Price Formation Enhancements

Working Group Session #15

3/12/2024

Housekeeping reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- These collaborative working groups are intended to stimulate open dialogue and engage different perspectives.
- Please keep comments professional and respectful.
- Note: The ISO encourages any verbal or written agreements to comments made during this working group session.
- You may also send your question via chat to either Brenda Corona or to all panelists.

Recent changes to the Intellor platform, specifically around audio while joining meetings

- The “call me” feature is no longer being offered when joining Operator assisted meetings.
  - You must chose between Computer Audio option and a Dial-In audio options.
  - Dial In options (including your Attendee ID#) will be provided in the meeting details upon registration
    - This attendee ID is unique to your registration

- We are actively working with Intellor on alternatives options and appreciate your patience. I will provide and update at the beginning of the year.

Instructions for WebEx

- The “raise hand” icon is located in the lower tool bar. You will hear a beep tone when you are un-muted; at that time please state your name, and question. Attendees dialed in on the phone only press #2 will hear a notification when you are un-muted; at that time please state your name and question. ✋
- WebEx platform will **LOCK** and mute you if you mute yourself once you have finished your question. Do not mute yourself until you have completed your question or comment.

Today's Working Group Agenda

Time	Topic	Presenter
10:00 – 10:05 AM	Welcome, Today's Agenda, Stakeholder Process Overview	Brenda Corona
10:05 – 10:10 AM	Today's Goals	Juan Buitrago
10:10 – 11:35 AM	Battery Storage Bidding and FERC 831	Sylvie Spewak
11:35 – 11:55 AM	Stakeholder Discussion : Potential Next Steps	Juan Buitrago
11:55 – Noon	Closing	Brenda Corona

Goals of Today's Working Group Session

The Working Group structure is meant to embrace flexibility to allow organic and robust conversation on the topics at hand – it is still key for us to drive towards solutions collaboratively

- **Revisit proposed Energy Storage bid cap problem statement from Sprint 3**
  - Review stakeholder feedback
  - Provide relevant background

- **Stakeholder Discussion on Potential solutions and next steps**
  - Opportunity to request further information
  - Stakeholder feedback on defining scope
  - Stakeholder discussion on potential solutions

Battery Storage Bidding & FERC Order No. 831

Sylvie Spewak
Senior Policy Developer

March 12, 2024

From PFE working group 12, Scarcity Pricing Sprint 3

Proposed problem statement: Energy storage resource bids/DEBs are limited to a bid cap of $1000/MWh which may not reflect opportunity costs in tight system conditions when the bid cap is raised to $2000/MWh.

