



Market Performance and Planning Forum

December 14, 2022



CAISO PUBLIC

Reminders:

- This quarterly forum that engages stakeholders in review of market performance issues and in high level dialogue on release planning, implementation and new market enhancements. This is intended to foster open dialogue and sharing of ideas and perspectives
- Please raise your hand if you have a question or comment at any time during the meeting
 - Please start by stating your name and affiliation
- Meetings are recorded and video files posted on **User groups and recurring meetings > Market performance and planning forum > 2022**

Objective: Enable dialogue on implementation planning and market performance issues

- Review key market performance topics
- Share updates to 2023 release plans, resulting from stakeholders inputs
- Focus on implementation planning
 - Clarify timelines
 - Discuss external impacts
 - Policy discussions should occur in the initiative stakeholder process



California ISO

Market Performance and Planning Forum

Agenda – December 14, 2022

9 a.m. – 12 p.m.

Time:	Topic:	Presenter:
9:00 – 9:05	Introduction, Agenda	Brenda Corona
9:05 – 10:30	Market Performance Update	Market Analysis and Forecasting
10:30 – 11:30	Policy Update	Gillian Biedler
11:30 – 12:00	Release Update	Trang Vo



Objective: Enable dialogue on implementation planning and market performance issues

- Review key market performance topics
- Share updates to 2021 release plans, resulting from stakeholders inputs
- Provide information on specific initiatives
 - to support Market Participants in budget and resource planning
- Focus on implementation planning
 - Clarify timelines
 - Discuss external impacts
 - Policy discussions should occur in the initiative stakeholder process

Market Update: Change to Intertie Penalty Price



Guillermo Bautista Alderete
Market Analysis and Forecasting Department

Change to Intertie Penalty price

- Adjustment to intertie constraint penalty prices initiative increased intertie constraint penalty price in RUC and HASP to avoid intertie overscheduling. (Effective 6/1)
- Additional penalties were raised in STUC, RTPD and RTD

Penalty Price Description	Before 6/1	After 6/1
Tagged Quantity for Exports	1550	3100
Tagged Quantity for Imports	-1250	-3100
EIM Base Scheduled Exports	1550	3100
EIM Base Scheduled Imports	-1250	-3100
Exceptional Dispatch for Tie Generators	1600	3200

- ITC overload in subsequent FMMs. When the first FMM sees the overloaded ITC, it should cut schedules pro-rata and remaining FMMs should not be overloaded.

Re-evaluate the additional penalty changes

- Expectation: inertia limit should be respected in FMM. Market should be able to cut tagged values and EIM interchange base schedules after HASP when necessary.

- Import direction:

Intertie import direction binding with system under-gen

$$Penalty^{Imp} \leq 2900 - 1450 = 1450$$

- Export direction:

Intertie export direction binding with system over-gen

$$1450 \leq Penalty^{Exp} \leq 2900 - 750 = 2150$$

Proposed values

- Proposed changes
(Scheduling run values based on \$1000 cap)

Penalty Price Description	Production	Proposed
Tagged Quantity for Exports	3100	1550
Tagged Quantity for Imports	-3100	-1250
EIM Base Scheduled Exports	3100	1550
EIM Base Scheduled Imports	-3100	-1250
Exceptional Dispatch for Tie Generators	3200	1600

- Coming soon: emergency BPM process for penalty price changes

Market Parameter changes enhancements

CAISO resume this initiative in May 2022

- Based on stakeholders' feedback, CAISO is exploring an expansion to the original scope of the shift factor threshold enhancement
- Original proposal is to apply a Shift Factor threshold of 0% to DLAPs and THs. The expansion would also cover major intertie locations
- CAISO needs to perform computational feasibility with the additional locations, which requires software changes

CAISO plans to implement a phase approach

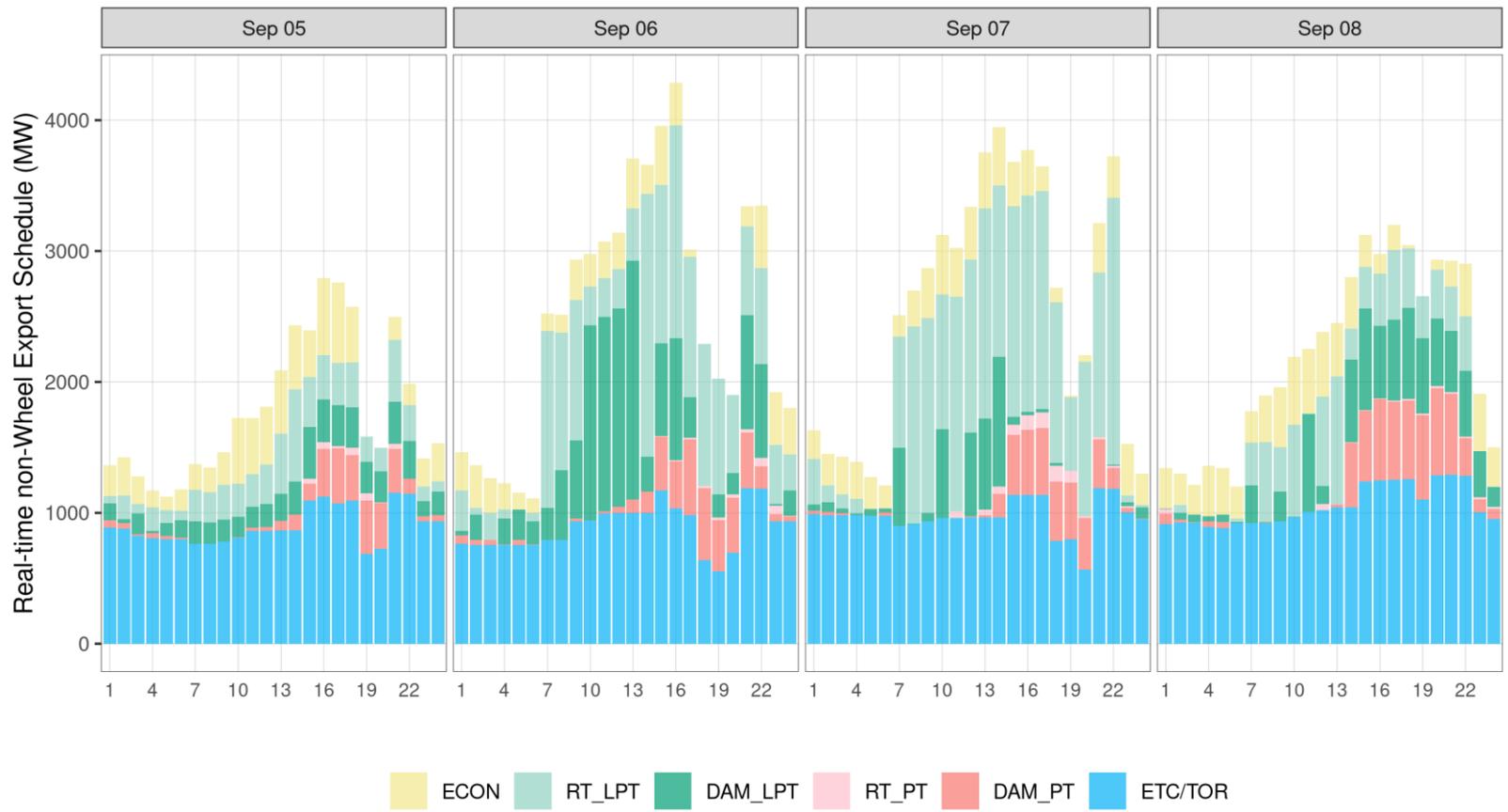
- CAISO will propose to pursue the original solution with the flexibility to add intertie locations in a second phase if feasible
- CAISO will issue a Final Draft Proposal in January, targeting a March BOG approval

Scheduling Priorities for inertie resources

Scheduling Priorities in real-time

- Tariff defines the overall scheduling priorities
- Under tight supply conditions, economical exports are reduced first followed by low-priority exports; if needed then high-priority can be reduced at the time power balance is relaxed
- The market clearing process for CAISO's market uses two passes:
 - Scheduling run, and
 - Pricing run
- Scheduling priorities are effectuated in the Scheduling run; Pricing run uses only the bid cap/floor
- For real time, schedules and prices are from the Pricing run

During the September heatwave, there were real-time solutions with unintended export awards



During the September heatwave, there were real-time solutions with unintended sequencing of export reductions



The unintended market solution was driven by the solution achieved in the Pricing run

- The Pricing run solution set up and other software issues resulted in export reductions projected in Scheduling run to be undone in the Pricing run
- In Pricing run, export schedules assessed from Scheduling run are lower bounded in the clearing process
- An enhancement implemented on October 13 imposes an upper bound in the Pricing run to export schedules from the Scheduling run

Treatment of Resource-Adequacy Capacity for Storage Resources

Current treatment of RA capacity for Storage resources in the RUC process is limited

- Resources can participate in the day-ahead market by submitting bids.
- Energy bids are used in the Integrated Forward Market (IFM) to determine energy awards
- For RA resources awarded in IFM below RA levels, the RUC process will consider the capacity up to the RA level

RUC process can schedule the unused RA capacity to meet the load forecast

- RUC process will consider first RA capacity since it comes with zero costs
- RUC uses IFM awards as a starting point to assess any incremental capacity needed
- Only RUC schedules above RA capacity are deemed RUC awards and are paid the RUC price

The RA capacity above IFM schedules is not currently considered in RUC for storage resources

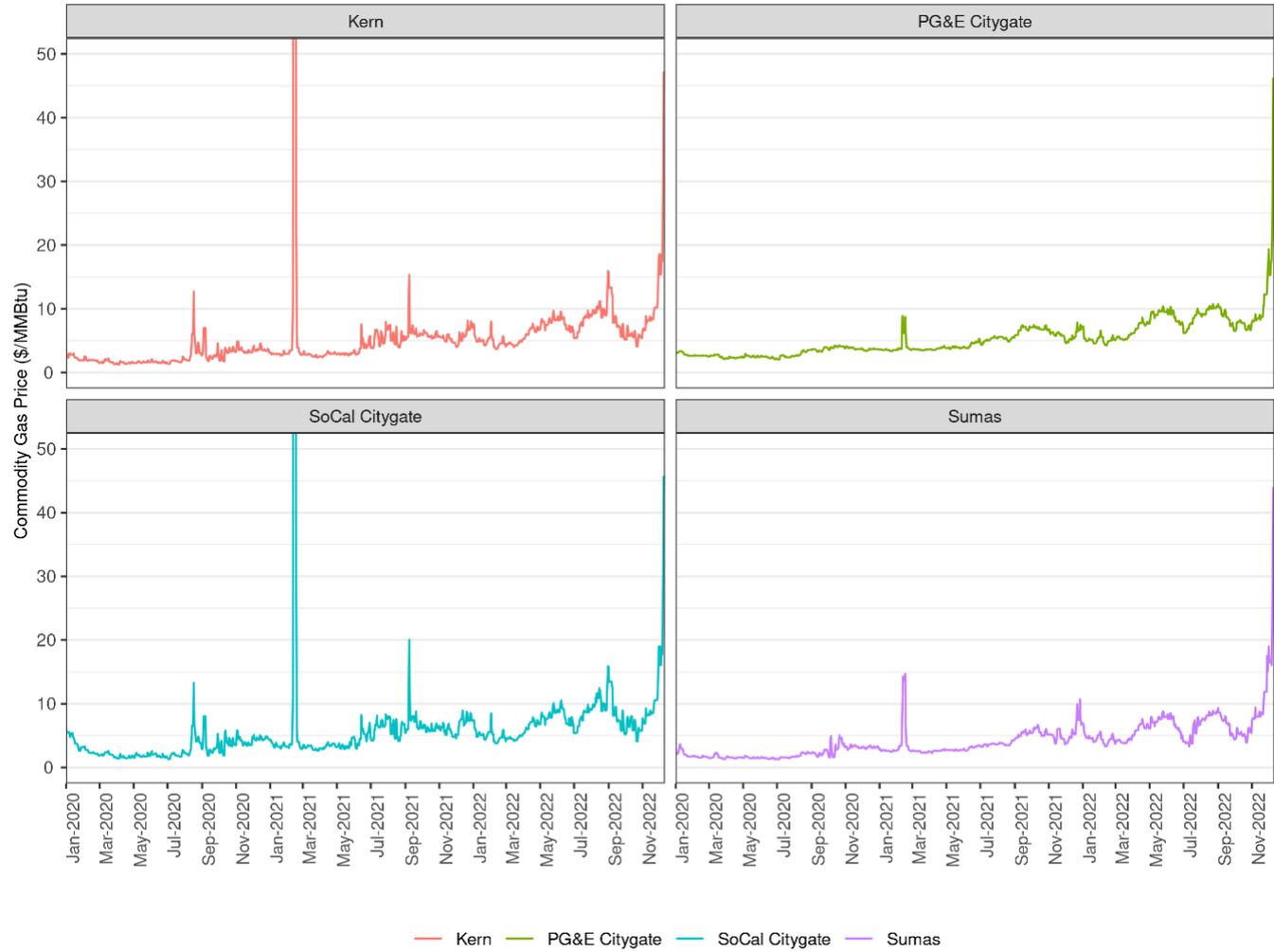
- For storage resources, only the capacity up to energy awards from IFM are considered in RUC
- The RA capacity from these resources is still available in real-time given must offer obligations
- CAISO is assessing the Tariff provisions and BPM language to determine next steps
- Given the complexities of modelling storage resources by being energy limited, an effort is required to define the logic to treat these resources in RUC

