



Comments on the Second Revised Draft Final Proposal
Flexible Ramping Product
Department of Market Monitoring
December 5th, 2012

I. Overview

The Department of Market Monitoring (DMM) appreciates the opportunity to comment on the ISO's Second Revised Draft Final Proposal for the Flexible Ramping Product posted on October 24, 2012. There have been only minor changes made to the proposal since the Revised Draft Final Proposal, the most significant being its integration with the proposed Order 764 market re-design. At this time, DMM believes the revised FRP design using real ramping has been the only workable solution put forth and agrees with the ISO that current design should be used as a foundation for any future flexible ramping product. DMM is supportive of the design overall and appreciates the recent changes in response to our and other stakeholders comments. Although the proposal design remains complex with a high risk of unintended consequences, the integration with Order 764 and the delayed finalization until after board approval of the final 15-minute market design gives some assurance that the finalized ramping product will fit the needs of the ISO in the future. Below, first we comment generally on the flexible ramping product (FRP) design proposal and then review specific aspects of the proposal.

- DMM supports the ISO's decision to delay the finalization of the FRP design until after the Board of Governors has approved the Order 764 market design. FERC Order 764 may necessitate significant market changes in order to accommodate 15-minute scheduling. The close relationship between the flexible ramping product and energy has already obligated changes to the FRP design due to the initially proposed Order 764 design.
- DMM believes that the FRP market design may be a costly solution to build and a risky solution to implement, as the FRP market design impacts every major piece of the ISO spot market. While an elegant approach, the proposal does add an additional layer of complexity to the market clearing optimization and will have an impact on the other products procured. Given the projected procurement quantities, it is not clear that such a complex and interwoven solution is warranted in the short-term; however, DMM agrees that as an increasing percentage of the generation online is variable energy a flexible ramping product will be needed in the future. We

encourage the ISO to monitor the markets closely for unintended consequences during the design build and simulation, and to make any findings transparent and available to all market participants.

- Finally, DMM has observed high price volatility in the ISO's real-time market, and that the flexible ramping constraint currently in place may not be providing the benefits initially expected. At a minimum, DMM notes that the ISO has not done significant empirical analysis of the impact that the flexible ramping constraint has actually had on real-time unit commitments and dispatches, and the resulting impacts on real-time price volatility and reliability. Such an analysis may shed light on the potential benefits of the proposed ramping product. DMM encourages the ISO to present such an analysis before the finalization of the FRP design.

II. Comments on specific aspects of proposal

Summary

1. Integration with Order 764: As noted in the previous section DMM supports the integration of this initiative with the Order 764 market initiative. There are two main changes that came with the integration with Order 764. First, that in real-time the FRP will be priced at \$0. DMM is concerned that this will cause additional price divergence between the day-ahead and real-time. Details of this aspect of the proposal may change and so we will hold further comments until the next proposal is completed. Second, energy and the FRP will now be binding in the 15-minute market and only the incremental difference will be paid in the 5-minute market. We note that this may lead to a resource being double paid due to a false opportunity cost payment in the 15-minute market. While this does appear to be a potential market inefficiency with explicit transfer of payments, it is not clear at this time that there is a way to explicitly exploit this inefficiency.
2. Regulation as Flexible Ramping: DMM has continuously advocated that regulation capacity and flexible ramping capacity are inherently different products and therefore regulation and FRP should not be explicitly tied together in the market design.¹ We support the ISO's decision to separate these products.
3. Integrated DA market: DMM appreciates the ISO's efforts to delay the implementation of the integrated DA market (iDAM) together with flex-ramp product. Given the significance of the design change, DMM encourages the ISO to more specification regarding the technique, so that stakeholders can have enough time to discuss and digest the design changes and implications.
4. Real ramp requirement: DMM would like to highlight that the real ramp requirement and advisory energy requirement cover the same operating capacity. More specifically, that one requirement is imposed in two products. The same requirement may be met by a different set

¹ <http://www.caiso.com/Documents/DMM-Comments-FlexibleRampingProductRevisedDraftFinalProposal.pdf>

of generators. As both flex-ramp and multiple-interval energy optimization may affect binding energy price, DMM also notes that the same operating capacity may be valued twice.

