Pacific Gas and Electric Company

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Flexible Resource Adequacy Criteria and Must Offer Obligation Phase 2 – Draft Flexible Capacity Framework

Submitted by	Company	Date Submitted
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Pacific Gas and Electric Company (PG&E) offers the following comments on the California Independent System Operator's (CAISO) Flexible Resource Adequacy Criteria & Must Offer Obligation Phase 2 (FRACMOO2) Draft Flexible Capacity Framework

In light of CAISO's recently announced roadmap to enhance its day-ahead market, including creating a new way for EIM entities to participate in the day-ahead market, PG&E recommends that CAISO pause the FRACMOO2 initiative until the day-ahead market enhancements are near market implementation. The impact of the load following reserve product will significantly shape how Flexible RA resources will need to participate in the CAISO markets. PG&E greatly supports the development of the load following reserve product, and is concerned that RA policy will slow down the development of this much-needed load following day-ahead product.

1. EFC rules for wind and solar resources

While PG&E supports a pause on the broader Draft Flexible Capacity Framework, PG&E supports continuing one remaining item that is in scope for the initiative, modifying the Effective Flexible Capacity (EFC) counting rules for wind and solar resources that provide economic bids.

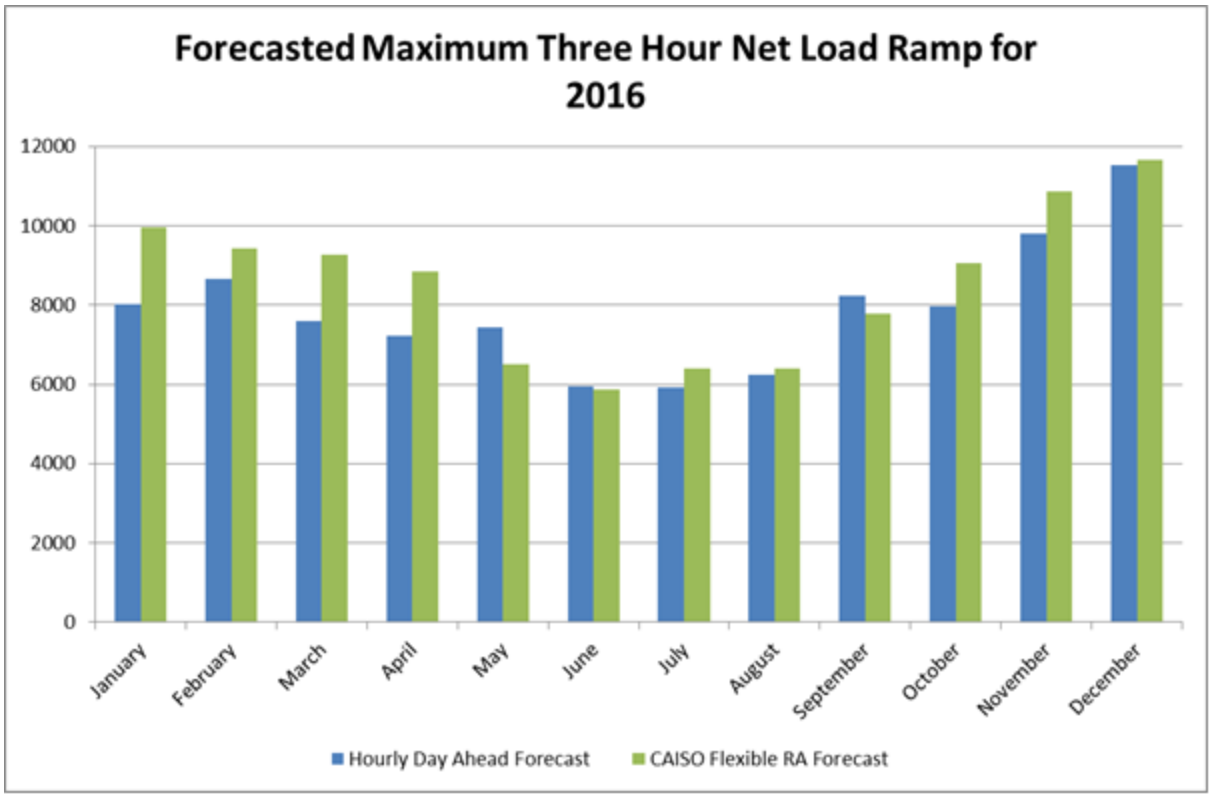
PG&E recommends two potential approaches, a simple approach and a complex approach, to modify the EFC rules for wind and solar resources that provide economic bids. The simple approach uses nameplate capacities to translate the aggregate contribution of wind and solar resources to an individual wind and solar resource's contribution to the maximum monthly 3-hour net load ramp. The complex approach changes the Flexible RA requirement to use Day-Ahead load and renewable forecasts to calculate each resource's contribution to the monthly maximum 3-hour net load ramp.

