

**Day Ahead Market Enhancements Revised Straw Proposal**  
**Comments by Department of Market Monitoring**  
**July 11, 2018**

## **Summary**

The Department of Market Monitoring (DMM) appreciates the opportunity to provide comments on the *Day Ahead Market Enhancements June 19, 2018 Working Group*.<sup>1</sup>

The ISO proposes significant changes to both the day-ahead and real-time markets. While the current proposal includes many desirable aspects and potential benefits, the proposed changes are extensive and complicated. The proposed constraint formulations constitute an intervention in the market by the ISO to procure flexible reserves. This intervention is quite different than the ISO's other interventions in the markets. The impacts of this new type of intervention are not well understood and could be significant. Further, many aspects of the proposal are not defined, such as the settlement derivations and sub-regional constraints. This makes it more difficult to understand how all the pieces of the proposal fit together.

Making all these changes at once, and having stakeholders understand the implications of these changes, is a significant undertaking. There are several options to get much of the flexible reserves and other potential benefits of the current proposal while avoiding some of the complications. Pursuing these other options could create more time for the ISO and stakeholders to continue working on the more complicated portions of the proposal.

The ISO could move to implement a 15-minute day-ahead market which offers significant potential benefits in terms of increasing the flexibility of the schedules produced by the day-ahead market. The ISO could move to a 15-minute day-ahead market whether or not other changes to the day-ahead or real-time market are made. A 15-minute day-ahead market would be a significant enhancement on its own.

The ISO could also procure day-ahead flexible reserves through a requirement that is independent of the cleared amount of physical generation or load. This approach would avoid many of the complications of the current proposal. Such constraints could be interim while the ISO and stakeholders take more time to work on and consider the currently proposed constraints.

Currently the ISO plans to only release one more paper, the draft final proposal, before taking the proposal to the EIM governing body and ISO board for approval. An updated paper before the draft final proposal would allow stakeholders to provide comments on a more fully specified proposal and would allow more time for stakeholders to consider the significant and complicated changes the ISO is contemplating.

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<sup>1</sup> *Day Ahead Market Enhancements: Updates to Revised Straw Proposal Workshop*, June 19, 2018:  
<http://www.caiso.com/Documents/Agenda-Presentation-Day-AheadMarketEnhancements-Jun19-2018.pdf>

## **1. Proposal significantly increases the impact of ISO forecasts on the day-ahead market**

The proposed day-ahead Flexible Ramp Product (FRP) formulation creates significant changes to the day-ahead market. Under the proposed formulation the ISO would intervene in the day-ahead market to procure flexible capacity as well as energy.

The ISO currently intervenes in the market, with good reason, to procure products such as spinning, non-spinning and regulation reserves. The value of increased flexibility could also justify intervening to procure day-ahead FRP capacity. The ISO's proposal defines one way that a market operator could intervene. But the proposal calls for the ISO to intervene in a much different way than the ISO currently intervenes in order to procure other reserves. With current reserves, such as spinning reserves, the ISO sets requirements for total reserves that are independent of the energy traded in the market. The proposed day-ahead FRP formulation explicitly ties FRP and energy procurement together. The type of intervention proposed is new and its effects on the market are complicated and may not be well understood.

The ISO's proposed requirements would place a demand on energy in addition to participant submitted bids. That is, bid in supply would not only clear against bid in demand. Bid in supply would also clear against the ISO FRP requirements. The day-ahead FRP formulation creates energy price differences between physical generation (including imports/exports) and all other day-ahead energy sales or purchases. These price differences are the result of the demands from the ISO's FRP requirements.

If, according to the ISO's FRP requirements, not enough physical generation would be purchased based on supply and demand bids, the ISO's formulation will result in increases to the price of physical generation. This could potentially result in the day-ahead market clearing physical generation for which load's willingness to pay was below generators' submitted marginal costs. Conversely, if the ISO requirements determine that too much physical generation would be purchased based on supply and demand bids, the formulation will result in lower physical generation prices and potentially a lower quantity of cleared physical generation. This could result in the day-ahead market not clearing physical generation for which load's willingness to pay exceeds generators' submitted marginal costs.

