Price Formation Enhancements

Incorporating Emergency Actions into Pricing

Policy Development Working Group

February 6, 2025

Reminders

- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- The meeting is structured to stimulate dialogue and engage different perspectives.
- Please keep comments professional and respectful.
- Please try to be brief and refrain from repeating what has already been said so that we can manage this time efficiently.

Instructions for raising your hand to ask a question

- Open the Participant and Chat panels from the bottom right.
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  - **Note**: *3 only works if you dialed into the meeting.
- Please remember to state your name and affiliation before making your comment.
- You may also send your question via chat to either **Brenda Marquez** or to all panelists.
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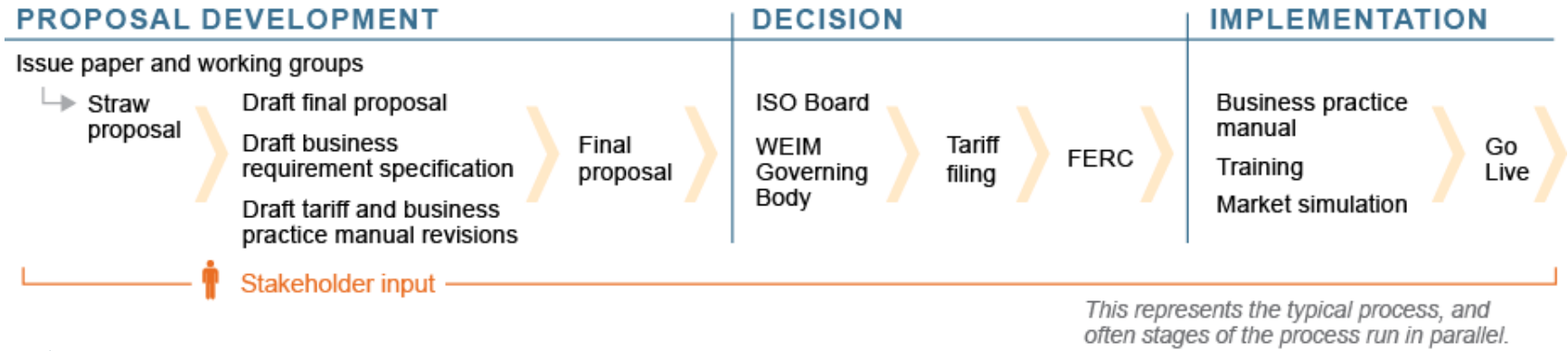
CAISO Policy Initiative Stakeholder Process



We are here

Today's objective

- To explore and discuss market mechanisms that can reflect the impact of emergency actions on pricing during scarcity events to ensure that market prices align with the real-time grid conditions.

- These are mechanisms that may be needed **in addition to** core scarcity pricing changes discussed in previous sessions.

Scarcity pricing is crucial for grid reliability

- Scarcity pricing helps prevent reliability events by motivating the right actions from market participants to maintain balance when supply is tight.

- Earlier scarcity pricing signals are essential for creating a more responsive and efficient market, reducing the risk of severe grid emergencies, and providing market participants with the necessary information to make informed decisions.

What the working group has discussed so far

- **December 16, 2024:** CAISO presented potential improvements to ancillary service procurement and the Scarcity Reserve Demand Curve

- **January 22, 2025:** CAISO presented potential market mechanisms for implementing gradual price increases during scarcity conditions, including three main concepts: extending the flexible ramp product (FRP) procurement curve, expanding spin/non-spin reserve procurement beyond minimum requirements, and creating a new reserve product with an associated demand curve.
  - DMM presented their recommendation to extend the time horizon of FRP to account for uncertainties 1-4 hours ahead, which could help better position resources and improve pricing signals ahead of potential scarcity conditions.

What the working group has discussed so far

- **January 22, 2025:** CAISO presented a proposal to anchor market penalty prices to Value of Lost Load (VOLL) instead of bid caps, examined MISO's recent VOLL-based pricing filing, and considered the challenges of implementing such an approach across the EDAM/WEIM footprint.
  - Vitol presented their support for implementing an enhanced Operating Reserve Demand Curve in CAISO's markets that would allow prices to rise more gradually before shortage conditions occur.

