

Hybrid Storage Interconnection Proposal

Kanchan Upadhyay

Energy Market Design

Amanda Myott

Capacity Market Design

ICAPWG/MIWG

May 07, 2020

Agenda

- **Project Background**
- **Interconnection Process for HSRs**
- **Next Steps and Timeline**

Discussion Goal

- **Discuss interconnection process for the proposed participation options for Hybrid Storage Resources (HSRs) and solicit feedback**

Previous Presentations

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

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

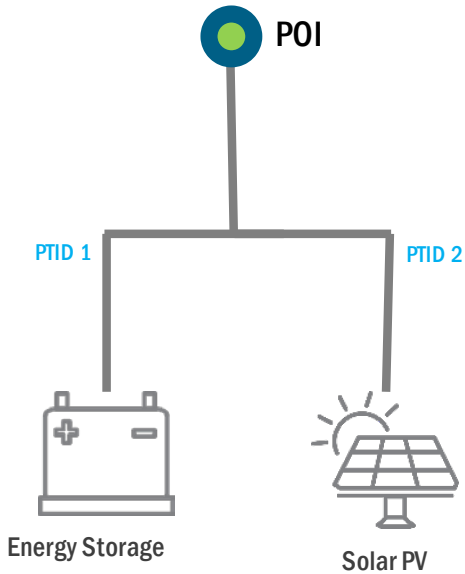
Improving Capacity Market Valuation



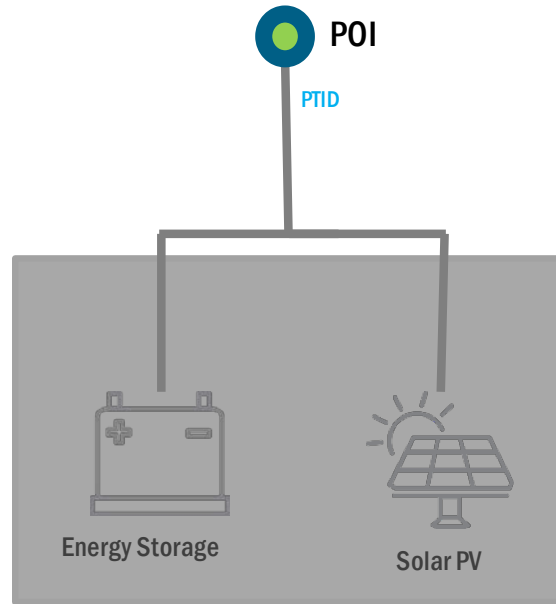
Project Background

- **This project seeks to explore market participation option(s) for co-located front-of-the-meter generators and energy storage resources (i.e. Hybrid Storage Resources)**
 - Incentives along with improvements in flexibility and availability are motivating developers to couple generation resources with storage resources
- **If modifications to existing market rules are required, these will be developed for a potential vote at the BIC by the end of 2020**
 - It is reasonable to expect that the design could be multifaceted, where some elements of the design are advanced faster than others
 - To ensure faster design and implementation, the NYISO proposes that an HSR participate under existing market models, to the extent possible
 - This may necessitate minor modifications to existing market rules, but will allow for quicker implementation

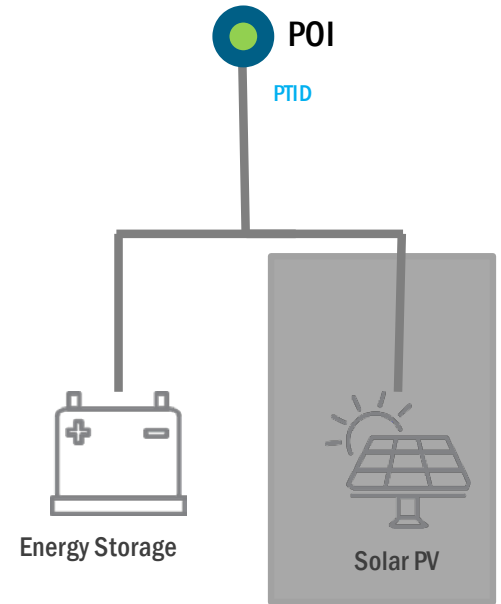
Proposed HSR Participation Options



Option 1: Distinct Resources



Option 2: Aggregate Hybrid, similar to DER (w/o size limit)



