Energy Storage Integration: Ancillary Services Treatment

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Agenda

- Background
- Ancillary Services in the ESR Participation Model
  - Regulation
  - Operating Reserves
  - Other Ancillary Services
- Future topics for consideration
- Questions

Previous Discussions

Date	Working Group	Discussion points
08-04-16	Market Issues Working Group (MIWG)	Initial discussion on alternatives for Energy Storage in the NYISO markets
09-29-16	MIWG	Market Design ideas discussion
11-29-16	MIWG	Presentation providing more detail on the Market Design that the NYISO will pursue
05-05-17	MIWG	Presentation addressing the proposed modeling enhancements as the cornerstone of the Energy Storage Integration phase
07-19-17	MIWG	Presentation delving into the eligibility criteria and RT scheduling logic for Energy Storage Resources ("ESRs").
08-25-17	MIWG	Discussion on the Settlements logic for ESRs.
10-03-17	MIWG	Day-Ahead scheduling logic and Mitigation framework
11-02-17	MIWG	Aggregations in the ESR model
12-20-17	MIWG	Market Design Concept Proposal Summary

Background

- In 2017, the NYISO developed a Market Design Concept to integrate ESRs.
- As part of the ESR Market Design Concept, the NYISO proposed that assets could provide an energy level telemetry signal.
  - Only resources with a capability of at least 1MW that can be sustained for at least one hour will be eligible for NYISO energy level monitoring.
- In 2018, the NYISO will complete its Market Design for the ESR participation model, including rules that will allow ESRs to provide Ancillary Services, by Q3 2018.

Regulation Service

Proposed Regulation Service Provisions

- All Regulation providers must meet NYISO eligibility requirements, including the ability to respond to 6-second Base Points, and are compensated for Regulation Capacity and Regulation Movement (See NYISO MST – Section 15.3)
- The NYISO proposes that ESRs utilize the existing two-part bid structure:
  - Regulation Capacity
  - Regulation Movement
- The NYISO also proposes that ESRs follow the existing Regulation Capacity scheduling logic, which considers the following:
  - The Regulation Service Supplier's Capacity Bid MW
  - The sum of the Regulation Capacity Bid price, and the product of the Regulation Movement Bid price and the Regulation Movement Multiplier established for that hour.
- ESRs will also receive Regulation Movement instructions in RT, which will be calculated and distributed through AGC in the same fashion as existing Regulation providers.

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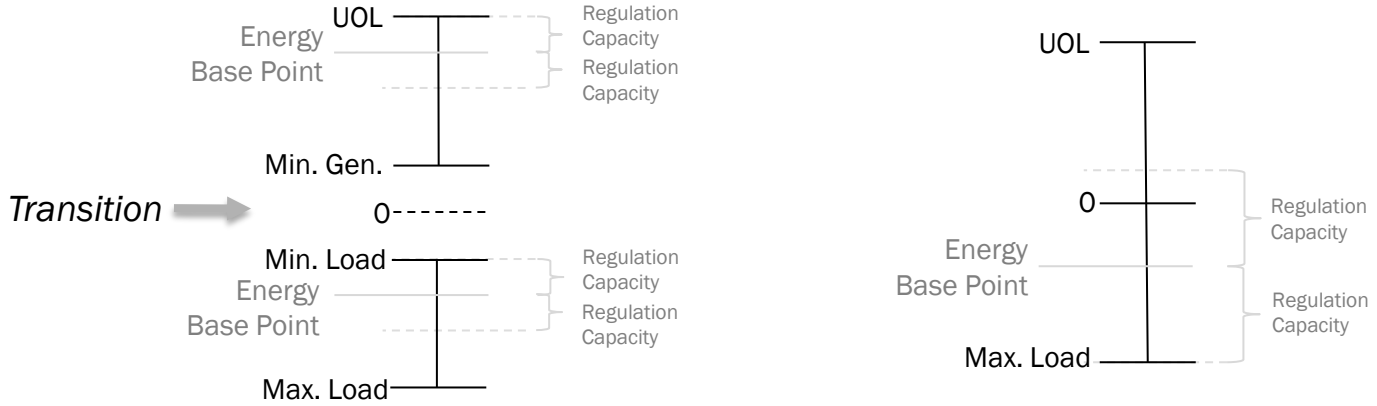
Proposed Regulation Service Provisions (Cont.)

- **The NYISO proposes that ESRs be able to offer Regulation Capacity and receive awards according to each resource's ability to transition between withdrawing and injecting states.**
  - ESRs that can seamlessly transition between states (i.e. without binding commitment parameters), could offer Regulation Capacity and receive awards spanning both the injecting and withdrawing states.
  - ESRs that cannot seamlessly transition between states (i.e. commitment parameters associated with operating characteristics), could offer Regulation Capacity and receive awards within either injecting or withdrawing states.
  - Commitment parameters include:
    - Transition Time
    - Min. Load and Min. Gen
    - Min. and Max. Run Time
    - Min. and Max. Withdrawing Time
    - Start-up and Start-up Load Costs
    - Start-up Notification Time
  - This proposal is subject to successful testing prior to implementation.

