

Memorandum

To: ISO Board of Governors
From: Anna McKenna, Vice President Market Design and Analysis
Date: July 8, 2026
Re: **Decision on congestion revenue rights enhancements: phase 1**

This memorandum requires ISO Board of Governors action.

EXECUTIVE SUMMARY

Management proposes enhancements to the ISO's modeling capabilities and revenue adequacy in the congestion revenue rights (CRR) market to allow the ISO to model loop flow, also referred to as unscheduled flow, in the annual CRR process. This targeted enhancement will improve alignment between the CRR model and the day-ahead market, reduce a known source of CRR revenue inadequacy, and strengthen the effectiveness of CRRs as a hedging tool.

With the authority to model and account for loop flow in the annual CRR process, the ISO will be better positioned to account for the effects of loop flow when determining the quantity of CRRs to release. Releasing a quantity of CRRs that is more accurately aligned with the energy flows in the day-ahead market, from which congestion revenue is collected, will reduce the frequency and magnitude of revenue inadequacy. Improved revenue adequacy will, in turn, improve the effectiveness of CRRs as a hedging tool.

Analysis shows that lack of loop-flow modeling in the annual CRR release processes is a significant driver of CRR revenue inadequacy. This proposed change comes from the first phase of the CRR Enhancements initiative, which the ISO undertook as part of its commitment to evaluate CRR market performance and identify improvements that strengthen CRRs as hedging instruments while supporting the ISO's open-access transmission framework. This proposal addresses a specific CRR modeling issue and improves alignment between the day-ahead market and CRR models.

Stakeholders supported or did not oppose the proposed change and agreed that it is consistent with the ISO's analysis of the causes of CRR revenue inadequacy.

Moved, that the ISO Board of Governors approves the congestion revenue rights enhancements phase 1 final proposal as described in the memorandum dated July 8, 2026; 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 changes proposed in this memorandum, including any filings that implement the overarching initiative policy but contain discrete revisions to incorporate Commission guidance in any initial ruling on the proposed tariff amendment.

BACKGROUND

The ISO's congestion revenue rights enhancements (CRRE) initiative focuses on identifying and developing enhancements to the ISO's CRR market. When the ISO adopted changes to the CRR framework in 2018, it committed to reviewing CRR market performance and evaluating whether further changes were warranted. The CRRE initiative fulfills this commitment, and Management's proposal in this memorandum is the first result of that effort. The CRRE initiative continues and will likely yield further enhancements.

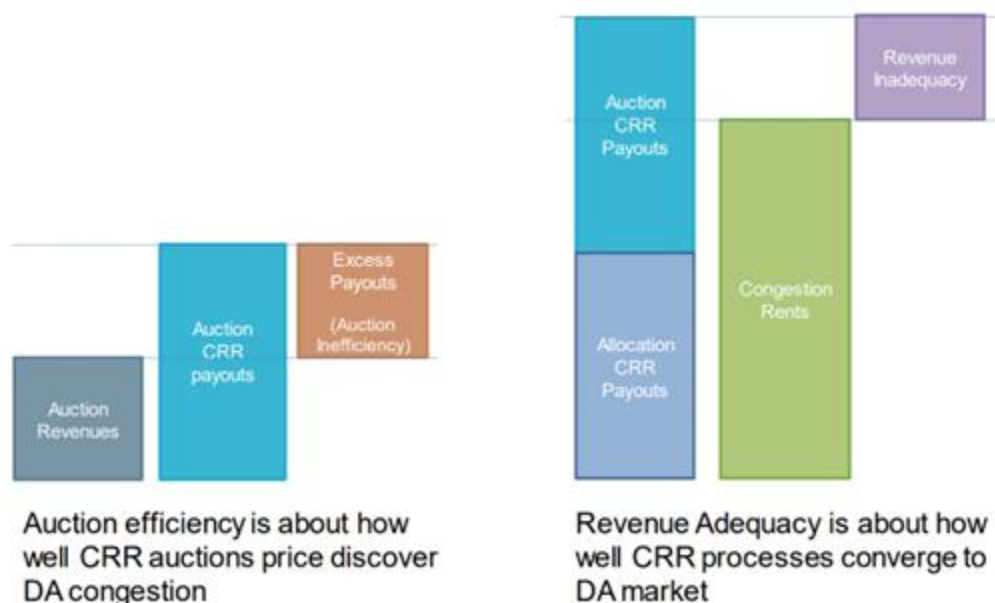
The CRRE initiative began with a scoping phase from November 2024 through December 2025. During this phase, the CRRE working group established objectives and problem statements to guide subsequent policy development. The working group identified three priority areas: revenue adequacy, auction efficiency, and product definition.

