

Comments of Pacific Gas and Electric Company

Flexible Ramp Product

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Pacific Gas and Electric Company (PG&E) offers the following comments on the California Independent System Operator's (CAISO) June 10, 2015 Flexible Ramp Product (FRP) Draft Technical Appendix.

PG&E supports the development of robust design of FRP for both up and down directions in real time functions. The current draft technical appendix resolves many open issues from the last round (January 2015) of comments and we appreciated CAISO's efforts on this paper. These comments focus strictly on elements of the technical paper. PG&E looks forward to discussing the merits of the design elements CAISO is developing in the FRP proposal, and potential future enhancements to the CAISO's FRP design.

The Summary of PG&E's Comments are:

1. CAISO should correct its formulae to correctly account for shortages in ramp capability.
2. PG&E believes it is appropriate to measure the amount of unavailable Flexible Capacity for each given resource by comparing each resource's metered output against both its upper and lower economic limits and determining the amount of uncommitted capacity that remains available from the unit, factoring the resource's actual ramp rate capability.
3. PG&E requests that CAISO create an additional No Pay process for resources that fail to meet a flexibility dispatch
4. PG&E does believe that 3% of a resource's energy schedule would be an appropriate threshold level for protection from Flexible Ramping Cost Allocation charges
5. PG&E suggests that CAISO establish monthly baseline Allocation Percentages for each allocation category to correspond to their probability histogram weighting and overall cost causation
6. PG&E believes that the initial per-MW allocation cost should be capped at no more than the interval RTD FRP price and that a secondary allocation tier should be included to ensure that no single resource is charged with excessive allocation costs during the initial Daily settlement process.

1. CAISO should correct its formulae to correctly account for shortages in ramp capability.

The formulation for FRU/FRD surplus cost function for the flexible ramp requirement due to uncertainty on page 7 is given as:

$$CSU_t(FRUS_t) = PC \cdot \int_{\frac{EU_t - FRUS_t}{ED_t - FRDS_t}}^{EU_t} ep_t(e) de, 0 \leq FRUS_t \leq FRUR_{Ut}$$

$$CSD_t(FRDS_t) = PC \cdot \int_{ED_t}^{EU_t - FRUS_t} ep_t(e) de, 0 \geq FRDS_t \geq FRDR_{Ut}$$

These formulae overstate the expected shortages. For $e > EU_t - FRUS_t$ the shortage will not be e but $e - (EU_t - FRUS_t)$. This is because CAISO will still have ramp up capability of $EU_t - FRUS_t$ available leading to a shortage of $e - (EU_t - FRUS_t)$. Similar result holds for ramp down shortages. The above formulae should be corrected to correctly account for the shortages in ramp capability.

$$CSU_t(FRUS_t) = PC \cdot \int_{\frac{EU_t - FRUS_t}{ED_t - FRDS_t}}^{EU_t} (e - (EU_t - FRUS_t))p_t(e) de, 0 \leq FRUS_t \leq FRUR_{Ut}$$

$$CSD_t(FRDS_t) = PC \cdot \int_{ED_t}^{EU_t - FRUS_t} (e - (ED_t - FRDS_t))p_t(e) de, 0 \geq FRDS_t \geq FRDR_{Ut}$$

This will be in line with DMM suggestion (equation 6).

2. PG&E believes it is appropriate to measure the amount of unavailable Flexible Capacity for each given resource by comparing each resource's metered output against both its upper and lower economic limits and determining the amount of uncommitted capacity that remains available from the unit, factoring the resource's actual ramp rate capability.

The CAISO proposes two possible evaluation mechanisms for measuring the amount of unavailable Flexible Capacity for each given resource. The first methodology suggests comparing each resource's metered output against both its upper and lower economic limits and determining the amount of uncommitted capacity that remains available from the unit, factoring the resource's actual ramp rate capability. The second methodology simply assumes that any Uninstructed Imbalance Energy (UIE) represents unavailable ramping capacity in the corresponding direction.

PG&E believes that while the first methodology is more complicated to calculate it does represent a more accurate metric of each resource's available ramp capabilities. PG&E suggests

that the CAISO also limit a unit's upper and lower evaluation levels to economic capacity that is not already allocated for providing Ancillary Services:

$$\begin{aligned}
 & \textit{Unavailable Flex Ramp Up} \\
 & = \max \left\{ 0, FRU \right. \\
 & \quad - \max \left\{ 0, \min \left\{ \textit{Effective Ramp Rate Up} \right. \right. \\
 & \quad \cdot 5 \textit{ minutes, Upper Economic Limit} - \textit{Regulation Up Capacity} \\
 & \quad \left. \left. - \textit{Spin Capacity} - \textit{NonSpin Capacity} - \textit{Metered Output} \right\} \right\}
 \end{aligned}$$

$$\begin{aligned}
 & \textit{Unavailable Flex Ramp Down} \\
 & = \min \left\{ 0, FRD \right. \\
 & \quad - \min \left\{ 0, \max \left\{ -\textit{Effective Ramp Rate Down} \right. \right. \\
 & \quad \cdot 5 \textit{ minutes, Lower Economic Limit} + \textit{Regulation Down Capacity} \\
 & \quad \left. \left. - \textit{Metered Output} \right\} \right\}
 \end{aligned}$$

