

# Comments on Price Formation Enhancements Working Group Sessions

## Scarcity Pricing Topics

### Department of Market Monitoring

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#### Summary

DMM appreciates the opportunity to comment on the ISO's *Price Formation Enhancements Working Group*.<sup>1</sup> The Price Formation Enhancements Working Group recently completed several workshops focused on scarcity pricing.<sup>2</sup> DMM suggests the ISO consider placing a priority on foundational market enhancements that will improve price formation before embarking on more complicated market design changes such as fast-start and scarcity pricing. Foundational enhancements that should be given top priority include: (1) extending the time-horizon of the flexible ramping product (or creating a new product/constraint that serves this purpose), (2) correctly incorporating intraday opportunity costs into default energy bids for storage resources, and (3) re-optimizing ancillary services in the real-time market. These comments explain how each of these three enhancements would address existing issues with price formation and provide other market and reliability benefits.

#### Extending time-horizon of flexible ramping product (or creating similar product)

Since 2018, DMM has recommended extending the flexible ramping product (FRP) time-horizon, or creating new products that serve the same purpose.<sup>3</sup> Extending the horizon can have three key benefits:

1. Allowing the optimization to consider upcoming scarcity in further out market intervals. This enhances price formation as capacity above that needed to meet energy and ancillary service requirements becomes more scarce in a longer timeframe.
2. Procuring capacity to meet net load uncertainty over longer time horizons in the market, rather than through operator interventions.
3. Addressing real-time settlement prices not equaling marginal costs caused by only settling one interval in a multi-interval optimization.

Because there is a tradeoff between procuring flexible ramping capacity or energy, when the amount of available capacity declines, the prices for both capacity and energy start to rise. This allows prices to increase as available flexible capacity falls, even before there is insufficient energy supply to meet load in the market. However, because FRP currently only looks out to one advisory interval, the FRP and energy prices will not reflect the potential scarcity of available capacity over a longer and more relevant timeframe.

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<sup>1</sup> <https://stakeholdercenter.caiso.com/StakeholderInitiatives/Price-formation-enhancements>

<sup>2</sup> Price Formation Enhancement working group presentations:  
<http://www.caiso.com/InitiativeDocuments/Presentation-Price-Formation-Enhancements-Jan10-2024.pdf>  
<http://www.caiso.com/InitiativeDocuments/Presentation-Price-Formation-Enhancements-Jan-17-2024.pdf>  
<http://www.caiso.com/InitiativeDocuments/Presentation-Price-Formation-Enhancements-Jan24-2024.pdf>

<sup>3</sup> <https://www.caiso.com/Documents/2018AnnualReportonMarketIssuesandPerformance.pdf>

Extending the time-horizon of FRP would allow FRP and energy prices to reflect upcoming scarcity in more distant advisory intervals. As DMM has previously noted, instead of extending the time-horizon of FRP, the ISO could create a new product that serves the same purpose. A product that works similarly to FRP but over a longer time horizon appears to be the same concept as the “latent capacity” product discussed in the Market Surveillance Committee meeting on September 25, 2023, and the Price Formation Enhancements workshop on January 17, 2024.<sup>4</sup> Either of these approaches would improve price formation by allowing prices for energy and flexible capacity to better reflect supply and demand conditions in the real-time market.

A product with a longer time-horizon may also address issues associated with operator load adjustments. Grid operators face significant uncertainty about net load and the future availability of resources to meet that load. This uncertainty contributes substantially to operators needing to systematically enter large load adjustments, which can have significant impacts on both the CAISO BAA and the Western Energy Imbalance Market (WEIM). The ISO could reduce the need for manual load adjustments by designing a real-time flexible ramping product that could procure and price the appropriate amount of capacity to account for uncertainty over longer and more relevant time horizons.

Extending the time-horizon would also help further address a pricing problem with the multi-interval optimization used by the CAISO. The CAISO real-time market optimization may dispatch resources up or down in the binding interval to make subsequent advisory intervals feasible. This capacity is procured through the power balance constraints in advisory intervals. The advisory interval prices reflect the marginal cost of these movements, but these advisory interval prices are not settled. When the intervals that were advisory become binding intervals in later market runs, the movement of resources to make the binding interval feasible has already occurred. Therefore, the costs are sunk and do not show up in the binding interval prices.

