

December Monthly Meeting

Chair: Hayley Williamson

Chair, Public Utilities Commission of Nevada

Vice-Chair: Gabriel Aguilera

Commissioner, New Mexico Public Regulation Commission

Staff: Bonnie Lamond

Western Interstate Energy Board

December 8, 2023

Agenda

- **Welcome Remarks**
 - *BOSR Chair Williamson, Chair of the Public Utilities Commission of Nevada*
- **DMM Overview – July 2023 Market Issues and Performance**
 - *Ryan Kurlinski, Senior Manager, Department of Market Monitoring*
- **CAISO Overview – July 2023 Emergency Events**
 - *Mark Rothleder, Senior Vice President and Chief Operating Officer, California ISO*
 - *Anna McKenna, Vice President, Market Design and Analysis, California ISO*



July 2023 market issues and performance

Ryan Kurlinski

Senior Manager

Department of Market Monitoring

Body of State Regulators Meeting

December 8, 2023

Overview of presentation and discussion

- Overview of CAISO Department of Market Monitoring
- Background: Relevant market design details and definitions for understanding significant July 2023 market issues
- Overview of significant July 2023 market issues impacting WEIM
- Questions and comments

Mission of independent market monitors

"Each independent system operator... must include a mission statement... that identifies the Market Monitoring Unit's goals, including the protection of consumers and market participants by the identification and reporting of market design flaws and market power abuses."

FERC Order 719

To provide independent oversight and analysis of the CAISO Markets for the protection of consumers and Market Participants by the identification and reporting of market design flaws, potential market rule violations, and market power abuses.

Department of Market Monitoring Mission Statement
CAISO Tariff, Appendix P

Core functions of independent market monitors (FERC Order 719)

1. Review and report on the performance of wholesale markets, including quarterly and annual reports.
2. Evaluate existing and proposed market rules, and provide recommendations.
3. Notify FERC Office of Enforcement when a market participant or the ISO has engaged in conduct that may require investigation.
4. Market monitors may also perform functions related to inputs for market power mitigation.
 - Bids used in mitigation, cost review, etc.

CAISO Department of Market Monitoring

- Independent from CAISO management, as required by FERC Order 719
 - DMM Oversight Committee consists of two CAISO Board members and Governing Body member as an observer
- Internal business unit of the CAISO
 - 18 staff (economics, data analysis, engineering)
 - Access to all CAISO/WEIM market and operational data
 - Work closely with CAISO staff on market design and ongoing monitoring
- Communicate frequently with FERC, state PUCs, WEIM Governing Body, and interested stakeholders

Relevant market design details and terms for understanding significant July 2023 market issues

Imports/Exports vs WEIM transfers in/out

- CAISO Imports/Exports:
 - Schedules based on bid of specific import or export resource at CAISO boundary point
 - Preliminary schedules determined by day-ahead market
 - (For the most part) schedules don't change after CAISO hour-ahead market run
 - Treated by non-CAISO WEIM BAs as fixed supply or load like other bilateral imports or exports
- WEIM transfers in/out:
 - Flows between specific WEIM balancing areas
 - Determined by WEIM market optimization in conjunction with determination of each WEIM BA's optimal generation dispatch

Real-time market composed of three markets

- Hour-ahead market
 - Runs 67 minutes before *start of hour*
 - Solution covers upcoming hour
 - Determines final schedules for hourly block imports/exports
 - Solution includes *advisory* WEIM transfers and generation dispatches across all of WEIM
- 15-minute market
 - Runs 37 minutes before start of each *15 minute interval*
 - Solution covers upcoming 15 minute interval
- 5-minute market
 - Runs 7 minutes before the start of each *5 minute interval*
 - Solution covers upcoming 5 minute interval
 - Determines final generation dispatch schedules and final WEIM transfers

Self-schedules vs market bids

- Self-schedules
 - Market participant wants the schedule to receive market award regardless of market price they would have to pay or get paid.
 - Will not always receive market awards due to limited transmission or supply
- Market bids
 - Market participant states bid price
 - Generation/import does not want market award if price $<$ market bid
 - Export does not want market award if price $>$ market bid

Significant July 2023 market issues impacting WEIM

Overview of significant July 2023 market issues impacting WEIM

- High load, particularly in Southwest
- Complex WEIM market dynamics related to CAISO balancing area actions:
 - July 20: Self-scheduled exports out of CAISO balancing area awarded in hour ahead market cannot be supported by capacity contracted to serve CAISO
 - July 25: CAISO BA significantly increases target load in hour-ahead market above load forecast
 - ISO hour-ahead market does not give awards to all self-scheduled exports out of CAISO balancing area
 - July 26 onwards: CAISO balancing area begins limiting hour-ahead and 15-minute market WEIM transfers into CAISO BA in peak hours
 - Impacts all WEIM balancing area generation dispatch and WEIM transfers

Atypical hydroelectric and weather conditions shift supply and demand



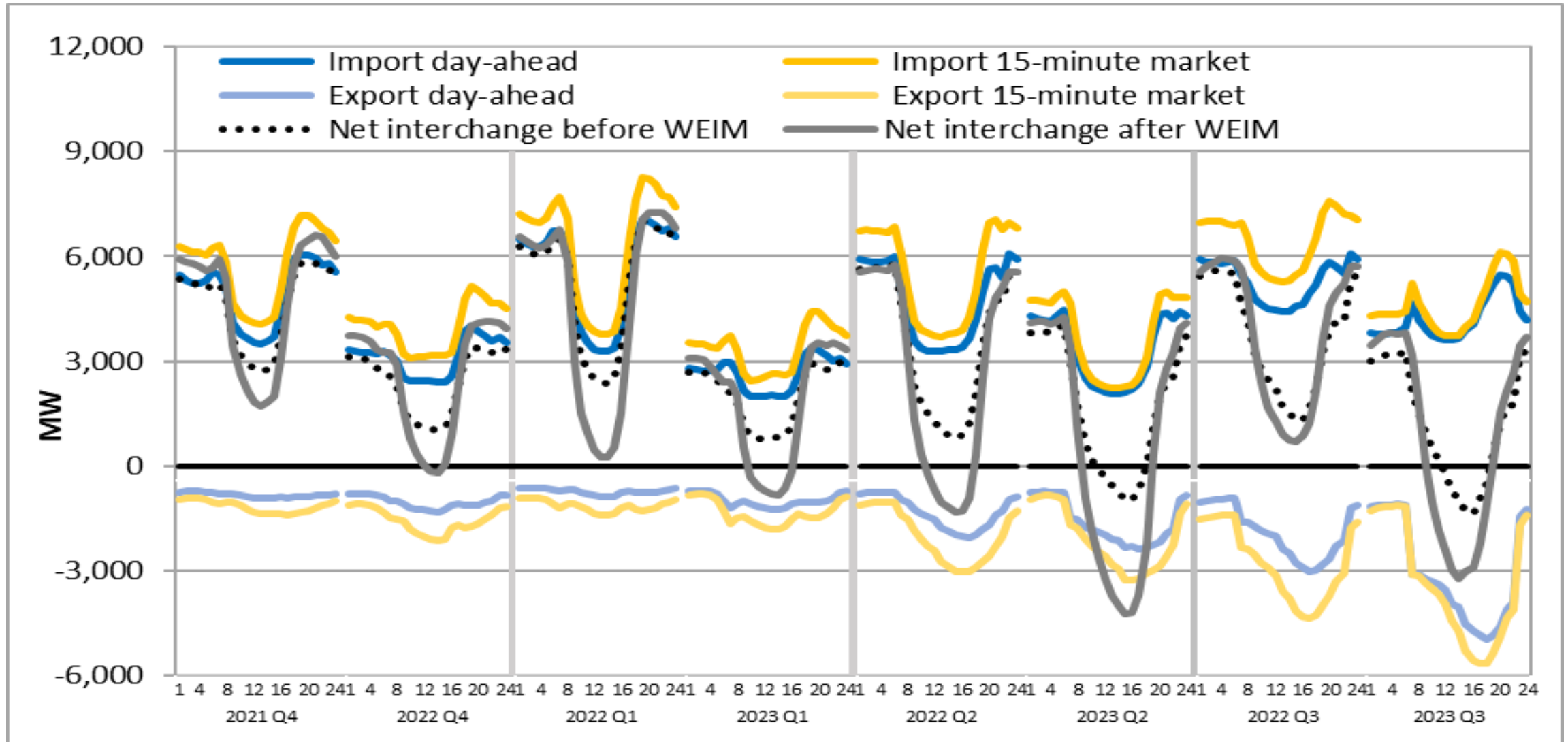
- Hydroelectric availability:
 - High in California
 - Low in Northwest
- Sustained high temperatures:
 - Southwest
- Typical power flows in peak hours:
 - Northwest to system
- Summer 2023:
 - Lower system to California flows

*Avangrid office; generation-only BAA with distribution across multiple states.
Map boundaries are approximate and for illustrative purposes only.

