

Comments on Flexi-Ramp Product Revised Straw Proposal
Department of Market Monitoring
January 4, 2011

The Department of Market Monitoring appreciates the opportunity to review and comment on the ISO's Revised Straw Proposal for the Flexible Ramping Product. We have included comments on several newer aspects of the proposal, and also included prior comments on aspects that either have not changed or are not currently addressed by the ISO proposal. A summary of our comments for select items follows:

- **Determining the Requirement:** The proposal provides general description but is not specific regarding how the requirement will be determined. Proposal needs further clarification of how the requirement will be calculated, including identifying specific drivers of demand and to what extent the ramping capability of energy bids alone will count toward meeting the requirement.
- **Real Time Reservation:** Capacity reservation for all advisory (non-binding) intervals in RTD may have unintended impacts on binding interval dispatch and should be reconsidered -or- the merits further explained. Also, the reservation protection mechanism in RTD may result in unintended impacts on energy LMPs as well as misaligned resource-specific reservation compared with RTPD procurement.
- **Opportunity Cost:** It is still unclear how frequently the ISO anticipates these reserves will be released for dispatch. The issue of whether or not an opportunity cost on energy is appropriate depends largely on this frequency.
- **Market Power Mitigation:** The issue of market power has not been addressed in the proposal. DMM recommends a must-offer requirement for Resource Adequacy resources, a bid price cap not greater than \$250/MW (the existing bid price cap for ancillary services), and review of the performance of the existing flexible ramping constraint to assess if other measures are warranted.
- **Interplay With Ancillary Services:** The proposal allow substitution between flexible ramping capacity and non-contingent online operating reserve. DMM requests clarification on how this is to be done (change bids from one service to another, or over-procure one service to satisfy requirement of another). Also, clarification on whether or not distinguishing in the model between contingent and non-contingent operating reserve will create a separate additional set of prices.
- **Cost Allocation:** DMM strongly opposes allocating the resulting cost to load. The ISO proposal indicates a report that will delineate cost proportionally among several sources that contributed to the requirement for reporting purposes. DMM recommends that this approach guide the design and implementation of a just cost allocation mechanism that closely follows cost causation principles at the initial implementation of flexible ramping product.

DMM looks forward to reviewing further developments on the flexible ramping product initiative and notes that existing market conditions and the newly-implemented flexible ramping constraint may provide additional empirical insight into some of the issues faced by the flexible ramping product.

Limitations of Release of Ramping Capacity Procured

The ISO has indicated that ramping capacity reserved for flex-ramp would be “reserved” and would only be released for dispatch in RTD when there is a realized imbalance difference. DMM is concerned about this feature and suggests that this constraint may need to be modified (relaxed) based on actual experience.

First no clear definition of realized imbalance is available in the proposal. DMM encourages ISO to clarify whether the realized imbalance includes demand changes (such as load forecast differences), supply changes (such as generator outage or deviations), and/or other factors (such as transmission outage). DMM understands that identifying these individual contributors may be challenging, however it appears they are essential in understanding what will drive procurement and ultimately how resulting cost will be settled.

The proposal indicates that RTD will enforce reserve requirements for all advisory (non-binding) intervals, plus it will enforce reserve requirement for binding intervals for the first and second RTD runs, but will not enforce reserve requirement for binding intervals for the third RTD runs. The merit of enforcing flex-ramp reservation in all advisory intervals is not clear at this moment, as far-off RTD intervals can be re-optimized for reserve procurement by subsequent RTPD runs. DMM encourages the ISO to compare an alternative of short procurement and retention (3 5-minute periods) in RTD with the proposal of longer retention across all non-binding intervals in RTD.

The third concern is about strictly protecting flex-ramp procurement unless there is a realized uncertainty. The un-availability of extra capacity may cause some operating issues in tighter supply conditions. In practice, the amount of this extra capacity may play an important role in avoiding current ramping conditions and alleviating those in future intervals. For example, if the ISO reserves flex-ramp based on historical statistical analysis (say confidence level) where a high target is applied (say, the 95% confidence level), too much capacity may be reserved for flex-ramp and it may be an operating challenge under tighter supply conditions. DMM encourages ISO to conduct more empirical studies on the issue.

The last concern is about the impact on RTD energy price resulting from the RTD reservation mechanism. The way of protecting flex-ramp in RTD is different from protecting ancillary service in RTD. For ancillary service, a resource’s upper operating limit is adjusted to reserve the ancillary service capacity procured and there is no explicit constraint imposed in RTD to respect the ancillary service requirement. For flex-ramp, there is an explicit requirement imposed in the RTD optimization to preserve the system-wide capacity reservation amount. In addition, no flexible ramping product capacity bids are used in the objective function in RTD. It is then possible that the flexible ramping requirement may be binding in RTD with a non-zero shadow price. It is not clear if this will impact the RTD energy price directly, or simply indirectly through withholding potentially lower-cost energy bids from dispatch via the withholding requirement.

