Proposed Tariff Revisions for Mitigation of ESRs

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Market Mitigation and Analysis

MIWG

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Agenda

- Reference Levels for ESRs
- Energy Mitigation Measures for ESRs
- Mitigation Measures for Bids Evaluated as a Price Spread
- Mitigation Measures for Uneconomic Withdrawals
- Opportunity Cost Adjustments
- Virtual Bidding

Previous Discussions

Date	Working Group	Discussion points and links to materials
05-05-17	MIWG	Proposed modeling enhancements as the cornerstone of the Energy Storage Integration
07-19-17	MIWG	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
02-21-18	MIWG	Ancillary Services Treatment in the ESR Participation Model
04-26-18	MIWG	ESR Energy Level Monitoring
05-23-18	MIWG	ESR Participation Model: Settlements
06-19-18	MIWG	ESR Metering
06-25-18	MIWG	ESR Settlements: Charges for deviating from NYISO Base Points
07-10-18	MIWG	Energy Mitigation Measures for ESRs
07-24-18	MIWG	1) ESR Settlements: Examples and detailed formula 2) ESR: Market Design Update
07-31-18	MIWG	ESR Operating Characteristics

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Reference Levels for ESRs

Reference Levels for ESRs

- **The NYISO will be required to calculate a Reference Level for ESRs**
  - A standard methodology for calculating the opportunity cost of these resources will be created and communicated to Market Participants
    - NYISO will have a separate presentation going into more details about what Opportunity Costs will be acceptable
  - Market Participants will be allowed to calculate opportunity costs using other methods, provided they are fully documented.
  - Reference Levels for ESRs, in order of preference, shall be cost-based, NYISO determined, or an average of similar units

Tariff Language Updates for Reference Levels of ESRs

- The NYISO proposed revisions to the following sections:
  - 23.3.1.4.1 and 23.3.1.4.3
- These changes ensure the correct Reference Level hierarchy and provide some additional details about Opportunity Costs
  - Opportunity cost is the cost, in dollars, representing the net revenue in future time periods that is expected to be forgone by being dispatched by the ISO in the current time period; and are limited to costs that the ISO reasonably determines to be appropriate based on available data

Energy Mitigation Measures for ESRs

Energy Mitigation Measures for ESRs

- **While ESRs are injecting, current mitigation measures should be sufficient in preventing the abuse of market power**
  - Except where the ISO economically evaluates the Bids as price spreads. The rules for mitigation of Incremental Energy Bids that are evaluated as price spreads are addressed in the next section

Energy Mitigation Measures for ESRs

- **Current mitigation measures will not be sufficient for ESRs while they are withdrawing energy**
  - An ESR with market power could submit a high offer to purchase energy in an attempt to set price and benefit the market party's generators in the same load pocket(s)

Example of High Withdrawal Offers to Benefit Other Generators

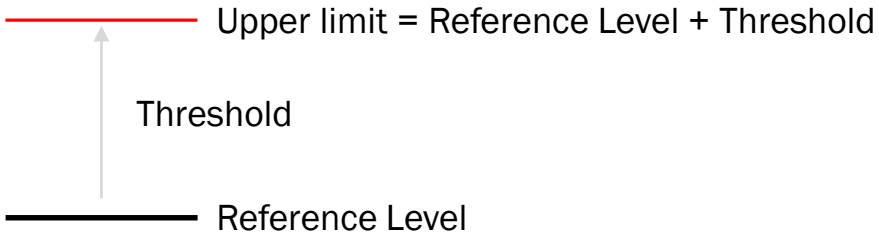
- Current Load of 1000 MW
- Generation Offers: 1050 MW at $50/MWh, 100 MW at $300/MWh
  - The Generation offers do not include the ESR, but could include Generators that are affiliated with the ESR
- 1000 MWs of Generation dispatched to meet Load and LBMP is $50/MWh
- ESR then offers to withdraw up to 100 MWs @ $200/MWh
- 1050 MWs dispatched to meet 1000 MWs of Load and 50 MWs withdrawn by ESR
- ESR offer is on the margin and sets LBMP at $200/MWh for all 1050 MWs

Conduct Test for ESR Offers to Withdraw Energy

- After discussion with MMU, NYISO is no longer proposing to add a bi-directional conduct test
- NYISO believes a bi-directional conduct test would result in many false positives and any mitigation applied would have been at odds with the no harm test

Conduct Test for ESR Offers to Withdraw Energy

- **Thresholds as follows:**
  - ROS: lower of 300% or $100/MWh, with a minimum of $75/MWh
  - Constrained Areas with active constraint: Load Pocket Thresholds
  - Reliability Schedules: greater of 10% or $10/MWh