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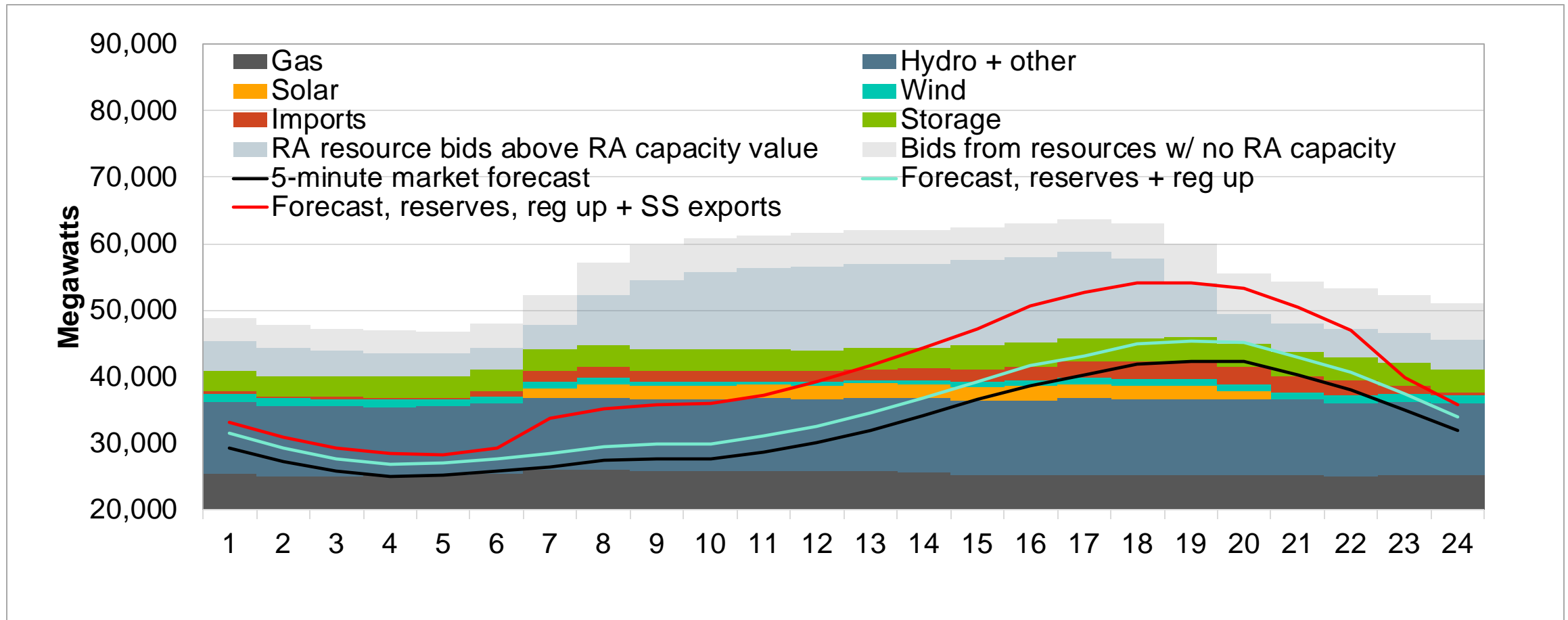
CAISO imports decrease and exports increase

Average CAISO hourly net interchange by quarter



CAISO balancing area July 20, 2023

Atypically high exports push demand above real-time market bid-in resource adequacy supply
CAISO calls an EEA1

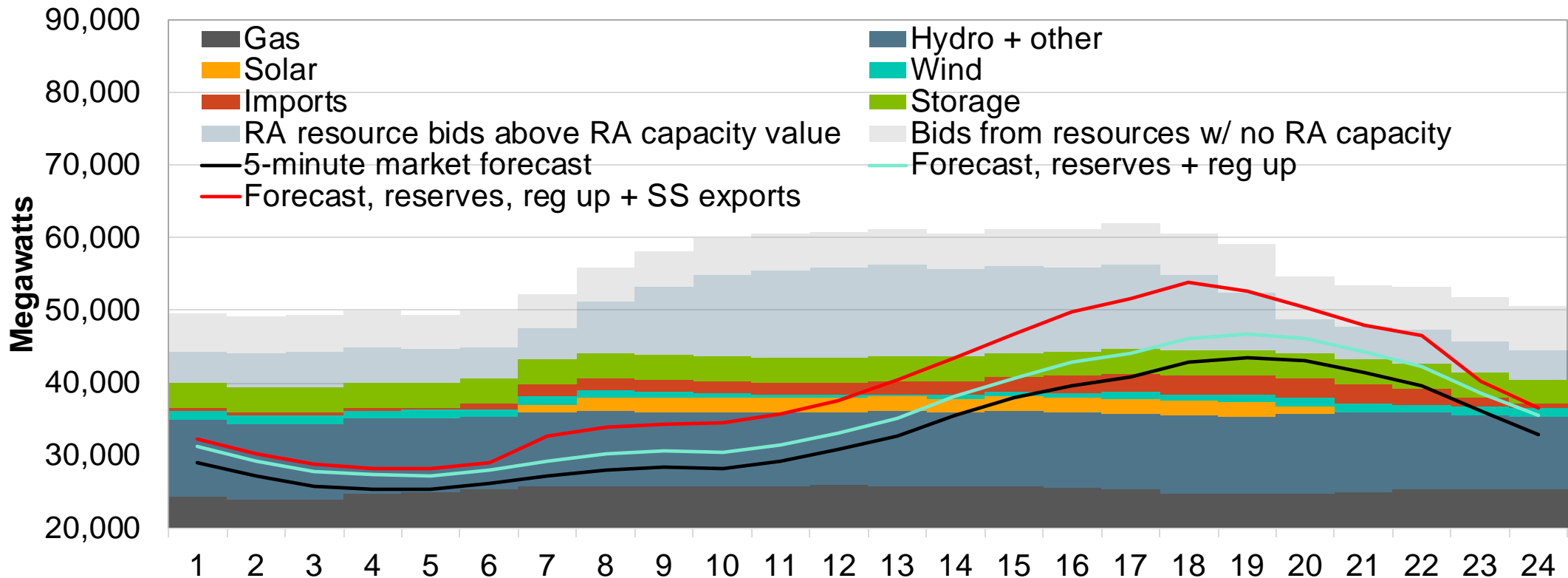


CAISO July 25, 2023

Atypically high exports push demand above resource adequacy supply

CAISO BA increases hour-ahead market load bias

Some self-scheduled exports do not receive hour-ahead market award, CAISO BA calls EEA Watch

