FRM STF: CAISO Case Study

July 17th, 2019

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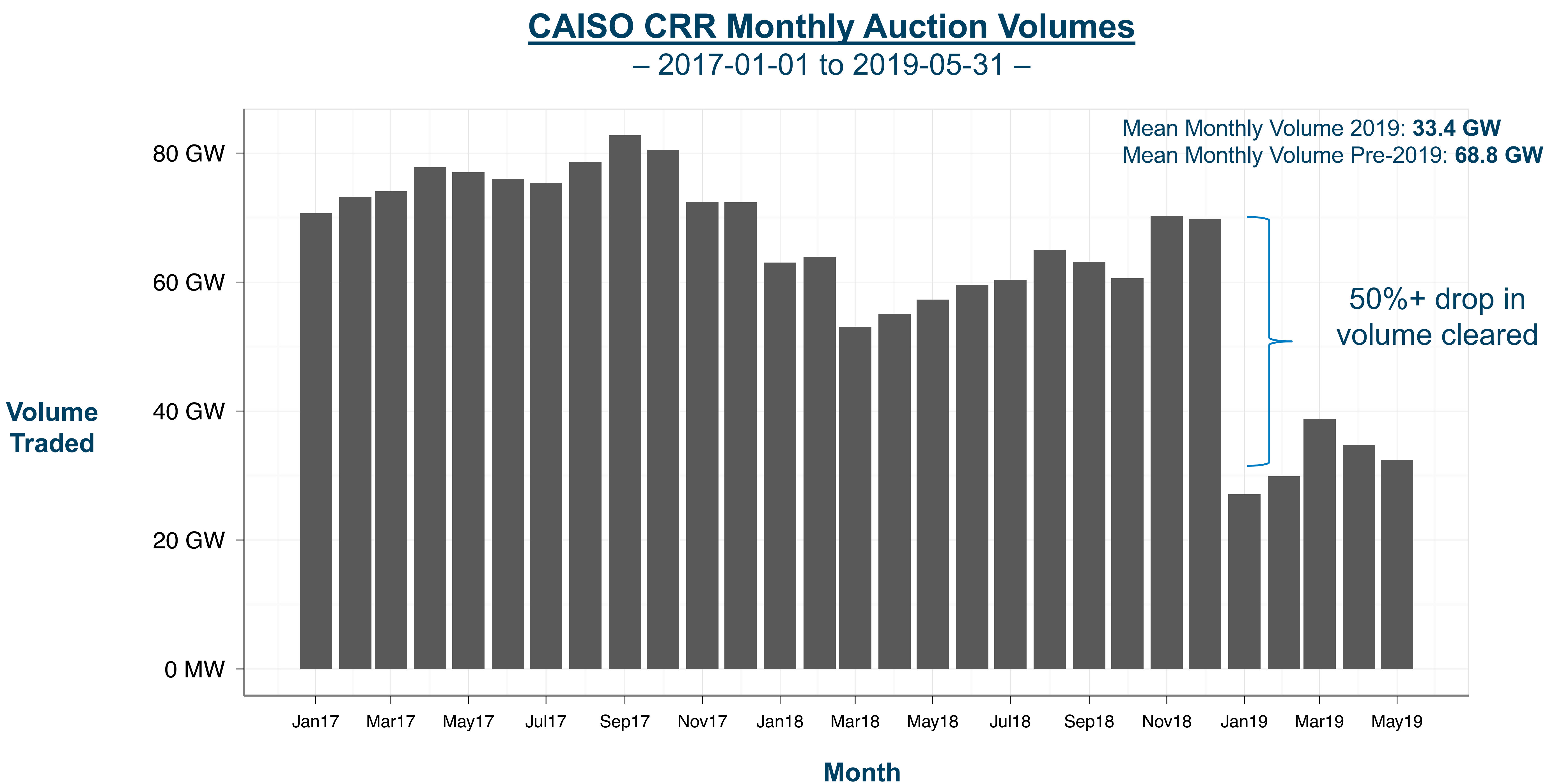
Changes to market structure should have the goal of improving liquidity and transparency

