

MARKET SURVEILLANCE COMMITTEE

Congestion Revenue Rights: Initial Thoughts on the Current Proposals

James Bushnell

California ISO/Western EIM Market Surveillance Committee

Market Surveillance Committee Meeting

June 2026

- Framing: costs and benefits of CRRs
- The minimum price proposal
- Minimum prices and allocated CRRs
- Issues beyond the auction: the allocation process
- Revenue inadequacy claw-backs and CRR quality

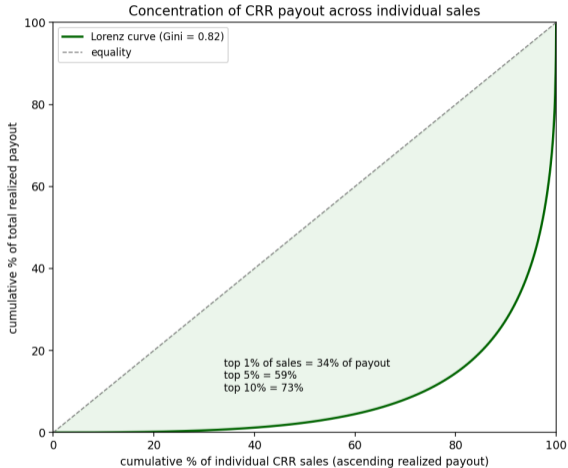
Framing: Costs and Benefits of CRRs

- Much of the discussion has focused on revenue losses—through either revenue inadequacy or auction inefficiency—as a “cost” of the CRR market
- But the idea of CRRs was based on the notion that they provide **benefits** to market participants as well
- Reducing the amount or access to CRRs would reduce revenue losses *but also reduce the benefits*
- Legal questions aside: the economic impact is a cost-benefit question.

Quantifying the Benefits

- Quantifying hedging benefits is very difficult
- I am not aware of empirical evidence on how much CRRs (or equivalents) improve investment efficiency or other outcomes
 - Mostly because markets have either had them or not—there is little “variation” to study
- Canonical examples of CRR value were applied to investments in generation (different issues for large loads)
 - Steve Stoft’s “bankability” argument
 - Only LT CRRs fully address this—yet the current process has devoted almost no attention to them
- How much value is there in the ability to nominate or purchase a sequence of seasonal or monthly CRRs for financing new investment?

CRR Payoffs Are Extremely Concentrated



- **Gini = 0.82**—payout is highly concentrated across individual auction purchases
- Top **1%** of purchases = **34%** of all realized payout
- Top 5% = 59%; top 10% = 73%
- Over half of all purchases produce essentially zero realized payout
- *Most CRRs, most of the time, are worth very little*

70,949 auction purchases (Buy Bid), ON-peak monthly, 2022–2024.

The Minimum Price Proposal

- The CAISO straw proposal (June 2026) proposes a minimum bid *and* minimum clearing price for the CRR auction—Phase 1 targeting 2027
- The idea was motivated by a hypothesis that a disproportionate amount of auction shortfalls were concentrated in low-price CRRs that “won the lottery” when unexpected congestion arose
- If true, a minimum price could yield a disproportionate reduction in auction revenue shortfalls

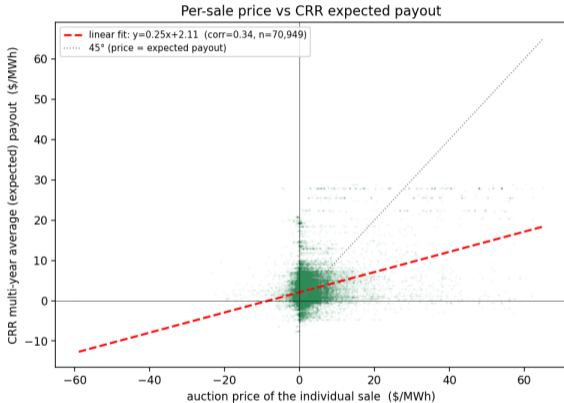
Minimum Price: What the Data Show

- Subsequent analysis shows this is **may not be the case**: low-price CRRs are not responsible for a majority of auction revenue shortfalls
 - Straw proposal Figures 8–9: “there is not a consistent pattern of any one price category being more profitable than the others”
- This means reductions in revenue shortfalls could require eliminating a proportionate number of CRRs from the auction
- If willingness-to-pay does not increase with the minimums, the effect is primarily to reduce auction participation and liquidity
- Potential risk: fewer participants → fewer binding constraints → *lower* auction revenues ?

