

Hybrid Aggregated Storage (HSR) Model – Generator Deactivation Rules for HSRs, Energy Mitigation

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New Resource Integration

MIWG/ICAPWG

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Agenda

- **Project Background**
- **Generator Deactivation Rules for HSRs**
- **Energy Market Mitigation Proposal**
- **Next Steps**

Previous HSR Presentations (2022)

Date	Working Group	Topic/Links to Materials
March 25 th , 2022	MIWG/ICAPWG	<u>Hybrid Storage Model – Energy and Capacity Market Design Proposal</u>
May 11 th , 2022	MIWG/ICAPWG	<u>NYISO Hybrid Aggregated Storage Resource (HSR) Model Use Case and Proposal Update</u>
July 15 th , 2022	MIWG/ICAPWG	<u>Hybrid Aggregated Storage (HSR) Model – Energy and Ancillary Services Market Design Proposal Update</u>
August 9 th , 2022	MIWG/ICAPWG	<u>Hybrid Aggregated Storage (HSR) Model – Energy and Capacity Market Design Proposal</u>
August 24 th , 2022	MIWG/ICAPWG	<u>Hybrid Storage Model – CSR Market Design Proposal Updates</u>
September 12 th , 2022	MIWG/ICAPWG	<u>Hybrid Aggregated Storage (HSR) Model – CSR Market Design Proposal Updates (Settlements/Metering and Telemetry)</u>
September 12 th , 2022	MIWG/ICAPWG	<u>Hybrid Aggregated Storage (HSR) Model – Tariff Modifications, Energy and Settlements</u>
September 20 th , 2022	MIWG/ICAPWG	<u>Hybrid Aggregated Storage (HSR) Model – Tariff Modifications: Interconnection, ERIS, CRIS</u>
October 4 th , 2022	MIWG/ICAPWG	<u>Hybrid Aggregated Storage (HSR) Model – Tariff Modifications: Energy and Settlements</u>

HSR Project Background

HSR Project Background

- **An HSR consists of an Energy Storage Resource (ESR) and at least one Intermittent Power Resource (IPR) and/or Run-of-River (RoR) Hydro Resource**
 - This model will support several Wind, Solar, Landfill Gas, RoR Hydro, and ESR(s) resources that aggregate, and share a POI, and operate as a single dispatchable resource

HSR Generator Deactivation Rules

HSR Forced, Planned, and ICAP Ineligible Forced Outages

Planned/Forced Outages and IIFO of HSR Generators

- **Individual HSR component generators will be subject to the Outage States/Short Term Reliability Process rules**
 - Each of the HSR component generators will individually enter outage states (Forced Outage, IIFO)
 - The HSR will be required to take a derate to reflect its reduced capability when one of its component generators is out of service (OOS), but the HSR itself will not enter an outage state.
 - The loss of the ESR presents a more significant concern than the loss of an IPR or ROR Hydro, because the ESR is expected to help the HSR operator conform HSR output to the dispatch the NYISO issues

ESR Component Outages

- **The loss of the ESR component due to any type of outage will significantly alter the HSR's ability to operate, by:**
 - Affecting the HSR's operational capabilities, such as its response rates and ability to withdraw Energy from the grid
 - Affecting Ancillary Service Eligibilities (disqualified from providing Regulation Service and Operating Reserves)
 - Reducing/limiting the ability of the HSR to achieve the ISO's dispatch instructions
 - The NYISO anticipates that a HSR's ESR will ordinarily be used to provide supplemental Energy when the IPRs produce less Energy than the NYISO dispatch, and will absorb Energy (charge) when a HSR's IPR(s)/ROR output exceeds the dispatch instruction

In-Day Forced Outage of ESR Component

- **If a HSR's component ESR sustains a complete Forced Outage in real-time operation, then the entire HSR will be expected to exit the ISO markets for the remainder of the Operating Day**
 - The loss of the ESR is expected to have significant impacts on the HSR's ability to operate, making it more likely for RTD/RTC to issue infeasible real-time dispatch instructions or to assign infeasible Operating Reserve or Regulation Service schedules
 - The HSR will be expected to inform NYISO, per ISO procedures, that the ESR suffered a Forced Outage and promptly update its UOL and LOL to reflect the loss of the ESR
 - The HSR will be expected to promptly submit an Operating Reserve Limit of zero to reflect its inability to provide Operating Reserves
- **NYISO will derate the HSR to an off state until the Resource's Real-Time Bids can be removed**

IPR/LCRoR Hydro Forced Outage

- **The loss of an IPR or LCRoR Hydro component of a HSR is anticipated to still allow the HSR to follow ISO dispatch instructions**
- **So long as the ESR remains in-service, the remaining components are expected to continue participating as an HSR**
 - The HSR will be expected to derate its capabilities to reflect lost generating capability resulting from the IPR/LCRoR outage, by submitting an updated UOL and ORL, as needed
 - The HSR will be expected to submit updated Real-Time Bids that reflect its reduced status as soon as possible
- **Example 1: An ESR + Wind HSR whose wind IPR suffers a Forced Outage, will be permitted to continue to participate as an HSR in the ISO markets, based on the capabilities of the remaining ESR component**
 - The component ESR will only be able to charge from the Grid, the HSR's injections will be limited by the ESR's stored Energy, and any dispatch the HSR receives to produce Energy is likely to affect the HSR's ORL

IPR/LCRoR Hydro Forced Outage, cont.