Potential implications of current logic

- Incremental RA capacity is not used to balance the demand forecast and may require other capacity (RA and Non RA) to be scheduled
- In tight supply conditions, missing the incremental RA capacity may result in infeasibilities or reduction of exports.
- However, in tight supply conditions, IFM is already dispatching storage resources at high levels, up to their RA level, rendering the missing capacity in RUC to be small

CAISO's Market Prices and Costs

Gas Prices trending high in December due to a confluence of factors during cold weather conditions



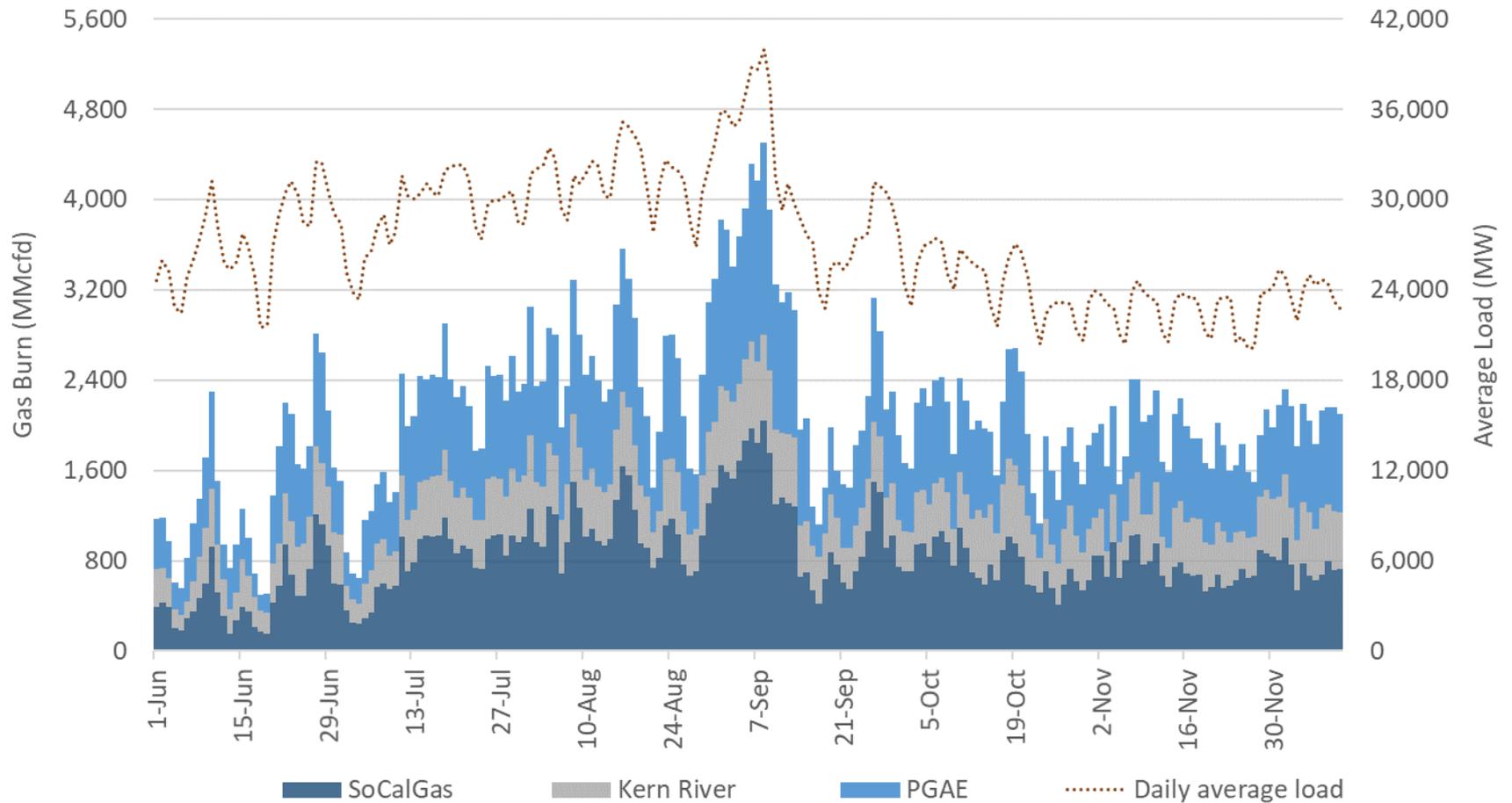
