Comments on Price Formation Enhancements Straw Proposal

Department of Market Monitoring

September 19, 2025

Summary

The Department of Market Monitoring (DMM) appreciates the opportunity to comment on the ISO's *Price Formation Enhancements Straw Proposal* and the subsequent working group sessions held on September 3-4, 2025.[1] In the straw proposal, the ISO proposed several changes to address balancing authority area (BAA)-level market power mitigation (MPM) and scarcity pricing.

The ISO proposed several changes to the BAA-level MPM process:

(1) Implement a grouping approach for BAA-level mitigation.

(2) Include CAISO BAA in the BAA-level MPM test.

(3) Incorporate "net supply position" into the BAA-level MPM process.

(4) Only mitigate pivotal suppliers.

DMM continues to support grouping connected BAAs to test for regional competitiveness, rather than testing all BAAs individually. DMM supports treating the CAISO BAA consistently with the other BAAs by including the CAISO BAA in BAA-level MPM testing, instead of assuming it is always competitive.

DMM supports changes to consideration of net supply position when calculating the withholdable capacity in BAA-level MPM testing, but notes that there may be significant computational and implementation challenges in doing this accurately. In many cases, state regulatory oversight may serve as a backstop for any inaccuracies in measuring the net supply position of regulated entities. This increases reliance on state regulation and may warrant further consideration.

Lastly, DMM disagrees that pivotal suppliers are the only resources that can exert market power, as there are scenarios where non-pivotal resources can also set market prices above their marginal costs.

In addition to BAA-level MPM changes, the ISO also proposed two incremental scarcity pricing mechanisms:

(1) Scarcity pricing when operators shed load.

(2) Pricing armed reserves as a scarcity pricing signal in the real-time dispatch (RTD).

DMM supports the ISO's interim proposal to implement a scarcity pricing mechanism during load shed events. DMM believes the in-market pricing option for scarcity pricing during load shed events aligns best with the core principles of scarcity pricing. DMM also supports the concept of pricing armed

[1] *Price Formation Enhancements Straw Proposal,* California ISO, August 22, 2025*:* https://stakeholdercenter.caiso.com/InitiativeDocuments/StrawProposal-Price-Formation-Enhancements-BAA-Level-MPM-Scarcity-Pricing.pdf

reserves in RTD, but it is unclear that the added benefit of this pricing mechanism would be worth the implementation effort and cost if this is an interim solution until the ISO implements full ancillary services procurement in RTD.

The ISO suggested postponing larger scarcity pricing market redesigns until more progress is made in other policy efforts. DMM continues to recommend that the ISO place a high priority on developing an uncertainty product with a longer time horizon to allow prices to rise as scarcity conditions approach. DMM believes such a product should be a very high priority from the perspective of price formation, as well as from the perspective of overall market design. For example, this type of real-time uncertainty product could be designed to help ensure that Upward Imbalance Reserve capacity procured in the Extended Day-Ahead Market (EDAM) is actually available in the real-time market. In addition, such a product appears to be the only viable way to reduce the need for grid operators to utilize an extremely large load bias to create the capacity needed to manage real-time uncertainty and flexibility. Thus, a real-time uncertainty product would address a variety of the most important market design issues that will remain once EDAM is implemented.

Comments

BAA-Level MPM

DMM supports grouping connected BAAs to test for regional competitiveness

The ISO is proposing to change the BAA-level MPM process from testing BAAs individually without accounting for supply from neighboring BAAs in the pivotal supplier calculation, to a grouping approach where competitiveness is determined by testing groups of interconnected BAAs with uncongested transfer constraints. DMM continues to support implementing a grouping approach to test the competitiveness of BAAs.[2] Testing BAAs together, rather than individually, may reveal that the group as a whole is competitive and would avoid unnecessarily subjecting individually non-competitive BAAs to mitigation.

