

**Comments of Powerex Corp. on
Extended Day-Ahead Market Workshop**

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to submit comments on the Extended Day-Ahead Market Workshop held February 11-12, 2020 (“EDAM Workshop”).

Powerex is fully committed to working with entities throughout the west to develop and implement a well-designed hourly day-ahead organized market. The implementation of such a market has the potential to generate widespread economic and environmental benefits, as it would:

- 1) Benefit those entities (and regions) experiencing renewable integration challenges by enabling them to more efficiently balance their systems and realize the cost savings associated with the diversity of generation and load within an expanded regional market; and
- 2) Benefit those entities (and regions) that are net sellers of energy, capacity, flexibility, and/or environmental attributes - such as the hydroelectric systems of the Pacific Northwest - by enabling them to make sales during the hours of the day when their output has the greatest value, make purchases during relatively low priced hours, as well as to more efficiently balance their systems.

At the same time, a well-designed hourly day-ahead organized market would respect states’ and other jurisdictions’ autonomy over energy and environmental policy, as well as resource planning and development, while supporting each jurisdiction’s objectives in these areas.

Powerex believes that this initiative – the development of an EDAM operated by CAISO – represents the most compelling opportunity available to pursue the implementation of an hourly day-ahead organized market. Powerex is particularly encouraged by the extensive collaboration that has taken place among the current and prospective EIM Entities, as well as with CAISO management, in connection with efforts to explore the feasibility of an EDAM. The results of this collaboration were on display at the recent two-day EDAM workshop on EDAM Resource Sufficiency and EDAM Transmission, where CAISO afforded the EIM Entities an extensive opportunity to provide their perspective and take questions. The EIM Entities’ presentations, as well as the robust follow-up discussions, successfully provided CAISO and stakeholders with a solid foundation for continued discussions on the EDAM Resource Sufficiency and EDAM Transmission topics in the weeks ahead.

Perhaps what was most impressive at this two-day EDAM workshop was the tremendous alignment among current and prospective EIM Entities on the conceptual design of an EDAM. This alignment appears to extend across a very diverse group of entities: from investor-owned utilities operating in the northwest and southwest, to community-owned California utilities, to northwest public hydro utilities, to a federal power marketing agency, and to Powerex. Each of

these entities faces different circumstances, priorities, and interests, making the extensive alignment both notable and promising. It is Powerex's view that this alignment has been achieved through each entity coming to the EDAM market design table with a commitment to the design and implementation of a reliable, efficient, and fair voluntary day-ahead organized market.

The successful design and implementation of an EDAM will require a similar commitment from both generation and load-serving entities in the CAISO balancing authority area ("BAA"). ***This reflects that achieving broad regional support for an EDAM will require the resolution of a range of complex and critical market design issues that - if not done in a manner that reflects sound market design and industry best practices - has the potential to result in massive shifts in value from ratepayers in one region to another.***

In considering what it means for an EDAM to be fair to all entities and regions, it is useful to consider the following key questions:

- 1) **Will an EDAM be designed and operated in a manner that ensures that all participating entities, including the CAISO BAA, are truly required to be resource sufficient prior to EDAM operations?** This is essential to ensuring that all load-serving entities, including those in the CAISO BAA, build and/or forward contract for sufficient capacity, energy and flexibility and do not lean on other entities or regions through the EDAM.
- 2) **Will an EDAM ensure an equitable and durable allocation of transmission value (i.e., congestion rents), particularly on the highly utilized and frequently congested Pacific AC and Pacific DC interties that connect the northwest region with California?** This is essential to ensuring that the entities that fund these jointly-owned transmission facilities – both in the northwest region and in California - receive a fair share of the economic value of such facilities.
- 3) **Will an EDAM calculate prices for EDAM energy products accurately and consistent with industry best practices, or will EDAM prices be skewed to the benefit of either net selling and/or net purchasing entities and regions?** This is essential to ensuring that differently situated entities and regions, which may be buyers or sellers during differing hours of each day and throughout the year, pay and receive fair prices in the EDAM.
- 4) **Will an EDAM implement applicable state greenhouse gas ("GHG") pricing programs in a manner that correctly calculates prices and accurately attributes environmental benefits to entities providing clean supply?** This is essential to ensuring entities receive fair compensation for their environmental attributes; to ensuring EDAM energy prices appropriately reflect GHG prices as applicable; and to ensuring individual state GHG pricing programs are respected.