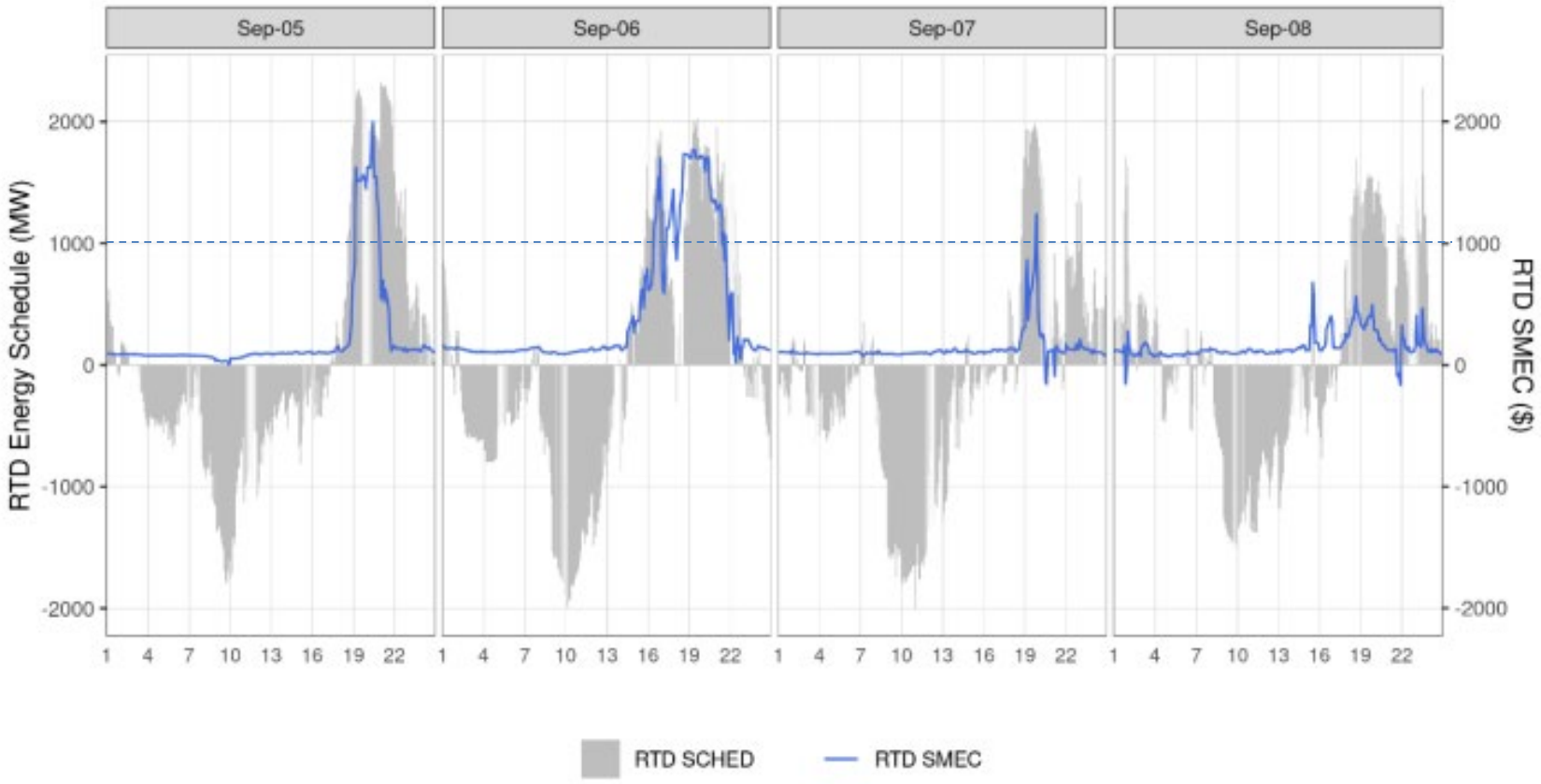
- Root cause: ISO systems cannot process storage resource requests to adjust DEBs to reflect costs above the soft offer cap.

- Impacts: storage capacity may be dispatched early, putting downward pressure on prices leading to a potential shortage later if conditions tighten; may increase reliance on market operator actions and constraints.

- Potential solution: develop an opportunity cost methodology that considers conditions when bids rise above $1000/MWh

On September 6 2022, storage was dispatched mid-day as prices rose above $1000/MWh

Figure 147: RTD Energy Awards for Storage and SMEC



Source: Summer Market Performance Report September 2022

STAKEHOLDER FEEDBACK

Prioritization and timeline

- **Stakeholders characterize this issue as a high priority issue,** seeking resolution before Summer 2024

  The ISO will need to assess a feasible timeline for stakeholder recommended next steps.

- Stakeholders characterizing this issue as medium priority noted
  - it should be resolved quickly assuming the solution is straight forward
  - more robust discussion of trade-offs and implications of any potential solution is warranted

Goals and Principles

- Improve the ability for non-gas resources to submit reference level change requests

  This presentation will review the role of the reference level change request (RLCR) process in FERC Order No. 831 compliance.

- Ensure storage resources are on a level playing field with other resources that can bid above the soft offer cap
  - Some stakeholders alternatively suggest that storage resources be on a level playing field with resources that can bid up to the hard offer cap

  This presentation will review how FERC Order No. 831 applies to different categories of resources to inform the feasibility of these goals.

Goals and Principles (cont.)

- Ensure resources can appropriately reflect intraday opportunity costs

  This presentation will review existing opportunity cost logic for battery storage resources, and opportunities for enhancement

- Reduce reliance on market operator actions like manual exceptional dispatch

- Ensure technology solutions use automated processes, and reduce reliance on manual actions.