The proposed algorithm ranks BAAs from highest to lowest marginal energy cost (MEC) and iteratively tests groups depending on their transfer capability to determine competitiveness and establish competitive locational marginal prices. DMM agrees that grouping BAAs based on their MECs and transfer capability is a sensible approach to the grouping process. DMM has previously questioned whether it would be preferable to rank BAAs from lowest to highest MEC as an alternative approach.[3]

The ranking methodology proposed by the ISO can lead to scenarios when BAAs that are competitive on their own are found to be non-competitive when tested in a group with larger non-competitive BAAs. Alternatively, if BAAs were tested from lowest to highest MEC, then likely all of the competitive BAAs

[2] *Comments on Price Formation Enhancements Balancing Authority Area-level Market Power Mitigation Working Group: Discussions on November 6 and 20, 2024*, Department of Market Monitoring, December 13, 2024: https://www.caiso.com/documents/dmm-comments-on-price-formation-enhancements-baa-level-market-power-mitigation-working-group-nov-06-and-20-2024-dec-13-2024.pdf

[3] *Comments on Price Formation Enhancements Issue Paper,* Department of Market Monitoring, August 11, 2022: https://www.caiso.com/documents/dmm-comments-price-formation-enhancements-issue-paper-aug-11-2022.pdf

with lower MECs would be identified as competitive prior to being included in a group with potentially larger non-competitive BAAs with higher MECs. DMM recognizes that both approaches could result in potential over- or under-mitigation in some situations but asks the ISO to consider the merits of this alternative ranking algorithm, and clarify why the approach in the straw proposal may be preferable.

DMM supports including the CAISO BAA in BAA-level MPM testing

DMM supports treating the CAISO BAA consistently with other BAAs by testing the CAISO BAA in the new grouping approach, as opposed to assuming the CAISO BAA is competitive by default. During the September 3, 2025 meeting, a participant argued that DMM's annual report shows the CAISO BAA is not structurally non-competitive, and thus the proposed change to include CAISO in BAA-level testing is not needed. DMM disagrees with this conclusion.

The report's day-ahead market structural measures of system competitiveness show residual supply index (RSI) values when a single pivotal supplier (RSI_1) is removed, two pivotal suppliers are removed (RSI_2), and when three pivotal suppliers are removed (RSI_3).[4] RSI values less than one represent hours when the CAISO BAA is structurally non-competitive. DMM found the day-ahead market had RSI values less than one for 24 hours (RSI_1), 97 hours (RSI_2), and 176 hours (RSI_3) in 2024. The totals for RSI_2 and RSI_3 represent increases from the previous two years. These results indicate that the CAISO BAA should not be assumed competitive in all hours, and support the inclusion of the CAISO BAA in the BAA-level MPM process.

DMM notes that non-pivotal suppliers can exert market power in some cases

The ISO is proposing to no longer apply mitigation to all suppliers in a non-competitive BAA, and instead only mitigate pivotal suppliers, stating that this would prevent excessive mitigation of suppliers who cannot raise prices uncompetitively. This assumes pivotal suppliers are the only resources that can exert market power and raise prices above costs. DMM notes that in some situations, resources that are not pivotal can also raise prices above costs and may have more incentive to do so if they are not subject to mitigation.

The current tests for market power conducted by the ISO assess the ability of a supplier to raise prices based on an RSI calculation, which only considers the supplier's capacity. Market power is the ability to set prices above marginal costs, not necessarily having pivotal capacity. While pivotal suppliers may be able to exert market power, other resources not identified as pivotal suppliers may also be able to exert market power.

While potential market power by non-pivotal suppliers is not directly identified in calculating an RSI, mitigating all suppliers when an RSI deems an area non-competitive also mitigates resources that have undetected market power. The attachment to these comments shows illustrative examples of a non-pivotal resource with market power and its ability to set prices above costs. In such a scenario, non-pivotal resources have an incentive to bid above their marginal cost, and it is possible these resources could be setting the price across multiple BAAs. However, such resources are most likely able to do so less consistently than a pivotal supplier would, and during certain circumstances that may or may not be

[4] *2024 Annual Report on Market Issues & Performance*, Department of Market Monitoring, August 2025, pp 142-144: https://www.caiso.com/documents/2024-annual-report-on-market-issues-and-performance-aug-07-2025.pdf

easily predicted (e.g., with knowledge of where the resource is positioned in the supply stack, when certain congestion patterns occur, when similarly priced resources go on outage, etc.).

