



CRR Performance Update

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CRR Enhancements and Policies Implemented in 2019



Analysis Phase. Nov 2017:
Understand the drivers to guide the policy discussion



Phase 0. First half of 2018.
Enhance ISO processes under existing Tariff requirements



Phase 1A. 2019 Annual process:
Additional reporting requirements for transmission outages
Elimination of non-delivery paths



Phase 1B. 2019:
Pro-rata funding for CRRs on a constraint by constraint basis
Capacity released in annual allocation reduced from 75% to 65%

CAISO's analysis has been focused mainly on auction efficiency and revenue adequacy as well as their drivers

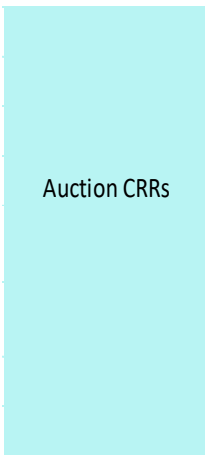
- Previously, auction efficiency has been calculated as

$$CRR \text{ auction shortfall ratio} = \frac{\text{Net Auction revenues}}{\text{Auctioned CRR payments}}$$

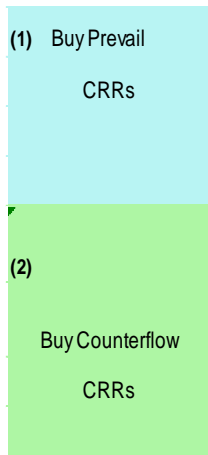
- This metric accounted for
 - Auction efficiency for buy CRRs
 - Arbitrage from annual auction to only auctions
 - CRR valuation for selling allocated CRRs...
- But CRR valuation of selling allocated CRRs is not an auction efficiency problem
- The policy changes adopted on January 2019 have required to revise this metric

Not all CRRs in the auction are created equal and not all CRR losses are driven by an auction inefficiency

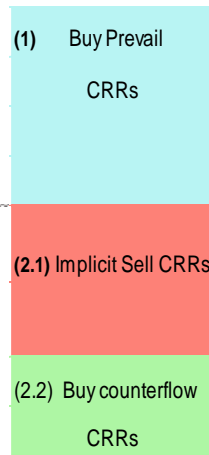
1. Pre-2019 Auction



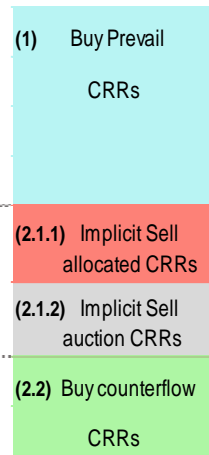
2. Pre-2019 Auction



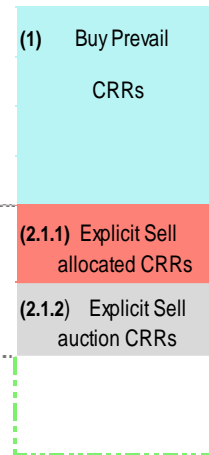
3. Pre-2019 Auction



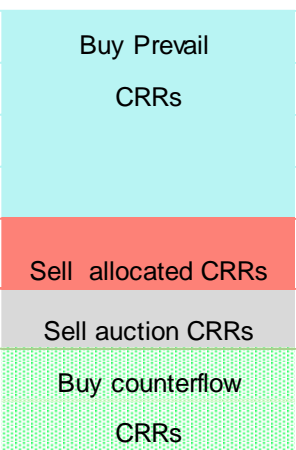
4. Pre-2019 Auction



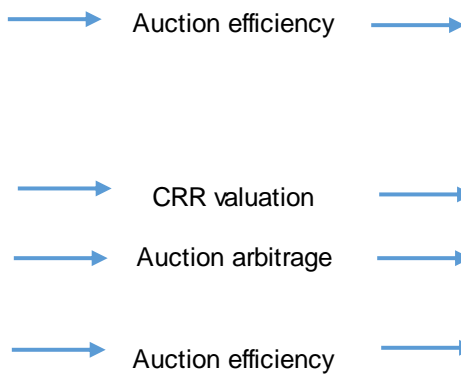
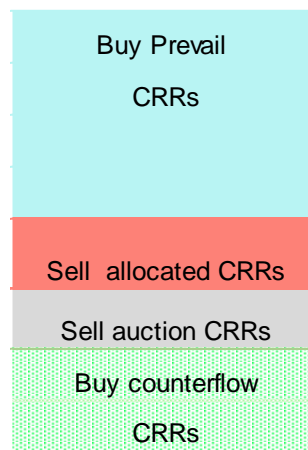
5. 2019 Auction



Auction



CRR payment



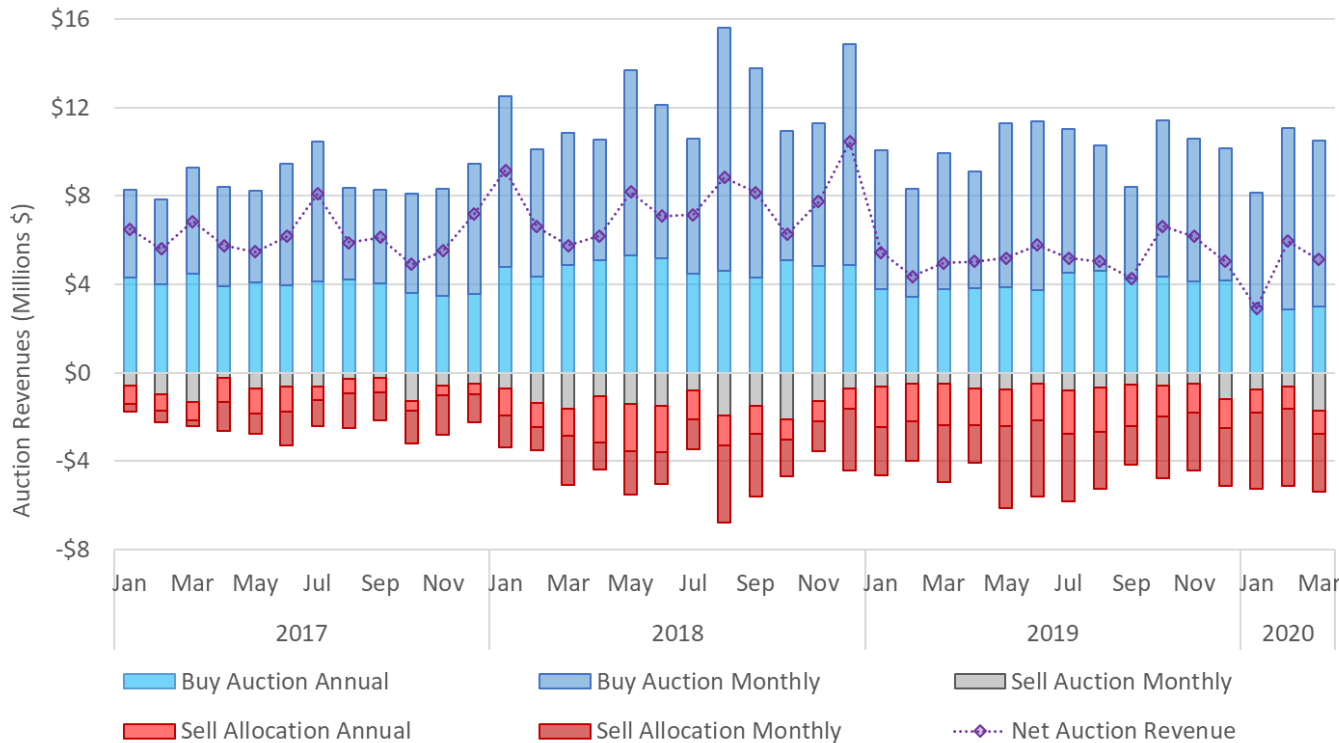
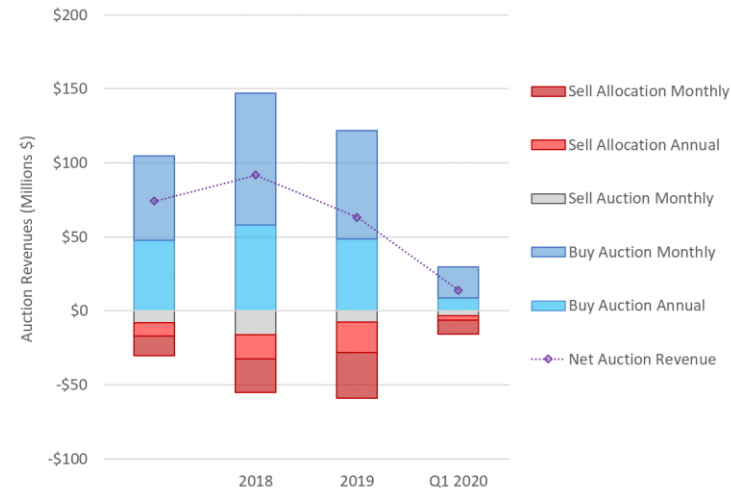
2019 metric