Under the current day-ahead market design if a load serving entity does not purchase all of its real-time energy needs in the day-ahead market, the LSE will have to buy more in the real-time market, possibly at higher prices. If an LSE purchases energy in the day-ahead market in excess of its real-time needs, the LSE will have to sell back energy in real-time, possibly at lower prices. The proposed formulation is a significant change from the current day-ahead energy market that is based on bids submitted by market participants. Under the proposed formulation, the day-ahead energy market will be greatly affected by the ISO's FRP requirements. This change and its significance has not been adequately vetted.

## 2. Different energy prices for physical generation than load/virtual bids

As DMM identified in previous comments, the proposed day-ahead formulation creates different energy prices for physical generation (which includes imports and export) than load or virtual bids.<sup>2</sup> The proposed real-time settlement changes appear to also introduce different real-time prices for physical generation and load. Introducing these price differences is a significant change from the current market design. The effects of this change appear to be complicated and have not been fully discussed.

For example, how would a storage resource bid or clear in the market when the price for generation is higher than the price paid by load? Could a participant with two batteries in the same location make money using one battery to charge the other battery when the up constraint is binding (possibly without any actual physical charging)?

Could paying physical generation a different price than virtual supply undermine the purpose of having virtual supply? If a participant submits a virtual supply bid because the participant thinks prices above their offer are too high or would yield too much physical generation, the physical generation with a higher offer price could still clear over the virtual bid when the up constraint binds. What is the implication of such a result? What is the implication when physical generation clears at a price above the marginal load bid?

## 3. Uplift allocation

The ISO proposal creates three day-ahead market uplift types. First is the uplift for the flexible capacity costs. Second is the uplift (positive or negative) created by the ISO requirement's demand on energy—the physical generation multiplied by the net FRP shadow prices. The ISO calls the third uplift the “reliability cost”. The “reliability cost” equals the positive difference from the ISO forecast less the cleared physical generation multiplied by the FRP up shadow price.

The ISO proposes allocating the costs or rents created by the ISO requirement's demand on energy, the second uplift type, to metered load. These costs or rents are caused by the ISO's requirements. They are not caused by the real-time metered load. Real-time metered load cannot affect the outcomes from the already cleared day-ahead market.

To the extent that metered demand is price inelastic the allocation will likely not create significant effects on real-time load behavior. To the extent that metered demand is price elastic, or becomes price elastic in the future, allocating sunk costs from the day-ahead market to metered demand may affect real-time load behavior. But the allocation of this uplift could raise some questions.

For example, consider a participant whose day-ahead load purchases match their real-time consumption. Perhaps the participant buys load to run controllable equipment so

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<sup>2</sup> *Comments on Day Ahead Market Enhancements Revised Straw Proposal*, Department of Market Monitoring, May 24, 2018: <http://www.caiso.com/Documents/DMMComments-Day-AheadMarketEnhancements-RevisedStrawProposal.pdf>

they can often buy day-ahead load that matches their real-time consumption. What is this participant purchasing when they are charged a portion of the uplift created from paying day-ahead physical generation the FRP up price? Can the participant take any actions to avoid the costs?

The ISO also proposes to allocate a portion of the “reliability cost” uplift to net negative demand deviation and net virtual supply. Part of the reasoning for allocating to net deviations and virtual supply was that this “reliability cost” was similar to RUC BCR costs. But the RUC BCR costs are mainly commitment costs while the “reliability cost” is the FRP up price times the difference between the ISO forecast and cleared day-ahead market physical generation. Is the allocation of this cost to load deviations and virtual supply meant to dis-incent participants from differing from the ISO’s forecast? It would be helpful if the ISO put more details on how the various uplift allocations fit together or are derived from cost causation principles in the next policy paper.

#### **4. Demand curve formulation may need updates for use in day-ahead**

The current real-time market FRP demand formulation is a simplified option value that DMM introduced in the Flexible Ramping Product stakeholder initiative.<sup>3</sup> FRP capacity creates the option to respond to different potential net load outcomes. If there is not enough capacity to respond to a particular net load outcome then there will be a power balance violation. Because there are no real-time options other than FRP capacity to respond to potential net load outcomes, the change in expected power balance violation costs for various levels of FRP procurement can be calculated and the FRP demand curves derived in a fairly straight forward manner.

