Comments of Powerex Corp. on
Day Ahead Market Enhancements June 19 Working Group

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to submit comments on CAISO's June 19, 2018 Day-Ahead Market Enhancements Working Group presentations and discussion ("Working Group"). The Working Group provided additional detail regarding the proposed enhancements, including introducing a number of new elements.

Powerex supports the general direction of the CAISO's proposed enhancements to the day-ahead market. In particular, Powerex believes that co-optimizing energy and imbalance reserves can provide CAISO with tools that will help CAISO address a broader range of market and system conditions. Additionally, shifting to 15-minute granularity will allow the day-ahead market solution to account for anticipated intra-hour conditions, and leverage 15-minute intertie scheduling capability, instead of being limited to scheduling and committing resources in full one-hour blocks in the day-ahead timeframe.

As discussed further below, however, Powerex believes the growing scope and complexity of the proposed day-ahead market enhancements, while understandable, necessitate additional opportunities for stakeholder discussion and engagement. Additionally, Powerex believes that:

- Energy, Flexible Ramping Up ("FRU") and Flexible Ramping Down ("FRD") must each be separately biddable products, both in terms of price and quantity;
- CAISO should adopt a well-designed demand curve to address shortfalls in the Flexible Ramping Product ("FRP");
- Additional measures are necessary to ensure supply offers represent genuine physical resources anticipated to be available and deliverable to the CAISO grid;
- CAISO should clarify that all market participants—not just load and variable energy resources ("VER")—will be able to shape their bid quantities with 15-minute granularity; and
- CAISO should further clarify the impact of the proposed enhancements on the CRR clawback rule.

Additional Time For Stakeholder Dialogue Is Required

At the Working Group, it became clear that the scope and technical complexity of the proposed enhancements have grown considerably. For instance, the proposed day-ahead enhancements now include changes to several aspects of the real-time market, including the definition and settlement of the FRP, and the re-optimization of Ancillary Services.

In concept, Powerex supports ensuring that the proposed changes to the day-ahead market address all of the inter-related aspects of the broader CAISO market design. However, it should be recognized that as the scope and complexity of the proposal grows, so, too must the opportunities for stakeholder engagement and feedback grow. The changes being contemplated for the day-ahead market are no less significant than CAISO's introduction of the Fifteen Minute Market in 2014, and perhaps more so. Ensuring that the new design, once implemented, strengthens CAISO's markets and avoids unintended adverse consequences requires that stakeholders fully understand the proposals, have opportunities to provide meaningful input, and that CAISO responds by making appropriate refinements to the evolving proposal. All of this takes time. Notably, however, CAISO's current proposed schedule appears to contemplate only one more round of stakeholder input, and approvals by the governing boards starting in October.[1] Powerex believes this timetable does not provide sufficient time for fully vetting and refining the proposed enhancements, particularly given the numerous design changes presented at the Working Group. Powerex urges CAISO to prioritize the thoroughness of stakeholder engagement over the speed with which a final proposal can be submitted for approval.

Energy, Flexible Ramping Up And Flexible Ramping Down Must Each Be Separately Biddable Products, Both In Terms Of Price And Quantity

CAISO's approach to participation in its various energy and ancillary service products must remain consistent with the voluntary nature of its day-ahead and real-time markets. The exception to this principle are resources that have voluntarily agreed to explicit must-offer requirements in the CAISO's day-ahead and real-time markets, such as RA and Flex RA resources.

Specifically, market participants must be permitted the flexibility to specify hourly quantities and hourly prices for each individual product that is voluntarily offered into the CAISO's day-ahead and real-time markets, as well as an hourly aggregate limit on the total quantities of all products that may be awarded to each resource. The CAISO's optimization software should co-optimize the procurement of each individual product to

[1] CAISO Presentation at 72.

achieve least cost for the CAISO grid, consistent with the prices and offers that have been individually submitted for each product, and the aggregate limit of the resource. Powerex believes the CAISO must not:

1) Presume that a voluntary offer for energy implies that the participant is willing to offer other products such as the day-ahead flexible ramping product, and that CAISO may therefore insert an offer quantity on behalf of the participant

2) Presume and insert offer prices for products based on CAISO's internal calculations of participants' opportunity costs (i.e. foregone energy sales opportunities to the CAISO) which will be highly inaccurate; or

3) Require that participants only be able to set offer quantity volumes through the master file, instead of through hourly bid submissions.

