

**California Independent System Operator's**  
**Renewable Integration Market and Product Review Phase II**  
**Day-of Market Design Framework**

**Comments of Jack Ellis**

Disclaimer

I am submitting these comments on the CAISO's Renewable Integration Market and Product Review Phase II discussion paper on my own initiative. They represent my views and do not represent the views of Resero Consulting, its clients or any other stakeholder interest.

Comments

This framework proposal is unlikely to address several important state policy objectives. Most notably, it doesn't provide the intra-day and intra-hour price discovery that flexible demand<sup>1</sup>, distributed generation and electric vehicles (EVs) require in order to meaningfully participate in the CAISO's energy and ancillary services markets. The same lack of price discovery will impede efficient use of both small- and large-scale storage, and it might limit the ability of conventional hydroelectric plants to provide flexibility the CAISO has repeatedly said it will need to manage increasing amounts of variable energy resources (VERs). Fossil-fired plants would also benefit, though since electricity markets have typically been designed with fossil-fired generation in mind, the gains in market efficiency might not be as large.

The way to provide intra-day and intra-hour price discovery is to ensure that a number of forward trading intervals are open concurrently and to allow market participants - and where necessary the CAISO - to buy and sell. Hydro plants, storage devices, EVs and flexible demand typically do not have the relatively static cost curves that characterize fossil-fired plants, and inter-temporal constraints are a critical part of their decision process. If they have to blindly bid day-ahead and then make corrections one hour at a time in whatever intra-day market emerges from this process, they will almost certainly not participate, whether directly, through aggregators or through their utility or ESP.

A presentation by PJM at the recent FERC Technical Conference on Increasing Market and Planning Efficiency through Improved Software<sup>2</sup> notes that PJM determines the day-ahead pumping and generating schedules for the pumped storage plants in its footprint at the cost of a 5-10x increase in solution time. Knowledge of and an ability to frequently trade on forward prices would greatly simplify this problem for storage, and it would also greatly simplify the operation of combined cycle plants, which do not have the mathematically well-behaved cost curves of older fossil-fired units.

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<sup>1</sup> Demand that can adjust in both the upward and downward directions.

<sup>2</sup> AD10-12.

I recommend the CAISO and stakeholders reconsider this proposal and instead think about a new design with the following high-level attributes:

- Multiple time frames open for trading concurrently, but not so they overlap. For example, there might be 24 hourly intervals, up to six fifteen-minute intervals and 3-6 five-minute intervals open at any one time, with the nearest hourly interval closing one hour prior to real-time and the six fifteen-minute intervals opening one hour before real-time. There is no reason market intervals could not be as short as one minute. The CAISO's framework proposal includes this idea, but only for within-hour intervals, for only one interval at a time, and with no opportunity for parties other than the CAISO to trade.
- Each market interval should be cleared frequently, but periodically. Clearing might take place every five minutes for the hourly intervals, and more frequently for the shorter intervals. Most of the trading, if not all of it, would be automated.
- To make the clearing process computationally efficient, bids and offers should be price/quantity pairs. This would also move the market toward prices that reflect all costs and it would minimize the need for bid cost recovery and other forms of cost uplifts and it would greatly simplify settlements.

The biggest drawbacks of the CAISO's current market design are that it discourages broad participation by its complexity, and it is narrowly focused on preventing abuse through strict behavioral rules rather than by encouraging competition. It is designed for the industry as it existed 15 years ago rather than for the industry as it will exist in 2020. I realize the CAISO feels it is under time pressure to complete the policy phase and move on to detailed design, but I am also certain that trying to move forward quickly with this proposal will consume more time in the long-run than investing time in a better design now.

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