

Uses of Reserves and Impacts to ESR

Aaron Markham

Director, Grid Operations

MC

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Agenda

- Background
- Impacts to ESR
- Proposed MST revisions
- Appendix

Background

Why Does NYISO Carry Reserves?

- **With all of the focus on reserve products in the NYISO market, Operations felt it is valuable to discuss with stakeholders why reserves are required**
 - Resource Loss
 - Transmission Loss

Reserve for Resource Loss

- NERC Standard BAL-002-3
- R1, The Responsible Entity experiencing a Reportable Balancing Contingency Event shall:
 - 1.1. within the Contingency Event Recovery Period, demonstrate recovery by returning its Reporting ACE to at least the recovery value of:
 - zero (if its Pre-Reporting Contingency Event ACE Value was positive or equal to zero); however, any Balancing Contingency Event that occurs during the Contingency Event Recovery Period shall reduce the required recovery: (i) beginning at the time of, and (ii) by the magnitude of, such individual Balancing Contingency Event, or
 - its Pre-Reporting Contingency Event ACE Value (if its Pre-Reporting Contingency Event ACE Value was negative); however, any Balancing Contingency Event that occurs during the Contingency Event Recovery Period shall reduce the required recovery: (i) beginning at the time of, and (ii) by the magnitude of, such individual Balancing Contingency Event.

Reserve for Transmission Loss

- NYSRC Rule C.2. Post –Contingency Operation:
- **R1.** If the readjustment of *generation*, including the use of *operating reserve*, phase angle regulator control, and HVDC control is not adequate to restore the system to a secure state, then other measures such as *voltage reduction* and shedding of *firm load* may be required. System adjustments shall be completed as quickly as possible, but in all cases within thirty (30) minutes after the occurrence of the *contingency*.

NPCC Directory 5

- **Sustainability of Operating Reserve**
 - R6. A Balancing Authority's **synchronized reserve**, **ten-minute reserve**, and **thirty-minute reserve**, if activated, shall be sustainable for at least one hour from the time of activation.
 - It is the expectation of the NYISO that Resources in the Market today manage this through bidding and/or derating

Managing the NPCC 60 minute sustainability requirement

- Resources are expected to manage reserve bids and offers to only make available reserves that are sustainable for 60 minutes.
- Resources are expected to inform NYISO Grid Operations, via the TO, of limitations on their ability to provide reserves.
 - ESRs are expected to satisfy this notification requirement by providing real-time state of charge (SOC) telemetry to the NYISO. If the telemetered data is not sufficient to give the NYISO an accurate understanding of an ESR's ability to provide reserves then NYISO Grid Operations should be informed by the resource via the TO.

Energy Storage Resources

ESRs that provide reserves will need to meet the NPCC requirement as well.

- The current market design and planned software implementation will not award an ESR a reserve schedule greater than the ESR can sustain for 60 minutes based on its state of charge (SOC).
- During a reserve pick-up (RPU) RTD may award a larger energy schedule to an ESR than is sustainable for 60 minutes. This can occur because the RTD-CAM used to perform an RPU only looks out 10 minutes (it needs to issue updated schedules very quickly).
- This is concerning, as it could result in an ESR running out of energy and not being able to continue following basepoints during the critical 60 minute recover period after loss of a resource or transmission element.
- The NYISO is proposing additional tariff authority and updated RPU software to only award an energy schedule that is sustainable for 60 minutes (or more) to ESRs that are bidding flexibly and eligible to provide reserves during an RPU.

Example of the Potential Problem

- A 100 MW ESR has SOC of 17MWh.
- The RTD run at 15:05 awards the unit a 0 MW energy schedule and 17MW reserve award.
- At 15:06 a 1000MW generator trips and the NYISO runs a RPU. Using the current logic, the RPU awards the ESR 100MW of energy (16.7 MWh for the 10 minute duration of the RPU) and 900MW to other units.
- The ESR appropriately follows the basepoints it receives during the RPU.
- At 15:16 the NYISO ACE has not crossed zero so the RPU remains active. The ESR runs out of energy and ramps to zero. This is not acceptable per the NPCC rules.
- After the software change, the appropriate energy award for this ESR during an RPU will be limited to 17 MW (2.8 MWh for the 10 minute duration of the RPU), because that schedule is sustainable for 60 minutes.

During RPU

- **We already account for the requirement that energy schedules be sustainable in the LESR market design by not scheduling regulation during RPUs**
- **An energy limited ESR that was dispatched before a RPU may see a reduction in basepoints during a RPU**

Proposed Market Services Tariff Revisions

4.4.3.1.1 Reserve Pickup

The ISO will enter this RTD-CAM mode when necessary to re-establish schedules when large area control errors occur. When in this mode, RTD-CAM will send 10-minute Base Point Signals and produce schedules for the next ten minutes. RTD-CAM may also commit, or if necessary de-commit, Resources capable of starting or stopping within 10-minutes. The ISO will continue to optimize for Energy and Operating Reserves, will recognize locational Operating Reserve requirements and Scarcity Reserve Requirements, but will set all Regulation Service schedules to zero. If Resources are committed or de-committed in this RTD-CAM mode the schedules for them will be passed to RTC and the Real-Time Dispatch for their next execution.

Resources that are eligible to provide Operating Reserves and that are available to the ISO for dispatch in real-time are required to be able to meet the energy sustainability requirements set forth in applicable NERC, NPCC and/or NYSRC reliability requirements. When the ISO enters a reserve pickup RTD-CAM mode it will determine sustainable Energy schedules for Energy Storage Resources that are eligible to provide Operating Reserves and that are available to the ISO for dispatch based on their telemetered state of charge.