Currently, the BAA-level MPM process indirectly addresses this type of market power by subjecting all resources to mitigation when the BAA fails the competitiveness assessment. The proposal to only mitigate pivotal suppliers would reduce this indirect benefit by no longer subjecting non-pivotal resources to mitigation, when such resources could potentially have undetected market power. DMM suggests taking this potential impact into account while considering the current proposal.

DMM suggests the ISO provide further details and analysis on proposals to only mitigate pivotal suppliers

The ISO presents two options to limit bid mitigation to suppliers identified as pivotal, as opposed to all suppliers in the non-competitive group. The first option is a previously discussed algorithm that iteratively replaces the third largest supplier with the n^{th} largest supplier until a tested group passes the RSI test. All resources in the failing groups are subject to mitigation.

The second option is a new algorithm that attempts to identify the minimal set of pivotal suppliers. This algorithm tests whether suppliers are individually pivotal, or jointly pivotal, and iterates down the supplier list until a group of three pivotal suppliers pass an RSI test. The ISO notes that the second option is less prone to identify false positives than the first option, but also requires more computational demand and is a novel approach that lacks precedent. DMM recommends the ISO provide examples and analysis that show the tradeoffs of these options for stakeholders to weigh the benefits with the costs of the second option.

Mitigation is currently applied in a single step, whether the resource is flagged by the local market power mitigation (LMPM) process or by the BAA-level MPM process. DMM requests the ISO provide additional details on how rules can differ in the mitigation step across the two types of market power assessments and whether this type of logic will be difficult to implement. Specifically, DMM requests the ISO provide details on how all suppliers will be subject to mitigation under the LMPM rules, but only pivotal suppliers would be subject to mitigation under the proposed BAA-level MPM rules.

DMM supports changes to consideration of net supply position when calculating the withholdable capacity in BAA-level MPM testing, but notes that there may be significant computational and implementation challenges in doing this accurately

The ISO proposes to incorporate "net position" into the BAA-level MPM process through two mechanisms.

The first mechanism is to extend the existing net buyer exclusion used in the CAISO BAA to Extended Day-Ahead Market (EDAM) participants. Currently, net buyers within the CAISO BAA are excluded from qualification as pivotal suppliers in the local market power mitigation RSI, under the assumptions that net buyers lack the incentive to exercise market power and inflate prices. However, under current BAA-level MPM rules for the Western Energy Imbalance Market (WEIM), all WEIM entities – even those that are net-buyers – are treated as net sellers in the RSI calculation and can be pivotal suppliers. DMM agrees that EDAM participants do not need this same exclusion from the standard treatment of net buyers in the RSI calculation for BAA-level MPM.

The second mechanism is to exclude load serving obligations from the withholdable capacity calculation of net sellers. The ISO argues that it would be economically irrational for affiliates to withhold supply up to their load serving obligations, because they would then have to buy energy at that inflated price. In addition, the straw proposal indicates this proposal was spurred by findings that the CAISO BAA was frequently found to be non-competitive because some of the California regulated utilities are now identified as net sellers, noting that these entities are subject to external regulation by entities outside the ISO.

DMM supports changes to consideration of net supply position when calculating the withholdable capacity in BAA-level MPM testing, but notes that there may be significant computational and implementation challenges in doing this accurately. The net supply position of many entities may vary significantly from hour-to-hour and day-to-day. To accurately assess an entity's net position, it would seem necessary to have complete data on the entity's complete supply portfolio, including availability of all supply and all bilateral positions. This may vary widely from hour-to-hour and day-to-day, and complete information on actual available supply (taking into account bilateral physical and financial positions) may typically not be available until just prior to the day-ahead and real-time markets.