Tariff Language Updates for Energy Mitigation Measures for ESRs

- The NYISO proposes revisions to the following sections:
  - 23.2.4.1.1, 23.2.4.1.2, 23.3.1.2.1.1, 23.3.1.2.14, 23.3.1.2.1.5, 23.3.3.3.1.3.3, 23.3.3.3.2.1.4 and 23.3.3.3.2.1.5
- The NYISO proposes the following new sections:
  - 23.3.1.2.1.1.1 and 23.3.3.3.2.1.6

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Mitigation Measures for Bids Evaluated as a Price Spread

NYISO Energy Level Monitoring in the DAM

- **SCUC will optimize the spread between ESRs' offers to charge and discharge over the 24 hour DAM time horizon.**
  - Example: An ESR offers to charge when LBMPs are less than or equal to $5/MW, and discharge when they are $25/MW or greater.
    - SCUC will ensure that the margin of $20 between charging and discharging offers is preserved over the day
    - SCUC may schedule the ESR to charge when the price is $30 if that will permit additional discharge to be scheduled at a time when the price is $50+

NYISO Energy Level Monitoring in the RTM

- **The same paradigm of protecting ESRs' bid spreads will be applied by RTC and RTD for ISO-Managed ESRs in Real Time.**
- **Even when given the exact same set of initial conditions, SCUC, RTC and RTD will produce different schedules for short-duration ESRs because:**
  - SCUC will optimize fuel use (energy level) and other operational and economic constraints over a 24-hour period.
  - RTC will optimize fuel use (energy level) and other operational and economic constraints over a 2.5-hour period.
  - RTD will optimize fuel use (energy level) and other operational and economic constraints over a 1-hour period for online, dispatchable units.

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Price Spreads and Scheduling

- **Since the price spread between offers to withdraw and inject may influence the scheduling and dispatch of NYISO-managed ESRs, the price spread offered will need to be monitored**
  - An ESR might offer $5/MWh to withdraw energy and $40/MWh to inject energy, representing a $35/MWh price spread
  - Given certain Energy Level constraints, the NYISO-managed ESR could be scheduled to withdraw at $20/MWh and scheduled to inject at $55/MWh, because this still produces a $35/MWh price spread

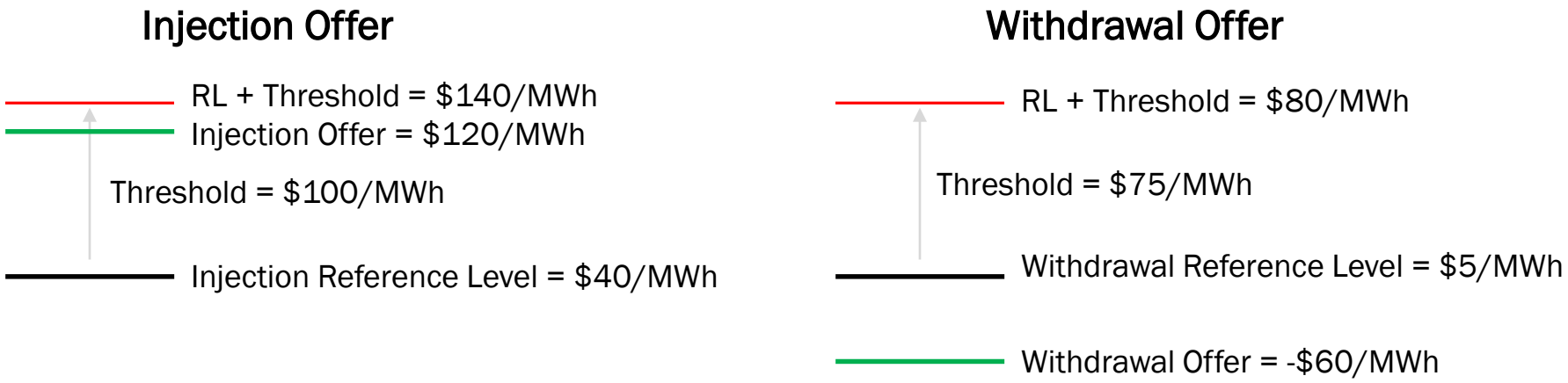
Conduct Tests

- The Incremental Energy Bid curve is compared to the Incremental Energy reference level curve. If the dollar spread of the Incremental Energy Bid curve exceeds the dollar spread of the Incremental Energy reference levels by more than the threshold, then the offer violates the conduct test.
- In the DAM, NYISO will also consider all Incremental Energy Bids submitted over a Day-Ahead market day and the Incremental Energy reference levels over the same period, the ISO shall compare the dollar spread between the greatest and the least Incremental Energy Bids to the dollar spread between the corresponding Incremental Energy reference level values. If the dollar spread of the Incremental Energy Bids exceeds the dollar spread of the Incremental Energy reference levels by more than the threshold, then the offer violates the conduct test.