Earlier cold weather

Pipeline work

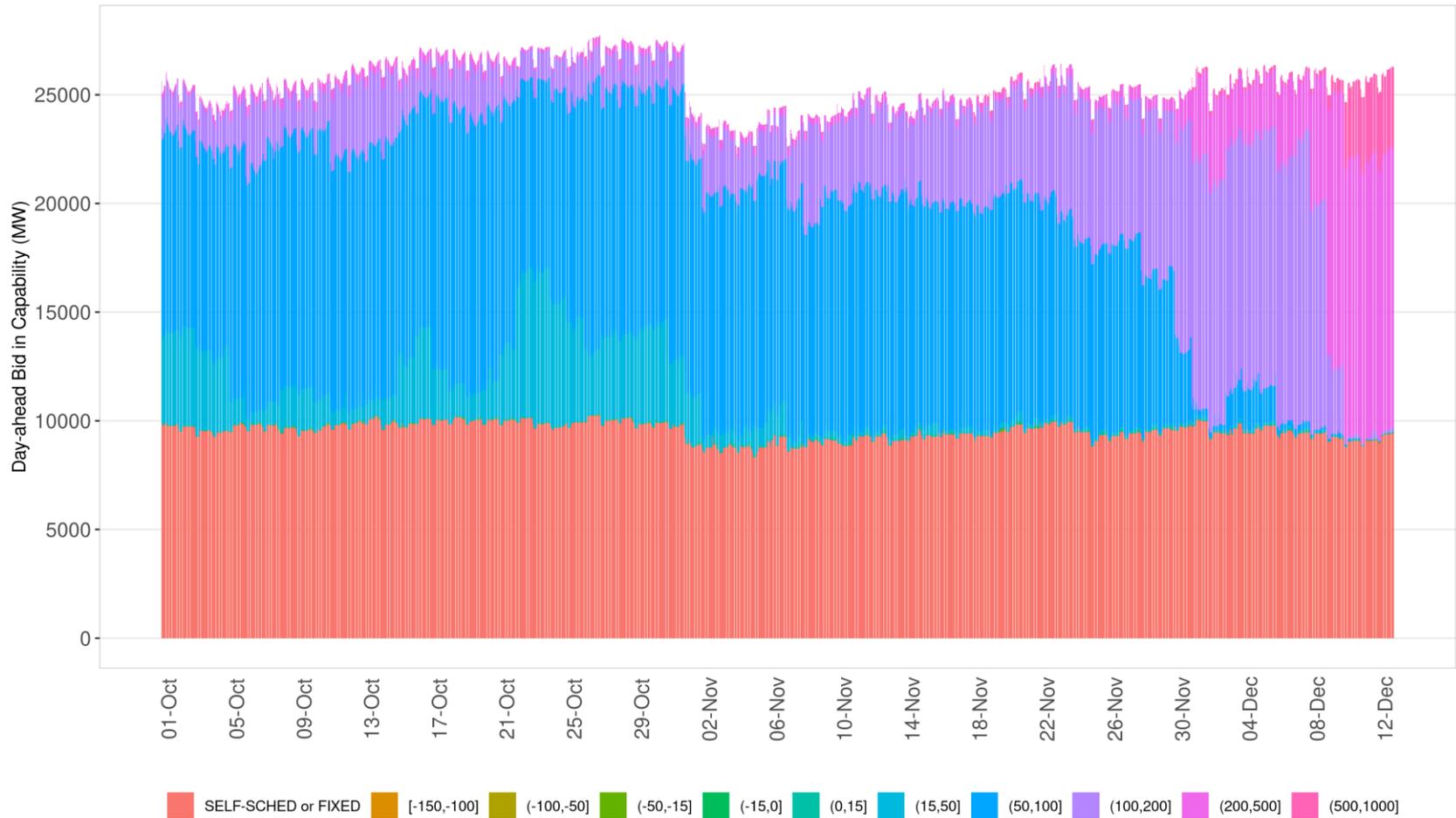
Overall gas dynamics

Gas Storage levels

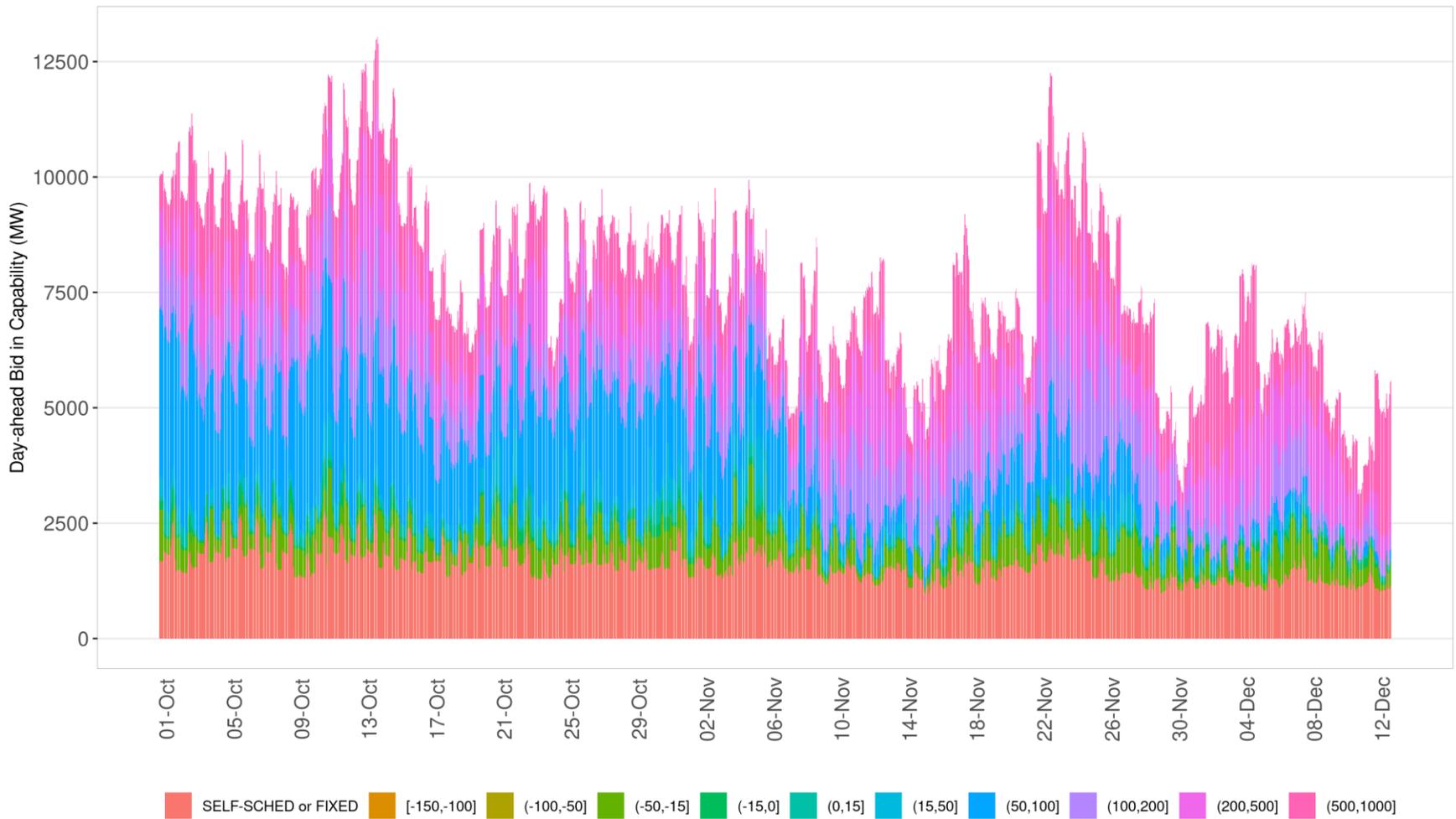
Gas burn levels in early December are within typical levels



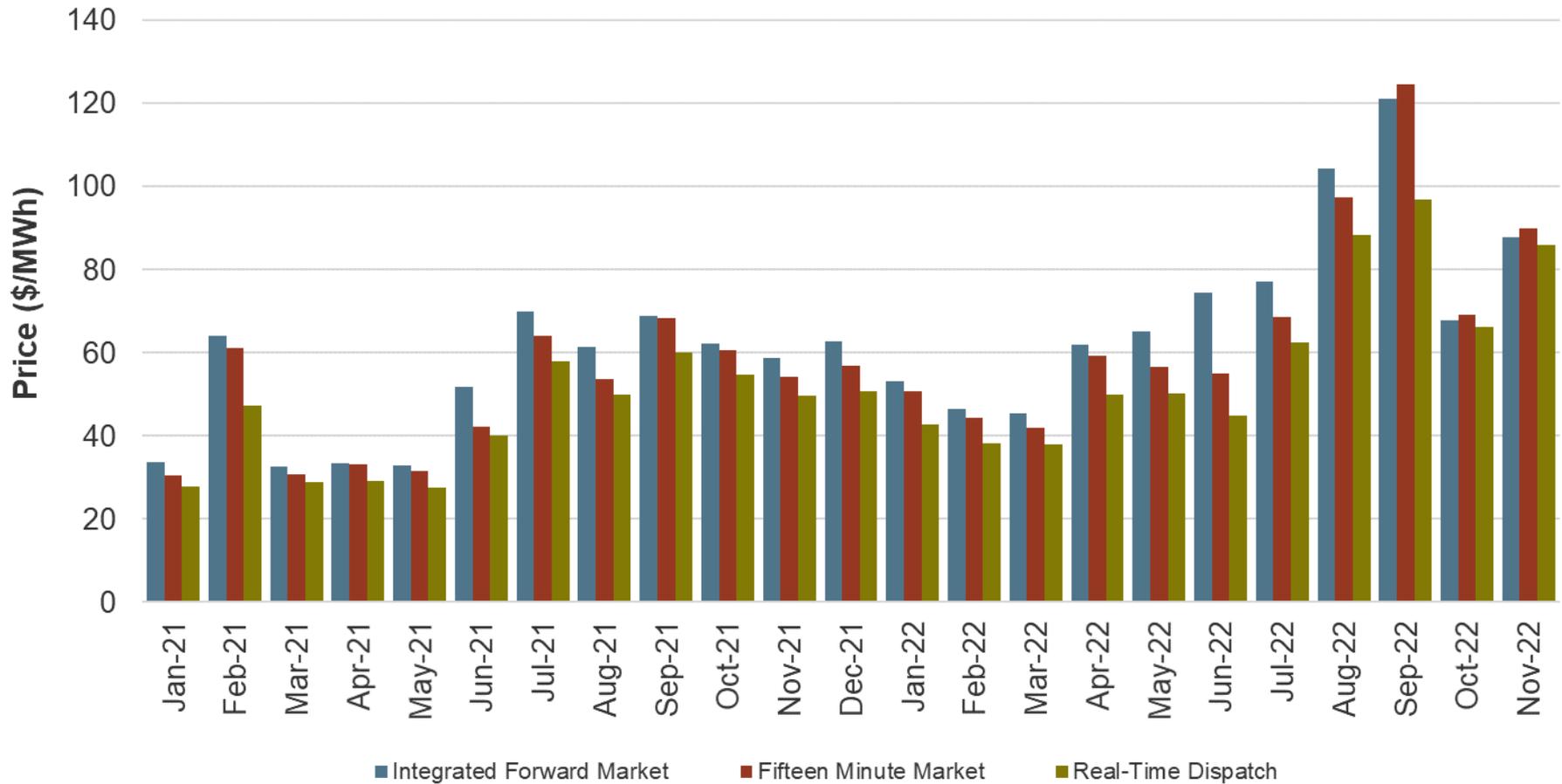
Gas prices are reflected accordingly in more expensive energy bids



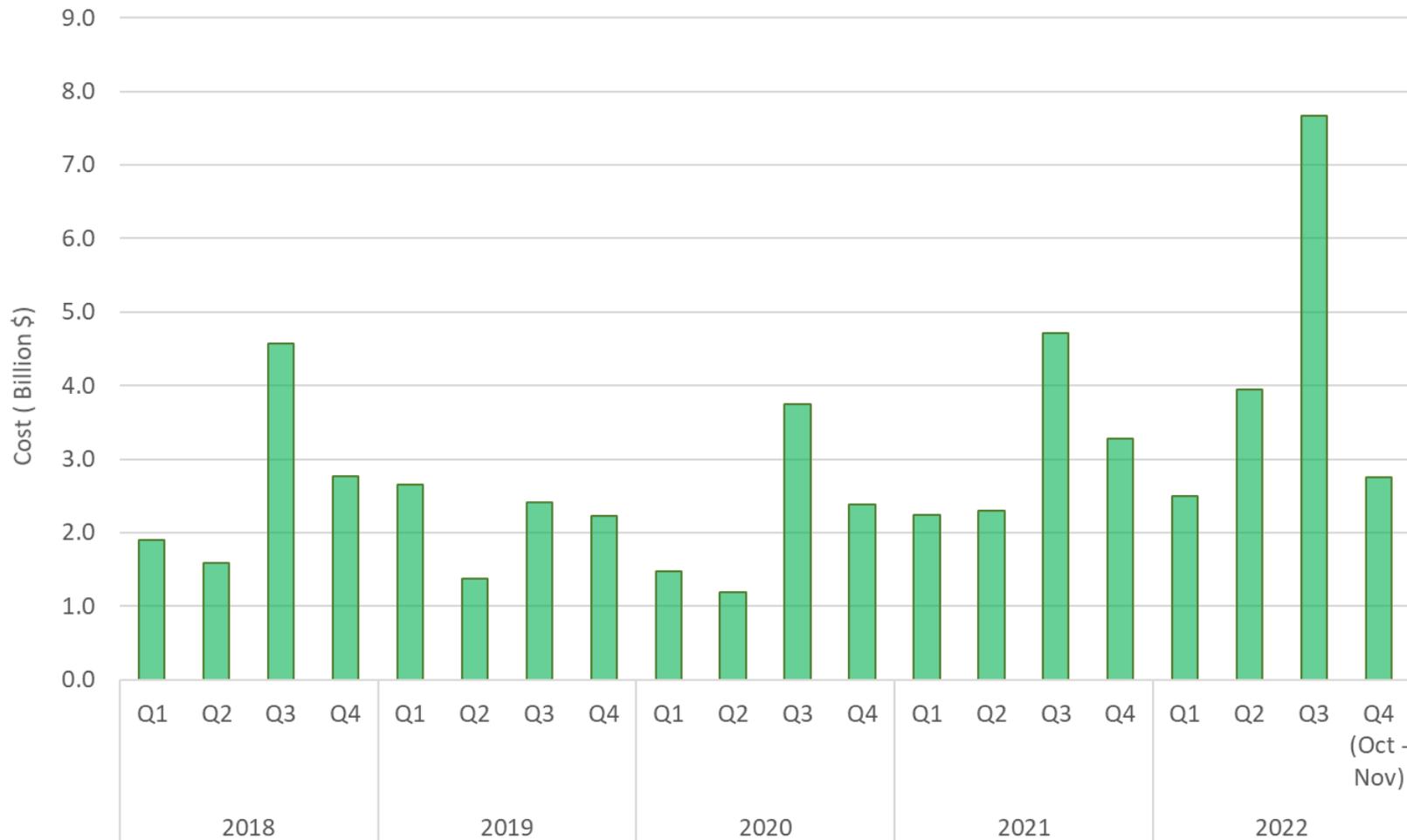
Imports participating in the CAISO market reflect gas dynamics, with lower volumes at higher prices



CAISO's electric prices have been trending high influence by gas dynamics



High wholesale market costs in Q3 2022 reflects the high loads and prices of summer conditions

