Comments of Pacific Gas and Electric Company

On Flexible Ramping Product Workshop

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I. Introduction

Pacific Gas & Electric ("PG&E") appreciates the opportunity to participate in the stakeholder process for the California Independent System Operator's ("CAISO") Flexible Ramping Product ("FRP") Initiative and to submit comments regarding the October 2nd Workshop.

Although PG&E has supported the development of the FRP, we do not support including the integration of the Integrated Forward Market (IFM) and Residual Unit Commitment (RUC) processes in the proposal to be presented to the CAISO Board in December. It is premature to consider such a fundamental market change which will require considerable investment in time and money from the stakeholders and the CAISO. This is especially the case when such a market change is unnecessary to the successful implementation of the FRP. PG&E is seeking three things before it can support the CAISO submitting the IFM/RUC integration proposal to the CAISO Board.

- **Resolve the Open Design Questions**
  As discussed further in comments below, there are fundamental open questions regarding the integration of the IFM and RUC that warrant further discussion. These issues deserve a separate stakeholder initiative that would be dedicated to assessing the ramifications of this market change.

- **Complete an Analysis Demonstrating Significant Efficiency Improvements**
  Once there is a clear understanding of the mechanics of the IFM/RUC integration, the CAISO needs to perform analysis showing that the integration will result in more efficient outcomes as compared to sequential IFM/RUC market option.

- **Complete Cost-Benefit Analysis for the Initiative**
  PG&E recommends the CAISO include this initiative among the other discretionary initiatives in the CAISO's Catalog and prioritization process which it is currently conducting. By doing so, stakeholders with have a clearer sense of the opportunity cost of doing this work versus another initiative. As part of that catalog process, the CAISO

should include a high-level cost-benefit analysis using the benefit information from item two above.

II. PG&E Comments on Workshop

Discussed below are fundamental open questions about the proposed IFM and RUC integration.

1. Integration of IFM and RUC

The mathematical model that CAISO presented to integrate the IFM and RUC in the Integrated Day-Ahead Market ("iDAM") process is clear and well presented. It provides much of the detail that participants would need to evaluate the proposal. However, more details regarding its interaction with Real-Time processes and settlements are needed to evaluate the potential benefits of the approach. Much of the needed detail involves how the combined market processes will handle uncertainty in the demand forecasts used in the reliability constraint.

CAISO claims that the current sequential IFM and RUC will produce a unit commitment solution that is suboptimal when compared with the solution that will be produced by the proposed iDAM process that integrates IFM and RUC[1]. If there were no uncertainty in the CAISO forecast of demand used to ensure sufficient resources are committed to meet reliability requirements, this claim would clearly be true. However, uncertainty in this demand forecast does exist. Additional detail is required to clarify how CAISO plans to deal with the effects of uncertainty in the demand forecast that is to be met in the reliability power balance constraint. Such detail will help evaluate whether uncertainty can cause iDAM to produce a less optimal commitment or produce more uplift to the market than would be produced by a sequential treatment of IFM and RUC in some cases.

In today's sequential IFM/RUC processes, the IFM commitment is based on participants' bids and offers without considering the CAISO's demand forecast. The participants take the risks that they may have to buy more energy or sell back energy if their forecasts of requirements and resource availability change. In RUC, CAISO determines whether it should commit additional resources to be able to meet its demand forecasts given the solution provided by IFM. The RUC commitment is driven by CAISO's forecast of demand which is subject to uncertainty. To deal with this uncertainty, CAISO will send start notices once RUC is run to resources committed by RUC whose start-up times require them to begin the start-up process to be on-line when needed. Start-up notices to other resources that can delay starting to be on-line when RUC projects that they will be needed such as fast start resources may be sent later after further evaluation. CAISO may start such resources after subsequent processes such as RTUC run and determine whether or not those resources will be needed based on revised and more accurate forecasts of demand. The ability to manage uncertainty

[1] The current Day-Ahead Market structure results in a suboptimal (higher cost) unit commitment solution in the Day-Ahead Market because it is achieved in two stages with different objectives at each stage and because the commitment of the first stage (IFM) is locked in the second stage (RUC). For example, a unit that is committed in IFM may have insufficient capacity to meet the demand forecast leading to additional resource commitment in RUC, which could render the IFM commitment unnecessary. By contrast, the iDAM will commit resources more efficiently in a single process by satisfying both IFM and RUC objectives simultaneously.

even to a limited degree can lead to a more efficient commitment than one produced by a process that does not treat uncertainty.