CAISO's approach in this stakeholder process has been inconsistent with the above voluntary framework. Initially, CAISO proposed that participants would submit prices and quantities for energy offers, but would only submit a price for day-ahead imbalance reserve capacity. The quantity of reserve capacity that could be awarded would merely be limited by the characteristics of the resource, as specified in the master file. In other words, participants offering energy would implicitly also be required to offer to provide imbalance reserve capacity, as the CAISO would effectively insert an offer quantity on their behalf. The Working Group materials added the ability for suppliers offering 15-minute intertie supply to specify an "on/off" flag in the master file so the offer is economically cleared only for energy "but not considered for DA FRP because the system resource isn't 15-minute dispatchable in real-time market."[2]

Powerex continues to disagree with this approach, as it deprives participants from voluntarily specifying the maximum quantity of FRU and FRD that they are willing to be awarded in each individual hour. The use of a binary flag provides a seller only an "all or nothing" choice. Moreover, making the selection as a feature of the resource in the master file—as opposed to a biddable attribute—limits how frequently the attribute can be updated. The likely outcome is that this approach will prevent intertie resources that *could* provide FRU or FRD from doing so (if the flag had previously been set as energy-only), while intertie resources that do not wish to provide FRU or FRD in a given hour may be prevented from submitting a day-ahead energy offer altogether if the master file specifies that the resource may be awarded those reserve products.

There are compelling reasons to enable external resources to explicitly state their willingness to provide specific quantities of energy, FRU, and FRD, and at specific

[2] CAISO Presentation at 36.

prices. The most important of these is that the participation of external supply in CAISO's markets—whether through the intertie bidding framework or the EIM—is strictly voluntary. CAISO's proposal is inconsistent with the voluntary nature of this participation, as it would compel external suppliers to either offer FRU and FRD for the full quantity of their energy offers or not be considered for any reserve awards at all. A bidding design consistent with the voluntary nature of external resource participation in CAISO's markets must permit sellers to specify the quantities and prices of each product that they are willing to commit to provide, each and every hour. To the extent that CAISO seeks to ensure there are sufficient quantities of energy and reserves offered in the day-ahead market, the appropriate approach is to (i) incent a high level of participation through appropriate price signals and/or (ii) ensure sufficient voluntary forward must-offer commitments are made through the Flexible RA Framework.

Additionally, the inability for participants to specify the quantity of FRU and FRD they are willing to be awarded effectively requires them to offer *all* FRU or FRD at a single price. Unlike energy offers, which can specify a different price for different quantities, all FRU and FRD offers would be limited to a single price.

Powerex continues to recommends that CAISO revise the bidding design for FRU and FRD to enable participants to specify the price *and* quantity of this product separately from the price and quantity of offers for energy, each and every hour.

CAISO Should Adopt A Demand Curve To Address Shortfalls In FRP

In CAISO's Straw Proposal, CAISO sought comment on whether it should rely upon a demand curve to procure the day-ahead FRP and the pricing that should apply in the event that there are inadequate reserves available. At the Working Group, CAISO explained that it is proposing to procure day-ahead FRP using a demand curve consistent with its existing procurement of FRP in the real-time market, but did not address the manner in which it would calculate prices when insufficient imbalance reserve bids are available.

It is important to recognize that ensuring that CAISO has sufficient imbalance reserves is of equal importance to ensuring that CAISO has sufficient energy and contingency reserves available to meet reliability needs. Like a shortage of energy and/or contingency reserves, failing to procure a level of imbalance reserves sufficient to meet ramping needs under a full range of operational needs with a high level of confidence poses a serious threat to reliability. As the supply of FRU or FRD decreases and approaches the amount required to meet ramping needs with a high degree of confidence, it is increasingly unlikely that CAISO will have sufficient capacity and flexibility available to meet forecast and uncertain changes in load and generation under a full range of operational conditions. This, in turn, increases the likelihood that CAISO

will not be resource sufficient, and may need to take additional actions, including potentially relying on available capacity and flexibility of adjacent BAAs or EIM Entities to maintain reliability.