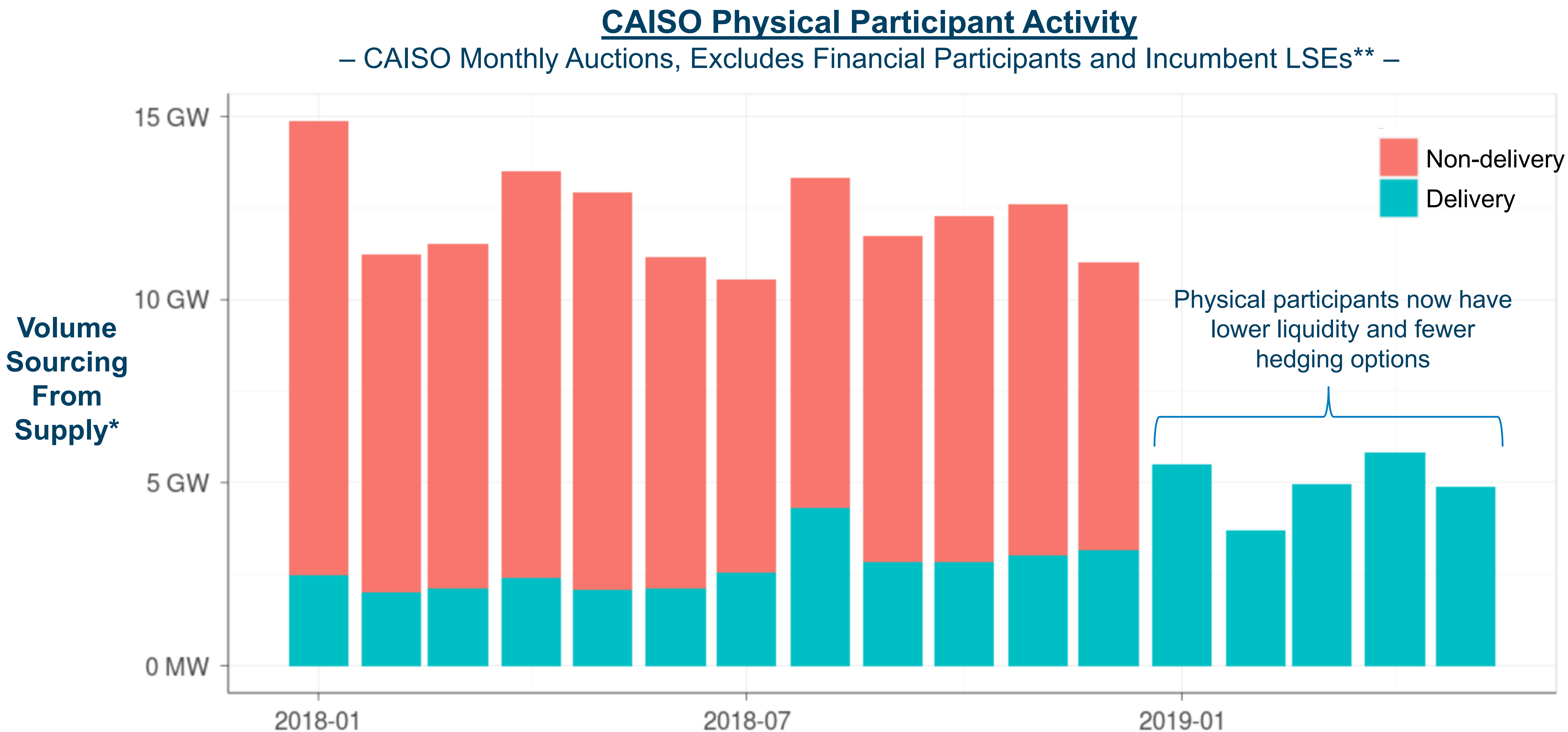
- **PJM has presented a study on reducing eligible path types in the FTR market to "physical delivery" paths**
  - FTR path types and biddable nodes were not a recommendation of the independent report
  - Changes to market structure should have the goal of improving liquidity and transparency