Potential impacts and areas of analysis

- Stakeholders noted potential impacts of the issue identified might include:
  - Unintended dispatch of resources
  - Premature depletion of state of charge
  - Challenges to hydro system management
  - An increase in real-time price volatility
  - Reliability risks
  - Issues with price formation
  - Impacts on exports

Classes of resources under consideration

- Stakeholders recommended expanding the scope of classes of resources under consideration:
  - Battery storage
  - Proxy demand response
  - Run of river hydro
  - Pumped hydro
  - Hydro with storage
  - Hydro
  - Non-gas resources
  - Resources that use opportunity cost logic in their DEBs

This presentation will illustrate some high level similarities/differences in the challenges different classes of resources face with updating costs above the soft offer cap.

Stakeholders want the opportunity to discuss and better understand

- The appropriateness of
  - the resource specific bid cap
  - existing storage DEBs and opportunity cost methodology under normal conditions and high price conditions
  - maximum import bid price (MIBP) logic, the sustainability/relevance of this metric in a post-EDAM world

- If opportunities exist to allow bids above the soft offer cap without cost-verification

- Recent tight system events including periods when prices rise above $1,000/MWh

This presentation will provide background on some of these topics, demonstrate salience to the problem statement

Determining next steps…

Scope

- Which resources types should be considered? Should different classes of resources be considered together?
- Should the discussion include other logic or rules associated with FERC Order no. 831 compliance?

Approach

- What trade-offs or potential implications should be considered?
- Should the issue be narrow, or be considered as part of a broader storage participation model discussion?