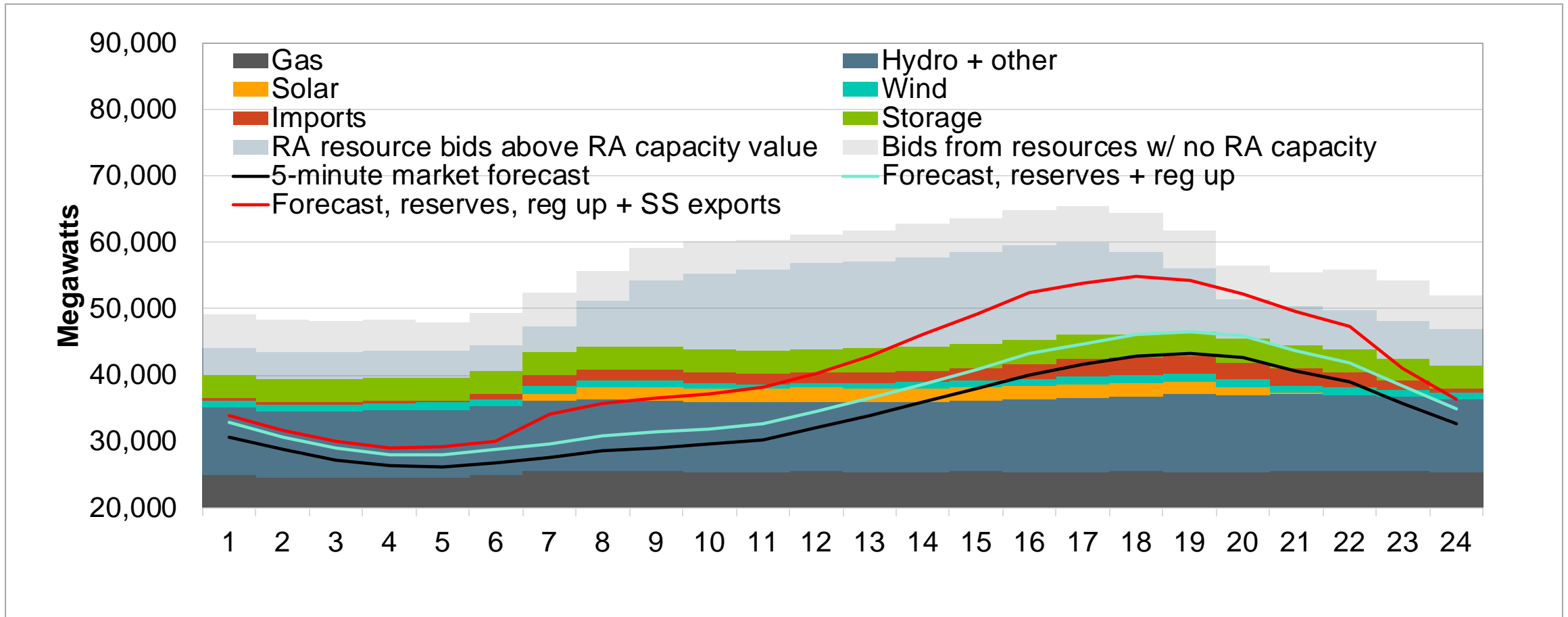


CAISO July 26, 2023

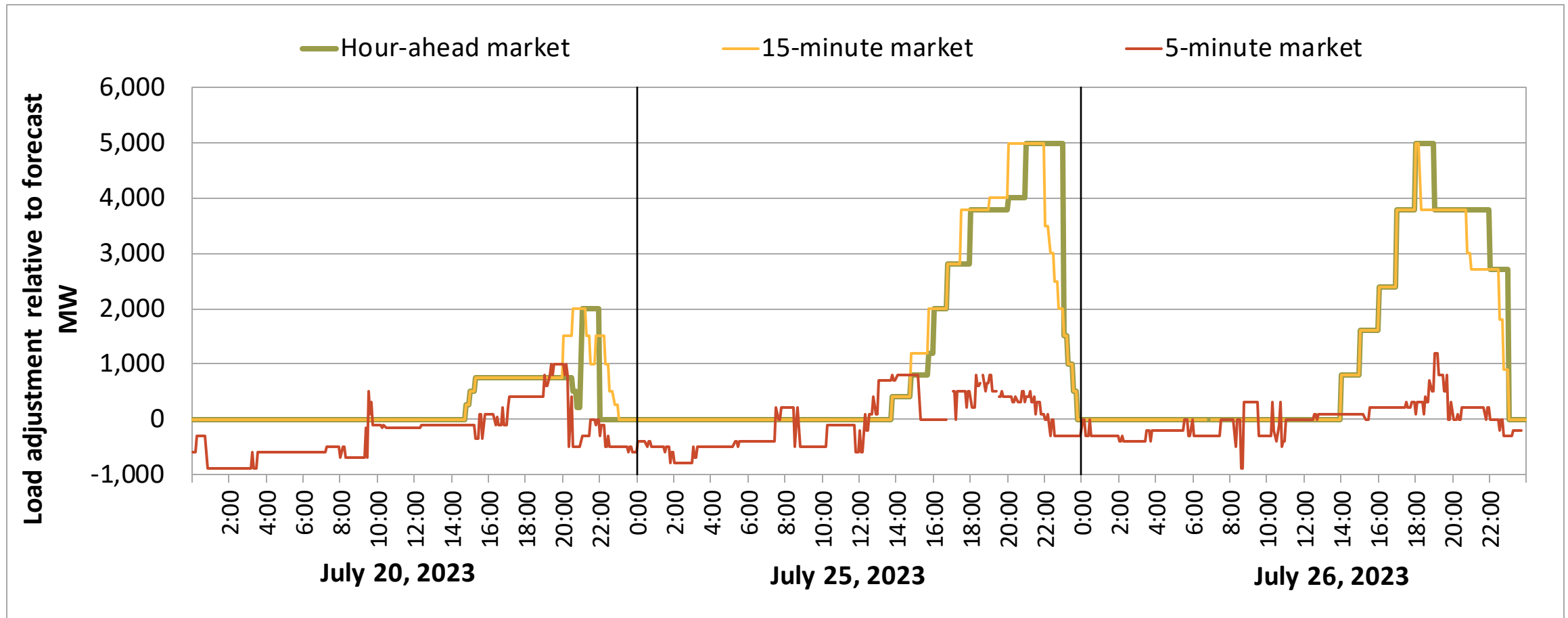
Atypically high exports push demand above resource adequacy supply

Hour-ahead market: CAISO BA continues high load bias, and self-scheduled exports do not get award

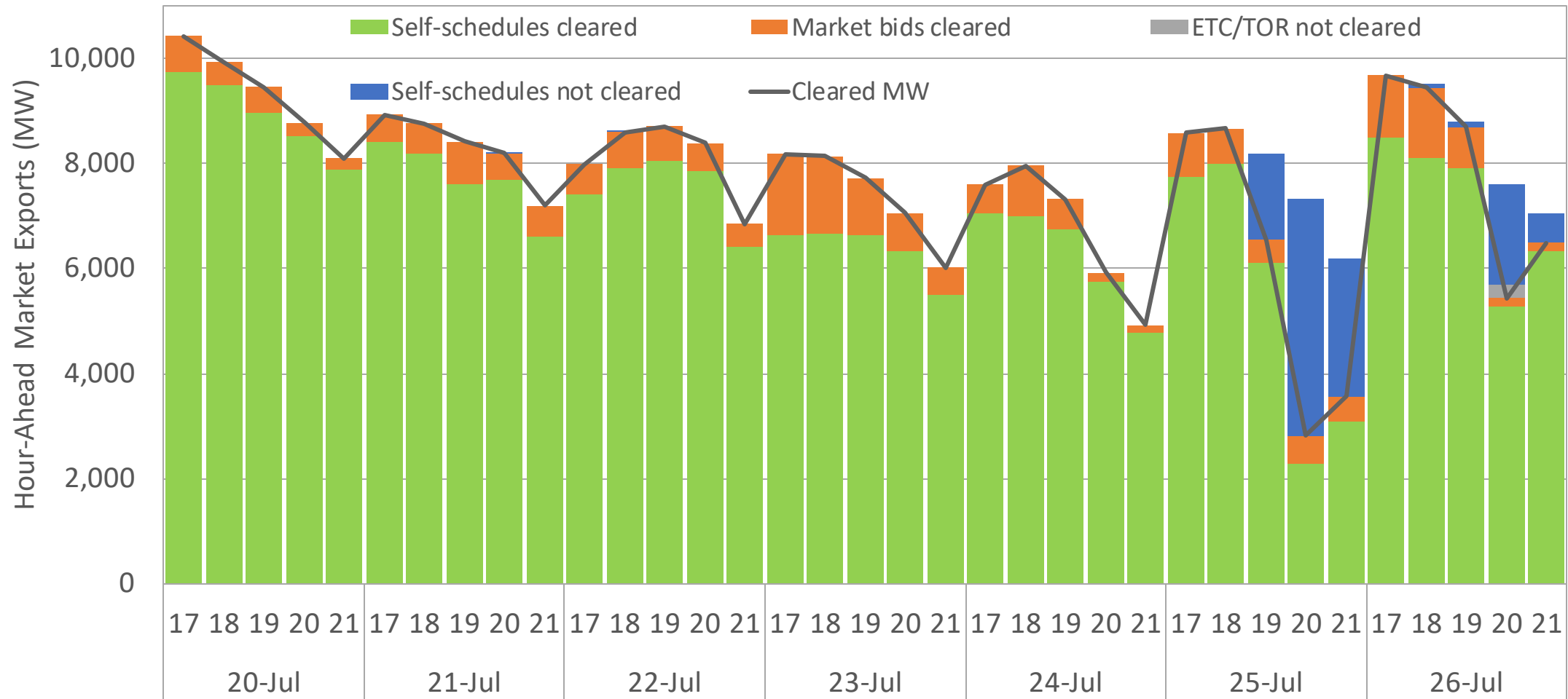
CAISO calls an EEA Watch, begins limiting hour-ahead and FMM WEIM transfers into CAISO