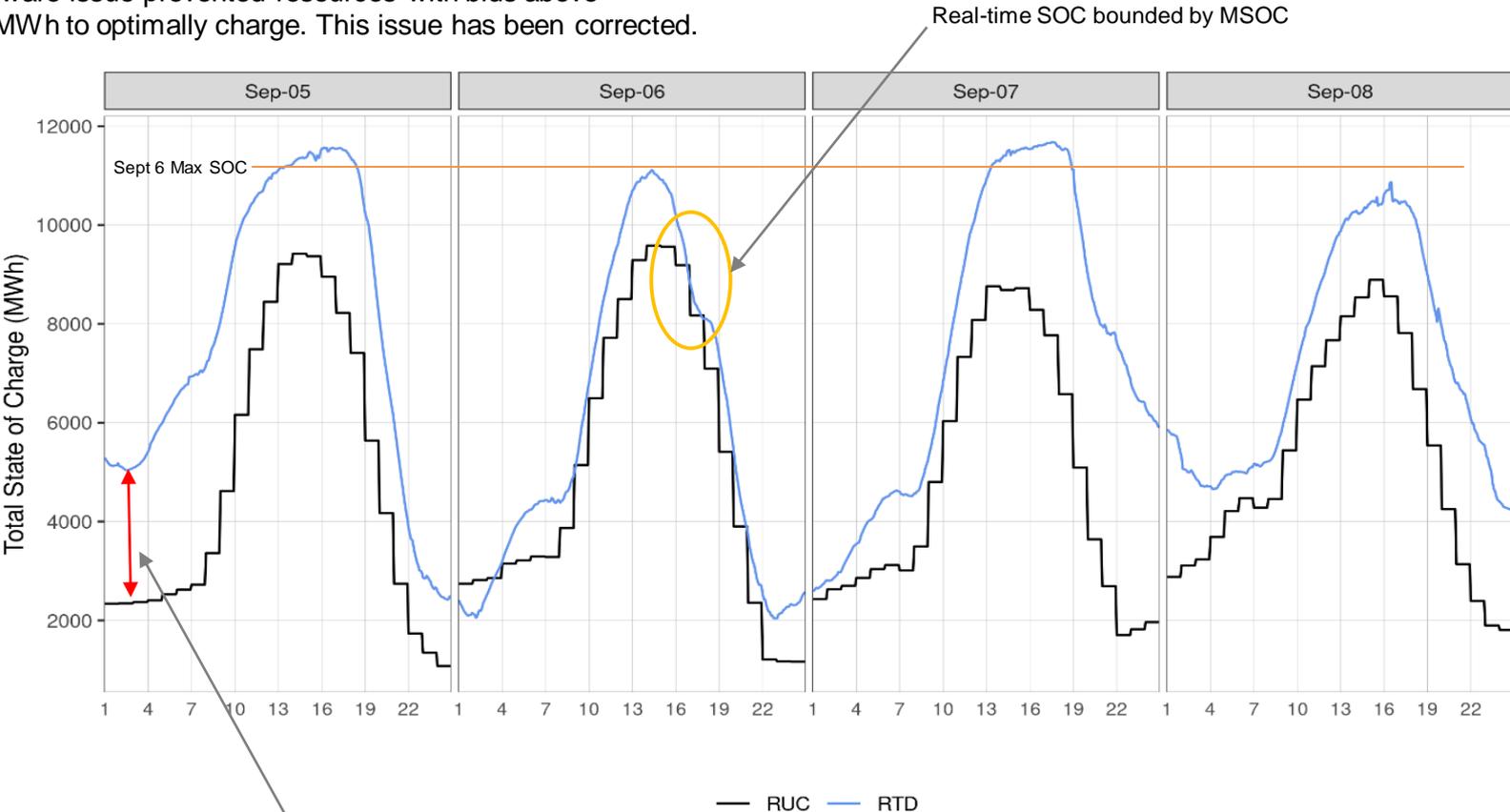


Settlements data is preliminary and subject to changes
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Batteries

September 6 observed a lower maximum SOC relative to adjacent days

A software issue prevented resources with bids above \$150MWh to optimally charge. This issue has been corrected.

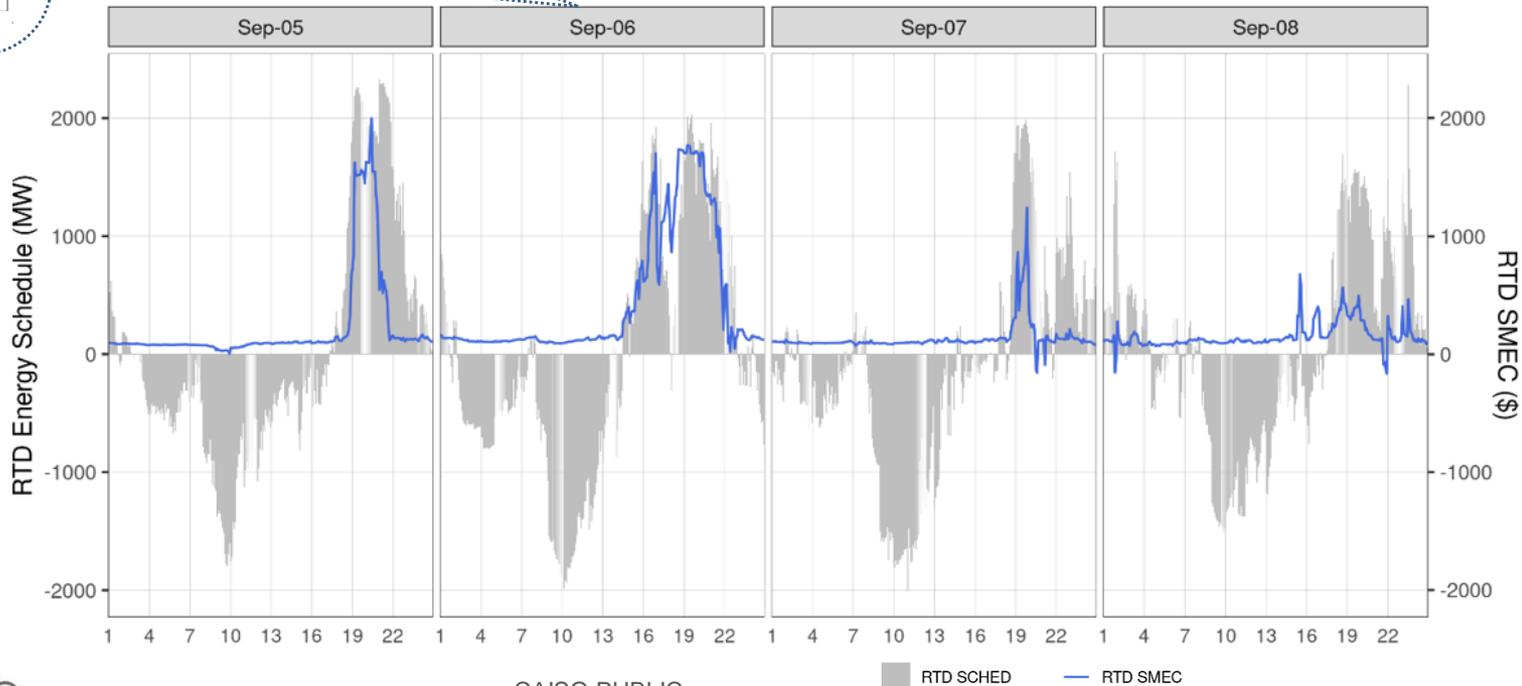


Real-time SOC bounded by MSOC

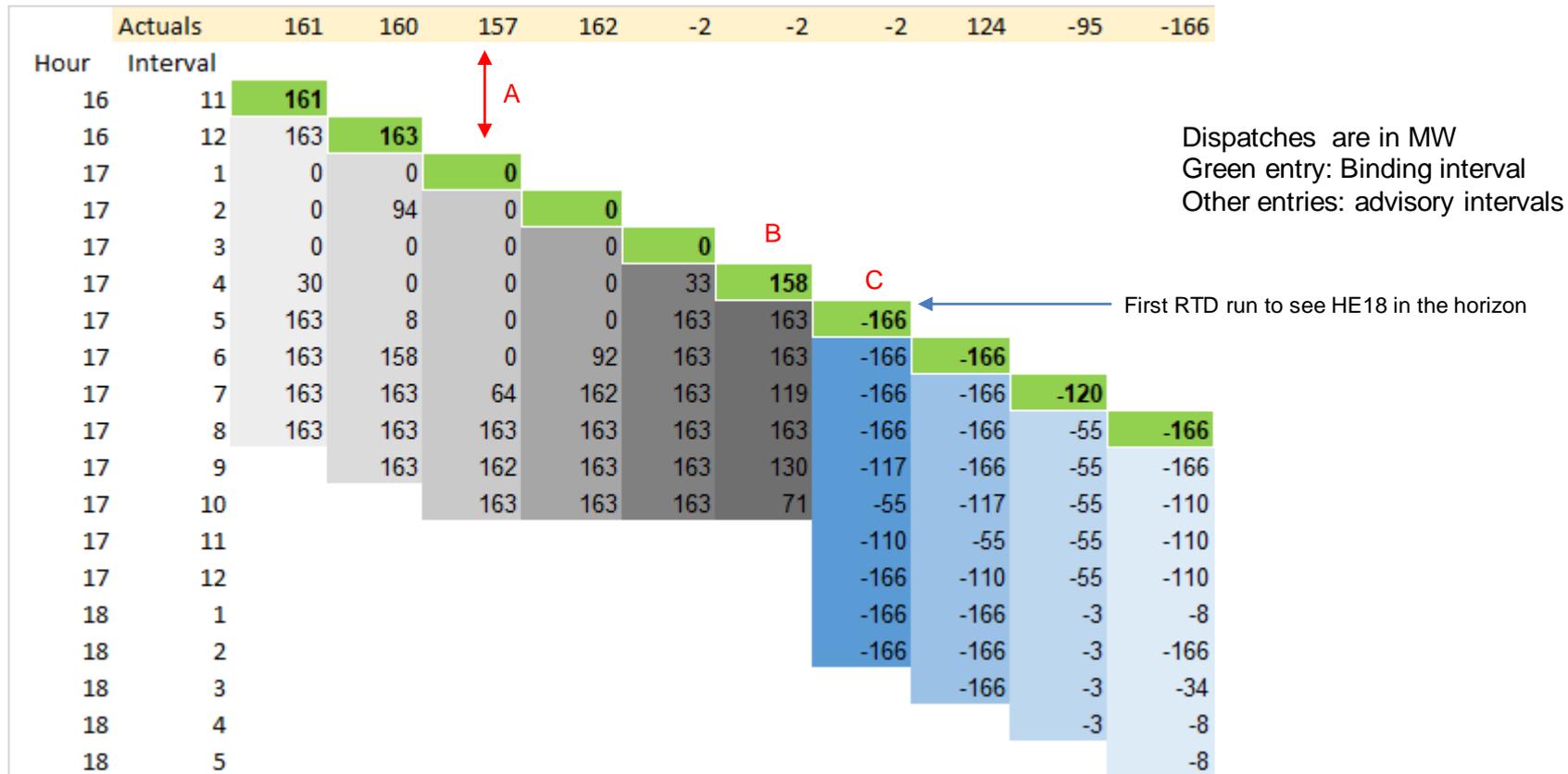
The initial day-ahead state of charge can be very different to what realizes in real-time. It will influence what MSOC is imposed in real-time

Storage resources started to discharge early on Sept 6 as prices quickly increased making resources economical

RTD dispatches can only look ahead for next 50 minutes.
RTD multi-interval optimization can only optimize through that horizon

