



Congestion Revenue Rights Enhancements

Phase 1 Final Proposal

July 6, 2026

Table of Contents

1.	Executive Summary.....	3
2.	Introduction.....	3
3.	Stakeholder Process.....	5
4.	Final Proposal: Phase 1 CRR Enhancements	7
4.1.	Background.....	7
	Historical Auction Efficiency Outcomes	7
	Historical Revenue Adequacy Outcomes	7
	Root Cause Analysis Findings on Revenue Inadequacy.....	8
4.2.	Stakeholder Feedback on the June 23 rd Draft Final Proposal.....	9
4.3.	Final Proposal: Phase 1 Enhancements.....	10
	Minimum Bid and Price Floor	10
	Modeling Enhancements for Improved Revenue Adequacy.....	10
5.	Governance Classification	11
6.	Next Steps.....	11

1. Executive Summary

This final proposal retains the modified version of the phased approach to the Congestion Revenue Rights Enhancements initiative outlined in the draft final proposal published June 23, 2026. Phase 1 consists of expedited changes designed to be in place for the 2027 annual Congestion Revenue Rights (CRR) process. The Phase 1 scope consists of modeling improvements under the existing tariff and expanded ISO authority to model loop flow in the annual CRR process. In response to stakeholder feedback, the concept of a minimum bid and price in the CRR auction will be explored in Phase 2 and will not be pursued further in Phase 1. This change is not a rejection of the auction floor in concept, but the ISO recognizes most stakeholders' position that this idea would benefit from more consideration and discussion than is possible in Phase 1. The auction price floor proposal will be considered in Phase 2 alongside other proposals for improving auction efficiency that stakeholders have suggested. Phase 2 will consider measures that require more time to fully develop and will include the product definition topics. This phased approach is designed to achieve improvements in revenue adequacy for the 2027 annual process while being responsive to stakeholder feedback and allowing time to fully consider more complex enhancements.

2. Introduction

The ISO's Congestion Revenue Rights Enhancements initiative has identified revenue adequacy, auction efficiency, and product definition as the three priority areas for CRR market reform.¹ In support of these priorities, this final proposal retains the modified version of the phased approach to policy development described in the draft final proposal.² This final proposal keeps the phased structure, which is designed to balance incremental improvements that can be implemented sooner with thorough consideration of more complex structural reforms. However, in response to stakeholder feedback this final proposal retains the modifications to the Phase 1 scope proposed in the draft final proposal. Phase 1, designed to be implementable for the 2027 CRR annual process, will include only the revenue adequacy measures from the straw proposal and draft final proposal. These measures consist of new ISO authority to model loop flow in the annual CRR process paired with ongoing model improvements within the ISO's existing tariff authority. The proposal for a bid and price floor in the CRR auction, designed to help improve auction efficiency, is moved to Phase 2 for consideration alongside other proposed enhancements aimed at auction efficiency.

This initiative is building on previous market improvements over the past seven years. Revenue adequacy and auction efficiency have improved since the ISO implemented the previous round of policy changes in 2019. Revenue adequacy improved from an average of 75% in the five years preceding the changes to 79% from 2019 through June 2025.³ Auction efficiency improved from 50% in the two years

¹ The full record for this initiative, including all papers, presentations, stakeholder comments, and recordings of working group meetings, can be found on the initiative's webpage: [California ISO - Congestion revenue rights enhancements](#).

² [Straw Proposal on Revenue Adequacy and Auction Efficiency](#), June 1, 2026.

³ [Issue Paper on Revenue Adequacy and Auction Efficiency Enhancements](#), page 10, January 14, 2026.

preceding the changes to 67% from January 2019 through June 2025.⁴ Nonetheless, the CAISO CRR market still faces persistent revenue adequacy and auction efficiency challenges. The improved 79% average system-level revenue adequacy from 2019 through June 2025 reflects a total shortfall of approximately \$856 million, or about \$114 million per year.

