

DER Energy & Capacity Market Design

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Agenda

■ DER Energy Market Design

- Overview & Purpose
- Transmission Nodes
- DER Aggregations: Overview, Rules & Participation
- Application of FERC Order No. 745 Net Benefits Test
- BPCG & DAMAP Eligibility
- Dual Participation
- DER Settlements for Regulation & Reserves
- Cost Allocation Methodology

■ DER Capacity Market Design

- Installed Capacity Supplier Payment Structure
- Capacity Suppliers with duration limitations
- Other Capacity Suppliers
- Capacity Market Rules for Aggregations
- Time Stacking
- ICAP Mitigation Measures
- Interconnection and CRIS Requirements for DER

DER Energy Market Design

Overview & Purpose

Purpose of the DER Roadmap Effort

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

DER Definition for the Market Design

- 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 NYCA.
- DER must be capable of responding in real-time to NYISO dispatch instructions.

Detailed Information

- **A more in-depth version of this presentation was posted with the April 17th, 2019 BIC materials**
 - <https://www.nyiso.com/documents/20142/6006612/BIC%20DER%20Market%20Design%20Presentation.pdf/9cdc8700-ab90-d741-c28d-0c29b3468807>

Transmission Nodes

Transmission Node Overview

- **The ISO, in coordination with the Transmission Owners, shall establish the set of Transmission Nodes in the New York Control Area**
 - All Transmission Nodes will be identified in ISO Procedures
- **Aggregators will work with Transmission Owners to determine which ISO identified 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 Aggregations: Overview, Rules & Participation

DER Aggregation Approach

- Aggregations grouped at a Transmission node allow NYISO to effectuate dispatch in a manner that both sends correct price signals and helps effectively relieve transmission constraints on the system

DER Market Participation

- **The DER participation model will only be available to Aggregations**
 - An Aggregation consists of two or more individual resources, except that Demand Side Resources and individual facilities that can reduce load and inject energy (i.e., transition from being Load to Supply without an infeasible operating range), will be permitted to individually use the DER participation model as a single-resource Aggregation
- **Individual facilities in an Aggregation will participate under the market rules for either:**
 - A DER Aggregation (when there are multiple Resource types in the Aggregation), or
 - The specific Resource type (when there is a single Resource type in the Aggregation)
 - For an Aggregation of Intermittent Power Resources, the technology type of each Resource in the Aggregation must be the same (E.g., Resources depending on wind as their fuel)

Basics for all Types of Aggregations

- Resources will be permitted to aggregate to meet minimum requirements and performance obligations for eligible participation models (see slide 15 for more details)
- 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

DER Bidding, Approach

- All DER Aggregations, regardless of resource mix, will be bid into the Energy market and settled as a single entity
- The distinction for the settlements process, as it will pertain to Revenue Metering and Telemetry, will be that the NYISO will account for the following aspects of each DER Aggregation when evaluating performance:
 - Energy Injection from Generation units
 - Demand Reduction provided as Supply from Demand Side Resources
 - To account for FERC Order No. 745
 - Energy Withdrawal from Withdrawal-Eligible Generators

Aggregation Services & Dispatch

- **Aggregations may qualify to provide Energy, Capacity and Ancillary Services**
 - Eligibility to provide services in the NYISO-administered markets will be dependent upon the operating and other characteristics of the Aggregation
 - Minimum offer requirements for all Aggregations will be 100 kW
- **Aggregations will not receive unit commitment from the NYISO and will instead be considered as a dispatch-only resource when participating in the wholesale market**

Aggregator Registration

- **Aggregators will be required to**
 - Register as a Market Participant
 - Post collateral
- **Aggregator will be required to register individual DER's parameters/unique operating characteristics, which will be a hybrid of existing Generator, ESR and Demand Response Parameters**

