

# Energy Storage Integration: Aggregations

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**MIWG**

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# Overview

- **Background**
  - Modeling enhancements
  - Areas covered in 2017
  - Open items
- **Aggregations**
- **ESR Participation Model Revisions**
- **Next Steps**

# Background

# Background

Date	Working Group	Discussion points
08-04-16	Market Issues Working Group (MIWG)	Initial discussion on <u>alternatives for Energy Storage in the NYISO markets</u>
09-29-16	MIWG	<u>Market Design ideas</u> discussion
11-29-16	MIWG	Presentation providing <u>more detail on the Market Design</u> that the NYISO will pursue
05-05-17	MIWG	Presentation addressing the <u>proposed modeling enhancements</u> as the cornerstone of the Energy Storage Integration phase
07-19-17	MIWG	Presentation delving into the <u>eligibility criteria and RT scheduling logic</u> for Energy Storage Resources (“ESRs”).
08-25-17	MIWG	Discussion on the <u>Settlements logic</u> for ESRs.
10-03-17	MIWG	<u>Day-scheduling logic and Mitigation framework</u>

# Proposed ESR Offer Parameters

<i>Registration</i>		<i>Registration / Biddable</i>		<i>Biddable</i>	
Transition Time	[minutes]	Min. Load	[MW]	Incremental Bid Curve	[\$/MW]
Upper Charge Limit	[MWh]	Min. Generation	[MW]	Beginning State of Charge	[MWh]
Lower Charge Limit	[MWh]	Min. Load Cost	[\$]	Ending State of Charge *	[MWh]
Maximum Load (Charge Rate)	[MW]	Min. Generation Cost	[\$]		
Upper Operating Lim. (Discharge Rate)	[MW]	Start-up Cost	[\$]	Bid Modes	[-]
Energy level (SoC)	[Yes/No]	Start-up Load Cost	[\$]		
Min. Withdrawing (Charge) Time	[minutes]				
Max. Withdrawing (Charge) Time	[minutes]				
Min. Run Time	[minutes]				
Max. Run Time	[minutes]				
Min. Downtime	[minutes]				
Withdrawing conversion losses	[%]				
Injecting conversion losses	[%]				
Through-Put	[MWh]				
Response Rate(s)	[MW/min]				
Start-up Notification Time	[minutes]				
Maximum Stops per Day	[n]				

(\*) Parameter reserved for Phase 2: Energy Storage Optimization

**Key**  
Existing Parameter  
Additional Storage Parameter

# What we have covered this year

- This year we have discussed several key aspects of the new ESR participation model:
  - Modeling Enhancements (New ESR parameters)
  - Scheduling logic
    - Day-Ahead and Real-Time markets
  - Settlements
    - Penalties
    - DAMAP
    - BPCG
  - Mitigation framework

# Future topics for consideration

- The topics below will be further discussed in the next market design phase beginning in 2018:
  - Scheduling of ESRs providing Ancillary Services (Regulation)
  - Dual-participation provisions (currently being addresses through the DER effort)
  - Capacity market participation for ESRs
    - The NYISO intends to base ESR capacity market rules on the capacity market rules applicable to DER.
  - Pricing considerations for ESR minimum generation/load blocks
    - The NYISO is considering the treatment of marginal fast-start resources as a broader market design effort.

# Aggregations



# ESR Aggregations - Concept

- **As part of the DER Roadmap effort, the NYISO has proposed the concept of Aggregations (see 2/28 – 4/24 – 9/29, 2017, MIWG materials)**
  - Proposal includes opportunity for both homogeneous and heterogeneous aggregations (i.e., aggregations of a single resource type, or aggregations of multiple resource types)
- **The NYISO's proposal requires homogeneous aggregations of resources (except Demand Side Resources) use the participation model for that particular resource type (e.g., Generators, Intermittent Power Resources)**
  - The proposal, therefore, will require homogeneous ESR aggregations to use the forthcoming ESR participation model
  - ESRs in heterogeneous aggregations will participate under the DER participation model

# Aggregations - Proposal Details

- **Minimum aggregation output of 100 kW.**
  - Currently, minimum size of 1 kW for each individual resource
  - Maximum 20 MW individual resource size
  - No maximum aggregation size
- **All individual resources in an aggregation (homogeneous or heterogeneous) must be mapped to the same electrically appropriate sub-zonal transmission node.**
- **Aggregations of 1 MW or above can offer energy, ancillary services and capacity.**
- **Aggregations of less than 1 MW can only offer energy and capacity (no ancillary services).**
- **Aggregations will be required to meet the same obligations as individual resources (e.g., metering, telemetry, bidding, etc.)**

# ESR Participation Model Revisions

# ESR Participation Model Revisions

- **Minimum output threshold reduced to 100 kW (previously 1 MW).**
  - This is consistent with the FERC Notice of Proposed Rulemaking (NOPR) on Energy Storage Participation<sup>(i)</sup>
- **Minimum storage capability reduced to 100 kWh (previously 1 MWh).**
  - The DA scheduling logic discussed in October 2017, with the exception noted on next slide, will also apply to ESRs under 1 MW/1 MWh
  - Resources with an UOL that they cannot maintain for 1 hour because of limits in their storage capability will have a DA offer maximum output threshold no greater than their maximum hourly capability

i. Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, 157 FERC ¶ 61,121 (Nov. 17, 2016).

# ESR Participation Model Revisions (Cont.)

- **NYISO is proposing an ESR-specific scheduling logic that will take into account ESRs' Energy Level (State of Charge (SoC)).**
  - Both individual ESRs and ESR aggregations of at least 1 MW/1 MWh will have the option to utilize the new scheduling logic including the resource's Energy Level (SoC) as a scheduling constraint
  - Energy Level management will not be available to individual ESRs or ESR aggregations with less than 1 MW of output or less than 1 MWh of storage capability
  - The NYISO will communicate with the ESR aggregator through telemetry, and the aggregator will be responsible for the accuracy of the signal received.

# Market Design Concept Proposal

# Whitepaper and Concept Report

- NYISO's Whitepaper on Energy Storage in the NYISO markets is coming soon.
- Additionally, the NYISO will release a Market Design Concept Report summarizing the proposed ESR participation model discussed this year in December 2017.

# Next Steps

- The NYISO will continue to evaluate the operational feasibility of the proposed ESR scheduling logic.
- During Q4-2017, the NYISO will release a whitepaper on Energy Storage in the NYISO markets as well as a concept report summarizing the framework of the participation model discussed this year.
- The NYISO will present the full participation model developed this year to this working group in December 2017.
- We will continue the discussions on the ESR Market Design in 2018.



# Feedback

- The NYISO seeks feedback on the materials presented today.
- Email additional feedback to: Daniel F. Noriega  
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# Questions?

We are here to help.

# The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

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- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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