Review of Price Spreads

- Thresholds used for review of bids evaluated as a price spread:
  - ROS: lower of 300% or $100/MWh
  - Constrained areas: Load Pocket Thresholds
- For constrained areas with an active constraint, price spreads represented by a single bid will be reviewed ex-ante (AMP)
- For ROS areas, price spreads will be reviewed ex-post
- Intertemporal prices spreads in the DAM will also be reviewed ex-post
  - Ex-post reviews could result in a financial sanction if there is LBMP impact

Example of Price Spread Evaluation



- Price spread represented by bids is $180/MWh, but price spread derived from Reference Levels is only $35/MWh
- This would fail the conduct test at $180/MWh exceeds $35/MWh by more than the $100 threshold

Tariff Language Updates for Price Spread Evaluations

- The NYISO proposed revisions to the following sections:
  - 23.3.2.2.3, 23.4.1 and 23.4.2
- The NYISO proposes the following new sections:
  - 23.3.1.2.1.1.2, 23.3.1.2.2.6, 23.4.3.3.1.1.1 and 23.4.3.3.1.2.1

Uneconomic Withdrawals

Mitigation Measures for Uneconomic Withdrawals

- Addresses uneconomic withdrawals achieved by self-scheduling or by failure to follow dispatch instructions that causes or contributes to transmission congestion
- Applies to energy withdrawn at an LBMP that exceeds the applicable reference level by at least 300% or $75/MWh, whichever is less
- Because this measure targets self-scheduling and failure to follow dispatch, it does not apply when the unit was scheduled based on the economics of its offer
- The mitigation measure applies to withdrawals if the output differs from dispatch by more than 15 minutes times the Generator's Response rate per minute, or by 100 MW for a Generator, or 200 MW for a Market Party and its Affiliates

Example of Uneconomic Withdrawal

- **An ESR self-schedules to withdraw energy at an LBMP of $110/MWh, while its Reference Level is only $30/MWh**
  - LBMP is $80 greater than the Reference Level, exceeding the $75 threshold
  - If this withdrawal causes or contributes to congestion, mitigation will apply if impact is determined

Tariff Language Updates for Uneconomic Withdrawals by ESRs

- The NYISO proposes the following new sections:
  - 23.3.1.3.2, 23.3.1.3.2.1 and 23.3.1.3.2.2

Opportunity Cost Adjustments

Opportunity Cost Adjustments

- **NYISO will create a means for all Generators to reflect changes to their opportunity costs while injecting or withdrawing**
  - This will work similar to a thermal unit utilizing a Fuel Cost Adjustment in order to revise the unit's Reference Levels
  - Generators will instead submit updated opportunity costs to be used to revise the unit's Reference Levels
  - There will be a penalty if inaccurate opportunity costs are submitted that result in the unit failing conduct and impact tests

Tariff Language Updates for Opportunity Cost Adjustments

- The NYISO proposed revisions to the following sections:
  - 23.3.3.3.1.5.1, 23.4.2, 23.4.3.3.3, 23.4.3.3.3.1.1, 23.4.3.3.3.1.2 and 23.4.3.3.3.2
- The NYISO proposes the following new sections:
  - 23.3.1.4.8, 23.3.1.4.8.1, 23.3.1.4.8.2, 23.3.1.4.8.3, 23.3.1.4.8.4, 23.3.1.4.8.5, 23.3.1.4.8.6, 23.3.1.4.8.7, 23.3.1.4.8.8 and 23.3.1.4.8.9

Decreasing Real Time Energy Offers and Virtual Bidding

Decreasing Real Time Incremental Energy Offers and Virtual Bidding

- NYISO will monitor for submitted real-time Incremental Energy bids at a price lower than the Incremental Energy bids submitted day-ahead when the Generator has a day-ahead schedule to withdraw Energy and a Virtual Supply bid in the same hour
- The Market Party may be subject to a penalty and loss of ability to submit Virtual Bids in Load Zones where its ESRs are located if the real-time Incremental Energy bids is less than the Reference Level by more than the lower of $100/MWh or 300%, with a minimum of $75, for ROS units; or the Load Pocket Thresholds for Constrained Areas with an active constraint

Tariff Language Updates for ESRs and Virtual Bidding

- The NYISO proposes revisions to the following sections:
  - 23.4.3.3.4, 23.4.3.3.4.1, 23.4.7, 23.4.7.1, 23.4.7.2.1, 23.4.7.3.1, 23.4.7.3.1.1 and 23.4.7.3.1.2
- The NYISO proposes the following new sections:
  - 23.4.3.3.4.2 and 23.4.7.2.2

Questions?

We are here to help. Let us know if we can add anything.

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