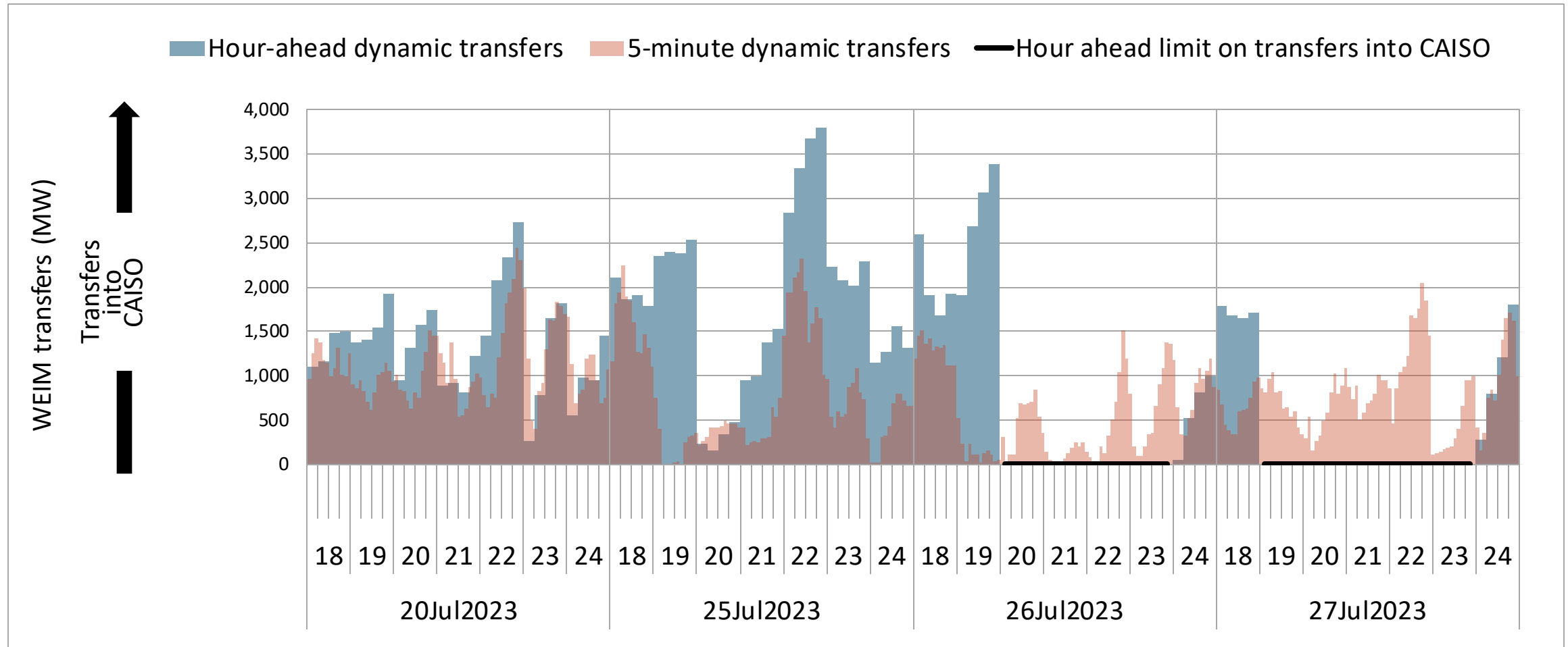
CAISO BA significantly increases hour-ahead market load bias between July 20 and 25



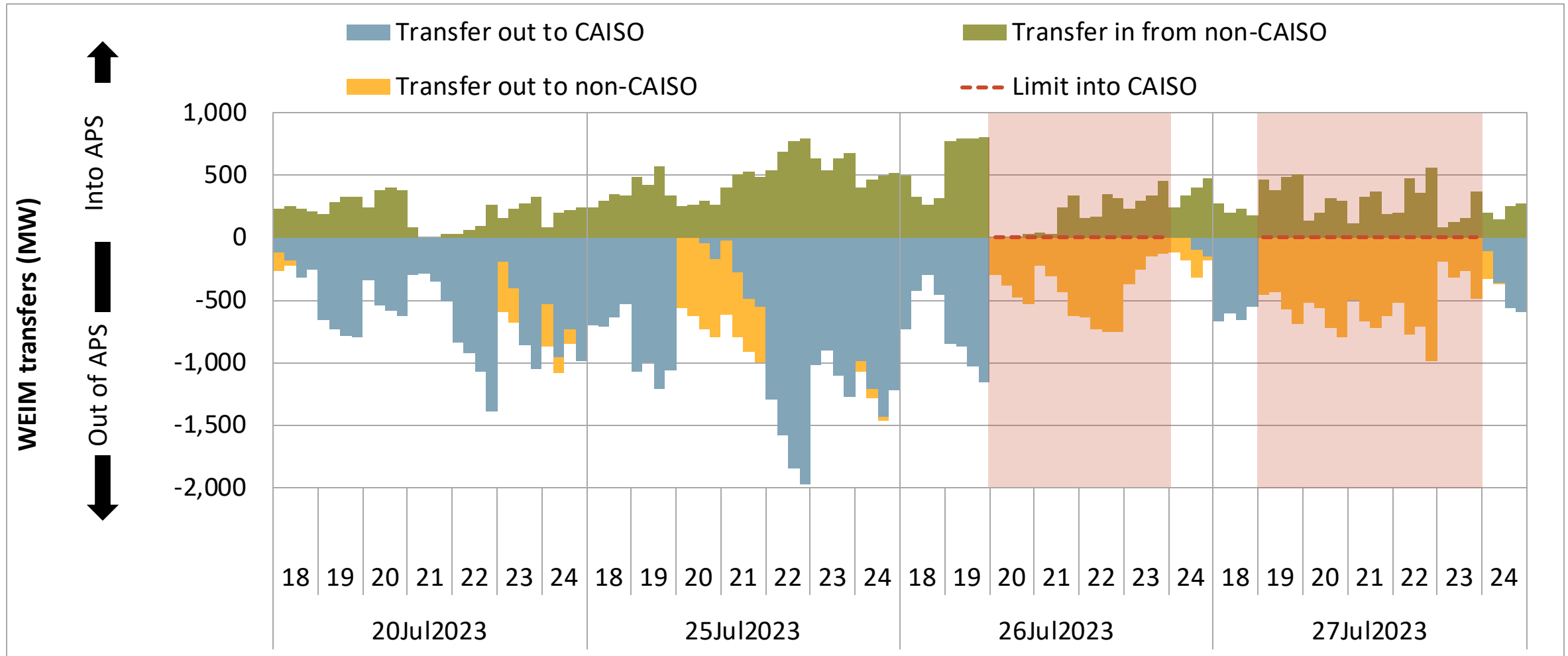
Export summary – CAISO peak hours, hour-ahead market



