Comments of Powerex Corp. on Price Performance Analysis

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to submit comments on CAISO's White Paper on Price Performance in the CAISO Energy Markets (the "CAISO White Paper"). In the CAISO White Paper, CAISO sets out a proposed framework for evaluating price formation practices in the CAISO day-ahead and real-time markets. CAISO explains that convergence in prices between the day-ahead and real-time markets traditionally has been viewed as indicative of robust price performance in organized markets. CAISO notes, however, that there have been increasingly concerns raised regarding the persistent lack of convergence between day-ahead and real-time prices, and the extent to which system conditions may not be accurately reflected in market prices. For that reason, CAISO states that it is proposing to evaluate the factors that may be contributing to price divergence, including operator interventions, out-of-market dispatch, and supply and demand deviations.

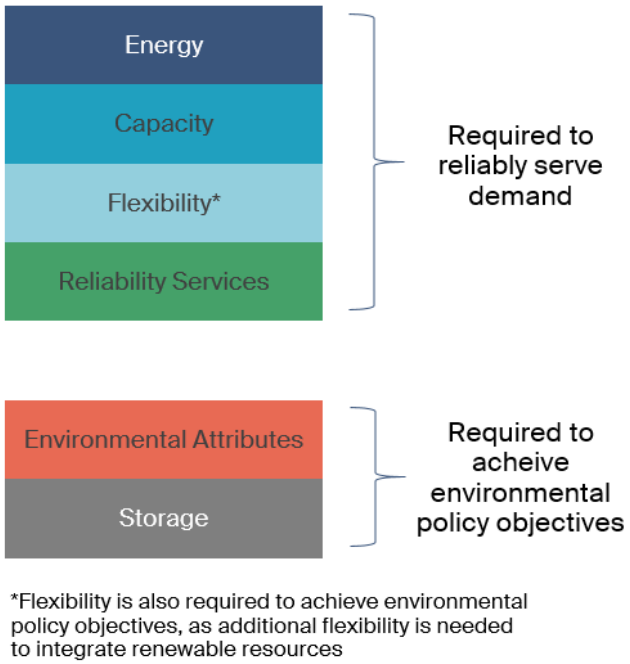
As a conceptual matter, Powerex supports CAISO's efforts to critically evaluate price formation in the CAISO markets and appreciates the effort that CAISO has spent in identifying the various factors that impact day-ahead and real-time prices. Powerex has long stressed the critical importance of sound price formation principles and practices in ensuring the ability of organized markets to send efficient price signals for the deployment and development of resources necessary to meet short-term and long-term reliability needs. As an active participant in the CAISO markets, Powerex has a significant interest in ensuring that price formation practices within the CAISO markets are transparent and result in prices that appropriately reflect the value of the specific products and services provided and relied upon to maintain reliability and achieve relevant policy objectives.

At the same time, Powerex believes that it is important that the price formation issues outlined in the CAISO White Paper not be viewed in isolation. As a practical matter, system marginal energy cost and locational marginal prices are very sensitive to market design choices. As a result, defective price formation practices often point to the need to address underlying market design issues that are distorting market dispatch and prices.

In this case, Powerex believes that the price formation issues set out in the CAISO White Paper reflect a broader misalignment between the existing design of the CAISO day-ahead and real-time markets and the evolving needs of the grid. In order to better understand the nature of this misalignment, it is useful to consider the different types of attributes that are required to meet the needs of the grid today. In particular, Powerex believes that there are six broad categories of

attributes that are necessary to reliably serve load with a high degree of confidence and meet relevant policy goals:

- **Energy**: the production of sufficient electricity to serve demand in a given period.
- **Capacity**: the characteristic associated with having sufficient physical resources available to reliably produce energy when needed.
- **Flexibility**: the characteristic associated with having sufficient dispatchable resources to meet forecast and uncertain changes in supply and load as they occur.
- **Storage**: the ability to store energy produced in one period for use in later periods.
- **Environmental Attributes**: the need for resources that align with policy goals set out in state or federal policies.
- **Reliability Services:** Other essential reliability services, such as system inertia and frequency response.



