Comments of Powerex Corp. on
Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2
Straw Proposal

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to provide written comments on CAISO's December 11, 2015 Flexible Resource Adequacy Criteria and Must Offer Obligation – Phase 2 ("FRACMOO2") Straw Proposal. Powerex greatly appreciates the CAISO's approach in this initiative to seek input on a wide range of issues relevant to the FRACMOO2 initiative, not just in the Straw Proposal but in the workshops that preceded it.

A major objective of the FRACMOO2 initiative is to expand the options available for meeting CAISO's growing flexibility needs to the greatest extent possible. This is essential to ensuring that California's renewables integration targets are met at least cost to consumers. At present, only resources that are 5-minute dispatchable (*i.e.,* primarily internal generators) are eligible to participate in meeting the grid's need for flexibility on a forward basis. The Straw Proposal seeks to extend that participation more broadly to external resources delivered to CAISO's interties. Powerex strongly supports this effort. However, the extent to which CAISO is able to incent such participation, and thereby realize the benefits of the Northwest's flexible clean hydro systems, will depend critically on the design choices developed in this initiative. As discussed in more detail below, certain aspects of the Straw Proposal are likely to significantly limit participation by these resources. In addition, Powerex believes that the ability of integrated hydro systems to help address CAISO's flexibility needs go beyond providing real-time dispatchable Flexible RA capacity; through the forward contracting for "shaped" energy deliveries, external hydro systems can reduce CAISO's need for Flexible RA in the first place.

The FRACMOO2 initiative is one of the most significant opportunities for CAISO to genuinely integrate its market design with the resources and practices that are available outside of its balancing authority area ("BAA"). This will directly benefit CAISO consumers through increased access to flexible resources that can help integrate renewable resources, and do so at potentially lower costs and with lower carbon emissions. Powerex is committed to working with CAISO and stakeholders to develop FRACMOO enhancements that can fully unlock the benefits of broad participation by external flexible resources in addressing CAISO's growing flexibility needs.

Powerex's comments are organized as follows:

- **Section I** (pg. 2) sets out Powerex's understanding of the need for flexible capacity, and the key principles and objectives of an efficient framework to procure that capacity on a forward basis.

- **Section II** (pg. 6) explains that, while some of the flexibility from integrated hydro systems in the Northwest may be available on a 15-minute by 15-minute interval basis, a substantially larger amount of flexibility could be accessed through forward planning and scheduling of "shaped" deliveries that mitigate predictable changes in CAISO net load.

- **Section III** (pg. 13) identifies specific aspects of the Straw Proposal that must be modified to promote broad participation by external resources in providing Flexible RA capacity.

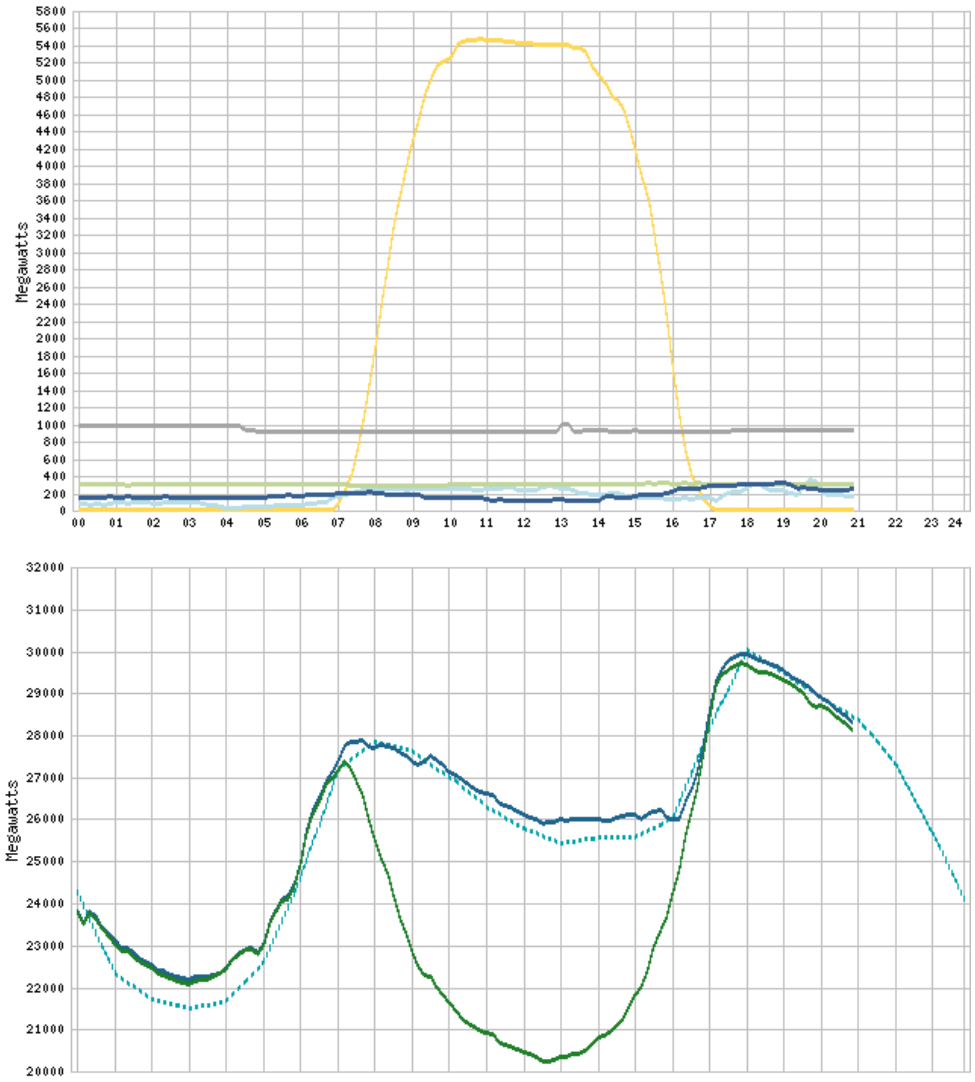
- **Section IV** (pg. 18) responds to CAISO's proposal to waive measured demand charges under certain circumstances to promote increased real-time liquidity.

I. Powerex's Understanding of the Need and Purpose of the FRACMOO Framework

Prior to providing more detailed comments on proposed enhancements to the FRACMOO framework, Powerex believes it is important to summarize its understanding of the need for and objectives of a properly functioning resource adequacy framework. The CAISO and many internal stakeholders are highly familiar with these concepts and with CAISO's existing market rules. But this information may be less familiar to external stakeholders, whose participation in the FRACMOO framework the current initiative seeks to promote.

The development of California's Flexible RA framework reflects the significant changes in resource composition that have re-shaped the electric power sector over the past decade. Ensuring reliable service to consumers no longer requires merely having sufficient *capacity* to meet peak demand, but also requires having sufficient *flexible capacity* to balance the short-term variation in output from variable energy resources. As policies have encouraged and/or required increased use of renewable resources, the amount of Variable Energy Resources ("VERs") has grown, and the need for flexible capacity has grown with it.

While many BAs have faced a growing need for flexible capacity associated with the mass installation of wind resources, the CAISO's flexible capacity requirements are further compounded by the rapid installation of solar resources in recent years. It has now become common for the CAISO grid to experience a surge of up to 6,000 MW in solar output each morning, with that same output declining to zero each evening. This pattern is illustrated in the CAISO charts below, for December 18, 2015. The top chart shows the output of renewable resources during the day, with solar output shown in yellow. Solar output increased from 0 MW at 7 a.m. to 5,200 MW at 10 a.m. As the bottom chart shows, this occurred after the morning ramp in load, which had essentially peaked by the time solar generation began to increase. This means that flexible resources had to rapidly increase output to follow the morning load ramp—which increased by approximately 5,000 MW between 5 a.m. and 7 a.m.—and then reduce output just as quickly to accommodate the rapid increase in solar output. The need for flexible resources is even more dramatic in the evening, with such resources needed to not just replace the sharp reduction in solar output, but also to concurrently follow the evening load ramp. The change in "net load" on this day was approximately 10,000 MW, with 7,000 MW of that occurring between 3 p.m. and 5 p.m.