Energy Withdrawals by Aggregations

- An Aggregation that contains a Withdrawal-Eligible Generator may Bid to withdraw Energy for a market interval
- Aggregators will be allowed to balance individual DER response within the Aggregation to achieve Aggregation dispatch
 - The combination of Energy Injections, Energy Withdrawals and Demand Reduction will be bid in at the net value

Real-Time Telemetry & Settlement Data

- **Similar to Generators participating in the NYISO markets today, the Aggregation will be required to send all telemetry signals for 24 hours of the day, 7 days a week**
 - This will be required regardless of dispatch schedule, for the independent signals for:
 - Aggregation aggregate signal, and;
 - Aggregation aggregate Injection, and;
 - Negative Generation (when an Aggregation eligible to withdraw Energy is dispatched to withdraw), and;
 - Aggregation aggregate Load Reduction
- **The aggregator will need to measure the injection, withdrawal and the load reduction of all DER within the Aggregation, during dispatch**

Application of FERC Order No. 745 Net Benefits Test

Time of Application of Order 745

- **The NYISO will apply its NBT as an after-the-fact evaluation**
 - NYISO will continue to calculate a monthly NBT value applicable to Demand Side Resources and to the Demand Reduction portion of Resources that can both curtail Load and inject Energy onto the grid, participating in the DER participation model
 - NYISO will perform an evaluation of LBMPs and telemetry data during the settlements process
 - Application of the NBT during the settlements process instead of as an Offer Floor will allow aggregators to bid in Demand Side Resources and Resources that can both curtail Load and inject Energy onto the grid in the energy markets at any dollar value
 - If the clearing price for energy is equal to or greater than the monthly NBT value, Demand Side Resources and Resources that can both curtail Load and inject Energy onto the grid would be eligible for payment
 - If the clearing price for energy is less than the monthly NBT value, Demand Side Resources and Resources that can both curtail Load and inject Energy onto the grid would not be paid (notwithstanding its contribution to the Aggregation's response to the dispatch signal for performance)
 - Demand Reductions will be included in the evaluation of whether an Aggregation meets its basepoint signal, regardless of whether that Demand Reduction is eligible for payment.

BPCG & DAMAP Eligibility

DAMAP/BPCG Eligibility

- Aggregations will be eligible for DA BPCG payments
- In real-time, Aggregations will be eligible for DAMAP and BPCG only when operating OOM or as part of an SRE
- Aggregations comprised entirely of Energy Storage Resources that Self-Manages its Energy Level and Bids as ISO-Committed Flexible will also be eligible for real-time BPCG

DER Settlements

Settlements Approach

- **Settlements will need to account for the following aspects of each DER Aggregation when evaluating performance:**
 - Energy Injection from Generation units
 - Demand Reduction provided as Supply from Demand Side Resources
 - Energy Withdrawal from Withdrawal-Eligible Generators
- **This will be implemented by separating the Telemetry signals and the Revenue Meter files into distinct data sets for Settlements processing**

Cost Allocation Methodology

DER Aggregation Settlements and Application of Net Benefits Test Threshold

- Day-Ahead DER Aggregation offers receiving a Day-Ahead Market schedule will be compensated at the DAM LBMP
- NYISO will apply the Monthly Net Benefits Test Threshold against the Real-Time Market LBMPs

Demand Reduction Cost Allocation

Methodology

- The NYISO will calculate the cost of demand response as compensable real-time Demand Reduction times the RT LBMP
- Costs of demand response will continue to be allocated to the Loads that benefit from Demand Reductions, consistent with existing settlement structure submitted in compliance with Order No. 745

Dual Participation

Dual Participation

- The NYISO's market design will allow resources that provide Wholesale Market services to also provide services to another entity (*e.g.*, the utility or a host facility)
- Dual participation concept applies to all resources, not just DER Aggregations
- Dual participating resources will be required to:
 - Comply with all NYISO market rules for the services offered to the wholesale market
 - Appropriately offer into the wholesale markets to reflect any non-wholesale (*e.g.*, retail) obligations