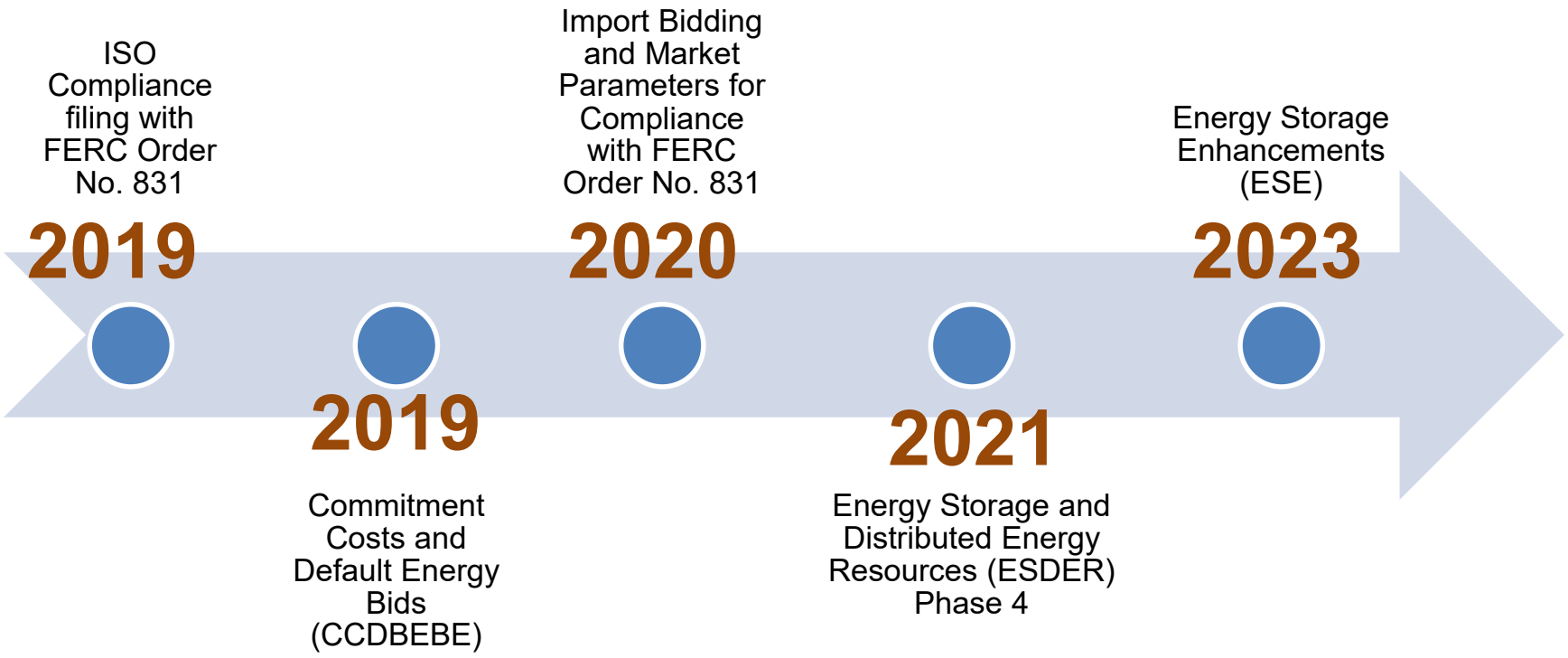
Clarifying the nature of the problem

- The ISO agrees with stakeholders that resources subject to the soft offer cap should be able to accurately reflect costs in the market when they rise above $1000/MWh

- FERC Order No. 831 requires these resources cost-verify in order to bid above $1000/MWh

- No cost-verification policy or functionality has been developed for storage resources to validate costs above $1000/MWh through the reference level change request process

Relevant policies and milestones



Requirements

FERC ORDER NO. 831

FERC Order No. 831 requires resources to verify cost-based offers above $1,000/MWh

- In order to successfully submit a energy bid above $1,000/MWh into a market, a resource has to verify that cost based offer
- Resources that cannot be identified are not subject to cost-verification
- ISOs/RTOs have the authority to define cost

FERC Order No. 831 applies differently to different resource types

- **Hard cap only group**: Demand Bids, Export Bids, Virtual Bids, and Bids for Non-Resource-Specific System Resources.
  - Non-resource-specific system resources are external, non-specific resources/imports.

- **Soft cap group:** All other resources, including generators, non-generating resources, demand response resources, etc.
  - Bids in this category must justify bidding above the soft cap.

The Hard Cap Group

- Resources in the **hard cap group** can bid above the soft cap automatically, without cost justification, when at least one of two things occur:
  1. Maximum Import Bid Price (MIBP), which approximates prevailing energy prices outside the market, rises above $1,000/MWh, or
  2. The soft-cap group resources cost-verify their bids above the soft offer cap

- The MIBP and cost-verified bids of others resource do not impact **the soft-cap group's** ability to bid above the soft offer cap.
  - They have to cost verify their bids.

The Hard Cap Group subgroups

- If the ISO-calculated MIBP exceeds $1,000/MWh or ISO has accepted a generator's cost-verified energy bid above $1,000/MWh for the applicable trade hour:
  - **Non-resource specific system resources that are RA:** bids above $1,000/MWh will be reduced to the greater of the MIBP or the highest-priced energy bid from a resource-specific system resource
  - **Imports and exports, virtual resources, and Demand resources:** bids up to $2,000/MWh will be accepted.

The Soft Offer Cap Group

- Energy bids above the soft offer cap are capped by the higher of the soft offer cap and a verified cost-based incremental energy offer
- Cost-verification is required regardless of whether the bid cap is raised for other resources
- The verification process for cost-based incremental offers above $1000/MWh should ensure that a resource's cost-based incremental energy reasonably reflects that resource's actual or expected costs
- The soft offer cap applies to resources for which short-run marginal costs are opportunity costs

Energy storage resources and FERC Order No. 831

- FERC did not prescribe how to cost verify
  - The expectation was that ISOs/RTOs would build on existing processes

- The ISO's process for updating incremental energy offers is the **reference level change request (RLCR) process**