Sources: CAISO "Renewables" (top) and "Net Demand" (bottom) charts for December 18, 2015, retrieved from http://www.caiso.com/Pages/TodaysOutlook.aspx

In addition to solar generation, the CAISO grid also manages over 4,000 MW of wind output, whose variability follows entirely different, less predictable, patterns. For instance, there was essentially no wind production at all between December 15 and 18, but significant wind output across all hours in the following days. The variations in output from solar and wind resources interact with each other and with the changes in demand in ways that can either mitigate or exacerbate the need for flexible resources. To identify the magnitude of flexible capacity required on a forward basis, CAISO has developed a methodology for quantifying and estimating the forward need for flexible resources based on a forecasted maximum 3-hour "net load" ramp. For 2016, the CAISO calculates a system-wide need for flexible capacity ranging from just over 7,000 MW for June to nearly 13,000 MW for December.[1]

[1] Cal. Indep. Sys. Operator Corp., *Final Flexible Capacity Needs Assessment for 2016* at 11 (May 1, 2015), *available at* http://www.caiso.com/Documents/FinalFlexibleCapacityNeedsAssessmentFor2016.pdf.

CAISO is addressing the growing need for flexible capacity through various market design changes and initiatives. In Powerex's view, the EIM has advanced this objective by enabling the "pooling" of committed flexible capacity and the diversification of variations in VER output and load across the participating BAAs. But while this makes more efficient use of capacity that has already been committed to providing balancing services, both the EIM and CAISO's re-designed FMM have not yet been effective in attracting the voluntary participation of *surplus* flexible capacity in external BAAs into CAISO's markets. Attracting this voluntary participation can be achieved through two complementary approaches. First, by ensuring there are efficient price signals in the organized spot markets, resulting from robust price formation including scarcity and shortage pricing. Second, by implementing a resource adequacy framework that provides compensation in return for the voluntary forward commitment of resources to participate in the short-term energy markets. The FRACMOO framework is the core vehicle through which such capacity compensation occurs for the forward commitment of flexible capacity to serve CAISO's flexibility needs.

How a Resource Adequacy Framework Supports Reliability and Renewables Integration

A resource adequacy framework consists, at its core, of forward commitments by resources to be available to meet the operational needs of the grid. A resource adequacy framework therefore helps meet a fundamental reliability objective by securing enough physical resources ahead of time to serve firm load obligations, with an ample margin to account for the uncertainty of what actual system conditions will be.

Resource adequacy frameworks also serve a second important purpose: to provide market-based compensation for investment in (and forward commitment of) physical *capacity*, supplementing the *energy* revenues earned in short-term organized markets. This additional compensation is critically important for capacity resources, as it is well-recognized that energy revenues in short-term organized markets are frequently insufficient to meaningfully contribute to the recovery of the fixed costs of such resources. For example, CAISO's Department of Market Monitoring ("DMM") has repeatedly found that net energy revenues (*i.e.*, revenues above variable production costs) earned in CAISO's day-ahead and real-time markets only provide a fraction of the contribution necessary to support new investment in a simple-cycle combustion turbine (*i.e.*, the most flexible thermal generation technology).[2] In fact, energy market revenues are often insufficient even to cover the ongoing fixed costs of many *existing* facilities. Resource adequacy frameworks are therefore an essential component to providing the additional market-based compensation necessary to overcome this widely recognized "missing money problem." Properly designed resource adequacy frameworks support necessary investment not only in entirely new resources, but for capital upgrades to expand or extend existing resources. They also support the investment associated with committing existing capacity to a designated purpose, foregoing other alternative uses that may arise.

[2] *See, e.g.,* Cal. Indep. Sys. Operator Corp. Department of Market Monitoring, *2014 Annual Report on Market Issues & Performance* at 53-55 (June 2015), *available at* http://www.caiso.com/Documents/2014AnnualReport_MarketIssues_Performance.pdf. For 2011-2014, DMM estimates that a hypothetical new combustion turbine would earn net revenues of $31.75/kW-year (NP15) or $45.34/kW-year (SP15), compared to a levelized fixed cost revenue requirement of $190.1/kW-year.

CAISO's FRACMOO framework takes the resource adequacy concept a step further, by tailoring resource adequacy requirements specifically to *flexible* capacity resources. This ensures that compensation supports resources with the desired attributes necessary to address CAISO's specific needs, which is increasingly for flexible capacity, rather than for generic capacity or energy.

The above discussion highlights the importance of resource adequacy frameworks in achieving both reliability and renewables integration objectives through the efficient procurement and forward commitment of flexible capacity resources. However, resource adequacy frameworks also serve an additional, important *equitable* purpose: to provide appropriate compensation for existing flexible capacity paid for by one group of customers when those resources are relied upon to serve the needs of a different group of customers. A well-designed resource adequacy framework therefore supports the regional integration of electricity markets by overcoming equity concerns associated with the potential for uncompensated "leaning" on capacity investments through dispatch in the short-term integrated energy markets. Equity concerns also arise if the compensation is perceived to be discriminatory against a particular class of participant. Therefore, it will also be important that the FRACMOO program lead to competitive outcomes that provide comparable compensation for all resources that are able and willing to provide equivalent flexible capacity, and that are free of discrimination between new and existing resources or between internal and external resources. To promote the transparency necessary for participants to build confidence in the FRACMOO framework, Powerex encourages the CAISO and/or the California Public Utilities Commission ("CPUC") to publish annual and monthly data and analyses of prices and procured quantities of RA and Flexible RA from different types of resource categories.

Developing a robust FRACMOO framework that addresses these equity concerns has the potential to significantly increase participation by flexible external resources in CAISO's short-term markets, and hence could be a major step toward building increased support for greater integration of electricity markets across the WECC.

A Properly Designed Flexible RA Framework Can Attract Regional Participation and Meet California's Flexibility Needs in a Cost Effective Manner

The costs associated with meeting the Flexible RA requirement in its first year have not yet been published. But even applying the CPUC's reported 2015 average weighted price for *conventional* RA of $3.12/kW-month[3] yields a total ballpark cost for Flexible RA of $375 million per year. Given the more stringent technical requirements of providing flexible capacity, the actual costs of meeting the Flexible RA requirements are presumably even higher. And as California's need for flexible resources grows in order to meet its 50% renewable portfolio standard, so, too, will the costs.

[3] Cal. Pub. Util. Comm'n, *The 2013-2014 Resource Adequacy Report,* at 23, Tbl. 10 (Aug. 2015) (showing the "weighted average price" for 2015 capacity), *available at* http://www.cpuc.ca.gov/NR/rdonlyres/2AF422A2-BFE8-4F4F-8C19-827ED4BA8E03/0/2013_14ResourceAdequacyReport.pdf. This represents the average bilateral prices as reported in response to the CPUC's January 21, 2015 data request. Prices exclude qualifying facilities, imports and exports, and are based on a response rate representing approximately 25% of transactions.

The current FRACMOO2 initiative is an important opportunity to ensure not only that CAISO has sufficient flexible resources committed to reliably serve load, but to ensure that this objective is achieved at least cost. This requires a careful examination of two broad questions:

- **Does the FRACMOO framework accurately identify the amount of Flexible RA that is needed to ensure reliability?** If the current methodology overstates the requirement for resources that can be dispatched on a 5-minute or 15-minute basis, costs to ratepayers will be unnecessarily high. Costs will be inflated in two ways: first, by simply being required to purchase an excessive quantity of Flexible RA; and second, by increasing the average price for Flexible RA that is purchased. At the same time, any reduction to the Flexible RA requirement must be grounded in objective data and a sound methodology that ensures reliability is not compromised.

- **Does the FRACMOO framework permit CAISO's flexible capacity needs to be met by the broadest possible group of qualifying resources?** It is widely recognized that significant resource flexibility exists outside of the CAISO BAA, particularly among the clean hydro systems that characterize the Pacific Northwest. It is also widely recognized that continuing to meet CAISO's flexible resource needs solely by maintaining, and possibly expanding, the flexible fossil-fueled fleet within the CAISO BAA could be expensive, with costs that could be mitigated or avoided through participation of external low-GHG resources, including the large clean hydro systems of the Northwest. The cost to California ratepayers of integrating the large and growing fleet of VERs therefore directly hinges on how successfully the Flexible RA framework evolves to permit and attract the participation of flexible resources throughout the WECC.