The CAISO's February 2025 root cause analysis identified three structural drivers of revenue inadequacy: missing power flow contributions from injections below the 2% shift factor threshold, loop flows consuming transmission capacity without contributing to congestion rent collection, and divergence between the CRR network model and the day-ahead market, particularly from outage timing misalignment.

The CRR working group also identified auction efficiency as a priority area with significant variation in stakeholder perspectives. Some load-serving entities, the ISO Department of Market Monitoring (DMM), and the California Public Utilities Commission (CPUC) Energy Division conjectured that the low auction efficiency stemmed from an auction design that allows participants with limited congestion risk exposure to acquire CRRs at prices consistently below their realized day-ahead value. Financial market participants and marketers contended that auction efficiency metrics fail to capture significant value streams and that improving revenue adequacy by reducing uncertainty would organically improve auction prices and efficiency.

To drive further improvement in all three key areas, this final proposal retains the modified version of the two-phase structure proposed in the draft final proposal. The purpose of the two phases remains the same. Phase 1 is focused on achieving incremental improvements as quickly as possible, while Phase 2 is designed for comprehensive consideration of more complex potential reforms.

Phase 1 retains the revenue adequacy-focused scope from the draft final proposal, which was not opposed by any stakeholders commenting on the draft final proposal. This consists of new ISO authority to model loop flows in the annual CRR process. This will be accompanied by modeling enhancements within the ISO's existing tariff authority to improve alignment between the CRR model and the day-ahead market. The auction bid and price floor from the straw proposal, aimed at improving auction efficiency, is moved to Phase 2 in response to stakeholder requests for further consideration.

Future phases will pursue larger structural redesign continuing in 2026 and likely into 2027. The ISO will continue considering options already discussed with stakeholders and reflected in stakeholder comments. This may include combining a minimum price floor with other changes, taking into account considerations such as ensuring access to the transmission system via CRRs at a reasonable rate, providing participants with access to hedging instruments, and providing participants a venue to resell allocated rights that do not best fit their hedging needs. Phase 2 will also expand on the Product Definition Straw Proposal with updated time-of-use periods and storage sink flexibility.⁵

⁴ Id. at 18.

⁵ [Issue Paper and Straw Proposal on Product Definition](#), December 12, 2025.

Modeling improvements will continue in Phase 2, including potentially incorporating Extended Day-Ahead Market (EDAM) Congestion Revenue Allocation (CRA) information to inform modeling and outage timing reforms. Phase 2 could also include discussion on whether outage information received after the start of the allocation process should be included in auction runs.

Several factors will need to be accounted for going forward. The ongoing evolution of the EDAM CRA framework could affect the congestion revenue the ISO has available to fund CRR obligations, and any changes developed in this initiative must be compatible with the EDAM framework. Also, the ISO upgraded the CRR software platform in July 2025, and additional modeling improvements may be achievable under existing tariff authority using this new platform.

The ISO is committed to working with stakeholders to develop policy changes that advance the goals and address the problem statements that the CRR working group identified. We appreciate stakeholders' rigorous engagement with the straw proposal and draft final proposal. This final proposal does not seek to resolve all of the questions the working group identified, but seeks to establish a specific two-phase direction and bring the Phase 1 policy process to a conclusion.

3. Stakeholder Process

In the scoping phase of this initiative, the working group identified five goals for the initiative across two key CRR market functions. These goals represent the outcomes that changes to the CRR market design should achieve and that will guide policy development throughout this initiative.

CRR Market Function: Fair allocation of transmission revenues to customers paying the embedded costs of the transmission system:

- **Goal 1:** CRRs in the auction should be priced at a reasonable approximation of their costs and the expected payout of congestion rent in the day-ahead market.
- **Goal 2:** Customers paying the costs for the CAISO transmission grid should receive approximately commensurate value for payouts made to CRR rights purchased in the auction when considering all demonstrated value provided by entities purchasing CRRs in the auction.

