CAISO Congestion Revenue Rights Market

Presented by Vitol Inc.

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CRR auctions enable access to hedging opportunities and are a key element of nodal market design

FERC recognizes Financial transmission Rights provide a congestion hedging function

- “The purpose of FTRs to serve as a congestion hedge has been well established.” - Order on Rehearing and Compliance, FERC Docket No. EL16-6-002, at p.27 (January 31, 2017)

- CRR Auctions enable access to hedging opportunities in the form of a robust and centrally clearing auction

- The CRR market provides an opportunity for market participants to hedge risk by shifting it to willing counterparties
  - Allows each market participant to focus on their core competency
    - Energy provider: serve end users with clean and affordable energy
    - Energy supplier: efficient and reliable operation to ensure least cost supply
    - Financial participant: accept and manage price risk

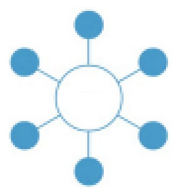
A closer look at how CRRs can be used

Power is often bought and sold forward at liquid trading hub points, however nodal market settlement is at nodal locations. This creates “basis risk”.

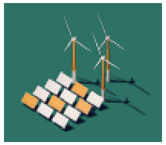
- Resources settle at their nodal location
- Loads settle at their load aggregation point
- Interchange transactions settle at the interties

The basis risk created from trading hub transactions can be hedged with CRRs

Load consumption settles at LAP



Trading Hub Load and Resource and market makers trade forward standardize products



Resource output settles at its node

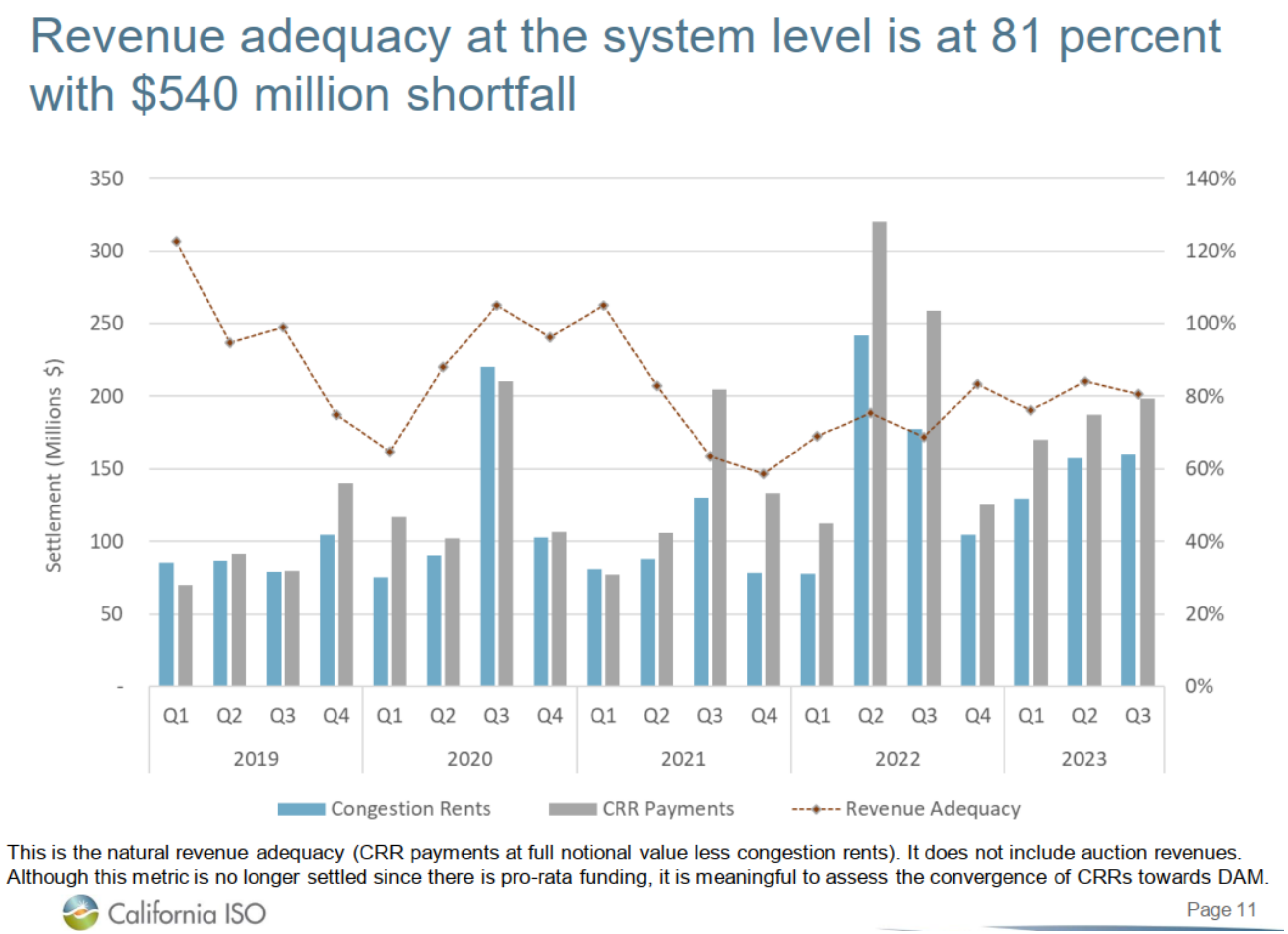
Current State of CAISO CRR Market

CAISO implemented two significant changes to its CRR Auctions on Jan. 1, 2019

- Elimination of non-delivery paths for bidding in CRR auctions
- Pro-rata adjustments of CRR's settlement based on their contribution to revenue deficiency
  - CRR holder payments are reduced when day-ahead congestion funding is not sufficient to meet CRR target payout settlement
  - Occurs due to differences between the CRR Auctions and Integrated Forward Market
    - Topology differences
      - Planned outages submitted after the auction close
      - Constraint modeling
    - Missing congestion funding: Unsettled flows in the Integrated Forward Market do not settle on congestion prices
      - Loop flows
      - Application of a shift factor threshold

The CAISO's current methodology for assigning revenue inadequacy or "shortfall" significantly impairs the ability of CRRs to manage risk

CRR funding for the period of January 2019 to Q3 2023 was 81% overall, however the risk posed to any single CRR position is significantly higher



CAISO presentation to the Market Surveillance Committee on 11/29/2023 at slide 11: https://www.caiso.com/documents/congestionrevenuerights-presentation-nov29-2023.pdf

Vitol's perspective on the current state of the CRR Market

The predominate issue with CAISO's shortfall assignment is that it leaves CRR holders short paid when there is surplus congestion funding available to improve funding

- This impairs the value of the hedge
- The shortfall can be so severe it exceeds the notional value payout of the CRR ("settlement reversal")
  - Especially harmful when considering the price paid to acquire a CRR asset
  - It is caused by missing congestion settlement for unsettled flow and topology differences. The cost is shifted to CRRs holders through the shortfall allocation
- These high impact/low probability tail events influence CRR bid prices and market participation, which works against ongoing efforts to improve the CRR auction efficiency metric
  - Risk premiums to account for shortfall risk can reduce auction proceeds
  - A market participant may decide to no longer purchase CRRs to avoid settlement reversal[1], which harms competition

[1] Dr. Patton, Potomac Economics: FERC Technical Conference in the matter of PJM'S FTR/ARR Allocation EL16-6-001 and ER16-121-000, Thursday, February 4th, 2016 at p76-77: https://www.ferc.gov/sites/default/files/2020-08/EL16-6-001-Transcript.pdf

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