For that reason, Powerex believes that it is critical that CAISO adopt a robust shortage pricing mechanism that reflects the increased reliability risks as the FRU and FRD approaches the required quantity of FRP to meet forecast and uncertain changes in demand and supply with a high level of confidence. Adopting a shortage pricing mechanism for the FRP will create efficient price signals for market participants to make themselves available to provide FRU and FRD, thereby helping to ensure that resources are available to deployed when and where they are necessary to meet system needs.

Powerex notes that organized markets generally take one of two approaches to shortage pricing. In certain markets, shortage pricing is not applied until the point at which system demand for a particular product exceeds available supply, and, at that point, a single price step is often applied This approach can be illustrated using a simplified example consisting of a total of 1000 MW of offers ranging from $30/MWh to $50/MWh for FRP. If the market is run with a forecast of FRP needs of 999 MW, market prices will be set based on the offer of the marginal resource (i.e., $50/MWh). If demand increases to 1001 MW and the market is unable to balance FRP supply and established levels of FRP demand, however, prices will be set based upon a single, administratively-determined penalty price (*e.g.*, $1000/MWh). This is the approach that CAISO currently employs in the case of energy power balance constraint violations.

Other markets, in contrast, have adopted shortage pricing mechanisms based upon an operating reserve demand curve that ensures that prices gradually increase as the supply of a given product decreases towards the procurement requirement for that product, with prices rising *before* remaining supply is fully depleted and/or below the established requirement. Under this approach, during periods when the reserve supply approaches the required demand level to meet system needs, shortage pricing is gradually applied to ensure that prices increase above the offer price of the marginal resource to reflect the increased risk of shortage conditions and involuntary load curtailments, with prices set equal to the product of the value of lost load and the probability of involuntary curtailments. In contrast to the “all or nothing” approach set out above, this approach ensures that prices increase as supply begins to become tight, and gradually as the risk of a shortage increases.

Powerex believes that the first approach has a number of disadvantages that make the use of a demand curve the preferable option when designing a shortage pricing framework for the FRP. In particular, waiting until supply is less than required to meet demand to apply shortage pricing increases reliability risks by muting price signals for

resources to make themselves available to meet system needs. Notably, under the first approach, it is only at the point that supply of the product at issue is less than demand that prices increase above the offer price of the marginal resource. As applied to the FRP, this would mean that shortage pricing would only be triggered after CAISO had failed to procure the required level of FRP necessary to meet forecast and uncertain changes in load and supply. At that point, however, CAISO would have under-procured the required FRP – meaning that CAISO does not have sufficient flexible ramping capability to meet system needs under a full range of operational conditions – and it may be too late for the higher prices associated with the application of shortage pricing to create an incentive for additional resources to make themselves available. This may mean that CAISO systemically under-procures FRP, with the result that CAISO routinely leans on the capacity and/or flexibility investments of EIM Entities to meet system needs without appropriate compensation. Such an outcome is highly problematic, both from a reliability and equity perspective. The second approach, in contrast, reduces the potential for heightened reliability risk and leaning by gradually increasing prices of FRP as the supply of FRU and FRD approaches the established demand for this product, thereby increasing the FRP that is procured as well as the incentive for resources to voluntarily make themselves available.

For the foregoing reasons, Powerex believes that CAISO should adopt a shortage pricing framework for the FRP that employs a robust demand curve that ensures that CAISO consistently procures sufficient FRP, and that prices increase as the quantity of FRU and FRD procured decreases towards the FRP requirement. In fact, Powerex believes that it would be appropriate for CAISO to consider transitioning shortage pricing for all operating reserve products – including spinning and non-spinning reserve – to use of a demand curve.

Powerex recognizes that transitioning to use of a shortage pricing framework employing a demand curve may require further stakeholder dialogue that may go beyond the scope of this proceeding. For that reason, Powerex believes that it may be appropriate, to adopt a shortage pricing framework that employs a single penalty price consistent with CAISO's existing approach respecting its power balance constraint as an interim measure while CAISO considers longer term changes to its shortage pricing framework.

Powerex emphasizes that regardless of the approach adopted by CAISO—whether on an interim or permanent basis—it is critical that penalty prices be set at a level that accurately reflects the value of lost load (and the probability of involuntary load curtailment) and ensures that CAISO consistently procures the required level of FRP to meet forecast and uncertain changes in load and supply with a high degree of confidence. As a practical matter, adopting a shortage pricing mechanism that does not include robust penalty pricing is likely to lead to under-procurement of FRP, with CAISO effectively having an incentive to "go short" on FRP whenever offer prices are above the

penalty price at issue. Such a result would lead to systematic leaning by CAISO and is fundamentally inconsistent with the purpose of adopting a FRP in the first place.