Revenue adequacy is a measure of the extent to which the congestion revenue the ISO collects in the day-ahead market meets the notional value of CRRs allocated and auctioned by the ISO. If the ISO collects less congestion revenue than the notional value of the CRRs it has issued, there is revenue inadequacy. In other words, revenue inadequacy occurs when congestion revenues collected by the ISO are insufficient to fund the notional value of issued CRRs.

Auction efficiency is the ratio of the total amount paid by participants in the CRR auction to the total amount of congestion revenue paid out to holders of auctioned CRRs. It measures how effectively auction prices reflect the congestion revenues ultimately paid to CRR holders. Figure 1 compares the information used to calculate revenue adequacy and auction efficiency.

Product definition refers to how CRRs are defined, particularly whether CRR products align with market participants' hedging needs and exposure to congestion risk in the ISO energy market. Product definition includes characteristics such as the hours of the day covered by a CRR, the duration of the CRR (e.g. monthly versus seasonal), and the transmission paths CRR market participants may nominate in the allocation or purchase through the auction.

Figure 1. Definition of auction efficiency (left) and revenue adequacy (right)



Revenue adequacy and auction efficiency have improved since the ISO implemented the previous round of CRR design enhancements in 2019. Revenue adequacy, which would equal 100% if the congestion revenues collected in the day-ahead market fully funded the notional value of issued CRRs, increased from an average of 75% in the five years preceding the changes to 79% from 2019 through June 2025. Auction efficiency improved from about 50% preceding the changes to 67% from January 2019 through June 2025. Despite these gains, the ISO's CRR market still faces persistent revenue adequacy and auction efficiency challenges. While revenue adequacy improved from 75% to 79% following the 2019 reforms, approximately 21% of the notional value of issued CRRs remains unfunded on average, indicating that further improvements are warranted.

The ISO's February 2025 root cause analysis identified three structural drivers of revenue inadequacy. The first is the exclusion of power-flow contributions from injections that fall below the shift-factor threshold used in the day-ahead and real-time markets. The shift-factor threshold is necessary in the day-ahead and real-time markets to ensure timely market optimization. Although these flows are small individually, excluding them in the markets but not in the CRR model collectively creates a difference between the CRR and market models.

The second driver is loop flows consuming transmission capacity without contributing to congestion revenue collections. Loop flows occupy transmission capacity, and the market dispatches based on the amount of available transmission less estimated loop flows. Accordingly, market dispatch accounts for the impact of loop flows by reducing the transmission capability available to the market. Congestion revenue results from market dispatches paying for congestion, but loop flows do not pay. Because loop flows are not associated with market transactions, they do not contribute to congestion revenues.

The third driver is divergence between the CRR network model and the day-ahead market, which creates revenue inadequacy.

To drive further improvement in all three priority areas, the ISO has taken a sequenced, two-phase approach to the policy development portion of the CRRE initiative. Phase 1 focuses on targeted enhancements designed to address discrete challenges and deliver incremental improvements. Management's proposal presented in this memorandum is the final product of Phase 1. Phase 2 will evaluate more complex reforms related to auction efficiency and product definition, as well as additional measures to improve revenue adequacy.

PROPOSAL

Management proposes expanding the ISO's authority to model loop flow in the annual CRR process. This change will improve the accuracy of CRR modeling and reduce the likelihood and magnitude of revenue inadequacy.

Management proposes to implement this change by adding loop flow to the list of factors the ISO may consider when calculating the Seasonal Available CRR Capacity — the amount of CRR capacity the ISO can release in each annual CRR process. The ISO already includes in the tariff "adjustments for possible unscheduled flow at the Interties" in the factors it considers when calculating the Monthly Available CRR Capacity, which plays a corresponding role in the monthly CRR process. Management proposes adding comparable language to the tariff section governing calculation of Seasonal Available CRR Capacity.