Powerex strongly believes that significant progress can be made in the FRACMOO2 stakeholder process to address both of these issues.

II. The Need for Flexibility Does Not Need to be Met Exclusively from Real-Time Dispatchable Resources

At the core of the current FRACMOO framework is a projection of the maximum 3-hour change in net demand (*i.e.,* the net of changes in demand and changes in VER output). This quantity—together with 3.5% of peak load—establishes the quantity of Flexible RA that must be procured. Currently, this Flexible RA demand quantity can only be provided by resources capable of responding to 5-minute CAISO dispatch.[4] The current FRACMOO framework, in other words, requires that the entire 3-hour net load ramp be capable of being met from resources that can be dispatched by the CAISO in its 5-minute market.

[4] Each resource may supply Flexible RA up to the amount of its Effective Flexible Capacity ("EFC"). The data for 2016 shows total EFC from internal units of over 36,000 MW, which is significantly in excess of even the maximum monthly Flexible RA requirement of 13,000 MW. EFC data available at https://www.caiso.com/Documents/FinalEffectiveFlexibleCapacityList2016.xlsx. On the surface, these metrics appear inconsistent with CAISO's assessment that it may not have sufficient flexible resources available to it to reliably meet the net load changes on the CAISO grid. Powerex seeks greater clarity from CAISO on this topic, and in particular on whether modifications to the calculation or interpretation of EFC may be warranted.

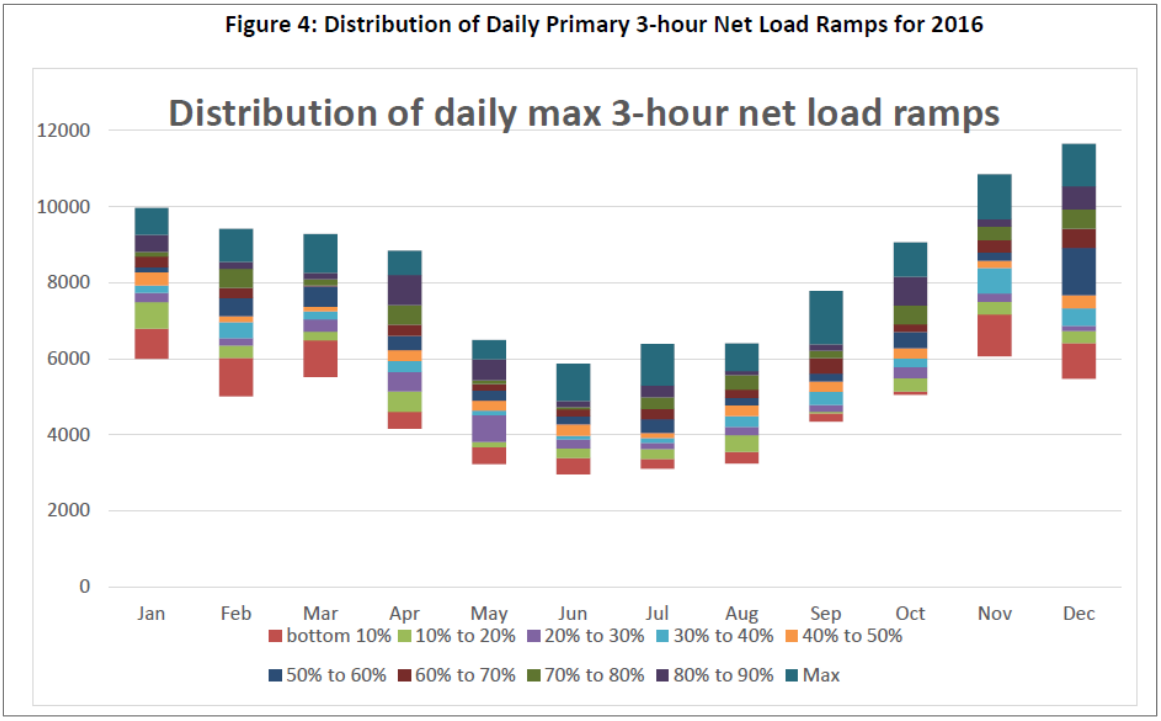
In the FRACMOO2 initiative, CAISO is exploring how resources that only are able to participate in its 15-minute dispatch can help meet the net load ramp. This is a positive step which Powerex strongly supports, as it opens up the provision of Flexible RA to external resources outside the CAISO BAA. As discussed in the following section, the cost to California ratepayers will be minimized by a FRACMOO framework that includes as many eligible suppliers and resources as possible. Opening up participation to dispatchable flexible resources outside of the CAISO BAA is a major step in that direction.

But opening provision of Flexible RA to 15-minute intertie resources does not alter the fundamental assumption behind the FRACMOO framework: that the entirety of the 3-hour maximum net load ramp must be met by capacity that can respond to CAISO real-time dispatch with relatively little notice. CAISO's ability to dispatch—or not dispatch—flexible resources in real-time is necessary to respond to ramping requirements that become known in real-time, but, importantly, is <u>not</u> necessary to address ramping requirements that are known ahead of time.

As discussed in the charts presented above, both demand and solar output follow relatively predictable patterns throughout the day. The now-familiar "duck chart" routinely displays a morning upward ramp followed by a downward ramp (the "tail"); a mid-day period where net demand is at its lowest point of the day (the "belly"); and a large afternoon upward ramp (the "head"). The precise magnitude of each of these characteristic features can change from day to day, primarily as a result of weather, but these features are always present to some degree. In other words, a significant portion of the 3-hour net load ramp on any given day is highly certain on a forward basis, with the remainder uncertain until closer to real-time when actual weather patterns and grid conditions are better known.

In the Flexible Ramping Product stakeholder process, CAISO recently developed a conceptual framework that distinguishes between these two different sources of the need for flexible capacity: "forecast movement" and "uncertainty." The same concept can and should be applied in the context of the FRACMOO framework. Specifically, it should be recognized that there will be some amount of net load ramp on any given day that is highly predictable in advance, and a portion that is not known until closer to actual operation. The chart below shows CAISO's analysis of the distribution of the daily maximum 3-hour net load ramps for each month of 2016:

Figure 4: Distribution of Daily Primary 3-hour Net Load Ramps for 2016



Source: CAISO Final Flexible Capacity Needs Assessment for 2016, at 14, Fig. 4.

It is clear that the CAISO's conceptual framework from the Flexible Ramping Product is readily applicable here. In November 2016, for instance, the daily maximum 3-hour ramp always exceeds 6,000 MW, while the single largest daily maximum 3-hour ramp is just under 11,000 MW. Thus more than half of the ramping needs for November 2016 would appear to be highly predictable in advance.

The significance of this framework is that "forecast movement" can be addressed by forward *scheduled changes* in resource output or interchange, even if those resources or interchange schedules have limited ability (or are entirely unable) to respond to CAISO economic dispatch in real-time (*i.e.*, they are "self scheduled"). For instance, if it is known ahead of time that in November 2016 net load will increase by at least 6,000 MW beginning at 14:00, then 6,000 MW of ramp can be provided by forward scheduling a 6,000 MW increase in imports .

CAISO could achieve this itself in its day-ahead market, of course, but only if CAISO has available to it sufficient offers from flexible capacity able to be committed in this manner on a day-ahead basis. And while the flexible capacity available to CAISO on a day-ahead basis is likely greater than what is available strictly in real-time (*i.e.,* dispatched on a 15-minute basis with as little as 22.5 minutes of notice), there is considerable additional flexibility in the larger hydro systems of the Pacific Northwest that can be accessed through planning further ahead than on a day-ahead basis.

In other words, if FRACMOO2 only extends participation to external flexible capacity that can be dispatched by CAISO on a 15-minute basis (with as little as 22.5 minutes of notice), it is likely to miss out on a considerably larger source of hydro system flexibility. As was explained in

Bonneville's presentation at CAISO's October 6, 2015 workshop on real-time intertie liquidity,[5] much of a large, integrated hydro system's operations are established well in advance of real-time, meaning that the ability to make very short-notice changes to output can be highly limited. But with advance planning, a hydro system can be managed to achieve much larger *planned* increases (or decreases) in output.

