Capacity Market Rules for Energy Storage Resources

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Agenda

- Background
- Energy Storage Resource (ESR) overview
- Capacity Market Rules
  - Capacity Market Qualification Rules
  - Capacity Market Eligibility and Participation Rules
  - Derating Factors for Energy Storage Resources
  - Obligations and Other Capacity Market Rules

Background

FERC Order No. 841

- On February 15, 2018, FERC issued a final rule to remove barriers to the participation of ESRs in the competitive wholesale markets
- NYISO has been engaged in the development of a participation model for ESRs since 2016

Previous Presentations

- April 24th ICAPWG – Identification of Concepts
- May 23rd ICAPWG - Initial Market Design

Purpose of Today's meeting

- **Review NYISO's proposed design of Energy Storage Resource Capacity Market rules**
  - Existing rules for storage resources participating in the NYISO's markets are not changing (ELR, LESR)
- **Solicit feedback on the market design**

Energy Storage Resource Overview

Energy Storage Resource Overview

- **FERC Order No. 841 defines an Energy Storage Resource as "a resource capable of receiving electric energy from the grid and storing it for later injection of electric energy back to the grid"**
  - Examples include:
    - Electrochemical systems
    - Pumped Storage
    - Fly-wheel systems
    - Thermal Storage
    - Compressed Air Storage
- **Initially, we will only be discussing rules for individual, directly metered Energy Storage Resources that participate only in the NYISO's wholesale markets (sometimes referred to as "front" of the meter)**
  - Dual participation of Energy Storage Resources in wholesale and retail markets will be discussed as part of the DER Participation Model

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Capacity Market Rules

Capacity Market Qualification Rules

- **What will an Energy Storage Resource need to be qualified to participate in the Capacity Market?**
  - Satisfaction of all registration requirements, including an effective Interconnection Agreement with the Connecting Transmission Owner (or with the Connecting Transmission Owner and the NYISO, if the resource is subject to the NYISO's interconnection procedures) that allows wholesale market participation
  - Have a minimum injection capability of 0.1 MW or greater
  - CRIS obtained through existing NYISO processes
    - Consistent with current practice, CRIS will only be for the Injection capability of the Energy Storage Resource
  - Outage Schedules two years forward from the anticipated date of first offer into the capacity market

Capacity Market Qualification Rules (continued)

- **What will an Energy Storage Resource need to be qualified to participate in the Capacity Market?**
  - Capability to meet the existing 4-hour minimum run-time requirement
    - Energy Storage Resources can derate the capacity of the resource to meet the 4-hour duration requirement
      - For example, a 40 MWh battery with the capability of injecting 20 MW would be able to reduce its capacity to 10 MW for 4 hours to meet the duration requirement.
    - The NYISO is still requiring that these resources be able to perform for the full 4 hours
      - NYISO recognizes the feedback it received that some resources are unable to sustain a injection to the grid for 4 hours
        - » If the resource in unable to sustain the injection to the grid for 4 hours, the NYISO believes that they are ineligible for the capacity market under today's rules
    - Modifications to the minimum run-time duration as well as partial capacity payments for resources that are unable to meet the minimum run-time duration are being evaluated as part of the DER Participation Model
      - If changes are warranted, the NYISO expects that any proposal would be generally applicable to all Capacity Suppliers
  - DMNC test
    - More information on the DMNC test is found on the following slides

Buyer-side Market Power Mitigation (BSM) of ESRs

- **What will an Energy Storage Resource need to be qualified to participate in the Capacity Market?**
  - Energy Storage Resources in Mitigated Capacity Zones (i.e., presently NYC and G-J Locality) must be evaluated under the BSM Rules to determine if they are eligible for an exemption or their Offer Floor (i.e., the price at or above which they can offer, and such offers are restricted to the ICAP Spot Market Auction)
    - Energy Storage Resources are eligible to apply for existing Buyer-Side Mitigation exemptions
    - Some stakeholders have suggested that Energy Storage Resources should not be subject to the Buyer-Side Mitigation Rules
    - NYISO is not proposing to modify any of the BSM rules for this filing.
      - NYISO is no longer recommending to modify the rules to subject new entrants less than 2MWs to BSM. Nor is NYISO proposing an ESR specific exemption.