Historically, when the grid was characterized predominantly by conventional generation resources, these attributes were less important or did not need to be separately procured, for a number of reasons:

- First, it is only with the rise of Renewable Portfolio Standards and other similar requirements that the *environmental attributes* of generation resources have become an important consideration.

- Second, the emerging and growing need for energy *storage* is largely driven by the desire to store renewable resource output for later use.

- Third, before the growth of variable energy resources ("VERs") in response to environmental policy objectives, the need for flexible resources was much smaller as flexibility needs were limited to balancing changes in load.

- Fourth, while there always has been a need for resources that could provide sufficient capacity, flexibility to balance demand, frequency response, and other essential reliability services, until recently the vast majority of resources connected to the grid producing energy, inherently possessed the required attributes necessary to supply these services. As a result, there generally was no need to separately procure these attributes in order to maintain reliability. In many cases, if sufficient energy was procured to meet demand,

sufficient quantities of the other attributes necessary to maintain reliability were often also automatically acquired as "bundled" products and services given the resource technologies of the time.

For these reasons, organized markets traditionally have been focused primarily on the dispatch, pricing, and settlement of resources for energy, and have not been designed to procure the various attributes set out above.

The CAISO's markets are no exception. In particular, the existing CAISO markets are best characterized as an "energy only" market design that is inherently focused on the dispatch, pricing, and settlement of energy. Under this framework, offers to supply firm energy that are bundled with capacity and/or flexibility attributes are treated the same as virtual supply, speculative supply, non-firm supply and other supply products that lack bundled capacity attributes for the purposes of dispatch, pricing and settlement. In effect, the existing market design treats all supply offers as if they are interchangeable without regard to the different attributes associated with different supply offers.

Powerex believes that rapid and dramatic changes in the resource mix are posing new challenges to this paradigm and exposing the limitations of CAISO's "energy only" approach to market design. With the growth of renewable resources—which often have limited ability to control their output and/or supply certain essential reliability services—it can no longer be assumed that resources developed or procured to provide sufficient energy will possess each of the aforementioned attributes. At the same time, the growth in renewable resources and retirement of conventional generation resources has rapidly increased the need for resources capable of providing storage and flexibility that CAISO and other market operators can use to respond to changes in the output of VERs and balance their systems. Collectively, these factors have created a growing need to ensure that the resources committed through the day-ahead and real-time markets possess the attributes necessary to allow CAISO and other market operators to maintain reliability. Because the existing CAISO market and other organized markets do not differentiate between resources based on the attributes that they possess, however, there currently is no mechanism to do so.

Powerex believes that the price formation issues outlined in the CAISO White Paper can be traced back to this fundamental "energy only" market design issue. More specifically, the failure of the existing CAISO market design to procure the right combination of attributes necessary to maintain reliability increases the need to rely on out-of-market dispatch and operator interventions to meet system needs. For instance, it is well-known that CAISO has repeatedly had to rely on the procurement of backstop and/or residual capacity on an hourly and multi-hour basis after the day-ahead market to firm up day-ahead energy awards that cannot be counted upon to perform. It also is well-documented that CAISO operators will regularly rely on operator interventions, such as load biasing, to increase the quantity of resources committed in order to ensure that there is sufficient flexible capacity online to address system needs. Importantly, these commitments take place outside of the organized markets for energy, with the result that the costs of committed resources are compensated through side payments and are not reflected in market prices. At the same time, the capacity and flexibility attributes of suppliers that do offer firm supply into the

markets—and that reduce the need for out-of-market commitments and interventions—are not taken into account in dispatch, pricing, or settlement.

While the reliance on out-of-market dispatch and operator intervention may be understandable in these circumstances, an efficient market design would ensure that the need for additional capacity and flexibility to meet system needs is reflected in market dispatch, pricing, and settlement. At the same time, an efficient market design would ensure that resources that provide capacity and flexibility attributes – and reduce the need for the system operator to procure physical capacity and flexibility – are compensated for the contribution that they make to reliability. Such a market design stands in stark contrast to the existing "energy only" design where firm supply regularly receives the same compensation as virtual, speculative, and non-firm supply, which serves to *increase* the need to make additional capacity and flexibility commitments to backstop this supply.