Consider even a relatively simple external hydro system consisting of a single dam and generating facility, with a nameplate capacity of 500 MW, native load of 100 MW and limited storage. It would be simplistic and incorrect to assume that this system could offer 400 MW of incremental capacity for CAISO to dispatch on a 15-minute basis throughout the day. Under 15-minute dispatch, the resource owner would have no idea whether or not the resource would produce at 100 MW or be dispatched to the full 500 MW each interval. Any dispatch it does receive would be known for only one 15-minute interval at a time, and with as little as 22.5 minute of lead time. If the resource enters the operating day with its daily storage nearly full and it is *not* dispatched by CAISO for several intervals in a row, then it risks having to spill water. Conversely, if it goes into the operating day with low reservoir levels, then it will be limited in the frequency and/or amount of additional generation it is able to supply to CAISO throughout the day. Such a resource could simply not commit to offer 400 MW to CAISO for 15-minute dispatch in each interval throughout the course of the day. If, however, the resource knew ahead of time that it would need to increase its output by 400 MW between 3 p.m. and 8 p.m., it could take appropriate operating decisions to make this possible. Instead of facing CAISO real-time interval-to-interval dispatch uncertainty, it would face a predictable output commitment that would preserve its ability to manage its streamflow and storage constraints.

As hydro systems increase in complexity—with multiple facilities on a river, multiple river systems, and multiple river management needs and regulations—the need for advance generation planning becomes even more important. For these reasons, larger, integrated hydro systems are typically planned not just a day in advance, but often weeks and months in advance. Successfully tapping into the full flexibility of large hydro systems in the Northwest will be possible only if the FRACMOO framework aligns the CAISO's timeframe of performance requirements with the operational planning timeframes of external hydro systems. Otherwise, the outcome will be that CAISO is only able to access a portion—and perhaps a small portion—of the flexibility that these external, clean hydro resources can truly provide toward meeting CAISO's growing flexibility needs.

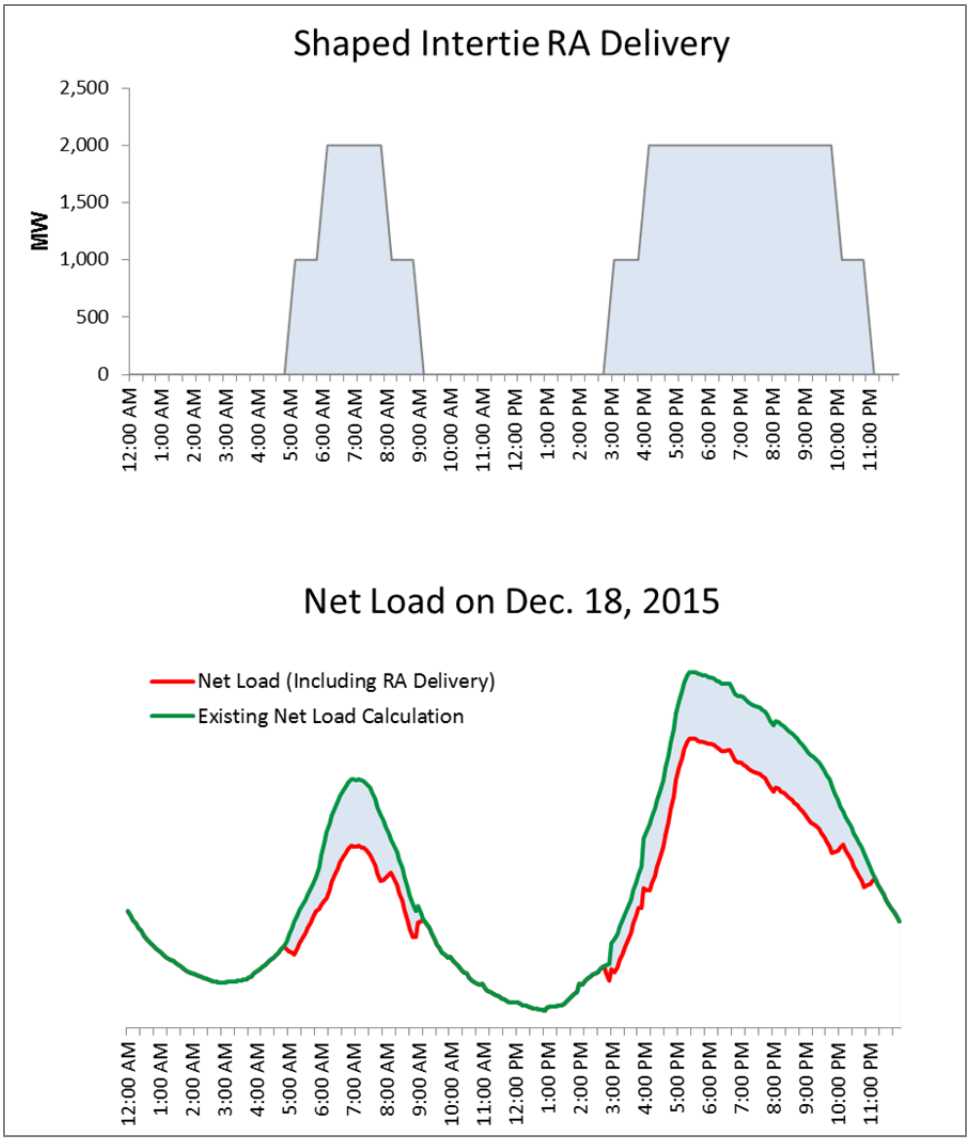
Powerex does not recommend or propose that the Flexible RA product be changed to something that does not require real-time dispatchability, however. Instead, Powerex urges the CAISO to recognize that its flexibility needs can be met in two distinct ways: First, CAISO's flexibility needs can be met by making real-time dispatchable capacity available to CAISO. This is the approach taken in FRACMOO to date, including in the Phase 2 Straw Proposal. But additionally, a portion of California's flexibility needs can be met through forward scheduling commitments that reduce the need for dispatchable capacity in the first place. Achieving this

[5] Bonneville Power Administration, *CAISO 15-Min Liquidity*, at 5-7 (Oct. 6, 2015), *available at* http://www.caiso.com/Documents/BPAPresentation_Import-ExportLiquidity_15-MinuteMarket_Workshop_Oct6_2015.pdf.

does not require creating a new category of Flexible RA product, but rather recognizing that forward RA import agreements that commit to supply "shaped" energy deliveries with a magnitude and timing that mitigates the change in net load reduces the CAISO's net load ramping requirements, and hence should reduce a Load Serving Entity's ("LSE") Flexible RA requirement.

This is highly consistent with the current approach to determining the Flexible RA requirements. This determination currently begins with a projection of (1) changes in demand; and (2) changes in VER output. Powerex believes this calculation should be enhanced to add one additional component: (3) changes to energy delivery schedules under forward RA contracts. To illustrate, assume that the average daily maximum 3-hour net load ramp for November 2016 is expected to be 9,000 MW during the evening ramp period. A forward commitment for self-scheduled imports to increase by up to 2,000 MW during targeted hours (*e.g.*, between 3 p.m. and 11 p.m.) would reduce the residual 3-hour net load ramp that would need to be met by CAISO's dispatch of resource offers to 7,000 MW, on average. The average daily maximum 3-hour net load ramp for November would be reduced by 2,000 MW in this simplified example, and thus would avoid the need for 2,000 MW of Flexible RA procurement.

For example, the net load graph for December 18, 2015 (on page 3, above) showed a maximum net load ramp of approximately 10,000 MW. Now consider a shaped intertie delivery of between 1,000 and 2,000 MW during the morning and afternoon peak hours, shown below (top chart). Such a contract would reduce the net load ramps in both the morning and evening by approximately 2,000 MW. This effect is illustrated in the lower chart, below.



In order to be included in the determination of Flexible RA needs, these shaped forward RA energy contracts would need to be executed prior to the time CAISO conducts its annual analysis. Moreover, these contracts would need to provide sufficient assurance of deliverability and performance, consistent with the RA program. The effectiveness of these "shaped" RA contracts towards reducing the Flexible RA requirements would be based on the extent to which they reduce the 3-hour maximum net load ramp.