Data and Methods: Preliminary

- Two CAISO day-ahead datasets, joined per node-pair and month:
 - **CRR auction results** (what buyers paid): clearing price, cleared MW, revenue for every CRR sold. Covers **2022–2024**
 - **Realized day-ahead congestion** (what CRRs paid out): the MCC component of each node's LMP, **2018–2024**
- Universe: “popular” CRRs (source→sink pairs clearing >50 MW total over 2022–24; ~7,850 pairs) → captures ~93% of cleared MW and ~92% of auction revenue
- Per-sale charts use **auction purchases only** (Buy Bid class; monthly-term, on-peak): 70,949 purchases; ~438,000 MW; ~\$560M realized payout vs ~\$255M paid
 - LSE allocations (Nomination, ~24% of monthly MW) and auction sell side (Sell Bid, ~19%) excluded—their “price” is not a buyer's purchase price
- Payout = avg hourly MCC difference (sink – source), \$/MWh
Auction price = clearing price ÷ term hours, \$/MWh
 - No Phase 1B payout clawbacks included

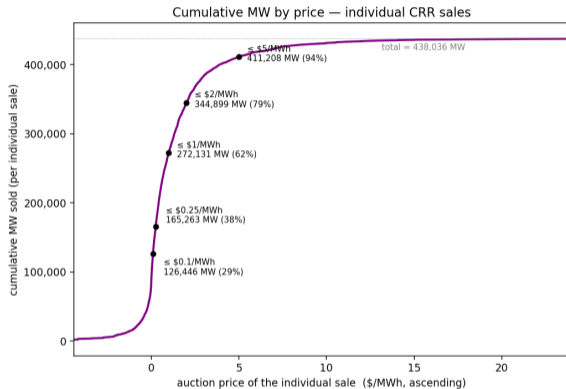
How Does Auction Price Compare to Payout



- Each dot is an **individual sale** price (x) vs. that CRR's long-run average payout (y)
- Slope = **0.25**—far below the 45° line
- Paying more on any single transaction buys very little extra expected value
- The same CRR transacts across a wide price band → high-priced purchases overpay $\sim 4\times$

70,949 auction purchases (ON-peak, monthly, 2022–2024). Expected payout averaged 2018–2024.

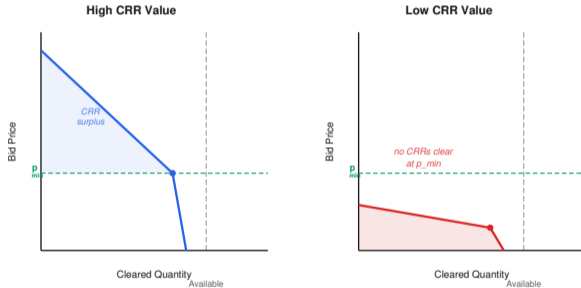
How Much Volume Clears at Low Prices?



- **38%** of all auction MW clear at $\leq \$0.25/\text{MWh}$
- $\leq \$1/\text{MWh} \rightarrow$ **62%**; $\leq \$2 \rightarrow$ 79%
- A \$1/MWh minimum price could potentially eliminate **nearly two-thirds** of auction volume
 - Depends upon how many *bids* there are above the price-floor on these CRRs

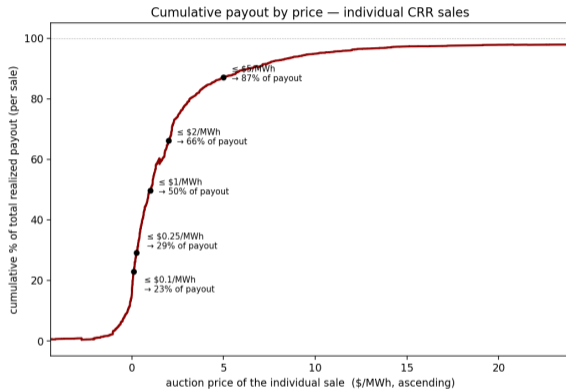
Auction purchases (Buy Bid), ON-peak monthly, 2022–2024. Total: $\sim 438,036$ MW across 70,949 purchases.

