtain CRIS just as any other facility (I.e., 2 MW or smaller can obtain CRIS without a deliverability evaluation, DERs larger than 2 MW can obtain CRIS through an Expedited Deliverability Study or Class Year Study) per existing procedures identified in OATT 25.

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Modifications to List of Resources in Aggregation

Distribution Utility Review Communication and Data Sharing Protocols

- In its Order 2222 compliance filing, the NYISO explained that it would automatically notify the Distribution Utility when an Aggregator's submission of DER/Aggregation data is complete.
- The NYTOs expressed concern of the potential that such notification may go unnoticed, and that a DER or Aggregator may be enrolled in the wholesale markets without Distribution Utility review and approval.
- Therefore, the NYISO proposed to establish communication protocols to provide the Distribution Utility with notice ten days prior to the expiration of the 60-day review period that the Distribution Utility review period was close to expiration.
- The NYISO has collaborated with the Joint Utilities to establish said protocols.

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Distribution Utility Review of Changes to an Aggregation

- The Compliance Filing proposed that Distribution Utilities have 60 calendar days to review the reliability and safety impact of each new DER and any incremental change to an Aggregation.
- The June 2022 Order stated that "any incremental change" must be revised so that the distribution utility review period applies to "any change" to an Aggregation.
- NYISO will delete the word "incremental" from Services Tariff Section 4.1.10.7.1.

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List of DER in Aggregation

- The June 2022 Order also required the NYISO to revise its tariff to specify that Aggregators must update (i) the list of DER in an Aggregation, and (ii) any associated information and data when the modification to the Aggregation results in a change to the Aggregation's performance.
- The NYISO will revise MST 4.1.10.3 accordingly.

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Coordination between the ISO, Aggregator, and Distribution Utility

Distribution Utility Review Criteria

- The June 2022 Order required the NYISO to include in its tariff criteria by which the Distribution Utilities will determine whether each DER is capable of participating in an Aggregation.
- The NYISO's November 19, 2021, Data Request Response identified criteria that the Distribution Utilities may use to evaluate DER safety and reliability, but those criteria were not included in the NYISO's proposed tariff revisions.
- The NYISO has collaborated with the Joint Utilities to develop a representative list of criteria categories that it expects will characterize the Distribution Utility reviews of DER upon the program's deployment.
  - These criteria will be included in the revised draft MST

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Distribution Utility Review Showing

- Order 2222 required the Distribution Utility to provide a showing that explains any safety and reliability findings from its review of each DER.
- The June 2022 Order found that while NYISO's Data Request Response did explain this requirement, its compliance filing did not contain the accompanying tariff modification to require the DU to provide a showing to the NYISO.
- The June 2022 Order directed NYISO to revise its tariff to include the requirement that the Distribution Utility submit, as necessary, a showing that a DER presents significant risks to the reliable and safe operation of the distribution system.
- The NYISO will revise MST Section 4.1.10.7 accordingly.

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Operating Reserves for Heterogenous Aggregations of DER

NYISO 2019 DER Market Design

- **The NYISO's FERC-accepted 2019 DER and Aggregation market design contained the following provision in MST 15.4.1.2.1:**
  - "The following types of resources are only eligible to provide Spinning Reserve if all of the generating units use inverter-based energy storage technology and meet the criteria set forth in the ISO Procedures…"
- **The NYISO's market design allows for provision of an operating reserves product only if each DER comprising an Aggregation is capable of providing the product.**
  - For example, an Aggregation with 3 energy storage resources each capable of providing spinning reserves, and 2 solar facilities (which are ineligible to provide any operating reserve product) would be ineligible as an Aggregation to provide spinning reserves, even though 3 out of the 5 facilities in the Aggregation are technically capable of providing the service.
- **This design was accepted by FERC in 2020, and the NYISO has designed its initial DER deployment software based on this rule.**

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FERC Order No. 2222

- **June 2022 Order:**
  - "…we find that any DERs that an Aggregator uses to satisfy NYISO's relevant technical, operational, and/or performance requirements should be allowed to provide ancillary services through aggregation."
  - "…so long as some of the DERs in the Aggregation can satisfy the relevant requirements to provide certain ancillary services (e.g., the one-hour sustainability requirement), we find that those DERs should be able to provide those ancillary services through aggregation, in accordance with the goal of Order No. 2222 to allow distributed energy resources to provide all services that they are technically capable of providing through aggregation."

