

**Comments of Powerex Corp. on
Congestion Revenue Rights Efficiency Working Group**

Submitted by	Company	Date Submitted
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Powerex appreciates the opportunity to submit comments on CAISO's December 19, 2017 Congestion Revenue Right ("CRR") efficiency working group discussion. As expressed in its comments on the CRR analysis report, Powerex believes the detailed and comprehensive analysis conducted by CAISO is very helpful in identifying aspects of the CRR design that should be improved or modified. Powerex commends CAISO staff for the depth and breadth of the analysis and the accompanying report.

Powerex supports efforts to address inefficiencies in the CRR framework while preserving the critical role of CRRs in providing open access to CAISO transmission service on a forward basis. Powerex believes both of these objectives—open access and efficient market outcomes—are vital and achievable. The working group discussion suggests, however, that some entities view these goals as mutually exclusive, requiring CAISO to pick one of these important objectives and sacrifice the other. In Powerex's view, such a sacrifice is completely unwarranted and unnecessary. It would be wrong to point to challenges with CRR performance as a justification for abandoning forward open access to the CAISO transmission system by restricting access to forward transmission rights to load serving entities. And it would also be wrong to suggest that open access principles somehow require ratepayers to bear large financial consequences associated with inefficiencies in the CRR framework, such as funding systemic profits from financial speculation on transmission outages. Powerex believes both of these positions are extreme, and for the same reason: they elevate the economic interests of one subgroup of market participants above the goal of preserving transmission open access and efficient market outcomes for the market as a whole.

Powerex remains optimistic that CAISO will avoid taking such extreme positions, and will instead seek to identify CRR enhancements that continue to ensure efficient, open access to forward transmission rights on the paths necessary for competitive forward contracting between physical supply and CAISO load. Moreover, while much of the discussion to date has focused on the financial impacts of the current CRR design on one group of stakeholders (*i.e.*, load serving entities ("LSE")), Powerex believes enhancements should strive to improve the efficiency of the CRR framework as a whole.

These comments first summarize Powerex's understanding of the key objectives that any CRR framework must achieve. Many of these principles were discussed in CAISO's 2006 FERC filings in which it first proposed the existing CRR design. Then, as now, the most important role of CRRs was recognized as supporting forward contracting of physical supply by allowing

parties to lock in congestion charges that otherwise would not be known until the day-ahead market was run each day. CRR quantities that are directly supported by the CAISO's collection of day-ahead congestion charges maximize the availability, and minimize the cost, of providing these critical congestion hedges to support forward contracting arrangements and efficient forward market outcomes. There also is no reason to pre-determine which type of market participant—whether generator, LSE, or intermediary such as a marketer—can obtain a CRR, as efficient forward contracting requires support for a variety of forward arrangements.

In addition to the need for CRRs to enable forward contracting, the design of the CRR framework must also include a mechanism to ensure the economic value of the transmission grid is generally returned to the ratepayers that fund it. Under the current CRR framework, this occurs through both the allocation of CRR auction proceeds to ratepayers and the direct allocation of CRRs to LSEs. Powerex believes there are significant drawbacks to this latter approach, and alternative mechanisms are available and used extensively in other organized markets.

With these fundamental objectives of any CRR design in mind, Powerex makes specific recommendations that it believes will largely address the current concerns with CRR revenue inadequacy while resulting in a more robust and efficient process for making CRRs available. These recommendations include that CAISO:

1. Limit eligible source and sink points for CRRs

Powerex proposes that, in the CRR auction process, CAISO would issue CRRs only between locations required to efficiently hedge forward contracts for the physical delivery of energy. Specifically:

- a. From generator nodes or import scheduling points to forward trading hubs (SP15 or NP15); and
- b. From forward trading hubs (SP15 or NP15) to LSE load aggregation points or export scheduling points.

2. De-rate allocated and auctioned CRRs volumetrically each day

Powerex proposes that CAISO develop and implement a daily process, in advance of the day-ahead market, to efficiently “de-rate” the quantity of awarded CRRs in order to ensure simultaneous feasibility under updated transmission conditions, thus reducing revenue inadequacy.

3. Reduce the volume of CRRs directly allocated to LSEs

The direct allocation of CRRs to LSEs seeks to provide an equitable distribution of the economic value of the transmission grid, yet it also can result in inefficient forward contracting and/or inefficient scheduling of physical resources in the day-ahead and real-time markets. Powerex proposes that CAISO revisit the rationale for directly allocating

CRRs to LSEs, as some of the circumstance that existed over a decade ago—and in particular the long-term contracts in place at the time—may no longer exist. In particular, Powerex proposes that CAISO explore implementing a framework of auction revenue rights (“ARRs”) to allocate the value of the grid to ratepayers, as occurs in most other FERC-jurisdictional organized markets. This would require all market participants, including LSEs, to procure CRRs through the CAISO auction, making the auction more efficient and improving price discovery. To the extent any CRRs continue to be directly allocated to LSEs, these should be limited to the quantities and paths necessary to support forward contracts that have already been executed, and/or to CRRs from liquid forward trading hubs such as NP15 and SP15.