$$RAS = \frac{AR(1) + AR(2.1.2)}{CRRP(1) + CRRP(2.1.2)}$$

Pre-2019 metric

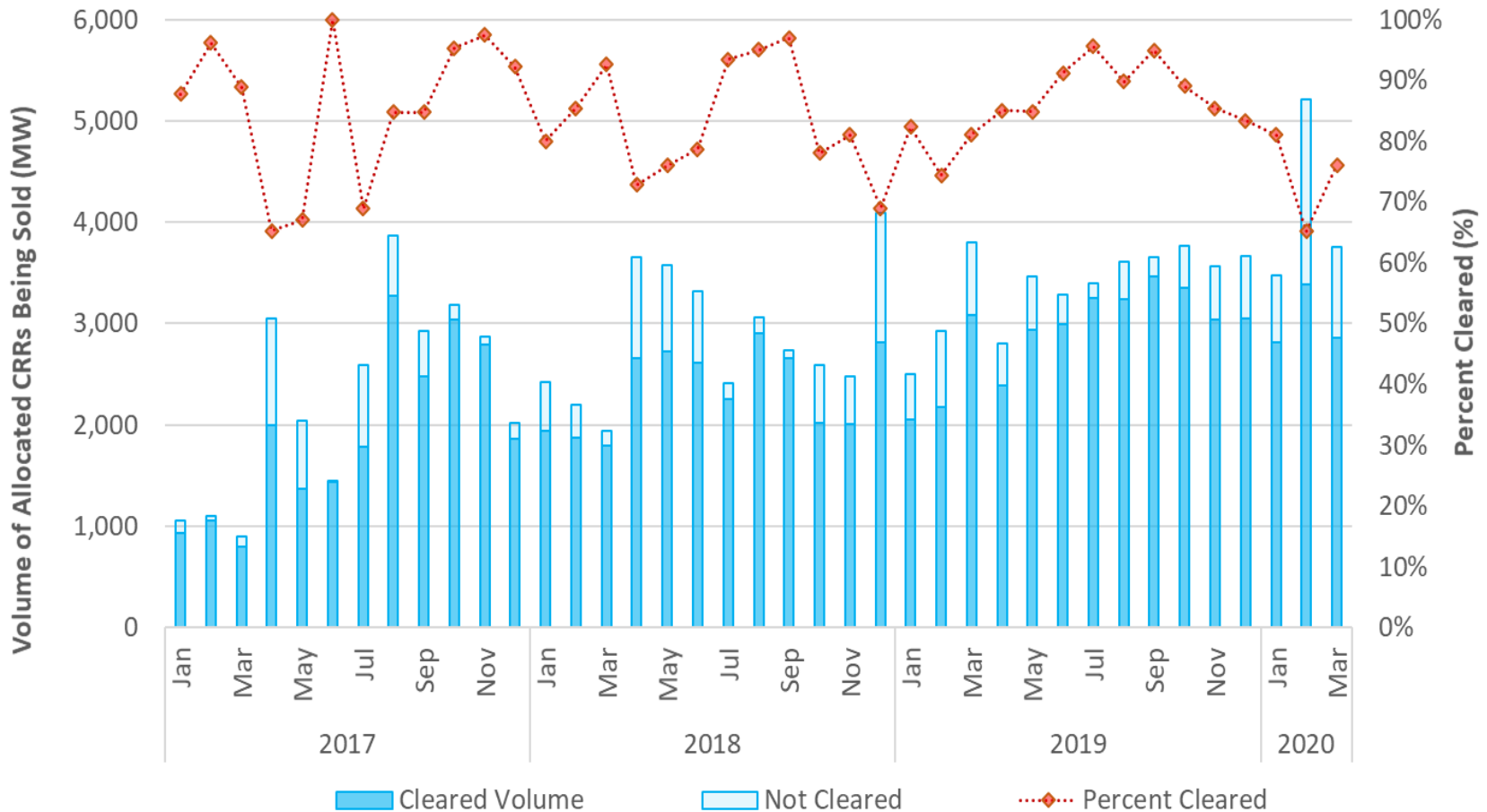
$$RAS = \frac{AR(1) + AR(2.1.2) + AR(2.2)}{CRRP(1) + CRRP(2.1.2) + CRRP(2.2)}$$

Overall, auction revenues have seen a reduction after the policy changes mainly driven by the increase of selling CRRs

