Comments of Powerex Corp. on
2018 Policy Initiatives Catalog

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Powerex appreciates the opportunity to propose four issues to be included in CAISO's 2018 policy initiatives catalog.

I. New Default Energy Bid Option for Resources Located Outside of the CAISO Balancing Authority Area

The EIM is an extension of the CAISO's real-time market to include generation resources, load and transmission located outside of the CAISO balancing authority area ("BAA"). When the EIM was developed, several aspects of the CAISO real-time market design were customized in consideration of the differing circumstances that exist outside of the CAISO BAA. However, the procedures for local market power mitigation—and specifically the calculation of resources' Default Energy Bids ("DEBs")—were not modified.[1] Indeed, Powerex believes that the EIM development process did not include any meaningful examination of whether the existing DEB provisions of the CAISO tariff would be well-suited to mitigating local market power outside of the CAISO BAA, nor whether approaches used in other organized markets may be more appropriate.

Importantly, the existing CAISO tariff provisions regarding DEBs were developed entirely in the context of generating resources that were located in the California BAA, and that hence were part of a full ISO/RTO market. Resources located outside of the CAISO BAA face fundamentally different circumstances, however. Specifically:

- Resources located outside of the CAISO BAA face ***multiple alternative market opportunities for the sale of their output***. This means that the marginal cost for external resources is not limited only to the variable cost of *producing* electricity, but must also recognize the opportunity cost of selling that output to the EIM rather than supporting alternative market transactions.

[1] As part of the EIM Year 1 Enhancements Phase 2 initiative, CAISO implemented certain tariff amendments regarding which constraints would or would not be included in the dynamic competitive path assessment for each EIM Entity. While these amendments modified the conditions that could lead to mitigation of sellers' offers, it did not alter the manner or level of mitigation when it does occur.

- Resources located outside of the CAISO BAA often ***face supply obligations outside of the organized market***, such as native load requirements, meaning that only "residual capability" is available for participation in the CAISO's real-time market.
- The currently planned expansion of the EIM includes entities with a markedly different resource mix than that of existing EIM entities or of the CAISO BAA. In particular, the addition of Idaho Power, Powerex and Seattle City Light will introduce participation supported by ***complex, multi-facility integrated hydro systems, including some with extensive storage capability***. For such entities—and for the large storage hydro systems of other potential future entrants—CAISO's efforts to develop simplified formulas (under the existing tariff options for DEBs) for accurately and reliably estimating marginal costs would be a futile undertaking, producing an external formula that, in any given day or hour, may significantly overstate or significantly understate the seller's own assessment of its marginal costs.

The above circumstances were not considered in the development of the three existing DEB options available to resources. The existing DEB options consist of a Variable Cost Option, which does not incorporate *any* opportunity costs; an LMP Option, which is based on a 90-day *lagging* metric of prices, and hence cannot represent same-hour or future-hour opportunity costs; and a Negotiated Rate Option based on negotiations with CAISO's Department of Market Monitoring ("DMM"). And while a Negotiated Rate Option conceivably provides a framework for a customized estimate of marginal costs, it does not eliminate the inherent hour-to-hour inaccuracy of *any* formulaic approach that attempts to estimate external resources' marginal costs, including opportunity costs.

Applying the CAISO tariff's existing DEB options to resources located outside of the CAISO BAA thus introduces a significant risk that sellers of output from those resources will find the CAISO's DEB framework challenging and potentially unworkable. This is particularly true in the circumstances where sellers of energy from resources located outside the CAISO BAA have a materially different view of their resources' marginal costs than the values calculated under the CAISO's existing DEB options. To the extent that a resource's DEB is frequently below a seller's own estimate of its marginal cost, this can have important financial consequences for the seller, as well as potentially for the level of voluntary supply participation in the EIM. This challenge is further exacerbated for sellers that are required, on an ongoing basis, to sell their resource's output at prices determined by CAISO's DEB framework.[2] PacifiCorp recently described the challenges it has experienced as a result of applying the existing DEBs to its hydro resources, explaining that, under certain circumstances

[2] While the CAISO's LMPM mechanism has to date resulted in infrequent bid mitigation, FERC's MBR orders for PacifiCorp, NV Energy and APS cap the offers from those EIM entities to the DEB in all intervals. While FERC's directives in this regard may be viewed as beyond the intended scope of application of the DEBs, they underscore the need for a DEB framework that is robust, rather than one whose shortcomings are tolerated simply because the adverse outcomes are expected (though not guaranteed) to occur only infrequently.