I. Open And Non-Discriminatory Access To CRRs Is Necessary To Support Efficient Forward Arrangements For Physical Energy

This section provides an overview of the multiple objectives and design choices regarding CRRs. These comments draw on CAISO’s 2006 submission to FERC regarding its Market Redesign and Technology Upgrade (“MRTU”) initiative, which included the core CRR design that remains in place today. Powerex believes this context is valuable in identifying the key attributes that are—and are not—vital to the CRR framework, and can help distinguish the core aspects of the existing CRR design that must be preserved from those elements that can potentially be modified, removed, or replaced.

A. The Most Important Purpose Of CRRs Is To Facilitate Forward Contracting Of Physical Supply

The basic function of CRRs was summarized by CAISO in 2006: “CRRs will allow Market Participants to obtain financial protection for the risk of Congestion Charges associated with the LMP Congestion Management design.”¹ The primary purposes of CRRs were further explained in supporting testimony from Dr. Scott Harvey and Dr. Susan Pope, stating that the “most important purpose of financial rights such as CRRs is to facilitate long-term contracting by load-serving entities ... and generators.”² Drs. Harvey and Pope explained that the price differences inherent to LMP markets exposed long-term arrangements to congestion-related charges that would not be known until delivery is scheduled in the day-ahead or real-time market. “Absent some form of effective long-term congestion hedge, the risks arising from changes in congestion patterns would deter LSEs from entering into long-term contracts.”³

Powerex believes the CAISO CRR design properly emphasized the importance of CRRs in supporting forward contracts for physical supply. CRRs are essential to enabling forward contracting by providing a means for the contracting entities to “lock in” the cost of CAISO

¹ *Cal. Indep. Sys. Operator Corp.*, Electric Tariff Filing to Reflect Market Redesign and Technology Upgrade, Docket No. ER06-615-000, Transmittal Letter at 23 (filed Feb. 9, 2006) (“MRTU Filing”).

² MRTU Filing, Exh. No. ISO-2 at 22.

³ *Id.* at 25.

transmission service on a forward basis. In this regard, CAISO's offering of CRRs provides the financial equivalent of monthly or annual firm point-to-point physical transmission service under the *pro forma* OATT. Either approach—whether based on financial rights or physical scheduling rights—enables entities to enter into forward transactions and obtain certainty regarding the cost of the transmission service needed for physical delivery of those forward transactions. Enabling forward transactions, in turn, reduces reliance on spot markets and is widely recognized as critical to properly functioning electricity markets.

Notably, the stated purpose of CRRs did *not* include more broadly enabling entities to take financial positions on future congestion charges. The primary need for congestion hedges was driven by their importance to forward contracting for physical supply, not for hedging other types of risk or for financial speculation. As is discussed in Section II, Powerex believes it is thus possible for CAISO to limit the eligible CRR source/sink combinations in a manner that continues to make CRRs available on paths that enable forward physical delivery arrangements, but reduces the availability of CRRs for financial speculation on isolated constraints that do not serve that core purpose.

B. Offering CRRs Cannot Simply Be Left To Private Entities

CAISO's 2006 MRTU Filing also addressed another point that has been raised in this stakeholder process: whether forward congestion hedging instruments could be offered by entities other than the CAISO. Drs. Harvey and Pope testified that such instruments likely would be offered, but that "[i]t is not likely . . . that the market for congestion hedges would be as liquid, or that the cost of the hedges (i.e., the premium over expected day-ahead congestion values) would be comparable to the cost of CRRs in a CAISO-coordinated auction."⁴ This reflects that CRRs offered by the CAISO are funded by the same congestion charges collected by the CAISO in the day-ahead market; CAISO is therefore the only entity that can offer forward congestion hedges without needing to estimate future congestion patterns, future energy prices, or other future conditions, and thus without needing to take a speculative position.⁵

Powerex believes that these core principles of CAISO's CRR design remain as sound today as they were when the framework was filed at FERC in 2006. Hedging the congestion charges associated with delivery of physical energy remains crucial to enabling forward contracts and efficient forward markets, and the CAISO remains the only entity that can offer CRRs without requiring a speculative financial position regarding future congestion charges.

