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Independent System Operator

Hybrid Storage *Aggregation* Resource (HSR) Model: Project Kick-Off

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2021 Approved Market Project

- The 2021 Hybrid Aggregation Model project deliverable is a Q4 Market Design Complete.
- 2021 Project Schedule Milestone Update
- 2021 Approved Market Projects Product and Project Management
  - See Project 14 (Page 17 of 26)

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Agenda

- Background
- CSR, ESR, and DER Participation Models
- 2021 Project Scope
- Planned Timeline & Next Steps
- Appendix: 2020 Hybrid Storage Model: CSR

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Background

Grid in Transition – A Path Forward in 2021

- **The NYISO's wholesale markets can serve as an effective platform for achieving New York State environmental objectives.**
  - Through active engagement with stakeholders and policymakers, the NYISO is developing design improvements to meet the future challenges expected to arise with high levels of intermittent renewable and distributed energy resources.
- **The plan includes a set of enhancements that work together coherently and efficiently to satisfy New York's changing grid reliability needs.**
  - These opportunities are organized across three main points of focus (discussed on the next slide)
  - Some opportunities will require immediate attention while others might be something to consider as more information and experience becomes available.

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Grid in Transition – A Multifaceted Approach

- **Aligning Market Incentives**
  - Carbon Pricing
  - Comprehensive Mitigation Review
- **Prepare for New Technologies**
  - DER Participation Model
  - Energy Storage Participation Model
  - Hybrid Co-Located Model
  - Hybrid Aggregation Model
  - Large Scale Solar on Dispatch
- And more....

Aligning Competitive Markets and New York State Clean Energy Objectives

- **Review Energy & Ancillary Services Design for Incenting Flexibility**
  - More Granular Operating Reserves
  - Regulation Up & Down Services
  - Ramping Services
  - Grid Services from Renewable Generators
- **Evolve the Day Ahead and Real-Time Markets to improve managing Forecast Uncertainty**
- **Track certain market metrics to evaluate incentives for flexible resources**
- And more...

Valuing Resource & Grid Flexibility

- **Enhancements to Resource Adequacy Modeling**
- **Improving Installed Capacity Market Incentives**
- **Review Capacity Market Resource Ratings to Reflect Reliability Contribution**
  - Expanding Capacity Eligibility
  - Tailored Availability Metric

Improving Capacity Market Valuation

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Background

- The NYISO's market rules currently allow an Energy Storage Resource (ESR) and a Wind or Solar Generator to be co-located at a single point of interconnection and share a common injection limit. These rules were introduced in the Co-located Storage Resource (CSR) market participation model.
- However, those rules do not permit these resources to share the same point identifier (PTID). Instead, each resource type must be separately metered, bid, and scheduled.
- State and Federal initiatives such as REC procurements provide incentives for developers to couple storage and intermittent renewable assets. Such programs are aimed at improving the availability of intermittent resources and firming their output.

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CSR, ESR, and DER Participation Models

Co-located Storage Resources (CSR) Participation Model

- **Provides market rules for co-located front-of-the-meter wind or solar generators and energy storage resources to share a single point of interconnection**
  - Status: Market rules filed with FERC in February 2021, with an expected implementation of Q4 2021.
- **The CSR model is for a pairing of a single ESR and a single wind or solar Intermittent Power Resource (IPR) only.**
  - Hybrid Storage Aggregation Resource ("HSR") Participation Model will look to expand this to be more than two resources and additional types of resources.

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Energy Storage Resources (ESR) Participation Model

- **Provides market rules for ESRs to participate in NYISO's Energy, Ancillary Services, and Installed Capacity markets**
  - Status: Implemented
- **The ESR model is for standalone storage resources and homogenous Aggregations of ESRs.**
  - Coupling storage with another resource type creates additional complexity that is not addressed within the ESR model.
  - HSR Participation Model will provide rules that permit an aggregation which includes at least one ESR and other Generator(s) to be co-located behind the same point of interconnection, share a single PTID, and act as a single market resource.

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Distributed Energy Resources (DER) Participation Model

- **Provides market rules for DERs to participate in NYISO's Energy, Ancillary Services, and Installed Capacity markets**
  - Status: Market Design completed; FERC Order No. 2222 filing due in July 2021
  - Continued software design efforts and deployment planned in 2021 with an expected implementation of Q4 2022
- **The DER model permits aggregation of resources across multiple locations and an Individual Resource may leave/join Aggregations at the start of a calendar month.**
  - HSR Participation Model will only apply to Aggregations located at a single physical location and may not allow for swapping Aggregations.
- **The DER model only allows resources up to 20 MW injection capability.**
  - The HSR model will accommodate resources with greater than 20 MW injection capability.