In addition, because the requirement is imposed at a system level and specific reservations at the resource level are not made in RTD, it appears that the RTD may “re-optimize” the flexible ramping

product among the pool of flexible ramping product resources and result in different resource-level reservations than what was settled on after RTPD procurement. This may have implications for payment and opportunity cost in cases where a resource had more capacity withheld in RTD than it sold in RTPD due to the re-optimization in RTD. DMM encourages the ISO to provide more clarification on these two issues.

Day-ahead Procurement

The ISO has indicated that it intends to procure flexible ramping product in the day ahead market, co-optimized with energy and ancillary services. The proposal is not specific in the day ahead requirement, but does offer alternatives for procuring all or a portion of the projected requirement in the day ahead market. Further, it has proposed substitution between flexible ramping product and on-line non-contingent operating reserve. In contrast to the real time market, the day ahead market draws from a larger pool of resources, is generally less ramp constrained, and has price responsive load. These factors lend to a more competitive environment in which the initial procurement of flexible ramping product will take place. Procuring to the expected requirement in the day ahead will contribute to more competitive outcomes.

One concern is that there may be over (or mis) procurement in the day ahead market given the requirement for flexible ramping product is based on expected uncertainties in real time and the day ahead market occurs well before those uncertainties can be more fully assessed. We note that ancillary service requirements change between day ahead and real time, and the market model has some adjustment mechanisms to deal with this. However, there is more clarity in the setting of ancillary service requirements. The Revised Straw Proposal does not provide similar clarity for determining flexible ramping product requirements. It is not clear at this time how real time uncertainties will be assessed in the day ahead and how mis-procurement in the day ahead will be addressed in real time procurement. Procuring only a portion of the projected requirement in the day ahead market would help to mitigate potential over-procurement.

Another concern is with the impact of changes in resource output between the day ahead and real time markets. A resource may have a different output level in real time compared to their day ahead schedule. Often, ramp rates (and the amount of flexible ramping product that can be provided) depend on where a resource is on its output curve. If a resource sells flexible ramping product at a higher ramp rate in the day ahead and subsequently is dispatched in real time to an output level with a lower ramp rate, the day ahead flexible ramping product award will not be available. DMM requests additional clarification on how this is treated in procurement and settlement.

Interaction With Ancillary Services

The Revised Straw Proposal clarifies that procurement of flexible ramping product in both markets will be co-optimized with energy and ancillary services AND that flexible ramping product capacity will be

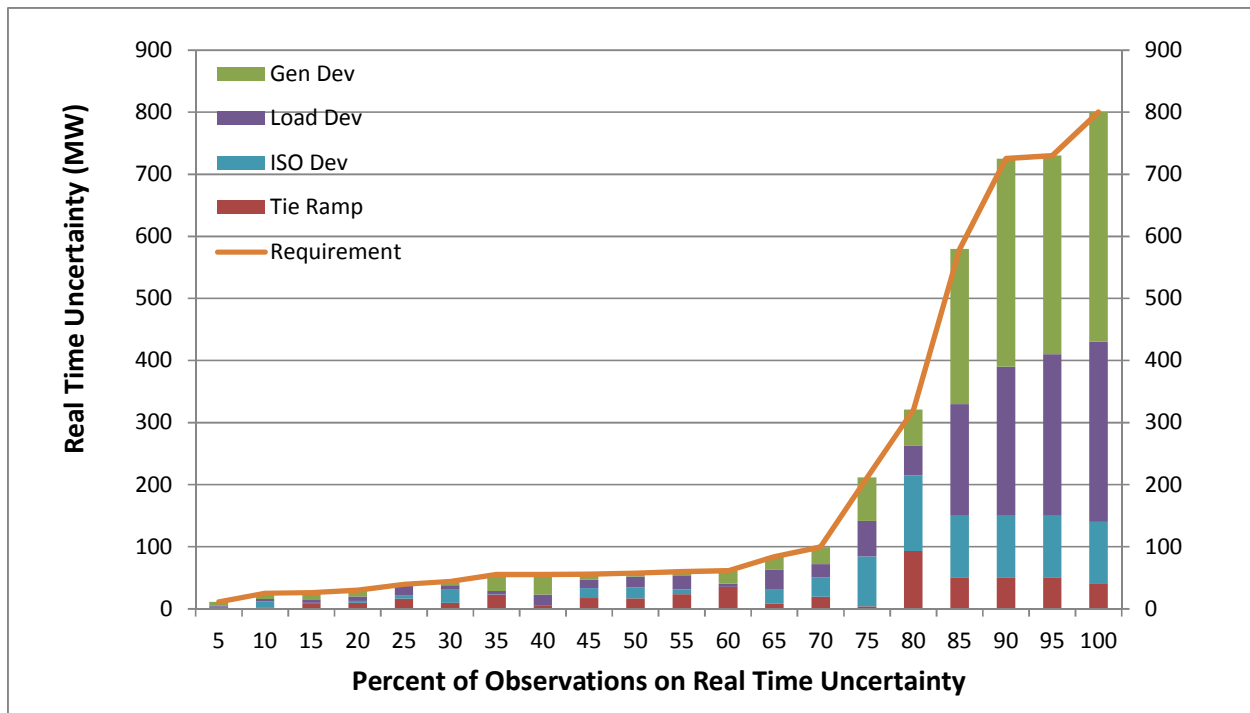
substitutable with non-contingent operating reserve from online resources. DMM requests additional clarification on the distinction between contingent and non-contingent operating reserve will be made by the market software and whether or not this distinction will create separate prices for contingent and non-contingent versions of the same operating reserve product.