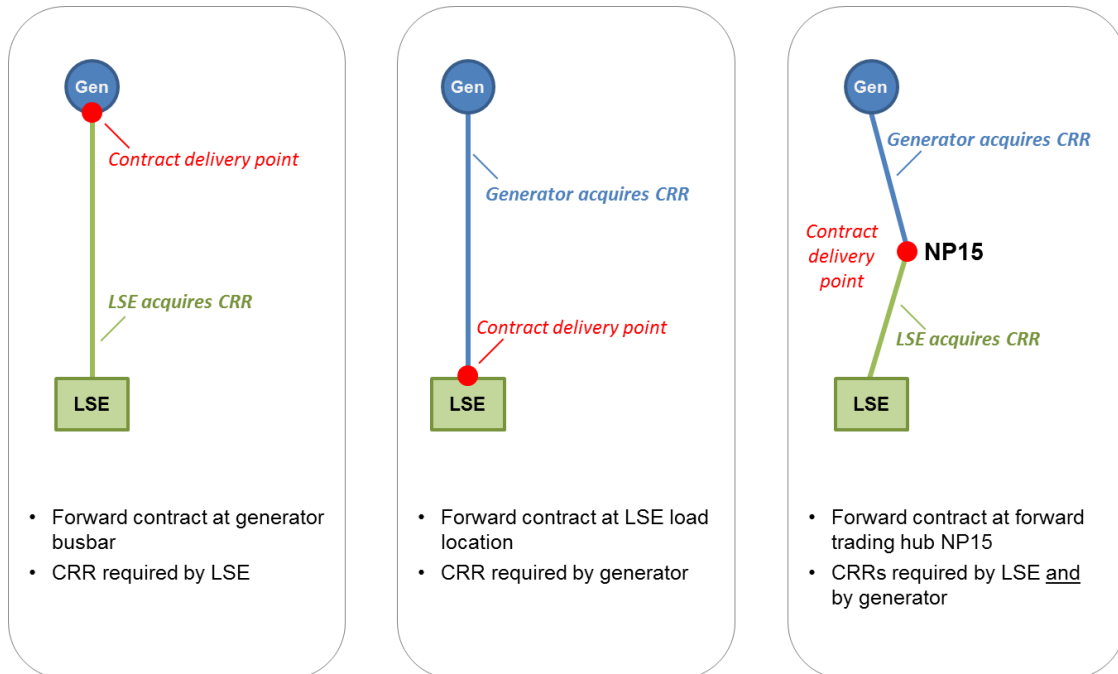
C. Forward Access To The CAISO Transmission System Must Be Made Available To All Market Participants, Not Just California LSEs

The prior sections explain why forward contracts for physical supply require CRRs to be available. However, forward contracts for physical supply do not require that CRRs be held specifically by LSEs, as the purchasing party, as opposed to other parties involved in the

⁴ *Id.* at 34.

⁵ *Id.* at 34-35.

forward contracting arrangements. For instance, one type of forward contract arrangement involves a situation in which an LSE buys power at a generator's busbar, and the LSE also procures a CRR to hedge the congestion charges between the contract delivery point (*i.e.*, the generator's location) and its load. This is illustrated in the left-hand diagram below.



But under a different forward contract arrangement, an LSE may buy power delivered to its load location, with the *generator* obtaining the CRR from its busbar to the load points, as shown in the middle diagram of the illustration above. Yet a third type of arrangement may entail a generator and an LSE who do not contract directly with one another at all, but instead contract to sell and buy power at a liquid forward trading hub, such as NP15. Under this arrangement, shown in the right-hand diagram above, the generator obtains a CRR to hedge future congestion charges between its busbar and NP15, while the LSE procures a CRR to hedge future congestion charges between NP15 and its load.

Each of these types of arrangements result in long-term contracts for physical supply, and all of them require that CRRs be available to support the transactions. Only the first example involves CRRs being obtained exclusively by the LSE, however, as opposed to other parties involved in forward contracting activity.

Even though efficient forward contracting can require CRRs to be procured by any of the contracting parties, the current CRR framework also includes a separate CRR allocation process whereby the CAISO first makes CRRs available exclusively to LSEs, at no charge. This aspect of the CRR framework reflects a second and distinct objective of financial transmission rights, however. This second objective was described in the MRTU filing as

“ensuring that the market participants that have a continuing obligation to pay the embedded cost of the transmission system receive the economic value of the transmission system.”⁶ In other words, the purpose of allocating CRRs to LSEs was separate and distinct from the core purpose of enabling forward contracting by providing a hedge against future congestion charges. The CRR allocation process was used as a way to return congestion rents back to transmission ratepayers.⁷ In this manner, “the allocation of CRRs ... provides a transition mechanism that preserves the economic value of customers’ existing entitlements to use of the transmission system.”⁸

Importantly, however, it has always been recognized that the equitable allocation of the congestion value of the transmission system does not necessarily require LSEs to receive CRRs directly. Instead, this objective also can be achieved by returning CRR auction proceeds to LSEs, such as through the explicit assignment of ARR to LSEs on specified paths.⁹ Under the ARR approach—which is used in most FERC-jurisdictional organized markets—LSEs receive an allocation of ARRs on specified paths, which entitle them to the revenues associated with the auction of associated CRRs on those paths. LSEs thus receive the economic value of the grid through the collection of revenues from the competitive sale of the risk-hedging CRRs, rather than receiving the CRR for the purpose of collecting day-ahead congestion rents on those paths. Stated another way, ARRs ensure that ratepayers receive the expected economic value of the grid, but without reducing the availability of the CRRs that are critical to managing the risk of actual congestion charges as they vary hour to hour and day to day. Of course, an LSE that receives an ARR for a particular path can then also bid to purchase the associated CRR in the CRR auction, with the net financial outcome of receiving the CRR at no cost. But, importantly, an LSE is not *required* to purchase and hold the CRR in order for its customers to receive the economic value of the particular transmission path.