- **CAISO restricted bids to "supply delivery" paths in 2019. This provides a good case study for PJM members to evaluate when considering biddable nodes**
  - CAISO defines "supply delivery" paths as generator bus to either a load aggregation point, trading hub or intertie
  - Counterflow on these supply delivery paths is no longer allowed

After CAISO restricted biddable paths in 2019, volume cleared in monthly auctions dropped by over 50%. The annual auction saw a 66% drop in volume cleared

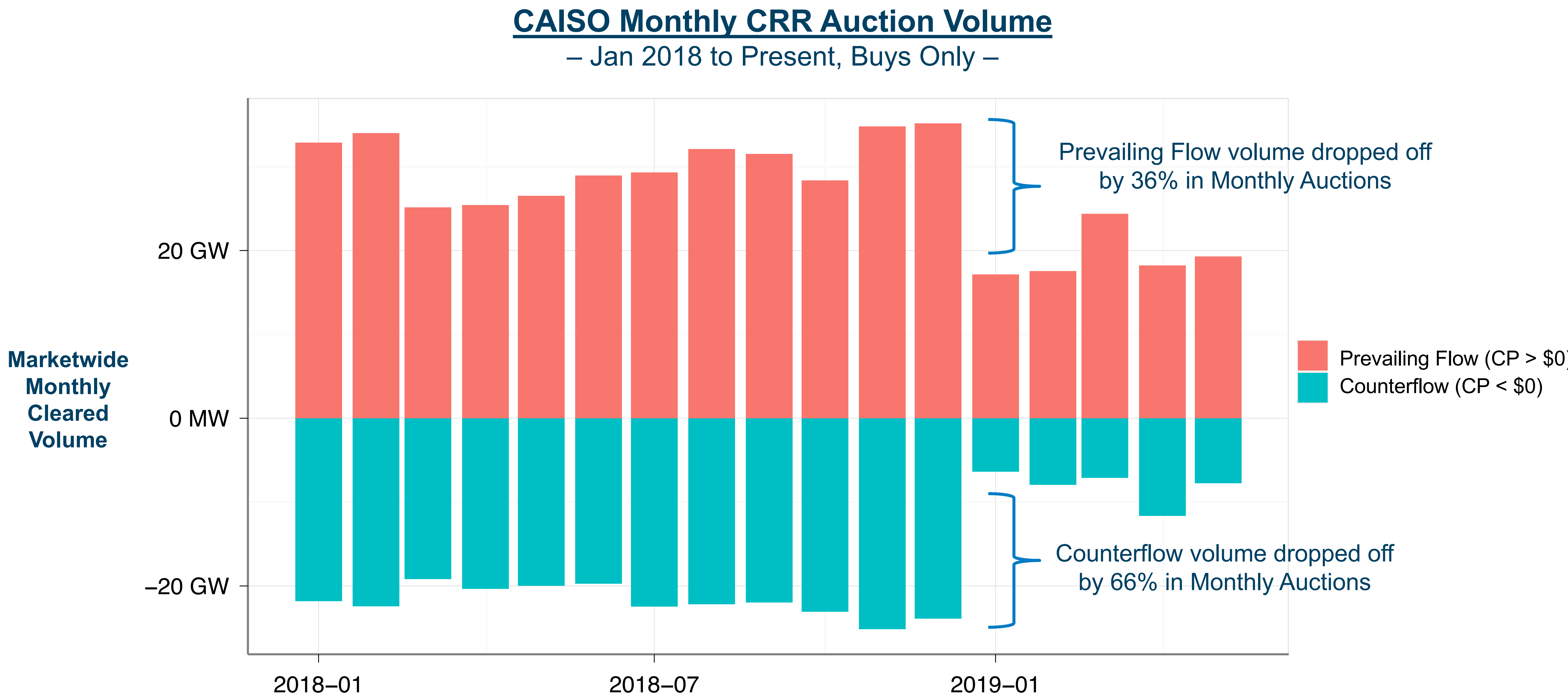


The drop in volume was not isolated to financial participants. Physical participants saw a drop in the volume they could clear sourcing from supply points