Implementing MPM rules that rely in part on state regulations and regulatory agencies to prevent non-competitive behavior may warrant further consideration

In many cases, state regulatory oversight may serve as a backstop for any inaccuracies in measuring the net supply position of regulated entities. DMM acknowledges that load serving utilities subject to state regulation may have limited incentives to withhold available capacity in an attempt to raise prices. However, implementing MPM rules that rely in part on regulatory agencies to prevent non-competitive behavior is a fundamental shift from previous market power mitigation design. Determining a lack of need for mitigation based on assumptions about regulatory incentives is introducing a reliance on state regulation into the MPM process that does not currently exist and may warrant further consideration.

For instance, DMM has encountered cases where regulated load serving entities (LSEs) have indicated they have state regulatory requirements to ensure that any excess capacity they make available for market sales must provide net revenues for their ratepayers, who pay the fixed costs for these resources. Some LSEs appear to interpret this regulatory requirement to mean that they must ensure that any market sales are clearly profitable during every interval or commitment cycle. Some LSEs appear to be more concerned about potential regulatory scrutiny of this profitability requirement than on any sales that may raise market prices. In such cases, LSEs may err on the side of offering any excess capacity at relatively high prices in order to essentially guarantee that these sales are significantly profitable under all scenarios.

Scarcity Pricing

DMM continues to recommend the ISO create an hour-ahead uncertainty product

The ISO proposes postponing a full scarcity pricing redesign until progress is made in other policy initiatives. DMM continues to recommend that the ISO place a higher priority on developing a new hour-ahead uncertainty product that would allow the real-time market to better reflect real-time conditions and provide earlier price signals prior to a scarcity event.[5] An uncertainty product with a time horizon longer than one interval would allow capacity and energy prices to rise gradually and reflect upcoming scarcity in more distant advisory intervals. Additionally, a longer uncertainty horizon could mitigate the need to consider other scarcity pricing mechanisms, such as administrative pricing for emergency actions.

DMM believes such a product should be a very high priority from the perspective of price formation, as well as from the perspective of overall market design. For example, this type of real-time uncertainty product could be designed to help ensure that Upward Imbalance Reserve capacity procured in the Extended Day-Ahead Market (EDAM) is actually available in the real-time market. In addition, such a product appears to be the only viable way to reduce the need for grid operators to utilize an extremely large load bias to create the capacity needed to manage real-time uncertainty and flexibility. Thus, a real-time uncertainty product would address a variety of the most important market design issues that will remain once EDAM is implemented.

DMM supports in-market scarcity pricing during load shed events as a mechanism to provide real-time price signals that impact market dispatch

The ISO proposes a new mechanism to trigger scarcity pricing during load shed events. Load shed events reduce the amount of demand seen by the market, which could potentially prohibit the market optimization from procuring additional supply to meet the previously shed load. Further, by reducing modeled demand, load shed events may also prevent the market price from fully reflecting the unserved demand and real-time scarcity. To address these issues, the ISO proposed three potential options to ensure prices in the real-time market are at or above the bid cap during actual load shed events including one in-market process and two post-market processes.

Among the three options proposed by the ISO, DMM recommends the in-market pricing option because it is the only option that would provide a real-time price signal that could influence dispatch in real-time. Any post-market pricing mechanism defeats the purpose of scarcity pricing, which is to develop prices that reflect scarcity and affect market dispatch accordingly. With no real-time price signal, the market cannot appropriately respond to or attempt to remedy a supply shortage.

DMM recommends additional analysis to determine the potential magnitude of operational and settlements issues associated with the in-market pricing option

The ISO is concerned that the in-market pricing option may result in operational challenges. Specifically, if the market were to over-dispatch supply, more action may be required from market operators to manage area control error (ACE). It is unclear to DMM how significant these risks are, considering the

[5] *2024 Annual Report on Market Issues and Performance,* Department of Market Monitoring, August 2025, pp 27-28: https://www.caiso.com/documents/2024-annual-report-on-market-issues-and-performance-aug-07-2025.pdf

relative frequency, duration, and size of load shedding events. Therefore, DMM recommends the ISO consult market operations on the likelihood of over-dispatching supply to assess the magnitude of risk this could pose to the market.