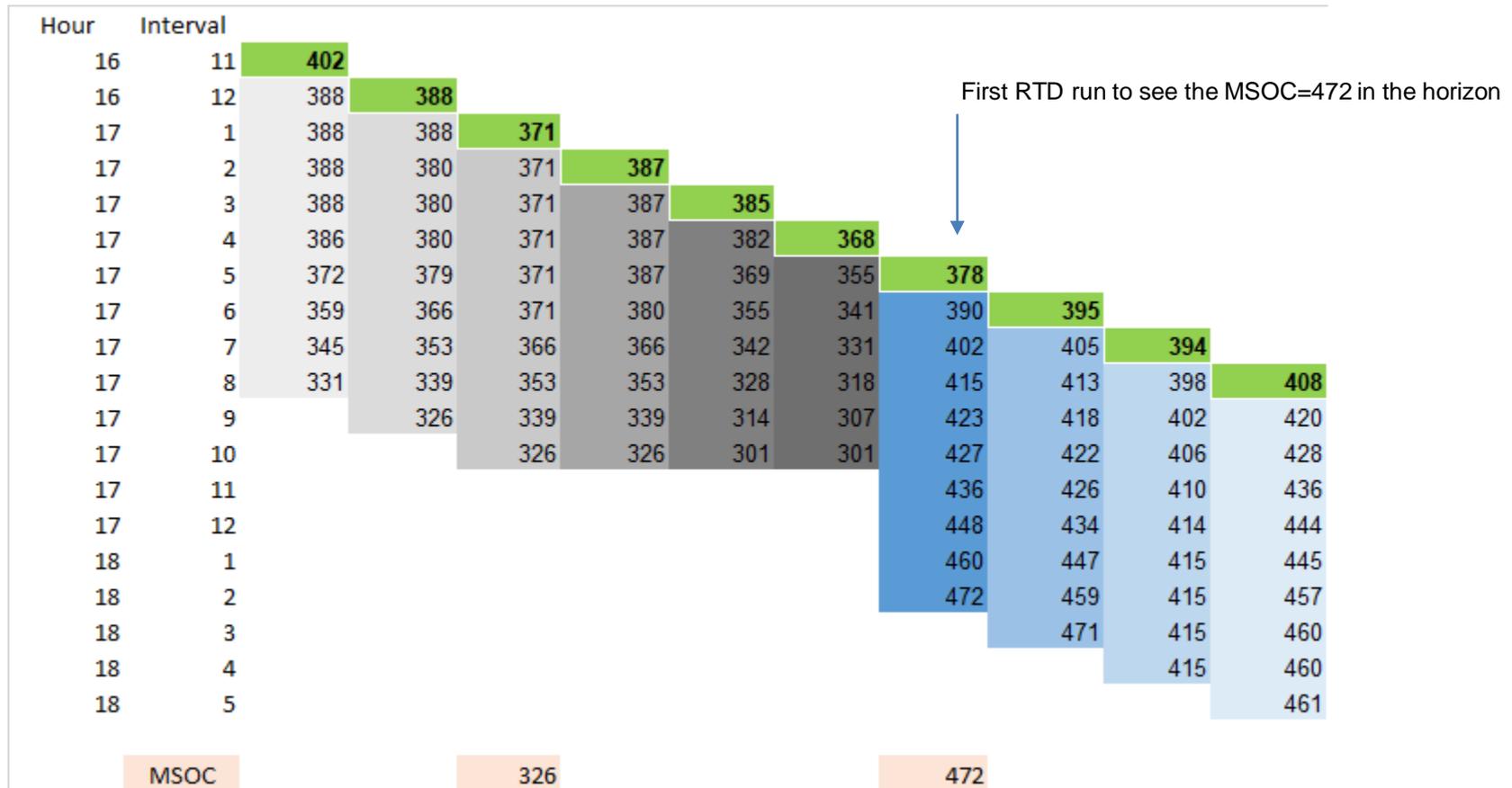


Early discharges were driven by economics when resources were in merit across the optimized horizon



The multi-interval horizon was too short to foresee and position resources more in advance

Dispatches were driven to meet SOC constraints and regulation procurement

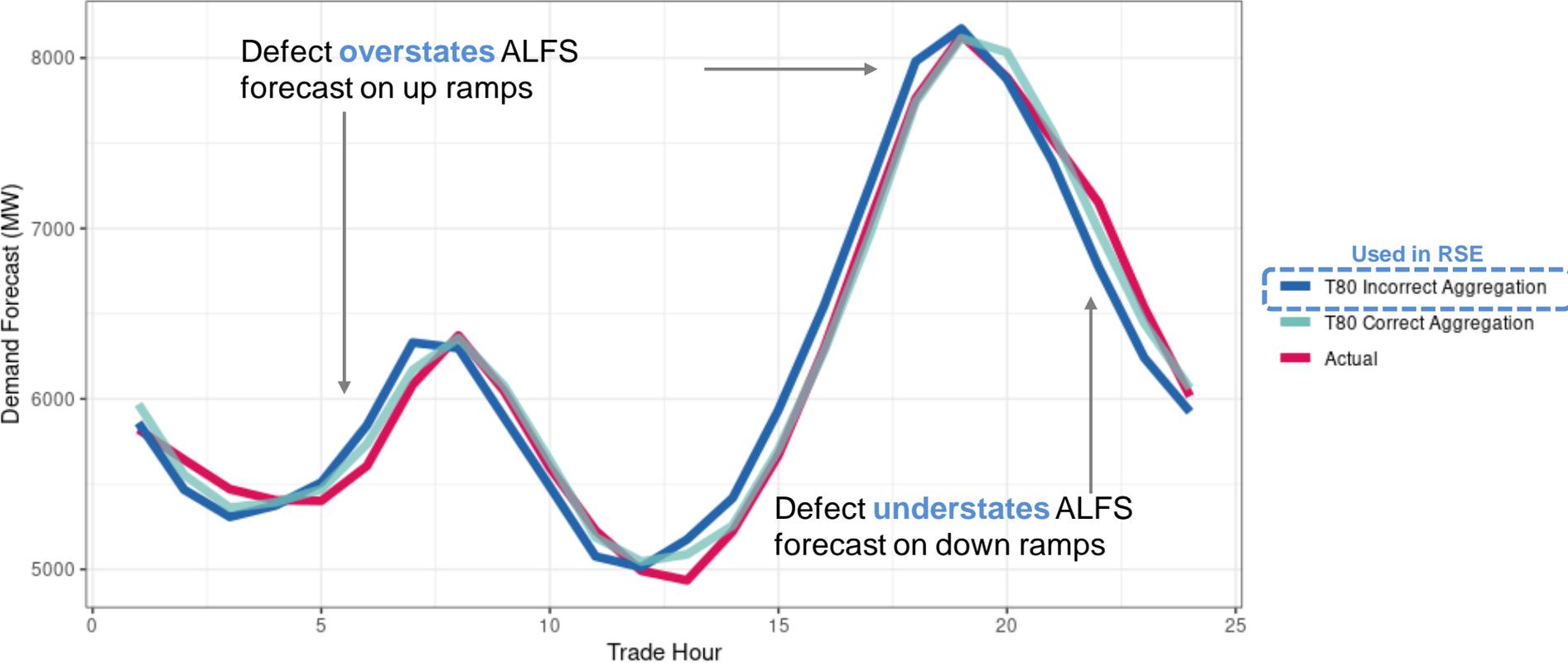


Demand Forecast Averaging Defect

Demand Forecast Averaging Defect

- Defect with post process that averages ALFS 15 min interval load forecast to hourly
- Defect was first identified and corrected in Jun 2018 but defect reappeared in Sep 2018
- Impacts hourly T80/T40 forecast used in Resource Sufficiency Evaluation (RSE)
- Level of impact varies – most notable during strong ramping periods

