Comments on
CAISO's June 10, 2015
Flexible Ramping Products Draft Technical Appendix

July 1, 2015

On June 10, 2015, the CAISO released the Flexible Ramping Product (FRP) Draft Technical Appendix. On June 17, 2015, the CAISO held a workshop to review and discuss the Technical Appendix. California Department of Water Resources State Water Project (CDWR) appreciates the opportunity to submit commits.

CDWR supports the CAISO's efforts to create a product that resolves the need for greater ramping capability which in large part is exacerbated by increasing levels of variable energy resources while at the same time allocate costs fairly among all market participants. CDWR appreciates the complexity of the FRP and supports the CAISO's efforts in clarifying and simplifying the design, most notably in no longer procuring the FRP in the day-ahead market and simplifying the previously proposed "no-pay" rules.

Comments:

1. It is CDWR's understanding that FRU and FRD prices will be based on respective demand curves using costs of expected power balance violations in absence of the FRP.[1] However, in Scenario 2 of the upward flexible ramping example (Page 19), the FRU price is referred to as an "energy opportunity cost". Please confirm whether FRP prices will be based on power balance violations costs or energy opportunity costs or when each will be used.

2. Section 7.1 (Page 19) shows four scenarios for an increasing net demand example. These scenarios demonstrate the properties and benefits of having upward flexible ramping. Each scenario represents the following cases.

   Scenario 1: Single interval RTD optimization, without upward flexible ramping
   Scenario 2: Single interval RTD optimization, with upward flexible ramping
   Scenario 3: Two-interval RTD optimization, without upward flexible ramping
   Scenario 4: Two-interval RTD optimization, with upward flexible ramping

Section 7.2 (Page 21) shows the properties and benefits for having downward flexible ramping in a decreasing net demand example, with similar scenarios. However, scenario 4 is not shown in Section 7.2. Please add description of scenario 4.

[1] http://www.caiso.com/Documents/DraftTechnicalAppendix_FlexibleRampingProduct.pdf at P7

3. In Section 8 (Page 23), the CAISO seeks stakeholder input on the two alternatives in measuring unavailable FRP capacity. CDWR prefers the first alternative (a resource's upper and lower economic limits are taken into account when determining unavailable FRP) over the second alternative (simply assume UIE corresponds to unavailable FRP) because the first alternative is more accurate. Even though the second alternative is simpler, this methodology may lead to a resource having to pay back unavailable FRP when in actuality it had available FRP capacity.

4. In Section 9.1 (Page 27), the CAISO explains that supply movement can come from certain CAISO dispatched instructions and from "uninstructed deviations from ISO dispatch instructions" (UIE). Table 14 (Page 29) shows examples of dispatch instructions to four different supply resources that result in FRU or FRD. However, this table does not show a UIE example. For completeness of Table 14, the CAISO should include an example of a supply resource that has UIE and as a result is allocated FRU/FRD.

5. In Section 9.2 (Page 29), the CAISO explains that it "will use gross uninstructed imbalance energy to determine the share of flexible ramping costs attributable to load." The following sentence says "The allocation will be based upon five-minute net uninstructed imbalance energy." CDWR believes both sentences are trying to explain the same type of allocation. However, the first sentence uses "gross" while the second uses "net". Which one is correct?

6. In Section 9.3 (Page 29), the CAISO explains that in order to determine the shares of FRU and FRD to be allocated to supply resources within the supply category, "uninstructed deviations will net against other five-minute movement that otherwise would receive a FRU or FRD allocation". Can the CAISO provide an example of a supply resource's uninstructed deviations netting against other 5-minute movement (that otherwise would receive a FRU or FRD allocation) in order to clarify this statement?

7. In Section 9.4 (Page 30), the CAISO clarifies that if an intertie's fixed ramp movement is aligned with the net load movement (intertie increase and net load increases in the same interval), FRP cost allocation to that intertie resource will be limited. Limiting FRP cost due to intertie resource movement relative to net load movement is not specific to only interties. This concept applies to load and supply resources as well. The CAISO should also clarify this concept in the load and supply sections (9.2 and 9.3).

- If a load resource movement is opposite the net load movement, FRP costs to the load resource will be minimized. For example, in the morning load ramp, the CAISO will require more FRU. FRU costs will be greater, relative to FRD costs in a given 5-minute interval. If in the same 5-minute interval, a resource's load is decreasing, the load movement will result in FRD cost being allocated to it. Since in that 5-minute interval, fewer FRD costs are to be allocated (relative to FRU costs), the load resource allocation of the FRP will be minimized.
- If a supply resource movement is aligned with net load movement, FRP costs to the supply resource will be minimized. For example, in the morning load ramp, the CASIO will require more FRU. FRU costs will be greater, relative to FRD costs in a given 5-minute interval. If in the same 5-minute interval, a supply is producing more energy than expected, resulting in a positive movement and requiring FRD, a FRD cost will be allocated to the supply resource. However, since in that 5-minute interval, fewer FRD costs are to allocate (relative to FRU costs), the supply resource allocation of the FRP will be minimized.