- **Example 2:** An ESR + Wind + LCRoR Hydro HSR whose wind IPR enters an outage state will continue to participate as an HSR in the ISO markets, based on the capabilities of the remaining ESR + LCRoR Hydro components
 - Again, the HSR may need to reduce its UOL and its ORL to reflect the Energy output that is no longer available from the wind IPR
- In some cases a HSR's ESR may not be permitted or able to charge from the grid. In the event of an IPR/LCRoR Hydro outage, the remaining ESR component may become stranded (no fuel source). Such an ESR may continue to participate in the ISO markets as a HSR until it runs out of fuel, at which time the ESR component would also be expected to enter a Forced Outage

Converting HSR Components to the Generator Model

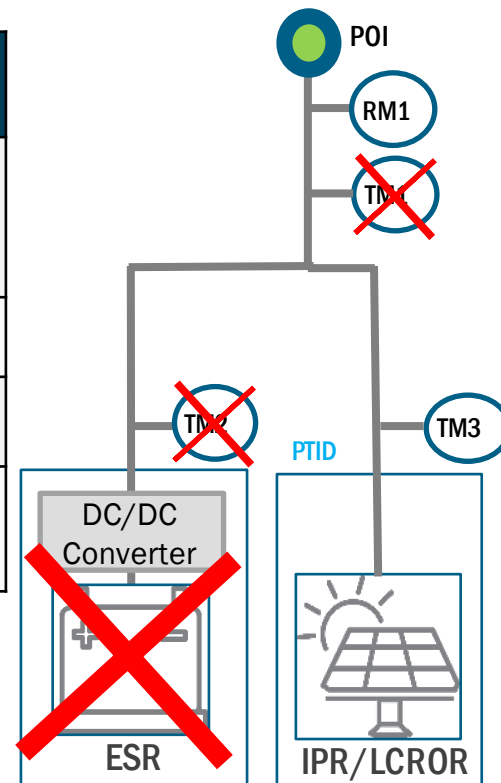
Converting HSR Component Generators to Participating Independently

- If a HSR's ESR component were to suffer a Catastrophic Failure, an MP might choose to transition a HSR's remaining, operational IPR and/or LCRoR Hydro components to participating under a different market model
- In other words, it might want to transition the IPRs or LCRoR to participating as stand-alone Generators
- Depending on the particular configuration of each HSR and the component Generators, the MP might need to complete a number of steps to transition the IPR(s) and/or LCRoR to participating in the markets as independent Generators, including:
 - Submit a Material Modification request
 - Reconfigure on-site Metering, or Install new/additional metering if the HSR included several IPR/LCRoR
 - Reconfiguration of PTIDs and inclusion of the generator(s) in the NYISO market models
 - Reregistration of individual Generators in MIS
 - Reconfiguration of Resource Basepoints/Dispatch-Signals (need to send basepoint to each Generator)
 - Provide meteorological data to NYISO's vendor
 - Update CRIS (same location CRIS transfer) and ERIS
 - Capacity Market Election
- It may require significantly more effort and time to transition a HSR that includes three or more Generators to permit the IPR(s) and/or LCRoR Hydro to participate independently in the markets.

Metering: Two Component HSR to One Standalone IPR

Meter Designation	Meter Requirements	Data flows
RM1	Revenue grade; dual – channel meter; reported by a Meter Authority on behalf of standalone Gen 1	Hourly data
TM1	SCADA data	6 second output telemetry from HSR
TM2	SCADA data	6 second telemetry measuring SOC of ESR component
TM3	SCADA data	6 second output telemetry measuring performance of IPR/LCROR Hydro component(s)