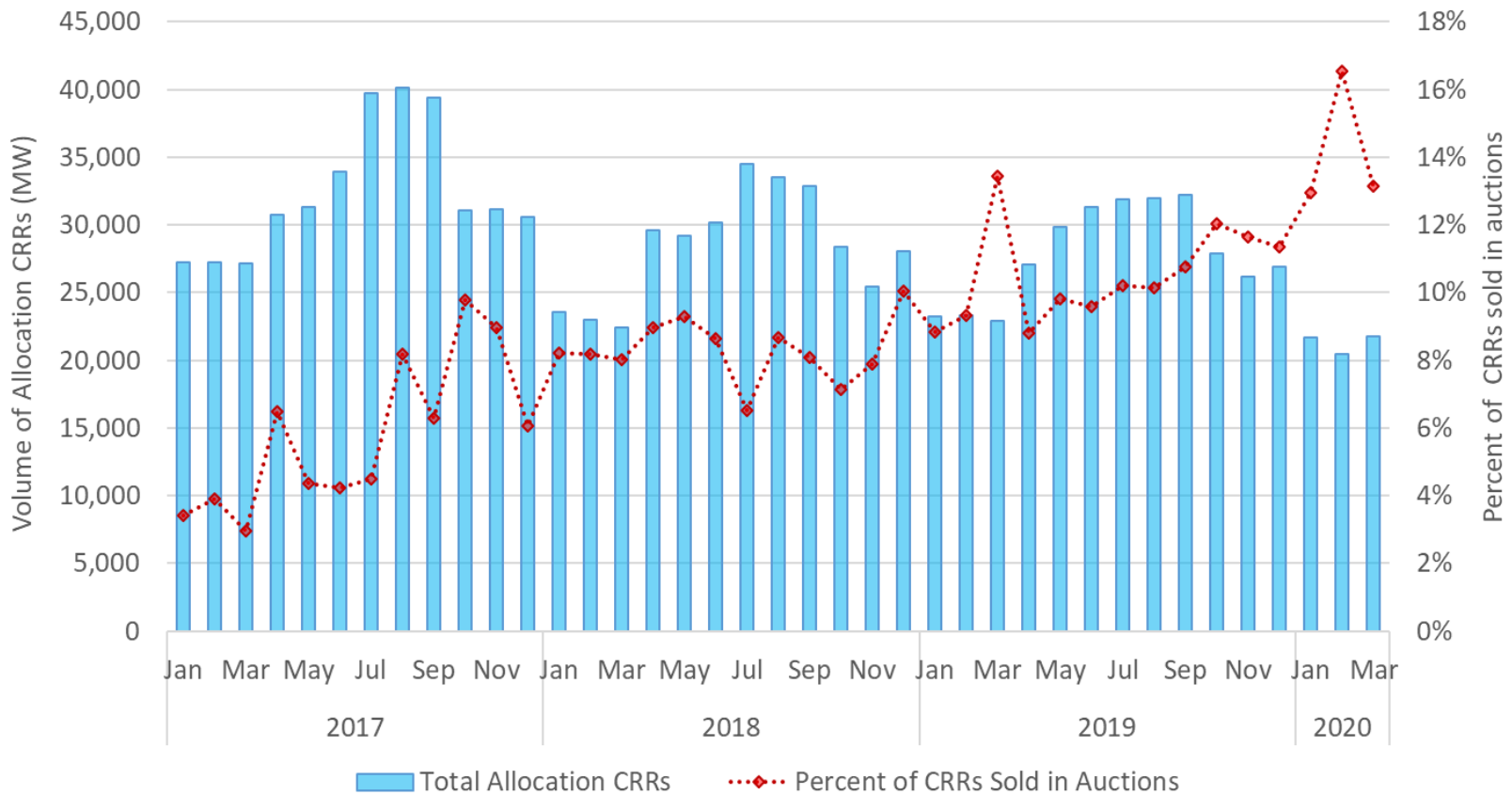


Sell-type CRRs prior to 2019 are estimated based on those buy-type CRRs that are in opposite direction to existing CRRs

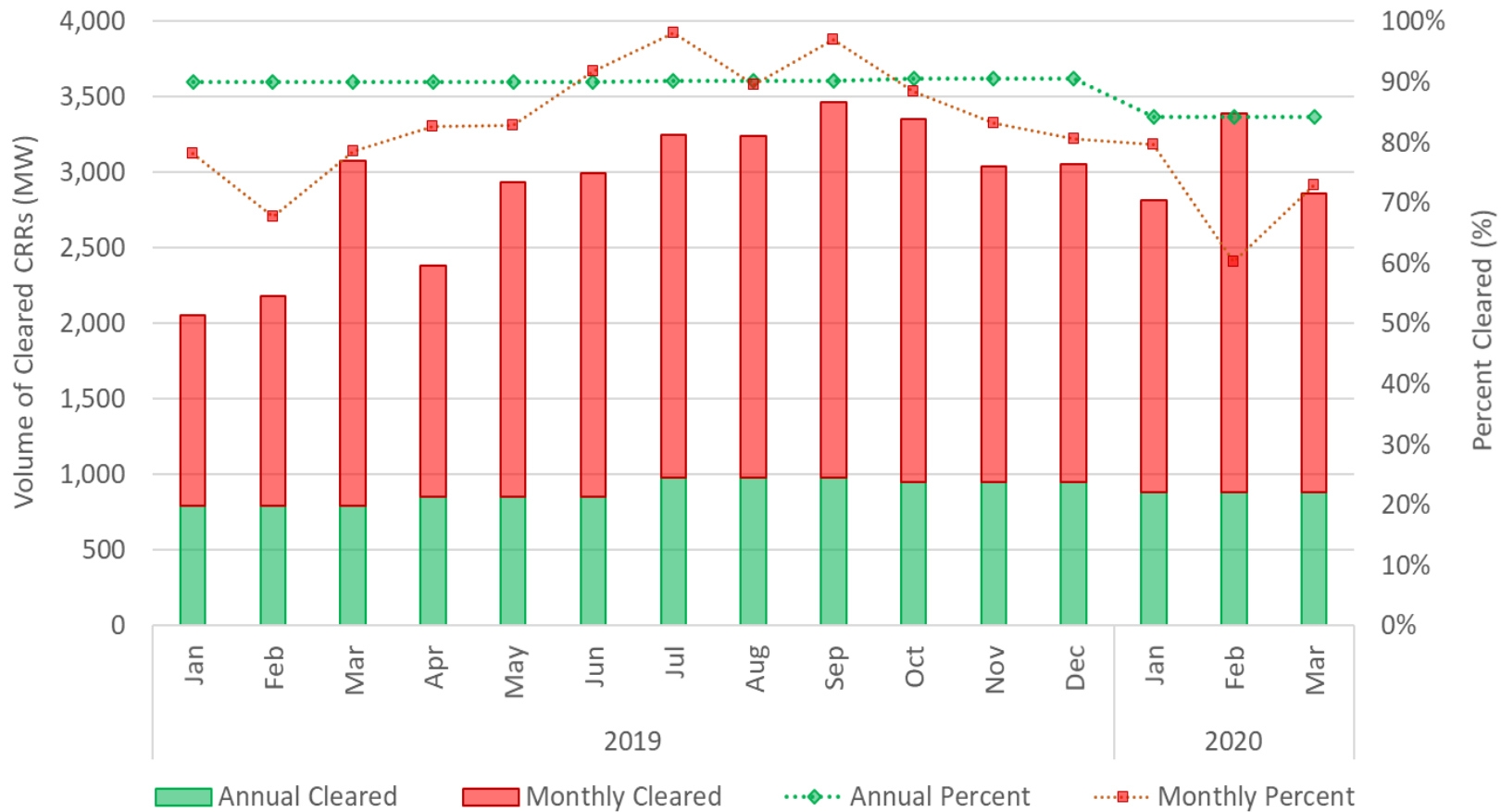
Sales of allocated CRRs by LSEs have increased by 40 percent or 1,000MW in 2019 and 2020