A flexible "shaped" RA contract would provide extremely useful benefits to the CAISO over standard forward energy contracts. For example, the most common forward energy contracts transacted in western markets currently are:

1. Fixed volume on-peak deliveries (HE 7-22 Mon-Sat, excluding NERC holidays),
2. Fixed volume off-peak deliveries (HE1-6, 23,24 Mon-Sat; HE1-24 Sun and NERC holidays), and
3. Fixed volume flat deliveries (HE1-24 every day).

In Powerex's experience, the majority of import RA contracts executed today also entail a bilateral forward purchase of fixed-volume energy deliveries under these standard products, with these deliveries generally submitted as self-schedules by the applicable LSE in the CAISO's day-ahead market. That is, obtaining RA from external resources may often *not* result in day-ahead economic bids, which the CAISO can accept or reject depending on market conditions. Instead, RA from external resources may often result in self-schedules of energy deliveries across all hours of the day. While complying with CAISO's performance requirements for RA from external resources, such bilateral RA energy contracts do little to address CAISO's need for flexibility. In fact, it is clear that the current RA framework may actually be *exacerbating* the flexibility challenge by encouraging self-scheduled RA energy imports precisely when they are not needed: during the "belly" of the duck curve.[6]

In contrast, a forward import RA energy contract that was self-scheduled with a delivery profile that was *shaped to mitigate* the CAISO's 3-hour net load ramp would both be highly beneficial toward meeting the CAISO's physical needs and could be readily provided by most external flexible resources, including large, integrated hydro systems. For example, a December forward import RA energy contract that provided fixed hourly volumes in HE 6-9 and HE 16-23, with no deliveries in HE 24-5 or HE 10-15 would directly reduce the net load ramps observed in the mornings and early evenings, while also reducing (or at least not exacerbating) the CAISO's over-supply challenges by eliminating deliveries during the midday hours. Permitting such a forward import RA energy contract to reduce an LSE's Flexible RA requirement would provide the appropriate price signal for such contracts to be pursued, replacing the more common, and much less beneficial, standard products transacted as forward import RA energy contracts today.

Powerex strongly encourages CAISO, together with stakeholders, to further explore ways in which forward import RA commitments for shaped energy deliveries can be incorporated into the FRACMOO framework as a means to reducing the need to procure Flexible RA. Exploring this approach will require an evaluation of the amount of net load change that can reliably be forecast for each month, a year in advance. CAISO and stakeholders may also wish to consider certain safeguards for initial implementation, such as a limit on the amount by which an LSE may reduce its Flexible RA requirement through forward shaped RA energy contracts. This limit could start at, say, 50%, and then be gradually increased as additional experience is gained. Residual external flexibility dispatched at CAISO's discretion would still be able to participate as a Flexible RA product, but the major vehicle for external participation of large hydro facilities in meeting the CAISO's growing flexible capacity challenge is perhaps more likely to be forward shaped import RA contracts that reduce the CAISO's Flexible RA needs in the first place.

Such an approach would be highly aligned with the operating practices and forward optimization of large, integrated, clean hydro systems in the west, and therefore would provide an avenue for California to benefit from considerable additional flexibility that may not be available to provide

[6] In addition to the proposals outlined in these comments, CAISO may find it beneficial to revisit the requirements for imports to qualify for conventional RA. Specifically, rather than requiring system resources to be bid in or self-scheduled in all hours, CAISO may consider revising the requirement to an identified subset of hours. This would retain the RA framework's objective of forward procurement of capacity to meet peak demand without inadvertently exacerbating oversupply conditions.

the short lead-time, 15-minute Flexible RA product itself. There would, of course, still be a need for Flexible RA, in particular to ensure CAISO has the real-time dispatchable capacity necessary to respond to ramping needs that cannot be predicted in advance. Large hydro resources in the Pacific Northwest can be expected to potentially supply an important portion of that Flexible RA need, and the following section discusses how CAISO's proposal can be improved to maximize that participation.

III. Promoting the Broadest Possible Participation in Provision of Flexible RA

A major enhancement being considered in the FRACMOO2 initiative is enabling participation of external resources in providing Flexible RA capacity. Currently, only resources capable of being dispatched on a 5-minute basis are eligible to provide Flexible RA; the proposed enhancement would extend that eligibility to external resources that are dispatched on a 15-minute basis. Powerex is highly supportive of this proposal, as it is the first significant step toward ensuring that the CAISO's Flexible RA requirements can be met in the most economically efficient and environmentally friendly manner possible.

It will be critical that the CAISO evaluate and adopt market enhancements that dovetail closely with the types of products and commitments that external resources are capable of providing. Experience has shown that if the CAISO market design is not accurately and fully aligned with the bilateral markets in the rest of the WECC, external participation will be reduced. For instance, the re-design of CAISO's Real Time Market around 15-minute dispatch has resulted in significantly reduced intertie liquidity, due in part to differences between the CAISO's market design and prevailing practices in external markets. The requirements for external resources to provide Flexible RA must be carefully designed to provide the specific products that the CAISO needs to reliably manage its grid, while ensuring that these products are *also designed in a manner* that will attract maximum participation by external resources. Powerex looks forward to working with the CAISO and other stakeholders to achieve such an outcome.

As initial feedback, Powerex believes that there are two discrete aspects of the CAISO's initial Straw Proposal that it believes are likely to unnecessarily, and materially, inhibit the participation of external flexible resources in the FRACMOO framework:

- The Straw Proposal requires Flexible RA to be provided on a unit-specific basis. But this is inefficient, and often entirely unworkable, for many of the large integrated hydro resources in the Pacific Northwest. Powerex proposes that external flexible resources be permitted to be provided as a "system" commitment, rather than strictly requiring designation of a specific generating unit as proposed.

- The current approach to allocating intertie capacity to LSEs creates artificial impediments for LSEs attempting to contract for RA with external resources. While Powerex does not propose a wholesale re-design of the Maximum Import Capability (MIC) allocation framework, it proposes an important safeguard against the significant under-utilization of intertie capacity that has been observed to date.

Each of these issues is discussed more fully below, together with proposals to address them.

Unit-Specific vs. System-Level FRACMOO Resource Designation

The Straw Proposal proposes that, in order for an import to provide Flexible RA capacity, it must be resource-specific.[7] CAISO gives two reasons for proposing a resource-specific eligibility requirement. First, to avoid potential "double-counting" of the same resource to meet two (or more) capacity obligations. Second, to ensure that the import was capable of providing the specified flexible response. CAISO sought stakeholder feedback on this and other eligibility criteria.

Powerex strongly supports measures that ensure Flexible RA commitments represent genuine physical resources actually capable of providing the CAISO with the dispatch flexibility being committed. Flexible RA is not, and should not become, a speculative product where a supplier intends to meet its performance obligations by simply procuring available capacity on a short-term basis. Powerex also strongly supports measures that ensure physical capacity is not "double-counted" by multiple BAAs. Powerex respectfully submits, however, that requiring imports providing Flexible RA to do so on a unit-specific basis as a means of achieving these two objectives is unworkable as it is wholly inconsistent with the way that flexible capacity is often transacted between BAAs outside of the CAISO. As explained in more detail below, requiring imports to be unit-specific will virtually ensure that the clean, large integrated hydro systems of the Northwest are shut out from providing Flexible RA to meet CAISO's flexibility needs.

Many of the multi-plant hydro systems in the Northwest are planned and operated on a highly integrated basis. Such systems are subject to a myriad of constraints, including environmental restrictions, flood control, irrigation, and recreational constraints. Moreover, the production at one upstream facility in an integrated hydro system will impact the conditions and availability of downstream facilities, though these impacts may not be felt until hours or even days later. Complex hydro systems are therefore typically optimized for maximum efficiency of the system as a whole.

This system-level optimization approach is manifest in the types of wholesale market transactions that such systems support: in particular, transactions from integrated hydro resources are typically backed by the entirety of the specified system rather than by any one individual unit or plant. For instance, Powerex typically enters into fixed volume, forward physical delivery commitments that are scheduled from the BC Hydro system as a whole; these commitments do not specify any one particular generating facility. Indeed, Powerex has used this system-level approach to provide CAISO with considerable flexible capacity at 5-minute granularity in virtually every hour since 2005; there can be no serious question whether system-level scheduling provides adequate assurance of performance.