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Request for Rehearing/Clarification

- The NYISO filed a request for clarification/rehearing with FERC on July 18, 2022
- The NYISO has not received a response from the Commission as of the date of this presentation
- In an effort to move its DER market design forward, the NYISO presents this proposal to its stakeholders for their consideration

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Proposed Operational Reserves (OR) Improvements for DER

- **The NYISO procures reserves using its security constrained unit commitment and economic dispatch software in Real-Time using the following information:**
  - Online status of the resource (Available/Unavailable for dispatch)
  - Upper Operating Limit (UOL)
  - Ramp rate (MW/minute)
  - Energy offer
- **A heterogenous DER Aggregation will always be considered online and available for dispatch – the NYISO will maintain a UOL at the Aggregation-level and will evaluate an Energy offer at the Aggregation-level.**
  - Adding additional parameters to understand the operation of each individual DER would drastically alter the NYISO's current planned framework for Aggregation dispatch and would further delay the implementation of DER to ensure that the appropriate market design revisions can take place.

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Proposed OR Improvements for DER

- The NYISO is not capable of treating a heterogeneous DER Aggregation as being eligible to simultaneously provide both Synchronous and Non-Synchronous reserves or both 10- and 30-minute reserves based on the differing capabilities of the individual DER that participate in the Aggregation.
- Please see the numerical example on the following slides for an explanation of the reliability concerns associated with this proposal.

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Example

- **For the purposes of this example, consider 'Aggregation A' comprised of:**
  - a 5 MW (20 MWh) battery 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 30 minutes or less, and that is capable of providing up to 5 MW of 30-minute Operating Reserves.

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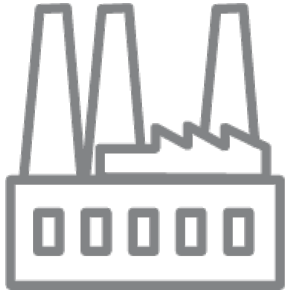
Example

✓ "Dispatch Only" = Always Online

‘Aggregation A’



Bidding, Scheduling, Dispatch, and Settlement

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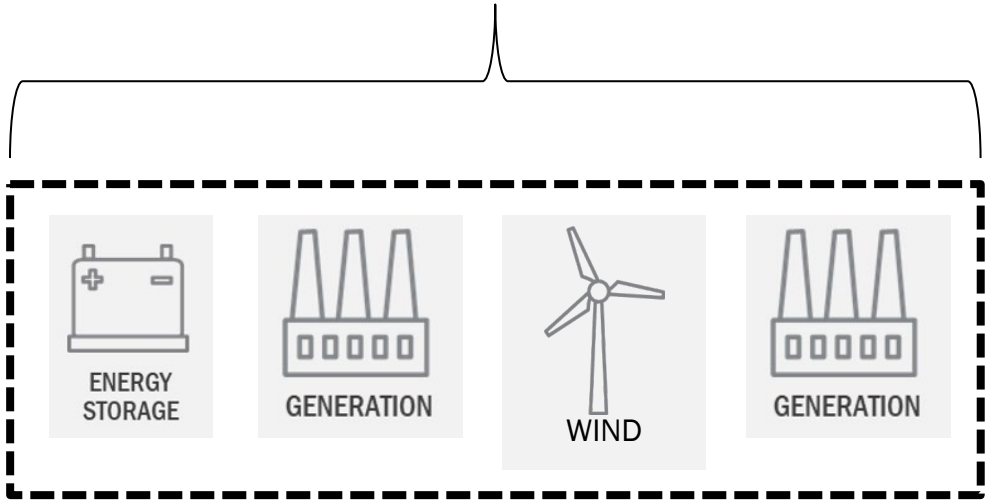

- The NYISO does not have awareness of the online status, ramp capability, fuel availability (e.g., state of charge), or local conditions (e.g., wind forecast) that may impact the operability of each individual DER.
- The NYISO will award all Energy and Reserves to Aggregation A based on the enrollment and bidding parameters submitted by the Aggregator to reflect the total performance capabilities of the Aggregation.