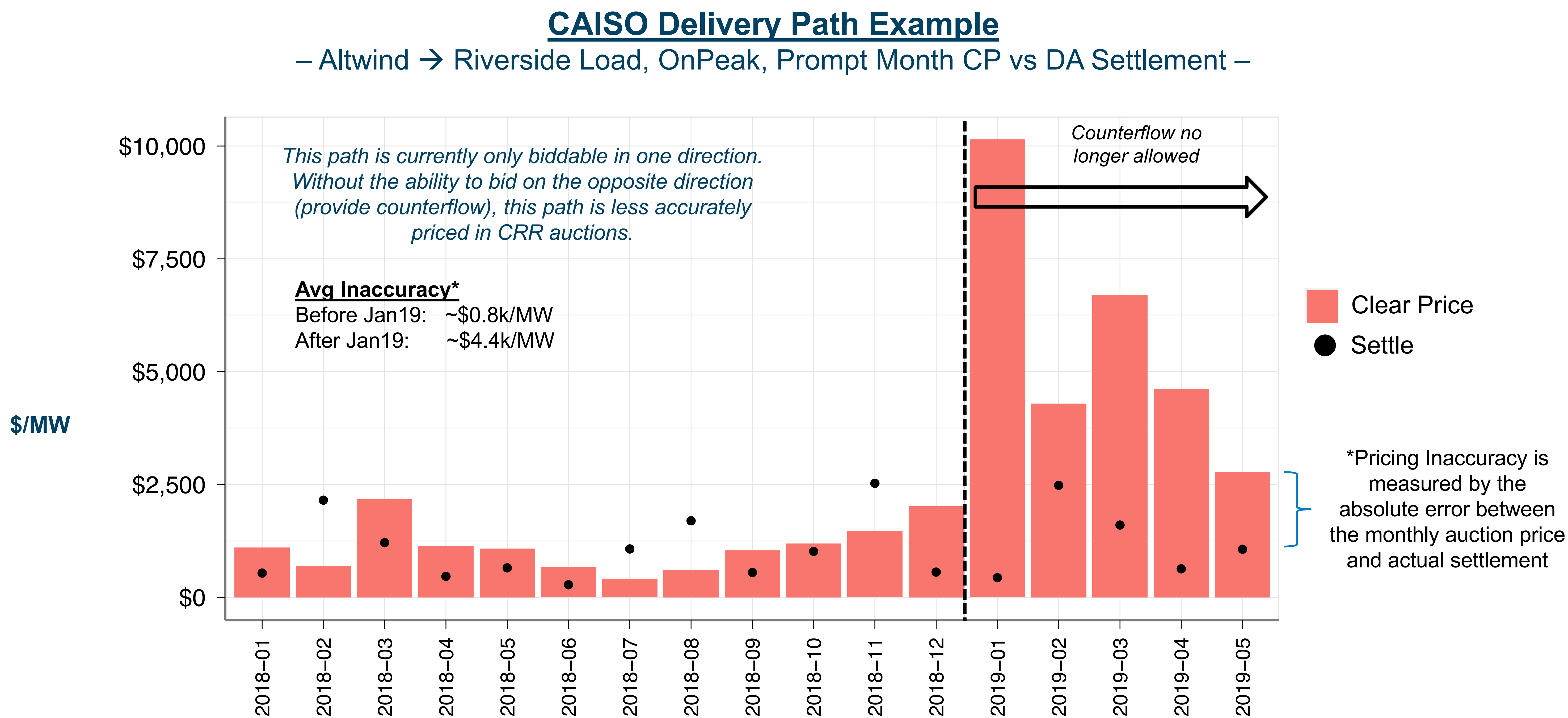


*Supply location includes Gen, TH, and intertie points
**Includes NRG, Direct, Calpine, Uniper, Clear Power, TransAlta, and 9 others

Counterflow was significantly reduced in the market. This was made worse by CAISO preventing participants from providing counterflow directly on delivery paths



