#### CIGRE U.S. Next Generation Network webinar on NYISO DER Value and Market Participation

#### James Pigeon, NYISO May 12, <u>2020</u>



#### **James Pigeon**

Manager – DER Integration, Market Design New York Independent System Operator

James has been involved in the evaluation, design, implementation, and operation of wholesale electricity markets at the New York Independent System Operator (NYISO) for over 19 years. His tenure at the NYISO includes work in Market Design, Information Technology and Project Management. As Manager of DER Integration he is currently responsible for integrating distributed energy resources (DER) into the NYISO wholesale electricity markets in support of New York State's strategic public policy objective called Reforming the Energy Vision (REV). His most recent work at the NYISO aligns with the company's DER Roadmap, which includes developing market concepts related to aggregation, measurement & verification, performance obligations and dispatch-ability of DERs. Additionally, to ensure seamless integration between the wholesale markets and the distribution system he is leading the effort to enhance operational coordination between the NYISO and the Joint Utilities of NY.

He has been involved in a wide array of projects at the NYISO, including integrating renewable technologies into the marketplace, working with emerging demand response, storage and generation technologies, enhancing interregional trade, improving overall market efficiency and design, as well as implementation and maintenance of NYISO market systems. He came to the NYISO as co-op student and began working fulltime for the NYISO after earning a Bachelor of Engineering degree in Computer Engineering in 2002 from Clarkson University.







#### NYISO DER Participation Model Overview & Value of DER in the NYISO-Administered Electricity Markets

James Pigeon

Manager, Distributed Resources Integration

CIGRE NGN: NYISO DER Value and Market Participation

May 12, 2020, Webinar

### **NYISO DER Roadmap Effort**

- Develop and enhance participation opportunities for DER in the NYISO-administered wholesale electricity markets by creating a DER Participation Model.
- Create a model that supports the NYISO Market Design Vision Attract and retain the most efficient resources to meet NY's reliability needs.



## **NYISO DER Definition**

- Distributed Energy Resource (DER): (i) a facility comprising two or more Resource types behind a single point of interconnection with an Injection Limit of 20 MW or less; or (ii) a Demand Side Resource; or (iii) a Generator with an Injection Limit of 20 MW or less, that is electrically located in the New York Control Area (NYCA).
- DER Aggregation must be capable of responding in real-time to NYISO dispatch instructions.



# Integrating DER Electricity Markets in NYISO-Administered Wholesale



New York ISO

## Aggregations & Transmission Nodes



## Aggregations

- DER will participate in the NYISO electricity markets in Aggregations, which allow facilities to act in concert to meet minimum eligibility requirements
- Aggregations may qualify to provide Energy, Capacity and Ancillary Services
- Minimum offer requirements for all Aggregations will be 100 kW
- There is no maximum Aggregation size



## **Aggregations & Transmission Nodes**

- Aggregations will be modeled at a "Transmission Node"
  - A Transmission Node is a bus in the NYCA at which DER may aggregate, and for which LBMPs will be calculated; an alternative to the traditional Gen Bus nodes used for central station units
- The NYISO, in coordination with New York Transmission Owners, will establish a set of Transmission Nodes in the NYCA
- Aggregators will work with Transmission Owners to determine which NYISOidentified Transmission Node each individual DER/Facility electrically maps to
  - Only DER/Facilities that map to the same Transmission Node may be aggregated together
- Aggregators may enroll one or more Aggregations at a Transmission Node



### **DER Hierarchy – Top Down**





## **DER Hierarchy – Top Down (Cont.)**

#### Aggregation



New York ISO

## **Basics for all Types of Aggregations**

- Resources will be permitted to aggregate to meet minimum requirements and performance obligations for eligible participation models
- The Aggregator will be the NYISO Market Participant
- The Aggregation will be a group of one or more resources participating in the NYISO Market, represented by a PTID
  - Bids will represent the offer of the Aggregation
  - Performance will be measured in aggregate
  - Financial settlements will be in aggregate
    - NYISO intends to separately process the injection, withdrawal and load reduction data to ensure accurate settlements



### **Dispatchable DER Participation Models**

Dispatchable	Aggregations of DER An aggregation under the responsibility of an aggregator and consists of resources: • Can qualify to participate in Energy, Ancillary and Capacity	Generator Resource Model	<b>Consisting of Only Generators</b> Aggregation must consist of 2 or more Generator DER	
		Energy Storage Resource Model	Consisting of Only Energy Storage Resources (ESR) Aggregation must consist of 2 or more ESR DER	
		Dispatchable DER Model	<ul> <li>Consisting of Only Demand Side Resources (DSR)</li> <li>Aggregation must consist of 1 or more DSR DER</li> <li>No DER in the aggregation can inject into the grid, load reduction only</li> </ul>	
	<ul> <li>market</li> <li>Capable of responding in real- time to NYISO's direction</li> </ul>		Mix of Generators, Energy Storage Resources, and Demand Side Resources • Aggregation must consist of 2 or more Resource Types (i.e. Generator, ESR, DSR) • Capable of injection and/or load reduction	
	<ul> <li>Individual Resource</li> <li>Can qualify to participate in Energy, Ancillary and Capacity market</li> <li>Capable of Injection</li> <li>Capable of responding in real-time to NYISO's direction</li> </ul>	Generator Model or Energy Storage Resource Model	Individual Generator or Energy Storage Resource Individual Generator or Energy Storage Resource under the responsibility of a Market Participant	