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Incompatibility of Reserve Products

- **Consider Aggregation A:**
  - a 5 MW (20 MWh) battery that is capable of providing up to 5 MW of 10-minute synchronous 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 30 minutes or less, and that is capable of providing up to 5 MW of 30-minute Operating Reserves.
- **Aggregation A operating characteristics:**
  - UOL: 25 MW
  - LOL: -5 MW
  - Response Rate: 1.5 MW/minute
- **If it were possible to allow the Aggregation to be eligible to provide multiple ancillary service products simultaneously, this Aggregation could provide:**
  - 5 MW of 10-minute synchronous reserves, AND
  - 5 MW of 10-minute nonsynchronous reserves, AND
  - 5 MW of 30-minute reserves
- **However, the existing market software cannot distinguish between the Operating Reserve products that an Aggregation makes available, because the NYISO is not monitoring or managing each DER within the Aggregation.**
  - Under the NYISO's accepted market design for DERs, each Aggregation participates in the NYISO's Energy and Ancillary Services markets as a (one) distinct Resource
  - Each Resource that participates in the markets can provide one Operating Reserves product
    - The NYISO's software is not capable of differentiating between Operating Reserve products that a Resource (an Aggregation) provides
  - The Aggregator could enhance its ability to provide Operating Reserves by creating separate aggregations for each DER that are each capable of providing a distinct Operating Reserve product

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Other Considerations

- **Additionally, the NYISO's market software, without substantial redesign, is not able to recognize that only the battery in this Aggregation is physically capable of providing up to 5 MW of synchronous 10-minute reserves – RTC and RTD could instead award the Aggregation up to 15 MW of synchronous 10-minute reserves based on:**
  - The battery's ability to provide 10-minute synchronous reserves
  - The Aggregation's UOL of 25 MW
  - The Aggregation's ramp rate of 1.5 MW/min, and
  - The Aggregation's total capability to provide Operating Reserves (15 MW)
- **The NYISO is concerned that a redesign of its market software could compromise the sequencing of RTC/RTD, and the 11AM daily DAM schedule post**
  - This concern stems from the need to add additional decision variables to the algorithm to track each and every distinguishing DER attribute and the DER status for all DERs in an Aggregation
  - This is a large departure from the Aggregation design that the NYISO proposed and FERC accepted
- **Even if the described redesign could be accommodated, the ex-ante nature of the NYISO market, where dispatch instructions have not been executed by the Aggregation before the next dispatch occurs, means that there is still a potential that the NYISO could issue infeasible schedules to the Aggregation**

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Design Enhancement

- **Upon implementation of Order 2222 tariff and software, the NYISO proposes to implement the following construct detailed in the July Request for Rehearing/Clarification, Page 8:**
  - "The NYISO proposes to permit the Aggregator for each heterogeneous DER Aggregation to choose during market registration whether the Aggregation will provide 10-minute synchronized Operating Reserves, or 10-minute non-synchronized Operating Reserves or 30- minute Operating Reserves. The NYISO will then permit all of the DER that participate in the heterogeneous DER Aggregation that are capable of providing the selected Operating Reserve product, or that are capable of providing a higher quality Operating Reserve product to provide Operating Reserves"
- **The Aggregator will remain responsible for managing its Aggregation to meet all reserve award obligations**

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Synchronous and Non-Synchronous Reserves

- **To implement the Behind-the-Meter Net Generation (BTM:NG) model, the NYISO developed the capability to treat operating reserves provided by dispatchable resources as non-synchronous.**
  - This design allows NYISO to extend operating reserve product eligibility to resources whose online/offline status it does not have direct access.
  - For a heterogenous Aggregation of DER, this rule will enable the 'dispatchable' Aggregation to provide Non-Synchronous Reserves, if that is preferred over Synchronous Reserves by the Aggregator.

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NYISO's Proposed Enhancement

- **Consider 'Aggregation A' comprised of:**
  - a 5 MW (20 MWh) battery 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 30 minutes or less, and that is capable of providing up to 5 MW of 30-minute Operating Reserves.