CRR Market Function: Allow hedging costs of congestion in the context of a day-ahead energy market:

- **Goal 3:** The CRR market's products and processes should facilitate the ability for participants to obtain effective hedging tools and maintain the hedging value of CRRs to the extent possible, including by minimizing divergence between the CRR model and the day-ahead market model.
- **Goal 4:** Day-ahead energy market participants exposed to congestion risk should be able to hedge that risk efficiently.
- **Goal 5:** The CRR market structure should support open access to the CAISO transmission system, in keeping with FERC Order 888.

The working group also identified five problem statements to guide the policy development phase. The straw proposal in the chapters that follow is structured to address each of these problem statements, particularly numbers 1 through 4.

1. **Auction revenue adequacy:** Since adoption of the 2019 policy changes, the ratio of auction revenue per dollar of CRR payout has improved from 50 cents to 68 cents. However, many load-serving entities have expressed that the benefits from the auction mechanism still do not fully justify the cost to them in foregone congestion rent allocation. Questions remain whether the auction mechanism justifies the cost to customers that pay the costs for the CAISO transmission grid in foregone congestion revenue.
2. **Participant contribution to fair allocation:** Based on market results, it is unclear to what extent all CRR auction participants contribute to the fair allocation of transmission revenues. Particular focus of reforms should consider whether the congestion revenues received from different types of auction participants are commensurate with (A) their funding of the transmission system, (B) their payments for auction CRRs, and (C) other hedging value received by physical market participants.
3. **Model divergence and revenue inadequacy:** Divergence between monthly CRR modeling outcomes and day-ahead market outcomes contributes to revenue inadequacy that reduces the value of CRRs as a hedging tool. CAISO should evaluate and where feasible adopt measures for reducing this divergence, including those related to loop flows, shift factors, and transmission outages. Reform measures should align with Congestion Revenue Allocation methodologies and consider the most accurate information of transmission use from neighboring balancing authorities.
4. **Shortfall allocation methodology:** The method for allocating revenue shortfalls should strike the best balance practicable between allocating congestion revenue back to transmission customers and maintaining the hedging value of CRRs, while recognizing the evolving congestion revenue allocation on external constraints. Allocation of revenue shortfalls should be guided by cost causation principles.
5. **Evolving hedging needs:** Hedging needs are evolving alongside the composition of the ISO BAA's generation fleet. The products available in the CRR market and the processes by which they are distributed should be updated to match evolving hedging needs. This could include revisiting time-of-use periods, developing measures to facilitate hedging of congestion risk associated with storage charging load, and revisiting the auction schedule.

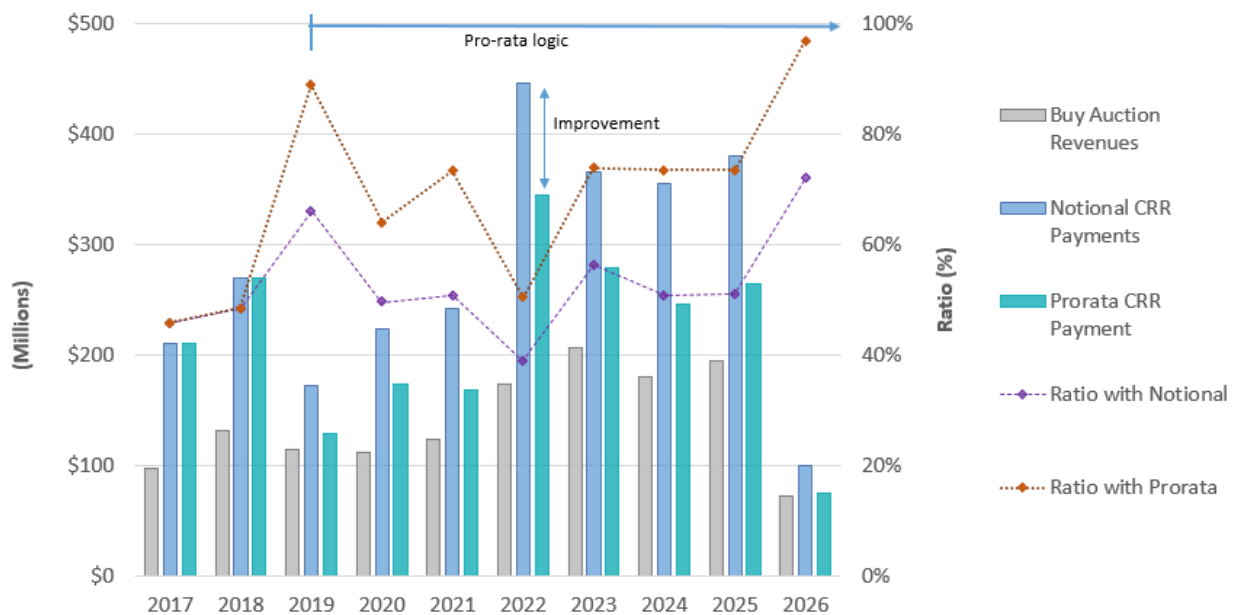
4. Final Proposal: Phase 1 CRR Enhancements

