Comments of Powerex Corp. on the September 26, 2017 Stakeholder Working Group on Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to comment on CAISO's September 26, 2017 Stakeholder Working Group Discussion regarding phase two of the Flexible Resource Adequacy and Must Offer Obligation stakeholder initiative. At the meeting, CAISO set out a proposed structure for a durable flexible resource adequacy ("RA") program to address CAISO's long-term flexibility and reliability needs.

Powerex strongly supports CAISO's efforts to conduct a holistic re-evaluation and re-design of the flexible RA framework. As CAISO acknowledged at the working group meeting, it has become increasingly clear that the existing flexible RA framework is not resulting in the procurement of the flexible generation capability necessary to meet the full range of flexibility and operational needs experienced by CAISO. With ample evidence that the need for flexible capacity is growing quickly and only likely to increase in the months and years ahead, Powerex agrees with CAISO regarding the need to develop a flexible RA framework capable of meeting CAISO's future needs.

At the stakeholder workshop, some participants appeared to question whether the type of a comprehensive re-design proposed by CAISO was necessary; Powerex strongly believes that it is, since the *status quo* simply cannot be sustained. Indeed, it appears that, absent a re-design of the flexible RA framework, the CAISO may soon need to develop operational procedures to limit the acceptance of schedules or offers from renewable resources (in both its day-ahead and real-time markets during the mid-day hours), in order to ensure it has sufficient flexibility to reliably serve demand throughout the evening peak. While such a pro-active renewable curtailment approach would maintain reliability, it would increase the costs and challenges of achieving California's long-term renewable and greenhouse gas reduction goals. In particular, without sufficient flexible ramping capability to effectively respond to variability and uncertainty in both demand and variable energy resource ("VER") output, CAISO may have little choice but to curtail renewable production pro-actively in order to maintain grid reliability.

It is clear that integrating the large amount of existing and new VERs needed to meet California's environmental policy objectives will require greater levels of flexible resources to balance both predictable and unpredictable variations in output. A properly designed and implemented flexible RA program can be a key tool to help ensure that

CAISO has access to the right quantity of resources, with the necessary flexibility attributes, in its day-ahead and real-time markets. In this manner, a redesigned flexible RA program can assist California in achieving its environmental policy objectives in a reliable and cost-effective manner.

Powerex believes that the framework discussed at the September 26 working group meeting represents a sound conceptual structure for a long-term flexible RA framework. As discussed further herein, Powerex encourages CAISO to proceed with efforts to further develop and implement the proposed flexible RA framework, including taking steps to ensure that external resources backed by physical capacity are able to fully participate in the re-designed program. Additionally, Powerex encourages CAISO to consider initiating a separate stakeholder process to consider enhancements to the day-ahead market that will be necessary for the implementation of a long-term flexible RA framework.

I. CAISO's Proposed Redesign of the Flexible RA Framework Will Help Ensure That CAISO Has The Resources Necessary To Efficiently Manage The Grid

A. CAISO's Proposal Will Align The Flexible RA Framework With CAISO's Operational Needs

At the September 26 working group meeting, CAISO set out a conceptual framework for a long-term flexible RA design. Under CAISO's proposal, each load serving entity would be required to procure capacity falling into three distinct flexible RA categories: (1) day-ahead ramping capacity; (2) 15-minute dispatchable flexible capacity; and (3) 5-minute dispatchable flexible capacity.

Powerex strongly supports CAISO's identification of the discrete flexibility products, as they are aligned with CAISO's operational needs and the market timeframes in which CAISO positions and deploys resources. As explained in detail in its previous comments in this proceeding, Powerex believes that the inability of the existing flexible RA framework to achieve its objectives reflects a misalignment between the existing flexible RA products and the manner in which CAISO deploys resources through its markets to serve load and balance its system. As a practical matter, CAISO procures a number of distinct products in its day-ahead and real-time markets to maintain reliability in its system:

Category	Technical Requirement	Why it is necessary
Hourly Energy	Deployed/positioned in IFM (Day Ahead) Market Day-ahead lead time	• Expected hour-to-hour variation in load or VER output within each day (*i.e.,* "forecast movement")
15-minute Flexible Capacity	Deployed/positioned in Real Time Pre-Dispatch	• Error in hourly load or VER forecast (*i.e.,* "uncertainty")

	• 22.5 minute lead time	• Expected variation in load or VER output within each hour
5-minute Flexible Capacity	Deployed/positioned in Real Time Dispatch • 2.5 minute lead time	• Error in 15-minute load or VER forecast • Expected variation in load or VER output within each 15-minute interval
Regulation Reserve	Capacity procured in IFM and in Real Time; deployed every 4 seconds via Automatic Generation Control	• Error in 5-minute load or VER forecast • Expected variation in load or VER output within each 5-minute interval

Notably, the existing flexible RA supply categories – base flexible capacity, peak flexible capacity, and super-peak flexible capacity – and associated performance requirements have no direct relationship to the products procured through CAISO's day-ahead and real-time markets. Instead, the existing flexible RA program was designed around the characteristics of the existing in-state generation fleet and designed to procure sufficient flexible resources to meet the largest expected three-hour net load ramp each month—a measure of flexibility needs that is too coarse to capture the full range of hourly and intra-hourly flexibility needs experienced by the CAISO.

Powerex believes that CAISO's proposal will address these issues by aligning the assessment of CAISO's flexibility needs, and the products procured to meet those needs, with the manner in which CAISO deploys resources through its markets. By structuring the flexible RA program around the products deployed through the day-ahead and real-time markets, CAISO's proposal will allow CAISO to more accurately assess its need for flexible capacity to address forecast and uncertain changes in load and in VER output across a full range of operational timeframes (*i.e*., hourly, 15-minute, 5-minute and regulation).

In addition, defining three flexible RA products will allow CAISO to appropriately differentiate and value resources based on their ability to ramp over various operational frameworks. For example, rather than basing the evaluation of a resource's flexibility around a single measure (*i.e*., a three-hour ramping period), each resource could be qualified to provide a maximum quantity of each of the defined flexible RA products based on the extent to which the resource can be deployed within the timeline for each product. For instance, a 300 MW unit with a ramp rate of 10 MW/min would qualify to provide up to 300 MW of hourly flexibility, 150 MW of 15-minute flexible capacity, or 50 MW of 5-minute flexible capacity (or some combination thereof). By evaluating and valuing resources based on their objective ability to ramp over relevant operational timeframe for each specific product, such a framework will help send efficient long-term

price signals to ensure that sufficient flexible resources are installed, maintained, and committed to meet CAISO's need for real-time ramping capability.

Powerex also believes that adopting flexible RA products that correspond to CAISO's operational needs will help reduce the costs associated with renewable integration. For example, while all intra-hour changes in load and in VER output could conceivably be balanced entirely by procuring a large amount of regulation reserve, such an approach would be prohibitively expensive because it would imply the commitment of very fast-responding resources to address needs that become apparent far earlier than the second-to-second changes such reserves are designed to manage. Adopting distinct hourly and intra-hourly flexible RA products, in contrast, will ensure that the highest quality, fastest-ramping resources are only procured to the extent necessary to address intra-hourly operational needs, allowing slower-ramping resources to meet flexibility needs known with longer lead times.

For the foregoing reasons, Powerex encourages CAISO to continue development of the conceptual proposal outlined at the working group meeting. In addition, Powerex believes it would be informative to stakeholders for CAISO to prepare additional analysis regarding its flexibility needs under the proposed conceptual framework, including:

- A month by month estimate of the aggregate needs by each product type, both currently and in future years; and
- An estimate of the aggregate quantity of each type of flexibility product that the existing in-state generation fleet is qualified to provide.

Powerex believes that such data would provide further clarity regarding the nature of CAISO's flexibility needs, particularly the specific products and months in which CAISO expects to experience shortages of flexible capacity.