Option 3: Hybrid ESR

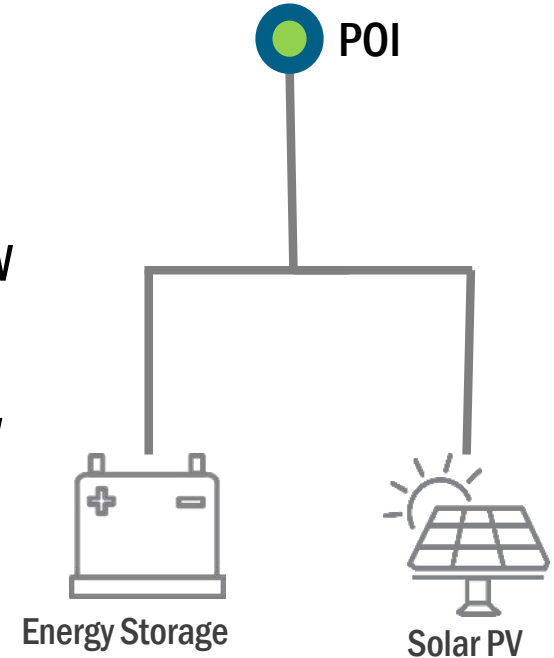
Interconnection Process for HSRs

Energy Resource Interconnection Service (ERIS) Process for HSRs

- **For new/proposed facilities proposing to interconnect as a hybrid resource, all resources behind the same POI may be included in a single Interconnection Request (IR) and will be evaluated as follows:**
 - Option 1 (Distinct Resources): Separate ERIS for each unit, limited to minimum of capability of the inverter(s) or capability of the respective unit
 - The injection limit of the HSR project must be greater than or equal to the combined capability of all resources within the project
 - The NYISO is still evaluating a potential enhancement that would enable this option to accommodate HSR projects with an injection limit that is less than the combined capability of its component resources
 - While units may be studied under a single IR, they may need separate Interconnection Agreements (IA) since they are treated separately in the market
 - Option 2 (Aggregate Hybrid Resource): Single, combined ERIS limited to minimum of capability of the inverter(s) or total capability of combined units
 - Option 3 (Hybrid ESR): Single, combined ERIS limited to minimum of capability of the inverter or capability of the storage component
 - Consistent with current practice for storage resources, NYISO will evaluate multiple scenarios under various system conditions, including scenarios with combined max injection and with the energy storage withdrawing energy from the system at its maximum capability

HSR ERIS Examples

- The following are simplistic, illustrative examples that may not capture all of the complexities of the ERIS allocation process
- Option 1: PV = 100MW; ESR = 20MW; Inverter = 120 MW
 - $ERIS_{PV} = 100MW$
 - $ERIS_{ESR} = 20MW$
- Option 2: PV= 100MW; ESR = 20MW; Inverter = 100 MW
 - $ERIS_{HSR} = 100MW$
- Option 3: PV= 20MW; ESR = 80MW; Inverter = 80 MW
 - $ERIS_{HSR} = 80MW$



Capacity Resource Interconnection Service (CRIS) Awards for HSRs

■ Option 1: Distinct Resources

- Each resource within the HSR may request CRIS individually up to the nameplate of each resource
 - The NYISO is still evaluating how to allocate CRIS between the two resources in the event we are able to implement an inverter limit