4.1. Background

Historical Auction Efficiency Outcomes

CRR auction efficiency averaged about 67% from 2019 through June 2025, an improvement from pre-2019 auction efficiency of 50%.⁶ The pro-rata revenue shortfall allocation methodology implemented in 2019 reduced payouts by over \$530 million, improving auction efficiency by driving down the difference between revenues and payments. Excluding the shortfall allocation, auction efficiency averaged 50% over the same time period, similar to the pre-2019 results.

Figure 1: Auction Efficiency from 2019-2026



Historical Revenue Adequacy Outcomes

Congestion rents collected in the day-ahead market have been consistently below the notional value of the CRRs allocated and auctioned by the ISO. From 2019 through June 2025, system-level revenue adequacy averaged 79%, with a total shortfall of \$856 million, or approximately \$114 million per year. Prior to 2019, revenue inadequacy was allocated to measured demand (load-serving entities and exports). Since the 2019 policy changes, revenue inadequacy has been allocated to CRR rights holders via the CRR1b methodology on a pro-rata, constraint-by-constraint basis.

⁶ [Issue Paper on Revenue Adequacy and Auction Efficiency Enhancements](#), page 18, January 14, 2026

Revenue adequacy has varied significantly across different constraints. In the ISO's previously shared analysis, three constraints with the largest documented shortfalls are the Moss Landing–Las Aguilas 230 kV constraint, the San Bernardino–Devers 230 kV constraint, and the Palo Verde intertie constraint.⁷ Together they account for more than \$174 million in shortfall as documented in the root cause analysis for the 2019–2024 period.

The Moss Landing–Las Aguilas 230 kV constraint recorded a \$70.3 million deficit on \$302.9 million in notional CRR value from 2019–2024, reflecting only 76.8% revenue adequacy despite being among the most consistently congested paths in the system. The San Bernardino–Devers 230 kV constraint achieved only 44.5% adequacy over a concentrated four-month outage episode that drove a \$53.0 million deficit. The Palo Verde intertie constraint had a \$50.9 million deficit attributable primarily to outages submitted after the applicable CRR auction deadline.

These outcomes translate directly into pro-rata haircuts on CRR positions ranging from 14% to 72% — and in tail cases exceeding 100%, resulting in settlement reversals that transform CRR revenue streams into payment obligations. Approximately 4% of all CRR payments system-wide result in reversals, with the distribution highly concentrated on specific chronically inadequate constraints.

Root Cause Analysis Findings on Revenue Inadequacy

In February and March 2025, the ISO shared with the working group a root cause analysis of the contributors to revenue inadequacy in the CRR market since the 2019 policy changes. The analysis identified three leading structural causes.

Shift Factor Threshold

The ISO's day-ahead market uses a 2% shift factor threshold: injections whose shift factors on a given constraint fall below this threshold are not modeled. The CRR model does not use a shift factor cutoff. This asymmetry causes the settlement process to exclude injections that collectively contribute substantial flow to binding constraints, systematically understating congestion contribution in the settlement calculation.

Stakeholders broadly agreed that the shift factor threshold is a high-priority area for reform. However, the ISO's market AC powerflow optimization and timing limitations limit the ability of the ISO to adopt near term solutions in these areas.

