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Independent System Operator

Hybrid Storage: Proposed Market design updates and energy market tariff revisions for Co-located Storage Resources (CSR)

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Energy Market Design

ICAPWG/MIWG

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WebEx

Agenda

- Project Background
- Market Design Overview
- Proposed updates for CSR Scheduling limits
- Continued discussion on CSR Scheduling
- Proposed tariff revisions to Market Administration and Control Area Services Tariff (MST)
- Next Steps

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Previous Presentations on Market Design Proposal and Tariff revisions

Date	Working Group	Discussion Points and Links to Materials
01-13-20	ICAPWG/MIWG	Hybrid Storage Model Project Kick-Off https://www.nyiso.com/documents/20142/10252714/Hybrid%20Storage%20Model_MIWG_Jan%2013%202019.pdf/caf29abe-a431-a2d1-358d-43326153824a
04-14-20	ICAPWG/MIWG	Hybrid Storage Model – Initial Market Design Concept Overview https://www.nyiso.com/documents/20142/11904936/Hybrid%20Storage%20Model%20MIWG%2004142020%20Final.pdf/08841944-5251-4497-c52b-105151f150ad
05-11-20	ICAPWG/MIWG	Hybrid Storage Interconnection Proposal https://www.nyiso.com/documents/20142/12465245/Hybrid%20Storage%20Interconnection_0511%20MIWG_ICAPWG_FINAL.pdf/0740db02-ac07-e7f4-42b4-0b17da0e82eb
06-30-20	ICAPWG/MIWG	Hybrid Storage: Proposal for participation options https://www.nyiso.com/documents/20142/13434223/Hybrid%20Storage%206.30.2020%20ICAPWG_MIWG%20draft%20v5_final.pdf/176a272a-cc21-08ef-749a-c4a157fe2bc3
07-22-20	ICAPWG/MIWG	Hybrid Storage: Energy Market Participation rules for Co-located Storage Resources https://www.nyiso.com/documents/20142/13960166/Hybrid%20Storage%20ICAPWG%20MIWG%2007.22.20%20Energy%20Market%20Rules%20%20final.pdf/89700275-108e-8002-1e44-aaffe1712f0e

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Previous Presentations on Market Design Proposal and Tariff revisions(cont'd)

Date	Working Group	Discussion Points and Links to Materials
07-22-20	ICAPWG/MIWG	Hybrid Storage Model: Interconnection and Capacity https://www.nyiso.com/documents/20142/13960166/Hybrid%20Storage%20Interconnection%20and%20Capacity_07222020%20MIWG_FINAL.pdf/e3ba434d-a7ac-21d2-855d-c9cb249da614
08-10-20	ICAPWG/MIWG	Hybrid Storage: Market Design for Co-located Storage Resources https://www.nyiso.com/documents/20142/14404876/Hybrid%20Storage%20ICAPWG%20MIWG%20081020%20final.pdf/f414f66a-eee0-3a3c-393d-6b075fe5a1ba
08-19-20	ICAPWG/MIWG	Hybrid Storage: Proposed Energy market tariff revisions for Co-located Storage Resources (CSR) https://www.nyiso.com/documents/20142/14617012/02_Hybrid%20Storage%20Energy%20tariff%20ICAPWG%20MIWG%2008.19.20%20draft%20final.pdf/a6b81cb1-fe9a-72cd-2a8f-75befefc4afa
08-19-20	ICAPWG/MIWG	Hybrid Storage: Proposed CRIS and Interconnections tariff revisions for Co-located Storage Resources (CSR) https://www.nyiso.com/documents/20142/14617012/03_Hybrid%20Storage%20Interconnection%20tariff%20ICAPWG%20MIWG%2008.19.20_FINAL.pdf/dbae9003-8314-e5c0-d0c3-55a7d6384cec

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Project Background

A Grid in Transition – The Plan

- Carbon Pricing
- Comprehensive Mitigation Review
- DER Participation Model
- Energy Storage Participation Model
- Hybrid Storage Model

