Pacific Gas and Electric Company

Comments of Pacific Gas & Electric Company

Day Ahead Market Enhancement June 20th Technical Workshop

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) Day Ahead Market Enhancement (DAME) June 20th Technical Workshop. PG&E finds that the two proposed options lack the necessary detail to fully understand its impact. Since the CAISO decided to not pursue 15-minute granularity, PG&E finds that it'd be helpful for CAISO to re-examine and re-clarify its objective for this initiative.

PG&E's comments can be summarized as follows:

1. PG&E finds that the two proposed options still lack the necessary details for us to either support or oppose. Thus, we remain undecided and requests the CAISO provide clarification on what it hopes to achieve and how the two proposed options will further that objective.
2. CAISO needs to clarify how it is going to formulate various requirements with both options. PG&E provides the following list of questions and requests for clarification.
3. PG&E is concerned that the current formulation would result in the double counting of the ramp needed and provides an example to illustrate this problem.

1. <u>PG&E finds that the two proposed options still lack the necessary details for us to either support or oppose. Thus, we remain undecided and requests the CAISO provide clarification on what it hopes to achieve and how the two proposed options will further that objective.</u>

The draft technical descriptions and workshop materials lack a clear problem definition and clear articulation of the benefits the two proposed options hope to achieve. The CAISO should better clarify its a clear goal for this initiative as well as how each option achieves this goal, with clearly delineated costs and benefits in order for PG&E to support either approach. The CAISO should also provide clarity on the specifics associated with implementing the proposed options. Based on the information provided to date, it is unclear how the CAISO proposes to treat FRP in the processes. The CAISO should explain how it will model ramp requirements caused by forecast uncertainty between the Day Ahead Market (DAM) and the Fifteen Minute Market (FMM) versus the ramp requirements resulting from granularity issues between DAM and FMM dispatch models. It is unclear whether the two requirements are to be modeled by a single requirement or modeled separately.

While PG&E sees an opportunity for DAME to provide multiple benefits to market participants, PG&E needs addition detail that quantify potential economic versus reliability benefits of each option for the following criteria:

- Reduction of exceptional dispatches
- Day Ahead market efficiency gains
- Improved forward contracting
- Improved convergence of Day-Ahead and Real-Time markets

CAISO has not yet demonstrated that the proposals' benefits outweigh the CAISO's and stakeholders' costs to implement. Before the CAISO spends more time developing this initiative and stakeholders spend more time evaluating proposals, the CAISO should provide an estimate of implementation costs.

2. CAISO needs to clarify how it is going to formulate various requirements with both options. PG&E provides the following list of questions and requests for clarification.

    1) For the IFM-RUC Option, the CAISO states that physical reliability energy schedules would balance the CAISO's demand forecast. If the CAISO schedules reliability energy to balance demand forecast, the CAISO should explain how it proposes to treat renewable energy schedules in the FMM for renewable resources that did not schedule energy in the DAM. PG&E is concerned that CAISO could potentially over-procure reliability energy in the DAM when renewable energy that was not scheduled in the DAM but was accounted for in the net demand forecast used in the FMM. To account for this, should the physical reliability energy schedule in the DAM balance the CAISO's net demand forecast (demand forecast less renewable energy forecast) rather than the CAISO's demand forecast? If so, how should the model account for renewable energy that the DAM schedules in its energy market component when the DAM procures physical reliability energy to meet the CAISO's net demand forecast?

    2) Ramp capability is needed to respond to the granularity differences between the hourly scheduling process of the DAM and the 15-minute scheduling process of FMM. Ramp capability is also needed to respond to random changes between demands that drives the schedules in the DAM versus the demands in the FMM. PG&E requests that CAISO describe the process that it will use to determine the amount of ramp capability the DAM should procure to respond to granularity differences between the DAM and the FMM versus the amount of ramp capability the DAM should procure to address uncertainty between the demands in the DAM and the FMM. Given the constraints outlined in the technical documents regarding ramp, PG&E is concerned that ramp for granularity may have a different impact than ramp for uncertainty. (See below question for more detail.)

    3) The data that will be used to form the histogram needs further clarification. Does the CAISO propose to compare the ramp needed in a given historic hour in the DAM with the ramp needed in the same historic hour in the FMM? To do this, will CAISO divide the ramp needed in the historic hour in the DAM by four to get an average ramp for each 15-minute interval in the hour and compare that to the ramp needed in each 15-minute interval in the hour in FMM? Will the difference between average ramp in the hour in the DAM and the 15-minute ramp in the FMM be used to define ramp needed for uncertainty versus granularity? If so, CAISO will need to differentiate between the ramp required for granularity as opposed to uncertainty.