This is especially important if the LSEs that receive an allocated CRR tend to hold it, regardless of whether they enter into forward physical supply arrangements supported by the CRR, and regardless of whether the CRR has more value to other market participants. In such cases, allocated CRRs are effectively “taken out of circulation” and are unavailable to be used for their intended purpose of enabling forward supply arrangements. The working group discussions to date make it clear that these conditions exist in the CAISO, and that at least some LSEs simply do not actively participate in the CRR auction or otherwise engage in buying or selling CRRs. It

⁶ *Id.* at 23.

⁷ Absent CRRs, net congestion rents are generally returned to ratepayers in proportion to their load-ratio share, which may not reflect historical entitlements to use of the grid; the allocation of CRRs enables an alternative distribution of congestion rents to ratepayers.

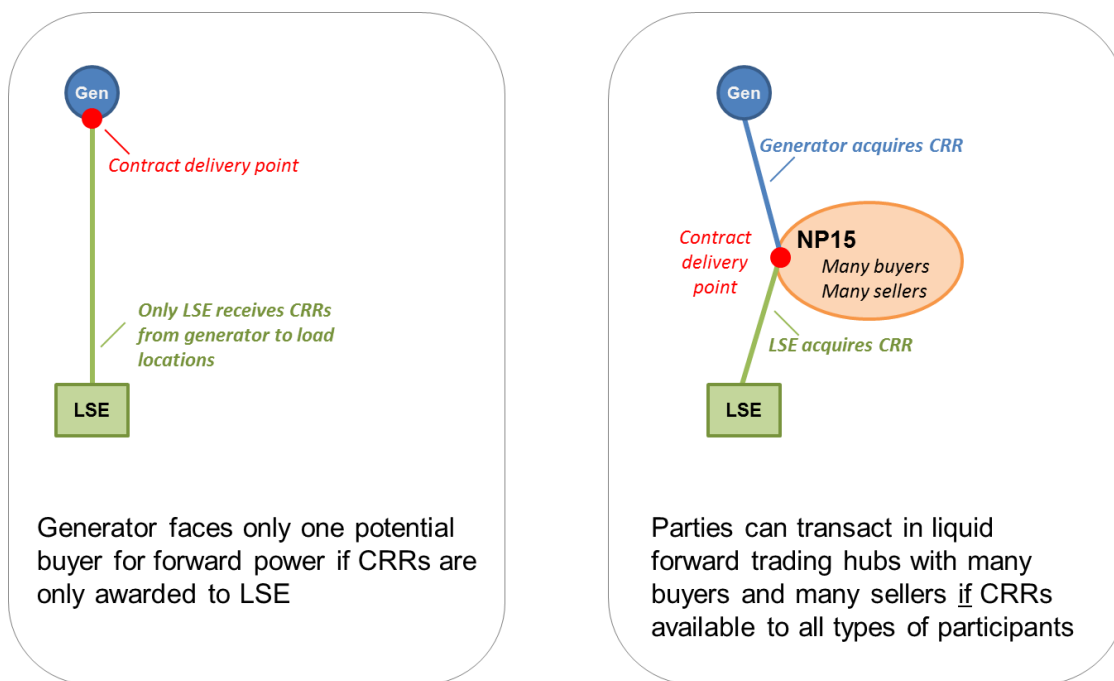
⁸ MRTU Filing, Exh. No. ISO-2, at 45.

⁹ *Id.* at 45, n. 22. (“This allocation of economic value can be direct—through the allocation of CRRs—or indirect—through the allocation of auction revenue rights.”). Drs. Harvey and Pope also discuss the ability of auction revenue rights to support long-term CRRs (*id.* at 147) while achieving the equity objective (*id.* at 158).

has also been stated that LSEs may even face institutional or regulatory barriers that *prevent* them from doing so. CRRs allocated by CAISO to LSEs are therefore likely to stay with that LSE, regardless of whether the acquiring LSE actually uses it to support forward contracting activity.

Moreover, even where allocated CRRs are used by the acquiring LSE to support forward contracting, the preferential access to CRRs can lead to inefficient outcomes. This can occur in at least two ways.

First, the allocation of CRRs to LSEs can actually reduce the competitiveness and efficiency of forward markets. For example, if only LSEs are able to receive CRRs from the CAISO, then a generator at location A effectively has only one potential counterparty for a forward supply contract: the LSE that holds the CRRs; a sale to any other potential buyer would require the buyer to accept the risk of future congestion charges from location A to its desired delivery location, each and every day and hour of the forward contract.¹⁰ A far more competitive forward contracting environment would occur if both suppliers and LSEs transacted at liquid trading hubs, such as NP15 and SP15, where there are many sellers and many buyers. But such an outcome requires that all potential contracting parties have an opportunity to obtain CRRs. The forward contracting scenarios, and their relationship to CRR availability, are depicted below.