Aligning Competitive Markets and New York State Clean Energy Objectives

- Enhancing Energy & Shortage Pricing
  - Ancillary Services Shortage Pricing
  - Constraint Specific Transmission Shortage Pricing
  - Enhanced Fast Start Pricing
- Review Energy & Ancillary Services Product Design
  - More Granular Operating Reserves
  - Reserve Enhancements for Constrained Areas
  - Reserves for Resource Flexibility

Valuing Resource & Grid Flexibility

- Enhancements to Resource Adequacy Models
- Revise Resource Capacity Ratings to Reflect Reliability Contribution
  - Expanding Capacity Eligibility
  - Tailored Availability Metric
- Capacity Demand Curve Adjustments

Improving Capacity Market Valuation

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Project Background

- **This project seeks to explore market participation option(s) for co-located front-of-the-meter generators and energy storage resources**
  - Incentives along with improvements in flexibility and availability are motivating developers to couple generation resources with storage resources
- **Modifications to existing market rules will be developed to accommodate Co-Located Storage Resources (CSR) by the end of 2020**

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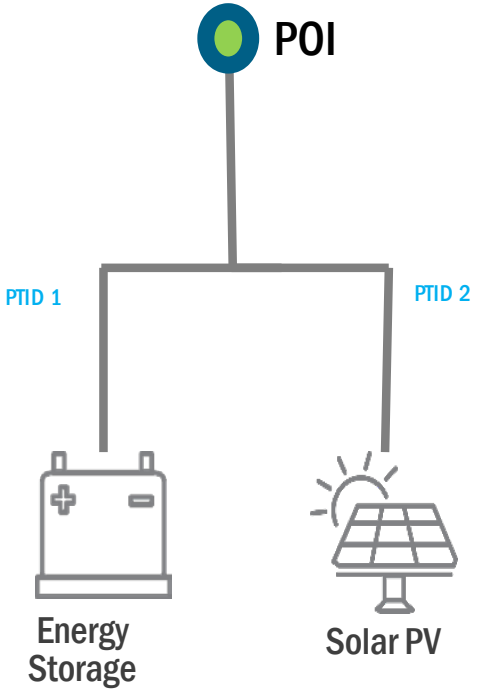
Market Design Overview for Co-Located Storage Resources (CSR)

CSR: Market Design Overview

- Each unit within a CSR will have a distinct PTID/bid/schedule/settlement
- The NYISO proposes to require a CSR to be represented by a single Billing Organization and to have a single bidding agent
- Units will participate under their own participation model. In the illustrative example shown here, Solar PV will participate as an Intermittent Power resource(IPR) and Energy Storage will participate under Energy Storage Resource (ESR) model
  - Only the ESR unit will be eligible to provide Reserves and Regulation
- The NYISO plans to utilize a CSR scheduling constraint to determine feasible energy and reserve schedule for units within the CSR
- All units within a CSR will be settled at the LBMP at Point of Injection



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Proposed Updates for CSR Scheduling limits

CSR Scheduling Limits

- **The NYISO plans to utilize a CSR scheduling constraint to determine feasible energy, operating reserves and regulation schedule for units within the CSR**
  - The CSR scheduling constraint will ensure that the unit schedules are within the CSR Scheduling Limits
- **There will be two CSR Scheduling Limits:**
  - CSR injection Scheduling Limit: Maximum injection of the CSR at the AC Point of interconnection
  - CSR withdrawal Scheduling Limit: Maximum withdrawal of the CSR at the AC Point of interconnection
- **The NYISO proposes that each CSR unit shall specify the CSR Scheduling Limits with its Day-Ahead and Real-Time bids**
  - Each of the CSR Scheduling Limits will be a MW submission only. There will not be a price ($/MW) associated with the CSR Scheduling Limit values
  - This capability will allow the CSR to reflect any physical operating problem like Inverter outage through the bids
- **The NYISO operators will be able to issue an Out of Merit (OOM) to change the CSR Scheduling Limits in Real-Time for ISO/TO reliability or at the Market Participant's request**