DER Capacity Market Design

Installed Capacity Supplier Payment Structure

ICAP Suppliers

- **A resource must not have any daily duration limitations to qualify as a Capacity Supplier**
 - Have a minimum injection capability of 1 MW for traditional resources, 0.1 MW for ESR or DER
 - Receive 100% capacity payment
 - Subject to most existing qualification requirements
- **A resource that has a daily duration limitation may qualify as a Resource with an Energy Duration Limitation**
 - Have a minimum injection capability of 1 MW for traditional resources, 0.1 MW for ESR or DER
 - Receive capacity payment as applicable for resource's duration

ICAP Supplier Payment Structure

- The NYISO's capacity values for duration limited resources
 - These rules will be effective for the 2021-2022 Capability Year

	Incremental Penetration of resources with duration limitations	
Durations (hours)	Less than 1000 MW	At and Above 1000 MW
2	45%	37.5%
4	90%	75%
6	100%	90%
8	100%	100%

Capacity Value Study

- **The NYISO will review the Capacity Values in 2022-2023, with results from the future study implemented in the 2025-2026 Capability Year**
 - Going forward, the NYISO will review the Capacity Values every 4 years with a 205 filing
 - The Capacity Value Study will be reoccurring starting two years before the Demand Curve Reset process begins (every 4 years) (e.g., 2022, 2026, etc.)

Capacity Suppliers with duration limitations

Qualifications

- **Qualifications for Capacity Suppliers with duration limitations**
 - Resources must be electrically located within the NYCA
 - Have a minimum injection capability of 1 MW for all resources, excluding ESR and DER where the minimum injection capability is 0.1 MW
 - Resources will be allowed to derate and/or time stack to aggregate to meet a certain duration requirement
 - Performance-based generators (Wind, Solar, RoR Hydro) will not be eligible for a duration limitation

Obligations

- **Like all Capacity Suppliers, Capacity Suppliers with duration limitations must conduct a DMNC test, as applicable for the resource type**
 - Duration limited resources must perform their DMNC test during the Peak Load Window
- **Capacity Suppliers with duration limitations must be available during a predefined Peak Load Window**
 - These resources are required to Bid, Schedule, or Notify during the Peak Load Window
 - More detail on the following slide

Peak Load Window

- **The Peak Load Window for Winter and Summer Capability Periods are different**
 - The 6 hour window is applicable for incremental penetration of resources with duration limitations less than 1000 MW
 - Winter: HB 16 through 21
 - Summer: HB 13 through 18
 - The 8 hour window is always applicable to resources that elect an 8-hour duration limitation, and will be applicable to all duration limited resources for incremental penetration of resources with duration limitations equal to or greater than 1000 MW
 - Winter: HB 14 through 21
 - Summer: HB 12 through 19

ICAP

- **ICAP calculation will still apply to all resources as current practice, but the payment for all resources will be based on an Adjusted ICAP**
 - $ICAP = \min(CRIS, DMNC)$
 - ICAP value used consistent with current practices (i.e. Bid/Schedule/Notify, etc.)
 - $Adjusted\ ICAP = \min(CRIS, DMNC) * Duration\ Adjustment\ Factor$
 - Applies to all Capacity Suppliers where the payment corresponds to the Duration Adjustment Factor for that duration
 - The derating factor is applied to the Adjusted ICAP for the system wide ICAP to UCAP translation
 - $UCAP\ for\ market = Adjusted\ ICAP * (1 - derating\ factor)$
 - Derating factors for availability-based resources will be derived from GADS or the UOL calculation, as applicable to the resource type

Other Capacity Suppliers

Other Capacity Suppliers

- The SCR program will remain at a 4 hour duration requirement for participation in the Capacity Market
- Performance-based generators (Wind, Solar, RoR Hydro) will continue to be Installed Capacity Suppliers if qualified
 - These resources will not be eligible for an Energy Duration Limitation

