



Memorandum

To: ISO Board of Governors

From: Keith Casey, Vice President, Market & Infrastructure Development

Date: May 10, 2010

Re: **Decision on Refinements to Congestion Revenue Rights Processes**

This memorandum requires Board action.

EXECUTIVE SUMMARY

The California Independent System Operator Corporation has released short-term and long-term congestion revenue rights (CRRs) as a feature of its new market design that has been in effect since April 1, 2009. CRRs are released annually and monthly through an allocation process and auction. CRRs provide payments or assess charges to holders of such rights based on the direction of congestion reflected in locational marginal prices between different defined locations on the ISO grid. The receipt of revenue related to CRR holdings allows market participants to manage their exposure to congestion costs in the market.

The ISO's experience in conducting these processes and market participants experience over the past year offers an opportunity to consider refinements in the related processes. Management proposes several refinements to the processes for awarding CRRs, to make CRRs a more effective tool for market participants to manage their participation in the ISO markets.

We are proposing five areas of modifications to the CRR processes:

1. New process and dispute mechanism for adjusting holdings of CRRs released through the allocation process to reflect the transfer of load responsibility between load serving entities;
2. New methodology for modeling and treatment of trading hubs in CRR allocation process;
3. Elimination of multi-point CRRs;
4. Refinement of tiers in monthly allocation; and
5. New methodology to distribute reductions among CRR allocations when requested CRRs are not feasible due to network limitations.

Management proposes that the ISO Board of Governors approve the following motion adopting these refinements CRR processes:

Moved, that the ISO Board of Governors approves the proposal regarding the refinements of congestion revenue rights processes, as detailed in the memorandum dated May 10, 2010; and

Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed tariff change.

DISCUSSION AND ANALYSIS

1. Process for adjusting CRR holdings to reflect load migration

CRRs are allocated annually and monthly to load serving entities free of charge based on the load serving entity's load obligation, *i.e.*, the amount of load served by each load serving entity. As required by the Federal Energy Regulatory Commission, the ISO adopted a procedure that ensures that when the obligation to serve load transfers from one load serving entity to another, the ISO ensures that a commensurate amount of CRRs transfer to the load-gaining load serving entity. This reflects the basic principle that CRRs are allocated to load serving entities as custodians for the load they serve.

The current methodology for transferring CRRs due to load migration between load serving entities first requires a determination of the load that actually transfers to the load-gaining load serving entity. Once this load transfer metric is determined the ISO can determine what CRRs must transfer with the migrating load. The first step of determining the load transfers requires the ISO to handle data on individual retail end-use customers. This retail level data is not the type of data for which the ISO is normally responsible for handling and processing as part of its obligation to provide wholesale transmission service. To accomplish this first step, the ISO was required to develop business processes that do not serve other ISO functions and that expose the ISO to risks in data management that it would not otherwise face. Management proposes a revised process to avoid the ISO handling large quantities of such confidential retail end-user data but continues to ensure that CRRs transfer with the migrating load.

The ISO's proposal retains the same methodology currently used to determine the load transfers but requires that the utility distribution company in which the load resides to conduct the first step of counting the number of transferred customers in each customer class and report the resulting load transfer to the ISO. This will avoid the need to transfer raw retail level confidential data to the ISO. The ISO will then calculate, as it does now, the net load migration between load serving entities within each utility distribution company distribution service territory, and transfer the allocated CRRs between load serving entities as it does now.

To ensure the successful transfer of the responsibility for the calculation of the load transfers, the ISO has assisted the utility distribution companies in setting up the existing process, including the provision of prototype computer software that performs the required

calculations, and will continue to provide such assistance as needed. To complete this transfer of responsibility the ISO must also obtain approval of a tariff amendment that eliminates the requirement that the ISO conduct this first step. In addition, as discussed below, in response to stakeholder requests, Management proposes certain new dispute resolution mechanisms to address any disputes between load-serving entities regarding the calculation of the load transfers.

Management proposed refinement aligns data management with the ISO's wholesale market functions and the utility distribution companies' retail functions, provides a dispute resolution process that is currently lacking, and allows further consideration of additional changes.

Stakeholder comments

The Alliance for Retail Markets (AReM) raised initial concerns about a load serving entity's ability to have confidence in the load migration results if the calculation process is turned over to the utility distribution companies. To address this concern, Management proposes a dispute resolution process for load migration that will allow the load serving entity more time than is currently available to review load transfer amounts and to work with the utility distribution company and the ISO to resolve any disputes. In the event a dispute cannot be resolved within the proposed process, the load serving entities may pursue further review through the existing alternative dispute resolution mechanisms of the ISO tariff, as would occur today.

