

# Comments on Day-Ahead Market Enhancements Second Revised Straw Proposal

## Department of Market Monitoring

August 18, 2021

### Summary

The Department of Market Monitoring (DMM) appreciates the opportunity to comment on the *Day-Ahead Market Enhancements Second Revised Straw Proposal (Proposal)*.<sup>1</sup> DMM supports day-ahead procurement of flexible reserves. However, there are several important questions that the proposed market design still needs to address:

- How will the real-time market efficiently hold needed reserves procured in the day-ahead market?
- How will the day-ahead market consider energy costs of dispatching reserves in real-time when procuring imbalance reserves?
- How will the imbalance reserve up (IRU) requirements incorporate adequate reserve margins given that they will be instrumental in setting real-time must offer obligations?
- Are the performance incentives for resources receiving real-time must offer obligations under this design adequate?

These aspects of the market design require significant additional consideration and development, as further discussed on these comments. These comments also address why the appropriate default capacity bid will depend on the final design of the reserve products, and why the fifteen minute ramping constraints on all imbalance reserves is likely too stringent.

### Comments

#### ***The real-time market needs to be able to hold and access reserves procured in day-ahead market.***

The real-time market should have mechanisms to efficiently decide whether or not to hold onto flexible reserves procured in the day-ahead market. If the real-time market does not have a mechanism to maintain these reserves, the value of procuring them in the day-ahead market could be significantly reduced.

Extending the real-time flexible ramping product and real-time market lookout horizons would help the real-time market manage this capacity. DMM continues to recommend that as part of

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<sup>1</sup> *Day-Ahead Market Enhancements Second Revised Straw Proposal*, California ISO, July 21, 2021: <http://www.caiso.com/InitiativeDocuments/SecondRevisedStrawProposal-Day-AheadMarketEnhancements.pdf>

the current initiative, the ISO extend the uncertainty horizon of the real-time flexible ramping product so that the markets can procure and compensate the capacity required to address net load uncertainty that exists over the real-time market's four-hour time horizon.<sup>2</sup> If these changes are not considered, the ISO should at least consider adding simpler products to the real-time markets in order to procure and compensate the ramping capacity and energy required to meet expected net load and uncertainty over a multi-hour horizon (e.g. 1, 2, 4, and potentially even 8 hours out from the current market run).<sup>3</sup>

These new products could resemble more traditional reserve products. Therefore, they may be much easier to implement in the near-term time frame of the current initiative than a more complicated approach that incorporates net load uncertainty directly into advisory intervals of the multi-interval optimization. To help incorporate energy storage resources and the energy required to meet net load demand overnight when there is no solar production, it will be important for these new reserve products to consider energy requirements in addition to just rampable capacity several hours out from each real-time market run.

***The proposal to limit imbalance reserve up capacity procured from higher energy cost resources needs more consideration.***

Unlike current spinning and non-spin reserves (which are dispatched only during contingencies), the imbalance reserve up is likely to be dispatched often in real-time. Therefore, the ISO is proposing to have the imbalance reserve up awards consider the cost of calling on the reserves for energy in real-time. The current proposal is to create an energy offer price threshold. Resources that offer energy at prices above the threshold are not considered eligible for imbalance reserve up awards.

DMM recommends that the ISO consider alternatives to the proposed approach of not considering all offers submitted in the market. There are also circumstances where most of the available supply may be needed, and resources with energy costs above the threshold would *likely* be dispatched if available. In these circumstances, it seems problematic to have some capacity ineligible for imbalance reserve up and potentially not having a real-time must offer

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<sup>2</sup> *Comments on day-ahead market enhancements: August 13, 2019 Working Group*, Department of Market Monitoring, September 6, 2019, pp. 1-3: <http://www.caiso.com/Documents/DMMCommentsDay-AheadMarketEnhancements-Aug13-Aug19Meetings.pdf>

*Enhancing the flexible ramping product to better address net load uncertainty*, Department of Market Monitoring presentation to Western EIM Body of State Regulators, June 12, 2020: <http://www.caiso.com/Documents/Presentation-Real-TimeFlexRampProductEnhancements-WesternEIMBodyofStateRegulators-June122020.pdf>

<sup>3</sup> Similar new types of reserve products for 2-4 hour ramp capacity have been recommended in other ISO/RTOs. See *2020 state of the market report for the MISO electricity markets*, Potomac Economics, May 7, 2021, p. 120: <https://www.potomaceconomics.com/wp-content/uploads/2021/05/2020-MISO-SOM-Report-Body-Compiled-Final-rev-6-1-21.pdf>

obligation. Further, some types of resources which provide resource adequacy can have high dispatch costs, such as some types of demand response resources. These resources should not automatically be dropped from consideration in providing imbalance reserves.