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2021 Project Scope

Hybrid Storage *Aggregation* Resource ("HSR") Participation Model

- This project is distinct from the DER and ESR Integration initiatives, but it will build on work completed as part of those initiatives. This project is a continuation of the 2020 Hybrid Storage model effort and will develop market rules that allow at least one ESR and other Generator(s) to be co-located behind the same point of interconnection, share a single PTID, and act as a single market resource.
- It is reasonable to expect that the design could be multifaceted, where some elements of the design are advanced faster than others.
- The 2021 project deliverable is a Q4 Market Design Complete.

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Project Scope

- **This project will explore different aspects related to participation of hybrid resources, such as:**
  - Participation in NYISO's Energy market
  - Provision of Ancillary Services, including Operating Reserves, Regulation, and voltage support
  - Participation in NYISO's Installed Capacity market
  - Settlement process
  - Modeling for interconnection, planning and operations
  - Metering requirements
- **The project will evaluate the changes required to enable hybrid storage aggregated resources to receive a single dispatch schedule.**

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Planned Timeline & Next Steps

Stakeholder Engagement Plan

- **Q1 2021**
  - Initial stakeholder discussions
- **Q2 & Q3 2021**
  - Continue to solicit and share feedback from stakeholders
  - Consider concepts based on feedback provided
  - Develop market design and discuss tariff revisions
- **Q4 2021**
  - Present Market Design Complete to Stakeholders at BIC

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Next Steps

- NYISO would like to hear from Stakeholders if there are other areas to explore in this project.
- NYISO will continue discussions with stakeholders on different use cases.

Questions?

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit 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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Appendix: 2020 Hybrid Storage Model: CSR

Link to full presentation:
November 18, 2020 MC Presentation - Hybrid Storage Model: Co-located Storage Resources (CSR) Market Design Proposal

CSR Definitions

- **New terms have been added to Market Administration and Control Area Services Tariff (MST) 2 Definitions:**
  - Co-located Storage Resources ("CSR"): A wind or solar Intermittent Power Resource and an Energy Storage Resource that: (a) are both located behind a single Point of Injection (as defined in Section 1.16 of the OATT); (b) participate in the ISO Administered Markets as two distinct Generators; and (c) share a set of CSR Scheduling Limits. Resources that serve a Host Load may not participate in the ISO-Administered Markets as components of a CSR.
  - CSR Scheduling Limits: The CSR injection Scheduling Limit sets the maximum, combined Regulation Capacity, Operating Reserve and Energy injection schedules for, and the maximum net injection by a CSR's Generators. The CSR withdrawal Scheduling Limit sets the maximum, combined Regulation Capacity and Energy withdrawal schedules for, and the maximum net withdrawal by a CSR's Generators….

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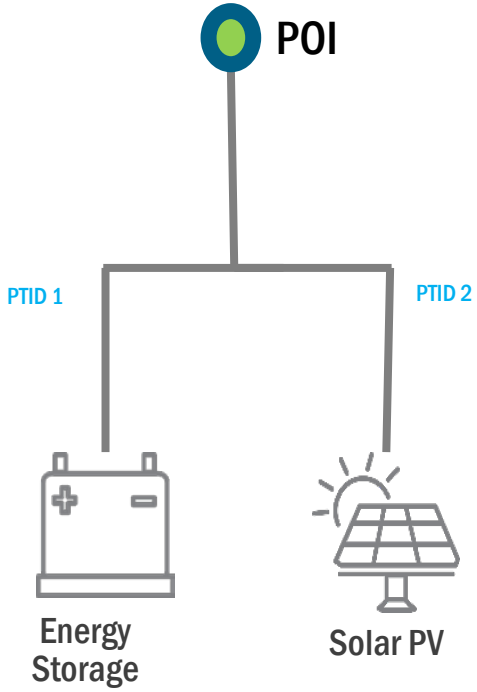
CSR Market Design Proposal Summary

- Each unit within a CSR will have a distinct PTID/bid/schedule/settlement
- A CSR shall be represented by a single Billing Organization and have a single bidding agent
- Each unit will participate under their own participation model. In the illustrative example shown here, Solar PV will participate as an IPR and Energy Storage will participate as an ESR
- A CSR scheduling constraint will be used to determine feasible energy and Ancillary Service schedules for units within the CSR
- All units within a CSR will be settled at the same LBMP
- Only the ESR unit will be eligible to provide Reserves and Regulation
- Subject to the existing supplier qualification criteria, both the ESR and IPR unit may be eligible to provide Voltage Support Service
  - The total MVAR capability from the CSR shall be based on the lesser of the reactive power capability of the individual VSS Supplier(s) or the total Reactive Power capability at the Point of Injection (POI) and not the sum of individual units' capabilities



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CSR Market Design Timeline

- **Market rules were filed with FERC in February 2021, with an expected implementation of Q4 2021.**
  - The NYISO requested an effective date of 60 days from the FERC filing for the interconnection provisions of the proposal.
  - The provisions NYISO asked to take effect 60 days from the FERC filing included tariff changes that are necessary to implement the interconnection rules as intended, which will also included tariff changes made to the Buyer Side Mitigation rules.

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