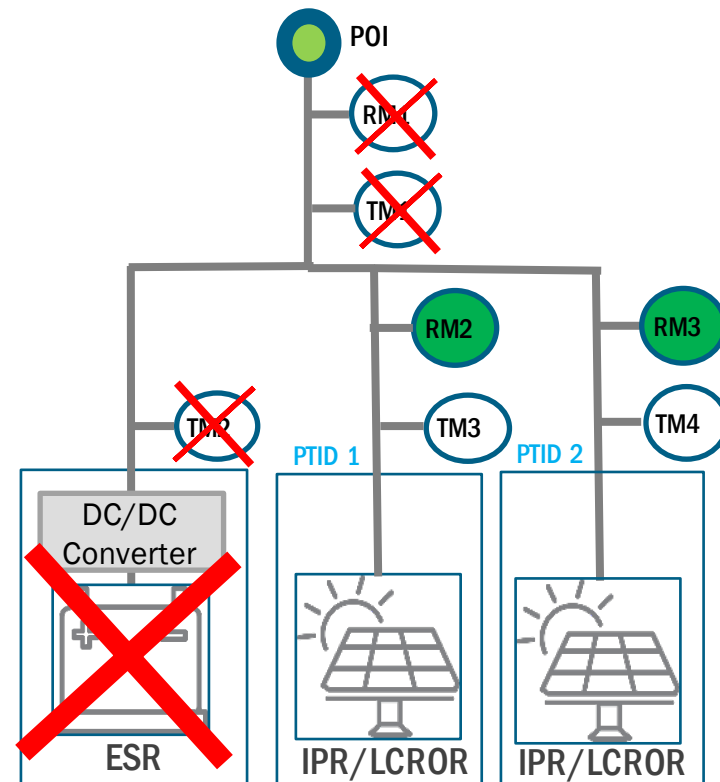
- If the ESR component experiences an outage and the HSR chooses to transition its remaining IPR to the Generator model, the new standalone IPR Generator may utilize the existing revenue grade meter located at the HSR POI**



Metering: Three Component HSR to Two Standalone IPRs

Meter Designation	Meter Requirements	Data flows
RM1	Revenue grade; dual-channel meter; reported by a Meter Authority	Hourly data
RM2	Revenue grade; reported by a Meter Authority	Hourly data
RM3	Revenue grade; reported by a Meter Authority	Hourly data
TM1	SCADA data	6 second output telemetry from HSR
TM2	SCADA data	6 second telemetry measuring SOC of ESR component
TM3	SCADA data	6 second output telemetry measuring performance of IPR/LCROR Hydro component(s)
TM4	SCADA data	6 second output telemetry measuring performance of IPR/LCROR Hydro component(s)

- If the ESR component experiences an outage, and the HSR chooses to transition its two remaining IPRs to the Generator model, on-site metering must be reconfigured. Each standalone Generator will be required to obtain its own dedicated Revenue-Grade Meter**



Interconnection

- **The MP may request to transfer the HSR's total CRIS to the new standalone IPR/LCRoR operating behind the POI via the same-location CRIS transfer rules, subject to the MW limitations in Attachment S to the OATT**
- **The total, summed ERIS of all HSR components that have transitioned to standalone Generator models cannot exceed the POI Limit**
 - For example, a 100MW HSR POI would limit the total, summed ERIS award of all Generators operating behind it to 100MW
 - Two 75MW IPRs operating behind this 100MW POI could be awarded 50MW of ERIS each, or share the ERIS 25MW/75MW, etc.

PTID Reconfiguration

- **Each HSR component that is seeking to become a standalone Generator will be given a new PTID and added to the NYISO's network model**
 - This process may take up to 3 months, but can be done in conjunction with metering installation
- **NYISO will maintain the original HSR PTID in an inactive state, which will allow the new standalone Generators to transition back to the HSR model once the ESR component is repaired**

Forecasting Data

- **Wind and Solar components seeking to re-register as standalone Generators will need to comply with all of the meteorological data rules/requirements associated with standalone Solar/Wind units**
 - This may require the installation of additional sensors, etc.
 - Additional information regarding Wind/Solar meteorological data requirements can be found in the Wind & Solar Plant Operator Data User's Guide

STAR Evaluation of HSR Components

- **Each of an HSR's component Generators will be independently subject to review in the NYISO's Short-Term Assessment of Reliability (STAR) if that component enters IIFO or if the MP submits a valid Generator Deactivation Notice**
 - The NYISO will amend the Short-Term Reliability Process rules to prohibit the MP from voluntarily deactivating an ESR that is a component of a HSR while the other HSR component Generators remain in-service
 - The other component Generators need to either deactivate at the same time as the ESR, or the MP needs to reconfigure the other HSR Generators to operate under a different participation model (as IPRs or as LCRoR Hydro) before the ESR deactivates
 - The restriction will not limit the voluntary deactivation of IPRs or as LCRoR Hydro that are components of a HSR

Outage States

Outage State Rules (MST 5.18)