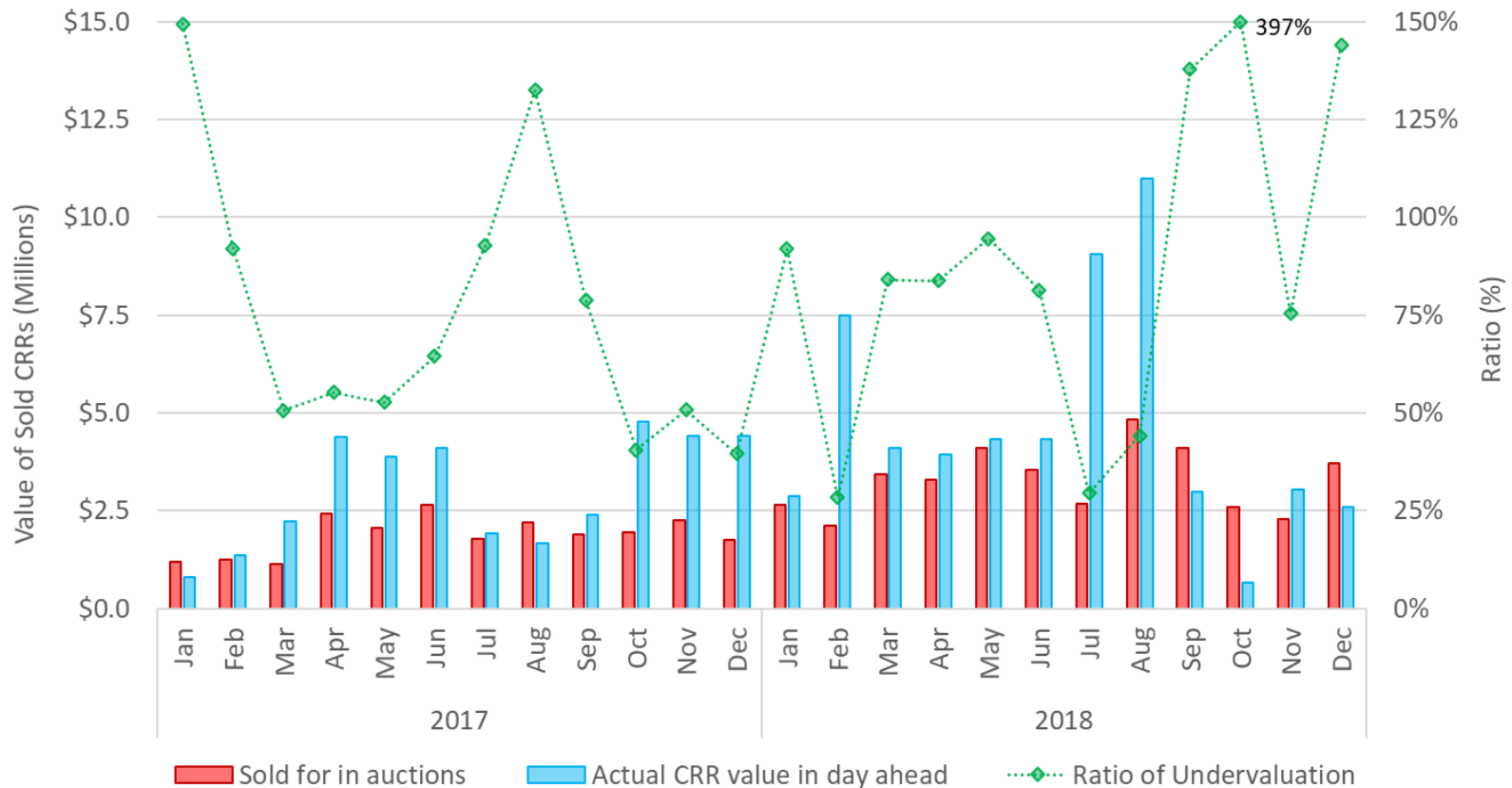
Volume of allocated CRRs being sold in auctions have increased from 4 percent in early 2017 up to 17 percent in 2020



About 70 percent of the allocated CRRs put for sale were sold in monthly auctions.



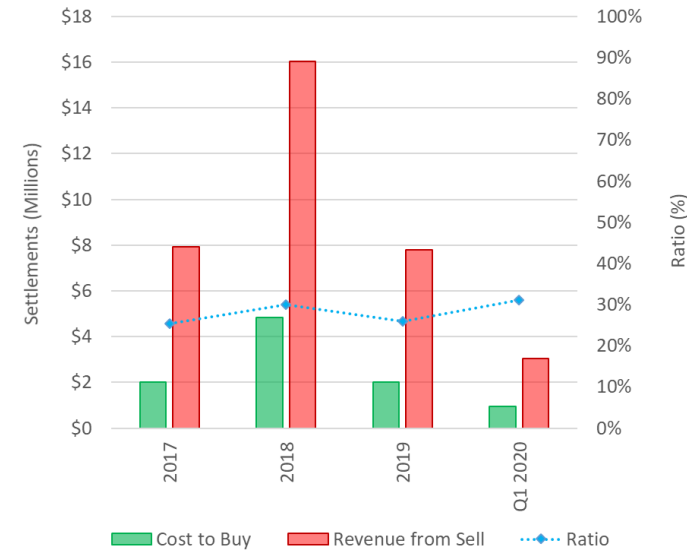
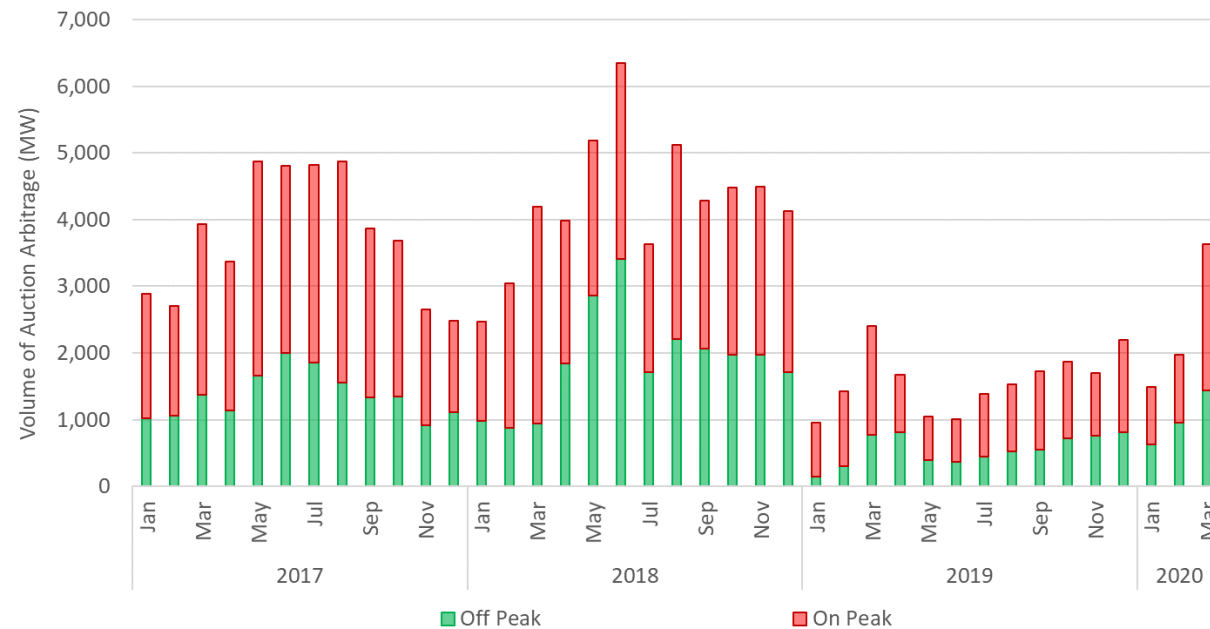
LSEs sold allocated CRRs for about \$31 million less than their day-ahead market payout in 2017 and 2018