The EDAM feasibility assessment estimated aggregate annual benefits ranging from \$119 million to \$227 million.¹ In theory, each entity and each region should be able to enjoy their fair share of

¹ Extended Day-Ahead Market: Feasibility Assessment Update from EIM Entities (Oct. 3, 2019), available at: <http://www.caiso.com/InitiativeDocuments/Presentation-ExtendedDay-AheadMarketFeasibilityAssessmentUpdate-EIMEntities-Oct3-2019.pdf>.

those benefits through the careful design of an EDAM, with such benefits growing over time. However, the potential for an unfair shift in value between entities and regions from inappropriate EDAM market design choices - in any one of the four areas set out above – could easily amount to several hundreds of millions of dollars per year, dwarfing potential EDAM benefits.

Powerex highlights these potential shifts in value at this critical juncture, as CAISO and stakeholders have now begun exploring key EDAM design elements. For example, from the recent EDAM workshops, it was clear that the current and prospective EIM Entities all support a robust EDAM Resource Sufficiency framework that prevents capacity, energy and flexibility leaning (Question 1 above) and also support an equitable and durable allocation of transmission value, including congestion rents (Question 2 above). Question 3 and Question 4 will be similarly explored at upcoming workshops.

What is not yet clear, however, is whether key stakeholders in the CAISO BAA share the aligned perspective of the current and prospective EIM Entities. This is a critical question that needs to be answered in the weeks ahead.

Powerex looks forward to further discussion on these important topics as the EDAM stakeholder initiative progresses.

Finally, Powerex believes it is also important to highlight at this time that arguably the single most important market design issue facing an EDAM is the set of market design improvements being discussed separately from the EDAM stakeholder process, in the CAISO’s Day-Ahead Market Enhancements (“DAME”) initiative. As further explained in the attached Appendix, these enhancements are essential to ensuring that the core design of the CAISO’s day-ahead market engine is redesigned to ensure the procurement of sufficient physical resources to reliably meet demand and balance the grid.² In contrast, an EDAM pursued without the successful implementation of the CAISO’s DAME proposal may simply represent an expansion of the CAISO’s existing financial day-ahead market—a market in which extensive physical supply is procured through inefficient, non-transparent, and highly distortionary out-of-market interventions. At this critical juncture, and in the context of a rapidly tightening western grid, many entities may find the proposition of a financial EDAM unpalatable.

The DAME initiative is a very complex topic that requires sufficient time for discussion and debate to ensure all stakeholders can develop a comprehensive understanding of the CAISO’s core design objectives and the numerous associated benefits. CAISO and stakeholders will also benefit from sufficient time to explore one or more specific design formulations capable of achieving these objectives. Powerex thus urges CAISO and stakeholders to afford sufficient time and resources to this crucial initiative.

² The need for the proposed DAM enhancements, and its critical link to EDAM, was explained by Mark Rothleder during his opening remarks at the February 11 EDAM workshop. (See <https://youtu.be/mHGUXj5Tbkw> beginning at 5:10) In particular, Mr. Rothleder highlighted the CAISO’s goals of: (1) aligning the day-ahead solution with the changing operational realities of the system; (2) ensuring prices reflect the value of both energy and other products necessary to operate the grid in real time; and (3) providing a good foundation for extending the EIM into the day-ahead market.

APPENDIX

Day-Ahead Market Enhancements Are Critically Necessary to Ensure the EDAM is a Physical Market

The CAISO's DAME proposal is a significant departure from the existing day-ahead market ("DAM") design that currently applies to the CAISO BAA. Powerex understands the CAISO's proposal is intended to achieve two key objectives:

1. Address the ongoing operational challenges facing CAISO BAA operators as a result of insufficient capacity and flexibility being committed on a day-ahead basis through the existing CAISO DAM.
2. Transition the CAISO DAM from a purely financial day-ahead market to a physical day-ahead market (with a modified, more efficient, role for virtual bidding) in preparation for the development of a physical EDAM.