Second, the types of forward arrangements enabled by CRRs held by LSEs, as opposed to other parties, can lead to inefficient self-scheduling of physical resources in certain

¹⁰ Conceivably, there may also be LSEs with loads located at the same (or an electrically similar) location, but such a scenario assumes away the very congestion risk that CRRs were designed to manage.

circumstances. This is particularly true for CRRs involving import scheduling points. In Powerex's experience, California LSEs request and receive direct allocation of large quantities of CRRs at specific import locations. Once these CRRs are obtained, the LSEs then typically enter into monthly, quarterly or annual forward purchases in the bilateral markets for industry-standard on-peak and off-peak multi-hour blocks. Under these standard contracts, however, the purchaser (*i.e.*, the California LSE) must take delivery of the forward purchased energy, resulting in imports being self-scheduled in CAISO's day-ahead market by the LSE during each hour of the multi-hour delivery block. ***Powerex believes that the allocation of intertie CRRs to California LSEs is one of the most significant reasons for import self-schedules in CAISO's day-ahead market and directly limits the efficiency of the CAISO's day-ahead and real-time markets.***

This inefficient outcome could be avoided if all of the physical import intertie capacity was available to support CRRs offered exclusively in the CAISO CRR auction. CRRs acquired by the sellers of the output from external resources could be used to support forward *financially-settled* contracts with California LSEs but at liquid forward trading hubs such as NP15 and SP15. LSEs, in turn, would obtain CRRs between the forward trading hub and their load locations. Such an arrangement would provide LSEs with forward price certainty equivalent to that achieved today, but without requiring the LSE to forward contract *physical power* at import scheduling points, thus avoiding the self-scheduling of imports each hour of the underlying forward energy contract. That is, the generator or importer who now holds the CRRs to the forward trading hub and executes a forward financial sale at the forward trading hub, remains able to submit *economic import bids* in the CAISO day-ahead market, providing the CAISO with valuable flexibility of supply. Such arrangements are precluded, however, when CRRs are directly allocated to LSEs, and those LSEs lock-in forward physical energy contracts, instead of actively selling those CRRs in the CRR auction process.

For the above reasons, Powerex believes that the direct allocation of CRRs to California LSEs works at cross-purposes with the primary objective of CRRs, which is to enable efficient forward contracting. This means, first and foremost, that proposals for CAISO to provide CRRs exclusively to LSEs should be firmly rejected. Such a restriction would not only be inefficient, but it would also effectively shut the door on open access to the CAISO grid on a forward basis to all other market participants.

This would also be contrary to the availability of transmission service under the *pro forma* OATT used in neighboring transmission systems, which makes forward transmission available to all transmission customers, not just to customers that serve load within the transmission provider's footprint. California LSEs directly benefit from the ability to obtain forward firm point-to-point transmission service from other transmission providers in order to deliver the output of renewable projects located in other states. California LSEs would likely find it highly objectionable if external transmission providers began to offer forward transmission service, either physical or financial, only to LSEs located within their own service territories. Under both the physical transmission rights framework and under the financial transmission rights framework, genuine open access requires that transmission providers not discriminate between

the type of, or the location of, transmission customers when offering physical or financial transmission service.

Powerex instead urges CAISO to seek ways to increase, rather than to decrease, the quantity of CRRs made available through an open and competitive auction process in which all entities can participate. This would require reducing the quantity of CRRs directly allocated to LSEs. This would not undermine the objective behind the current allocation of CRRs (*i.e.*, ensuring ratepayers that fund the grid receive the associated economic benefits), which Powerex recognizes and supports; Powerex believes, however, that this goal can be more efficiently achieved through approaches that do not lead to the stranding or inefficient allocation of CRRs to LSEs. The use of a dedicated ARR framework to ensure equitable allocation of economic value to ratepayers was described as a potential future enhancement in the 2006 filing,¹¹ and Powerex believes this enhancement merits consideration today.

D. Ensuring Any Future Design Achieves The Core Objectives Of CRRs

Powerex believes that the foregoing outlines some of the key requirements of any framework of financial transmission rights, such as CRRs. By the same token, it highlights areas where the existing CRR design may go beyond what is necessary to support the core purposes of CRRs, or where there may be alternative approaches that achieve that purpose in a more efficient manner. More specifically, Powerex believes that a range of proposals to modify the existing CRR framework may be workable, as long as they include the following key features:

- CRRs continue to be offered by CAISO, and supported by available transmission capacity and the collection of day-ahead congestion rents;
- CRRs continue to be offered on paths that support efficient forward contracting for physical supply to loads;
- All market participants are eligible to obtain CRRs from the CAISO; and
- The direct allocation of CRRs to LSEs is limited as much as possible, while ensuring that the economic value of the existing grid is returned to the ratepayers that fund it.