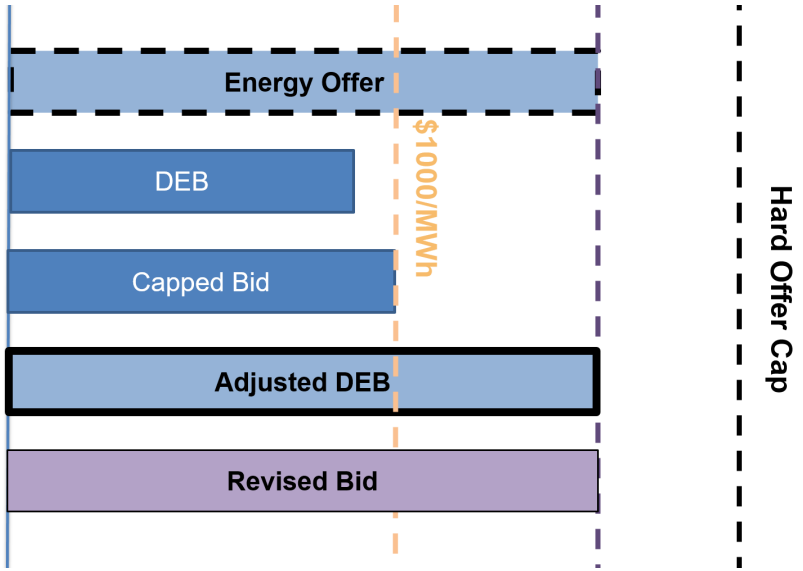
- During the first phase of implementation, energy storage resources in ISO markets were not subject to market power mitigation and did not have a DEB
  - This was noted in the ISO's 2019 Compliance filing

Implementation

REFERENCE LEVELS AND COST ADJUSTMENTS

The role of the reference level change request process in compliance with FERC Order No. 831

- In order to bid above the soft offer cap, a scheduling coordinator must successfully adjust their default energy bid (DEB) to reflect the verified cost offer
  - If successfully cost verified, the resource's energy bid will be capped at the higher of the soft offer cap or the adjusted DEB



SCs may choose a DEB option

- In addition to three standard methodologies for calculating the DEB–LMP option, negotiated rate option, variable cost option– SCs may choose:
  - Storage DEB option
  - Hydro DEB option

A primer on reference levels

- The **Default Energy Bid (DEB)** replaces energy offers that exceed the soft offer cap
- Without modification, the DEB is also capped by the soft offer cap
- To calculate DEBs, the ISO uses a resource's **reference levels**

A primer on reference levels

- The reference level change request (RLCR) process can be used to update a resources reference levels

- SCs have two ways to update their reference levels and receive and adjusted DEB:

Automated RLCR	Manual RLCR
Compares requests to a resource-specific reasonableness threshold	Can be used to update and revise reference levels
Changes are made to the applicable trade hour	Changes are made to the applicable trade day

The automated reference level change request process

- Automated reference level change request can be used to request an adjusted default energy bid
  - requests are validated against resource-specific **reasonableness threshold**