In Powerex' s experience, other integrated large hydro system owners—like BPA with its federal power system and public power utilities with hydro generation at Mid-Columbia—also typically transact in a similar fashion, entering into fixed volume delivery commitments scheduled from their respective, integrated hydro systems as a whole. Some of these entities also make

[7] Straw Proposal at 13.

variable volume commitments—by selling "slices" of their entire system output (including capacity, energy and storage)—which are also generally scheduled from their integrated hydro systems as a whole. This "system based" scheduling practice reflects the reality that it is far more challenging—and would be tremendously inefficient—to enter into a forward commitment to produce and schedule, say, 100 MW for export from a *specific* hydro generating unit than it is to commit to produce and export 100 MW from the totality of hydro system resources producing at the time of delivery. The CAISO's draft proposal to require Flexible RA to be strictly provided on a unit-specific level is simply incompatible with how many of the integrated hydro systems in the Northwest operate and schedule deliveries today. Consequently, imposing such an eligibility requirement is likely to sharply limit the quantity of Flexible RA that will be provided by the clean, flexible hydro resources available in the region.

Powerex believes it essential to the success of this initiative for CAISO to leverage the manner that flexible capacity commitments are already transacted bilaterally in the west today, and modify the proposed eligibility criterion to permit designation of a specific system resource, rather than requiring identification of an individual unit within that system. Modifying the Straw Proposal in this manner would greatly increase the extent to which clean hydro resources are able to provide Flexible RA to the CAISO. Moreover, this modification would in no way undermine CAISO's objective—which Powerex shares—that Flexible RA be genuinely backed by physical generation capacity. To be clear, Powerex does not propose that Flexible RA be provided with no designation of the underlying physical resources whatsoever; rather, the designation of physical resources should be compatible with how those same types of commitments are scheduled today.

Specifically, Powerex recommends that CAISO require that suppliers of Flexible RA identify both the "source BAA" and the generation "source" to be included in the e-Tag, which may be provided either as a system resource or a specific unit. A key performance requirement of Flexible RA is to offer economic bids into the FMM, and the CAISO Tariff requires that FMM economic bids from intertie resources submit an e-Tag by 20 minutes prior to the applicable trading hour, *even if the bid does not clear in the CAISO FMM market.*[8] Therefore, import Flexible RA will be required to submit a valid e-Tag for every hour of the term of the Flexible RA contract. By requiring sellers of import Flexible RA to commit in advance to key parameters of those e-Tags (*i.e.,* the source BAA and the generation source), entities would be unable to "go short" and sell Flexible RA with the intention of procuring capacity in the bilateral spot markets. Powerex has included a sample e-Tag in Appendix A, showing a hypothetical delivery from the BC Hydro system pursuant to a Flexible RA import commitment. In addition to requiring advance commitment to the delivery arrangements for imported Flexible RA, these commitments would be subject to CAISO performance requirements, just like internal resources.

Permitting a system-level, rather than a unit-level, designation of Flexible RA resources also does not raise the concerns articulated in the Straw Proposal regarding the potential double-

[8] *See* Cal. Indep. Sys. Operator Corp., Fifth Replacement FERC Electric Tariff, Section 30.6.2.5, (requiring an e-Tag with a transmission profile at least equal to the maximum bid-in capacity for the Trading Hour). At T-20, the FMM results for the *first* 15-minute interval may be known, but the results for subsequent intervals will not.

counting of capacity both to provide Flexible RA to CAISO and to satisfy the EIM flexible ramping capacity requirement. Powerex describes an alternative approach to address the double-counting issue in greater detail in the following section. As a threshold matter, however, it is clear that a unit-specific requirement for resources in BAAs that are not EIM entities is unnecessary, as those BAs are not subject to the EIM's flexible ramping capacity requirement, and hence cannot present the specific concern raised by CAISO in the Straw Proposal.

While CAISO takes the view that it needs to have unit-specific information in order for it to determine the physical response capabilities of the underlying generating units supporting the import into CAISO grid, that view is misplaced in the case of imports. Unlike internal generation, whose flexibility depends on the characteristics of each generating unit, interchange schedules generally follow a fixed ramp profile.[9] These fixed ramps do not change simply because a generating resource in the source BAA adjusts its output faster or slower than the specified interchange ramp. For this reason, the individual unit supplying Flexible RA to CAISO—even if it could be identified—does not determine whether or not CAISO receives the dispatchable flexible capacity that was promised under a Flexible RA contract.

Ensuring Transparency of all Flexible Capacity Obligations of EIM Entity BAAs

The Straw Proposal raises the concern that the same generating capacity may be double-counted, first to meet the BAA's flexible ramping capacity requirement under the EIM, and again to provide Flexible RA to the CAISO. Powerex agrees that double-counting should be avoided; a MW of capacity cannot be relied upon to meet the reliability needs of multiple BAAs. This concern goes beyond the commitments made to CAISO and the host EIM Entity BAA, however. It is commonplace for capacity to be committed through products including spinning reserve or dynamic scheduling arrangements where the sink BAA has the right to deploy the capacity to deliver energy. For CAISO to have complete visibility into the resource sufficiency of EIM Entity BAAs, it needs a framework for those entities to comprehensively report on capacity commitments to external BAAs, including not only Flexible RA commitments to the CAISO, but also flexible capacity commitments to other BAAs, including those that do not participate in the EIM.

As an example, consider a scenario in which (1) entity(ies) in NV Energy's BAA sells 100 MW of "on demand" spinning reserve to a non-EIM BAA; (2) entity(ies) in NV Energy's BAA sells an additional 100 MW of Flexible RA to the CAISO; and (3) CAISO determines that NV Energy must include at least 100 MW of flexible ramping capacity in its EIM resource plan to satisfy the EIM resource sufficiency requirements. The Straw Proposal appears to identify the concern that the same capacity used to sell Flexible RA to CAISO (*i.e.,* numeral 2, above) will be included in the EIM resource plan and satisfy the NV Energy flexible ramping capacity requirement (*i.e.,* numeral 3, above). But the same concern arises if the capacity used to sell "on demand" spinning reserve (*i.e.,* numeral 1, above) is also included in the EIM resource plan. Ultimately,

[9] Specifically, hourly schedules are adjusted over a 20-minute period beginning at 10 minutes prior to the start of the hour and concluding 10 minute after the start of the hour. Fifteen-minute schedules adjust over a 10-minute period beginning at 5 minutes prior to the start of the interval and concluding 5 minutes after the start of the interval.

CAISO's need for full visibility into the capacity available in the NV Energy BAA necessitates that it be informed of all three of the above commitments when it evaluates EIM resource plans.

Powerex believes there are two key steps required for CAISO to achieve this level of visibility. First, it needs information on the flexible capacity commitments made by entities in each EIM Entity BAA to other BAAs. Since flexible capacity commitments are delivered through interchange e-Tags, Powerex believes it would be straightforward for CAISO to require EIM Entities to utilize the existing e-Tag token field functionality to gather and subsequently communicate this information to CAISO. Second, CAISO will need information from the EIM Entity BAA regarding which generating units are being relied upon to satisfy these external flexible capacity commitments. This can be achieved by requiring that the EIM resource plan account for all flexible capacity commitments of the BAA, and identify the unit or units being encumbered to satisfy those commitments. Only generating units not otherwise fully encumbered by flexible capacity commitments to other BAAs (including Flexible RA commitments to CAISO) should be eligible to satisfy the EIM flexible ramping capacity requirement.

Importantly, the above framework ensures there is no double-counting of flexible capacity in an EIM Entity BAA *without* requiring that Flexible RA contracts specify resources down to the unit level. In other words, a Flexible RA design that permitted resources to be designated at a system level would be fully compatible with CAISO's needs for unit-level information in the EIM. The unit-level specificity would be found in the EIM resource plans submitted by each EIM Entity BAA prior to each operating hour, however, and would not need to be locked in for the duration of the forward Flexible RA contract.