The simple approach takes the nameplate capacity of the resource and divides it by the total nameplate capacity of the resource type. With that percentage, and percentage of the contribution of that resource type towards the maximum monthly 3-hour net load ramp, an EFC can be determined. An example of how a solar resource's EFC is calculated using PG&E's simplified methodology in December 2018 is below.

Nameplate Capacity of Solar Resource 1	200 MW
Aggregate Nameplate Capacity of all solar resources	10,000 MW
3-hour net load ramp + 3.5 Percent of Forecast Peak Load in December 2018	15,000 MW
Total solar resources' contribution to 3-hour net load ramp in December 2018 (%)	48%
Total solar resources' contribution to 3-hour net load ramp in December 2018 (MW)	15,000 MW * 48% = 7,200 MW
Solar Resource 1 contribution to 3-hour net load ramp in December 2018 (MW)	7,200 MW * 200 MW/10,000 MW = 7,200 * 0.02 = 144 MW

PG&E alternatively suggests a more complex methodology that more fully captures the true contribution of each wind and solar resource to the monthly maximum 3-hour net load ramp. This methodology was developed to address concerns the CAISO indicated they had related to the potential double counting of renewable curtailment by refining the method that the CAISO calculates the maximum monthly 3-hour net load ramp. The CAISO indicated during the November 29th stakeholder meeting that is it currently investigating how to back out curtailed renewables from the historical data used to develop the maximum monthly 3-hour net load ramp used to set the Flexible RA requirement. Rather than attempting to re-constitute historical output data by backing out curtailments, PG&E recommends the CAISO use its own historical hourly day-ahead load and renewable forecast data to develop a hypothetical maximum monthly net load ramp.

Under the Draft Flexible Capacity Framework, CAISO will have additional flexible capacity that is dedicated to uncertainty between CAISO's three markets. Therefore, the need for precision for the maximum monthly 3-hour net load ramp is greatly lessened and the minute-by-minute data used for the current maximum 3-hour net load ramp is no longer needed. Another benefit of using the CAISO's historical load and renewable forecast data is that the Flexible RA requirement will be more closely tied to the CAISO's dispatch engine, which uses the day-ahead renewable forecast for dispatching self-scheduled renewable resources and is used as the maximum Day Ahead output for economically bidding renewable resources. Using the historical day-ahead hourly forecasts allow for the CAISO to more easily determine how each renewable resource contributes to the overall maximum monthly 3-hour net load ramp. In order to show a comparison between the Day-Ahead Flexible RA requirements and the current Flexible RA requirements, 2016 requirements are re-produced using historical day-ahead hourly load and renewable forecasts. These requirements are compared to the CAISO's Flexible RA forecast in 2015 below.



To calculate an individual resource's EFC using day-ahead forecasts, the coincidence of the individual resource's output is needed during the maximum monthly 3-hour net load ramp. Based on the historical hourly load and renewable forecast, 2016's maximum monthly 3-hour net load ramp was 11,523.04 MW on December 18th from 3pm to 6pm. Solar Resource 1's renewable forecast on December's maximum monthly net load ramp was from 96.25 MW at 3pm to 0 MW at 6pm. Therefore, Solar Resource 1 contributed 0.84% of the total 3-hr net load ramp.

Using historical data, these percentages can form the basis for forecasted contributions of individual resources to monthly maximum 3-hour net load ramp. For example, if December 2017's forecasted net load ramp were 10% greater than 2016, or 12,675.34, and December 2016 was the only data point used, then Solar Resource 1's EFC in December 2017 would be 0.84% of 12,675.34 = 106.47 MW.