### **Non-Dispatchable DER Participation Models**

Non-Dispatchable	Non-Dispatchable Aggregation or Individual - Demand Side	Special Case Resource Model	Special Case Resources (SCR) Individual Demand Side Resources or Small Customer Aggregation under the responsibility of a Responsible Interface Party (RIP) and are resources: • Qualified to participate in Capacity market
	<ul> <li>Resource(s)</li> <li>Capable of load reduction</li> <li>Not capable of responding in real-time to NYISO's direction</li> </ul>	Emergency Demand Response Model	Emergency Demand Response Program (EDRP) Individual Demand Side Resources under the responsibility of a Curtailment Service Provider (CSP) and are resources: • Qualified to provide Energy during reliability events



## **Operations: Telemetry & Coordination**



#### **Real-time Telemetry Data Communication Paths Options**

Option 1 – Aggregator communicates only with DSP and DSP provides data to/from NYISO Option 2 – Aggregator communicates with both DSP and NYISO in parallel





# Aggregate Response Signal with Individual Components



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## **Capacity Market**



## **Capacity Suppliers with Duration Limitations**

- Resources that do not have a daily run-time limitation will be allowed to qualify as a Capacity Supplier for participation in the Capacity market
  - These resources will participate in the Capacity market consistent with existing rules
- Resources with a daily run-time limitation will be allowed to qualify as Capacity Suppliers for participation in the Capacity market
  - These resources will be eligible to elect an Energy Duration Limitation
    - Energy Duration Limitations will be for 2, 4, 6, or 8 hour duration
  - Resources will be allowed to aggregate to meet a certain duration requirement
    - This is known as Time Stacking
  - Payments to Capacity Suppliers with duration limitations will depend on the resource's duration



## Capacity Suppliers with an Energy Duration Limitation

- Resources with a daily run-time limitation will elect one of the Energy Duration Limitations
  - Each Energy Duration Limitation has a corresponding Duration Adjustment Factor
  - The Duration Adjustment Factor directly impacts the payment that the resource will receive through Adjusted ICAP

	Incremental Penetration of Resources with Energy Duration Limitations		
	Less than 1000 MW	1000 MW and greater	
Energy Duration Limitation (hours)	Duration Adjustment Factor (%)	Duration Adjustment Factor (%)	
2	45	37.5	
4	90	75	
6	100	90	
8	100	100	



## **Time Stacking – Qualifications**

- Time Stacking the ability to stack/sequentially align facilities to meet minimum duration requirements for capacity payments
  - Individual facilities must be separately registered and must be able to run for a minimum of 1 hour per day to participate in time stacking



### **Time Stacking – example**





## **Dual Participation**



## **Dual Participation**

- The NYISO's market design will allow resources that provide wholesale electricity market services to also provide services to another entity (e.g., the utility or a host facility)
  - The NYISO believes that providing resources with the flexibility to meet wholesale and distribution system needs will maximize benefits to New York electricity consumers
  - Resources participating in the wholesale electricity markets will continue to be obligated to follow all applicable NYISO market rules and utilize good utility practices
- All Resources will be permitted to engage in dual participation



## **Dual Participation Requirements**

#### • NYISO dual participation requirements:

- Comply with all NYISO market rules for the services offered to the wholesale market
  - Non-compliance may result in financial penalties
- Appropriately offer into the wholesale electricity markets to reflect any non-wholesale (e.g., retail) obligations
  - Resources will be required to follow NYISO dispatch instructions at all times;
  - Resources will submit offers to NYISO when providing non-wholesale service
    - Based on resource type and market product enrollment, the offer may denote "Self" or "ISO"-Committed mode
  - Resources will receive payments for Energy or Ancillary Services scheduled through these offers



## **Dual Participation Obligations**

- Outages on the Distribution system must be reflected in the Aggregator's Bids or a derate
  - As part of the Aggregator/TO communication procedures, the Aggregator will be responsible for reflecting distribution system outages in its wholesale market Bids
  - The Aggregator is responsible for updating bids or derating the Aggregation to properly represent an Aggregations ability to perform as a result of any distribution system outages



## Timeline



#### NYISO DER and Aggregation Participation Models Deployment Timeline





## 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