Calculating the change in expected power balance violation costs for various levels of day-ahead FRP procurement does not appear as straight forward as in the real-time market. The calculation is complicated by the ability to take actions other than deploying the day-ahead FRP capacity. That is, there are more options than just the day-ahead FRP capacity to respond to potential real-time net load outcomes.

For example, if net load in hour ending 17 is different from the day-ahead forecast it is also likely that the net load differences from forecasts in preceding hours were correlated with the hour ending 17 difference. Generation that had no hour ending 17 day-ahead FRP capacity awards may have been dispatched to meet net load differences in the previous hours and the whole hour ending 17 difference could be met without deploying any of the hour ending 17 day-ahead FRP capacity.

Calculating the value of day-ahead FRP as if it were the only option to respond to potential real-time net load outcomes might lead to incorrect estimates of the capacity’s option value. The demand curve formulation may need to be updated for use in the day-ahead market.

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<sup>3</sup> *Appendix A of Comments on Flexible Ramping Products Straw Proposal Incorporating FMM and EIM*, Department of Market Monitoring, July 7, 2014, pp. 3-8: <http://www.caiso.com/Documents/DMM-CommentsFlexibleRampingProductsStrawProposal.pdf>

## 5. Day-ahead and real-time FRP are not the same products

The ISO proposes to settle the difference between FMM FRP awards and day-ahead FRP awards at the FMM FRP prices. This deviation settlement only makes sense if the day-ahead FRP and real-time FRP are the same product—so that the day-ahead award is simply a forward purchase of the real-time product. It is not clear to DMM that day-ahead and real-time FRP are the same products.

The real-time FRP is designed to procure capacity in one interval to respond to uncertain potential net load outcomes in the next interval. That is, real-time FRP is procured because the current real-time market run does not know what net load the next real-time market run will need to serve. But the day-ahead market optimizes over the entire day. There is no such thing as one day-ahead market interval not knowing what the state in the next interval will be—all intervals are solved simultaneously. Also, the real-time FRP is designed to meet net load (non-dispatchable load less non-dispatchable generation). The day-ahead FRP formulations are based around forecasted load.<sup>4</sup> The concept of the real-time FRP does not appear to be exactly aligned with the concept of the day-ahead FRP. It is also unclear how the concept of non-dispatchable load can be applied to the day-ahead market were demand bids can procure all or part of their expected real-time time loads—which may or may not be dispatchable in real-time.

It is also DMM's understanding that, although the ISO is making significant changes to the real-time FRP settlements, the ISO is not changing the real-time FRP formulations. But the day-ahead FRP formulations do not appear to be the same as the real-time formulations. With the day-ahead formulation the energy price includes the FRP shadow prices. With the real-time market formulation the energy price does not include the FRP shadow prices. Perhaps the ISO's "...transformation that allows for a deviation settlement..." accounts for this difference.<sup>5</sup> But the derivation of the day-ahead to real-time settlements is not shown. In addition to DMM, other stakeholders appeared to be unsure how the ISO got from the FRP formulations to the proposed settlements. Showing the derivation of the settlements from the day-ahead and real-time formulations would help stakeholders better understand the proposal.

Consider a simple example where a resource has no day-ahead awards but has a 100 MW energy award and 10 MW FRP up award in FMM. Assume the FRP down price is zero. Under the current real-time settlements the resource would be paid the FRP up price for 10 MW, plus the energy LMP for 100 MW. But under the proposed deviation settlement the resource would be paid the FRP up price for 110 MW, plus the energy LMP for 100 MW. The difference in settlement outcomes seems to imply that either the real-time FRP formulation has changed, the current real-time FRP settlements are

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<sup>4</sup> It is not entirely clear whether the ISO demand curves will be formulated to meet load or net load uncertainty.

<sup>5</sup> *Day-Ahead Market Enhancements Appendix C: Draft Technical Description*, June 15, 2018, pp. 16-17: <http://www.aiso.com/Documents/RevisedAppendixC-Day-AheadMarketEnhancementsDraftTechnicalDescription.pdf>

incorrect, that the proposed real-time FRP settlements are incorrect, or that DMM does not have a clear understanding of the ISO's proposal.