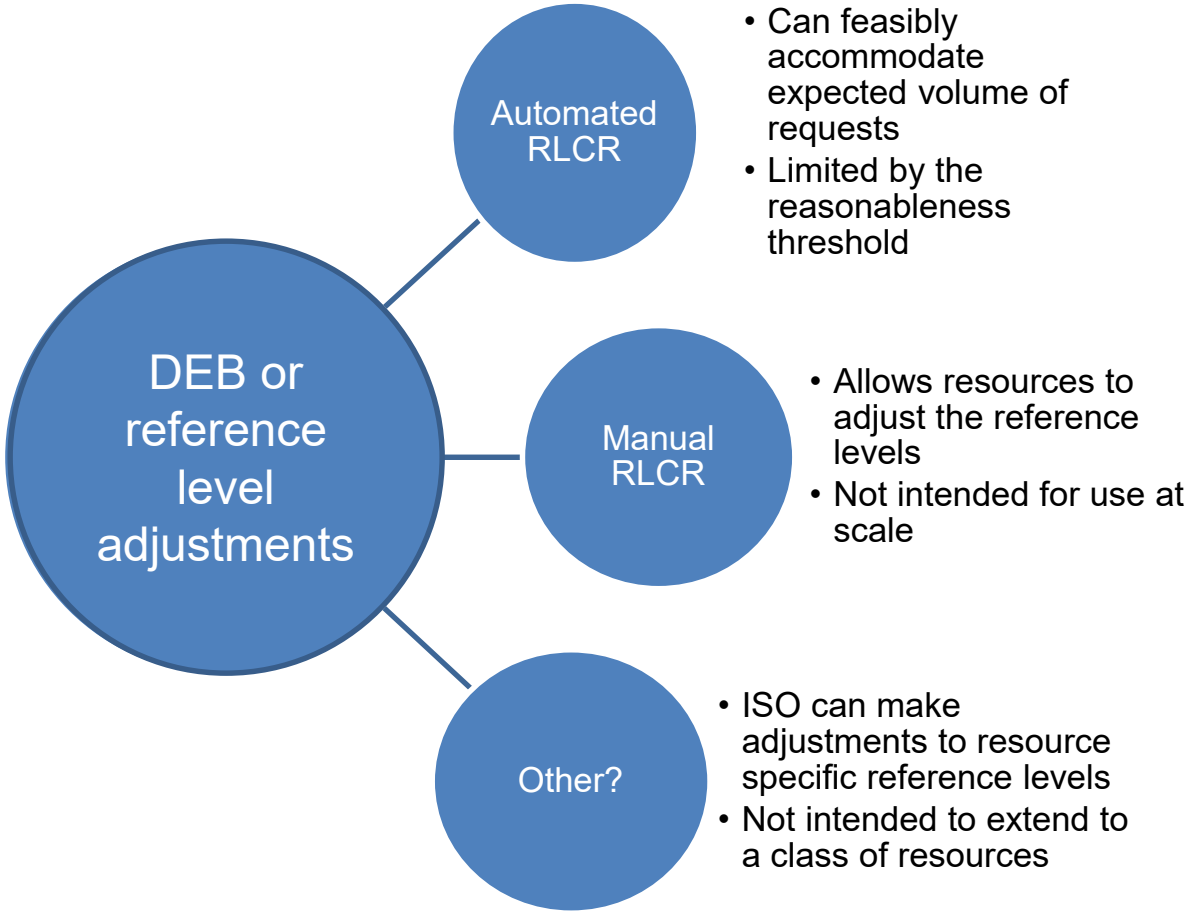
- The reasonableness threshold is an upper bound value based on the variable cost DEB formula

Reasonableness Threshold DEB for a non-gas generator = **1.10** x {(Incremental fuel or fuel equivalent cost x **1.10**) + (VOM_EN) + (GMC)} + FMU + OC

The manual reference level change request process

- The manual RLCR process can be used to update a resources' reference levels, like a fuel or fuel equivalent value
- The reference levels for a resource with an approved manual request are recalculated with the approved manual request value
- Manual RLCRs are reviewed manually by the ISO:
  - must be submitted by 8am prior to the relevant trade day through CIDI
  - Changes apply to whole trade day

Is there any other way to receive an adjusted DEB besides cost-verification?



Same-day gas price updates

- When the ISO detects that same-day gas prices are 10% greater than those used to calculate the reasonableness threshold, the CAISO recalculates the reasonableness thresholds
  - Hydro DEBs that are registered to fuel regions impacted by same-day update will be automatically recalculated

Multiple manual RLCR adjustment

- The ISO will update the reasonableness threshold for all resources mapped to a fuel hub at which we've received 3 manual RLCR
  - Fuel cost is updated to a volume weighted average of the 3 verified requests

- Other resources mapped to that fuel hub would still have to submit a RLCR in order to update their DEBs, but can do so through the automated process

- This rule only impacts the reasonableness thresholds of gas resources mapped to that fuel hub

- This only applies to real-time, not day ahead

Adjustments for Persistent Conditions

- The ISO can apply a resource-specific parameter to the reasonableness threshold when a resource's fuel or fuel-equivalent costs are systematically greater than the gas price index used to calculate reference levels
  - Not intended for use across a class of resources

Frequently mitigated Unit (FMU)

- An FMU An additional adder can be added to a resource's DEB if the resources is constantly getting mitigated
- "Frequently" means over 80% of it's run hours over a 12 month period, and have historically risen
- Note: adders are subject to FERC Order No. 831 rules

CURRENT DEB POLICY

Energy Storage DEB policy

- Storage DEBs account for
  - Energy cost to purchase/charge
  - Cycling costs
  - Price-based Opportunity cost

	Opportunity Cost	Policy
RT DEB	4th highest DA LMP	Energy Storage and Distributed Energy Resources (ESDER) Phase 4
DA DEB	4th highest LMP from the MPM run of the DAM run	Energy Storage Enhancements (ESE)

Hydro DEB

DEB = MAX(Gas floor, ST Comp, LT Geo Comp)

Gas Floor – represents a hydro generator replacing peak energy with a gas resource.