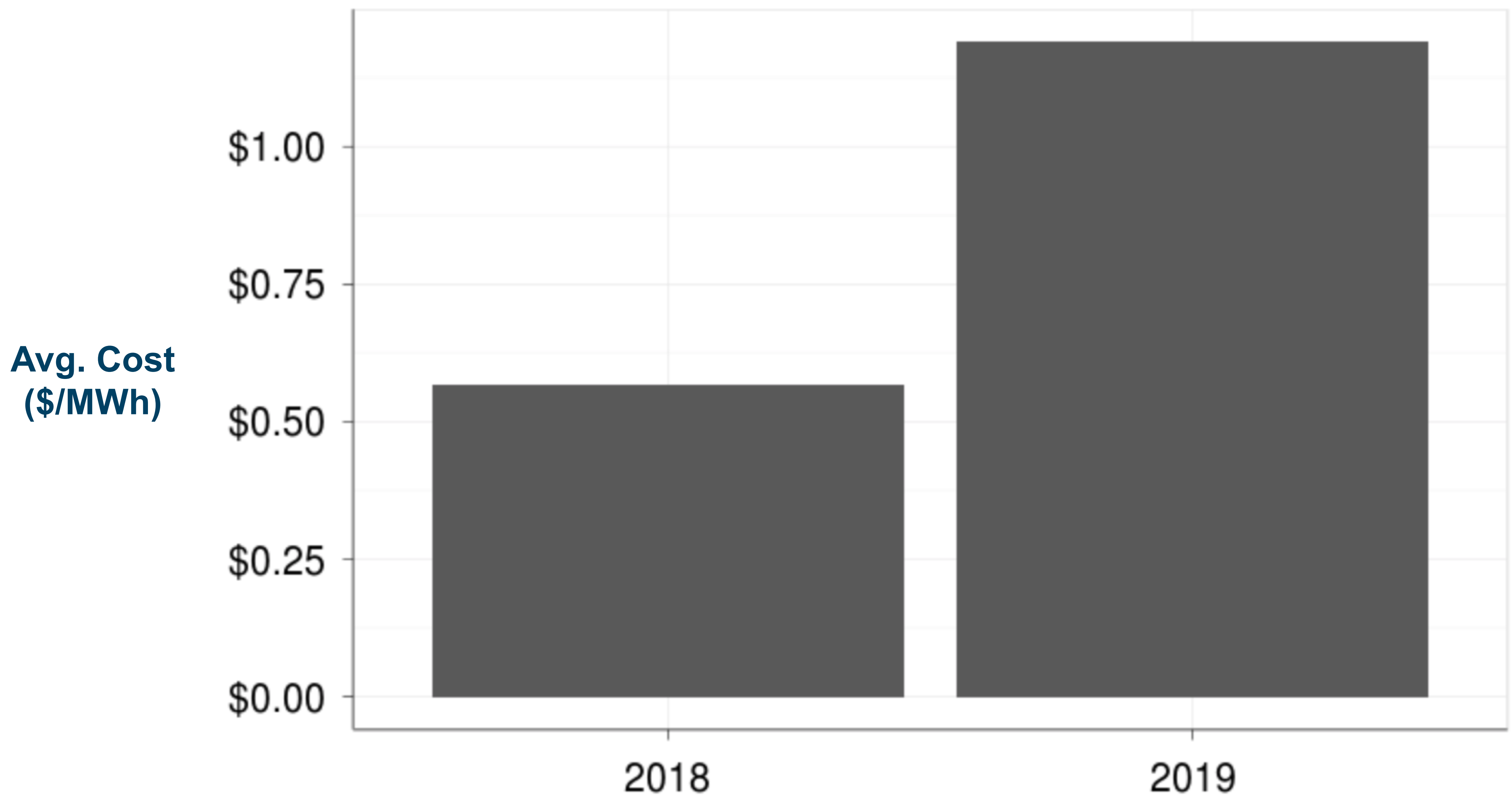
Removal of counterflow can create pricing anomalies that are not justified from settlement outcomes



On average, prices on the delivery paths that hedgers must now use more than doubled as competition was forced onto these paths and direct counterflow was not allowed

