

Offer Price Capping and Mitigation Update

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Market Issues Working Group:

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Agenda

- Overview
- Energy Storage Resource Offer Curve Concerns
- Offer Price Capping Update
- Mitigation Update
- ESR Reference Level Clarification

Overview

Overview

- **During development for the Energy Storage Resource Project, issues that require tariff language cleanup were discovered including:**
 - Updates required to properly address offer caps and mitigation (today's discussion)
 - Adding clarity to the DAMAP calculation and DAM bidding requirements
- **NYISO intends to include all of these updates in a single 205 filing**
- **The slides that follow will describe the updates required by Market Mitigation and Analysis**
- **Future presentations will discuss additional changes that are needed by other groups**

ESR Offer Curve Concerns

Potential Issues with Impact of ESR Charging on Offer Curve

- Example of an ESR offer curve

MWh	-20	0	10	20
\$	5.00	10.00	11.00	15.00

- However, there are efficiency losses from charging and discharging the ESR

- Assuming an efficiency of 85%, SCUC, RTC and RTD would effectively view this offer curve as follows:

MWh	-20	0	10	20
\$	5.00	10.00	9.35 (11*.85)	12.75 (15*.85)

- This results in a curve that is effectively not monotonically increasing

- This can causes problem with developing a market solution

Solution

- An offer curve for ESR's must include a MW segment at 0
- There will also be bid validation logic that will ensure an ESR's offer curve properly accounts for the unit's efficiency losses

MWh	-20	0	10	20
\$	A	B	C	D

- Using the offer curve above, the bid validation logic will perform the following check:

$$B \leq C\eta$$

- Where η is the units round trip efficiency

Problems Following Offer Submission

- While this solution will ensure that offer curves for ESR's appropriately account for the unit's round trip efficiency, the offer curve could be altered after it has been submitted by:
 - Offer Price Capping
or
 - Mitigation

Offer Price Capping

Current Price Capping Logic

- The current price capping logic is as follows:
 - $=\min(\text{Bid}, \max(1000, \min(2000, \text{Reference})))$
 - Where: Bid is the dollar value on the offer curve for the MW segment tested
 - Reference is the dollar value on the reference curve for the MW segment tested

Example of Offer Price Capping Issue

- Example of an ESR offer curve and the resulting offer price capping (example assumes all required info submitted and reference levels in excess of \$1,000 have been verified)

MWh	-20	0	10	20
Bid \$	800.00	900.00	1400.00	1700.00
Reference \$	550.00	600.00	900.00	1100.00
Price Capped \$	800.00	900.00	1000.00	1100.00

- However, the offer curve above does not incorporate charging efficiency. SCUC, RTC and RTD are aware of the ESR's round-trip efficiency of 85% and effectively view this offer curve as follows:

MWh	-20	0	10	20
Price Capped \$	800.00	900.00	850.00 (1000*.85)	935.00 (1100*.85)

- This results in a curve that is effectively not monotonically increasing

Proposed Solution

- **The NYISO proposes to update the offer price capping logic so that offers to withdraw energy are capped at the lowest of the following:**
 - The price of the energy offer
 - The price allowed by the current capping logic
 - The price required to account for the unit's round trip efficiency (new)
- **The proposed solution is intended to ensure that when analyzed by SCUC, RTC and RTD, the offer curve will be viewed as monotonically increasing**
- **The current price capping logic will continue to be applied if a unit's energy offer does not cross zero, and will be applied to all energy segments that are greater than zero**

Proposed Solution

- **Additional price capping logic is as follows:**
 - $=\min(\max(1000, \min(2000, \text{reference}^*, \text{bid}^*)), \text{Bid}, \max(1000, \min(2000, \text{Reference})))$
 - Where: Bid is the dollar value on the offer curve for the MW segment tested
 - Reference is the dollar value on the reference curve for the MW segment tested
 - bid* is the dollar value on the offer curve for the first positive MW segment
 - reference* is the dollar value on the reference curve for the first positive MW segment
 - This logic will only apply if an offer curve crosses zero and will only apply to energy segments that are less than or equal to zero (offers to withdraw energy)

Examples of Updated Logic Results

- Examples of an ESR offer curve and the resulting offer price capping using the updated logic

MWh	-20	0	10	20
Bid \$	800.00	900.00	1400.00	1700.00
Reference \$	550.00	600.00	900.00	1100.00
Price Capped \$	800.00	850.00	1000.00	1100.00

MWh	-20	0	10	20
Bid \$	1500.00	2100.00	2500.00	2700.00
Reference \$	1200.00	1800.00	2400.00	2500.00
Price Capped \$	1200.00	1700.00	2000.00	2000.00

Mitigation

Example of Mitigation Issue

- Example of an ESR offer curve and the result of mitigation using a \$4.00/MWh conduct threshold

MWh	-20	0	10	20
Bid \$	10.00	30.00	38.00	50.00
Reference \$	9.00	27.00	32.00	40.00
Target (ref + \$4 threshold)	13.00	31.00	36.00	44.00
Conduct Test	Pass	Pass	Fail	Fail
Mitigated Curve \$	10.00	30.00	32.00	40.00

Example of Mitigation Issue

- The mitigated offer curve on the previous slide does not incorporate charging efficiency
- Reference Levels for ESRs must account for expected losses incurred when charging
- However, the offer curve above does not incorporate efficiency losses. SCUC, RTC and RTD are aware of the units' round-trip efficiency of 85% and effectively view this mitigated offer curve as follows:

MWh	-20	0	10	20
Mitigated Curve \$	10.00	30.00	27.20 (32*.85)	34.00 (40*.85)

- This results in an offer curve that is effectively not monotonically increasing

Proposed Solution

- Mitigation will not be applied if it would result in a mitigated energy curve that does not account for the Energy Storage Resource's round trip efficiency

MWh	-20	0	10	20
Mitigated Curve \$	A	B	C	D

- Using the mitigated offer curve above, market close will perform the following check:
 - If $B \leq C\eta$, then mitigation will be applied
 - If $B \geq C\eta$, then mitigation will not be applied
- Where η is the units round trip efficiency

ESR Reference Level Clarification

New Unit Reference Clarification

- **Energy Storage Resource Reference Levels should only be calculated using cost-based Reference Levels**
 - Current tariff language would require ESRs that are New Capacity to have a New Unit Reference Level
 - New Unit Reference Levels are based on historical LBMPs and would not be representative of ESRs costs or operating parameters such as round trip efficiency
- **New tariff language is needed to explicitly exempt ESRs from requiring a New Unit Reference Level**

Questions?

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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