Example: Demand Forecast Averaging Defect

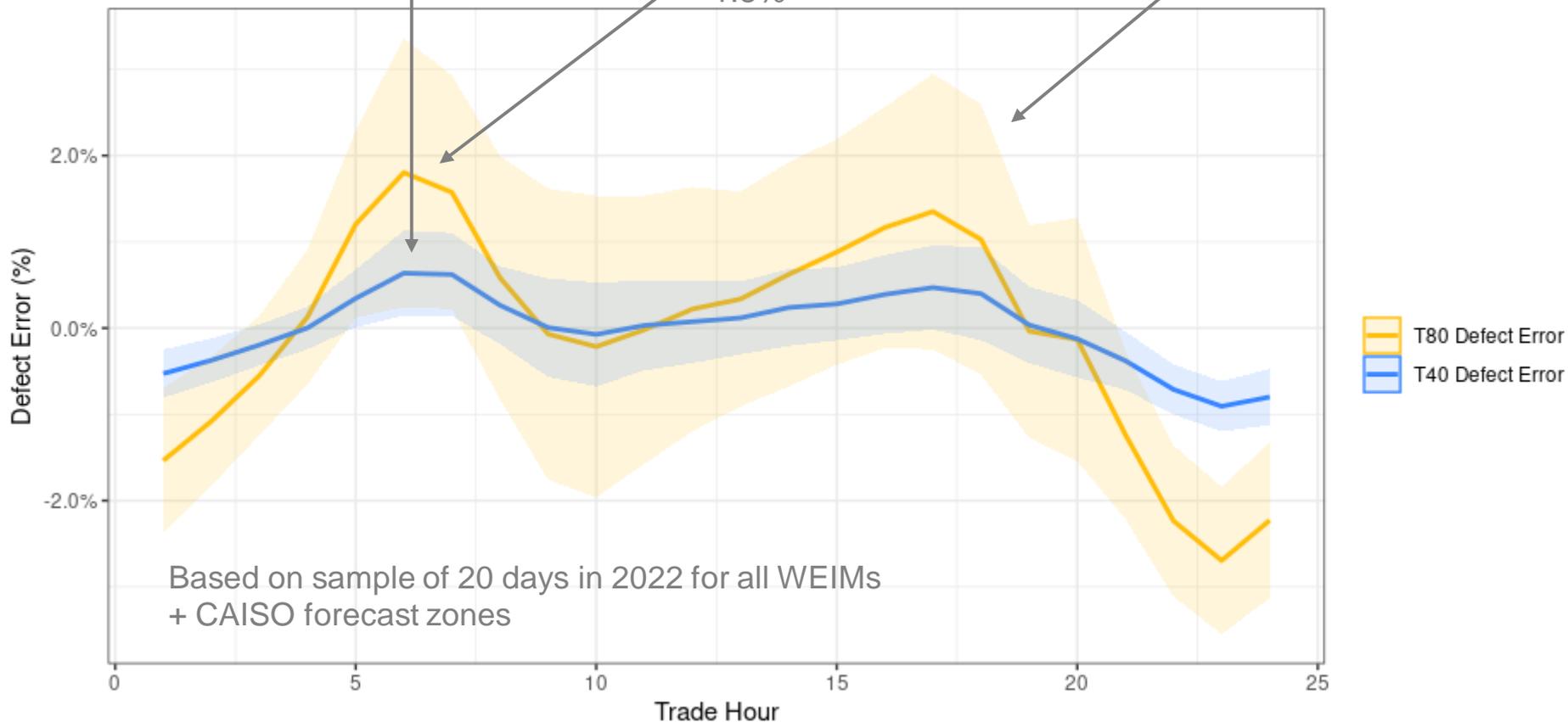


Overall Impact of Defect on Hourly Load Forecasts

Average impact on T40 during ramping period 0.5%

Average Impact on T80 during ramping period 1.8%

Shaded area represents upper/lower bounds



Based on sample of 20 days in 2022 for all WEIMs + CAISO forecast zones

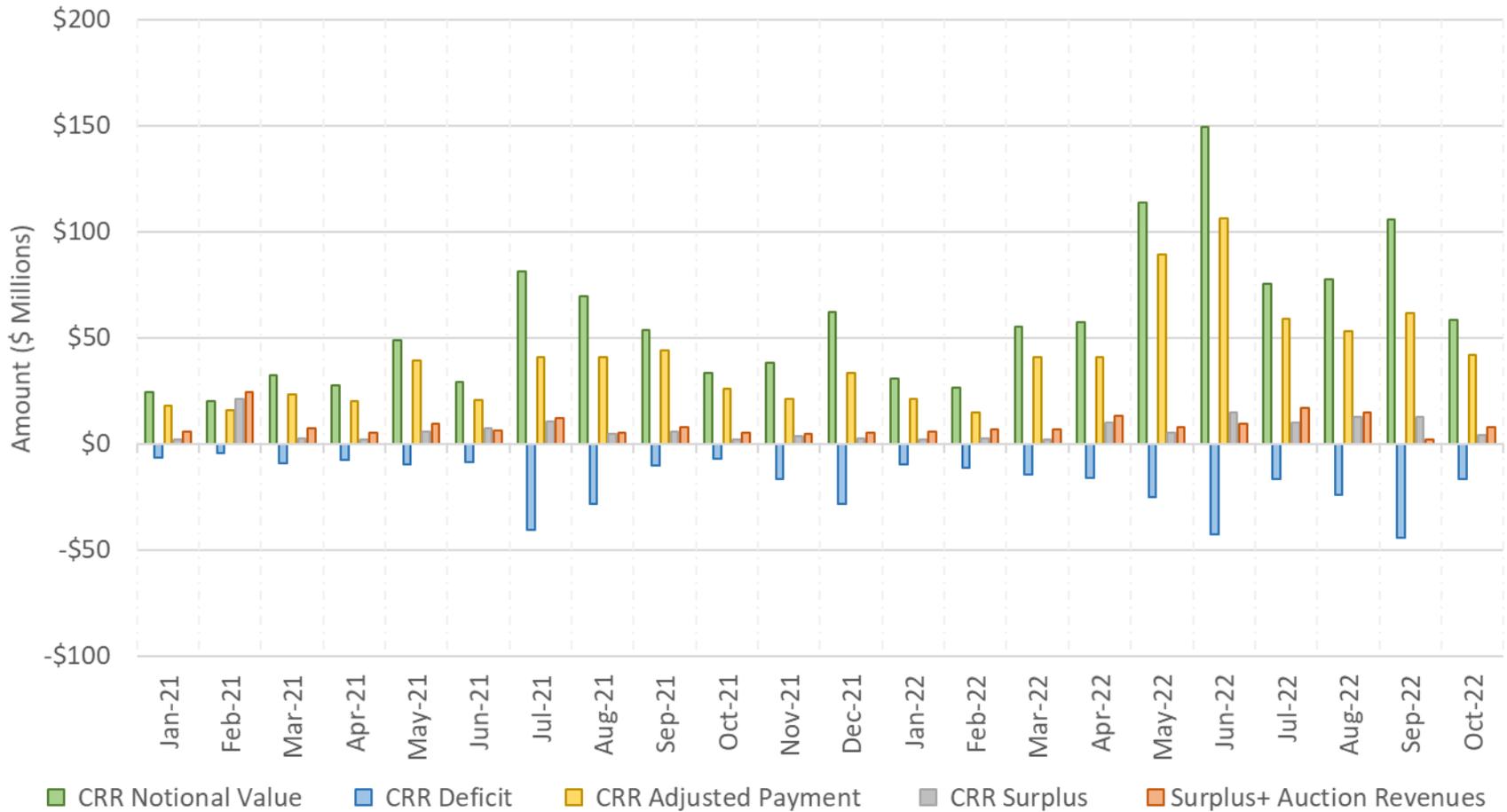
$$\text{Defect Error} = (\text{Incorrect Aggregation} - \text{Correct Aggregation}) / \text{Correct Aggregation}$$

Next Steps for Correcting Averaging Error

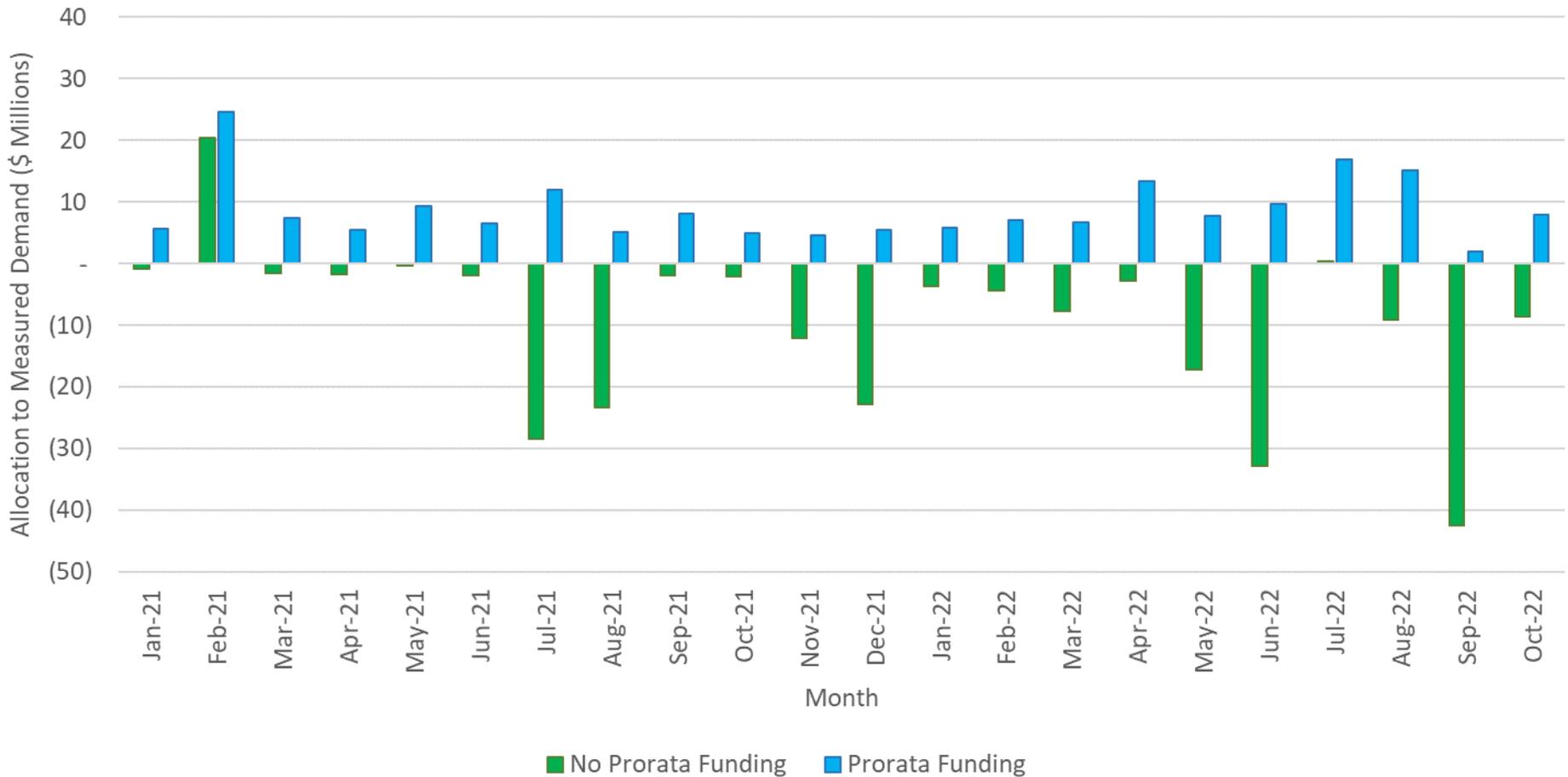
- CAISO IT is currently testing a fix
- Fix will be rolled into production after successful testing
- Target to rollout fix by Jan 2023
- CAISO will communicate to participants via market notice after fix goes into production

Market Performance Metrics

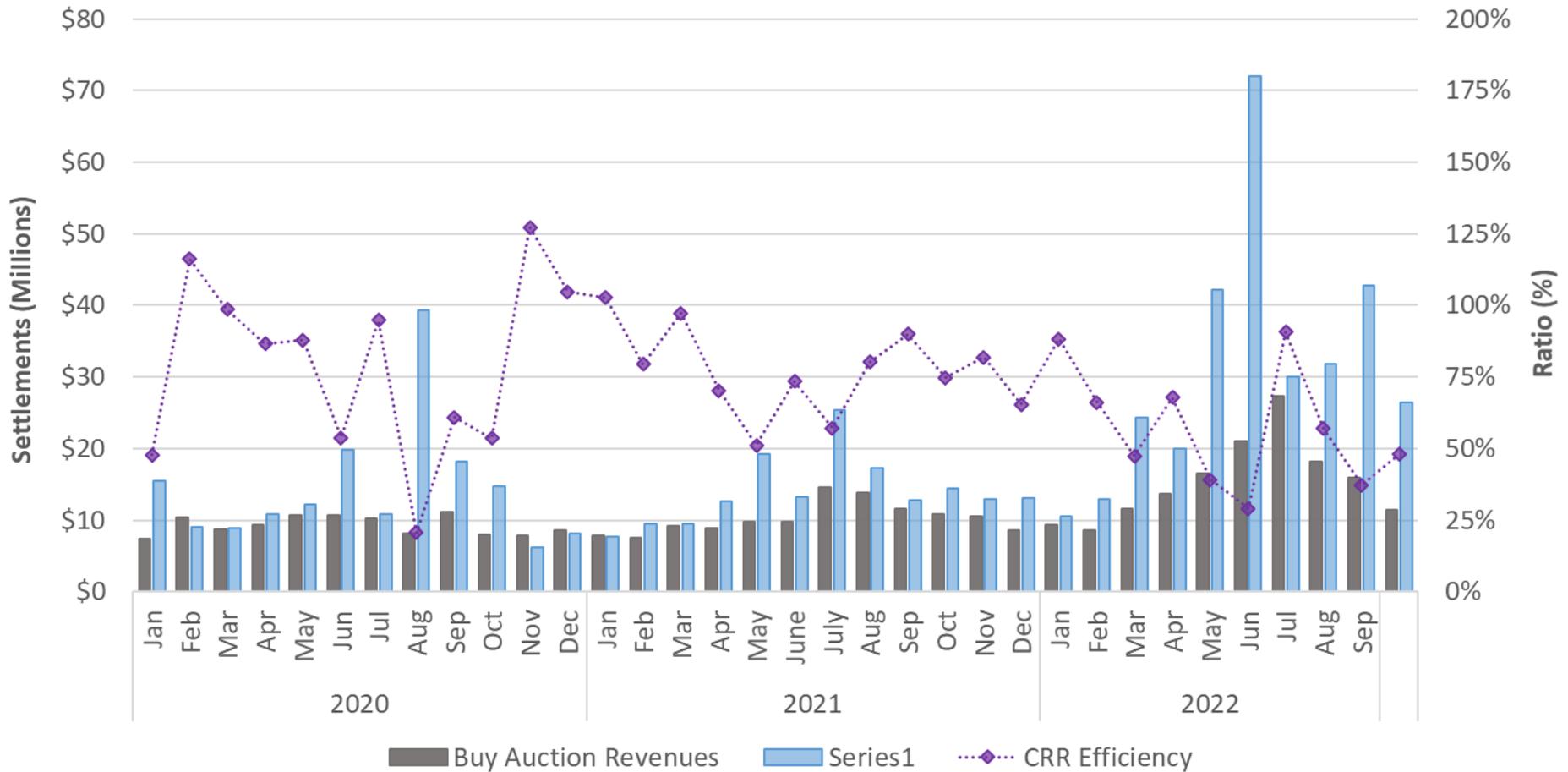
The magnitude of the overall CRR settlements has decreased after summer