Hour-ahead and 5-minute market dynamic WEIM transfers into CAISO balancing area

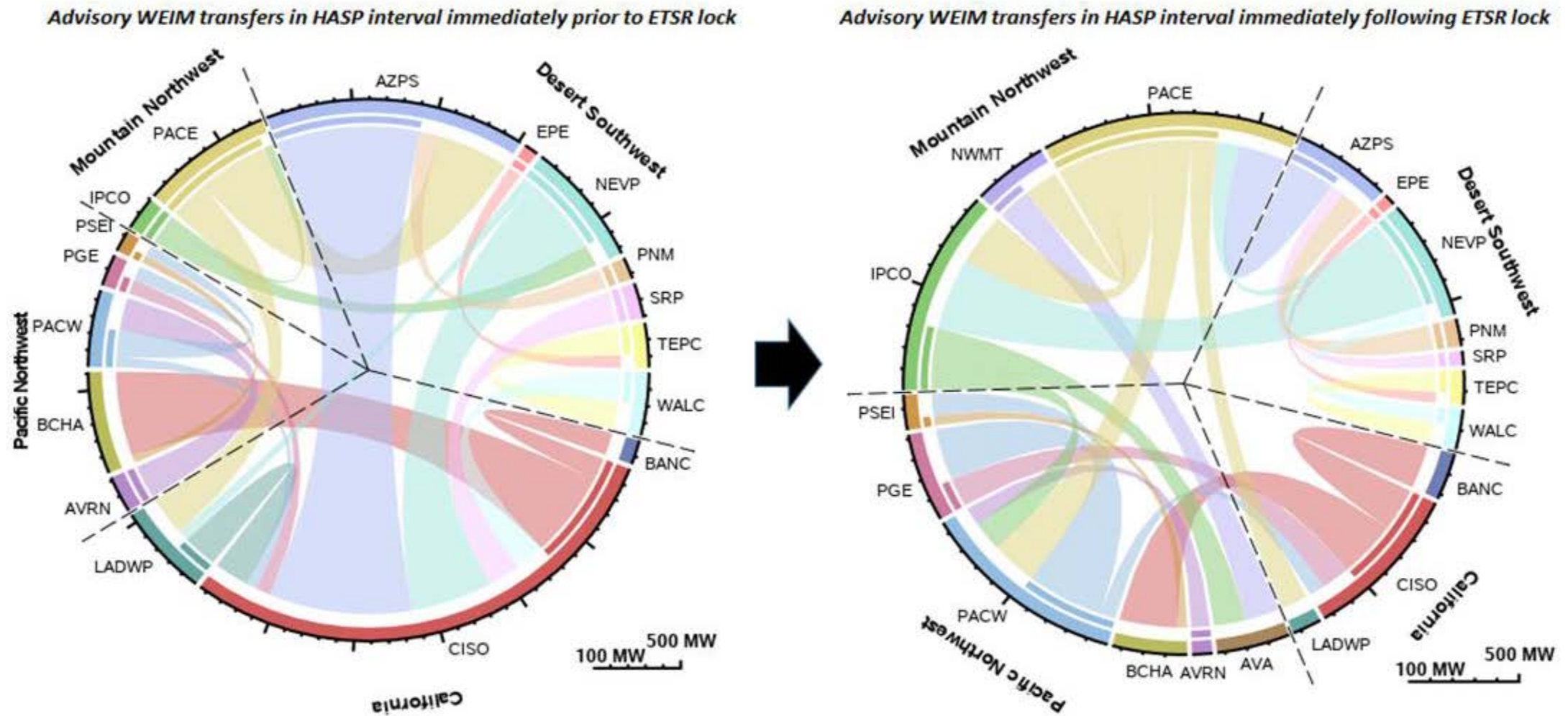


Arizona Public Service dynamic WEIM transfers hour-ahead market



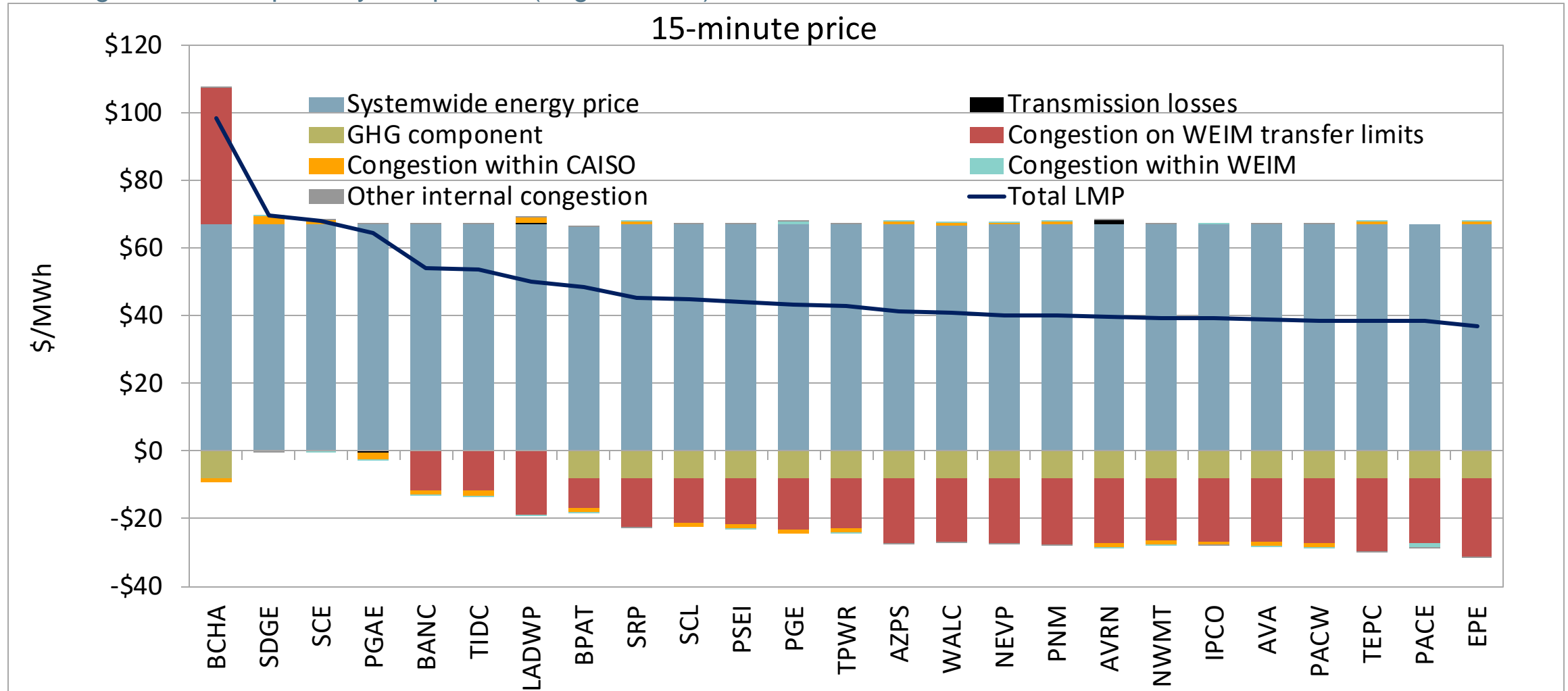
Estimated changes in WEIM transfers due to hour-ahead and 15-minute market limits on dynamic transfers into CAISO BA

(Average for each circle is one 15-minute interval from hour-ahead market per day from July 26 - August 7)



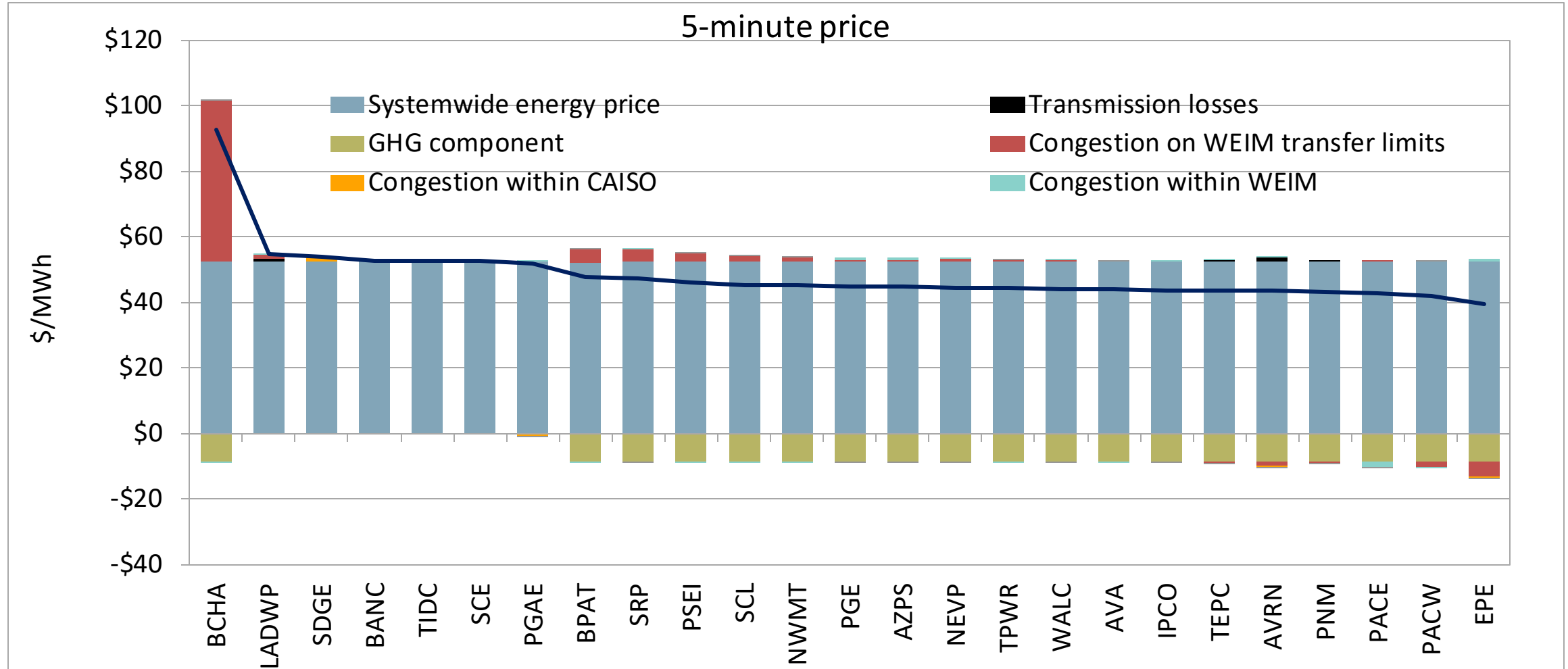
WEIM transfer caps in the 15-minute market affect 15-minute prices