The bigger picture

	Phase 2	
	Scarcity Pricing / BAA-Level MPM	**Fast-Start Pricing (Policy)**
Oct-24	Working group preparation	Working group preparation
Nov-24	Proposal development and iteration	Proposal development and iteration
Dec-24		
Jan-25		
Feb-25		
Mar-25		
Apr-25		
May-25	Straw Proposal	Straw Proposal
Jun-25	Proposal development and iteration	Proposal development and iteration
Jul-25		
Aug-25		
Sep-25		
Oct-25		
Nov-25		
Dec-25		
Jan-26		
Feb-26		
Mar-26	BOG/GB meeting	BOG/GB meeting

Scarcity Pricing

REVIEW PREVIOUS SESSION

Major questions raised by stakeholders

- There were a significant number of open questions that would need to be evaluated as part of any future proposal, such as:
  - Whether a new ORDC would be in addition to, or a modification of, the existing AS scarcity pricing mechanism.
  - The impact of expanding FRP uncertainty requirements on the WEIM RSE test.
  - The eligibility criteria for extended FRP and whether offline resources would qualify.
  - Whether extended FRP would still be procured to the 97.5 percentile of uncertainty.
  - On a new reserve product: several stakeholders had questions like which real-time market run it would apply to, and whether it would apply in the day-ahead market.

Major questions raised by stakeholders

Q: How would an ORDC-like mechanism work in WEIM today given WEIM entities don't clear operating reserves?

A: It depends on the approach. If using an extended FRP, this would implicate the WEIM since FRP is procured across the broader market footprint. If applying an ORDC specifically to CAISO's spin and non-spin products, this would not implicate the WEIM. If creating a whole new product, decisions would need to be made about whether and how it's procured across the broader market. Or an ORDC can be applied to a combination of these options, in which case some of the ORDC would apply to WEIM entities and some if it wouldn't.

Major questions raised by stakeholders

Q: Several stakeholders had questions or concerns about how to determine appropriate VOLL levels.

A: The overall message was that while determining precise VOLL levels is challenging and imperfect, there are established methodologies and precedents from other markets that could inform our approach. The bigger challenge may be implementing a VOLL-based system across the diverse WEIM/EDAM footprint rather than determining the values themselves.

Major questions raised by stakeholders

Q: Is there a relationship between the VOLL price and EEA status?

A: No, the VOLL mechanism would work continuously through market pricing rather than being triggered by discrete emergency declarations. VOLL itself is a single number. It would be established as the power balance constraint penalty price (e.g., $10,000 in MISO's filing). The market would calculate Loss of Load Probability (LOLP) at different reserve margin levels. As reserve margins get tighter, LOLP increases, causing prices to gradually rise toward the full VOLL.

Major questions raised by stakeholders

Q: What is the rationale and methodology for designing "circuit breakers" (i.e., a mechanism to temporarily suspend scarcity pricing)? Specifically, how do we determine both the timing and price levels for when circuit breakers should activate?

A: There isn't a single universally accepted method for constructing circuit breakers. Markets typically base them on either the duration of emergency conditions or the total financial impact.

Scarcity Pricing

EXPLORING POTENTIAL ENHANCEMENTS

Overview

- The common thread in this discussion is that emergency actions, while essential for reliability, may mask or distort the underlying scarcity signals in market prices, leading to:
  - **Weakened Incentives** - market participants might not receive clear and strong enough price signals to respond appropriately to approaching scarcity (e.g., increase generation, reduce demand proactively).
  - **Inefficient Dispatch** - the market may not prioritize resources optimally if prices are not accurately reflecting scarcity value.
  - **Reduced Transparency** - the true operational risks and costs of maintaining reliability during emergencies may not be fully visible in the market prices.

Overview

- The core purpose of scarcity pricing is to create accurate price signals that reflect real-time grid conditions and scarcity of resources. It is not about preventing price drops.
  - How to distinguish between emergency actions that accurately reflect an improved supply situation and those that artificially mask scarcity?

- These actions may distort the price signals needed to manage scarcity efficiently and effectively. We highlight these actions not to criticize them but to show that when these actions occur, they can affect wholesale market price signals in ways that work against the goals of scarcity pricing.

- The Phase 1 working group wanted to explore ways to incorporate emergency actions into the market-clearing process to improve price signal accuracy.
  - Should the market incorporate additional mechanisms to prevent artificially masking of scarcity? Should an eventual Operating Reserve Demand Curve design include the "margin" created from activating emergency supply?

Examples of emergency actions

- CAISO or WEIM entities activate emergency demand response programs.
- CAISO dispatches certain "strategic reserve" resources that are typically held offline and are not normally participating in the market.
- Market operators issue exceptional dispatches, request emergency supply assistance, or initiate firm load interruptions (load shedding).