Proposed Regulation Service Provisions (Cont.)

- Example: ESR with binding commitment parameters (left) and ESR without binding commitment parameters (right)



Proposed Regulation Service Provisions (Cont.)

- **When an energy level signal is provided, the NYISO will utilize it to ensure that ESRs receive a Regulation award that they can achieve.**
  - In both DA and RT optimizations, the Regulation Capacity offered will be evaluated against the Energy available at the beginning of each evaluation interval. These evaluation intervals will be hourly periods for the DA optimization, and 15 (RTC) and 5-minute (RTD) periods in RT.
  - The NYISO will ensure that ESRs have enough Energy to sustain the Regulation Capacity awarded throughout the full evaluation interval considered.

Operating Reserve Service

Proposed Reserve Service Provisions

- Operating Reserves provide the NYISO with backup generation in the event of a Real-Time power system Contingency.
- ESRs will be eligible to provide Spinning, 10-min Non-Synchronous, 30-min Synchronous, and 30-min Non-Synchronous Reserves if they are capable of meeting the existing Tariff requirements to provide those services.
  - Inverter-based ESRs will be eligible to provide Spinning Reserves.

Proposed Reserve Service Provisions

- **The NYISO proposes to award ESR Operating Reserve schedules based on the resource's state (i.e. injecting/withdrawing/idle) and its capabilities to transition between states.**
  - If the ESR is injecting or is idle/offline, it could be awarded up to the difference between its Energy Base Point and Upper Operating Limit.
  - If the ESR is withdrawing, additional constraints, including transition limitations, will dictate the amount of Reserves awarded.
    - If an asset has transition constraints, it could be awarded up to the difference between its Energy Base Point and Min. Load.
    - If an asset has no transition constraints, it could be awarded up to the difference between its Energy Base Point and Upper Operating Limit.

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Proposed Reserve Service Provisions (Cont.)

- **If an asset chooses to provide the NYISO with an energy level telemetry signal, the NYISO will schedule the resource for Operating Reserves only if the energy level indicates that the schedule could be maintained for at least one hour.**
  - Operating Reserve awards will respect the Response Rates identified by the Resource.
  - Units that choose not to provide an energy level telemetry signal will be responsible for managing their energy level, and ensuring that they can maintain Operating Reserve awards for at least one hour if converted to Energy.

Other Ancillary Services

Proposed Voltage Support Service Provisions

- **The NYISO proposes that ESR eligibility to provide Voltage Support Service ("VSS") be based on whether the ESR participates in the wholesale market individually, or in aggregation, in addition to existing Tariff requirements.**
  - ESRs with a single interconnection point that comply with the NYISO's qualification criteria to provide VSS, which includes successfully performing a Reactive Power (MVAr) capability test in accordance with NYISO procedure, be eligible to provide VSS.
  - The NYISO proposes not to make Aggregations of ESRs eligible to provide VSS at the bulk power system level.
    - Voltage Support is a highly localized service. Since aggregations of resources are distributed in nature, aggregations' capability to alleviate bulk transmission system voltage needs would be limited.
    - The NYISO will not be able to accurately measure the Reactive Power contribution of aggregations.
    - The NYISO cannot ensure that aggregations of resources located at the distribution level dispatched to serve a bulk power system need will not create or aggravate local voltage-related needs at the distribution level.

Black Start Capability Service

- **The NYISO's Black Start Capability Service is a cost-based Ancillary Service.**
  - Black Start facilities are compensated for their costs to provide Black Start Capability Service (See NYISO MST – Section 15.5, Rate Schedule 5).
- **The New York Control Area (NYCA) Restoration Plan calls for the energization of a 345-kV and 230-kV transmission backbone from Niagara, St Lawrence, and Gilboa Black Start facilities (See NYISO Emergency Operations Manual-Section 6).**
  - This transmission backbone consists of three major paths:
    1. Buffalo to Utica to Albany to New York City;
    2. Massena to Utica; and
    3. Buffalo to Binghamton to Albany.

Black Start Capability Service

- The NYISO periodically reviews and updates the Black Start Restoration Plan for the NYS Power System.
  - The NYISO may amend this restoration plan and determine black start requirements to account for changes in system configuration.
  - If the NYISO determines that additional black start resources are needed. The NYISO has the flexibility to seek bids for new resources whenever it amends the current plan.
- Resources providing Black Start Capability should be capable of energizing the NYCA transmission backbone.
- ESRs may be considered for Black Start Service in future revisions to the NYISO's restoration procedures if they meet the requirements to provide such service.

Next Steps

- The NYISO continue to seek stakeholder feedback on the ESR Market Design in 2018. The NYISO is looking to complete the design of the ESR participation model in 2018.
- The NYISO will work with its stakeholders on detailed ESR Settlements' rules.

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Feedback

- The NYISO seeks feedback on the materials presented today.

- Email additional feedback to: Daniel F. Noriega dnoriega@nyiso.com

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:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system

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