For resources with energy offer prices below the threshold, the current proposal would not differentiate between offer prices that are just above the day-ahead clearing price and offer prices that are just below the threshold. Therefore, the proposal would not attempt to procure from lower energy cost resources among imbalance reserves procured beneath the threshold.

The ISO should consider this aspect of the design further and have a clearer discussion on what they are trying to achieve and how. The issues the ISO is looking to address here are not wholly new. The ISO could look to previous work in this area when framing this discussion.<sup>4</sup>

Stakeholders and the ISO may be able to develop a method for scoring the day-ahead capacity bids against the expected reduction in real-time energy dispatch costs in order to determine optimal imbalance reserve awards, as has been discussed in prior literature.

#### **Imbalance reserve requirements need further review to ensure adequate real-time must offer obligations.**

Under the proposal, the only capacity with real-time must offer obligations will be the upward imbalance reserves (plus other market awards). The ISO proposes to set the upward imbalance reserve requirement at the estimated 97.5 percentile of net load errors. Given the limitations on capacity with a real-time must offer obligations, this is likely to be too low to adequately meet reliability targets. With this requirement, in about 2.5 percent of real-time intervals—over half an hour each day—the ISO would expect to rely on operating reserves or regulation procured in the day-ahead market to meet real-time energy shortfalls caused by higher than expected net load outcomes.<sup>5</sup> DMM suggests that the ISO consider studying whether a reserve margin needs to be added to the upward requirement in order to ensure that the amount of capacity required to bid into the real-time markets meets reliability targets such as less than 1 day of load shed every 10 years.

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<sup>4</sup> A couple of examples of previous research (far from exhaustive) include:

Bushnell, James B and Shmuel Oren, “Bidder Cost Revelation in Electric Power Auctions”, *Journal of Regulatory Economics*, 1994.

Chao, Hung Po and Robert Wilson, “Multi-Dimensional Procurement Auctions for Power Reserves: Robust Incentive-Compatible Scoring and Settlement Rules”, *Journal of Regulatory Economics*, 2002.

<sup>5</sup> It could potentially be worse than this since not all capacity scheduled in the day-ahead market are always available in real-time. For instance, a generating unit scheduled in the day-ahead market may go on outage or be de-rated prior to the real-time market. Another case could be when the real-time market shuts down a resource that had day-ahead energy schedules later in day. If, for example, this resource is now out of starts for the day, the imbalance reserves up would have to cover the lost energy schedules for this resource plus the net load uncertainty. Other unit constraints could have similar effects.

***More consideration of performance incentives for resources awarded real-time must offer obligations is needed.***

The current proposal adds costs tied to real-time flexible ramping prices for day-ahead imbalance reserves that do not show up in real-time. This appears to be an improvement from the last proposal which would only rescind day-ahead payments for intervals when resources do not show up in real-time. However, the ISO proposes to use imbalance reserves (plus other day-ahead awards) to replace resource adequacy capacity real-time market must offer obligations. DMM recommends that the ISO consider adopting significant performance penalties for resources that do not perform according to the imbalance reserve must offer obligations under tight system conditions. These penalties may be on the order of magnitude that would incentivize capacity under long-term capacity contracts to be available and perform.

***Appropriate default capacity bids depend on the final design.***

The appropriate default capacity bid will depend on the final design of the reserve products. Given the final design it may or may not be appropriate to use historic spin prices (presumably to be replaced with historic imbalance reserve and reliability capacity prices when available) to set default capacity prices for use in mitigation.