The first of these two objectives is entirely an issue within the CAISO BAA. The large and ongoing installation of variable energy resources ("VERs") together with the ongoing retirement of thermal resources in the CAISO BAA has exposed a significant gap in the current design of the CAISO DAM. Specifically, CAISO has identified that its existing DAM chronically fails to commit sufficient physical capacity and sufficient physical flexibility to enable operators in the CAISO BAA to confidently serve load and balance the CAISO BAA in real-time. ***This results in the CAISO BAA routinely relying on post-DAM out-of-market actions to secure hundreds, and often thousands, of MWs of additional physical capacity and flexibility to maintain reliability.***

The specific market design gaps in the current CAISO DAM include:

1. No mechanism (*i.e.* model constraint) to ensure that sufficient physical capacity and sufficient upward and downward physical flexibility is committed to meet potential variations and uncertainty in demand and VER output (*i.e.* net load); this directly results in CAISO operators often scrambling to maintain reliability through large, inefficient, and highly distortionary, post-DAM, out-of-market actions and processes;
2. No differentiation between physical supply and virtual supply in the dispatch (*i.e.* resource selection) process; this results in virtual supply and virtual demand significantly affecting the level of day-ahead physical unit commitments in the CAISO BAA in the DAM (indirectly influencing the need for operator out-of-market actions and processes); and
3. Failure to recognize the capacity benefits provided by physical firm energy in the price formation process, resulting in incorrect prices being paid to physical and virtual supply (*i.e.*, they are inefficiently compensated at the same price).

The CAISO DAME proposal—whose key design principles Powerex strongly supports—seeks to address these market design shortcomings with two critical improvements.

First, the CAISO proposes to create a new upward and downward day-ahead imbalance reserve product in order to set aside flexible capacity for the large and growing uncertainty between the CAISO's day-ahead net load forecast and actual real-time grid conditions, as well as to ensure sufficient flexible resources are also available to meet large and growing real-time variations in net load.

Second, the CAISO proposes to, in effect, add a physical capacity constraint that would ensure that sufficient total capacity (dispatched firm physical supply, forecasted VER supply, as well as hourly and fifteen minute flexible reserves) is committed on a day-ahead basis to meet the CAISO operator's demand forecast with a high degree of confidence.

Since these critical enhancements are needed to resolve the significant challenges faced by market operators in balancing the CAISO BAA, they are being debated in a stakeholder process specific to the CAISO DAM and separate from the EDAM initiative. It would be a mistake, however, for EDAM stakeholders to fail to recognize the importance of the DAME initiative to a future EDAM. Simply put: ***the DAME initiative will determine whether CAISO will be able to extend its revised physical DAM into a physical EDAM that can reliably and efficiently commit sufficient physical resources across the West.***

This is critically important, as a key potential benefit of an EDAM is the ability for entities outside of the CAISO BAA to confidently "de-commit" units that would otherwise be committed without EDAM participation. EDAM participants would instead rely on more cost-effective physical supply from other BAAs participating in the EDAM (*i.e.* imports resulting from the EDAM unit commitment and day-ahead dispatch solution). CAISO has recognized that such de-commitment decisions will only be possible if all EDAM entities are confident that sufficient physical resources are actually committed in other EDAM BAAs, including in the CAISO BAA, to support the transfers scheduled by the EDAM solution.

There are two key requirements to achieving this:

1. The EDAM must have a robust and meaningful resource sufficiency test to ensure sufficient resources are brought to the EDAM each day, as separately discussed in Powerex's EDAM comments.
2. The EDAM optimization process must commit sufficient physical resources from this pool of available resources to meet load across the EDAM footprint with a high degree of confidence.

This second key requirement to unlocking EDAM benefits is precisely the goal being pursued by the CAISO's proposal in the DAME initiative. Consequently, failure to pursue the day-ahead market enhancements proposed by CAISO has the potential to materially undermine the EDAM initiative. Under the existing (financial) DAM design, unit commitment decisions in EDAM BAAs could often be determined by virtual bids in the CAISO BAA (submitted by financial participants speculating on energy prices), which would undermine EDAM benefits, as:

1. Many EDAM entities may continue to commit additional capacity and flexibility outside of the EDAM to protect reliability in their BAAs, rationally refusing to rely on EDAM imports that may not be backed by real physical supply in the CAISO BAA; and
2. Any EDAM entities that do rely on EDAM imports may find that this extends the existing reliability challenges facing the CAISO BAA to their BAAs.

Both of these potential consequences can be expected to weaken support for EDAM participation by entities outside the CAISO BAA.

The following table highlights key differences between a financial EDAM (based on CAISO's current DAM design) and a physical EDAM (based on CAISO's revised DAM design pursuant to CAISO's DAME straw proposal).