Flex-Ramp Requirement

The ISO proposal did not include explicit formulas for the calculation of the ramping requirement. The proposal does make clear that the requirement will be derived from an estimate of the distribution of historical uncertainty and also notes potential sources of this uncertainty. However, the explicit formulation of uncertainty, the explicit factors that cause it, the period over which it will be calculated (hourly requirements calculated each day based on past 10 like days?), how it will be updated to reflect new information in the real time market (compared to the day ahead application), and its relationship to the market requirement are still unclear.

It is also unclear the extent to which the calculation of the flexible ramping requirement will take into account the existing pool of energy bids that would otherwise be used to meet a ramped dispatch. For example, if a flexible ramping requirement of 500 MW is determined, does that figure already account for the natural ramping capacity that would otherwise be available from the pool of energy bids available for dispatch? In other words, while there may be a historical real time uncertainty for that hour, there may also historically (or in the current hour) be more than sufficient ramping capacity inherent in the energy bids submitted for that hour to meet the projected potential 500 MW need. Meeting the ramping needs of the system, including inherent variability, is part of the function of the real time 5-minute dispatch of energy. Procurement of additional ramping capacity should be reserved for cases where the natural ramping capability of the pool of energy bids is projected to be deficient to meet needs, including projected uncertainties, and additional capacity reservation and unit commitment are required. DMM requests clarification as to how the calculation of the flexible ramping product requirement will account for the projected ramping capability of the existing pool of energy bids.

An empirical study showing the distribution of uncertainty, the contribution of its components, and the resulting derived requirement for ramping product would be very useful in better understanding the potential impact of the proposal. For example, the figure below shows the cumulative distribution of observed flexible ramping product requirements and the average contribution to those requirements by the characteristic sources listed in the ISO proposal: generation deviations, load deviations, ISO manual intervention, and inter-tie ramping. The figure is for illustrative purposes only - data are stylized and do not reflect actual measurement of uncertainty.



Presume this distribution applies to hour-ending 16 for weekdays in March. If the ISO chooses to select the ramping requirement based on the distribution of uncertainty, it may choose an inflection point (80th percentile → requirement = 310 MW). In this case, it can be clear which sources contribute the most to this requirement provided the components can be calculated. Further, some sources may contribute evenly across the distribution while others are more variable and have a greater contribution to the requirements at the higher end of the distribution – those that will wind up being procured with a cost to be allocated.

Another issue that can be visualized with this figure is the impact of the inherent ramping capability of the energy bid stack. If, historically (or estimated for the current hour) there is 400 MW of additional 5-minute ramping capability in the energy bid stack beyond what is projected to meet load, we can visualize the net requirement for flexible ramping product. At the 90th percentile, the uncertainty measure would project a gross requirement of about 710 MW. Subtracting the 400 MW of additional existing 5-minute ramping capability available from the energy bid stack leaves a flexible ramping product requirement of about 310 MW. As noted in prior comments, it is not clear if this type of netting is part of the proposal.