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Continued Discussion on CSR Scheduling

CSR Scheduling

- **At the 08/10/2020 ICAPWG/MIWG meeting the NYISO proposed that the solar or wind IPR unit shall not exceed its real-time dispatch schedule when the total CSR schedules are near the CSR injection Scheduling Limit**
  - The purpose of this treatment is to ensure that reliability services, such as operating reserves and regulation service, are deliverable by the ESR at times when the schedules of the CSR are near or equal to the CSR injection Scheduling Limit
- **The NYISO proposed that a "Do Not Exceed" limit (a "Wind and Solar Output Limit") on the IPR unit will be set if certain conditions are met:**
  - **Condition 1:** ESR unit either has a non-zero ancillary services award or a positive energy schedule; and
  - **Condition 2:** The sum of the CSR Generators Energy + Operating Reserves + Regulation Service schedules is greater than or equal to X % of the CSR Injection Limit
    - It is expected that X would be a relatively large value (~95%) and would be updatable by the system operators based on experience of IPR output variability
- **The purpose of today's discussion is to bring more clarity on the proposal and provide examples**

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CSR Scheduling

- **Applying a Wind and Solar Output Limit to the IPR will not prevent the CSR Generators from being scheduled up to the CSR injection Scheduling Limit**
  - Imposition of a Wind and Solar Output Limit is a post processing step that occurs after the schedules are determined by the market software
  - If the schedules from RTD satisfy both conditions described on previous slide, the IPR will receive a Wind and Solar Output Limit. When the limit is set, IPR unit is instructed to not exceed their schedules, for that singular (5 minute) RTD run
  - Subsequent RTD runs will true-up the IPRs schedule to the IPR's current forecast, so if wind or irradiance is increasing, the IPR's subsequent schedules should reflect that increase

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Energy Market Scheduling for CSR

- **Example of when Wind and Solar Output Limit is set:**
  - CSR IL = 100MW; IPR nameplate = 120MW; ESR nameplate = 50 MW; X = 95%
    - 0.95*CSR IL = 95MW

Units' Schedules					Whether Condition 1 is met	Whether Condition 2 is met	Solar and Wind Output Limit set
ESR Energy (MW)	ESR Reserve (MW)	ESR Reg (MW)	IPR Energy (MW)	Total units' schedule			
10	10	10	60	90	Yes	No	No
10	10	10	66	96	Yes	Yes	Yes
10	10	10	70	100	Yes	Yes	Yes
-10	5	5	98	98	Yes	Yes	Yes
0	0	0	97	97	No	Yes	No
10	0	0	87	97	Yes	Yes	Yes
-15	0	0	115	100	No	Yes	No

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Proposed Energy Market Tariff revisions

Initial, Partial Set of Proposed Energy Market Tariff Revisions

- Redlined version of Tariff revisions to reflect market participation rules of CSR proposal are posted with today's meeting materials
- Revised sections pertains to
  - MST 2 Definitions

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MST 2 - Definitions

- **The NYISO proposes revisions to these sections**
  - 2.23
  - CSR revisions in MST 2.23 are redlined
    - Other revisions in the sheet pertain to Solar on Dispatch (SoD) rules. The NYISO plans to bring proposed SoD tariff revisions to stakeholders in September 2020.
- **Proposed changes include :**
  - To address the real-time variability of energy deliveries from renewable intermittent resources that participate in a CSR, when the combined real-time net Energy, Regulation Service and Operating Reserves schedule for a pair of CSR Generators approaches the CSR injection Scheduling Limit, the ISO will impose a Wind and Solar Output Limit

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Next Steps

Next Steps

- The NYISO is targeting to return to a future working group to discuss the questions and concerns raised by stakeholders at the August 10 and August 19 ICAPWG/MIWG
- The NYISO will continue to review its proposed Energy and Ancillary Services Market Tariff revisions with stakeholders as they are developed
- NYISO will return to future working groups to discuss Tariff revisions to other sections

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Questions?

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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