CAISO Delivery Path Prices

– CAISO Monthly Auctions, OnPeak Comparison of Jan-May of 2018 vs. 2019 –

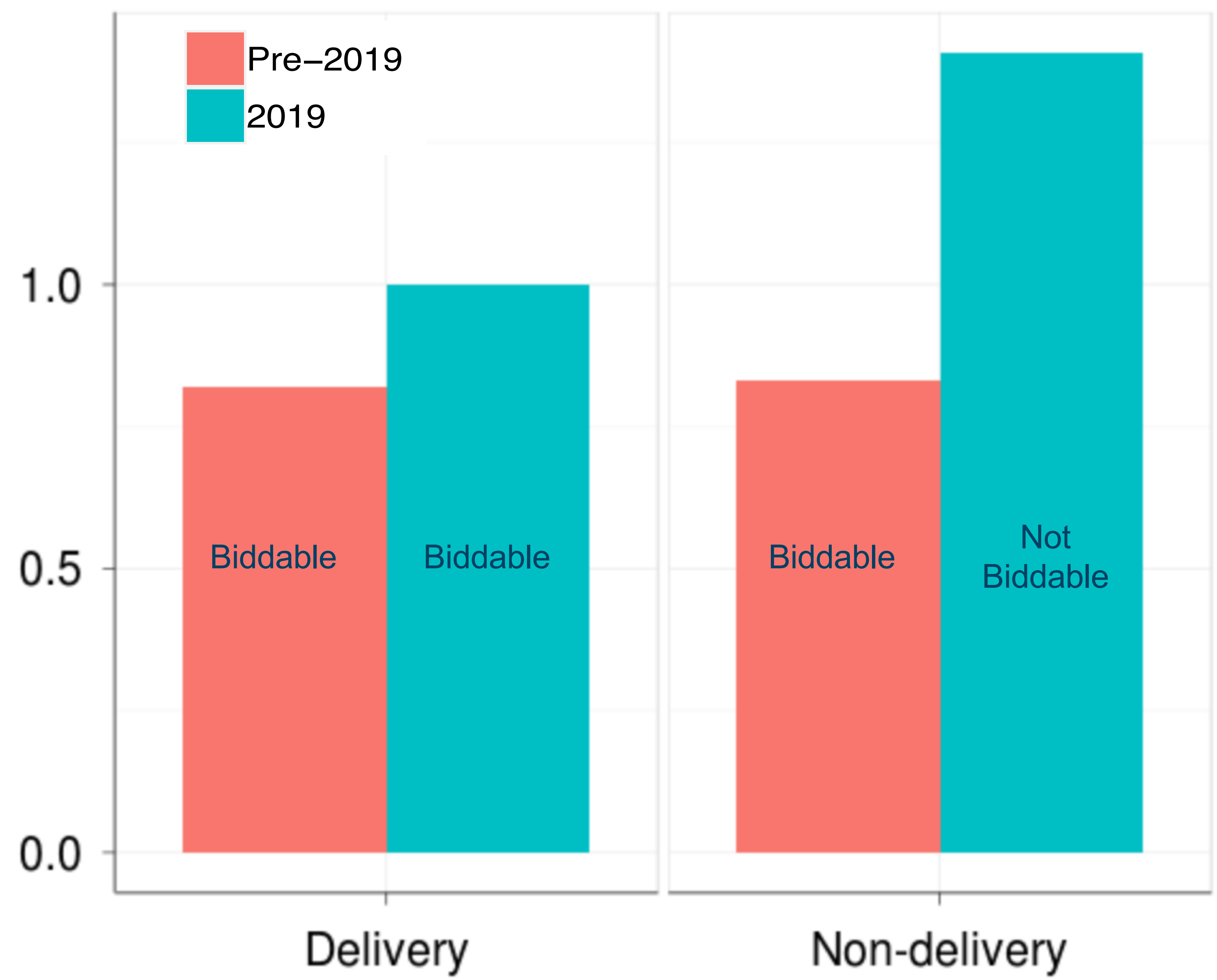


While pricing rose across delivery paths, the prices did not become more accurate

CAISO Monthly Auction CRR Pricing Inaccuracy

Pricing Inaccuracy is measured by the absolute error between the monthly auction price and actual settlement