B. CAISO Should Expand Its Flexible RA Requirements To Include External Resource Commitments Backed By Physical Flexible Capacity

Powerex also supports CAISO's focus on expanding the set of physical resources that would be permitted to provide flexible RA, subject to the type of objective performance criteria discussed above. By artificially limiting the pool of resources that may compete to provide flexible RA, the current program's broad exclusion of external resources likely prevents CAISO from meeting its flexibility needs with the most efficient and cost-effective set of resources possible. The result of this limitation is that external resources with significant ramping capability are currently barred from competing to meet CAISO's flexibility needs. Powerex believes that expanding the flexible RA framework to allow external resources to provide flexible RA will allow CAISO to meet flexibility needs in an efficient and least-cost basis.

Powerex recognizes the legitimate concerns that have been raised regarding CAISO's generally reduced visibility into the underlying physical resources located outside of the

CAISO BAA compared to internal resources. Enabling physical resources located outside of the CAISO BAA to provide flexible RA must be done in a manner that addresses these concerns, and ensures that the promised resources will be available and will perform when the CAISO grid needs them.

Powerex encourages CAISO to develop transparency and performance requirements that ensure that flexible RA contracts represent capacity commitments from physical resources that are identified and available at the time the contract is executed. Powerex believes that this could be achieved by requiring a supplier of flexible RA: (1) at the time that an RA contract is executed, to specify the source BA, the e-Tag generation source(s), and transmission path from which the flexible RA capacity will be provided to a specified CAISO intertie; and (2) for every hour of the contract term, submit e-Tags identifying the same source BA, generation source(s) and transmission service supporting delivery to the CAISO intertie.

II. Enhancements To The Day-Ahead Market Are Necessary To Ensure The Success of the Proposed Flexible RA framework

Although Powerex believes the proposal outlined at the working group meeting represents a sound conceptual framework for a long-term flexible RA structure, it is important to recognize that the effectiveness of any forward procurement mechanism for flexible capacity is likely to be compromised to the extent that CAISO's market optimization does not also recognize and position the right quantity of flexible resources to provide flexible capacity (as opposed to energy). In that regard, Powerex notes that the current day-ahead market optimization includes market design "gaps" that will need to be addressed in order for the benefits of any long-term flexible RA framework to be realized.

For instance, the day-ahead market currently does not take into account the need to set aside flexible capacity to address uncertainty regarding changes in net load after the day-ahead market run. Although the day-ahead optimization ensures that supply schedules are feasible to meet the quantity of market-cleared day-ahead demand at an hourly granularity level, CAISO's day-ahead market currently does not position additional flexible capacity to be available in case real-time conditions differ from the day-ahead inputs. Moreover, the day-ahead optimization seeks to satisfy *bid-in* demand—which may differ significantly from CAISO's day-ahead *forecast* of demand—while the day-ahead supply selected to meet that demand can include virtual supply, which will need to be replaced by physical supply in real-time. In addition, the day-ahead market does not currently recognize the flexible capacity needs due to intra-hour variations and uncertainty in load or intra-hour variations and uncertainty of supply (*i.e*., 15- and 5-minute flexibility needs). Each of these factors can increase the need for flexibility beyond what is currently recognized in the day-ahead market.

Because CAISO's day-ahead market does not currently recognize the full range of CAISO's flexibility needs, the result is that even highly flexible resources, including

those under flexible RA contracts, may be fully committed to provide energy rather than being “held back” to provide upward and downward flexibility in real-time. Powerex cautions that the benefits of a flexible RA framework could be largely nullified if flexible resources that enter into forward contracts with California load-serving entities to provide flexible capacity can be fully scheduled to supply energy in the day-ahead market.

Powerex believes that enhancing the day-ahead market to fully recognize the CAISO’s flexibility needs is vital to ensuring that any long-term flexible RA program achieves the intended goal of making additional flexible capacity available to CAISO in real-time. Powerex believes that it would be appropriate to convene a separate stakeholder process to explore and develop enhancements to the CAISO’s day-ahead market to ensure that CAISO’s flexibility needs are appropriately reflected in the day-ahead market optimization.