> … PacifiCorp must make the decision to remove the resource from the market to preserve the water to serve its own load as scheduled on a day-ahead basis, risking penalty pricing in the EIM as well as restricted market activities, or, it must allow the unit to be used for energy in the market and realize financial losses on the replacement energy it must then purchase in the bilateral market.[3]

Paradoxically, the very mechanism intended to serve as a proxy for competitive market outcomes can actually discourage voluntary participation and thereby hinder *genuinely* competitive market outcomes.

In its stakeholder process on Commitment Costs and Default Energy Bid Enhancements, CAISO has recognized the need to provide bidding flexibility, and the potential adverse consequences of a DEB regime that is overly restrictive:

> … the CAISO believes its current bidding rules do not always provide suppliers the flexibility they need to reflect costs and business needs, especially in light of the expanding Energy Imbalance Market, increasing instances of constrained conditions, and growth of its fleet to include increasingly diverse supply resources. If the market overly limits supply offers, the CAISO is concerned this could undermine market efficiency and discourage participation by non-resource adequacy resources and Energy Imbalance Market resources.[4]

Powerex notes that enhancing the CAISO's DEB options to appropriately recognize the circumstances of resources located outside of the CAISO BAA does not require "starting from scratch." Indeed, substantially different approaches to local market power mitigation have been approved by FERC and are used in several other organized markets; Powerex believes that some of these approaches may be very well suited to addressing the challenges faced by resources located outside the CAISO BAA, and should be explored further.

Powerex submitted comments in the CAISO's stakeholder process on Commitment Costs and Default Energy Bid Enhancements, urging CAISO to expand the scope of that initiative to explore developing an additional DEB option available to resources located outside of the CAISO BAA.[5] Powerex reiterates its request to address this important issue ***in that existing***

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[3] Affidavit of Kelcey Brown, submitted as Exhibit 2 to the August 31, 2017 filing of Nevada Power Co., Sierra Pacific Power Co., and PacifiCorp in Docket Nos. ER17-2392, *et al.* at P 11.

[4] CAISO Commitment Cost and Default Energy Bid Enhancements Draft Final Proposal (August 23, 2017) at 4. *Available at:* http://www.caiso.com/Documents/DraftFinalProposal_CommitmentCosts_DefaultEnergyBidEnhancements.pdf

[5] *See* Comments of Powerex Corp. on Commitment Costs and Default Energy Bid Enhancements Straw Proposal (July 20, 2017). *Available at:* http://www.caiso.com/Documents/PowerexComments_CommitmentCosts_DefaultEnergyBidEnhancementsStrawProposal.pdf

stakeholder process, particularly in light of the significant challenges with the existing DEB options that will be faced by multiple upcoming entrants to the EIM, including Powerex. Unlike previous EIM entrants, Idaho Power, Powerex, and Seattle City Light all have a resource mix consisting predominantly of multi-facility integrated hydro systems. In the event CAISO decides not to address this important issue in that stakeholder process, Powerex requests that this issue be explored in a new, high-priority stakeholder initiative in the early months of 2018.

II. Day Ahead Flexible Capacity Product

Powerex recommends that CAISO initiate a new stakeholder process to develop a day-ahead flexible capacity product. The need for such a product was discussed in the Flexible Resource Adequacy Capacity and Must Offer Obligation Phase II ("FRAC-MOO 2") initiative earlier this year.[6] That initiative has clarified that the CAISO grid generally has access to sufficient capacity and flexibility to meet load (and changes in that load); but from time to time CAISO does not have sufficient flexible capacity to also balance changes in supply, particularly from wind and solar generation. In other words, CAISO's access to capacity and flexibility does not present a *reliability* challenge, but it does present an economic and environmental challenge since insufficient flexibility can ultimately limit the grid's ability to fully accept the output from available renewable resources.

Powerex believes that CAISO needs additional tools to increase the amount of flexible capacity that is available to the real-time market. Powerex therefore recommends that CAISO evaluate introducing a formal flexible capacity product into its Day-Ahead Market to allow it to set aside flexible capacity and secure a commitment to offer that capacity in the Real-Time Market, in exchange for a capacity payment.