Capacity Market rules for Aggregations

Obligations of Aggregations

■ Obligations of Aggregations

- Bid/Schedule/Notify obligations will be based on the characteristics of the Aggregation
- The NYISO will require the DER to perform a DMNC test once every Capability Period for the Aggregation as a whole
- The method for calculating the derating factor for a DER will be based on the characteristics of the DER by treating the DER as a single resource

Resources Changing Aggregations

- Resources that switch Aggregations but remain within the same participation model can switch on a monthly basis
- Resources that switch between participation models or wholesale/retail participation must do so at the beginning of the Capability Year

Time Stacking

Time Stacking - Qualifications

- **Time Stacking - the ability to stack/sequentially align DER to meet minimum duration requirements for capacity payments**
 - Individual DER must be separately registered and must be able to run for a minimum of 1 hour per day to participate in time stacking
 - Individual DER will only be allowed to participate in hour increments and be truncated down to the hour duration before time stacking
 - A time stacked DER will be rated for the amount of power it can sustain over the run time requirement
 - DER participating in the homogeneous intermittent model cannot time stack
- **The NYISO will require the time-stacked Aggregation to perform a DMNC test once every Capability Period**

ICAP Mitigation Measures

ICAP Mitigation Measures

- **The NYISO has not identified the need for any additional market mitigation measures specifically for the DER participation model at this time**
 - Aggregations will be subject to the mitigation measures that pertain to ICAP offering behavior
 - DER Injections will be subject to the mitigation measures that pertain to market entrance/exit
 - Language changes are proposed to the supplier-side and buyer-side provisions to identify DER participant types

Interconnection and CRIS Requirements for DER



Interconnection Requirements for DER

- Interconnection (ERIS) and CRIS Requirements will focus on the facility (i.e., all assets behind a single facility meter) rather than the asset or aggregation
- NYISO will redefine what may be included in one Interconnection Request to allow multiple assets behind a single facility meter and point of interconnection to be treated as a single project with the same queue position, even if different technologies

CRIS Requirements for DER

- NYISO will award CRIS at the “facility” level
- CRIS will only be applicable to the injection capability of resources (not withdrawal or load reduction portion)
- In order to obtain CRIS, if the facility is larger than 2 MW, must be evaluated for deliverability in a Class Year Study

CRIS Requirements for DER (cont.)

- **The Class Year Deliverability Study uses derated generator capacity incorporating availability – UCAP Deration Factor (UCDF)**
 - Based on the UCAP of each resource (or Net-UCAP, for BTM:NG Resources)
 - $UCAP = ICAP * (1 - \text{Derating Factor})$
 - Derating Factor
 - For non-intermittent resources (including ESRs), derating factor is based on the average from historic ICAP to UCAP translations on a Capacity Region basis
 - For intermittent resources, derating factor is based on resource type

CRIS Requirements for DER (cont.)

■ Proposed DER Deliverability methodology:

- For DERs evaluated in the Deliverability Study, the following ICAP to UCAP translation will still apply:
 - $UCAP = ICAP \text{ (i.e., CRIS)} * (1 - \text{Derating Factor})$
- UCAP for DERs will be based upon their maximum ICAP possible, for Developer-selected duration, reduced by the applicable derating factor
- For a multi-technology facility, NYISO proposes to use a blended UCAP
 - If the facility includes a load reduction asset, the amount of load reduction will not impact the blended UCAP

CRIS Requirements for DER (cont.)

- If a facility moves between aggregations, the CRIS awarded to the facility stays with the facility and moves with it to the new aggregation
- For a multi-asset facility, if an asset within that facility moves to another facility, the original facility retains the full amount of CRIS
 - The individual asset does not take a portion of the original facility's CRIS with it to the new facility
 - The original facility may not transfer CRIS to the new facility (*i.e.*, same location CRIS transfer rules will not apply to this scenario)

Feedback?

- Email additional feedback to:
DER_Feedback@nyiso.com



Don't forget the underscore

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:

- 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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