Comments on Flexible Ramping Product Revised Draft Technical Appendix

Department of Market Monitoring
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1 Summary

The Department of Market Monitoring (DMM) appreciates the opportunity to provide comments on the Flexible Ramping Product Revised Draft Technical Appendix.

DMM supports the Flexible Ramping Product (FRP) design as a more effective way of ensuring flexibility than the current flexible ramping constraint. In particular, the change presented in this Revised Draft Technical Appendix to settle expected net load ramps *in-market*[1] is a significant design improvement over the previous approach of allocating costs as an uplift. Section 2 provides more detail on our support for this substantial change.

While DMM supports the overall proposal, there are several issues that the ISO should consider. Sections 3 through 7 below provide more detail on these issues.

2 Support moving expected ramp settlement into the market

DMM supports the change to settle the expected ramp in-market instead of creating an out-of-market uplift. Settling in-market allows the schedules that support the net load movement to be compensated at market prices by the schedules driving the net load ramp (whether or not the schedules supporting the ramp are dispatchable).

This also removes the odd incentives created by the previous allocation proposal which assigned costs to resources that were not 5-minute dispatchable but whose ramp schedules reduced overall costs by ramping in the direction to support the overall net load ramp.

The potential for non-dispatchable resources to game the settlement by submitting false forecasts is mitigated by the use of the ISO forecast in both the market and settlements of expected ramp FRP.

3 Allocating uncertainty costs to generator UIE is problematic

It is not clear why UIE is included in the allocation of the uncertainty portion of the flexible ramping costs for generators.

[1] Where those driving the expected ramp pay those providing the expected ramp at the market price for ramp.

Allocating the uncertainty portion of FRP costs based on generator UIE can cause generators to pay for FRP that the generators did not cause to be used and which was not procured in the market.

The effect that dispatchable resources' uninstructed deviations have on FRP is not represented by UIE. It seems more reasonable to include in the FRP demand curves the effects that the deviations of dispatchable resources have on FRP and allocate based on the effects. Such a change would make the allocation of the uncertainty portion of FRP more in line with the market based approach for settling the expected ramp portion of FRP.

The FRP that non-dispatchable resources cause to be procured (besides the expected ramp of these resources which will be settled in market) is entirely captured by the non-dispatchable resources' forecast errors (the vertical binding minus advisory interval data from Figure 10 of the ISO's Revised Draft Technical Appendix). The uncertainty portion of FRP should therefore be allocated to non-dispatchable resources based on the resources' forecast errors. Allocating FRP to non-dispatchable resources based on their UIE would result in a random allocation of these FRP costs to non-dispatchable resources such as VERs.

More details on the effects of uninstructed deviations on FRP availability are in Section 7 below.

4 Unclear why allocating uncertainty costs to load UIE

It is unclear what the correlation is between load UIE (metered load less day-ahead cleared load) and the real-time load forecast errors that create the need for FRP. An entity who clears a lower percentage of their load in the day-ahead market could pay for the costs of FRP to cover the real-time forecast uncertainty created by an entity with larger loads who clears a higher percentage in the day-ahead market. The uncertainty portion of FRP should therefore be allocated to load in the same way it should be allocated to all non-dispatchable resources: based on the real-time forecast errors that create the demand curves for FRP. Each load serving entity's load share is a better representation of its contribution to the demand for the uncertainty portion of FRP than is UIE.

5 Histograms of forecast errors will need sufficient data

The ISO is appropriately leaving itself room to change and improve how it estimates forecast errors and the FRP demand curves. DMM would like to note that it is important that sufficient data is used in creating the histograms so that the estimate of forecast errors, and the demand curves, are not sensitive to a small number of observations within the data sample. DMM has previously noted issues created by small sample sizes used to estimate the flexible ramping constraint requirement.[2] This will likely require grouping data across multiple trade hours and days.

[2] For further information please see section 2.2 of "Q2 2015 Report on Market Issues and Performance" http://www.caiso.com/Documents/2015_SecondQuarterReport-MarketIssues_Performance-August2015.pdf

6 Granularity differences between FMM and RTD

As the ISO showed, there are granularity differences between procuring 15-minute FRP in the FMM and 5-minute FRP in RTD. These types of granularity differences also exist in the current energy market. While DMM does not believe these granularity differences merit changing the FRP design at this time, the ISO should be prepared to deal with issues arising from the granularity differences, including turning off the FRP in either the FMM or RTD if necessary. DMM hopes that any future FRP enhancement or other initiatives will consider what changes, if any, need to be made to the FRP or real-time market design due to market granularity issues.

7 Details on uninstructed deviation effects on FRP

This section provide some brief examples to illustrate why allocating costs to dispatchable generator UIE is problematic and allocating costs to non-dispatchable generator UIE or uninstructed deviations is inappropriate.

Figure 1 shows a dispatchable generator with a constant ramp rate and a deviation from its binding dispatch. The ramp available from the binding dispatch is constrained by the resource's maximum operating level (Pmax). When the generator has a deviation it reduces the amount of energy it can feasibly provide (its flex ramp up) in the next interval. But this reduction in available flex ramp up is less than the deviation. This is because the resource can make up some of the deviation with its ramp that is now not constrained by its maximum operating level.

Figure 2 shows a similar situation to Figure 1, but with the maximum operating level constraining the ramp from both the binding dispatch and the actual output after the deviation so that there is no change in available flex ramp up even though there is a deviation.