***Forecast errors between day-ahead and real-time markets do not occur over just 15 minutes.***

The current proposal still requires that imbalance reserves must be deliverable over only fifteen minutes to meet the forecast errors between day-ahead and real-time. It seems implausible that the entire forecast error between the day-ahead and real-time market for a given hour or interval would be realized over only fifteen minutes. Rather, some of the errors are realized thirty minutes, one hour, or longer before the real-time interval.

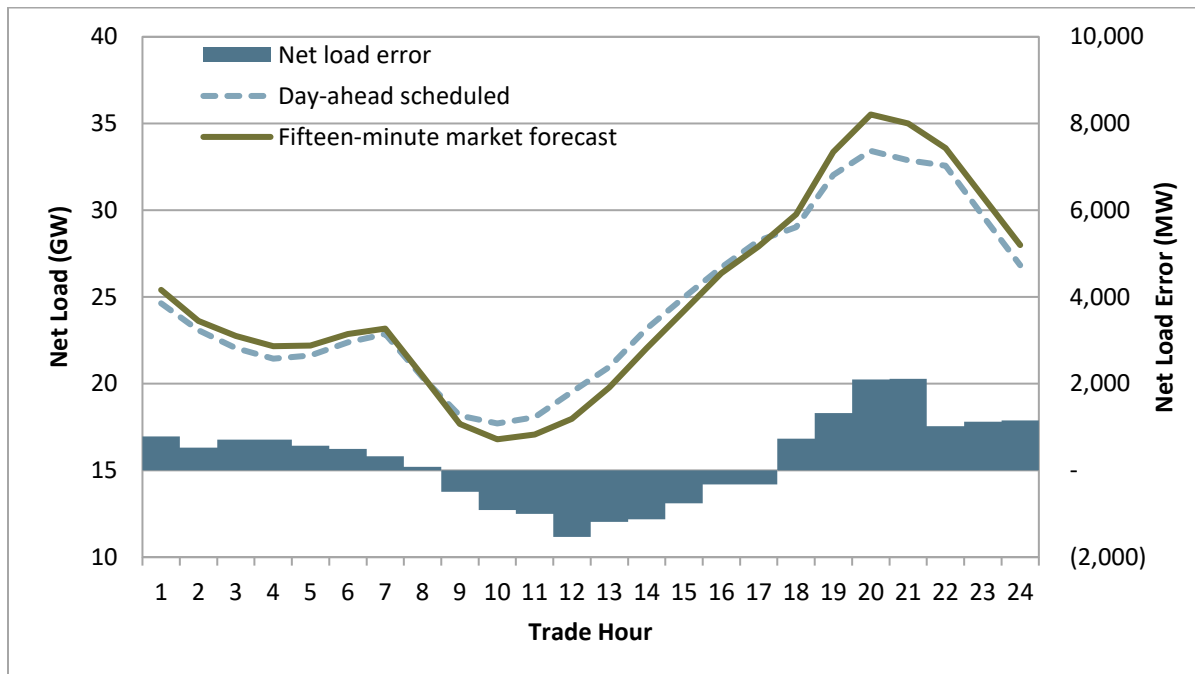
Table 1 below shows the correlation of hourly errors between cleared day-ahead market net load and fifteen-minute market net load. The table shows significant correlation between errors in the hours shown and at least the previous three hours. This suggests that portions of the errors for a given hour are realized in previous hours. Figure 1 shows an example day of day-ahead net load schedules versus the fifteen-minute market forecasted net load (which the fifteen-minute market clears against). As can be seen in the figure, net load errors are similar across multiple intervals.

These data should raise the concern that restricting all imbalance reserves to being rampable within fifteen minutes is overly restrictive. The ISO should consider allowing portions of the imbalance requirements to be met with reserves rampable over longer timeframes than just fifteen minutes. The ISO should further study the appropriate ramp horizons needed for the imbalance reserves.

**Table 1. Correlation of hourly day-ahead to fifteen-minute market net load errors  
June 1 through August 15, 2021<sup>6</sup>**

HE	Correlation		
	HE - 1	HE - 2	HE - 3
19	0.89	0.85	0.79
20	0.92	0.81	0.75
21	0.87	0.82	0.78

**Figure 2. Day-ahead scheduled net load and fifteen-minute market net load for July 29, 2021**



<sup>6</sup> All reported correlations are significant with p-values < 0.001.