The current auction is an effective and useful tool for LSEs

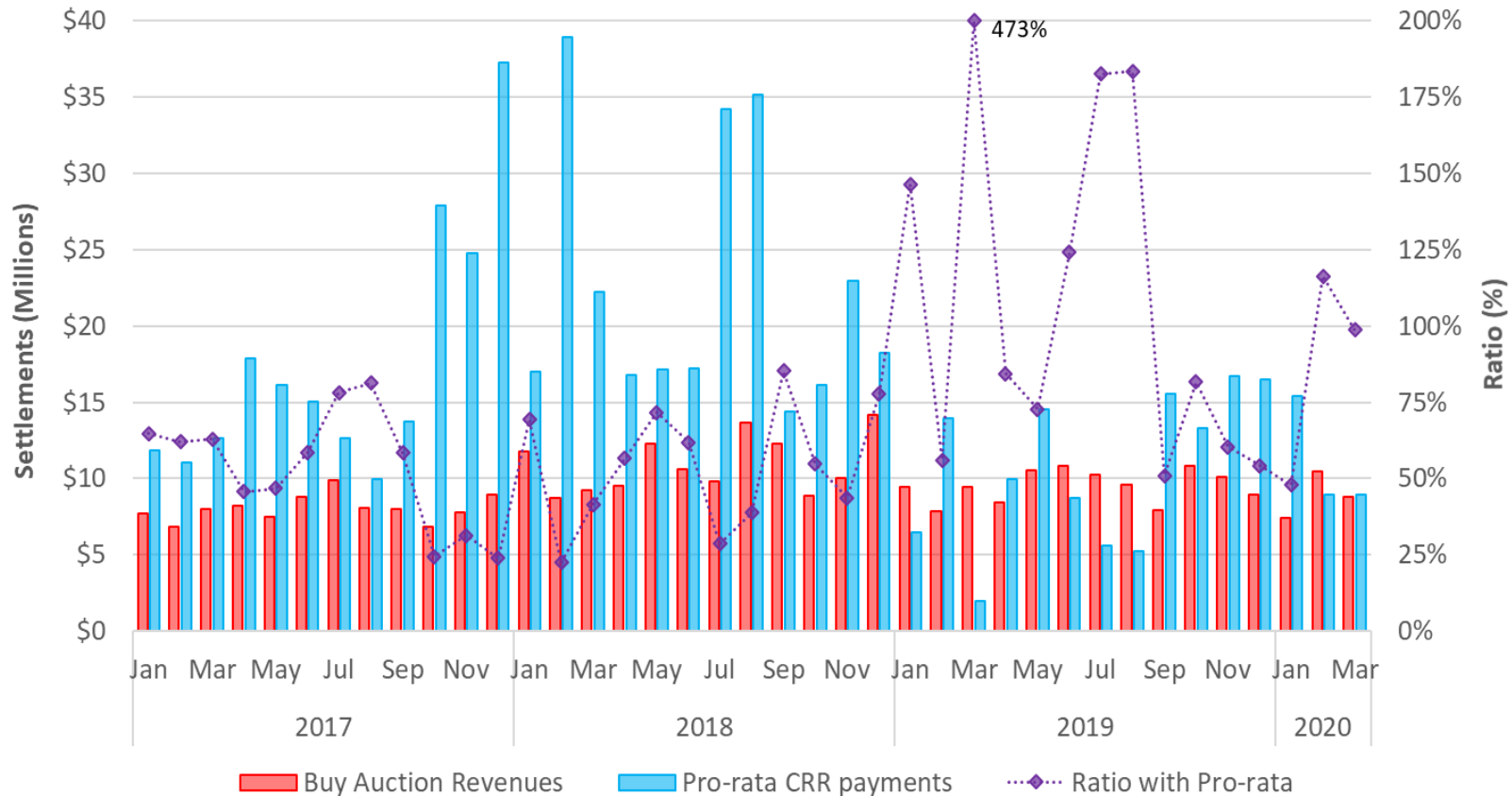
- Data shows LSEs are increasingly relying on CRR auctions to rebalance their portfolios
- Allocated CRRs have been sold in auctions but are being either
 - undervalued due to the complexities of predicting congestion, or
 - sold at a discount based on a risk tolerance/profile
- Either case is not due to an auction inefficiency; its not a problem of having an auction as the vehicle to trade CRRs
- Using other vehicle to trade CRRs will not resolve this issue

The purchase and resale of CRRs between auctions fell by 56 percent between 2017 and 2018, and 2019 and Q1 2020 from an average of 4,000 MW to an average of 1,735 MW



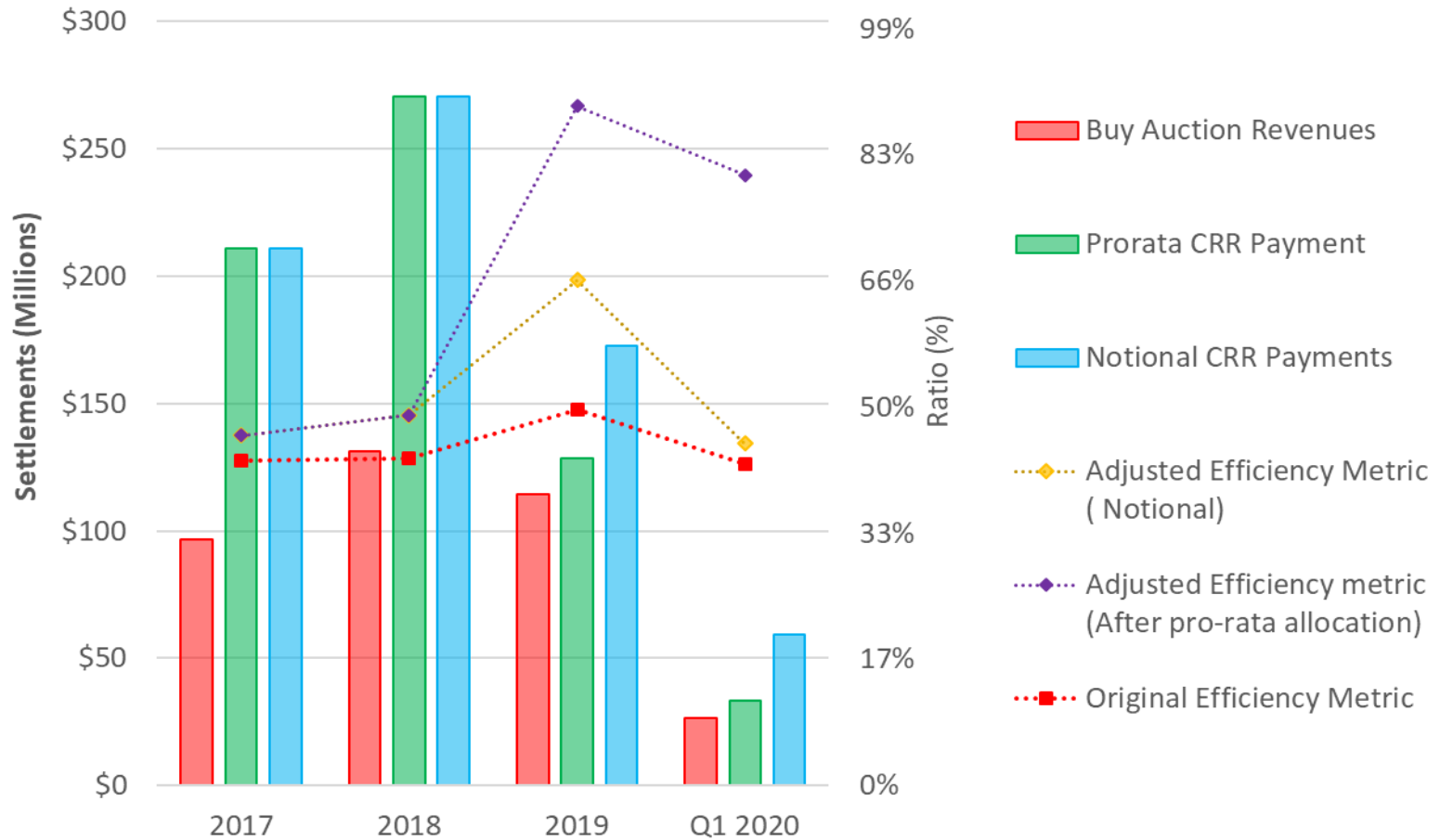
Average profit from this arbitrage reduced from \$8.5 million to \$7.8 million