These are just two simple examples of how deviations are not equivalent to reductions in flex ramp. There are other cases where the deviation and effect on flex ramp availability are not equal. Rather than allocating costs based on uninstructed deviations, the effect on flex ramp availability could first be calculated and added to the demand curve. Then allocation of FRP costs due to uncertainty could be made based on this contribution of each resource's uninstructed deviation to the FRP demand curve. A formula that could be used to estimate the effect of deviations by dispatchable generators on FRP availability is shown in Equation 1. Equation 1 could work for either the flex ramp up or flex ramp down products.

Equation 1. Estimate of dispatchable generator deviation effects on available flex ramp capacity

$$FRU\ Effect = FRP@Actual - FRP@Binding - (Binding - Actual)$$

Figure 1. Dispatchable generator deviation causing a reduction in flex ramp up availability

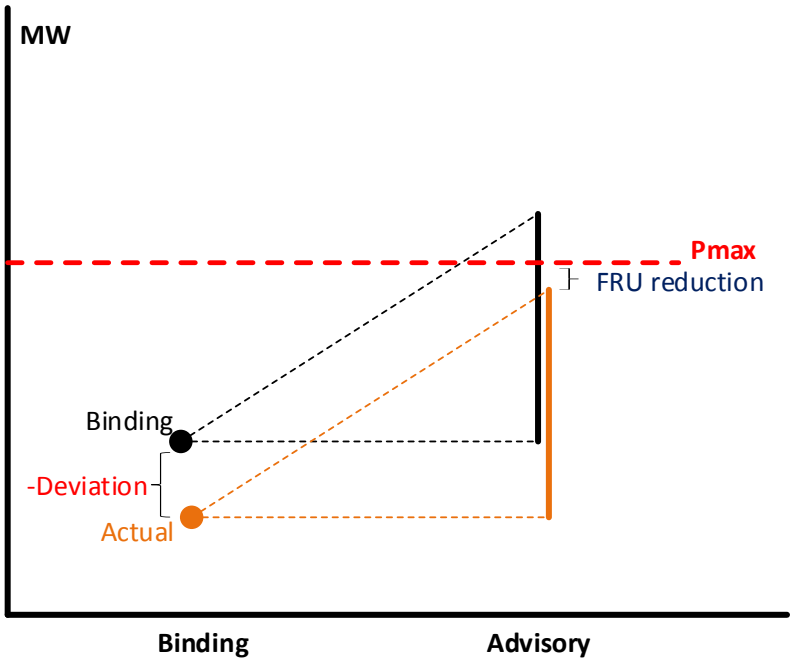

Figure 2. Generator deviation causing no change in flex ramp up availability

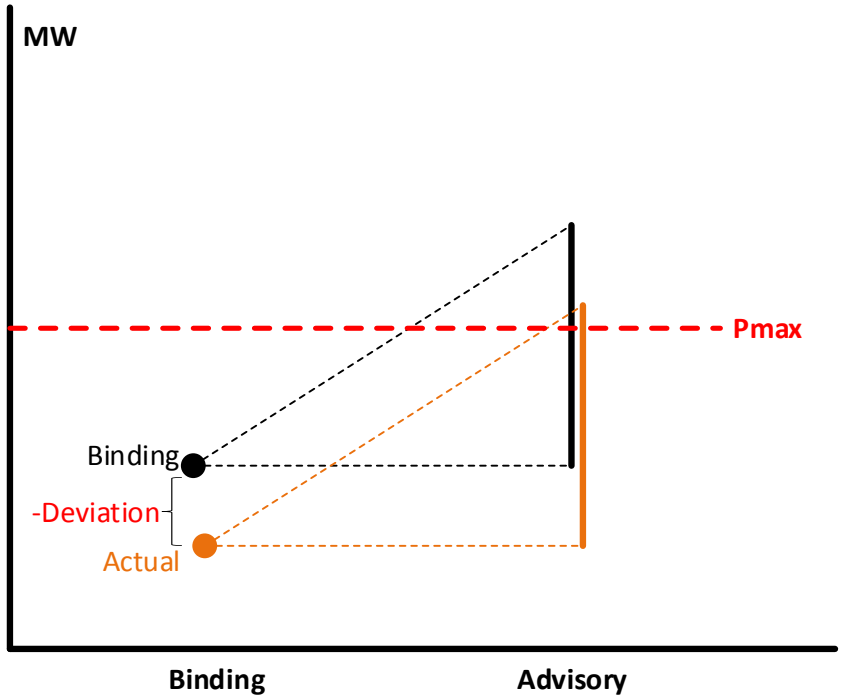

Figure 3 shows a non-dispatchable generator whose binding schedule in interval 2 is different than the advisory schedule for interval 2, i.e. the generator has a forecast error. The binding less advisory schedule measures this forecast error regardless of the cause of the error. In this example it is assumed that the cause of the entire error is a deviation in interval 1. The forecast error already accounts for the effect on flexible ramping use. There is no need attempt to include uninstructed deviation effects from non-dispatchable resources on FRP in either the demand curve or cost allocations. This, in combination with using the deviation from binding 2 and actual in interval 2, just results in a random change to the appropriate allocation of FRP costs to non-dispatchable resources such as VERs.

Figure 3. Non-dispatchable generator deviation effects on flex ramp accounted for in forecast error