Examples of emergency demand response (CAISO)

In-Market

- Reliability Demand Response Resources (RDRR)
- Proxy Demand Response (PDR) under the Demand Side Grid Support (DSGS) Program

Out-of-Market

- Emergency Load Reduction Program (ELRP)
- Load Modifying Demand Response
- DSGS backup generation (BUGs)
- DSGS behind-the-meter (BTM) batteries

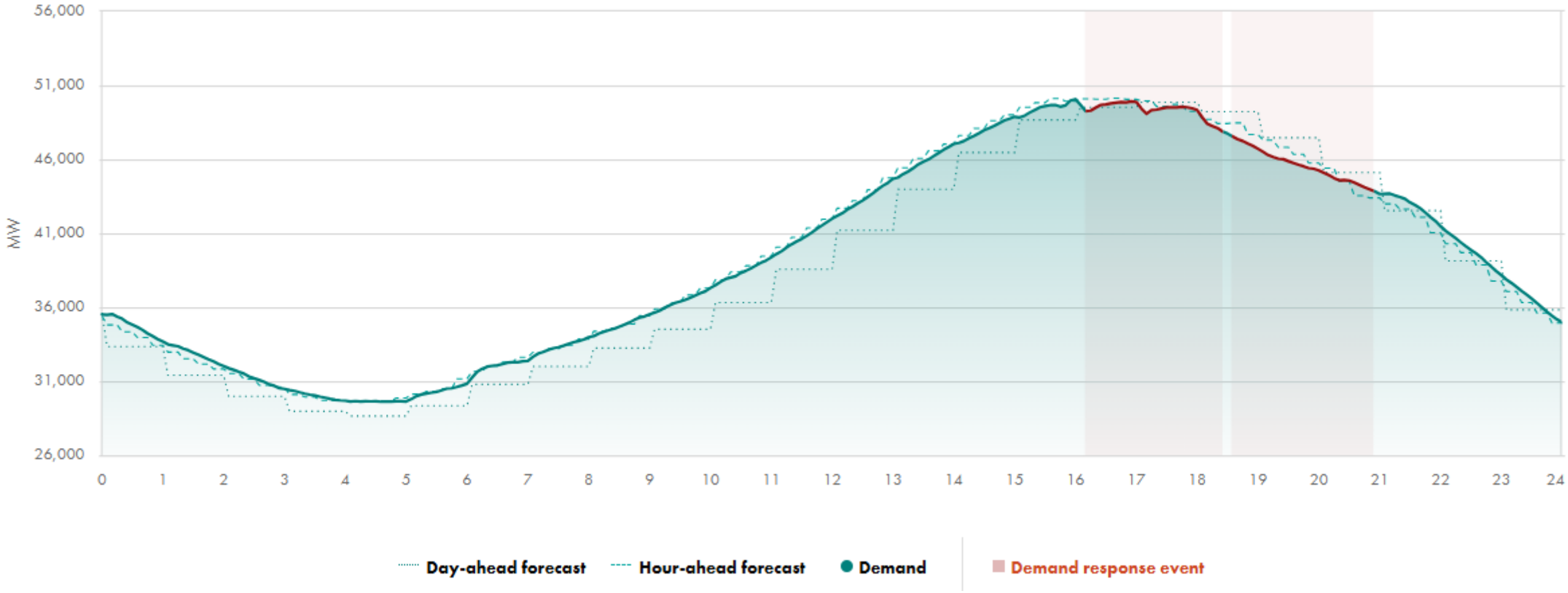
Impact on Demand Forecast

In the day-ahead market, certain program values are incorporated into the forecast, while in real-time, the forecast generally follows the actual load, which implicitly accounts for DR.

Emergency demand response triggers (CAISO)

Emergency Levels	Demand Response Operational Actions	Business Rules
Flex Alert/Day-ahead EEA Watch	ELRP Residential - Day Ahead activation	A Flex Alert is a call to consumers to voluntarily conserve electricity when the ISO anticipates energy supply may not meet high electricity demand. Can be multi-day events, but generally for specific hours (i.e. 1600 – 2100, not for 24 hour period)
EEA Watch (Day-ahead or Day-of)	ELRP Non-residential, non-backup generation (BUG) DSGS, non BUGs Note: some DSGS options trigger based on high CAISO day-ahead market prices RDRR – may be enabled in market or forced dispatch (if EEA Watch exists day-of)	Generally issued day ahead by 1500 for the next day for specific hours (forecasted deficiencies) Note: The ISO generally issues Flex Alert and EEA Watch notices in the day-ahead timeframe, but may issue Flex Alert and EEA Watch notices earlier or day-of depending on system conditions
EEA 1	RDRR – may force dispatch if not market dispatched	Issued day-of for specific hours (future hours with forecasted deficiencies). Real-time analysis shows all resources are in use or committed for use, and energy deficiencies are expected. Consumers are encouraged to conserve energy
EEA 2	ELRP and DSGS BUGs	Issued day-of for specific hours – CAISO requests emergency energy from all resources and has activated emergency energy programs. Consumers are urged to conserve energy to help preserve grid reliability