If the CAISO chooses to use this methodology, statistical analysis of distributions of renewable forecasts can determine how many observations are needed to accurately estimate the individual resources' contribution to the maximum monthly 3-hour net load ramp. If an individual resource's contribution to the monthly maximum 3-hour net load ramps is determined to be too inconsistent for RA counting, then relationships between the individual resource's forecast and the total aggregate wind or solar forecast could also be used. This would be similar to how the simple methodology uses the aggregate renewable nameplate capacity, but instead using the aggregate day ahead renewable forecast.

PG&E recommends that, as a beginning step, that the Must Offer Obligation (MOO) and Resource Adequacy Availability Incentive Mechanism (RAAIM) Assessment for flexible solar and wind

resources be more stringent than other resources in order to ensure that the resources are available to be optimized through all three CAISO markets. A more stringent MOO would allow the CAISO to reduce the dispatch of the flexible wind and solar resources in anticipation of the 3-hr net load ramp. Therefore, the Must Offer Obligation would be to provide economic bids at the CAISO's renewable forecast in all day ahead, fifteen minute, and five minute intervals when the CAISO's renewable forecast is not zero megawatts. This Must Offer Obligation and RAAIM Assessment structure can be applied to either of PG&E's renewable EFC approaches.

2. The Draft Flexible Capacity Framework should have a well-developed LRA and LSE allocation methodology before the CAISO submits this framework to the CAISO Board of Governors.

In order for PG&E to support the CAISO's Draft Flexible Capacity Framework, the framework will need to have a well-developed LRA and LSE allocation methodology for all required products. While the existing methodology could be applied for the DA shaping Flexible RA product, the allocation methodologies for the 15 minute and 5 minute Flexible RA products have yet to be developed. PG&E recommends developing these methodologies after the CAISO has completed its day-ahead enhancements but before submitting this framework to the CAISO Board of Governors.

3. PG&E does not support using a Flexible RA structure that completely ignores the ability of self-schedules to adjust to load changes throughout the month.

The CAISO working group presentation indicates that the CAISO believes the Day Ahead (DA) flexible RA product should be based on the current 3 hour net load ramp. PG&E supports this structure for now. Considering the significant variability and adjustability of self-schedules, particularly self-scheduled imports, between different days within a week and different weeks within a single month, PG&E believes a future DA shaping flexible capacity requirement should account for the flexibility of shaped self-scheduled resources or the CAISO should create an EFC for shaped self-scheduled resources to count towards DA shaping needs.

4. PG&E supports the elimination of the Flexible RA Categories to the extent that Must Offer Obligations for DA shaping resources no longer have a 17-hour bidding requirement.

During the November 29th FRACMOO2 stakeholder meeting, the CAISO indicated that it plans to eliminate the current Flexible RA categories. PG&E supports this change. The Department of Market Monitoring presented a compelling case in 2015 that flexible capacity needs occur primarily on weekends, which greatly limits the effectiveness of Flexible RA Category 3. PG&E also supports eliminating the Flexible RA Categories because they reduce the complexity associated with the RA program. The one area where PG&E would support modifications in light of the elimination of the Flexible RA Categories is to reduce the 17-hour bidding requirement for Flexible RA resources. PG&E supports re-defining the Must Offer Obligation to tailor the resource performance obligation directly to method that is used to develop the LSE requirement. If the CAISO's DA shaping product continues to use the maximum monthly 3-hour net load ramp to set the LSE's RA requirement, PG&E believes the Must Offer Obligation should also focus on the time when the maximum monthly 3-hour net load ramp is expected to occur.

5. PG&E asks the CAISO to provide updates on the analysis discussed during the August 2nd Working Group meeting.

In its 2018 Stakeholder Catalog, the CAISO has recently announced its intention to consider a number of the topics discussed during the August 2nd FRACMOO2 Working Group meeting, including increased granularity in Day Ahead schedules, a load following reserve product, and Integrated Forward Market (IFM) - Residual Unit Commitment (RUC) integration. The CAISO also indicated that real-time market enhancements, including expanding the Short Term Unit Commitment (STUC) outlook horizon, are still under consideration but will be delayed until the day-ahead market enhancements are complete. PG&E supports the CAISO's new focus. However, PG&E has also asked the CAISO to investigate using maximum ramp rate restrictions on variable energy resources and how this form of a restriction could reduce the operational challenges the CAISO currently faces. PG&E would like the CAISO to consider this potential solution when evaluating the benefits associated with day-ahead market enhancements.