    4) PG&E requests further justification on why the confidence levels are set ad hoc and a priori. It is unclear that this approach will lead the procurement of the optimal level of ramp that accurately balances the costs with its expected benefits. CAISO could consider using demand curves to evaluate the economic benefits versus the costs of procuring different levels of FRU/FRD.

5) PG&E requests that CAISO provide information to demonstrate that the regions it is proposing to procure FRP in the DAM will be able to be nested so that the deliverability constraints modeled will be reasonable and accurate. Given that CAISO intends to Extend the Day Ahead Market (EDAM) to EIM entities based on the same market design, CAISO should also provide that same analysis for the EIM regions.

6) CAISO should run representative historic DAMs and provide the information on how the options would affect commitment and dispatch—including the resulting price differences. Without such counterfactual market runs, stakeholders do not have the data needed to make an informed decision between the two options.

7) The workshop provided two charts on the differences between requirements in the DAM and the FMM. One provided the historic differences between CAISO Net Demand Forecast in RUC and CAISO Net Demand Forecast used in FMM. The other provided the historic differences between CAISO DA Bid-In Demand and FMM Demand Forecast. This data is insufficient to support an informed decision between Option 1 and Option 2. Further analysis should be performed with clearer definitions of the data being provided.

    - CAISO needs to clarify how it calculated the FMM net demand forecast for an hour. Did the CAISO sum the net demand forecast used in each fifteen-minute interval in the FMM in an hour to get an hourly FMM forecast? If so, the data is not helpful for addressing the granularity concerns. If not, how is the ISO comparing an hourly bid in demand in IFM or an hourly RUC net demand forecast with the 15-minute net demand forecast used in FMM?
    - The CAISO should clarify whether it plans to compare bid-in demand in the Integrated Forward Market (IFM) with the forecasted net demand used in the FMM. Does the CAISO propose to adjust the bid-in demand used in IFM by expected renewable generation output so that it is comparable to FMM net demand forecast since the latter is demand forecast less renewable forecast?
    - The data or charts used to illustrate the differences should be based on differences in each hour over a shorter historic period to provide necessary information on seasonality.

3. <u>PG&E is concerned that the current formulation would result in the double counting of the ramp needed and provides an example to illustrate this problem.</u>

The technical documentation provided is not clear on how the CAISO will define the ramp capability needed for granularity differences between the DAM and the FMM versus the ramp capability needed to respond to uncertain changes in demand forecasts between the DAM and the FMM. The documentation is also unclear on how the FRU and FRD will be used to treat the potentially different granularity versus uncertainty needs.

The technical document describing the sequential IFM-RDA that will be used in Option 1, states that:

> "…the FRU/FRD is reserved capacity above/below the Day-Ahead Energy schedule that must be available for dispatch in the Real-Time Market (RTM) to meet granularity differences and upward/downward uncertainty from the Day-

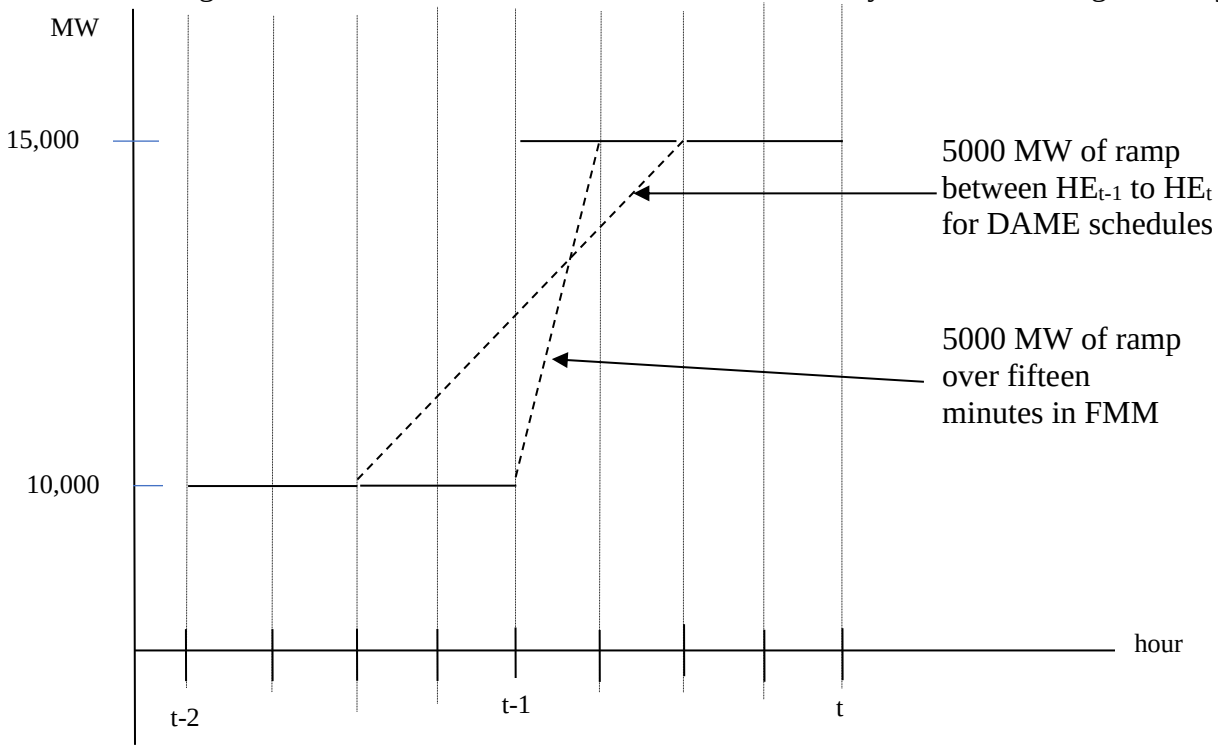
> Ahead Energy schedule to the demand forecast in the Fifteen-Minute Market (FMM). The granularity difference materializes because the DAME clears in hourly intervals producing hourly Day-Ahead Energy schedules whereas the FMM clears in 15min intervals producing 15-minute FMM Energy schedules. The uncertainty is due to the net demand forecast error that may materialize in the FMM." (page 1)