Although the ISO currently incorporates adjustments for possible unscheduled flow in the monthly CRR process, the tariff does not provide comparable authority in the annual CRR process. The proposed amendment closes this gap and ensures consistent treatment of loop flow impacts across CRR timeframes.

Of the three structural drivers identified in the ISO's root-cause analysis, the phase 1 proposal directly addresses loop flow impacts and partially reduces model divergence by allowing the annual CRR process to better reflect conditions represented in the day-ahead market.

This proposal presents limited implementation risk because it expands the ISO's modeling authority without requiring changes to market systems, CRR products, participant processes, or settlement calculations. Initial implementation will utilize existing CRR modeling capabilities and configurable transmission constraint parameters.

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. For the 2027 CRR releases, this will consist of targeted, manual adjustments to transmission constraints with significant market impacts based on historical loop flow data. Over time, the ISO will explore other loop flow modeling approaches under this same authority, such as modeling loop flows as injections and withdrawals rather than constraint derates.

Having the flexibility to change the exact method of loop flow modeling will allow the ISO to use the best available information and coordinate with the evolving congestion management framework in the Extended Day-Ahead Market (EDAM).

STAKEHOLDER FEEDBACK

Management appreciates the robust stakeholder engagement and thoughtful feedback received throughout phase 1 of the initiative. Over the course of phase 1, the ISO published four papers: an Issue Paper, Straw Proposal, Draft Final Proposal, and Final Proposal. Between January and June 2026, the ISO hosted four stakeholder meetings and received a total of 74 sets of written comments. These contributions were instrumental in refining the final proposal.

Stakeholders supported or did not oppose expanding the ISO's loop flow modeling authority in the annual CRR process. Many stakeholders expressed support for this measure due to its alignment with the findings of the ISO's root cause analysis of the drivers of revenue inadequacy in the CRR market. Some stakeholders requested more details on how loop flow modeling would be conducted. Others noted that, while valuable, this measure was not sufficient and should be built on in Phase 2.

The ISO will provide additional details on its loop flow modeling as the 2027 annual CRR process begins in July. For the 2027 annual process, the methodology the ISO plans to use for initial loop flow modeling will not require any changes by CRR market participants. The manual adjustments to constraint limits described above are implementable within the ISO's existing CRR model, where constraint limits are already configurable. The final constraint limits resulting from the loop flow work will be published as part of the ISO's existing practice of publishing all constraint limits used in the CRR model. These constraints will continue to be published in the same manner and format, so CRR market participants who use ISO CRR materials as inputs for their own internal processes will not experience any disruption. To the extent that the ISO evolves its loop flow methodology in the future, the ISO will keep market participants informed.

Some stakeholders stated that, while the loop flow modeling is an improvement they support, it is insufficient on its own and will need to be augmented in phase 2. This position is consistent with the ISO's planned approach for phase 2. Continued work in the third quarter of 2026 will include consideration of additional revenue adequacy measures alongside proposals focused on auction efficiency and product definition.

As part of the stakeholder process for phase 1, the ISO considered and included in the straw proposal an additional measure to improve auction efficiency. The ISO proposed a bid and price floor in the CRR auction as an incremental enhancement until more complex auction restructuring proposals could be fully considered in phase 2. However, stakeholders generally opposed moving forward with the proposal in phase 1. While some stakeholders opposed the floor concept on principle, even those who supported

the concept argued that the idea was complex enough to merit more discussion than was possible for implementation in the 2027 annual process. Therefore, this possible change will be considered in phase 2, where it will be considered alongside other proposals for improving auction efficiency.

CONCLUSION

Management recommends that the ISO Board of Governors approve the proposed expansion of the ISO's authority to model loop flow in the annual CRR process. This proposal directly addresses a documented contributor to CRR revenue inadequacy, improves consistency between the CRR and day-ahead market models, presents minimal implementation risk, and has broad stakeholder support. Approval will provide the ISO with an additional tool to improve CRR market performance while maintaining flexibility to pursue further enhancements in phase 2.