Based on the revised metric, the policy changes improve the CRR auction efficiency to 87 percent

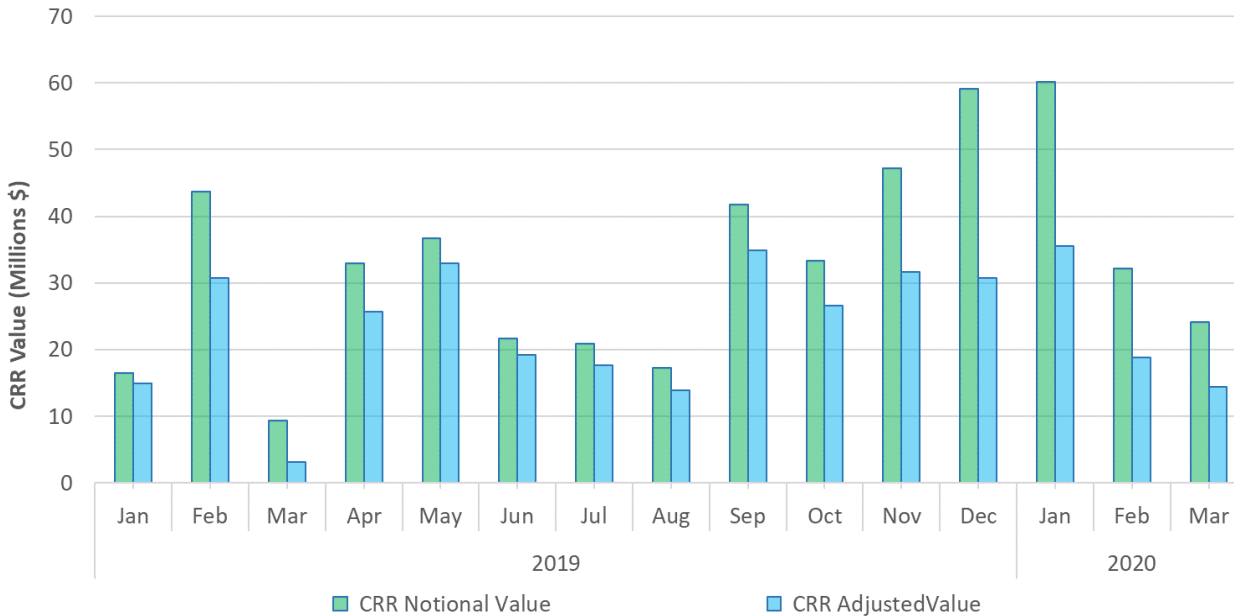
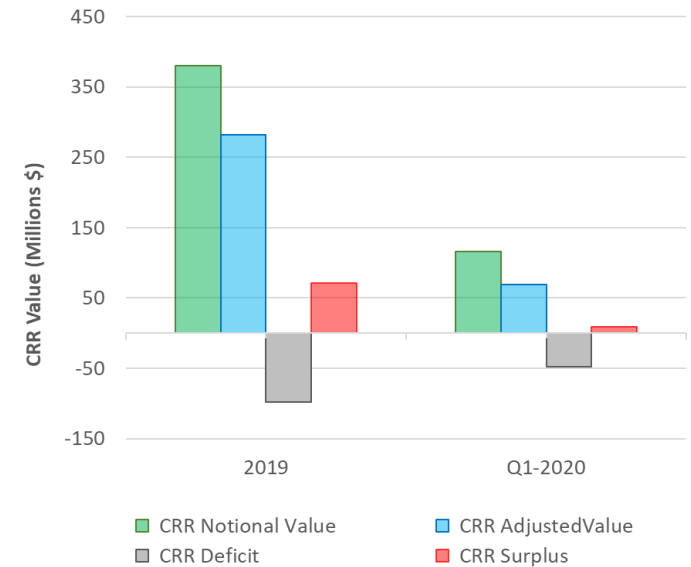


Revised metric only includes auction revenues and CRR payments from buy-type CRRs and sales of auctioned CRRs. Excludes resale of allocated CRRs. For pre-2019 CRRs, it also includes buy-type CRRs of counter-flow CRRs

