Comments on Demand and Distributed Energy Market Integration Working Group Discussion Paper

Department of Market Monitoring

July 11, 2025

Summary

The Department of Market Monitoring (DMM) appreciates the opportunity to comment on the *Demand and Distributed Energy Market Integration Working Group Discussion Paper* and presentation dated June 13 and 17, 2025, respectively.[1, 2] In these comments, DMM adds to our previous comments from the ISO's Demand and Distributed Energy Market Integration (DDEMI) Working Group Meeting on April 7, 2025.[3]

DMM appreciates the work that is going into the DDEMI effort. However, the ISO has not presented information on the costs and benefits of these enhancements. DMM recommends that an assessment of the effort required for these market improvements should be included in this stakeholder process. Without any such assessment, it appears to DMM these enhancements should have a lower priority than other policy efforts currently underway, such as EDAM congestion rent allocation refinements, congestion revenue rights reforms, storage default energy bids, and uncertainty products.

DMM offers comments on the following four topics:

- **The ISO should work toward a long-term goal of modeling demand response resources as participating load.** DMM recommends the ISO incrementally work to move demand response from a supply-side resource to a demand-side resource. Further, DMM recommends in this stakeholder process the ISO consider the interactions of this change to long-term planning for resource adequacy obligations, and methods to value the resource adequacy of demand-side resources if they are treated as load.
- **Real-time load bidding.** DMM supports enhancements to real-time load bidding functionality for load resources that are able to respond to real-time economic signals. DMM recommends the ISO consider the interaction between demand response participating through real-time load bidding and the resource adequacy capacity accreditation of these resources.
- **Western Energy Imbalance Markets (WEIM) demand response models.** DMM supports expanding the demand response models available to WEIM entities. Real-time load bidding and resource

[1] *Demand and Distributed Energy Market Integration Working Group Discussion Paper*, California ISO, June 13, 2025: https://stakeholdercenter.caiso.com/InitiativeDocuments/DiscussionPaper-DemandandDistributedEnergyMarket-June13-2025.pdf

[2] *Demand and Distributed Energy Market Integration Working Group*, California ISO, June 17, 2025: https://stakeholdercenter.caiso.com/InitiativeDocuments/Presentation-Demand-Distributed-Energy-Market-Intgeration-Jun17-2025.pdf

[3] *Comments on Demand and Distributed Energy Market Integration*, Department of Market Monitoring, May 1, 2025: https://www.caiso.com/documents/dmm-comments-on-demand-and-distributed-energy-market-integration-apr-07-2025-working-group-may-01-2025.pdf

participation are preferred models. However, DMM cautions any model must not allow for double counting of the resource capacity in the resource sufficiency evaluation test.

- **Participation model for electrolyzer resources.** DMM supports the ISO's development of a hydrogen electrolyzer resource model that is similar to the storage model, to the extent there are resources that will be imminently participating in the market and require such a model to do so. In developing this model, DMM asks the ISO to carefully consider characteristics unique to electrolyzers that may differ from storage, such as state-of-charge and ancillary service requirements.

Comments

Demand response should be modeled as participating load whenever technologically feasible

DMM believes demand response (DR) should be modeled as participating load rather than as a supply-side resource whenever technologically feasible. Modeling demand response as a real-time demand-side resource instead of a supply-side resource will improve market efficiency by increasing the slope of the demand curve of the market. This will in turn improve reliability and reduce overall system costs by not scheduling uneconomical loads.

DMM recommends an incremental transition to modeling DR as a demand-side resource. Modeling more demand response as participating load is a long-term goal, however, there are considerations to be made in the interim. A near term enhancement could allow real-time participation under the existing participating load model, with future enhancements for other DR participation models as learnings and technological improvements further facilitate the ability to treat a wider range of DR as a real-time demand-side resource.

Modeling DR as participating as load will require additional attention to the interaction with the current capacity planning paradigm. Currently, capacity obligations are determined ahead of time, and with no consideration of market conditions. Adding additional price responsive demand will both modify the long-term forecasted loads used for planning, and the potential capacity (qualifying capacity) of the participating resources. DMM recommends in this stakeholder process the ISO consider the interactions and overlapping policy structures of participating loads, long-term load forecasting for resource adequacy (RA), and the qualifying capacity of resources in the RA process.

Furthermore, in the incremental development of a demand-side DR model, the potential DR model developments discussed in this stakeholder process for WEIM balancing authorities (BAs) could work as pilot programs of this functionality.[4] These improvements are discussed below.

DMM supports enhancements to real-time load bidding functionality

DMM continues to support real-time load bidding functionality for load resources that are able to respond to real-time economic signals.[5] Currently, load can bid economically in the day-ahead market,

[4] Western Energy Imbalance Market (WEIM) balancing authorities (BAs) include BAs that are in the Western Energy Imbalance Market (WEIM) and the forthcoming Extended Day-Ahead Market (EDAM)

[5] *Comments on Demand and Distributed Energy Market Integration*, Department of Market Monitoring, February 21, 2025: https://www.caiso.com/documents/dmm-comments-on-demand-and-distributed-energy-market-integration-feb-05-2025-working-group-feb-21-2025.pdf

but all load is served in real-time without regard to price. This is true even for participating load resources that may be willing and able to respond to real-time economic signals to increase or decrease consumption. This is also true for WEIM balancing authorities, which are discussed below. DMM supports real-time bidding functionality, initially for participating load resources, to provide for greater system flexibility and additional slope to the demand curve. This model could then be incrementally extended to additional DR models beyond the participating load model.