8. The table in Section 9.5 (Page 31) lists the monthly re-settlement steps for the FRU and FRD products. Although these steps are useful, they are not enough to clearly explain the details of each step. CDWR requests the CAISO to provide a detailed spreadsheet example that shows the methodology/formulas for each step with one month worth of data.

   Based on CDWR's understanding of the construction of the FRU/FRD demand curves and the examples shown in Section 5.3.2, it seems that FRU/FRD prices can be calculated from previous data. If this is the case, CDWR also requests CAISO to provide FRU/FRD prices and a monthly rate for the selected monthly data set example requested above.

9. CAISO has shown in past workshops a table summarizing the FRP cost allocation "rules", both between the three categories (first slice of the pie) and between resources within each category (the second slice(s) of pie pieces). Even though a description of the rules are explained in the technical appendix and the draft final proposal, the CAISO should consider including these cost allocation rules in a summary table(s) in the revised FRP draft final proposal for further clarification and easier reference.

Miscellaneous corrections and suggestions are noted below in yellow highlight:

Page 3, near the middle

The portion of FRP the ISO market will procure for uncertainty in the fifteen-minute market will be based on the net load forecast error between the first advisory fifteen-minute market (FMM) interval and the corresponding binding maximum five-minute real-time dispatch (RTD) interval. The portion of FRP the ISO market will procure for uncertainty

Page 13, near the bottom

For FRD, the histograms will be constructed based on the difference of the net demand the market used in the FMM for the first advisory RTUC interval and the ~~maximum~~ minimum net demand the market used for the three corresponding RTD intervals.

Page 19, near the middle, Table 1, Energy Bid column

Generation	Energy Bid	Initial Energy
G1	$25 ~~MW~~	400 MW
G2	$30 ~~MW~~	0

Page 27, top

The ISO will initially allocate the costs for the flexible ramping product based upon supply~~, and~~ demand, and intertie "movement" that requires the ISO market to dispatch other resources in the five-minute real-time dispatch.

Page 22, near the bottom

ramping capability as the flexible ramping requirement in interval t. The LMPs are different because there is an interaction between the energy price and flexible ramping price. When net system demand is ~~in~~decreasing, which creates more downward ramp need, the look-ahead optimization will increase the energy price in the binding interval (for similar but opposite reasons as described in the FRU example in scenario 3 in the preceding section ~~(~~7.1).

Page 28, near the middle

"undispatchable" and "unavailable" no-pay provisions). Depending on implementation complexity, this alternative could consider the resource's actual ramping capability, or simply compare the FRU or FRD award to the difference between the metered output and the resource's upper and lower economic limits, respectively.

Page 28, near the middle

Table 1~~5~~4 also provides examples of the allocation to several supply resources. Resource A can

Page 29, Table 14, 2nd and 3rd rows

Movement	RTD1	RTD2
Load: load forecast	1,100 MW	1,080 MW
Intertie: ~~Demand~~ Deemed delivered (1-hr schedule changes)	200 MW (export)	210 MW (export)
Supply: Res A – ~~No~~ ~~e~~Economic bids and dispatch at upper economic limit	150 MW	135 MW

Page 29, near the middle

9.2 Billing determinant ~~of~~ within load category

Page 29, near the middle

The ISO will use gross uninstructed imbalance energy to determine the share of flexible ramping costs attributable to load resources. The allocation will be based upon five-minute net

Page 29, near the bottom

9.3 Billing determinant ~~of~~ within supply category

Page 30, near the top

A resource will not be allocated FRU or FRD costs for movement less than the threshold. For example, assume a resource has instructed energy of 10 MW in a given settlement interval, if the resource's five minute movement ~~and~~ is less than 0.3 MW the resource's would not be allocated FRU or FRD costs. If the five-minute movement and uninstructed is greater than 0.3

Page 30, near the middle

9.4 Billing determinant ~~of~~ within intertie fixed ramp category

Page 30, near the middle

economically participating in the FMM. The 15-minute schedule changes do have prescribed 10-minute ramps: however, the subsequent FMM run can modify the five-minute ramp at the end of the fifteen-minute interval~~)~~ to be consistent with changing system conditions in FMM.