Impact of a Minimum Price on CRR Demand



- A minimum price screens out CRRs with low demand, but preserves paths with high CRR value
- If most bidder surplus is concentrated on a few high-value paths, the impact on auction volume could be large but the impact on *value* could be small
- How 'steep' are the demand curves for the CRRs that currently clear near zero?

Where Does CRR Payout Come From?



- Purchases priced \leq **\$0.25/MWh** account for **23%** of total realized payout
- \leq **\$1/MWh** \rightarrow **50%**; \leq **\$2/MWh** \rightarrow **66%**
- About 16% of payout came from purchases the auction priced at **\$0 or below**

Auction purchases (Buy Bid), ON-peak monthly, 2022–2024. 70,949 purchases; \sim \$560M total realized payout.

Minimum Bid vs. Minimum Price

- An important distinction in the straw proposal:
 - **Minimum bid**: floor on what participants can bid; CRRs can still clear below this if constraints don't bind or counterflow expands capacity
 - **Minimum price**: floor on clearing prices; prevents paths from clearing at \$0/MWh
- The ISO proposes both, set at the same level
- On-peak options under consideration: \$0.25, \$0.50, \$1.00/MWh
- Off-peak options: \$0.05, \$0.10, \$0.25/MWh
- One consideration: how large is the bidder surplus, measured as the difference between infra-marginal bids and market clearing prices?
 - In other words - how many CRRs that currently clear at near zero prices would still clear at a higher minimum price"
 - approaching pay-as-bid CRRs?

Minimum Prices and Allocated CRRs

Several questions arise at the intersection of minimum prices and the allocation:

1. What percentage of low-price CRR auction sales can be traced back to allocated CRRs that LSEs offered to sell? Is this even calculable given reconfiguration?
2. Is it desirable to “protect” LSEs from selling their CRRs at low prices?
3. Is it technically possible to apply a minimum price only to *additional* CRRs or capacity (not to LSE sell-backs)?
4. Is the secondary market an adequate substitute? It would make reconfiguration difficult to impossible
5. How would a minimum price affect the long-term CRR process, if at all?

Issues Beyond the Auction: The Allocation Process

- A large amount of analysis has focused on the auctions, but the **majority of CRRs are dispersed via allocation**
- There are reasons to believe the allocation process is inefficient—based on basic market design principles
- Potential issues include:
 - **Equity**: some LSEs may gain far more value from allocations than others
 - **Efficiency**: herding to high-value CRRs, limited sink options in Tier 1
- Any initiative that reduces CRR capacity available in auctions *increases the share created through allocation*—raising the importance of getting allocation right

Allocation and the Secondary Market

- If minimum prices drive LSE sales of allocated CRRs to secondary (bilateral) markets rather than the auction:
 - Reconfiguration becomes difficult or impossible
 - Price discovery is reduced
 - Smaller LSEs may lack access
- The allocation process deserves attention commensurate with its share of total CRR volume

Revenue Inadequacy and CRR Quality

- The CAISO's approach to revenue inadequacy (Track 1B, 2019) is among the most aggressive of any ISO
 - Pro-rata shortfall allocation on a constraint-by-constraint basis
 - Haircuts from 14% to 72%; ~4% of all CRR payments result in reversals
- One result: the hedging value of some (many?) CRRs could be seriously degraded
- This could impact the auction if bidders view CRRs as more risky and less valuable

Fewer but Better CRRs?

- Is there a point where it's so bad that there isn't much point to CRRs anymore?
- Revenue adequacy has averaged $\sim 79\%$ system-wide (2019–2025), with a total shortfall of $\sim \$856$ million
- Does it make sense to develop a system that provides a **smaller quantity of higher-quality CRRs** rather than trying to deal with shortfalls by degrading CRR quality?
- Reducing the inadequacies would help on many fronts, and should be a high priority.

Summary

- CRR reform should be evaluated as a cost-benefit problem, not just a cost-reduction exercise
- The minimum price proposal may not achieve its goals if auction shortfalls are not concentrated in low-price CRRs
 - Should be able to learn more by looking at CRR bid curves and/or re-running some past auctions with minimum prices imposed.
- The interaction between minimum prices and the allocation process raises important and underexplored questions
- The allocation process itself—responsible for the majority of CRRs—warrants more scrutiny
- Revenue inadequacy remains a real problem that spills over into all of the other aspects of the system.