Powerex agreed that the ISO should not have access to individual retail customer information, and San Diego Gas & Electric agrees with simplification of the data requirements. Pacific Gas & Electric does not support the proposal because the existing process was developed through a previous stakeholder process, and is instead asking the ISO to review the entire load migration process. Management considered alternatives in response to PG&E's comments, but has found that more fundamental reforms of the load migration process will require an extended stakeholder process involving complex market design issues.

2. Method for handling trading hubs in the CRR release process

CRRs are defined by two points, a source and a sink. The specification of the source and the sink determines the location and direction of the CRR. Under the ISO's current procedures, participants in CRR allocations and auctions may request sources reflecting trading hubs, which are aggregations of generation pricing nodes with fixed distribution factors to form a weighted-average price. To ensure that CRRs whose source is defined at a trading hub reflect the congestion charges market participants will face in the market, the trading hub CRRs must maintain the same distribution factors for generators that comprise the trading hub.

A limitation in releasing trading hub CRRs is that if congestion on a network constraint limits further awards from a single generator within the aggregation, there can be no further awards from the trading hub as a whole.¹ This can be particularly problematic if a constraint to an

¹ To illustrate this, consider a trading hub consisting of five equally-weighted pricing nodes, at which market participants request 100 MW of CRRs in tier 1 of the CRR allocation (i.e., 20 MW going to each of the five pricing nodes). If only 15 MW of CRRs can be awarded to

individual generator becomes limiting early in the CRR allocation, since no further capacity is then available for awards using trading hubs later in the allocation process.

The current CRR allocation process addresses this problem by disaggregating a trading hub nomination into separate nominations for each constituent pricing node of the trading hub.² This produces a very similar economic value as the trading hub, since most of the separate CRRs can be awarded, but results in holdings of many small CRRs, which is both inefficient and burdensome for both the CRR holders and the ISO. In the actual ISO markets, a trading hub consists of hundreds of separate pricing nodes. Management proposes a revised process to reduce the burden on the ISO and market participants for managing these multiple CRR holdings by significantly reducing the volume of CRRs that the ISO must release and market participants must hold. This approach will continue to conduct the simultaneous feasibility test³ for releasing CRRs to load serving entities' nominations as is done now in the CRR allocation process by unbundling the trading hub CRRs. However, Management proposes to include a post-allocation process to rebundle CRRs back into a trading hub CRR. The post-allocation process awards a CRR from the trading hub to the load aggregation point, to the extent that there is no congestion to the load aggregation point itself, and then awards "counterflow" CRRs from the load aggregation point to the individual pricing nodes that are congested, to produce a reverse flow that relieves the congestion.⁴

In response to stakeholders' requests, Management also proposes to allow trading hub CRRs to be eligible for renewal in the priority nomination tier of the subsequent CRR allocation, which allows CRR holders to renew the previous year's awarded CRRs before new CRRs are awarded. This enhances the current process, and does not give trading hub CRRs priority over other CRRs in the priority nomination tiers of the subsequent year allocations.

Stakeholder comments

Southern California Edison, San Diego Gas & Electric, and Silicon Valley Power support Management's proposal. Silicon Valley requested the ISO to implement verification processes to avoid potential use of incorrect trading hub weighting factors. The ISO has already adopted measures to avoid such errors, which staff has described to stakeholders.

Powerex does not object to the proposal, but has concerns about renewing the trading hub CRRs in the priority nomination tiers of subsequent years separate from the counterflow CRRs that make them feasible. Silicon Valley similarly opposes the renewal of trading hub CRRs, unless the counterflow CRRs are also renewed, and is concerned that the feasibility of long-term trading hub CRRs cannot be ensured. Management's proposal has addressed this

one of the pricing nodes, the ISO could award only 75% of CRR nominations to the entire trading hub in the current tier, and could not award any CRRs to the trading hub in subsequent tiers, since the equal weights must be maintained.

² In the previous footnote's example, the ISO would award 20 MW of CRRs to four of the pricing nodes, and 15 MW to the constrained node. The result is a total of 95 MW of CRRs awarded to five separate pricing nodes, instead of a single trading hub.

³ The simultaneous feasibility test is used to check whether the requested CRRs can be awarded given network constraints.