	Current (Financial) DAM	CAISO Proposed (Physical) DAM Enhancements
Primary Goal of Market Solution	<p>Bid-in demand + Virtual demand = Physical supply + Virtual supply</p> <p><i>Market solution <u>does not</u> ensure sufficient physical capacity or physical flexibility is awarded to meet reliability</i></p>	<p>Bid-in demand + Virtual demand = Physical supply + Virtual supply</p> <p>and</p> <p>Forecasted Capacity Needs = Total Physical Supply</p> <p>Forecasted Flexibility Needs = Flexibility Up and Down Awards</p> <p><i>Market solution <u>does</u> ensure sufficient physical capacity and sufficient physical flexibility is awarded to meet reliability</i></p>
Level Of Capacity Unit Commitment	<p>Determined by physical and virtual bids (<i>i.e.</i>, financial participation affects total level of unit commitment)</p>	<p>Determined by physical supply, capacity and flexibility constraints</p> <p>(<i>i.e.</i>, virtual bids / financial participation does not reduce total level of unit commitment)</p>
Ensuring Flexibility to Balance VER Output and Demand Variability	<p>No day-ahead flexible reserve product currently exists;</p> <p>CAISO operators forced to intervene in market to commit units (RUC adjustment, exceptional dispatch, load bias) all of which inefficiently depress market clearing prices while generally increasing production costs</p>	<p>Proposed new day-ahead Imbalance Reserve products (up and down);</p> <p>Co-optimized with procurement of energy to ensure efficient use of resources.</p> <p>Procured “within the market” to ensure accurate prices across all products.</p>
Dispatch Treatment Of Physical Supply vs Virtual Supply	<p>Physical supply and virtual supply incorrectly treated as identical in dispatch (<i>i.e.</i>, resource selection)</p> <p>Separate process, is used the after day-ahead market to commit additional physical resources to ensure reliability, but only these additional resources receive compensation</p>	<p>Recognizes that physical supply and virtual supply are not identical in ensuring reliability</p> <p>(<i>i.e.</i>, net virtual supply may require additional physical capacity commitment)</p> <p>Fully reflected in market-clearing prices and compensation</p>
Pricing Treatment Of Physical Supply vs Virtual Supply	<p>Physical supply and virtual supply incorrectly compensated at the same price</p>	<p>Physical supply and virtual supply correctly compensated at different prices to reflect capacity contribution of physical supply</p>

Role of Virtual Supply	<p>Able to respond to buyer market power (<i>i.e.</i>, under-scheduling);</p> <p>Can improve convergence with real-time market;</p> <p>Can inefficiently reduce commitment of physical resources, increasing need for inefficient, highly distortionary, out-of-market actions</p>	<p>Able to respond to buyer market power (<i>i.e.</i>, under-scheduling);</p> <p>Can improve convergence with real-time market;</p> <p>Does not alter unit commitment of physical resources (but can shift whether physical resources are committed for energy vs. capacity)</p>
Need for Out-of-Market Interventions	<p>Large and systemic interventions occur in many hours of nearly every day, as market optimization fails to fully meet physical needs of CAISO BAA.</p>	<p>Operators will continue to have ability to take any action needed to maintain reliability, but DAME should make the need for intervention rare, random, and relatively small in magnitude.</p>
Market Efficiency Impacts of Out-of-Market Interventions	<p>Intervening in market solution depresses real-time prices, generates systemic profits for virtual sellers, and leads to discriminatory compensation of physical suppliers</p>	<p>Diminished need for intervention should support more efficient prices, improved price convergence, and virtual trading profits only when they increase efficiency.</p>

CAISO's February 3, 2020 DAME straw proposal included a specific proposed mathematical formulation of the constraints to achieve the above conceptual design. Powerex believes that, in addition to the straw proposal formulation, other potential formulations may also be effective and should be discussed. Regardless of the particular manner in which the proposed enhancements are formally expressed in the optimization, Powerex strongly supports DAM enhancements that:

- Procure sufficient upward and downward flexibility to meet uncertainty and variability in net demand;
- Procure sufficient upward capacity from physical resources to ensure reliability;
- Do not enable virtual supply to reduce the total commitment of physical capacity and flexibility; and
- Properly distinguish between physical supply and virtual supply in both the selection (*i.e.*, dispatch) and compensation of these distinct types of supply.