The ISO also notes that if scheduled supply does not match metered demand, there could be an increase in real-time imbalance energy offset (RTIEO). DMM agrees there may be potential for increased RTIEO during load shed events as a result of the proposed in-market pricing approach. However, like the noted operational concerns, the potential magnitude of this issue is unclear. DMM recommends the ISO conduct additional analysis on the potential settlement impacts to determine if this is likely to be a significant issue.

Load shed pricing should align with operational certainty

The ISO proposes only including the in-market pricing option in the RTD market, stating it is unclear if operations would have enough certainty of load shed events far enough in advance to include this mechanism in RTPD. To the extent load shed is uncertain in the timeframe of the RTPD market, DMM takes no issue with this pricing mechanism only applying to RTD, as this would be the most accurate reflection of physical market conditions and real scarcity. Additionally, RTPD prices most likely would reflect power balance constraint (PBC) violations prior to a load shed event, so RTPD prices would not be entirely unaffected by tight supply and potential scarcity conditions. However, DMM recommends the ISO consult market operations on the timing of certainty regarding load shed events to determine if it may be realistic/necessary in any circumstance to include this pricing in RTPD.

Propagation of scarcity pricing signals across balancing authority areas may be appropriate

The in-market pricing option has the potential to increase prices across interconnected balancing authority areas (BAAs) in the WEIM as load is shed within one particular BAA. DMM believes this outcome may be appropriate when transfers between the BAAs are not constrained. The WEIM resource sufficiency evaluation (RSE) establishes that all BAAs in the market have sufficient generation to meet their load for each operating hour in real-time. Therefore, any load shed events in the market are not likely to be the result of one BAA attempting to "lean" on others for capacity. As such, scarcity prices should not be administratively isolated to one BAA during load shed events. Further, allowing scarcity pricing signals to propagate to connected BAAs when not transfer constrained may increase the effectiveness of these signals to attract additional supply on a 5-minute basis through the WEIM.

DMM recommends further discussion of the scarcity price "circuit breaker" concept

To mitigate financial risk to market participants, the ISO proposed a "circuit breaker" as part of this pricing mechanism.[6] If administratively high prices were to be sustained for long periods, market participants may face credit or default risks. Therefore, the ISO suggests that after four hours, the market would deactivate this pricing mechanism.

DMM appreciates the potential risk of credit and default risk from prolonged exposure to extreme prices. However, load shed events are exceedingly rare and the few recent instances have been short in duration. In the rare case that a load shed event did exceed four hours, it may still be appropriate for

[6] *Price Formation Enhancements Straw Proposal,* California ISO, August 22, 2025, p 54: https://stakeholdercenter.caiso.com/InitiativeDocuments/StrawProposal-Price-Formation-Enhancements-BAA-Level-MPM-Scarcity-Pricing.pdf.

market prices to remain at or above the market bid cap for the duration of the load shed event, rather than administratively removing the scarcity price signal from the market. Conversely, because the instances where the price circuit breaker would trigger are likely to be very infrequent, there may be limited harm to including such a feature for the reasons described in the straw proposal.

DMM recommends continued discussion on this topic, and why the proposed four-hour timeframe would be the appropriate length if a scarcity pricing circuit breaker were to be implemented.

DMM supports reflecting the scarcity value of ancillary services in RTD when load is armed to meet reserves, but suggests that the implementation effort may not be worth the interim benefit

The ISO proposes an additional scarcity pricing mechanism that aims to reflect the scarcity value of ancillary services (AS) in RTD when operators arm load. This new mechanism would allow energy from a resource's previously awarded AS capacity to be economically dispatched based on the opportunity cost of the reserve shortage being met by armed load. This opportunity cost would be quantified by the Scarcity Reserve Demand Curve (SRDC). The ISO suggests that this approach allows real-time prices to reflect the true marginal cost of meeting energy demand and reserve scarcity, without full AS re-procurement in RTD.

DMM is generally supportive of this pricing mechanism and the conceptual framework, as it essentially prices the procurement of additional reserves acquired in RTD through armed load. However, DMM encourages the ISO to weigh the added benefit of this pricing mechanism relative to the cost and effort needed to implement it, especially if the ISO intends to redesign AS procurement in RTD in the relatively near future.