⁴ Returning to the example, the ISO would award 100 MW of CRRs sourced at the trading hub, and 5 MW of counterflow CRRs back to the single pricing node that is limited by a transmission constraint. When a trading hub consists of hundreds of separate pricing nodes (instead of five as in this example), only a few of which would have congestion, the post-allocation process results in a substantial reduction in CRR holdings that must be managed by the ISO and market participants.

concern in the context of the priority nomination tier of the annual allocation process by (1) using the load distribution factors and trading hub distribution factors of the current year's annual CRR process, rather than the previous year's factors that supported the original trading hub CRR awards, and (2) awarding new counterflow CRRs as needed to obtain feasibility of the renewed trading hub CRRs, by processing the renewal through the same simultaneous feasibility test process.

Pacific Gas & Electric does not support the proposal if it does not include eligibility for renewal as long-term CRRs, which would extend the awarded CRRs for a total of a ten-year term. Since this issue did not become prominent until late in the stakeholder process, it will be addressed in ongoing phases of the stakeholder process. In any case, this issue does not pose an immediate concern as no trading hub CRRs would be available this year for renewal as long-term CRRs since no trading hub CRRs have been awarded in previous years as would be required for renewal.

3. Elimination of multi-point CRRs

The current CRR process allows for multi-point CRRs, which enable participants to assign different priorities among multiple sources, sinks, or both. Multi-point CRRs were originally proposed early in the design of the CRR process, before the stakeholders and the ISO agreed on the tiered structure of the current CRR allocation process, to enable participants to designate their priorities through their choice of which CRRs to nominate in each tier. Accommodating both point-to-point and multi-point CRRs complicates implementation of new enhancements to the CRR system and adds complexity and cost. In the multi-tier allocation process, multi-point CRRs have had extremely limited use, totaling just over ½ of 1% (.007) of the total CRRs released in the 2009 annual CRR allocation and auction processes. Based on the limited use of this functionality and the high cost to maintain it, Management proposes to eliminate the multi-point CRR function.

Stakeholder comments

Most stakeholders support the removal of the multi-point CRR function as long as the monthly allocation process retains both of the existing tiers and includes the modifications to monthly allocation rules that are discussed in the next section. Powerex stated that it can only participate in the CRR auction, and multi-point CRRs provide a means to bid for CRRs on multiple paths while limiting its cleared amount of CRRs. While we understand Powerex's concern, we believe that the balance of all comments, and the benefits in implementing other enhancements that Powerex supports, justify removal of the multi-point function.

4. Refinement of tiers in monthly allocation

The current monthly CRR allocation process consists of a two-tier process for requesting CRRs plus an auction.⁵ After the ISO receives schedules for significant network outages (30

⁵ The monthly CRR process currently consists of two tiers, in which the first tier uses limited eligibility to request CRRs that are released in the second tier, in order to stage the CRR release. Part of the process for allocating and auctioning CRRs is to update the network model used in the CRR system to reflect any significant network outages.

days before the start of the month for which CRRs will be issued) the time available to conduct the monthly CRR allocation and auction processes is limited. Market participants have requested a decrease in the monthly process as the current process can take a considerable amount of time and resources for both the ISO and participants. Management proposes to reduce the amount of time required for the ISO and market participants to run the monthly auction by using a uniform definition of eligibility for CRR requests in both tiers.

The allocation of CRRs to the default load aggregation points (LAPs) in the first tier of the release process where most demand is scheduled is often limited by local transmission constraints. To address this issue, Management proposes to also allow CRR nominations to sub-LAPs in the first tier of the monthly allocation. Currently, such nominations are only allowed in the second tier. Management also proposes to increase load serving entities' eligibility to nominate CRRs in the first tier to 100% of the difference between their total eligibility to receive CRRs in the pertinent month and their previously allocated total of CRRs. Tier 2 remains available to fill any remaining eligibility when nominations are not adequately covered in the first tier.

Stakeholder Comments

Stakeholders are supportive of these refinements. San Diego Gas & Electric supports the proposal as long as the weighted least squares optimization is also implemented as described in the next section. Silicon Valley Power requested that sub-LAPs should be allowed in the second tier of the annual allocation process as well as in both tiers of the monthly allocation, and Management proposes to include this change.⁶ Pacific Gas & Electric supports the proposal but notes that it does not improve the timeline provided for the review of the full network model for the monthly CRR process. They would like to see more time built into the process for review of the full network model. Changes to the schedule for reporting planned transmission outages for incorporation into the full network model used in the monthly allocation will be examined in future phases of the CRR enhancements stakeholder process.