Loop Flows (or parallel flow)

Loop flows use transmission capacity without contributing to congestion rent collection. If not adequately accounted for in the simultaneous feasibility test, loop flows can cause the ISO to release more CRRs than can be funded by congestion revenue. The ISO currently indirectly accounts for loop flows through the global derate factor applied in CRR processes. The global derate factor is fixed while loop flow patterns have significantly different impacts on specific CRR paths. Stakeholder comments in the working group broadly supported enhanced loop flow modeling with more granular assessment in the monthly and annual processes of expected loop flow impacts. The ISO notes as well that the

⁷ [CAISO Root Cause Analysis presentation](#), slide 88, February 27, 2025.

amount, impact, and patterns of loop flow could change either as the EDAM footprint expands or as CRA enhancements are finalized. The Phase 1 enhancements described below include increased authority for the ISO to consider loop flow in the annual CRR process.

Model Differences Between the CRR and Day Ahead Markets

Any differences between the CRR and day-ahead markets can also contribute to revenue adequacy. For example, transmission outages that occur in the day-ahead market after the relevant CRR auction has already cleared can reduce available transmission capacity below the level the CRR model assumed. These differences directly affect the revenue adequacy of the allocated and auctioned CRRs. Reducing divergence between the CRR model and the day ahead market outcomes is a focus of both proposed phases of the proposed initiative structure.

4.2. Stakeholder Feedback on the June 23rd Draft Final Proposal

On July 2, 2026, 13 stakeholders submitted comments on the draft final proposal and June 25th stakeholder meeting. The major themes expressed in the comments were:

- 1) **Most stakeholders supported removing the auction bid and price floor concept from the Phase 1 scope.** Several elaborated that they did not think a single floor value applied to all paths in the auction should be the starting point for the Phase 2 auction efficiency discussion.
- 2) **All stakeholders supported or did not oppose the proposed Phase 1 revenue adequacy measures.** These measures include expanding the ISO's authority to conduct loop flow modeling into the annual CRR process and continuing to explore modeling improvements that fall within the existing tariff.
- 3) **Several stakeholders expressed support for moving directly into Phase 2 without a pause.** These comments also requested more concrete timelines or requested certain issues be prioritized.

The decision to remove the auction floor concept from Phase 1 was supported by all commenters except for the California Public Utilities Commission (CPUC) Energy Division. The Energy Division saw the lack of auction-focused measures in the revised Phase 1 scope as a missed opportunity to address the core issues facing the CRR market. The Energy Division's comments continued previous support for the bid and price floor as an incremental improvement that could be refined and built on in Phase 2.

Most stakeholders supported and none opposed the new loop flow modeling authority in the annual CRR process. The most frequent caveat to supporting the measure was a request for more details on the exact methodology the ISO would use to implement this loop flow modeling. In particular, the Department of Market Monitoring (DMM) requested clarification on whether the derates associated with the loop flow modeling would be applied instead of or in addition to the Global Derate Factor. The CPUC Energy Division, while not opposing the loop flow modeling authority, emphasized that it does not see this as the most pressing issue facing the CRR market and expects it to have limited effect on revenue adequacy.

4.3. Final Proposal: Phase 1 Enhancements

Phase 1 is targeted for CRR year 2027 implementation and is designed to take meaningful and quick action to address priority areas. The ISO makes this final proposal in response to stakeholder feedback on the draft final proposal.

Minimum Bid and Price Floor

In response to stakeholder feedback, the ISO stands by the removal of the minimum bid and price floor from the Phase 1 proposal. Measures such as a minimum price will be considered in Phase 2 alongside other reform options. . The ISO recognizes that some stakeholders do not see the auction price floor as discussed in Phase 1 as the preferable starting point for the Phase 2 discussion. The ISO also recognizes that some stakeholders had different models and packages for implementing a potential price floor including applying such a floor on a constraint basis. The ISO is committed to exploring a variety of options in phase 2, but the lessons and alternatives gained from the Phase 1 minimum bid discussion serve as a valuable starting point for the next phase.