Avg $\frac{|CP - Settle_{DA}|}{|Settle_{DA}|}$ **Prompt Month**

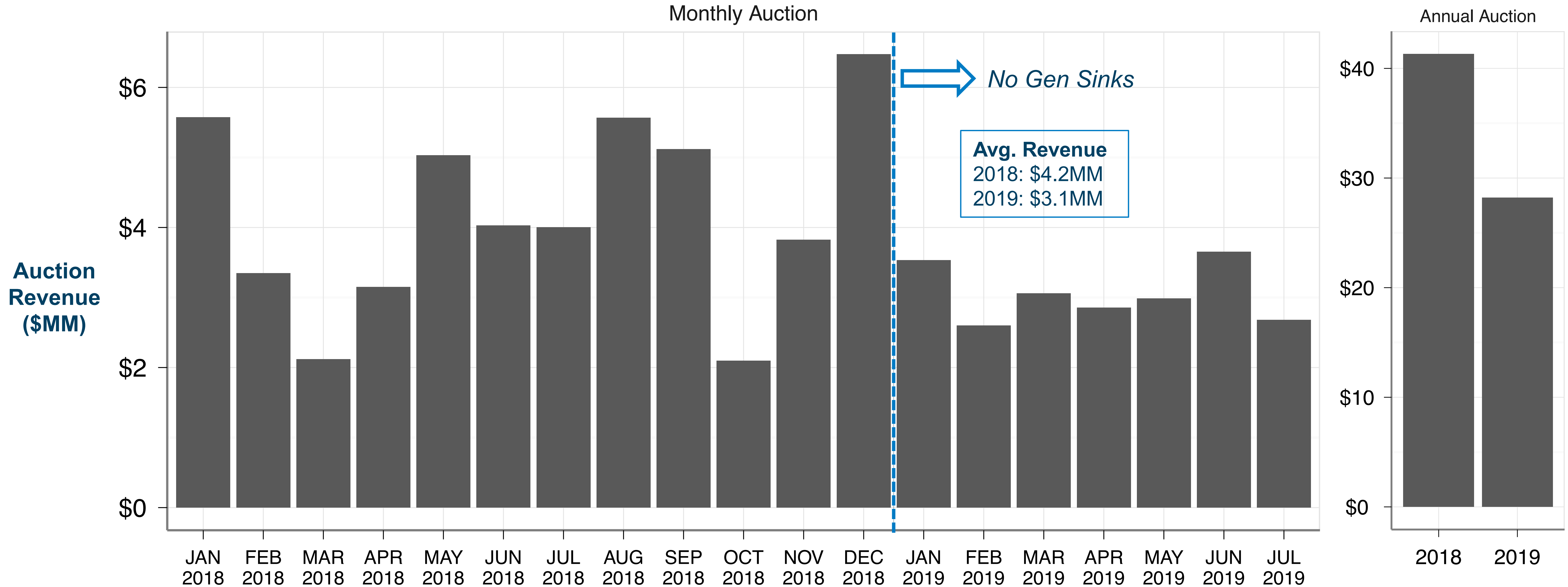


Price inaccuracy is normalized by settlement levels as 2019 has been a low congestion environment

While delivery prices rose, overall auction revenue actually declined. This is driven by the inability of participants to pay for various congestion elements due to path restrictions

Drop in revenue is due to a large decline in auction binding constraints. These constraints can no longer be purchased in the auction due to path restrictions

CAISO Auction Revenue
– Jan 2018 to Present –



Restriction to delivery paths has led to lower liquidity and less pricing transparency in CAISO

- **CAISO market liquidity has declined**
  - Overall market volume in CAISO dropped by over half
  - Liquidity for physical participants sourcing from supply sources has decreased
  - Counterflow was largely eliminated from the market

- **Price Transparency has been impaired**
  - Abnormally high prices have resulted on a number of delivery paths due to the inability of counterflow to converge pricing
  - Overall price accuracy has declined. This is of greater importance for PJM as these prices are utilized to determine appropriate collateral for portfolios via mark to auction

- **Costs for hedgers have increased while payments to load have declined**