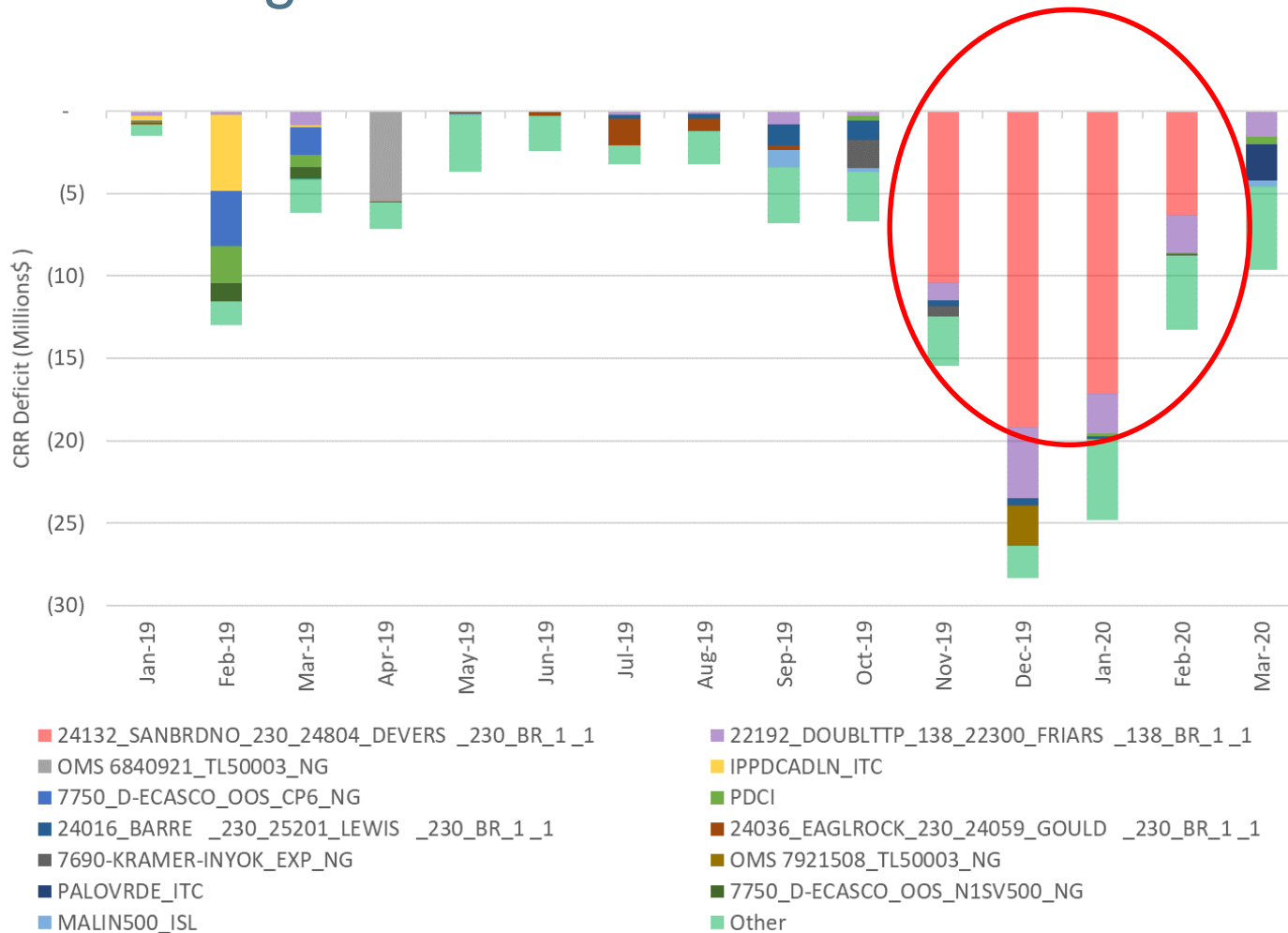
Revised metric for auction efficiency shows performance improved from 47% to 87% in 2019 with the policy changes implemented in 2019



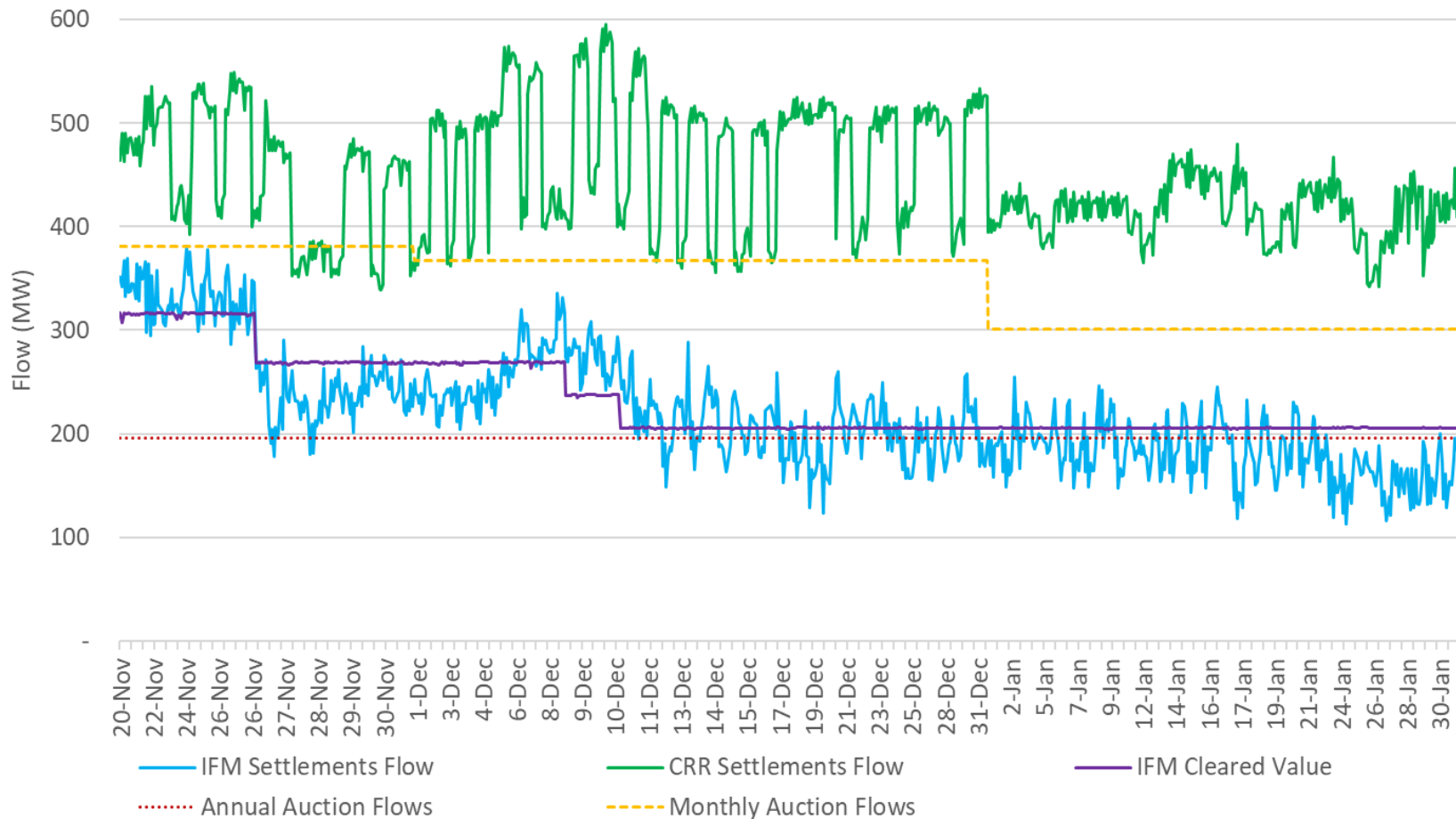
Since January 2019 pro-rata funding has reduced the congestion rent shortfall by 146 million, which is about 29 percent of the CRR notional value