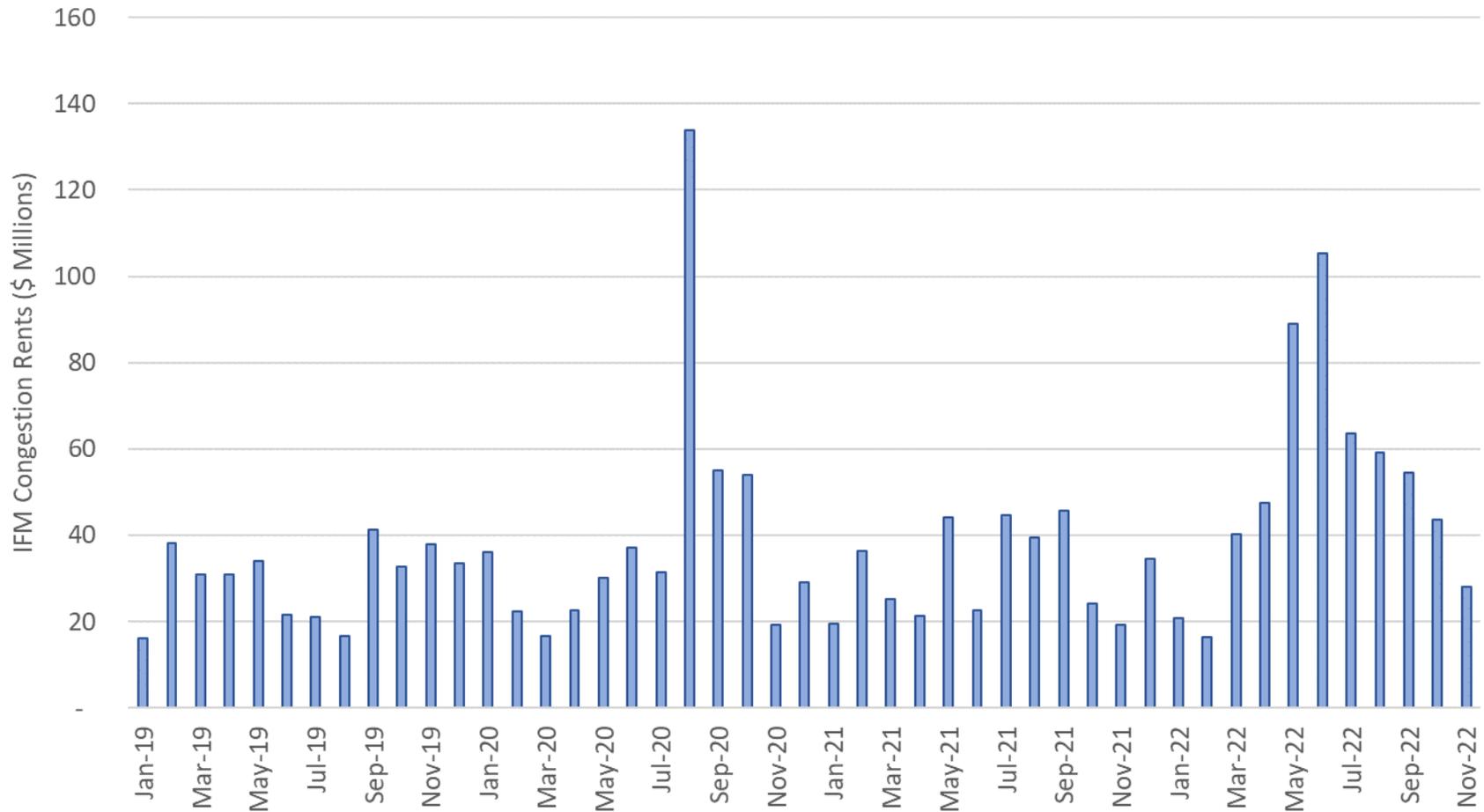
Implementation of pro-rata funding continues to improve revenue adequacy in 2022



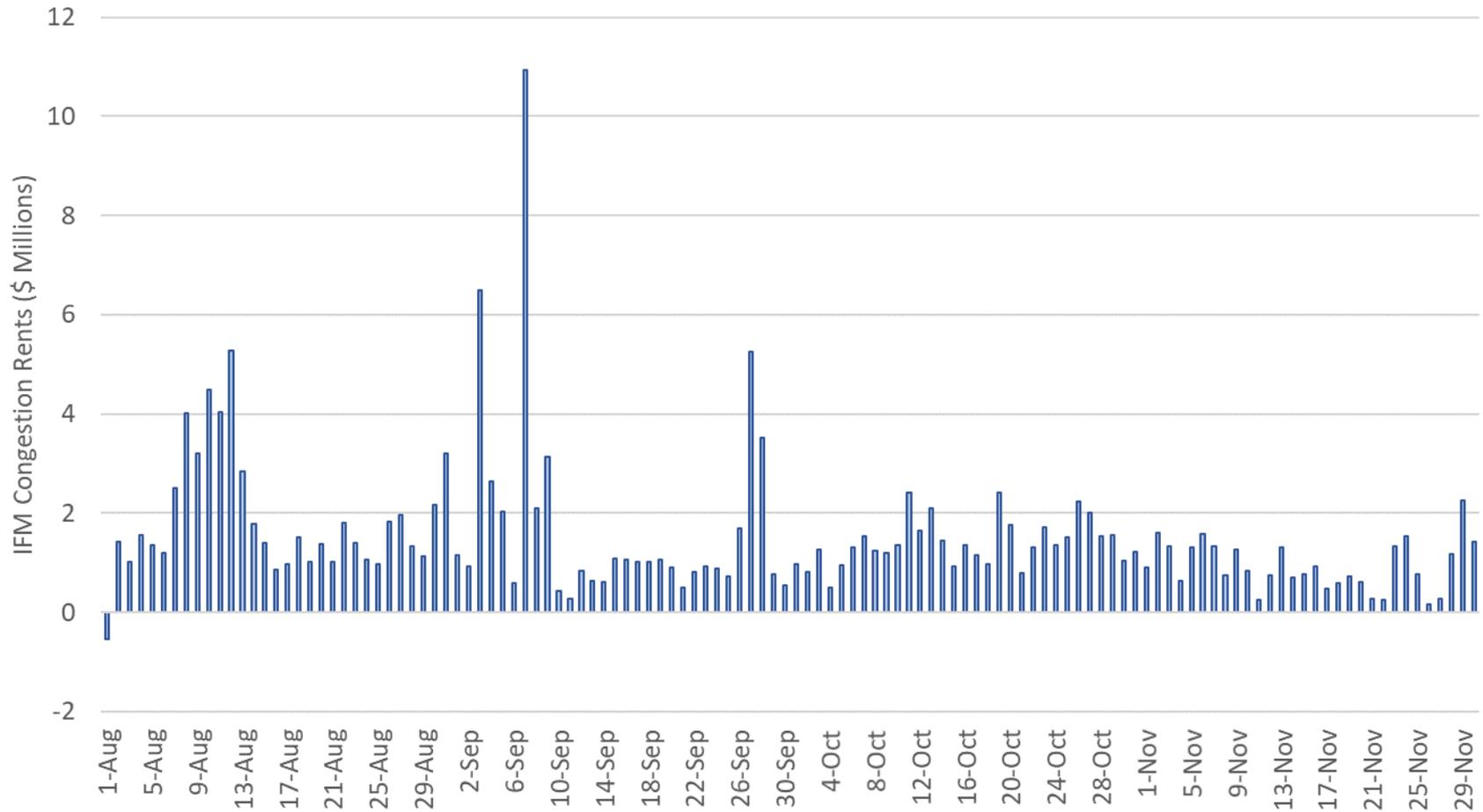
Auction efficiency remain low as congestion levels remained high in October due to scheduled outages



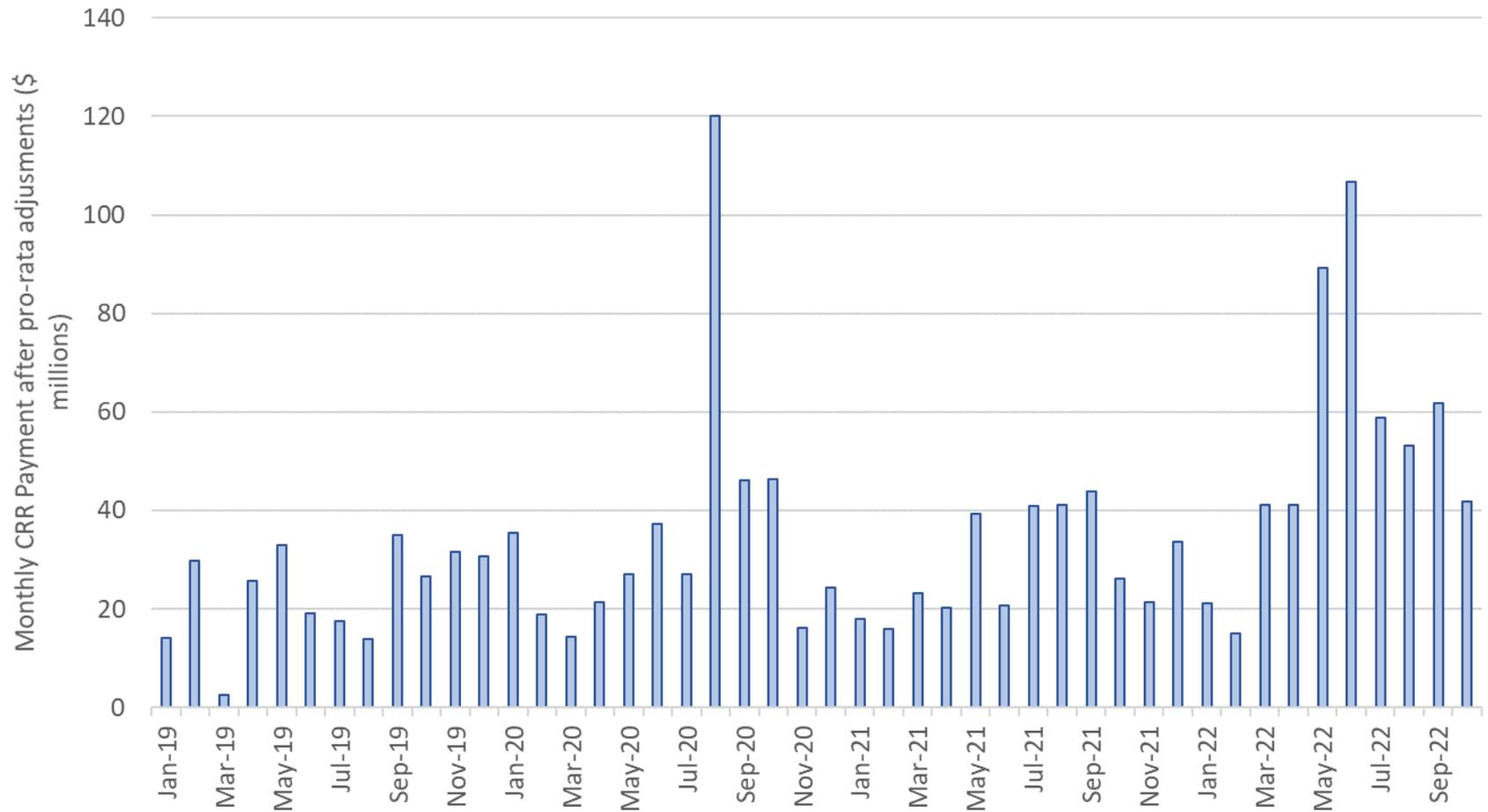
IFM Congestion Rents by Month since January 2019 – rents accrued during the summer months has been high