- The outage state rules address Generators in Forced Outages, the transition to ICAP Ineligible Forced Outage (IIFO) and the transition from IIFO to becoming Retired
- The Outage State rules will apply to each of a HSR's component Generators
 - The HSR will be required to derate its capabilities consistent with the availability of its component Generators, but the HSR will not be directly subject to the Outage States
- The NYISO is proposing significant changes to the Outage State rules to address how a HSR will operate using its remaining component Generators when one (or fewer than all) of its component Generators suffers an outage

Outage States—ESR Outage

- **If the component ESR suffers a complete Forced Outage, the HSR will be required to temporarily exit the market to apply appropriate limitations to its capabilities**
 - Without its ESR component, an HSR cannot provide Operating Reserves or Regulation Service, cannot withdraw Energy, and its ramp capability is likely to be reduced
- **Following the temporary outage, the HSR will be permitted to return to ISO market participation, with reduced Ancillary Service Eligibility, and operational limitations that reflect its reduced capabilities**
 - The HSR will still be subject to HSR operating requirements and settlement rules, including the obligation to follow the NYISO's dispatch instructions

Real-Time Operation of HSR with ESR

Out-of-Service

- **HSRs are dispatch-only Resources, even when operating with an out-of-service ESR**
 - If the HSR is unable to follow NYISO's dispatch instructions in real-time, and the ISO operators, or a Transmission Owner's operators determine that the inability to follow dispatch is causing or contributing to reliability concerns, then the NYISO will instruct the HSR to cease operating for the rest of the market-day
 - The HSR will remain financially responsible for any obligations it undertook that it is not able to meet because it was required to cease operating due to its inability to follow dispatch instructions
 - The NYISO anticipates that the operation of an HSR without its ESR will be a rare occurrence; if there are several HSR operating in this state simultaneously, then the NYISO may determine additional remedies or limitations are needed to protect reliability

ESR Outage, ESR Repair Plan

- **If repairs to the ESR are going to require significant time to complete, the MP will be required to submit a Repair Plan to the NYISO within 120 days of the start of the ESR's Forced Outage;**
 - All updates regarding the Repair Plan must be submitted to the NYISO by day 150 of the ESR's Forced Outage
 - The Repair Plan will need to demonstrate that the MP is actively working to either
 - (a) repair the ESR, or
 - (b) to reconfigure the HSR so that the remaining generators can participate independently as IPR(s) or LCRoR Hydro after the work is finished
- **If NYISO determines that the MP has a "Credible Repair Plan" that it is actively pursuing, then the HSR will be permitted to continue operating, as described on the previous slide, until the repairs are completed**
- **If the MP has not submitted a Repair Plan, or has not adequately demonstrated that it is actively working to repair the ESR in the information it submitted, then NYISO will require the HSR to shut down at the end of the month that includes the 180th day of the ESR's Forced Outage until either:**
 - (a) the ESR returns to service, or
 - (b) the MP finishes reconfiguring the generators so that the remaining generators can participate independently as IPR(s) or LCRoR Hydro

Outage of Component IPR or LCRoR Hydro

- **The Forced Outage or IIFO of a HSR's component IPR or LCRoR Hydro Generator will follow the "standard" Outage State rules**
- **The outage of a component IPR or LCRoR Hydro Generator is expected to impact a HSR's real-time operating capabilities (see slides 10 and 11);**
 - An HSR operating with an out-of-service IPR/LCRoR Hydro component is expected to derate its operating parameters to reflect its reduced capabilities
 - Diligent and accurate representation of derated HSR capabilities should be sufficient to permit continued market participation of the Resource; the NYISO is not proposing additional rules to govern an HSR's operation when operating with an out-of-service IPR/LCRoR Hydro component

Energy Market Mitigation

HSR Energy Market Mitigation

- NYISO has identified the need for an additional Energy and Ancillary Service market mitigation measure for HSR.
- This rule will compare the state-of-charge information it receives for a HSR's component ESR to the Operating Reserve Limits (ORLs) the HSR submits with its Bids or updates post market-close to test for possible physical withholding
 - An HSR shall be considered withheld if its Operating Reserve Limit is less than 75% of the HSR's capability (applicable State of Charge + response rate*[time period])
- Physical withholding reviews are Ex Post mitigation and require consultation with the Market Party before sanctions are imposed.

CSR Energy Market Mitigation

- **NYISO has not identified the need for additional market mitigation rules from the addition of Fast-Start Resources, LCRoR Hydro and landfill gas IPRs as being eligible to participate in a CSR will not require changes to the existing energy market mitigation rules, or to the rules that specifically address CSR**

Next Steps

■ Upcoming MIWG Topics:

- Generator Deactivation Tariff
- HSR Energy Mitigation Tariff
- HSR Metering and Telemetry Tariff
- HSR Capacity Tariff Follow – up
- BIC Vote
- Address other outstanding stakeholder feedback

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?