¹¹ MRTU Filing, Exh. No. ISO-2 at 158 (“[A]n auction process separates the process of obtaining CRRs from the process of allocating the value of the existing grid. With an allocation process these processes are combined, so if an LSE is not allocated CRRs, it receives none of the economic value of the existing grid, and also does not receive congestion hedges. With an auction process, an LSE may be outbid for every CRR it seeks to buy in the auction, but it would still receive the benefit of the economic value of the existing grid when the auction revenues are credited to the LSE or against the transmission access charge paid by the LSE.”)

II. Proposed Enhancements To The CRR Framework

In this section, Powerex offers three specific recommendations to improve the efficiency of the CAISO's CRR framework. Shortcomings in the performance of the CRR framework can be viewed as broadly attributable to (1) insufficient competition in the auction process; and/or (2) large payouts to CRRs due to unanticipated transmission outages. Powerex's proposals are designed to address both of these issues.

A. Limit Eligible Source And Sink Points For CRRs In The Auction

As explained in the prior section, the most important purpose of CRRs is to support forward contracting for physical supply to California loads. This was the core purpose of CRRs articulated in 2006, and Powerex believes it should remain the core purpose of any CRR design going forward. By the same token, CRRs on paths that are not related to the physical delivery of supply do not further this core objective. This does not mean that only physical suppliers should be permitted to acquire CRRs, however. Indeed, non-physical market participants, such as financial intermediaries, can serve an important role in promoting competitive CRR auction outcomes and robust price discovery by increasing demand for under-valued CRRs on physical supply paths. But there seems to be little or no efficiency benefit from the sale of CRRs on more "esoteric" paths. As the CAISO CRR Analysis shows, a large volume of auction CRRs are between source and sink points for which there was only a single purchaser, or between two supply points. These also appear to be the types of CRRs for which there is limited competition in the auction—and hence are sold at low prices—and where even a few hours of high congestion can lead to significant payouts funded by California ratepayers. Finally, Powerex believes these "esoteric" paths are most typically purchased for financial speculation on future congestion charges, rather than being purchased to hedge congestion charges associated with a forward supply contract.

In Powerex's view, the core purpose of CRRs can be achieved, and auction competitiveness increased, by CAISO refining the eligible source and sink locations of CRRs. More specifically, Powerex proposes that CAISO require each CRR to be either:

- From a generator bus or import scheduling point to a forward trading hub (SP15 or NP15); or
- From a forward trading hub (SP15 or NP15) to an LSE load aggregation point or export scheduling point.

Powerex believes that entities seeking to obtain CRRs to manage the risk of congestion charges for forward physical delivery arrangements will continue to be able to do so under the proposed CRR source/sink eligibility requirements. But participants that seek CRRs in order to obtain financial exposure to specific transmission elements, however, will no longer be able to purchase a CRR that pinpoints only that unique element. Instead, such participants will be required to compete to acquire CRRs on physical supply paths. This will improve liquidity for the physical supply path CRRs that are offered, while reducing the CAISO's sale (and

ratepayers' funding) of CRRs on paths for pure financial speculation and for which there has been limited liquidity.

B. Efficiently “De-Rate” CRRs On A Daily Basis To Better Reflect Actual Transmission Conditions And Reduce Revenue Inadequacy

Revenue inadequacy arises when the set of CRRs that has been issued by the CAISO is not simultaneously feasible under updated transmission system conditions. When this occurs, the payments on outstanding CRRs can exceed the congestion rents collected by the CAISO in the day-ahead market. To address revenue inadequacy, Powerex proposes that the payouts to CRRs no longer be calculated on a guaranteed CRR quantity, but rather on the CRR quantity remaining after adjustments to preserve simultaneous feasibility in light of changes to grid conditions. This proposal would effectively limit the net payments to CRR holders to the congestion rents expected to be realized in the day-ahead market.

Powerex proposes that each CRR that is issued by CAISO be subject to a quantity adjustment based on a simultaneous feasibility test closer to each day-ahead market run. While the current design of CRRs provides for payments or charges calculated using the original notional quantity of CRRs that were obtained by the holder, Powerex does not believe this is a required feature of financial transmission rights. More specifically, any reduction in transmission capability will necessarily limit the quantity of schedules that CAISO can accept in the day-ahead market, which will limit the financial exposure of entities to congestion charges associated with physical use of the grid. Moreover, CRRs that are subject to volumetric reductions based on actual transmission capability would be fully consistent with firm point-to-point transmission rights under the *pro forma* OATT. Firm rights-holders under the OATT are not guaranteed to be able to schedule the full quantity of their purchased rights when a transmission path is de-rated; instead the volume of firm rights is effectively reduced to reflect the reduced capability of the path.