ST Comp (short-term component) – represents short-term limitations based on prices in the resource's local area ranging from the next day to the next month.

LT Geo Comp (long-term, geographic component) – represents the opportunity costs of future sales and/or bilateral sales at remote hubs for a number of months equal to a resource's storage horizon.

POTENTIAL SOLUTIONS AND NEXT STEPS

Potential next step: define the scope of resources under consideration

- Different classes of resources might require different solutions
  - PDR is not subject to market power mitigation and does not have a DEB
  - The storage DEB option exists
  - A hydro DEB option exists, for which certain rules are explained in the tariff

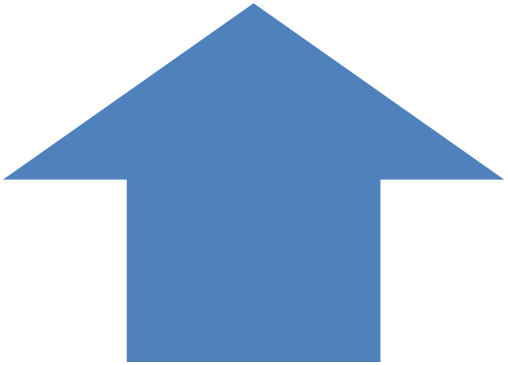
Potential next step: enhance the storage DEB option

- Existing opportunity cost logic for energy storage DEBs does not account for:
  - Intra-day opportunity costs
  - buying power on the bilateral market
  - Fuel costs

Potential next step: issues that may need to be explored further

- What is a reasonable representation of opportunity cost that gives use-limited resources the ability to offer such that the market dispatches them in hours of highest need
- Increased risk of market power prior to implementation of BAA-level MPM

- Achieve reliability more efficiently
- Greater autonomy over market participation and resource management



Next steps

- **Comments on today's session on Initiative page**

- **PFE Working Group Session 16 – Fast Start Pricing Analysis**
  - Friday, March, 22nd, 2024
  - Presentation of latest iteration of the Fast Start Pricing Analysis

For reference

- Visit Price Formation Enhancements Working Group initiative webpage for more information: https://stakeholdercenter.caiso.com/StakeholderInitiatives/Price-formation-enhancements

- Price Formation Working Group Schedule http://www.caiso.com/InitiativeDocuments/Price-Formation-Enhancements-Working-Group-Schedule-2024.pdf

- If you have any questions, please contact Brenda Corona at bcorona@caiso.com or isostakeholderaffairs@caiso.com

Save the Date: New Resource Implementation

We are planning to host the New Resource Implementation Hybrid Stakeholder Meeting

Scheduled for Wednesday, **May 1, 2024**

Notice and in-person registration is coming soon!

Any questions ISOStakeholderaffairs@caiso.com

Save the Date: 2024 Stakeholder Symposium

- The California ISO Stakeholder Symposium to be held Oct. 29-30, 2024
- The Symposium will be held at the Safe Credit Union Convention Center in Sacramento, California
- Welcome reception for all attendees the evening of Oct. 29. Additional information, including event registration and sponsorship opportunities, will be provided in a future notice and on the ISO's website.

Welcome reception:	**Stakeholder symposium:**
Date: Oct. 29, 2024 Time: 5:30 p.m. - 7:30 p.m. Location: To be announced	Date: Oct. 30, 2024 Time: 8:00 a.m. - 4:30 p.m. Location: **Safe Credit Union Convention Center**, 1400 J St., Sacramento, CA 95814

Please contact Symposium Registration at **symposiumreg@caiso.com** with any questions.

California ISO