5. Implicit demand curves: DMM observes that using a historical analysis to calculate implicit demand curves may be problematic due to the difficulty in analyzing the need for flexibility after the FRP is in place. If the historical analysis does not reflect inherent market characteristics without the impact of the FRP, the market may oscillate from procuring too much flexible ramping procurement to too little flexible ramping procurement.
6. Flexible ramping price and energy price interaction: DMM believes there is a potential strong interaction between the flexible ramping price and energy price in RTD. The natural change in load in some circumstances will be captured in both the flexible ramping requirement and energy requirement, such that the flexible ramping price and energy price may both reflect any temporary constraints. RTD cannot commit units in the 5-minute market to cover the extra requirement, and thus the energy price can be impacted significantly by the flexible ramping shortage. DMM is concerned that the link between the energy price and flexible ramping price will shift costs from one market to the other without any visibility into whether there is a positive net effect.
7. Discrepancy between day-ahead and real-time flex-ramp bid: DMM is concerned that there is potential price divergence impact due to differences between the day-ahead and real-time flex-ramp bids. DMM understands that the perceived cost basis may be different for day-ahead and real-time market, but is concerned that different input bid prices may lead to systematic price differences for energy and flex-ramp between day-ahead and real-time markets. Any systematic and predictable difference has the potential to be exploited by convergence bids, which may incentivize manipulation or cause high uplift costs to the overall market.
8. PIRP: DMM strongly supports the ISO's position that with a 15-minute market PIRP is no longer necessary and does not support any grandfathering. PIRP is not consistent with integrating renewable energy resources into the market, is not technology neutral, and does not promote dispatch flexibility. Further, we note that the lower bid price floor of $-\$150/\text{MWh}$ was designed specifically to accommodate wind dispatch flexibility. DMM suggests the ISO consider terminating PERP at implementation of the lower bid price floor in Fall 2013, rather than the expected 15-minute market implementation date of Spring 2014. The goal of lowering the bid price floor is to create better incentives for market participants to be more flexible and responsive in both their bidding practices and operations. Ending the PIRP program will further this goal.
9. Cost Allocation: DMM supports the overall cost-allocation methodology and notes that the changes in the final draft proposal and technical workshop are significantly more aligned with the ISO cost-allocation guiding principles. There remains some uncertainty on whether the cost allocation follows the "incentivize behavior" guiding principle. DMM recommends the ISO

consider the allocations to market participant again once the 15-minute market design and technical aspect of the FRP design have been finalized.

The following sections provide a more detailed discussion of these issues.

1. Integrated day-ahead market

ISO has published a technique paper on the iDAM design details and held a stakeholder meeting to discuss it. Since iDAM is a significant design change and involves complex mathematical formulations, DMM feels not all stakeholders fully understand the design and its implications. Thus DMM encourages the ISO to have further communications with stakeholders on the issue, and ideally present market simulation results for its potential impact.

2. Real ramp for flexible ramping requirement

DMM notes that real ramp requirement and advisory energy requirement cover the same operating capacity, that is, one requirement is imposed in two products. Both flex-ramp and advisory energy requirements work to ensure the same capacity (the MW difference between binding and next advisory intervals) is available, however it the requirement constraint cannot guarantee the same capacity comes from the same set of resources. Flex-ramp procurement is based on flex-ramp bids and advisory energy procurement is based on energy bids. So the same amount of requirement may be met by two sets of resources, which may result in over-procurement and market inefficiency. Also, the binding energy price is influenced by both flex-ramp and advisory energy products, so the dual application of the requirement across two products may have a more pronounced impact on the energy price.

3. *Implicit demand curves are difficult to calculate using a historical analysis*

The ISO proposes to construct implicit demand curves for the flexible ramping requirement, based on a cost-benefit analysis. The explicit approach, which uses a multiple segment demand curve with different penalty prices, is no longer being proposed. In the implicit demand curve, the first segment uses a penalty price, from 0 MW to the minimum flexible ramping requirement; all other segments use a dynamically calculated price based on historical data analysis.

One concern on using a historical cost-benefit analysis is that once the FRP is deployed, it will have a direct impact on the real-time market performance. Presumably, the application of FRP will be cost-reducing in the 5-minute energy market. Given this, it is very difficult to estimate what the current actual cost-benefit would be using historical data due to the inherent energy cost reducing influence of the FRP on the historical market outcomes. If the historical analysis does not reflect the inherited market characteristics without the FRP impact, it is possible that the market may oscillate from procuring too much flexible ramping to too little flexible ramping.

4. *No visibility into the net effect of interaction between flexible ramping price and energy price*

DMM remains concerned about the potential interaction between the flexible ramping price and energy price in RTD. This becomes a greater issue if the flexible ramping requirement turns out to be much higher than the conceived 250 MW range, as may be the future case with more variable energy resources integrated into the ISO system.