Powerex emphasizes that any volumetric adjustment to CRRs must be performed and communicated to CRR holders *before* market participants submit bids or self-schedules in the day-ahead market. It is vital that market participants be informed of the extent to which their CRR holdings will or will not provide a hedge against day-ahead congestion charges prior to scheduling their use of the system (*i.e.*, before submitting schedules or offers that can cause them to incur congestion charges). Therefore, this adjustment must not be performed after-the-fact; as a practical matter, it may be necessary to perform this adjustment on the day prior to the day-ahead market (*i.e.*, two days before the operating date). Nevertheless, this would be much closer to actual operating conditions than the current CRR process, which occurs months or even a year in advance of actual conditions. Perhaps as important, this adjustment will be performed on a daily basis, with hourly granularity, allowing it to incorporate transmission information that lasts for only a few hours.

The specific manner in which this advance volumetric adjustment is achieved needs careful consideration. At any given point, there may be dozens (or hundreds) of CRRs that impact a given transmission constraint. There will therefore be many different potential combinations of adjustments to CRRs that can restore the simultaneous feasibility of CRRs. For example,

CRRs could be reduced based on their shift factor to that constraint, with the highest shift factor CRRs reduced first. Alternatively, all CRRs with a shift factor above some threshold might be reduced by the same percent. But neither of these approaches ensures that the CRR reductions occur in an efficient manner, however. That is, none of these approaches considers the value of the CRRs being adjusted, and hence the value being sacrificed when the quantity of CRRs is reduced.

The table below shows a hypothetical example in which three CRRs have been issued, each with a different flow impact on a particular transmission element. Based on the awarded quantities of each CRR and its shift factor¹², the flow impact on the transmission element is 100 MW, which was feasible at the time the CRRs were awarded.

	Shift Factor on Constraint <i>i</i>	MW	Flow Impact on Constraint <i>i</i> (MW)
CRR 1	0.05	400	20
CRR 2	0.25	200	50
CRR 3	0.75	40	30
			100

The value of the constraint is now reduced to 60 MW, meaning that the simultaneous feasibility test would no longer be satisfied, and the CRRs may not be revenue adequate. Ensuring revenue adequacy requires adjusting the quantity of the outstanding CRRs such that the implied flow on the constraint is reduced from 100 MW to 60 MW. One simplistic way to restore feasibility is to reduce the effective quantity of each CRR by 40%. The adjusted quantities are shown below.¹³ The table also shows the value of each CRR, based on the auction price from the process in which it was acquired. Multiplying each CRR's quantity reduction by the value of that CRR yields the implied economic loss; under this approach, the loss is approximately \$1,522.

	Shift Factor on Constraint <i>i</i>	Original Result		After <i>pro rata</i> Adjustment		Value of CRR (\$/MW)	Cost of Adjustment (\$)
		MW	Flow Impact on Constraint <i>i</i> (MW)	MW	Flow Impact on Constraint <i>i</i> (MW)		
CRR 1	0.05	400	20	240	12	\$8.00	(\$1,280.00)
CRR 2	0.25	200	50	120	30	\$3.00	(\$240.00)
CRR 3	0.75	40	30	24	18	\$0.10	(\$1.60)
			100		60		(\$1,521.60)

¹² "Shift factors" are commonly defined at the nodal level and specify the flow impact on a particular constraint from the combination of an injection at the stated node and a withdrawal at the Reference Bus. For purposes of this discussion, "shift factor" refers to the impact on a specific constraint of an injection at the CRR Source and a withdrawal at the CRR Sink (rather than the Reference Bus), and is equal to the difference between the nodal shift factors of the Source and the Sink nodes on a given constraint.

¹³ For purposes of illustration, this example considers that only one transmission constraint is binding, and CRR quantities may be adjusted without causing any other transmission constraints to bind.

An alternative approach is to minimize the lost value resulting from the CRR quantity adjustments. This approach treats a CRR with a high shift factor and a low CRR value, such as CRR 3 in the example, as a relatively low-cost way of reducing flows on the affected transmission constraint. Conversely, CRRs with a low shift factor and a high CRR value, such as CRR 1 in the example, are a relatively costly way of achieving the requisite flow reductions. The table below illustrates the CRR adjustments that would occur under this approach. The lost value of the CRR reductions under this approach is \$124, or less than one-tenth of the value lost under the pro-rata approach discussed above.