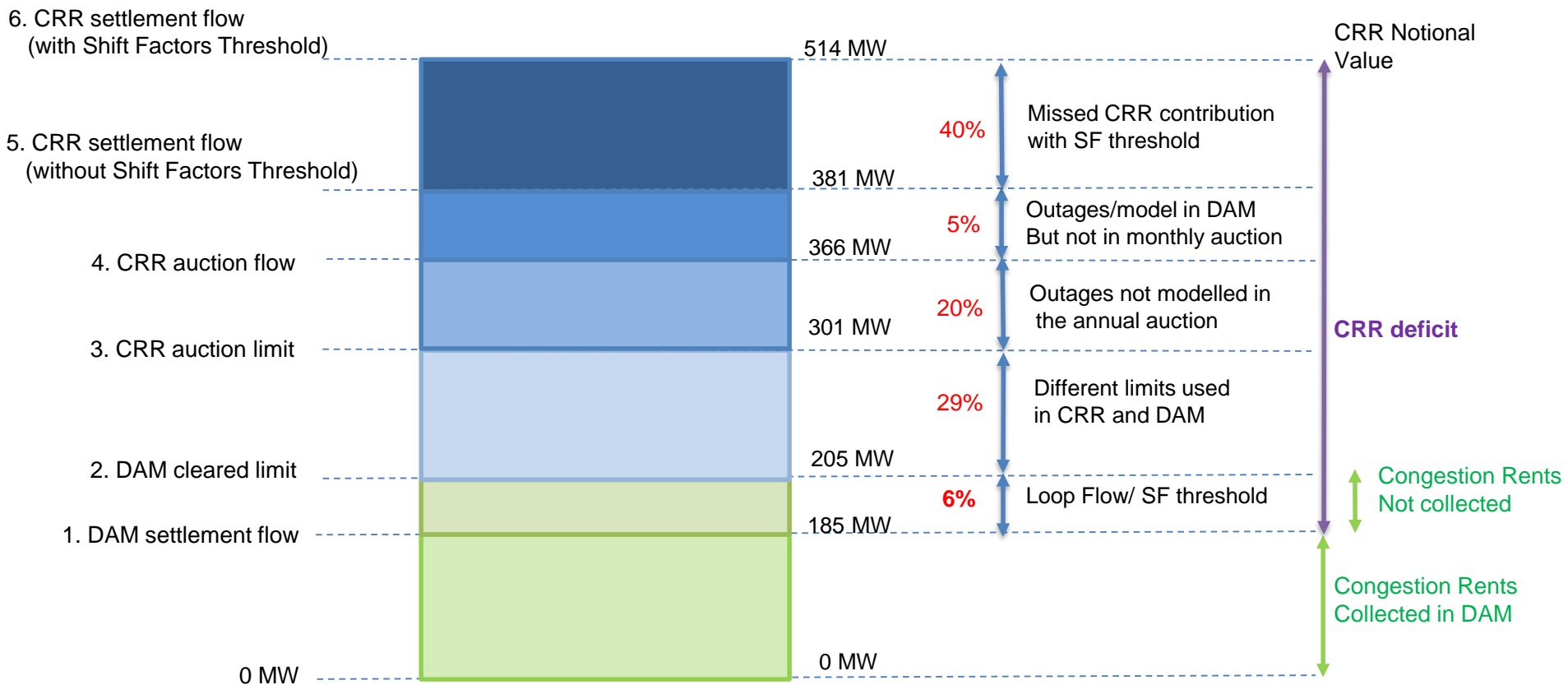
CRR deficits originated on multiple constraints throughout the period of analysis but SB-Devers caused a significant share of the deficit



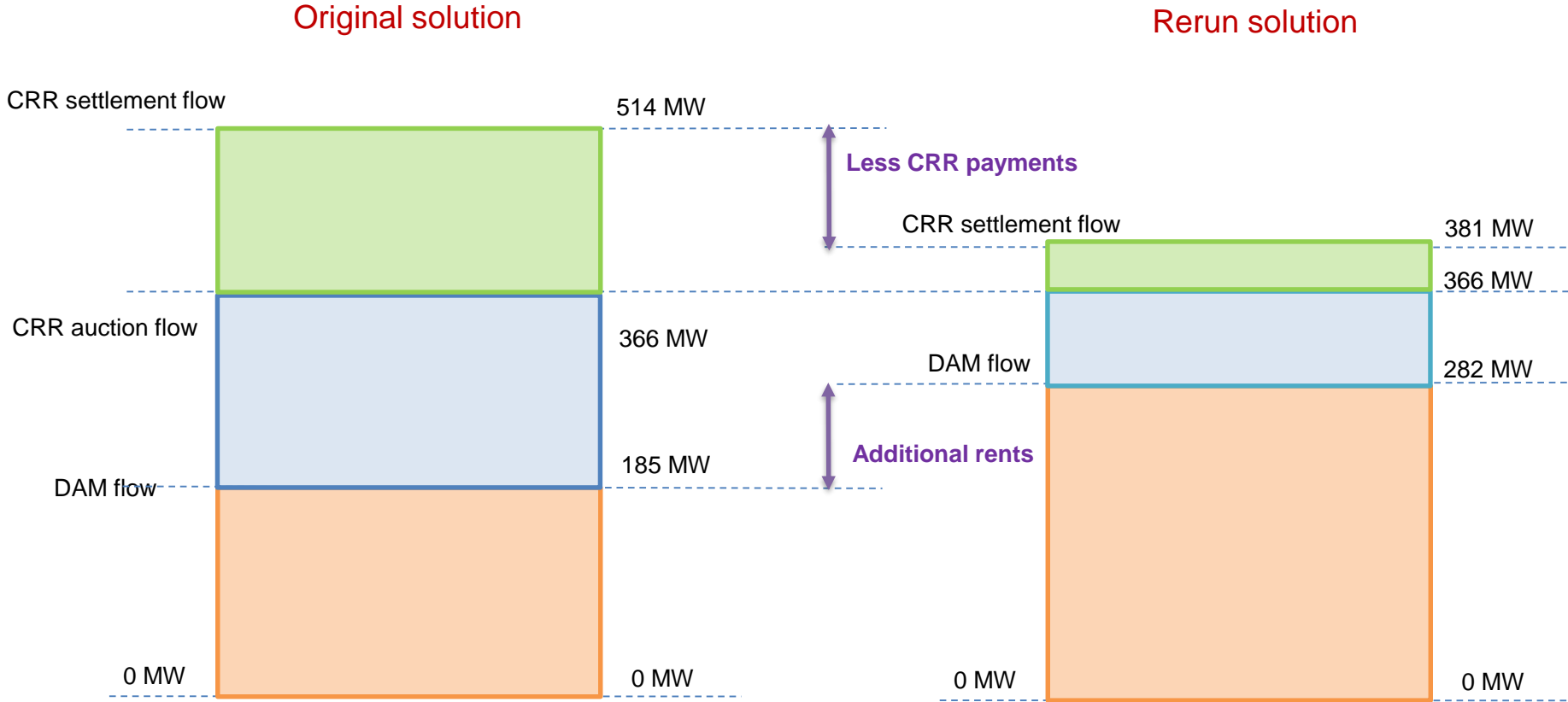
SB-Devers is a contingency-based constraint driven by outages in Southern California



Drivers for CRR deficits on the San Bernardino-Devers Constraint in Q4 2019 based on a sample day of December



CRR better converges to DAM if no Shift Factor threshold is used, resulting in more congestion rents and less CRR payments



* Bars are not to scale

Conclusions and recommendations

- CRR performance has improved from 47% to 87% with the policy changes implemented in 2019. Is 87% good enough?
- CRR deficits continue due to a variety of drivers but pro-rata funding is effectively regaining neutrality.
- About a half of the \$21 million of the auction shortfall is caused by arbitrage from CRR annual to monthly auctions.
- LSEs are actively using CRR auctions to rebalance their portfolios, but their undervaluation of CRRs is responsible for part of their losses.
- Shift factor threshold used in DAM impacts CRRs settlements; CAISO is exploring an enhancement for the use of the shift factors threshold.