Average 15-minute price by component (August 2023)



5-minute market dynamic transfers to CAISO not capped

Average 5-minute price by component (August 2023)



For more information

- Department of Market Monitoring webpage
 - <http://www.caiso.com/market/Pages/MarketMonitoring/Default.aspx>
- CAISO Tariff, Appendix P
 - http://www.caiso.com/Documents/AppendixP_CAISODepartmentOfMarketMonitoring_as_of_Apr1_2017.pdf
- Eric Hildebrandt, ehildebrandt@caiso.com
- Ryan Kurlinski, rkurlinski@caiso.com
- DMM@caiso.com



CAISO Overview – July 2023 Emergency Events Treatment of Export and Wheeling Transactions

Mark Rothleder, Sr. Vice President and Chief Operating Officer
Anna McKenna, Vice President, Market Design and Analysis

Discussion of July 2023 emergency events



Key discussion topics

- Balancing Authority Area (BAA) dynamics
- Low priority vs. high priority export transactions
- Wheel-through transactions
- July emergency events

Balancing Authority Area (BAA) dynamics



- All Balancing Authorities (BAs) must adhere to NERC and FERC rules regarding exports, firmness of transmission and load management
- Energy transfer transactions are prioritized between BAs during strained grid conditions
- Similar to all other BAs the ISO will clear low priority transactions once it has served its own native load and there is sufficient supply

■ WECC
□ Balancing Authority
Areas (generalized)

The California ISO
is one of 39
Balancing
Authorities in the
Western
Interconnection

As a Balancing Authority, the ISO adheres to these requirements to balance supply and demand

Important distinction between low priority and high priority exports

Low Priority

Considered opportunity sales sourced from the ISO's pool of resources that the ISO can support once it has met its own load requirements

High Priority

Supply from the ISO that is not already contractually committed to serve ISO load

Low priority exports may not be feasible during strained grid conditions

Treatment of wheel through transactions on the ISO system

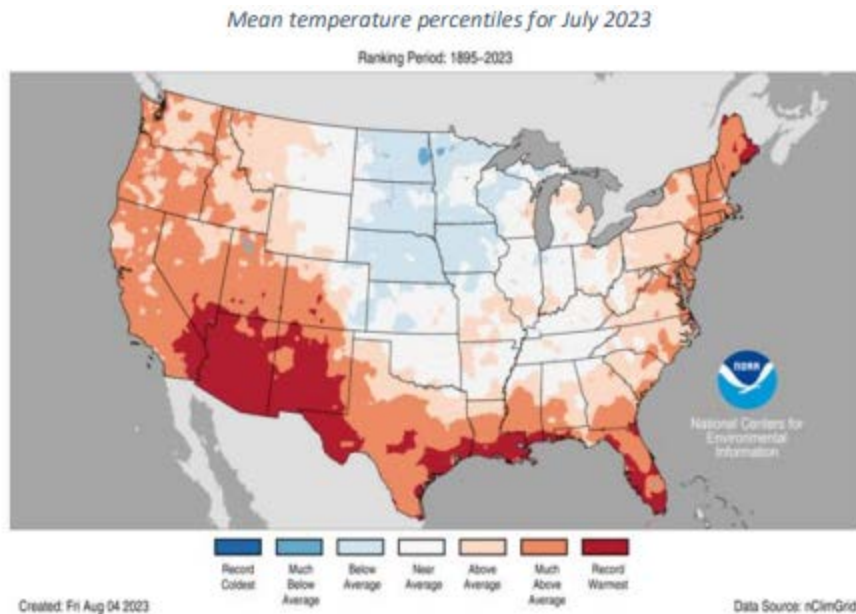
ISO provides low and high priority wheel-through service to allow entities to transfer energy through the ISO's transmission system from one BAA to another

High priority wheels

- Requires demonstration of need to wheel through the ISO system based on external contractual commitment at least 45-days in advance of the month
- Receive treatment equal to the ISO's native load

Without required demonstration the wheel is considered low priority

Summer 2023, extreme heat conditions in the desert southwest

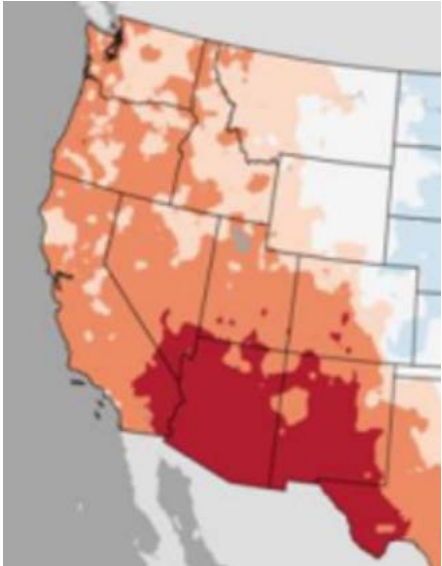


- Record heat in the DSW
- Unprecedented demand outside CA
- Western energy supply stretched thin

- Transmission Congestion
- Challenges for Grid Operators

Despite improved supply conditions from prior years, extreme heat put a strain on the grid in the month of July

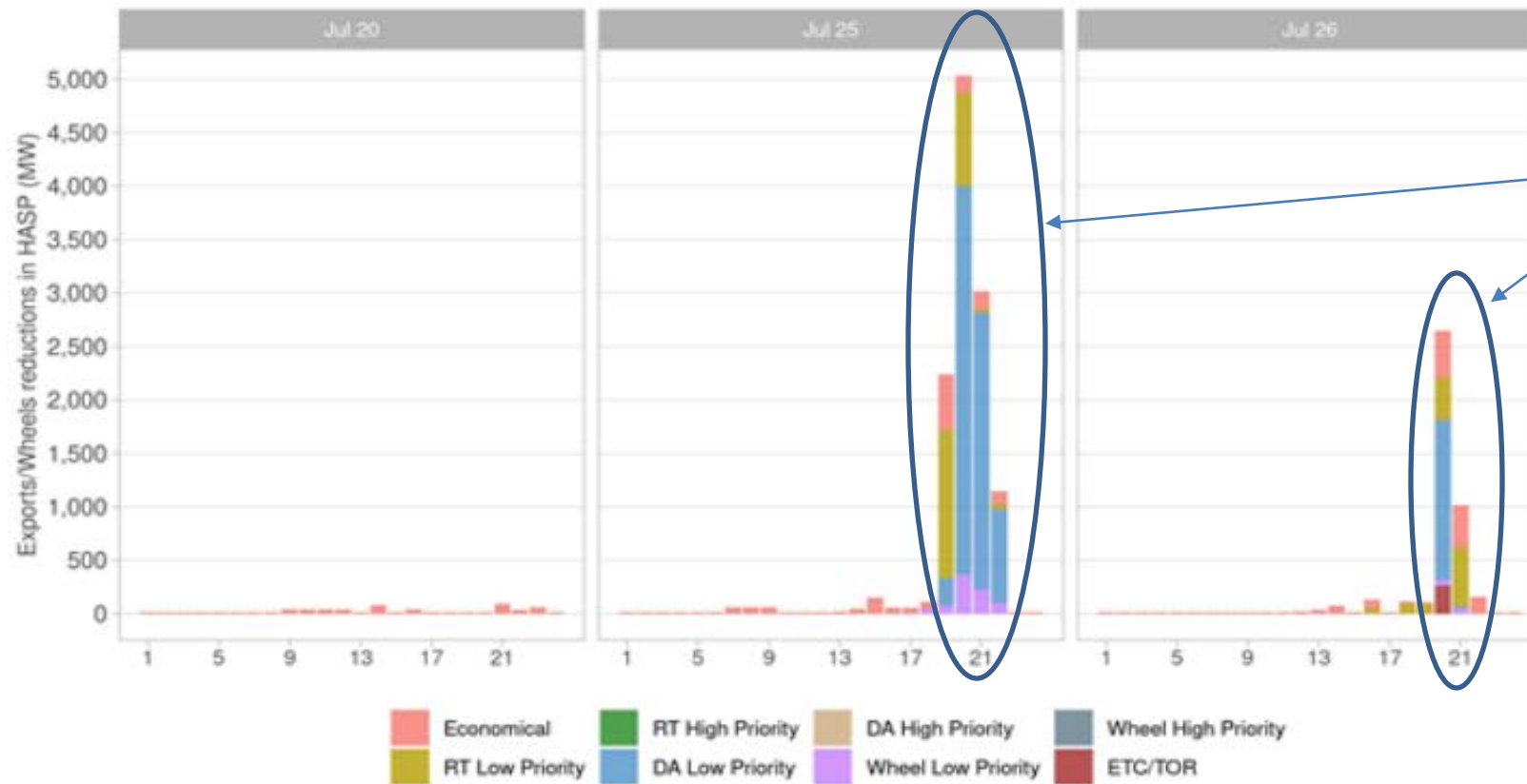
Emergency declarations and actions taken in July 2023 during high demand conditions