Safeguards are Necessary to Prevent "Stranding" of MIC Capacity

The Straw Proposal identifies a second criterion of imports providing Flexible RA: LSEs using an import resource for Flexible RA "must demonstrate that it has sufficient Maximum Import Capability (MIC) capacity."[10] The Maximum Import Capability is intended to ensure deliverability of intertie RA imports by limiting the total RA contracts on each intertie to no more than the intertie's expected import transfer capability. This is achieved by effectively allocating MIC on each intertie to LSEs through a 13-step process, largely based on an LSE's load-ratio share. That is, LSEs with larger loads are able to receive higher MIC allocations. Importantly, the MIC allocation does not confer any physical or financial transmission rights; it simply acts to limit the quantity of import RA that each LSE may claim toward satisfying its RA obligations.

Any effort designed to increase CAISO's ability to use external flexible resources to meet its flexibility needs will fail if the allocation of MIC capacity is flawed and results in significant under-utilization. Unfortunately, there is considerable evidence from the procurement of generic system RA that the MIC allocation process, as currently designed, is not working efficiently and results in a significant hindrance to the cost-effective procurement of RA from external resources.

[10] Straw Proposal at 14.

In its 2013-2014 report on the RA program, the CPUC notes that only between 5 and 10% of total committed RA capacity has been from imports.[11] This is consistent with earlier CPUC reports, and also with analysis conducted by the Department of Market Monitoring.[12] In its report for 2012, CPUC compared the quantity of import RA capacity to the allocation of MIC, and concluded that "CPUC jurisdictional LSEs used between nine and 56 percent of their monthly import allocations during the summer of 2012."[13] This low level of utilization of imports would be expected if external RA resources were more expensive than in-state capacity. But in Powerex's experience, intertie RA contracts are typically priced *below* the average price of system-wide RA contracts, as reported by the CPUC.[14] This strongly suggests that the MIC capacity allocations are significantly under-utilized despite the comparatively low price of import RA.

Powerex's experience and the CPUC data indicate that the MIC allocation process is a serious impediment to California LSEs procuring RA from the lowest cost resources. Simply put, some LSEs that wish to purchase import RA are unable to obtain sufficient MIC capacity, while other LSEs that have received allocations of MIC capacity do not fully utilize that allocation to support RA procurement from imported resources. There is a clear inefficiency in the allocation of MIC capacity, and it has resulted in significant and recurring "stranding" of import capability. There is no reason to believe that this same inefficiency will not plague contracting for Flexible RA from external resources as well.

While Powerex has significant concerns that the MIC capacity methodology may impair least-cost procurement of Flexible RA, it is cognizant that CAISO does not seek a wholesale redesign of that framework at the present time. Powerex believes that the stranding of MIC can be reduced through incorporating a simple, but highly important, safeguard into the existing MIC allocation methodology. This safeguard would reduce the allocation of MIC capacity to LSEs that did not utilize their allocation (or transfer their unused allocation to other entities) in the prior year. This unallocated MIC capacity could instead be made available to entities that do seek to procure import RA or Flexible RA, on a first-come first-served basis. Powerex provides additional detail, including proposed revisions to the pertinent CAISO Tariff provision, in Appendix B to these comments.

IV. Improving Export Efficiency

The Straw Proposal explains that CAISO is "exploring the potential for exports to provide flexible capacity." It also seeks stakeholder input on "whether adjustments to measured demand

[11] Cal. Pub. Util. Comm'n, *The 2013-2014 Resource Adequacy Report* at 17.
[12] *See, e.g.,* Cal. Indep. Sys. Operator Corp. Department of Market Monitoring, *2014 Annual Report on Market Issues & Performance* at 187 ("Utilities used imports to meet around 3,800 MW, or about 8 percent, of the resource adequacy requirements during the 210 highest load hours").
[13] Cal. Pub. Util. Comm'n, *2012 Resource Adequacy Report* at 34 (Apr. 2014), *available at* http://www.cpuc.ca.gov/NR/rdonlyres/94E0D083-C122-4C43-A2D2-B122D7D48DDD/0/2012RAReportFinal.pdf.
[14] It would be very useful for the CPUC to differentiate between system RA procured from internal as opposed to intertie resources in its annual analyses of the RA program. CPUC reports for 2012 and later limit pricing analyses only to contracts with internal generators.

charges (1) are needed to help facilitate exports ability to provide flexible capacity and (2) are applicable since the export is providing a grid service."[15]

Powerex believes that exports from the CAISO grid can play an important role in providing flexible capacity. Exports that increase when market prices are low can help mitigate oversupply conditions, whether due to short-term ramping constraints or due to longer-term minimum generation constraints. Exports that can be interrupted or reduced on short notice can also provide upward flexibility in the same manner that increased imports can. Powerex therefore strongly supports CAISO continuing to explore the role that exports can play in meeting CAISO's flexibility needs. That said, Powerex does not believe that incorporating exports into the FRACMOO framework should be a priority at this time. Once the core enhancements necessary to permit external flexible resources to participate in the FRACMOO framework have been implemented, it may be appropriate to consider future enhancements such as enabling export transactions as an additional mechanism for that participation.

Significant improvements can and should be made, however, to facilitate efficient export activity within the context of CAISO's energy spot markets. Powerex believes that improving the efficiency of short-term price signals may be highly effective in increasing the quantity of price-responsive intertie participation, especially in real-time. Some of these measures have already been raised in the context of other initiatives dealing specifically with increasing intertie liquidity. However, CAISO has sought input regarding whether the application of the Transmission Access Charge ("TAC") and other so-called "measured demand" charges impede efficiency and, if so, whether these charges should be waived in certain circumstances. Powerex believes these charges currently impose inefficient "hurdle rates" that prevent otherwise economic transactions from taking place.

The measured demand charges applied by CAISO serve a vital purpose, however, as they provide for the recovery of the revenue requirements for the transmission system, as well as other costs not fully recovered through market prices. Powerex concurs with the succinct explanation provided by CAISO during the December 21, 2015 stakeholder call: the cost of funding the CAISO transmission system should be borne by all entities using the system to meet firm load. Departing from this principle would be inequitable and inconsistent with cost causation principles. Moreover, exempting some firm load service from these charges would create a powerful and destabilizing incentive for entities to move into the "exempt" category. For instance, if TAC and other measured demand charges were assessed on CAISO loads but waived for all exports, it would create a greater than $10/MWh inducement for loads to leave the CAISO BAA. And, of course, every dollar of measured demand charges that are waived is a dollar more that must be recovered from customers that do not (or are unable) to avoid those charges.

It is equally important to recognize, however, than not all export transactions are for the purpose of meeting firm load service, just as not all electricity consumption within the CAISO BAA represents firm load service. Some entities export energy not to "keep the lights on" in another BAA, but to enable a more expensive external resource to be backed down, thus avoiding

[15] Straw Proposal at 16.

production costs and/or conserving energy for generation at a future time, when it is expected to be more valuable. This is certainly the case when entities, including Powerex, use energy purchases to reduce output from storage hydro systems. In a very similar fashion, pumped storage or other storage technologies within the CAISO BAA may consume energy to replenish or "charge" their facilities, thereby making additional energy available in future, more valuable periods.

These are important economic displacement activities, and they provide the CAISO with several types of benefit. First, and most obviously, they increase demand during lower-priced periods, ameliorating oversupply and preventing more severe price volatility. Second, additional consumption by storage resources—whether internal pumped-storage, battery storage or external hydro systems—provides an efficient means for energy to effectively be shifted from lower-value to higher-value periods. In other words, when storage resources consume energy in one period, it can *increase* supply in other periods, further mitigating upward price volatility.

Not only are these activities efficiency-enhancing, but they are also highly price sensitive. The application of measured demand charges to these activities is therefore likely to significantly deter this type of highly beneficial participation. Removing measured demand charges will remove distortions to the price signals that drive these economic displacement opportunities. Moreover, it will afford market participants with a greater incentive to participate in the real-time market. In Powerex's experience, if attractive opportunities to purchase energy in real-time are rare, participants will not manage their resources to be prepared to such opportunities. On the rare occasion that attractive purchase opportunities do arise, such as during oversupply events, few participants will be ready or able to respond to those price signals. But removing measured demand charges from economic displacement transactions can make attractive purchase opportunities more common, and hence lead participants to be better prepared to respond to real-time market conditions, including oversupply.