Additional Measures Are Necessary To Ensure Supply Offers Represent Genuine Physical Resources Anticipated To Be Available And Deliverable To The CAISO

In multiple aspects of its market design, the CAISO is grappling with the challenge of distinguishing between supply that is "real" as opposed to supply that simply cannot or will not perform as represented and/or supply that merely represents only a speculative financial position. This includes RA and Flexible RA commitments that do not account for forced outages; or that do not reflect historical failures to provide the supply or demand response when called upon. It also includes accepting intertie supply from intermediaries that have not yet procured physical generation and transmission service to be able to perform, and are merely speculating on their ability to obtain these services in the bilateral spot markets, if and when energy is called upon.

These challenges are perhaps most evident for day-ahead market awards at CAISO's interties, where offers are not only not required to e-Tag their awards on a day-ahead basis, but are not even required to identify a generation source nor a transmission delivery path on a day-ahead basis. It is only at the deadline for the submission of an e-Tag—which occurs just 20 minutes prior to the start of the delivery hour—that CAISO is informed of whether an offer into its market will perform, and what the generation source and delivery path will be. When this deadline passes, and CAISO becomes aware that certain day-ahead intertie awards will not physically perform, the options for replacing that supply are significantly reduced. This is an unnecessary inefficiency in the CAISO market design, given that a requirement for earlier submission of information identifying the generation source and transmission path could limited day-ahead offers and awards to real physical capability.

Intertie supply is not the only area of CAISO's market design where there is a need to more clearly distinguish between awards that reflect genuine supply that can be delivered to the CAISO grid and speculative positions. The RA program, for example, has various examples of resources that enter into RA commitments and do not comply with the most basic requirement of submitting a day-ahead energy offer.[3] Still other RA resources consistently submit bids at prices that are rarely dispatched to provide energy, but then may fail to perform in the rare circumstances that they are dispatched for energy, suggesting in such circumstances that the supply may have never existed in the first place.. And the basis upon which a resource can sell RA capacity—the Net Qualifying Capacity—does not account for planned or forced outages, effectively

[3] Cal. Indep. Sys. Operator Corp., Dept. of Market Monitoring, 2017 Annual Report on Market Issues & Performance at 229 (June 2018) ("DMM 2017 Annual Report").

enabling entities to rely on their potential ability to obtain alternative sources of supply during the times when these outages occur.

This challenge is highly relevant to the day-ahead market enhancements under consideration. One of the key design elements being proposed is the procurement, on a day-ahead basis, of upward and downward flexible capacity, which is expected to be necessary to accommodate both predictable and unpredictable changes in grid conditions between day-ahead and real-time. These reserves, in other words, are procured—at a cost—in order for the grid to be able to respond to events that turn out different than what was anticipated day-ahead. But this should not be viewed as a "cure-all" to address day-ahead or forward commitments that did not reflect real supply in the first place. While Powerex agrees that it is appropriate to procure reserves to address delivery failures that occur due to factors beyond the control of a supplier (*e.g.*, due to a transmission outage), Powerex believes that it is inappropriate to increase the procurement of reserves to address day-ahead intertie awards that fail to deliver because the seller never had physical supply in the first place and was unable to procure energy to support its award in the bilateral spot markets. Rather than procuring reserves to address such failures, CAISO should adopt market rules that proactively discourage and prevent these types of failures by requiring sellers to identify the physical sources and transmission reservations that have been arranged to support their physical commitments. Ultimately, it is supply backed by physical resources and transmission service that serves load in California; an efficient market design should procure such physical supply from the outset.

The failure to accurately distinguish supply that is "real" from supply that is not also has implications for EIM resource sufficiency requirements. Notably, since speculative intertie awards are counted as supply when evaluating whether CAISO passes EIM resource sufficiency requirements, the CAISO BAA may appear to satisfy these requirements when it actually does not, with CAISO effectively relying on out-of-market procurement and exceptional dispatch, as well as inappropriately leaning on the EIM, to replace non-performing delivery awards.