## **6. Regional procurement constraints have not been defined**

The ISO has proposed enforcing sub-regional constraints that would restrict the total FRP capacity and “transfer level” into and out of TAC regions.<sup>6</sup> The ISO has not yet defined these constraints or their formulations. DMM cannot fully assess the sub-regional constraints until they are defined. However we provide some initial observations below.

The ISO will need to develop and apply market power mitigation measures to the sub-regional constraints. The ISO currently applies market power mitigation tests for energy on large transmission constraints such as Path-15 and Path-26. The sub-regional constraints will also be affected by additional ISO demands for energy and flexible capacity. The sub-regional constraints need to be defined before market power mitigation measures can be designed.

DMM is apprehensive about the sub-regional constraint concept as briefly described in the working group presentation. The sub-regional constraints would affect not only the FRP capacity awards, but also directly constrain energy awards. As described, it appears the sub-regional constraints would be analogous to overlaying zonal constraints onto a nodal market. DMM does not know how the ISO will set the constraint limits or what effects overlaying these constraints onto the current market will have.

A detailed formulation of the sub-regional constraints and how their limits would be set would allow stakeholders to better understand and assess the proposal.

## **7. 15-minute bidding granularity**

The ISO proposes moving to 15-minute market intervals but maintain hourly bidding for all participants. Without 15-minute bidding, the differences in sub-hourly awards and prices will be driven by ramping limitations and ISO forecasts. The ISO's proposal to truncate submitted load bids by the ISO forecast does not have the same flexibility as the adjustments to bid prices and segment lengths that full bidding would allow. Although the ISO reasons that generator costs do not change every 15 minutes, load changes within the hour and potentially the willingness to pay for various amount of day-ahead load. With 15-minute bidding, market participants could shape their bids better meet sub-hourly changes and the ISO would likely increase the benefits of moving to 15-minute intervals.

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<sup>6</sup> *Day Ahead Market Enhancements: Updates to Revised Straw Proposal*, June 19, 2018, pp. 27-28: <http://www.caiso.com/Documents/Agenda-Presentation-Day-AheadMarketEnhancements-Jun19-2018.pdf>

## **8. Multiple options to enhance day-ahead market**

The ISO proposes significant changes to both the day-ahead and real-time markets. While there are clearly many potential benefits from procuring flexible ramping capacity in the day-ahead market, the proposed changes are extensive and complicated. Making all these changes at once, and having stakeholders understand the implications of these changes, is a significant undertaking. There are several options to get much of the flexibility and other potential benefits from the current proposal while avoiding some of the complications. Pursuing these other options could create more time for the ISO and stakeholders to continue working on the more complicated portions of the proposal.

***15-minute granularity in the day-ahead market.*** The ISO proposal to move to 15-minute day-ahead market intervals offers significant potential benefits and can increase the flexibility coming out of the day-ahead market. The ISO could move to a 15-minute day-ahead market whether or not other changes to the day-ahead or real-time market are made. A 15-minute day-ahead market would be a significant enhancement on its own.

***Set flexibility constraints independently of cleared generation.*** The ISO could procure day-ahead flexible reserves through a requirement that is independent of the cleared amount of physical generation or load. Such an approach would be similar to how the ISO procures other reserves. It would also be similar to how the Midcontinent ISO procures day-ahead flexible reserves. This approach would avoid many of the complications of the current proposal. It may also be easier to procure regional flexible reserves if the reserve procurement does not constrain energy procurement within a region. Such constraints could also be interim while the ISO and stakeholders take more time to consider the ISO's current proposed constraints.

## **9. Publish an updated proposal prior to the draft final proposal**

The ISO proposes significant and complicated changes to both the day-ahead and real-time markets. Currently the ISO has one more policy paper scheduled for September 5 before going to the EIM governing body and ISO board for approval. Given that the last paper came out in April, and that much of the proposal is not clear to stakeholders (or at least to DMM), an updated paper before the draft final proposal would be helpful. An updated paper before the draft final proposal would allow stakeholders to provide comments on a more fully specified proposal and would allow more time for stakeholders to consider the significant and complicated changes the ISO is contemplating.