CAISO already uses a similar capacity procurement approach to meet its contingency reserve requirement by procuring spinning and non-spinning reserve in the Day-Ahead Market; it also procures regulation reserve in the Day-Ahead Market. Resources that provide those products receive capacity compensation in return for a commitment to be available to be deployed for energy in real-time. Moreover, the procurement of these capacity products is co-optimized with the scheduling of day-ahead energy, permitting the optimization to find the best use for resources that offer to provide energy or capacity. A day-ahead flexible capacity product would be a natural complement to these existing capacity procurement practices. The new flexible capacity product would be for the purpose of securing flexible capacity that will be available to be dispatched in the 15- and 5-minute markets, as opposed to procuring capacity that provides contingency reserve or second-to-second regulation.

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[6] *See* Comments of Powerex Corp. on the August 2, 2017 Stakeholder Working Group on Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2 (August 18, 2017) at 8-10. *Available at:* http://www.caiso.com/Documents/PowerexComments_FlexibleResourceAdequacyCriteriaandMustOfferObligationPhase2-workinggroup.pdf.

Developing a formal day-ahead flexible capacity product would have at least two important benefits. First, it will increase the quantity of flexible capacity available to the CAISO in real-time. Currently, the flexible capacity available to CAISO is limited to resources that submit economic offers in the Real-Time Market, which is only a subset of the flexible capacity that may actually exist, either within the CAISO BAA or outside of it. A day-ahead flexible capacity product would provide additional compensation that could overcome some of the existing barriers that discourage resources from submitting offers into the Real-Time Market, including the need for external resources to acquire transmission service or to procure fuel. A capacity payment would also be necessary to compensate sellers of that product for the opportunity costs associated with foregoing day-ahead energy transactions (either to the CAISO or in external bilateral markets) in order to provide "stand-by" flexibility to CAISO in real-time. In addition, an explicit flexible capacity product would enable resource owners to offer flexible capacity independently of offering to sell energy (though they could elect to offer both).

Second, implementing a flexible capacity product will provide the framework necessary to "hold back" an internal or external flexible resource from being scheduled for energy in the CAISO's Day-Ahead Market in order to provide real-time upward flexibility. In this manner, the Day-Ahead Market will be able to explicitly recognize that scheduling a flexible resource to produce energy entails a "cost" in terms of reducing the flexible capacity that will be available for dispatch in the 15- and 5-minute markets. This, in turn, will permit the market optimization to more efficiently select between potential supply schedules based not only on the offer price for energy, but on the cost of procuring the necessary associated flexible capacity.[7]

Powerex believes there is likely a substantial amount of existing flexible capacity resources in the west that could be procured and set aside on a day-ahead basis to be available in the CAISO's 15- and 5-minute markets. As has been extensively documented in other contexts, the amount of voluntary participation in CAISO's Real-Time Market by external resources declined significantly after the introduction of the Fifteen Minute Market in 2014. This decline did not reflect a change in the installed quantity of flexible resources, but rather reflected changes in CAISO's market design that introduced significant new price and quantity uncertainty for external resources participating in the CAISO Real-Time Market. Introducing a day-ahead flexible capacity product could provide the appropriate price signals necessary to once again encourage flexible resources to participate in the CAISO Real-Time Market. Developing products that allow the CAISO to procure its flexible capacity needs from existing resources—in the amounts that it needs, and in just the hours it needs them—seems to be the obvious "low hanging fruit" to meeting CAISO's flexible capacity challenges at the lowest cost to consumers,

[7] Developing this ability to "hold back" flexible capacity from being scheduled for energy in the Day-Ahead Market is also vital to ensuring that any longer-term programs developed to secure flexible resources do, indeed, result in additional flexible capacity available to CAISO in real-time. Absent the development of a day-ahead flexible capacity product, any flexible resources procured under a long-term contract may be fully scheduled for energy in the Day-Ahead Market, with the intended flexibility benefits largely nullified.

and should be fully explored before turning to more costly solutions such as entering into long-term contracts to support building new flexible resources.

III. Enhancements to Resource Sufficiency Tests

The Resource Sufficiency ("RS") requirements have been a foundational principle of the EIM design since its inception. Consistent with the purpose of the EIM as an energy-only market, accurate and reliable Resource Sufficiency tests ensure that EIM participants do not "lean" on resources voluntarily made available by other participants, while still enabling EIM participants to share in the diversity benefits of the EIM.