For these reasons, Powerex urges CAISO to include both explicit requirements as well as robust consequences that ensure day-ahead offers from intertie resources represent real physical supply and transmission delivery arrangements. To the extent market participants anticipate only being able to procure physical supply and/or transmission in real-time, they have the opportunity to offer that supply (once it is physical supply) in the CAISO's real-time markets.

All Market Participants—Not Just Load And VERs—Should Be Able To Shape Their Bid Quantities With 15-Minute Granularity

CAISO's Working Group presentation states that "[i]nterties can be scheduled with 15-minute granularity…"[4] The presentation also states that "[e]xternal VERs can use forecast to schedule in day-ahead market." Elsewhere in the presentation, however, CAISO more explicitly discusses the ability to "shape" economic bids based on 15-minute forecasts, but confines that ability to load and VERs.[5] It is therefore not clear to Powerex whether CAISO's statement that "interties can be scheduled" is intended to refer to the fact that the market awards may be for different quantities in each 15-minute interval, or whether a participant may submit a self-schedule or economic bid where the quantities vary from one 15-minute interval to another.

Powerex believes that participants' ability to submit bids or offers with quantities that vary from one 15-minute interval to the next should be available on a non-discriminatory basis. The granularity with which supply can be offered in the day-ahead market should be no different for supply from a solar generator than for supply from a conventional thermal or hydro resource; and the granularity with which participants can bid to purchase energy in the day-ahead market should be no different for load than for exports. Extending intra-hour bid shaping to all resource types also would not appear to create additional complexity, given that this functionality is already intended to be enabled for some resources.

15-Minute Application Of CRR Clawback Rule May Discourage Real-Time Economic Bidding Of Day-Ahead Intertie Awards

Under Section 11.2.4.6 of the CAISO Tariff, a participant's CRR revenues will be subject to adjustment if the participant submits virtual bids or if the participant reduces a day-ahead import (or export) schedule in real-time. However, Section 11.2.4.6(a) limits the CRR adjustment only "if the segment of Economic Bids (but not Self-Schedule) leading to the Schedule reduction is: at an ***Energy Bid price greater than the Day-Ahead Market LMP at the relevant intertie***, in the case of an import; or at any ***Energy Bid price less than the Day-Ahead Market LMP at the relevant intertie, in the case of an export.***" (emphasis added)

Powerex previously requested clarification regarding the day-ahead LMPs that will be used to determine whether or not a day-ahead import (or export) schedule that was reduced in the real-time market would constitute a virtual bid, since the real-time energy bids would continue to have only hourly granularity. CAISO responded that "the price

[4] CAISO Presentation at 40.

[5] CAISO Presentation at 38-39.

used is the day-ahead 15-minute interval price and the real-time price is the corresponding FMM interval price."[6]

Powerex requested clarification since the day-ahead market enhancements will result in four "Day-Ahead Market LMP[s] at the relevant intertie" for each hour, but a participant's economic bids in real-time will continue to be submitted for the entire hour. For example, a participant may be awarded a 100 MW day-ahead import in all four intervals of a given hour, with the day-ahead LMPs at the relevant intertie being $15, $17, $20, and $19/MWh. Given CAISO's response, it appears that if the participant re-bid the 100 MW day-ahead import schedule in real-time at a price of, say, $18/MWh, it could potentially be considered a "virtual transaction" and subject to the CRR clawback rule during the first two 15-minute intervals (since the energy bid was greater than the day-ahead LMP in those two intervals); at the same time, this real-time bid would *not* be considered a virtual transaction and would *not* be subject to the CRR clawback rule during the last two 15-minute intervals (since the energy bid price was not greater than the day-ahead LMP).

Powerex requests that CAISO clarify whether the above understanding of its proposal is correct. If it is, then it would appear to imply that the intended safeguards put in place in 2017 against over-application of the CRR clawback rule will be available only if a participant re-bids a day-ahead import award at or below the *minimum* of the four day-ahead interval LMPs for each hour. Given potential intra-hour variability in the day-ahead LMPs (*i.e.,* where the LMP in one interval may be substantially lower than the LMP in the other intervals), together with the hourly granularity of real-time bids, this design may work to discourage participants from economically bidding day-ahead import or export award in the real-time markets.

[6] CAISO Comment Matrix, at 16.