Modeling Enhancements for Improved Revenue Adequacy

In light of stakeholder support, the ISO will continue forward with the Phase 1 revenue adequacy measures in the draft final proposal. These are to continue improving the ISO’s modeling to the extent the current tariff allows, while making a targeted improvement to loop flow modeling capabilities.

The ISO has already begun modeling improvements that are supported by the existing tariff and facilitated by the ISO’s move to an updated software platform in 2025. The April 22nd stakeholder meeting in this initiative and the April 27th Market Performance and Planning Forum both discussed how the ISO began applying the Global Derate Factor to contingency constraints in the CRR model in March 2026. While a single month is too small a sample to draw definitive conclusions, March saw a revenue adequacy surplus of \$1.6 million, the first monthly surplus in the last three years.⁸ The ISO will look for additional ways to improve its modeling accuracy within existing tariff authority and, as with this measure, to keep stakeholders apprised.

The expanded loop flow modeling authority will take the form of a tariff change to enhance the ISO’s loop flow modeling capabilities. Section 36.4.1.2(vii) currently directs the ISO to consider “adjustments for possible unscheduled flow at the Interties” among other factors when determining the quantity of CRRs to release each month, known as the Monthly Available CRR Capacity.⁹ The ISO proposes to add this same language to the previous tariff section, which details the factors to consider when determining the Seasonal Available CRR Quantity in the annual CRR process.¹⁰

With this expanded loop flow modeling authority in place, the ISO will be able to introduce loop flow modeling for the 2027 annual CRR process. This will consist of targeted, manual adjustments to some high-market-impact constraints based on historical loop flow information. In the longer term, the ISO

⁸ See slide 47 of the MPPF presentation: [MarketPerformance-PlanningForum-Apr-27-2026](#)

⁹ Tariff Section 36.4.1.2(vii): [section-36-congestion-revenue-rights-as-of-aug-3-2024.pdf](#)

¹⁰ Tariff Section 36.4.1.1: [section-36-congestion-revenue-rights-as-of-aug-3-2024.pdf](#)

will explore other loop flow modeling approaches, such as modeling loop flows as injections and withdrawals as opposed to constraint derates. The ISO recognizes continued stakeholder interest in the details of loop flow modeling and will provide more information in the future.

5. Governance Classification

CAISO staff believe that this initiative should be presented only to the CAISO Board of Governors (the Board) for decision, because any proposed tariff amendments will be limited to CAISO's balancing authority area's Congestion Revenue Rights rules.

The Western Energy Markets Governing Body has primary authority over any proposal to change or establish any CAISO tariff rule(s) applicable to the Extended Day Ahead Market (EDAM) or Western Energy Imbalance Market (WEIM) Entity balancing authority areas, EDAM or WEIM entities, or other market participants within the EDAM or WEIM Entity balancing authority areas. This scope excludes from primary authority, without limitation, any proposals to change or establish tariff rule(s) applicable only to the CAISO balancing authority area or to the ISO-controlled grid per charter for WEIM and EDAM Governance § 2.2.1. None of the tariff rule changes contemplated in this initiative would be "applicable to WEIM/EDAM Entity balancing authority areas, WEIM/EDAM Entities, or other market participants within WEIM/EDAM Entity balancing authority areas, in their capacity as participants in the WEIM/EDAM." Rather, the proposed tariff rules would be applicable "only to the ISO balancing authority area or to the ISO-controlled grid." Accordingly, the matters scheduled for decision fall outside the scope of primary authority.

While the WEM Governing Body "may provide advisory input over proposals to change or establish tariff rules that would apply to the real-time market but are not within the scope of primary authority," no aspects of this initiative would establish or modify rules of the day-ahead or real time market. Accordingly, this initiative falls outside of the WEM Governing Body's advisory role as well.

This proposed classification reflects the current state of this initiative and could change as the stakeholder process moves ahead.

6. Next Steps

The ISO anticipates Phase 2 discussions to be ongoing in Q3 2026 to develop broader solutions addressing the goals developed by the working group.