Powerex believes that the actual experience gained with the Resource Sufficiency tests provides an opportunity to consider improvements that could ensure that this core component of the EIM is achieving its intended purpose. To be clear, Powerex does not propose a stakeholder initiative to revisit the core premise or approach of the RS requirements in the EIM. Some entities that may be experiencing growing flexibility and/or capacity challenges would clearly benefit from weaker RS requirements and from the ability to "lean" on the capacity and/or flexibility investments made by other participants through the EIM. Similarly, other entities that may have surplus flexible resources would clearly benefit from tighter RS requirements in the EIM. It is thus important to recognize that *any* change to either loosen or tighten the RS requirements would inevitably and controversially "create winners and losers" between different EIM participants, and would depart from the RS requirements established at the outset of the EIM, and known to all entities at the time they committed to participating in the EIM. Powerex believes that any changes to the RS requirements must be the result of careful and objective analysis regarding the level of resources needed to ensure reliability and to avoid leaning; it would be highly inappropriate to change the RS requirements simply to increase the economic benefits for one group of entities at the direct expense of another group of entities.

In addition, Powerex does not propose that this stakeholder initiative depart from the core principle that failure of the RS test will result in a limiting of EIM transfers. The approach of limiting EIM transfers is necessary to ensure that the EIM affirmatively *prevents* leaning; merely applying a financial charge when leaning occurs would effectively give participants the *economic option* to lean on the EIM for capacity and/or flexibility. The RS failure consequence of limiting EIM transfers thus critically ensures that all BAAs take appropriate steps ahead of the EIM, including installing new resources and/or procuring sufficient capacity and flexibility in the bilateral markets, to ensure they can maintain reliability in their BAA under a wide range of operating conditions.

Rather than revisiting the core principles of the RS framework—which Powerex believes are sound—Powerex proposes a new stakeholder process to identify enhancements that will improve the accuracy of the RS test. In particular, Powerex proposes that the initiative (1) evaluate the accuracy of the values used by CAISO when applying the RS test to each EIM entity; and (2) reduce erroneous outcomes, including both false positive outcomes (*i.e.,* an EIM entity that is resource sufficient but fails the RS test) and false negative outcomes (*i.e.,* an EIM entity that is not resource sufficient but passes the RS test), as discussed below.

Evaluating the historical accuracy of the CAISO flexible ramping capacity requirement

Powerex believes that stakeholders would greatly benefit from quantitative analysis regarding the accuracy of the existing flexible ramping requirements. Simply put, are the values required by CAISO for each individual BAA to pass the RS evaluation prior to each operating hour consistent with ensuring resource sufficiency with 95 percent confidence? Historical operating data should allow CAISO and/or DMM to answer this question by comparing, for each BAA, on an hour by hour basis, (1) the quantity of flexible ramping capability the respective EIM entity was required to demonstrate in order to pass the RS test; and (2) the maximum 15-minute or 5-minute imbalance energy required by that EIM entity in each hour. This historical analysis could then be summarized by BAA, by operating hour of the day, or other relevant variables.

If the flexible ramping sufficiency test requirements are indeed accurate at a 95 percent confidence level, this analysis should illustrate that in approximately 95 percent of all historical intervals, the flexible ramping requirement was indeed equal or greater than the actual imbalance energy needs met in the 15- and 5-minute market intervals. If this is not the case, or if there are specific conditions (*e.g.,* seasons, hours of the day, high demand days … etc.) in which the RS requirement appears to systematically over- or under-state the actual needs for all or certain BAAs, then improvements to calculating the RS requirement should also be explored.

Reducing erroneous outcomes through improved RS test definition and timelines

It should be uncontroversial to state that a perfectly accurate RS test would consistently "pass" entities that are resource sufficient, and would consistently "fail" entities that are not resource sufficient. Powerex believes there are at least three enhancements that could bring the existing RS test closer to this goal:

- **Communicate the RS test requirements to EIM entities prior to the deadline for submitting economic bids to the EIM.** Currently, economic bids from resources are due at T-75, but the values used to conduct the RS tests are not finalized until T-40. This can result in RS test failures—and the application of associated consequences—simply because an EIM entity did not have an opportunity to increase the quantity of resources submitting offers into the EIM. Under the current timeline, an EIM entity is effectively required to guess the volume of capacity it must offer into the EIM in order to pass the RS evaluation. Earlier communication of the RS requirements for each operating hour will give EIM entities certainty regarding the quantity of resource bids and offers they must submit in order to pass the RS evaluation.