Powerex believes that addressing the misalignment between the CAISO market design and the evolving needs of the grid is critical to addressing the price formation issues identified in the CAISO White Paper and reducing reliance on out-of-market dispatch and operator interventions. As described in detail in the Powerex White Paper provided as an attachment to these comments, Powerex believes that this objective can be achieved by implementing a market design that provides for the joint and co-optimized procurement of energy, ancillary services, and flexible capacity and takes into account the attributes of different supply offers and resources. Under this approach, the extent to which the commitment of individual resources for energy in the day-ahead and real-time markets contributes to the need for other products would be expressly taken into account in the market optimization. For example, rather than relying on out-of-market procurement and operator interventions to backstop the risks of virtual, speculative, and non-firm supply, the market would expressly recognize the extent to which the selection of these supply offers increases the need for hourly and/or multi-hour capacity and/or flexible capacity commitments in the commitment, pricing, and settlement processes. In other words, the market would co-optimize the procurement of all products to ensure that adequate capacity and flexibility was procured to take into account the risk of non-delivery associated with the commitment of virtual, speculative, and non-firm supply. This approach would also ensure that resources are compensated for the capacity and flexibility attributes that they provide, with the result that the compensation paid for firm physical supply would be different than for virtual, speculative, or non-firm supply.

In addition to helping to mitigate the price formation issues outlined in the CAISO White Paper, Powerex believes that transitioning from the existing "energy only" market design towards a design that reflects the evolving needs of the CAISO grid would go a long way towards building support for a broader regional day-ahead market. In particular, Powerex believes that regions with excess capacity and flexibility, such as the Pacific Northwest, are likely to find it unpalatable to integrate into a market where firm, virtual, speculative, and non-firm supply are treated as fungible, without any recognition of the capacity and/or flexible capacity attributes of individual resources. From a price formation perspective, such a design may favor regions that are net short of capacity and flexibility by allowing virtual, speculative and non-firm supply to displace firm supply and suppress prices. In contrast, regions that have surplus capacity and flexibility on a day-ahead basis are likely to be significantly harmed by the extension of such a design, resulting

in a significant shift in value from ratepayers in these regions to the ratepayers in regions, such as California, that are increasingly net short on such attributes. At the same time, those regions that are net short of capacity or flexibility will likely continue to experience growing challenges in meeting the evolving needs of the grid due to a market design that fails to recognize the attributes of different types of resources in market dispatch, pricing and settlement processes.

For the foregoing reasons, Powerex cautions CAISO against proceeding with a price performance analysis predicated on the assumption that the measures that have traditionally been applied to evaluate market performance (*i.e.*, energy price convergence) represent appropriate benchmarks for evaluating the continued performance of the CAISO markets. Instead, Powerex encourages CAISO to focus its efforts on exploring modifications to the underlying design of the market to better align with the evolving needs of the CAISO grid.

To the extent that CAISO moves forward with efforts to analyze market performance in this proceeding, Powerex recommends that CAISO focus on evaluating the extent to which the failure of the existing market design to differentiate among resource attributes contributes to the need for out-of-market dispatch and operator interventions. This could include evaluating the conditions that typically lead market operators to make manual adjustments to the load forecasts used in the CAISO markets. For instance, if CAISO operators routinely use manual load adjustments to import additional energy in order to ensure that a particular quantity of unloaded upward flexible capacity remains available in real-time, that would suggest that there is an underlying need for upward flexible capacity that is not being procured in the day-ahead and real-time market. Similarly, CAISO could evaluate the extent to which market operators use out-of-market dispatch and manual interventions to commit resources in anticipation of scarcity conditions to help determine the magnitude of *additional* capacity and/or flexible capacity that needs to be procured and held to avoid these distortionary operator interventions. This could inform market design enhancements associated with scarcity/shortage pricing and/or the structure of a new operating reserve demand curve that could efficiently eliminate the need for the ongoing reliance on out-of-market dispatch and/or interventions in the first place. Such information could then be used to help determine the nature and magnitude of the needs that are not being addressed by the CAISO markets.