Capacity Market Eligibility and Participation Rules

- **What is necessary for an Energy Storage Resource to be eligible to participate in the Capacity Market and for what quantity?**
  - Must provide a 4 hour DMNC, consistent with existing rules
    - May provide derated output to meet duration requirements
    - A 4 hour test will ensure accurate accounting of capacity for resources that derate to meet the duration requirements
    - DMNC test length rules may need to be revised depending on the DER Participation Model's rules on the minimum run-time duration and partial capacity payments for resources that do not meet those duration requirements
  - ICAP for Energy Storage Resources will be the minimum of CRIS and DMNC
    - ICAP = Min(CRIS, DMNC)

Capacity Market Eligibility and Participation Rules (continued)

- **What is necessary for Energy Storage Resources to be eligible to participate in the Capacity Market and for what quantity?**
  - UCAP for Energy Storage Resources will be the ICAP times the quantity 1 minus the Derating Factor
    - UCAP = ICAP * (1-Derating Factor)
  - Derating factors for Energy Storage Resources will be calculated using the new availability calculation
    - Details on following slides
  - Energy Storage Resources in Mitigated Capacity Zones will be subject to “Supply Side” Mitigation measures (i.e., the Pivotal Supplier rules)
    - Must identify all “Affiliated Entities” each month
    - Will have a “must offer” obligation if their MW are under the control of a Pivotal Supplier

Derating Factors for Energy Storage Resources

- **How will derating factors for Energy Storage Resources be calculated?**
  - Derating factors for Energy Storage Resources will be calculated based upon a time-weighted UOL availability evaluated against the ICAP sold
    - For each RTD interval, the Normal UOL capped against the ICAP Sold, and the number of seconds will be calculated for that interval
    - For RTD intervals where the unit was on a planned or scheduled outage approved by NYISO operations, the seconds will be set to 0, removing it from the calculation

Derating Factors for Energy Storage Resources (continued)

- **How will derating factors for Energy Storage Resources be calculated?**
  - Derating factors for Energy Storage Resources will be calculated based upon a time-weighted UOL availability evaluated against the ICAP sold
    - For each month, 4 values will be calculated
      - Total Seconds – Sum of seconds in the month that the unit was not on an approved outage
      - Total Available Capacity – Sum of (Normal UOL for interval * seconds in interval) for the month
      - Total Expected Capacity – ICAP sold * Total Seconds
      - Monthly Availability – Total Available Capacity / Total Expected Capacity

Derating Factors for Energy Storage Resources (continued)

- **How will derating factors for Energy Storage Resources be calculated?**
  - 12 month blocks will be calculated, summing the Total Available Capacity, the Total Expected Capacity, and the availability calculation for the 12 month block
  - The derating factor for Energy Storage Resources will be the average of 6 of the 12 month blocks
    - These will be the same 12 month blocks used in the existing EFORd calculation
      - Derating factor to determine Summer UCAP uses a 12 month period ending in July, August, September, October, November, and December from the prior year
      - Derating factor to determine Winter UCAP uses a 12 month period ending in January, February, March, April, May, and June from the current year

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Derating Factors for Energy Storage Resources (continued)

- **What will be the default derating factors for Energy Storage Resources who are just entering the market?**
  - For Energy Storage Resources:
    - Once 3 or more resources have entered the market and have data available to calculate derating factors, the NYISO will use the NYISO class average
    - Until there are 3 or more resources, the NYISO will use the NERC reported EFORd for Pumped Storage
  - Resources that have some of the required timeframe but not all of the timeframe will use the default values for the timeframes that are missing

Comparison of New Availability Metric to GADS EFORd

- The NYISO tested this methodology on a number of existing GTs to compare the calculation to the existing EFORd calculation
  - These values would be applicable to Summer 2018

Generator	EFORd	UOL Calculation
A	6.24%	6.17%
B	11.33%	12.19%
C	16.05%	12.00%

* Unit C had a number of failed starts, which increases the EFORd

Obligations and Other Capacity Market Rules

- **What are the obligations for an Energy Storage Resource that has sold capacity into the NYISO's Capacity Market?**
  - Continue to provide 2 year forward outage information
  - Bid/Schedule/Notify for all 24 hours of the DAM for the ICAP equivalent of the UCAP sold
    - ESRs will be obligated to participate in the DAM as NYISO-monitored energy level
    - NYISO-monitored energy level will evaluate physical parameters, such as maximum charge level, minimum charge level, roundtrip efficiency, upper and lower storage limits to ensure that resources are given feasible schedules
    - Needed to prevent Infeasible DAM schedules for Energy Storage Resources, which could cause capacity shortfalls in real time

Obligations and Other Capacity Market Rules (continued)

- **What are the obligations for an Energy Storage Resource that has sold capacity into the NYISO's Capacity Market?**
  - Respond to a NYISO SRE
  - Provide State of Charge Telemetry to the NYISO
    - Provides visibility to grid operators on what resources are capable of in real time
  - Subject to penalties/shortfall charges, e.g., for over sale of capacity, failure to Bid/Schedule/Notify
  - Energy Storage Resources will be required to provide GADS information

Next Steps

- Future ICAPWG to continue discussion with tariff

Feedback/Questions?

- Email additional feedback to: ztsmith@nyiso.com and deckels@nyiso.com

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- Planning the power system for the future
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