- July 20 - An Energy Emergency Alert 1 (EEA1) was declared for the ISO BAA on the evening of July 20 resulting in a demand response event
- July 25 – An Energy Emergency Watch was declared as solar power diminished
- July 26 – An Energy Emergency Watch was declared due to similar system conditions as July 25

The ISO honored all high-priority exports and wheels during each of the emergency events

Due to tight supply conditions, the RT Market could not clear all low priority transactions



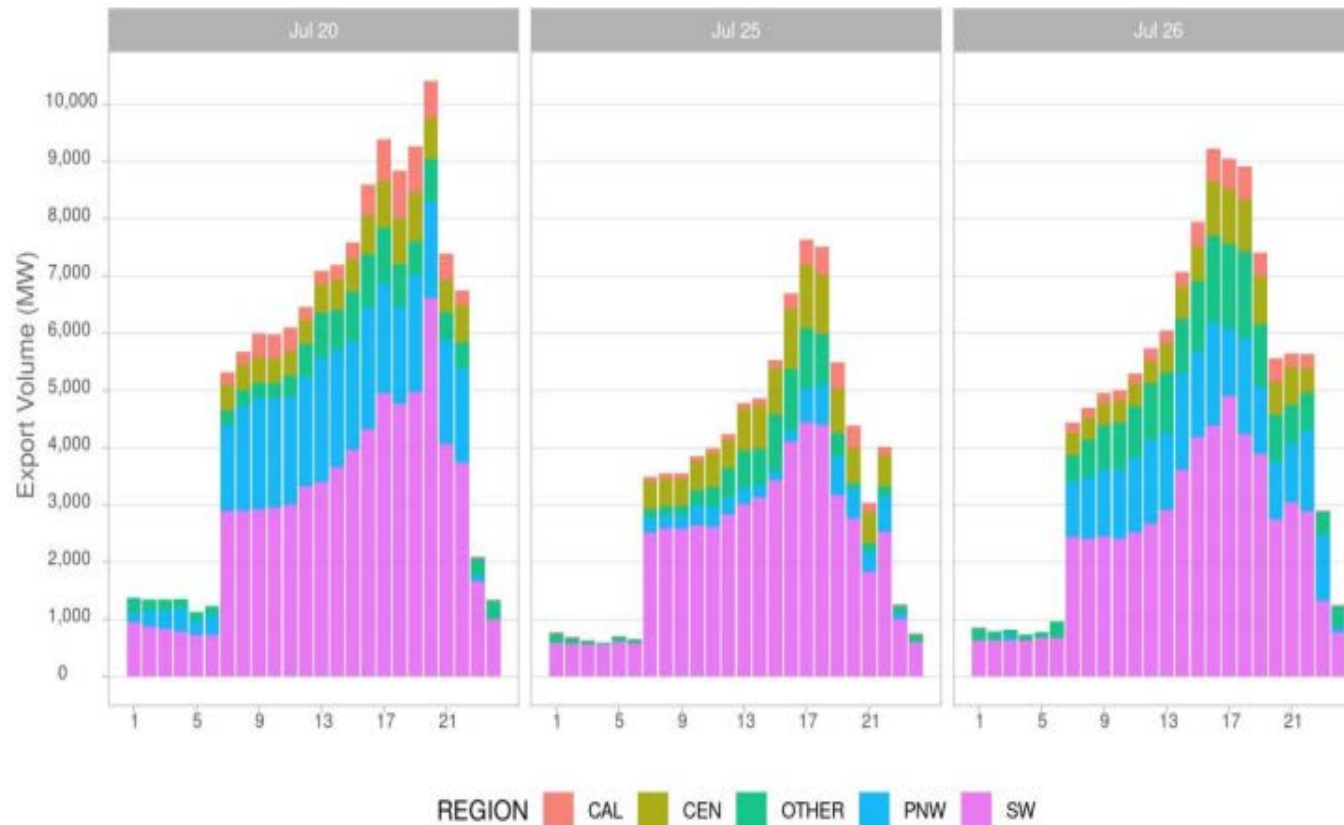
Low priority and economic transactions that could not clear the hourly market in hours 19 - 22

All high priority exports and wheel-through transactions were honored

The ISO was able to support a large volume of exports and wheels

Unprecedented high volume of exports cleared in July

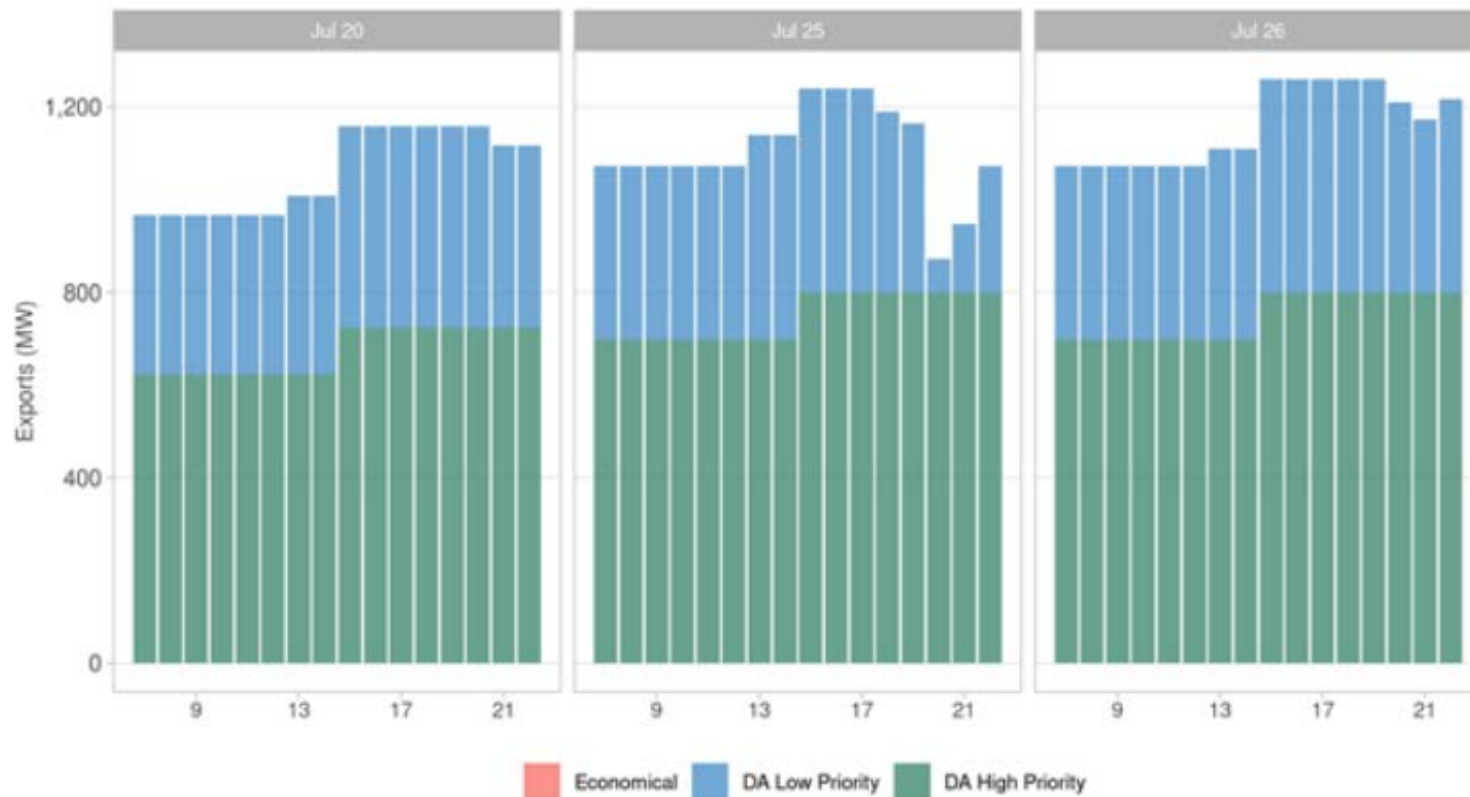
Exports during peak hours were double of those in summers of 2021 & 2022 during strained system conditions



Breakdown of ISO exports by sinking BAA July 20, 25 & 26

Market cleared an unprecedented 9,000 MW of exports at various times in July

During this critical time period, the ISO was still able to clear up to 1,200 MW of wheel-through transactions