Once IFM and RUC are integrated in iDAM, all resources that are committed in iDAM will receive financially binding energy and AS schedules. This raises question as to how CAISO plans to manage uncertainty and the costs of such management.

Will CAISO be able to decide not to start resources that were committed in iDAM based on revised forecasts?

CAISO will run processes such as RTUC to adjust commitments based on revised forecasts. Will CAISO be able to avoid starting a resource that was committed in iDAM if CAISO finds that it is no longer needed on the basis of refined forecasts used in later processes? If CAISO can decommit a resource that was not yet started in later processes using revised forecasts, CAISO will have an ability to manage uncertainty similar to its ability in the sequential IFM/RUC DA Market process. Without such ability to deal effectively with the effect of uncertainty on commitment decisions, iDAM could lock in a Day-Ahead commitment based on a forecast that is subject to uncertainty. If the iDAM commitment is locked in, this could conceivably produce a less efficient commitment at the end of the day than that produced by the sequential IFM/RUC which would allow delaying some start-up decisions (*e.g.* starting fast start resources) until better forecasts are available. Additional clarity will help participants evaluate this part of the proposal.

If CAISO decides not to a start a resource committed in iDAM based on revised forecasts, how will risks associated with its financially binding schedule be treated?

Assume that CAISO plans to decommit resources if later processes and forecasts show that the resource is not needed or efficient. Suppose that CAISO decides to decommit a resource committed in iDAM before it actually starts. Additional detail regarding the following issues would help in evaluating the proposal by providing clarity:

- The resource will buy back its iDAM energy, AS, and FRP schedules at the prices in the RT Market. If RT prices would cause the resource to incur losses when it buys back its iDAM schedule, would CAISO provide make whole payments to cover such losses? If CAISO provides such payments, how will this affect the uplifts charged to cover these payments?

- Suppose CAISO will not provide make whole payments to cover potential losses a resource may incur in buying back iDAM schedules if CAISO later decides not to commit the resource. This will increase risks that participants face. If participants respond by adjusting their DA offers to incorporate the cost of bearing such risks, how will this potentially affect the efficiency of the iDAM commitment and schedule?

- Suppose that a resource received Bid Cost Recovery payments in iDAM to cover start-up and minimum load costs that were not covered by iDAM market prices. If CAISO decides later not to start the resource, will CAISO charge back the BCR payments that covered the costs of actions that were scheduled in iDAM but which

CAISO cancelled before the actions were taken? If it does not recover such BCR payments, would sequential IFM/RUC have produced a less costly outcome by avoiding making such BCR payments and associated uplift charges?

While CAISO may have decided how it will address these issues, it is not clear in the proposal. Further detail regarding how CAISO will actually commit and manage resources under iDAM, as well as, treatment of cost recovery and risk management would aid participants in evaluating the iDAM proposal.

Depending upon how CAISO proposes to handle such issues, there may be instances in which efficiency or market uplifts may be lower under a sequential IFM/RUC DA Market than under iDAM.

2. Effect on Solution Time

By integrating IFM and RUC in iDAM, CAISO is effectively doubling the size of the mixed integer programming problem it is solving to commit and schedule resources in the Day-Ahead Market. CAISO should provide some information regarding expected impact on solution time since doubling the problem size could potentially more than double the expected solution time. Will CAISO be able to accommodate the potential increase in solution time in the DA Market clearing process?

CAISO should provide its thoughts on managing solution time needed to clear the DA Market in case the solution time for iDAM is unacceptable. Several approaches are possible. These include:

- Loosen solution tolerances so that the algorithm can stop further from an optimal solution than with today's IFM or RUC processes. How would this affect the economic efficiency?

- CAISO could adjust the time when it starts running the Day-Ahead Market or when the solution will be provided to participants. How would this affect market participants and the operation of the CAISO DA Market?

Such information will help participants evaluate the practicality of the proposal.