Energy Storage Enhancements Training, Track 1

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## Scheduling Coordinators with Storage Resources

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<th>Market Optimization</th>
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Housekeeping

Make sure to keep yourself muted unless you have a question

If you have a question, you may either ask over the phone or in the chat

If you want to ask a question, you can virtually “raise your hand” in WebEx
In today’s session we’ll cover:

- **Market Optimization** (15 min)
  - Bidding Rules (20 min)
    - Default Energy Bid (10 min)
  - Wrap Up (5 min)
In today’s session we’ll cover:

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- Bidding Rules (20 min)
- Default Energy Bid (10 min)
- Wrap Up (5 min)
The issue: The state of charge (SOC) optimization does not anticipate the energy that will be gained or lost when providing regulation.

Previous SOC

± Dispatch Instruction*

SOC

* Factors in round-trip efficiency
The solution: Consider regulation up and regulation down in the SOC optimization

Previous SOC

± Reg Instruction x Multiplier*

= SOC

± Dispatch Instruction*

* Factors in round-trip efficiency
Q&A
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- **Market Optimization**
  - (15 min)

- **Bidding Rules**
  - (20 min)

- **Default Energy Bid**
  - (10 min)

- **Wrap Up**
  - (5 min)
Storage resources that are awarded ancillary services in the day-ahead market have new bidding rules.

In real-time an energy bid is required to cover at least 50% of the AS award, in the opposite direction.

If AS award is for regulation up, spinning reserve or non-spinning reserve:
- Real-time energy bid must be for charging

If AS award is for regulation down:
- Real-time energy bid must be for discharging
Examples: A storage 48MWh resource with a ±12 MW range.

**Day-ahead**

12 MW regulation **up** award

**Real-time**

Bid at least 6 MW of energy to **charge** (negative range)

12 MW regulation **down** award

Bid at least 6 MW of energy to **discharge** (positive range)
Examples: A storage 48MWh resource with a \( \pm 12 \) MW range.

- **Day-ahead**
  - 8 MW regulation up and 8 MW regulation down awards

- **Real-time**
  - Bid the remaining 4 MW of discharging and charging range as energy

Link to Energy Storage Enhancements Final Proposal: [FinalProposal-EnergyStorageEnhancements.pdf](https://caiso.com)
Other details about the real-time energy bids.

- Energy self-schedules are not considered bids for this rule.
- If SC’s energy bid does not equal at least 50% of the AS award, the bid will be extended.
- If SC does not submit an energy bid in SIBR, a bid will be inserted at the default energy bid price.
Q&A
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Market Optimization (15 min)

Bidding Rules (20 min)

Default Energy Bid (10 min)

Wrap Up (5 min)
The issue: There were instances in the day-ahead market when the storage default energy bid (DEB) caused unanticipated results.

\[
DA \text{ Storage DEB} = \left( \text{MAX}(En_{\delta/\eta}, 0) + \rho \right) \times 1.1
\]
The solution: Include opportunity costs in the day-ahead storage DEB formula (mirrors the real-time storage DEB).

The maximum of the opportunity cost and:

(Maximum of the energy cost and zero) plus the variable costs

\[
DA \text{ Storage DEB} = \text{Max} \left[ \left( \text{MAX} \left( \frac{E_n}{\eta}, 0 \right) + \rho \right), OC_\delta \right] \times 1.1
\]
Q&A
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ESE Track 1 – Action Items

☐ Attend RUG and TUG meetings

Market sim starts on 05/01/23
☐ Attend market sim meetings (started 04/27/23)
☐ Submit questions and concerns in CIDI

☐ Prior to 6/1/23
☐ Submit questions: CustomerReadiness@caiso.com

☐ After 6/1/23
☐ With day-ahead AS awards, submit real-time energy bids that are at least 50% of the day-ahead ancillary service awards in the opposite direction
☐ Submit questions and concerns in CIDI
Final Q&A
Still have questions?

www.caiso.com

Thank you for your participation!