Significant volume of low priority transactions were supported

Closing Points



The interconnected nature of the grid coupled with the high demand from the desert southwest put a strain on the system

Coordination and communication with our customers and stakeholders was critical in maintaining grid reliability

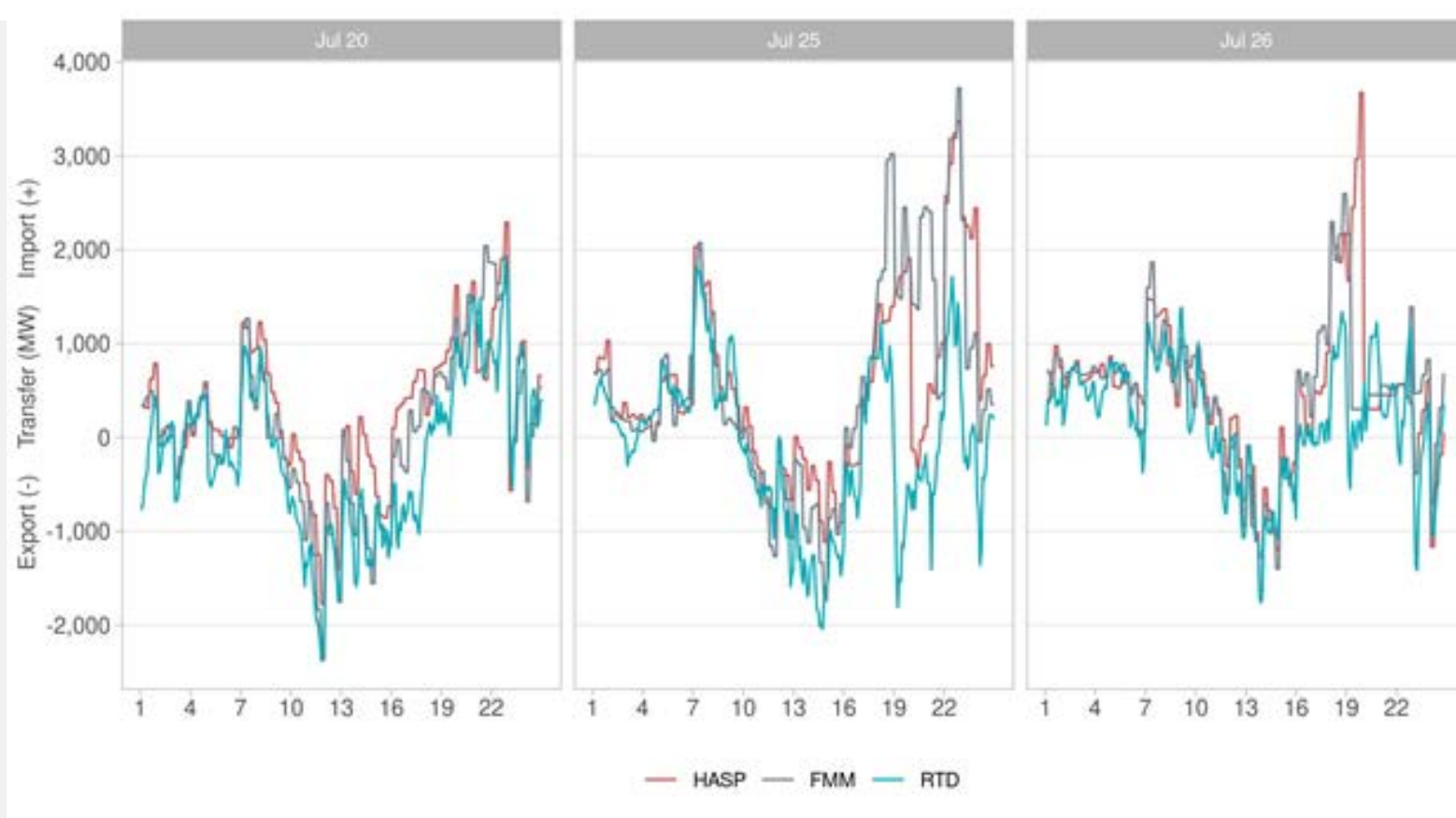
Increased regional coordination through an optimized regional market is essential to effectively leverage resources across the West

Detailed July market performance report was published in September

[Summer-Market-Performance-Report-for-July-2023.pdf \(caiso.com\)](https://www.aiso.com/~/media/Files/2023/Summer-Market-Performance-Report-for-July-2023.pdf)

Appendix

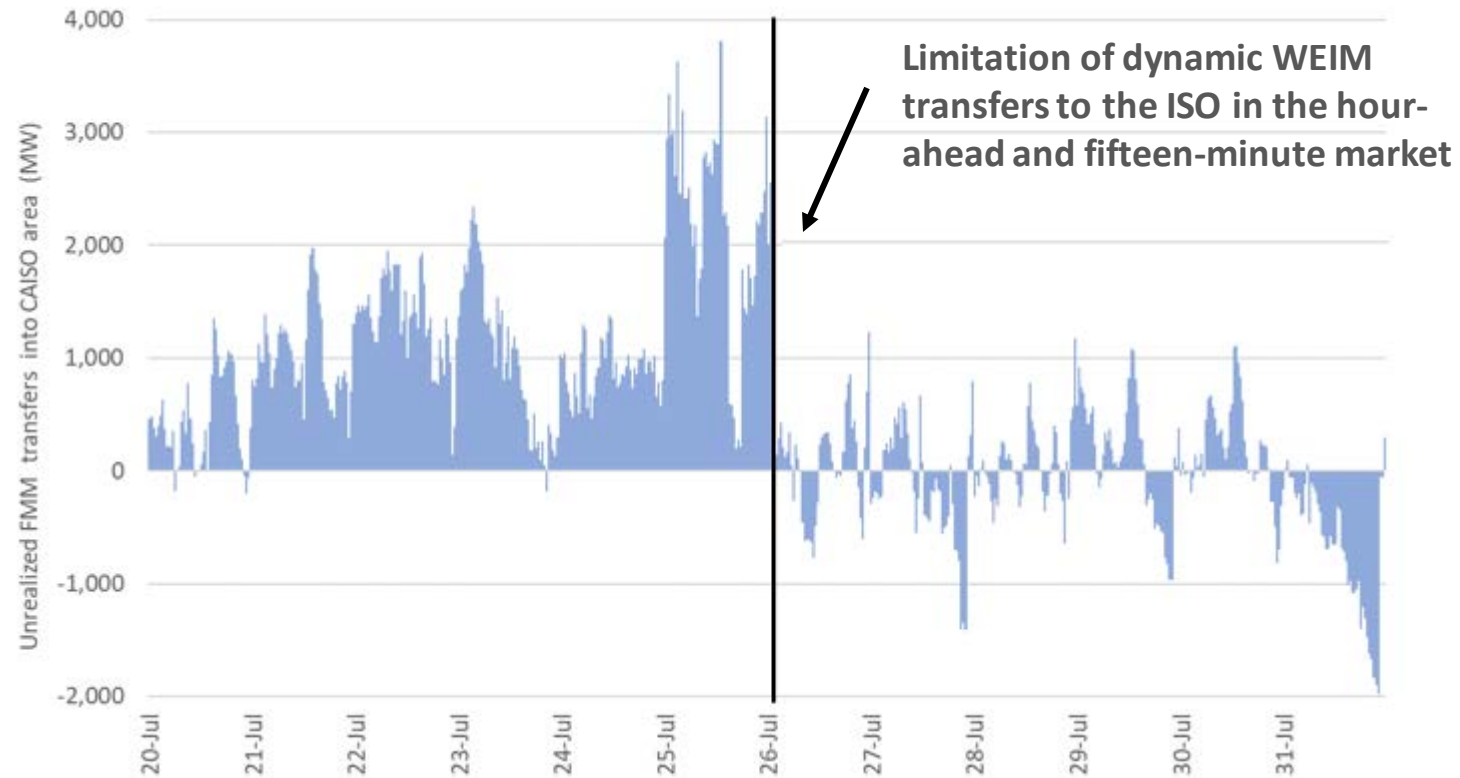
Energy Transfer Trends



Transfer pattern for ISO area across markets

On July 26, the ISO limited reliance on imports from the WEIM

Reliance on WEIM transfers into the ISO BAA were limited to minimize the risk of supply not materializing starting on July 26



Limiting incoming WEIM transfers was necessary to manage uncertainty

Upcoming Meetings

BOSR Monthly Meeting

Friday, January 12, 2024 at 10:00 AM MDT / 9:00 AM PDT