Cost Allocation

The ISO proposal will allocate cost only to load, however the Revised Straw Proposal and the December 11, 2011, presentation to the Market Surveillance Committee, p.5, shows recognition that other factors including inter-tie ramp, uninstructed deviation, and operator adjustments also contribute to the requirement for flexible ramping product. While the representation of these contributors is conceptual,

not empirical, it clearly indicates a fuller understanding of cost causation. Allocating the cost of procuring flexible ramping product to those factors that drive the requirement will provide an incentive to alter operation to reduce exposure and thus reduce demand for the product. At the very least it will allocate the cost to those who are driving it. The ISO proposal to allocate cost to load does not appear to be consistent with cost causation principles and as such will not provide the proper incentives to reduce the variability driving the demand for this product. The ISO has the opportunity to correctly align cost allocation with cost causation during the design phase of this new product without the friction of change since there is currently no standard for cost allocation this product. DMM recommends the ISO assess the contribution of the various sources to flex ramp product requirements and allow those results to inform a just cost allocation approach that reflects cost causation principles and not defer to a later date when a more “holistic” approach to cost allocation redesign can be undertaken.

DMM also suggests considering assigning a higher weight to more extreme contributions to uncertainty in the allocation of flexible ramping product cost. More specifically, we anticipate that hours where there is relatively small uncertainty derived from one or several sources there should be little or no flexible ramping product procured to cover this since the energy bid pool should be able to cover it. However, there may be instances where large deviations have a more pronounced (and possibly persistent) impact on the measure of uncertainty and consequently on the amount of flexible ramping product procured. These larger deviations should bear a higher proportion of the cost of procurement.

Operator Intervention

DMM is concerned about the impact that the high level of manual load adjustments often made in HASP may have on flex-ramp prices and awarded schedules. The ISO’s proposal appears to assume that the only difference in the RTPD run and the RTD runs are “uncertainties”. In practice, results for the first RTD run corresponding to each HASP/RTPD run are likely to be greatly impacted by load biasing done in the HASP/RTPD runs. DMM has observed frequent load biasing in HASP, RTPD, and RTD and has also observed frequent disparity in the load biases applied across these three market runs. DMM expressed a similar concern in its comments on the flex-ramp constraint.

DMM also understands from the proposal that there will be opportunity for ISO Grid Operators to apply manual adjustments to the ramping requirement should they feel the calculated amount is not consistent with current system needs. This feature may have a significant impact on short-term commitment, changes in MSG configurations, and market prices for energy, ancillary services, and ramping product. DMM recommends the ISO put in place procedures for determining appropriate adjustments, require that such adjustments are recorded separately from the calculated requirement in an electronic data base, and require logging of the purpose for the adjustment.

Opportunity Cost

It is still unclear whether the flexible ramping product capacity will be nearly fully withheld from dispatch like operating reserve, making an opportunity cost appropriate, or if it will be released for dispatch frequently enough that revenue from real-time dispatch will negate the need for an opportunity cost. While the opportunity cost of not selling ancillary services may be valid, the nature of the flexible ramping product contradicts the principle of paying an opportunity cost for not selling energy. The fundamental assumption of flexi-ramp product is that the capacity is frequently needed for dispatch in RTD to alleviate shortages in ramping energy and hence resources providing this service will frequently be dispatched in RTD. The purpose of opportunity cost is to compensate a supplier for foregone revenue due to the capacity reservation. Being dispatched for energy in RTD provides these resources the opportunity to receive at least their bid price for the energy dispatched if they are economic. If they are not, there is no opportunity cost. DMMs understanding of the nature of the flexible ramping product was that it would be procured only when it was anticipated it would be needed, and then would be released into the pool of real time bids to compete for dispatch. If flex-ramp capacity is rarely dispatched (making an opportunity cost more appropriate) then DMM believes that the ISO would be over-procuring this product and the requirement (and/or dispatch criteria) should be adjusted accordingly.

DMM realized that ISO proposes to only release flex-ramp procured capacity when there are “realized imbalance differences”, and as noted above the appropriateness of an opportunity cost lies in the frequency with which bids are released for dispatch. The implementation of the flexible ramping constraint on December 13, 2011, may provide an opportunity to observe how a similar market mechanism reserves capacity relative to realized need and releases that capacity in RTD for dispatch.

Market Power Mitigation

Once the ISO provides more details of the amount of flex-ramp it may procure and other aspects of this product, the ISO will need to consider if any form of mitigation is necessary and appropriate. At a minimum, DMM envisions that the ISO would need to impose a must-offer requirement for Resource Adequacy resources and some bid or price cap as it does currently with ancillary services. Due to the higher level of “temporal” market power that may exist in RTPD, a lower cap may be needed. However, this can only be assessed once more details of the amount of flex-ramp it may procure and other aspects of this product are determined.