Emergency demand response programs, both in and out of market, played a critical role in supporting grid reliability in September 2022



DR participation in the WEIM

Demand-Side DR reduces entities baseload forecast into the real-time market through a short term **load forecast adjustment**

- Reduces shown capacity needed to support that load and pass RSE.
- Required to reduce that load, implicitly valued as a self-schedule.
- DR deployment is expected and forecasted load reduction show up

Key Differences

Load Forecast Adjustment

- Full control of dispatch & scheduling by EIM entity
- Not directly EIM market price-responsive

Supply Side

- Dispatch determined by real-time market prices/conditions
- Bid in, price-responsive

Available balancing capacity (ABC) in the WEIM

- ABC is a mechanism within the WEIM that allows a WEIM entity to use specific resources to address power balance and transmission constraint violations in its BAA.

Relevant topics to be discussed in the Demand and Distributed Energy Market Integration working group

- There's interest in creating reliability DR programs similar to RDRR but tailored for the WEIM.

- The working group will also discuss demand-side bidding to allow large loads to participate directly in the market.

Strategic Reliability Reserve Program (SRRP) resources

- These resources are used when a California BAA experiences an extreme event.

- There are two types of SRRP resources:
  - **Long Start:** CAISO notifies SCs to confirm availability 4-7 days before a forecasted emergency. CAISO issues exceptional dispatch instructions at PMin 1-4 days before the event. These resources stay online at PMin and submit bids into the real-time markets. They remain online until CAISO issues an exceptional dispatch to shut down.
  - **Fast start:** SCs may submit bids for all hours in the real-time market during declared EEA periods.

Market operator actions

- Manual operator actions will always be necessary because not every contingency can and should be planned for.
- However, predictable and persistent actions may signal a lack of necessary market functionality.
- The Phase 1 working group highlighted that the market operator should proactively communicate emergency actions taken and provide as much transparency as possible.

It is not guaranteed that prices will reach the power balance constraint relaxation price during load shedding events

- Periods of load shedding should theoretically be associated with the highest scarcity prices. However, the market price might not always reach levels that truly reflect the severity of load shedding.

- In other words, during load shedding:
  - The actual physical demand remains high but some portion is forcibly disconnected.
  - The market optimization only "sees" the remaining connected demand.
  - With this artificially lower demand level, the market can find a feasible solution using available supply.
  - This leads to prices clearing below the power balance constraint penalty price, even though the system is in an emergency state requiring load shedding.

MISO ER25-579-000 (Filed November 2024)

- MISO proposes to use the Pricing VOLL of $10,000/MWh as an administrative price during MISO-directed load shedding events or EEA-3 in both the day-ahead and real-time markets. This ensures a high price signal during these critical periods.

Potential solutions

- Implementing a robust, market-wide Operating Reserve Demand Curve (ORDC) should help reduce impact from actions that artificially mask scarcity.

- It's questionable whether emergency demand response and strategic reserve programs will persist in their current form in perpetuity, so the CAISO PFE team cautions against building permanent market design features around them.

Any examples we missed?

- Any other specific design elements stakeholders believe are crucial to include in this discussion?

Next steps

Stakeholder presentations - if you are interested in presenting on a topic, please send an email with to ISOStakeholderAffairs@caiso.com or bmarquez@caiso.com. In the email, please include:

- Subject line: “Request to Present – Price Formation Enhancements”
- Desired presentation date/time

Next steps

- Next meetings
  - Feb 13, 2025* Meeting, Fast Start Pricing
  - Mar 06, 2025* Meeting, BAA level MPM
  - Mar 13, 2025* Meeting, Fast Start Pricing
  - Mar 20, 2025* Meeting, BAA level MPM
  - Mar 27, 2025* Meeting, Fast Start Pricing, Scarcity Pricing
  - Apr 03, 2025* Meeting, Fast Start Pricing
- Please submit written comments regarding today's meeting by end of day February 20 using the template provided in the initiative webpage at the ISO's commenting.

For reference

- All meeting material and notices are available on the Price Formation Enhancements Initiative webpage: https://stakeholdercenter.caiso.com/StakeholderInitiatives/Price-formation-enhancements
- If you have any questions, please contact Brenda Marquez bmarquez@caiso.com, or ISOStakeholderAffairs@caiso.com

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