The flexible ramping product partially addresses this problem by taking the marginal costs of making advisory intervals feasible and moving them to the binding interval prices. However, the flexible ramping product currently only looks out one advisory interval. Therefore, the FRP does not address the costs of making intervals beyond the first advisory interval feasible. Extending FRP horizon would allow capacity procured in further out advisory intervals to be reflected in a constraint in the binding interval, meaning the cost of procuring that capacity would be reflected in the binding interval energy and FRP prices.

Extending the horizon could also improve FRP prices. When the market optimization dispatches resources to make more distant advisory intervals feasible there may be no additional cost to make the first advisory interval feasible within the market run. This causes the binding interval FRP prices to be zero even when the market is incurring costs to procure capacity in future intervals. Extending the horizon would improve the accuracy of FRP prices by accounting for the marginal costs of making further out advisory intervals feasible.

Extending the flexible ramping product time-horizon would allow the market optimization to better reflect the scarcity conditions, potentially lower the need for manual load adjustments, and would fix a pricing issue in the current market design. Therefore, DMM continues to recommend that the CAISO extend the

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<sup>4</sup> Market Surveillance Committee, *Price Formation Enhancements*, September 25, 2023: [https://www.caiso.com/Documents/PriceFormationEnhancements-Presentation-Sep25\\_2023.pdf](https://www.caiso.com/Documents/PriceFormationEnhancements-Presentation-Sep25_2023.pdf)

flexible ramping product time-horizon or create products or constraints to serve the same purpose as extending the horizon.

### **Allowing storage resources to reflect intraday opportunity costs that exceed \$1,000/MWh**

During the January 24 workshop, the ISO highlighted the current inability of energy storage resources to bid over \$1,000/MWh on days when the \$2,000/MWh bid cap is in effect. This limitation can lead to inefficient early dispatch of storage resources on these days, when real-time energy bids and default energy bids are unable to appropriately reflect higher intraday opportunity cost. DMM recommends the ISO consider improving the ability of storage resources to reflect higher intraday opportunity costs in market energy bids and default energy bids on days when the \$2,000/MWh bid cap is in effect.<sup>5</sup>

In order to bid over \$1,000/MWh, even when the \$2,000/MWh bid cap is in place, CAISO resources currently must submit a reference level change request documenting that the marginal cost of operating exceeds \$1,000/MWh. DMM's understanding is that the ISO does not consider intraday opportunity cost as a fuel or fuel-equivalent cost that can support a reference level change resource. While accounting for intraday opportunity costs would require careful policy development, it would support more efficient dispatch of storage resources.

DMM notes that there will likely only be a certain subset of hours in a day where a reasonable estimate of intraday opportunity cost could exceed \$1,000/MWh. These hours would most likely occur only in the hours immediately preceding the net load peak and highest priced hours of the day, when the resource would have no opportunity to recharge after an early discharge. Therefore, the ISO would need to allow DEBs to change hourly, rather than using a static DEB value over the entire day.

DMM recommends the ISO consider an enhancement to allow storage resources to bid over \$1,000/MWh during hours when their intraday opportunity costs exceeds \$1,000/MWh. This enhancement would have three significant benefits:

1. Promote more efficient dispatch of energy storage resources.
2. Enhance real-time reliability by significantly decreasing the probability of early dispatch of storage resources before the hours of highest need, without relying on the use of manual exceptional dispatches.
3. Improve price formation by allowing energy storage resources to set prices that reflect their opportunity costs, even when these resources are being subject to bid mitigation.

### **Re-optimize ancillary services in the real-time**

DMM agrees that re-optimizing ancillary services with other products in the real-time would be beneficial. This could increase efficiency and allow real-time energy prices to better reflect real-time (ancillary service) conditions. The CAISO currently has ancillary service real-time re-optimization and locational procurement on their policy road map.<sup>6</sup>

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<sup>5</sup> *DMM Comments on Minimum State of Charge Extension Straw Proposal*, February 24, 2023: <https://www.caiso.com/Documents/DMM-Comments-Minimum-State-of-Charge-Extension-Straw-Proposal-Feb24-2023.pdf>

<sup>6</sup> <https://www.caiso.com/InitiativeDocuments/Final2023PolicyInitiativesCatalog.pdf>