5. *New methodology to distribute reductions among CRR allocations when mitigating congestion*

The ISO's CRR allocation process currently utilizes a mathematical optimization in which the objective function is to maximize the MW value of the awarded CRRs. The CRR nomination that is most effective in relieving a constraint is curtailed completely before less effective nominations are curtailed. Although this minimizes the curtailed nominations, it can impose most if not all of the curtailment on a single participant, which can result in an inequitable distribution of awarded CRRs.

To address this concern, Management proposes a new methodology that will more equitably distribute curtailments across CRR nominations that are effective in relieving congestion. This will be accomplished through a "weighted least squares" objective function that pro-rates

⁶ The first tier of the annual process is the priority nomination tier, which would allow renewal of the sub-LAP CRR in the subsequent year.

reductions in flow on a binding constraint based on squares of the power transfer distribution factor (referred to as the shift factor) of each CRR nomination for the binding constraint. The shift factor measures the percentage of a power transfer from source to sink that flows on a transmission facility.

The following example illustrates the difference. Consider two 50 MW CRR nominations, with CRR 1 having a shift factor of 0.5 on a binding constraint, and CRR 2 having a shift factor of 0.49 on the same constraint. CRR 1 contributes 25 MW of flow to the binding constraint, while CRR 2 contributes 24.5 MW. Under the current method, if a 10 MW reduction in flow on the constraint is needed, CRR 1’s contribution to the constraint would be reduced because it is the most effective adjustment. This requires a 20 MW reduction of this CRR award because each MW reduction produces a 0.5 MW change in flow on the constraint (based on the shift factor), while CRR 2 is not affected. The final award is 30 MW for CRR 1 and 50 MW for CRR 2.

In contrast, the proposed approach adjusts both CRRs. The optimization calculates the squares of all CRRs’ shift factors, sums these values, and then pro-rates the reduction in flows on the constraint using the squared shift factors. In the table below, the values of “Reduction in Flow across Binding Constraint” are divided by the shift factors to produce the values of “Reduction in Awarded CRR”. CRR 1 has a larger reduction because it has a higher effectiveness in relieving the constraint, but CRR 2 also shares in relieving the constraint, producing a more equitable result with only a minor reduction in the efficiency of the curtailment optimization (20.2 MW curtailed versus 20 MW curtailed under the current approach).

Example: CRR Allocation Using Revised Methodology

<i>CRR Nomination</i>	<i>Shift Factor</i>	<i>Nominated CRR Amount</i>	<i>Reduction in Flow across Binding Constraint</i>	<i>Reduction in Awarded CRR</i>	<i>Awarded CRR Amount</i>
CRR 1	0.5	50 MW	$\frac{0.25}{0.4901} \cdot 10 = 5.101$	$\frac{0.5}{0.4901} \cdot 10 = 10.2$	39.8 MW
CRR 2	0.49	50 MW	$\frac{0.2401}{0.4901} \cdot 10 = 4.899$	$\frac{0.49}{0.4901} \cdot 10 = 10$	40 MW
Totals		100 MW	10 MW	20.2 MW	79.8 MW

Stakeholder comments

San Diego Gas & Electric strongly favors implementing the weighted least squares objective function as soon as possible, to achieve equitable distributions of CRRs. San Diego’s support for refining the monthly allocation tiers, which other stakeholders support, depends on the weighted least squares optimization. Powerex supports this enhancement if it does not delay

the ISO's consideration of auction revenue rights⁷, and Southern California Edison supports the weighted least squares concept.

Pacific Gas & Electric requests simulations of actual nominations. Silicon Valley is concerned that the weighed least squares approach may favor larger market participants. We will continue to inform stakeholders of implementation details and results of testing, including the requested simulations of actual nominations and testing for disproportionate adverse impacts among market participants, before placing the changes in production, and will address any issues that arise as this work proceeds.

MANAGEMENT RECOMMENDATION

Management recommends that the Board approve the adoption of the refinements to the CRR release processes described herein and authorize Management to make all necessary and appropriate filings with FERC to implement this policy. These revisions to the current processes will increase the ISO's efficiency in administering CRRs as a tool for market participants to manage the congestion costs that they experience in the market, as well as facilitating participation in the ISO's market.

⁷ The ISO will be considering whether to implement auction revenue rights, which are used by some ISOs, as a future enhancement of the overall CRR program design. This will involve an extensive stakeholder process. The proposals presented at this time will not affect the consideration of auction revenue rights.