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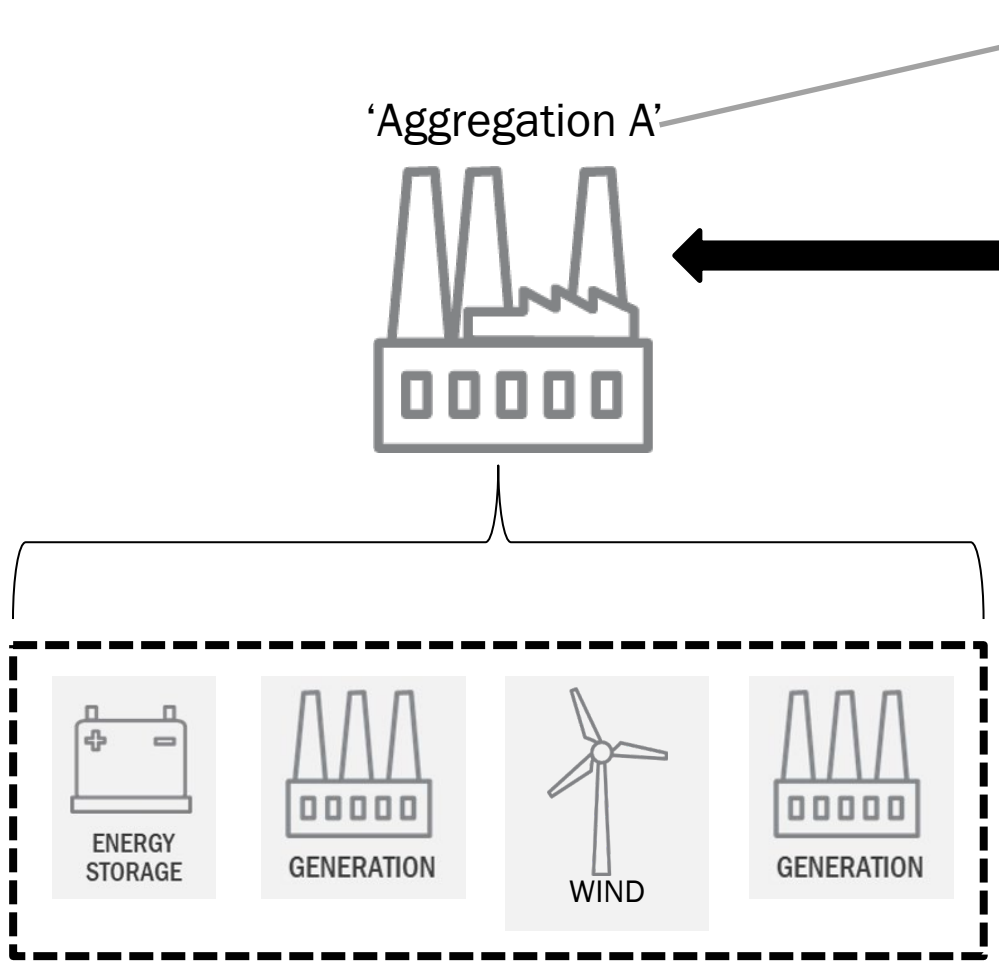
Example

✓ "Dispatchable Resource" = Always Online



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- **Aggregation 'A' is eligible to provide:**
  - 5 MW Synchronous Reserves based on the capability of the battery

  OR
  - 10 MW 10-Minute Non-Synchronous Reserves based on the battery and gas turbine

  OR
  - 15 MW 30-Minute Non-Synchronous Reserves based on the battery, 10-minute gas turbine, and 30-minute gas turbine

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Operating Reserve Limit

- The NYISO will also develop, as part of this enhancement, an Operating Reserve Limit to allow an Aggregator to indicate to the NYISO when and by how much the Operating Reserves MW capability changes for a given Aggregation.
- This feature will be an enhancement to the NYISO's economic dispatch software, enabling NYISO operators to avoid inappropriately requesting reserves from an Aggregation that is not capable of providing them, for whatever reason.

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Next Steps

Next Steps

- **NYISO expects to present remaining tariff revisions to comply with FERC's June 2022 Order at the October 20 ICAPWG.**
  - Topics to be discussed include:
    - Coordination between the ISO, Aggregator, and Distribution Utility
    - Metering and Telemetry System Requirements
    - Information and Data Requirements
    - Implementation Details
- **Please send any questions that were not addressed during this presentation to: DER_Feedback@nyiso.com**

New York ISO

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

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Questions?