3. PG&E requests that CAISO create an additional No Pay process for resources that fail to meet a flexibility dispatch

The CAISO has proposed a buy-back mechanism for capacity that is unavailable due to resource deviation from dispatch but has not proposed to rescind payments to resources that have been paid for Flexible Capacity who then fail to provide the corresponding ramping energy when dispatched via ADS. PG&E believes that a non-performance based recession mechanism will be beneficial in avoiding unnecessary costs while also providing a framework to discourage resource behavior that would negatively affect grid reliability.

PG&E suggests that, in addition to the non-availability buy-back process described above, any non-delivered flexibility energy would also be subject to full recession at the corresponding RTP FRP Price.

4. PG&E does not believe that 3% of a resource's energy schedule would be an appropriate threshold level for protection from Flexible Ramping Cost Allocation charges

In section 9.3.1 the CAISO suggests setting a minimum threshold within which supply resources would not be allocated Flexible Ramping Cost Allocation charges. The suggestion being a threshold of the lower of 5 MW, or 3% of the resource's interval energy schedule.

PG&E believes that a threshold based on a resource's energy schedule would be imprecise and inconsistent with similar performance thresholds already described in the CAISO Tariff. Such a threshold suggests that a resource is more operationally accurate when operating at lower output levels, that a unit with an operational range of 1-100 MW may operate more precisely at its 2 MW PMIN (where the threshold would allow an Imbalance tolerance of 0.06 MW) then when

the unit is scheduled to produce 90 MW (allowing a threshold of 2.7 MW). CAISO's proposed threshold is not consistent with actual generation behavior and would not allow for consistent protections between resources or between intervals. PG&E suggests that such a threshold should be based on the resource's PMAX instead of Energy Schedule.

5. PG&E suggests that CAISO establish monthly baseline Allocation Percentages for each allocation category to correspond to their probability histogram weighting and overall cost causation

As outlined in section 3 of the Draft Technical Appendix, the CAISO is proposing to procure Flexible Ramping capacity to accommodate uncertainty in the Real-Time market based on net load forecast error. This net load forecast error is based on unexpected changes in Load usage as well as deviations by variable energy supply resources (VERs) from their dispatched RTD values including forecasts. The net load demand curve that drives this procurement will be based on a histogram describing the probability distribution function for a given dispatch hour. The CAISO then proposes to allocate these procurement costs back to the market based on resource deviations from schedule. These initial 5-minute allocations are then re-settled each month based on each resource's actual pro-rata monthly deviation rate.

Firstly, PG&E seeks clarification as to whether the that net load forecast error also includes schedule deviations by non-VER supply resources for 5 and 15 minute markets.

Secondly, PG&E feels that because the procurement process is based on historically driven uncertainty probabilities, that the overall cost allocation process should also follow similar cost causation principles. To this end, the CAISO should establish a set percentage for each allocation group, for each trade month, based on their historical contribution to net load forecast error. This percentage would then be used to identify the allocation ratio of daily Flexible Ramping costs for each group. This process would help ensure that no one resource, or resource type, would be allocated excess FRP charges on any given day and that the general allocation would be comparable to the historical behaviors that determined the actual procurement levels. These daily allocations would then be reassessed under the monthly re-settlement process to ensure greater overall financial accuracy.

6. PG&E believes that the initial per-MW allocation cost should be capped at no more than the interval RTD FRP price and that a secondary allocation tier should be included to ensure that no single resource is charged with excessive allocation costs during the initial Daily settlement process.

The CAISO is currently proposing, in Section 9.1, to allocate all Flexible Ramping procurement costs based on supply and demand "movement" that requires the CAISO to dispatch other resources in the 5-minute RTD. Even with preset allocation group percentages, as outlined above, it is possible that a small group of resource might be responsible for paying for a significant amount of Flexible Ramping costs. PG&E believes that the initial per-MW allocation cost for these resources should be capped at no more than the interval RTD FRP price and that a

secondary allocation tier should be included to ensure that no single resource is charged with excessive allocation costs during the initial Daily settlement process. These allocation price caps and secondary allocation tier would then be reversed and removed during the monthly re-settlement process.