■ Option 2: Aggregate Hybrid Resource

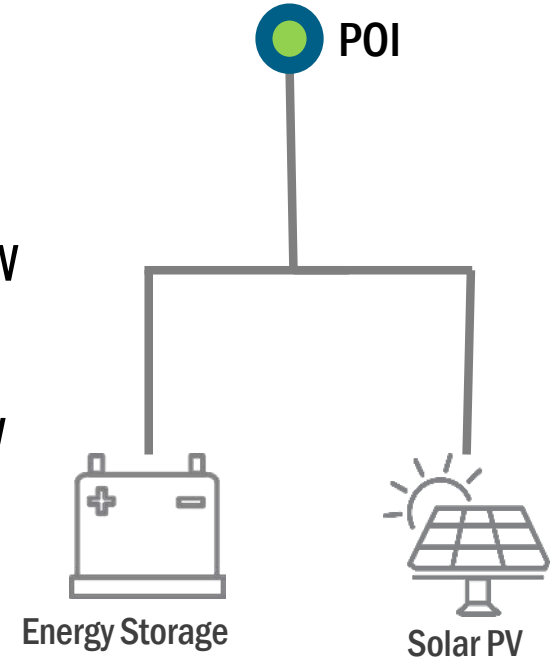
- HSR may request CRIS up to minimum of inverter(s) limit or nameplate of the components that comprise HSR

■ Option 3: Hybrid ESR

- HSR may request CRIS up to minimum of inverter limit or nameplate of the storage component

HSR CRIS Examples

- The following are simplistic, illustrative examples that may not capture all of the complexities of the CRIS allocation process
- Option 1 : PV = 100MW; ESR = 20MW; Inverter = 120 MW
 - $CRIS_{PV} = 100MW$
 - $CRIS_{ESR} = 20MW$
- Option 2: PV = 100MW; ESR = 20MW; Inverter = 100 MW
 - $CRIS_{HSR} = 100MW$
- Option 3: PV = 20MW; ESR = 80MW; Inverter = 80 MW
 - $CRIS_{HSR} = 80MW$



Material Modification Rules for HSRs

- **If an existing facility (or a proposed queue project that are not currently proposed as an HSR) proposes additions/modifications to become an HSR, they will be subject to a material modification review**
 - Under current tariff, modifications are material if
 - For existing facilities, they increase total output by more than 10MW or 5% (2MW for small generators) or are a material adverse difference in stability, voltage thermal or short circuit impact
 - For proposed projects in the queue, they increase total output or propose modifications that impact cost or timing of another project
 - If a modification is found to be material, the modification requires a new Interconnection Request and the modification must proceed through the interconnection study process, including a Class Year (if it is a Large Facility)
- **The NYISO is working on transition rules to enable projects that currently have separate positions in the Interconnection Queue to combine and proceed under a single Interconnection Request as an HSR**

Next Steps and Timeline

Next Steps

- **NYISO is seeking stakeholder feedback and will continue discussions with HSR developers to understand which option(s) best align with business needs**
 - This will inform which participation option will best align with HSR developer business needs and should be pursued as part of the NYISO's project proposal
- **Based on feedback received from stakeholders and developers, NYISO will bring more details on the HSR participation rules to future stakeholder discussions**

Planned Timeline

■ Q2 2020

- Continue discussions on market participation concepts for hybrid storage resources
- Present Market Design Concept Proposal to stakeholders

■ Q3 2020

- Present consumer impact analysis to stakeholders
- Present Market Design Complete to stakeholders

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



Appendix

Stakeholder Feedback Summary

- **The NYISO is working on responses to the following stakeholder questions, which will be addressed at a future working group:**
 - Request for additional information about NPCC reserve requirements
 - Request for clarification on “front-of-the-meter” definition
 - Request for exploration of possible thermal + storage model
 - Request for examples with numbers to understand how many MW can participate under each market (Energy, Reg, Reserves, Capacity) under each proposed option
 - Request for clarification on which option(s) the NYISO will pursue