CAISO has recognized in multiple other contexts that it is inefficient—and hence undesirable—to impose incremental "hurdle rates" on beneficial economic activity. This is a major source of the benefits of EIM participation, for instance, under which exports from the CAISO to EIM participating BAAs are exempt from incremental CAISO transmission charges and other CAISO measured demand charges that would otherwise apply. The EIM is able to do so, in part, because transfers between EIM BAAs are intended to be for economic displacement, and are permitted only if the receiving BAA has demonstrated it is not "leaning" on committed capacity from other EIM BAAs to serve its firm load obligations.

The challenge, then, is to reliably distinguish loads and exports undertaken for price-sensitive economic displacement activity from those that are relied upon to serve firm load obligations. Measured demand charges should continue to be applied to the latter, but should not apply to the former category. Identifying internal demand resources whose consumption is efficiency-enhancing should be straightforward, as CAISO has visibility to the specific characteristics of each facility (*e.g.,* pumped storage or battery storage). For exports, however, CAISO does not have visibility regarding the purpose for which the export is undertaken. It can nevertheless design an export category whose features would be entirely incompatible with exports being

relied upon to serve firm load obligations outside the CAISO BAA. Specifically, Powerex proposes that CAISO consider developing a new "Flexible Export" product, whose distinguishing feature is that it can be curtailed or reduced at CAISO's direction. This can be achieved through a new Flexible Export product with the following design features:

- All real-time bids for Flexible Exports would have to be price-sensitive – self schedules would not be permitted.

- A Flexible Export that is awarded in the day-ahead market would be required to be offered back as a price-sensitive "INC" bid in the real-time market (*i.e.,* it could not simply be self-scheduled in real-time).

- All Flexible Exports (including those awarded in the 15-minute market) would be subject to curtailment by CAISO prior to curtailing conventional (*i.e.,* "firm") exports. Curtailment of Flexible Export schedules would have an appropriate penalty price associated with this action, which may be lower than the existing CAISO penalty prices for involuntary curtailment of export schedules.

- All Flexible Exports would be required to be e-Tagged to the sink BAA using an unambiguous "non-firm" energy product designation (*e.g.,* "G-NF"). This ensures that the non-firm nature of the export is clear to all entities on the e-Tag, including the sink BA, and cannot be relied upon to meet firm load obligations.

- Flexible Exports would not be assessed TAC or other measured demand charges, in recognition that they do not serve firm load and they provide CAISO with valuable flexible capacity in return. All other exports, including wheel-through transactions, would continue to pay TAC and other measured demand charges.

Powerex believes that the Flexible Export concept could go a long way to encouraging additional 15-minute liquidity when CAISO is the lowest-cost source of power in the region. Additionally, if the CAISO determines in the future that it needs flexible exports to help manage oversupply from a reliability perspective, the Flexible Export product could provide the foundation for RA or Flexible RA exports during mid-day hours that comprise the "belly" of the duck curve.

Appendix A

Illustrative e-Tag Identifying Flexible Capacity Commitments to External BAAs

Tag Information				
Source BA	**PSE**	**Tag Code**	**Sink BA**	**Transaction Type**
BCHA	BCPS01	XYZ123	CISO	Normal

Market Path			
PSE	**Product**	**Contract**	**Misc**
BCPS01	G-F		
PWX01			
PWXSC	L		

Source BAA

System-level Source Point

PHYSICAL PATH							
BA	**TSP**	**PSE**	**POR**	**POD**	**Sched Entities**	**Contract**	**Misc (Token/Value)**
BCHA		BCPS01	**Source: BCHA**				
	BCHA	BCPS01	GMS.MCA.REV	BC.US.Border	BCHA		
	BPAT	PWX01	BC.US.Border	JohnDay	BPAT		
	BPAT	PWX01	JohnDay	Malin500	BPAT		
	CISO	PWX01	Malin500	NP15	CISO		Token: **CAISO_RA** Value: "**Flex RA**"
CISO		PWXSC	**Sink:** NP15				

Current Energy and Transmission Profiles:				
Date	**Start**	**Stop**	**Transmission Profile**	**Energy Profile**
1-Jan-17	15:00	16:00	100	0

Token/Value Pairs could be used to identify Flex RA obligations

Appendix B

Proposed MIC Allocation Safeguard

Powerex suggests that the allocation of MIC continue to be based on each LSE's load ratio share, according to the current 13-step process, but only if the LSE actually used its allocation (within a specified threshold) in the prior year. If an LSE used substantially less than its allocation in the prior compliance year, then its current year allocation would be based on its prior-year actual use. More specifically:

- Each LSE's MIC allocation on an over-requested intertie would be limited by its prior-year use of import capacity on that intertie if, in the prior compliance year, it:
    - Used less than 90% on average, in the peak load hour each day, in 6 or more months of its annual allocated MIC (net of bilateral transfers), for RA or Flexible RA contracts of any duration; or
    - Used less than 80% on average, in the peak load hour each day, in 6 or more months of its annual allocated MIC (net of bilateral transfers) for year-ahead and month-ahead RA or Flexible RA.
- These limitations would *not* apply if the LSE could demonstrate that it has executed annual RA or Flexible RA contracts on the respective intertie requiring a higher level of MIC than was used in the previous year; in this case annual MIC would be limited to the demonstrated volume of contracts in 6 or more months
- Any MIC capacity that is unallocated as a result of applying the above limitations would be available to other LSEs under the initial Intertie assignment during Step 9 of the allocation process. In addition, each LSE would still be able to request MIC capacity on the relevant intertie during any secondary allocation under Step 11 or Step 13.

Powerex believes that additional language could be added to Step 9 of the MIC Allocation (CAISO Tariff Section 40.4.6.2.1) as highlighted in bold below:

> Step 9: Initial Scheduling Coordinator Request to Assign Remaining Import Capability by Intertie:
>
> In accordance with the schedule set forth in the Business Practice Manual, the Scheduling Coordinator for each Load Serving Entity or Market Participant shall notify the CAISO of its request to assign its post-trading Remaining Import Capability on a MW basis per available Intertie. Total requests for assignment of Remaining Import Capability by a Scheduling Coordinator cannot exceed the sum of the post-traded Remaining Import Capability of its Load Serving Entities. The CAISO will honor the requests to the extent an Intertie has not been over requested. If an Intertie is over requested, the requests for Remaining Import Capability on that Intertie will be assigned based on each Load Serving Entity's Import Capability Load Share Ratio in the same manner as set forth in Step 4. **However, if during the previous compliance year and on the relevant intertie, an LSE either:**

a) **Used less than an average of 90% of its assigned Import Capability, net of bilateral transfers, in the peak load hour each day, during six or more months for deliveries of RA or Flexible RA contracts of any duration, or**
Used less than an average of 80% of its assigned Import Capability, net of bilateral transfers, in the peak load hour each day, during six or more months for deliveries of year-ahead and month-ahead RA or Flexible RA contracts, then the total request assigned to the LSE according to the methodology set forth in Step 4 shall not exceed the LSE's average usage (as measured during the six months of greatest usage) unless the LSE can demonstrate evidence of executed RA contracts on the relevant Intertie that exceed such quantity over six or more months. If the LSE provides such documentation, then the total request assigned to the LSE shall not exceed the quantity of such executed contracts.

A Market Participant without an Import Capability Load Share will be assigned the Import Capability Load Share equal to the average Import Capability Load Share of those Load Serving Entities from which it received transfers of Remaining Import Capability.

The above is only one possible approach, and Powerex would welcome the opportunity to discuss alternative safeguards with CAISO and other stakeholders. Ultimately, however, it must be recognized that the current approach has resulted in an allocation of MIC capacity to entities that may often significantly under-utilize that capacity to procure RA from external resources. In order to reduce the amount of inefficient "stranding" of intertie capacity for forward RA procurement, it will be necessary to reduce the amount of MIC capacity that is simply allocated to LSEs as "free options" to *potentially* support import RA contracts, and to increase the amount of MIC capacity that is available to entities actually intending to utilize it for yearly and monthly RA import contracts.