- **Apply the flexible ramping sufficiency test on an interval-to-interval basis, limiting changes in EIM transfers only during failing interval(s)**. Powerex understands the current flexible ramping sufficiency test is conducted each hour, with an entity's EIM transfers frozen for the entire hour even if the failure is due to insufficient flexibility in only one interval. In Powerex's view, this would be a "false positive" outcome in the intervals where the entity does have sufficient flexibility to balance interval-to-interval changes in imbalance energy needs. A more refined application of the flexible ramping

sufficiency test may be to compare the required flexibility from one interval to the next against the quantity of ramp-limited headroom of participating resources from a given EIM entity. An entity that fails this test would have its EIM transfers in the failing direction "frozen" during the failing interval only.[8]

- **Refine the capacity test to be based on the p95 confidence interval of *peak* demand in the upcoming hour.** Powerex understands that the current capacity test is based on the p95 estimate of demand over the entire operating hour, while the peak capacity requirements during each interval within the hour are currently reflected in the flexible ramping sufficiency test. If the flexibility test is refined to apply freezing only to interval-to-interval flexibility needs, as proposed above, it will be necessary for intra-hour peak capacity requirements to be assessed as part of the capacity test, instead of as part of the flexible ramping sufficiency test. This will also better align each test with a single aspect of resource sufficiency (*i.e.,* either capacity or flexibility, without conflating the two). Powerex therefore recommends that the capacity test be conducted based on the 95 percent confidence level of intra-hour peak demand (instead of expected hourly demand). Unless this change is made, an EIM entity could pass the current capacity test (which is based on projected average demand over the entire hour) despite having insufficient resources to meet peak demand *within* the hour. In Powerex's view, this would be a "false negative" outcome and would permit leaning on other EIM resources to meet intra-hour peak demand. An entity that fails the revised capacity test should be limited to importing no more than its share of the capacity diversity credit for the relevant hour of the failure.

Powerex believes that targeted refinements to the manner in which the RS evaluation is conducted could significantly improve the accuracy of this vital element of the EIM design.

IV. Review of Load Bias Functionality and Elimination or Redesign of Load Bias Limiter

The CAISO real-time market—including the EIM—optimizes the commitment and dispatch of resources to meet anticipated load in each 15- and 5-minute market interval. Powerex understands that the load forecasts used in each market run are based on the most current available data on actual load and on automated near-term forecasting tools. Like all other organized markets, CAISO operators have the ability to adjust the automated load forecasts based on additional information not incorporated in the forecast. Such load adjustments may include adjustments for errors in automated load forecasts, as well as to adjust for expected

[8] Powerex notes that the narrower application of consequences for flexibility test failures is possible only if the capacity test is modified to be based on intra-hour peak demand, as described in the prior point. If the capacity test is not modified in that manner, then simply limiting changes to EIM transfers for flexibility test failures would still permit intra-hour capacity leaning.

uninstructed deviations in generation, with such adjustments intended to improve the accuracy of the market solution.

CAISO has also developed an operational practice termed the "load bias limiter," which overrides manual load forecast adjustments submitted by CAISO operators. Unlike the manual load forecast adjustments, the load bias limiter only affects the pricing run of the CAISO markets, however. That is, the load bias limiter has no impact on the commitment and dispatch of physical resources (which occurs in the scheduling run), and hence it has no identifiable market efficiency benefits. Moreover, the load bias limiter only applies when overriding the manual load forecast adjustment would prevent the pricing run from applying penalty prices associated with power balance constraint relaxation. The load bias limiter thus appears only to suppress penalty prices, thereby reducing price volatility as well as average prices.

The CAISO Market Surveillance Committee has expressed concern regarding the load bias limiter, particularly in the context of the CAISO BAA, and specifically identified the potential for the load bias limiter to distort short-term energy prices during tight system conditions.[9] Separately, DMM published a document outlining potential modifications to the load bias limiter, though the process for approving and implementing any such changes was not clear.

Powerex proposes a stakeholder process to evaluate the role of operator load forecast adjustments, to explore increased transparency on the different purposes of load forecast adjustments, and to examine market enhancements that would reduce the need for load forecast adjustments. In addition, Powerex proposes that this stakeholder process evaluate the role and purpose of the load bias limiter, its financial impact on different BAAs and different categories of participants, as well as whether any other organized markets have applied a similar price adjustment feature. This stakeholder process would provide a necessary opportunity for stakeholders to more fully understand and provide input on this important price formation issue, with the resulting proposal reflected in tariff amendments filed with FERC for approval.

[9] *See* Harvey, Scott, "The Load Bias Limiter, Price Formation, and the Need for Flexible Capacity" presented during the May 5, 2017 meeting of the CAISO Market Surveillance Committee. *Available at:* http://www.caiso.com/Documents/LoadBiasLimiterandFlexibleCapacityFTIConsulting.pdf.