	Shift Factor on Constraint <i>i</i>	Original Result		After Minimum-Loss Adjustment		Value of CRR (\$/MW)	Cost of Adjustment (\$)
		MW	Flow Impact on Constraint <i>i</i> (MW)	MW	Flow Impact on Constraint <i>i</i> (MW)		
CRR 1	0.05	400	20	400	20	\$8.00	\$0.00
CRR 2	0.25	200	50	160	40	\$3.00	(\$120.00)
CRR 3	0.75	40	30	0	0	\$0.10	(\$4.00)
			100		60		(\$124.00)

Effectively, all outstanding CRRs are “re-bid” into a simultaneous feasibility test at the applicable clearing auction price from the annual or monthly CRR process in which the CRR was acquired. This would apply both to CRRs actually purchased in the auction as well as to any CRRs obtained in the allocation process. There are at least two attributes of this type of approach that Powerex believes are highly beneficial. First, it is efficient, in that it allocates the adjustment quantities to the CRRs whose auction value indicate it can provide the adjustment at lowest cost.¹⁴ Second, it is likely to significantly diminish the opportunity to purchase CRRs at very low prices and realize large financial gains funded by California loads. In this example, CRR 3 was purchased at a very low price, and has a very high shift factor on the affected constraint, consistent with low-liquidity CRRs designed to isolate a specific transmission element. Under Powerex’s suggested approach, such a CRR would be the first to be reduced when the underlying transmission elements are de-rated. Thus, the opportunity to benefit from unanticipated transmission de-rates should be significantly reduced, and the interest in purchasing CRRs that target isolated transmission elements in the auction should also decline.

Powerex believes that an efficient method of reducing the effective volume of CRRs on a daily basis has the potential to significantly reduce CRR revenue inadequacy while fully supporting the key function of CRRs as instruments to hedge day-ahead congestion charges on physical use of the grid. Powerex’s specific proposal to allocate CRR reductions in a manner that minimizes reductions to the value of CRRs appears to be economically efficient, and could also reduce the ability to use CRRs to speculate on unanticipated outages on specific constraints.

¹⁴ This approach also efficiently captures the interactions between topology changes directly affecting some CRRs, and the secondary effects of reduced counterflows from those affected CRRs, which may require adjusting other CRRs (even though they have zero or *de minimis* shift factors on the changed constraint).

C. Minimize Or Replace The Direct Allocation Of CRRs

Powerex supports the objective of ensuring that ratepayers that fund the transmission grid receive the economic value of the use of the grid. This principle applies both in organized markets—in which congestion rents or auction revenues offset transmission rates—and in transmission systems operating under the *pro forma* OATT—where the sale of point-to-point transmission service offsets the rates paid by network service customers.

As discussed in Section I.C, above, the direct allocation of CRRs to LSEs was put in place as a means of distributing congestion rents collected by the CAISO to ratepayers. The allocation of CRRs is not the only way to achieve this objective, however. Indeed, attempting to use CRRs—whose chief purpose is to hedge potentially volatile day-ahead congestion charges as they change from hour to hour and day to day—as the mechanism to distribute the economic value of the grid over a period of a month or a year appears to have numerous drawbacks and may be highly inefficient.

Powerex therefore proposes that CAISO explore replacing the existing direct allocation of CRRs to LSEs with a framework of allocating ARRs, similar to the frameworks implemented in many other FERC-jurisdictional organized markets. ARRs satisfy the equity objective by defining the manner that the economic value of the grid is distributed to LSEs, but without using CRRs for this purpose. Of course, LSEs would be able to bid for CRRs in the auction, along with other participants, and they would be effectively hedged against the auction price for the locations and quantities associated with their allocated ARRs. To the extent LSEs, like other market participants, require CRRs to hedge congestion charges for their forward contracts, ARRs would continue to enable LSEs to obtain those CRRs at no net additional cost.

Powerex recognizes that, in order for ratepayers to receive the economic value of the transmission grid under an ARR mechanism, auction prices for CRRs must be established in a competitive and efficient process, such that auction revenues properly reflect the expected value of CRRs. Given the concerns regarding the historical performance of CRR auctions, Powerex recommends that implementation of the enhancements to the auction and design of CRRs, proposed above, be pursued as the first phase of CRR reforms. Improved CRR auction efficiency can then support a transition to the use of ARRs as the means to ensure ratepayers receive the economic value of the transmission system.

If the CAISO decides to continue to allocate CRRs directly to LSEs, beyond the CRRs necessary to hedge executed forward contracts, any such additional allocation should be limited in order to minimize harm to efficient forward contracting. Specifically, Powerex believes that any direct allocation of CRRs to LSEs (beyond what is needed to hedge executed contracts) should be limited only to CRRs from a forward trading hub, such as NP15 or SP15, to an LSE's load. Powerex sees no compelling rationale for allocating CRRs to LSEs from a specific generator injection point or from a specific intertie scheduling point, as doing so can significantly reduce competition for forward contracts at those location. Rather, Powerex believes it is appropriate to require that LSEs compete to obtain forward transmission rights through a competitive auction process, just as other types of market participants do, and just as occurs on other transmission systems

Ultimately, Powerex believes that the efficiency of the CRR process as well as the efficiency of forward transactions in general both benefit from enhancements that increase liquidity and competition. Powerex believes its proposed enhancements can help achieve this objective in multiple ways: by increasing overall participation in the CRR auction process, by focusing CRR auction activity on a subset of paths that support forward contracting for supply, and by maximizing the ability of sellers and buyers alike to transact at liquid forward trading hubs such as SP15 and NP15.