The ISO will have discretion to classify a reserve pickup as a “large event” or a “small event.” In a small event the ISO will have discretion to reduce Base Point Signals in order to reduce transmission line loadings. The ISO will not ordinarily have this discretion in large events, except that it may limit the dispatch of Energy Storage Resources to satisfy Operating Reserve energy sustainability requirements. The distinction also has significance with respect to a Supplier’s eligibility to receive Bid Production Cost guarantee payment in accordance with Section 4.6.6 and Attachment C of this ISO Services Tariff.

Questions?

Appendix

Timeline of Operational Actions Associated with Event Recovery

Operations Timeline for Event Recovery (1)

■ T=0 Resource loss

- Operators identify and confirm loss
- Identify System Operating Limit (SOL) or Interconnection Reliability Operating Limit (IROL) exceedances
- Declare state change as required by system conditions
- Place derate in MIS on resource
- Run NPCC Simultaneous Activation of Reserve (SAR)
- Run Reserve Pick-Up

Operations Timeline for Event Recovery (2)

■ T=1-10

- Monitor resource response to RPU
- Take additional actions as needed to “cross zero” by minute 10
- Take any additional actions needed to resolve NERC SOL or IROL exceedances
- Actual flows must be below Short Term Emergency rating (STE) by T+5
- Evaluate need and implement load shed plan if necessary for NERC Disturbance Control Standard (DCS) Compliance (to be complete by T+15)
- Convert 30 minute off line reserves to energy as needed to reestablish 10 minute reserve per NYSRC
- If actual flows exceeded STE, flow must be below Long Term Emergency rating (LTE), by T+10

Operations Timeline for Event Recovery (3)

■ T=15

- NERC DCS violation if ACE has not returned to the lower of pre-contingency ACE value or crossed zero
- Actual flows must be below LTE if they did not exceed STE, and IROL flows must be less than 5% over limit

■ T=15-30

- Take any additional actions required to resolve NERC SOL or IROL exceedances

Operations Timeline for Event Recovery (4)

■ T=30

- Flows on IROL interfaces must be below limit to avoid a NERC violation
- Actual flows should be less than Normal ratings, and post contingency flows less than applicable limit or declare Emergency Transfer Criteria (ETC). Reestablish 10 minute reserve per NYSRC
- NPCC SAR terminated, redispatch to ramp the SAR out over 10 minutes

■ T=30-40

- NYCA generators ramp up to replace SAR energy being ramped out, NYCA reserve requirements must still be met

Operations Timeline for Event Recovery (5)

■ T=0-60

- Operators must manage up to four interchange ramps. RTC will have already determined interchange schedules for the next two to three 15 minute intervals (depending on when the loss occurred) based on system conditions prior to the resource loss.

■ T=60

- Min run time of quick start units concludes. Shut down as system conditions allow to reestablish units as non-synchronous reserves.

Examples of current limitations

Example: Pondage Hydro Resource

- A 30 MW hydro unit was scheduled for 20MW of energy in the DAM for all hours consistent with the river flow conditions.
- In addition to meeting the DAM Energy Schedule the unit has 20 MWh of additional stored water available for RT to offer as reserve.
- The unit offers 30 MW of energy and 10 MW of 10 minute reserve in the Real-Time Market. To ensure situational awareness, NYISO Grid Operations is informed by the resource via the TO of the limitation on the ability to provide energy associated with reserve bid. MPs should provide notice to the NYISO if unable provide the energy associated with reserve offers for a minimum of 4 hours.
 - ESRs are expected to satisfy this notification requirement by providing real-time state of charge (SOC) telemetry to the NYISO. If the telemetered data is not sufficient to give the NYISO an accurate understanding of an ESR's ability to provide reserves then NYISO Grid Operations should be informed by the resource via the TO.
- At 14:00 the reserve offer is converted to energy through the remainder of the hour.
- When the unit sees it will have less than 10MWh of additional energy left it is expected to update bids or derate to manage the 60 minute sustainability requirement.

Example: NOX Limited GT

- A 45 MW unit was scheduled for 45 MW of 10 minute non-sync reserve for all hours in the DAM
- The GT relies on another unit running to “NOx average” but that unit became unavailable so the GT only has 1 hour of run time available
- The unit updates its real-time energy bids to manage run time and, for situational awareness, informs NYISO Grid Operations via the TO of the limitation on its ability to provide reserves in real-time.
- At 16:00 the reserve offer is converted to energy and the GT has a 1 hour min run time.
- When the unit receives a start signal and is aware that the unit has less than 1 hour of run time left. It should call in a derate to zero to start at 17:00 through the end of the day to manage availability.

Example: Noise Limited GT

- **A 40 MW 10 minute GT is limited by permit to only operate between 06:00 and 22:59 each day due a local noise ordinance. The permit does not allow of any exceptions to the run time.**
- **The unit should not offer reserves in HB 22, as any start in RT in hour 22 would not meet the NPCC requirement that the resource be able to provide reserve for 60 minutes.**
 - In this example the GT should not offer energy and/or reserves into the DAM or RT in the hours it cannot operate due to the permit restriction
 - The GT should offer in as a fixed resource in the last hour prior to the restriction taking effect (HB 22 in the example) to avoid being awarded reserves

Example: Staff Limited GT

- A 40 MW 10 minute GT is only staffed to operate from 06:00 to 22:59 each day. However, under emergency conditions the staff can stay late to monitor the unit while it is running.
- The unit does not offer energy or reserves in HB 23 but offers energy and reserves in HB 22. At 22:45 the unit is started via a reserve pick-up.
 - The unit can be started by a RPU, as a RPU only incorporates a 10 minute dispatch with no “look Ahead” capability
- This is acceptable, as the plant staff can remain at the site and the unit can run to fulfill its min run time and satisfy the NPCC 60 minute sustainability requirement.

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- 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