Including the cost of reserve scarcity in RTD makes sense conceptually when load is armed to meet reserve needs, but the proposed price increase may not meaningfully change the price signal and the resulting market dispatch. For example, a $300/MWh increase on top of a $1,000/MWh market price may not change the price signal enough to meaningfully impact market dispatch in RTD.[7] DMM does not propose the marginal cost be tied to something different than the SRDC (or something arbitrarily higher), but the real benefit of the price increase may not be worth the implementation effort for an interim solution.

DMM understands that implementing this pricing mechanism would be an interim solution until full AS re-procurement is implemented in RTD. Therefore, this mechanism will likely become obsolete in the relatively near future. If the ISO were to move forward with this pricing mechanism, DMM suggests the ISO consider simplifying the pricing mechanism to a one-tier reserve slack penalty price, instead of using all three tiers of the SRDC. This could simplify the implementation effort for the ISO and would not substantively change the resulting marginal cost values, as the tiers are currently within $50/MWh to $100/MWh of each other. However, DMM understands that the current proposal is aligned with how the SRDC is used in RTPD, and recognizes the intended consistency between RTPD and RTD.

[7] *Ibid, p 58.* $300/MWh reserve slack penalty price if reserve shortage < 70 MW and the energy bid cap is $1,000.

Attachment: Illustrative Example of Non-pivotal Resource with Market Power

Figure 1 below shows a simple example of a non-pivotal resource with market power. Generator A4 is that non-pivotal resource in this scenario. This generator is in between two groups of resources – relatively cheaper resources that are essentially self-scheduling and more expensive resources with costs/DEBs much higher than the rest of the resources in the BAA. Depending on load demand, Gen A4 may be the marginal resource and can essentially set the price at any level up to $100/MWh through their own bids, or cause Gen A5 to set the price by withholding.

Figure 1 Non-pivotal Resource with Market Power Illustrative Example

	Gen A1	Gen A2	Gen A3	Gen A4	Gen A5	Gen A6	Load LA
Bid MW	110	100	100	95	90	50	-330
Initial bid	-$125	-$125	-$125	$80	$100	$200	
DEB	$30	$30	$30	$35	$100	$200	

Figure 2 below shows a more complicated scenario with two BAAs and 50 MWs of transfer capacity from BAA A to BAA B. In this example, Gen A4 is still the marginal resource that is setting the price at $80/MWh in both BAAs. Under the grouping approach, these BAAs would fail the RSI_3 test. However, the proposed option of an iterative pivotal supplier test would produce an RSI value greater than 1 by the second iteration that includes the two of the largest suppliers in BAA B (Gens B1 and B2) and one of the largest suppliers in BAA A (Gen A1). This means that Gen A4 would not be subject to mitigation, even though they can set the prices in both BAAs well above their estimated costs due to their position between cheaper and more expensive resources.

Figure 2 Non-pivotal Resource Exertion of Market Power

	BAA A								BAA B						
	Gen A1	Gen A2	Gen A3	Gen A4	Gen A5	Gen A6	Load LA		Gen B1	Gen B2	Gen B3	Gen B4	Gen B5	Gen B6	Load LB
Initial bid	-$125	-$125	-$125	$80	$100	$200		ETSR	$40	$40	$40	$100	$150	$150	
DEB	$30	$30	$30	$35	$100	$200		50 MW	$40	$40	$40	$100	$150	$150	
Final bid	-$125	-$125	-$125	$80	$100	$200		→	$40	$40	$40	$100	$150	$150	
pmax	110	100	100	95	90	50	-300		150	150	150	150	75	25	-500
Schedule	110	100	100	40	0	0	-300		150	150	150	0	0	0	-500

It is important to note that the current BAA-level MPM process also does not explicitly test for market power of resources that are not pivotal suppliers. Further, the ability of resources to exercise this type of market power may be less than that of a pivotal supplier. However, these resources are currently subject to mitigation if the BAA is deemed uncompetitive as a whole, because all resources in an uncompetitive BAA are subject to mitigation. By only mitigating pivotal suppliers, the proposed methodology would reduce the amount of times non-pivotal resources with market power are indirectly subject to mitigation.