Similarly, the technical document describing the combined IFM-RUC that will be used in Option 2, states that:

> "…the FRU/FRD is reserved capacity above/below the Reliability Energy schedule that must be available for dispatch in the Real-Time Market (RTM) to meet granularity differences and upward/downward uncertainty from the Reliability Energy schedule to the demand forecast in the Fifteen-Minute Market (FMM). The granularity difference materializes because the DAM clears in hourly intervals producing hourly Reliability Energy schedules whereas the FMM clears in 15-minute intervals producing 15-minute FMM Energy schedules. The uncertainty is due to the net demand forecast error between the DAM and the FMM." (page 1)

The granularity difference is due to the average ramp capability required to move from the DAM energy schedules or reliability energy schedules across an hour may differ from the intra-hour ramp that would be needed to move from energy schedules across a 15-minute interval in FMM. This granularity difference can arise even if the change in (reliability) energy schedules in DAM exactly match the forecast change in energy requirements in FMM across an hour. The uncertainty is due to changes in net demand forecast used in the DAM and that used in the FMM.

Consider Option 1 and the following illustration. Similar effects exist for Option 2. In this illustration, there is no change in net demand between DAM and FMM. The only difference is in granularity.



Suppose that the CAISO data indicates that the change in demand over the hour in FMM will exactly match the change in demand in DAM over the hour. That is, there will be no uncertainty in demand between DAME and FMM over the hour. However, all of the change is expected to occur in the first 15-minute interval in HEt in FMM.

Suppose that the ISO sets FRURt to cover the ramp it would need in a 15-minute interval. In the above example, it would require that the market procure sufficient ramp up capability to meet the 15-minute ramp up of 5000 MW in the first fifteen-minute interval with no 15-minute ramp needed for the second, third, and fourth intervals in HEt.

Consider the constraints on ramp up for Option 1 in this example.

$$\sum_i FRU_{i,t} \geq FRUR_t = 5000\ MW$$

$$FRU_{i,t} \leq RRU_t\left(EN_{i,t-1}, T_{15}\right)$$

$$EN_{i,t} - EN_{i,t-1} + FRU_{i,t} \leq RRU_i\left(EN_{i,t-1}, T_{60}\right)$$

In the example, these constraints require that CAISO procure:

Sufficient ramp to move 5000 MW in 15 minutes, and ramp sufficient to move:

$$\sum_i \left(EN_{i,t} - EN_{i,t-1} + FRU_{i,t}\right) \geq 5000MW + 5000MW = 10000MW$$

over the hour.

That would be 5,000 MW of ramp capability over the hour for the change in schedules in the DAM to meet the change in demand from HEt-1 to HEt plus an additional 5,000 MW of ramp capability in HEt to cover the ramp caused by the 15-minute granularity difference in the first interval. Thus, the model would require 10,000 MW of ramp over the hour which is twice the ramp capability over the hour that is actually needed.

CAISO should consider reformulating the ramp constraints to avoid this issue.