The FRP will be procured and settled at both 15-minute RTPD and 5-minute RTD binding intervals. The requirement may be different, as RTPD requirement is based on historical 15-minute data and RTD requirement is based on historical 5-minute data. Since RTD is not capable of unit commitment, procuring flexible ramping capacity in RTD to meet the requirement may result in infeasibility if the RTPD procurement is different from the needs in RTD, and RTD cannot find extra ramping to meet the requirement. In this circumstance RTD would re-dispatch available resources as a means to meet the requirement. However, in the end FRP and energy are competing for the same ramping capability in each 5-minute RTD interval. While we believe that procurement of FRP will reduce the frequency of extreme price spikes, we highlight that because it is competing with energy for the same ramping capability it will also likely increase the frequency of price increases up to the FRP cap. This is will happen in cases where the RTD interval would have otherwise been adequate without FRP however the FRP procurement (reserving ramp for the following interval) was inadequate. In this case FRP will be priced at its cap and the energy price will incorporate that value as well. The overall benefit of FRP in terms of reducing the cost of price spikes will depend on the relative frequencies of averted extreme prices and increased energy prices when FRP is short but energy is not.

One of the key factors for RTD pricing is the potential infeasibility of the flexible ramping requirement. As noted in our Q2 2012 report², DMM has observed that the flexible ramping constraint in each month has had about 1% of 15-minute intervals with procurement have a shortfall. In May, when hydro resources typically self-schedule and load is relatively lower, there was a flexible ramping constraint shortage in 6% of intervals. It is important to note that the requirement for the flexible ramping constraint is relatively low, and the flexible ramping constraint is procured at 15-minutes RTPD market, which has the ability to commit short-start resources. We would expect the FRP, which will be procured in RTD and will likely have a higher requirement, to be infeasible more often than we have observed with the flexible ramping constraint.

Overall, DMM is notes that not only is there no operating experience or analysis possible today to analyze the impact of the FRP on the energy price, in the future due to the additional commitment and re-dispatch in real-time it will be nearly impossible to assess whether on net the FRP increased or decreased the over-all cost of ramping.

5. Discrepancy about day-ahead and real-time flex-ramp bid

The proposal indicates the flex-ramp bids are only accepted for day-ahead market, while no bid is allowed for real-time market and zero dollar bid is used for it. To DMM's understanding, the reasons for

² http://www.caiso.com/Documents/2012FirstQuarterReport-MarketIssues_Performance-May2012.pdf

it are that there is no real-time cost basis but there may be an opportunity cost in day-ahead deciding offering in CAISO market or other market. DMM is concerned that by using different bids systematically, the design may potentially cause or contribute to systematic price difference between day-ahead and real-time market, and such price difference can be exploited by convergence bids and can lead to market inefficiency.

6. Allowing additional considerations to PIRP is counter to the goal of the initiative

The current proposal phases out PIRP in the 15-minute market design. DMM supports the ISO proposal to end PIRP on the grounds that PIRP is inconsistent with integrating renewable energy resources into the market, not technology neutral, and does not promote dispatch flexibility. The intent of this initiative is to implement changes to make additional real-time flexibility available to the ISO and allowing PIRP to continue is counter to this goal. Furthermore, supports the timeframe of ending the PIRP program when the lower bid floor goes in effect in Fall 2013, rather than the expected 15-minute market implementation date of Spring 2014 .

7. Cost allocation may not comply with ‘incentivize behavior’ guiding principle

DMM is generally supportive of the cost allocation design, but notes it may be necessary to reevaluate that the cost allocation design is still consistent with the Cost Allocation Principles after the 15-minute market design and technical aspect of the flexible ramping product design are finalized. DMM is supportive of the changes in the cost allocation that were presented in the technical workshop. The internal division of flexible ramping costs have been greatly improved by moving from net deviations back to gross deviations in many circumstances.

The ISO proposes to initially allocate flexible ramping costs into three buckets using a common movement metric. Then within each bucket the costs will be allocated to individual market participants. In order to be consistent with the ‘incentivize behavior’ guiding principle, it is important to allocate costs appropriately not simply within each bucket, but between the buckets themselves. If there is a situation where one group of resources is allocated the majority of the costs, but also has the least ability to change their behavior, this would indicate that the allocation is departing from creating a cost allocation policy that incentivizes efficient market outcomes.

It appears that this may be the case under the current cost allocation. The ISO provides an analysis that shows they expect load to be allocated the majority of the costs, although this proportion has decreased due to the latest design changes. Both load and the interties at this time have the least ability to respond to these incentives. On the other hand, internal generation and self-schedules have the most ability to alter their behavior, but are projected to be allocated the least amount of FRP costs. DMM acknowledges that there will always be some tension between the different Cost Allocation principles, and in this case would prioritize ‘incentivize behavior’ over the imprecise calculation of ‘cost causation.’