The ability to schedule loads in real-time would allow for uneconomical load to not be scheduled or served in real-time, allowing for existing on-line capacity to meet the needs of the system without additional supply. The additional supply could then contribute to reserves for tight conditions, and as a result lower real-time system costs because the market would not be dispatching the next marginal unit.

Western Energy Imbalance Markets

DMM further recommends the ISO extend real-time load bidding functionality to WEIM entities. WEIM considerations are more generally discussed below. At present, WEIM entities have no ability to bid load in real-time, and generation is matched to load forecasts. To facilitate DR participation in the BAs of WEIM entities, real-time load bidding would allow for the BAs to economically schedule loads that could adjust to price signals. The WEIM entity could self-schedule loads that are inflexible, and bid their flexible loads to facilitate prices responsive to DR in their BA. This would be beneficial to the WEIM entities because the price responsiveness would reduce system costs and increase reliability for the WEIM BAs.

Resource adequacy

DMM recommends clarification of the interaction between modeling DR as real-time participating load and resource adequacy accreditation. A participating load resource that has similar bidding requirements to demand response and has verifiable load reductions, should also receive resource adequacy credit (qualifying capacity). DMM understands RA accreditation is within the scope of the local regulatory authority (LRA), but DMM recommends the ISO work with the LRAs to monitor and verify appropriate RA accreditation.

The ISO should expand demand response participation models for use in the Western Energy Imbalance Market

DMM recommends the ISO expand demand response participation models to allow greater DR functionality for the WEIM entities. This extension of DR models could include the ability of WEIM entities to register DR resources, and/or adjust base schedules to reflect DR programs. DMM recommends DR participation models developed for WEIM entities allow the WEIM entities to bid DR programs as participating load in the real-time.

In the WEIM today, DR can participate on the supply-side using the dispatchable demand response (DDR) model, or as a load modifier that is submitted to the ISO daily. The DDR model offers one pathway to economic real-time participation of DR loads, but DR as a load modifier neither allows the resource to respond to price signals, nor provides robust availability or performance metrics for monitoring and verification of the resource.

WEIM entities have expressed interest in a verifiable method to allow for DR participation in their BAs, but prefer to use their own Performance Evaluation Methodologies (PEMs) instead of established CAISO

PEMs. The ISO has indicated consideration of a model for WEIM entities that does not use the current CAISO PEMs. DMM requests the ISO further discuss this model for WEIM DR participation without CAISO PEMs, as the use of less-transparent PEMs could lead to insufficient resource performance to meet demand for the WEIM BA.

To ensure WEIM DR participation does not lead to leaning if there is a lack of generation within the WEIM BA, DMM recommends the ISO consider the interaction of DR participation and the resource sufficiency evaluation (RSE) test. Overall, DMM supports expansion of WEIM DR participation models. However, DMM recommends such models be developed in a manner that ensures DR capacity is not double counted in the RSE test. The concern of double counting is that a registered DR resource may be shown as a resource, as well as an adjustment to base schedules, effectively double counting the load reduction of the DR program. The double counting may foreseeably result in a lack of capacity at the BA level, but not be reflected in the RSE.

Demand response as load in the WEIM

As discussed above, DMM recommends as a long-term goal modeling DR as participating real-time load instead of a supply-side resource. If the ISO were to extend real-time load bidding functionality, and the ability to adjust base schedules to reflect DR programs, the ISO would effectively be treating DR as participating load. DMM recommends this initial step as a viable solution to extending DR participation models to the WEIM, to the extent technologically feasible by WEIM DR resources.

DMM supports development of a participation model for hydrogen electrolyzers if needed that is similar to the storage resource model, but considers technology specific attributes

A hydrogen electrolyzer is a technology that can produce or consume electricity through the joining or splitting of water molecules into their component parts (hydrogen and oxygen). Since the resource can both produce and consume electricity, the electrolyzer is similar to a storage resource. However, electrolyzer technology is not limited to production and consumption of hydrogen, but can be used more generally to create hydrogen that is later used as a fuel source in other technologies, such as combustion to create electricity, or within the transportation industry. To cover both of these cases, DMM supports the ISO plan to develop a general electrolyzer model that is similar to the storage resource model, though with additional considerations specific to this technology. Because development of this new model may take extensive effort by the ISO, DMM supports the development of this new model only to the extent there are resources that will be imminently participating in the market and require such a model to do so.

While developing the electrolyzer model that is similar to the storage model is logical, fundamental differences should be addressed. An electrolyzer does not have the same concept of a state-of-charge or cycling. This is especially important if the electrolyzer is only producing hydrogen, but then not consuming the stored hydrogen, analogous to a storage resource.

Furthermore, if the electrolyzer is to provide ancillary services, especially regulation, the resource may have differing ancillary service constraints. DMM recommends the ISO work with stakeholders to closely develop a general model for electrolyzers that is similar to the storage model, but considers the unique characteristics of the technology that differ from the storage model.