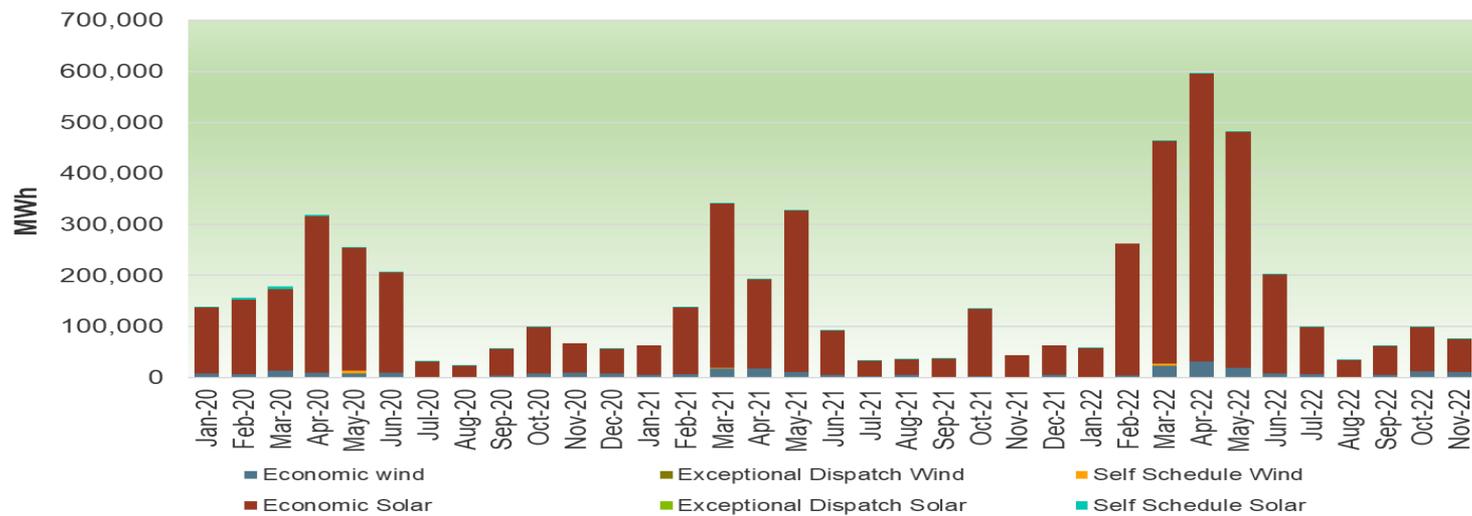
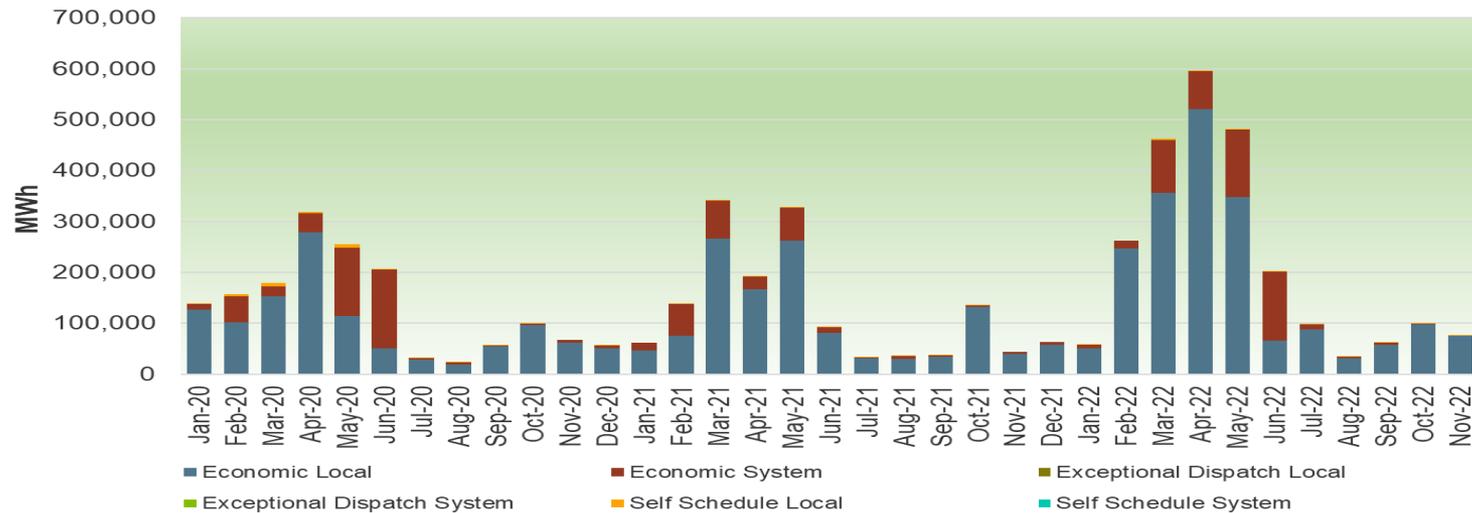
IFM congestion rents since may 2022 have increased



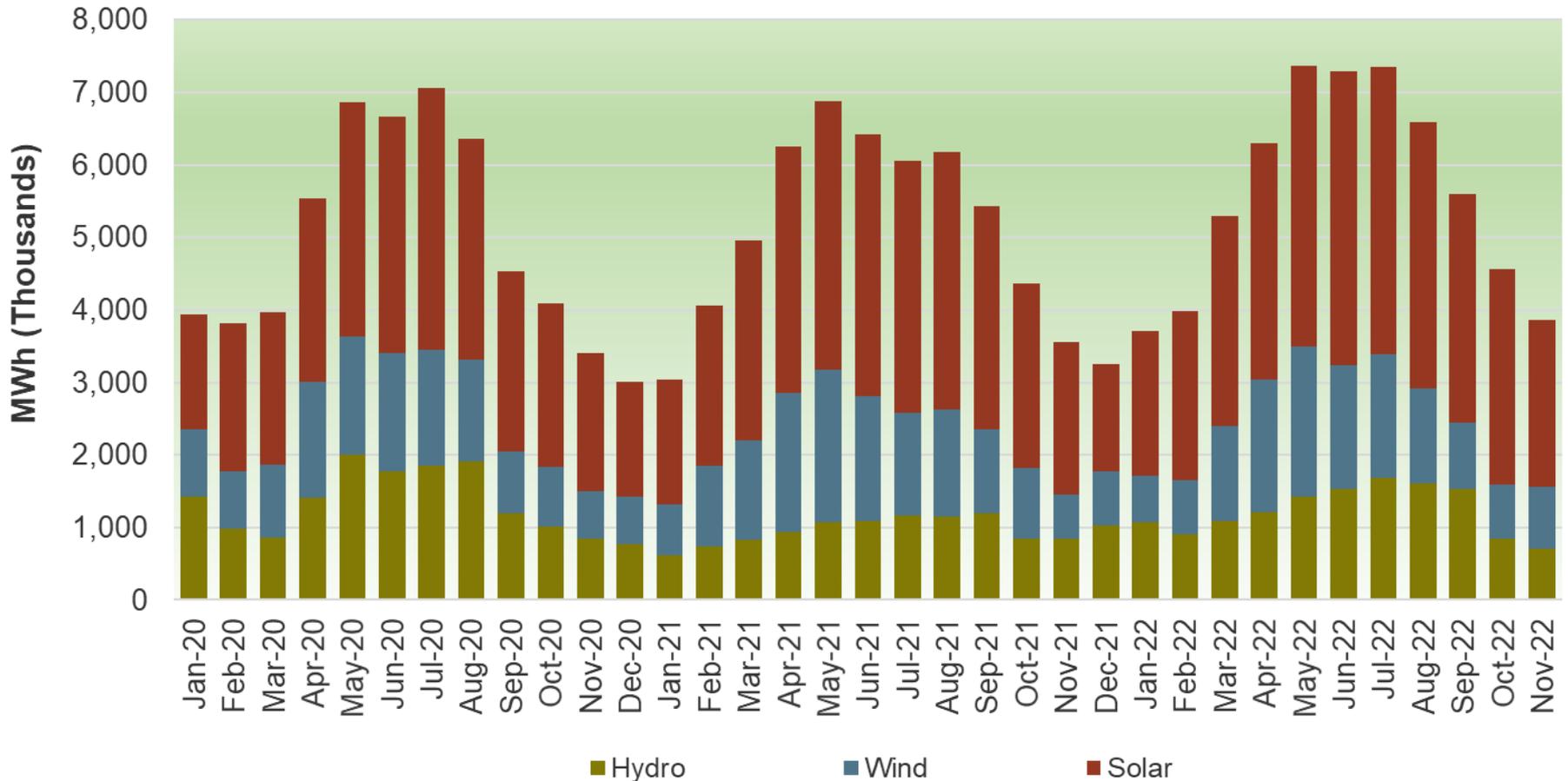
Monthly CRR payment after pro-rata adjustment – saw an increase during the summer months



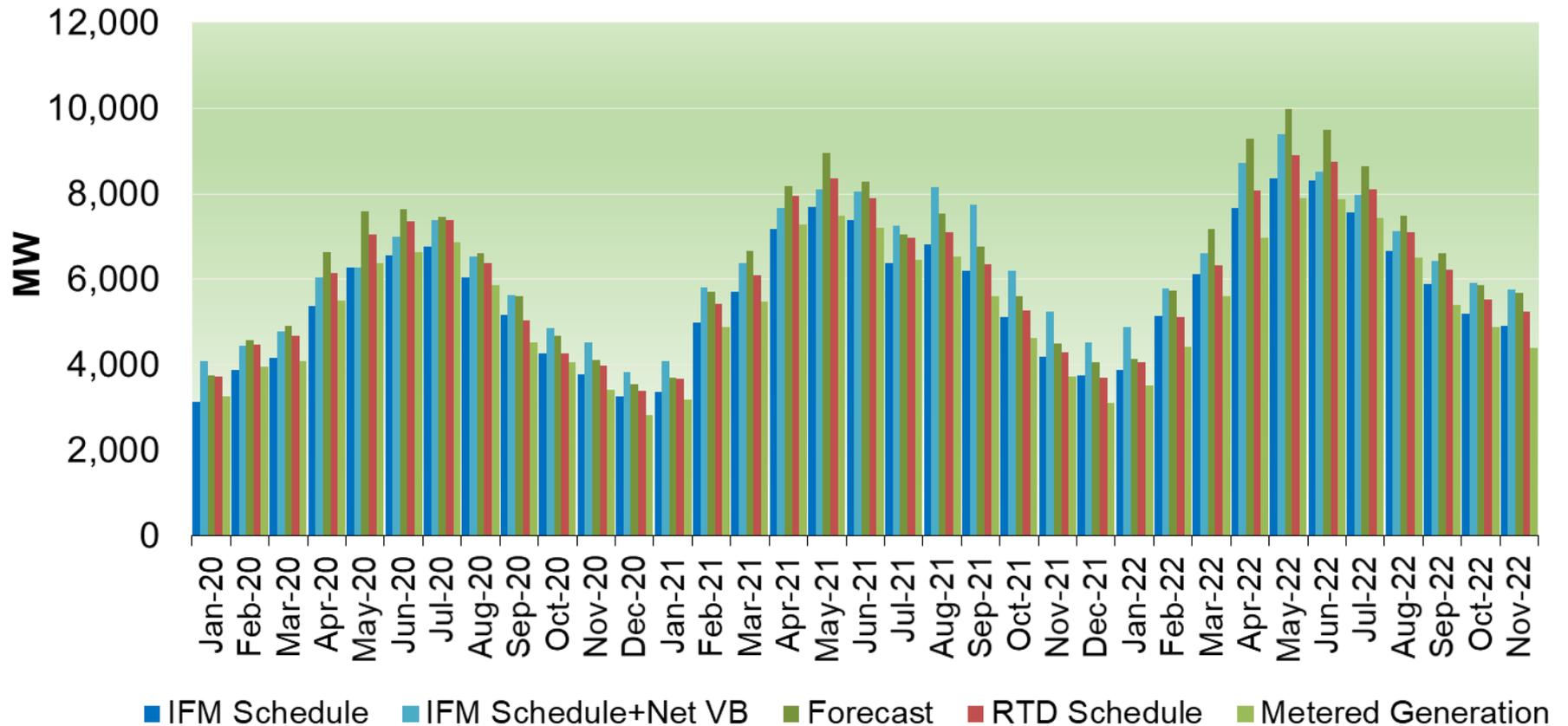
RTD renewable (VERs) curtailment at low levels



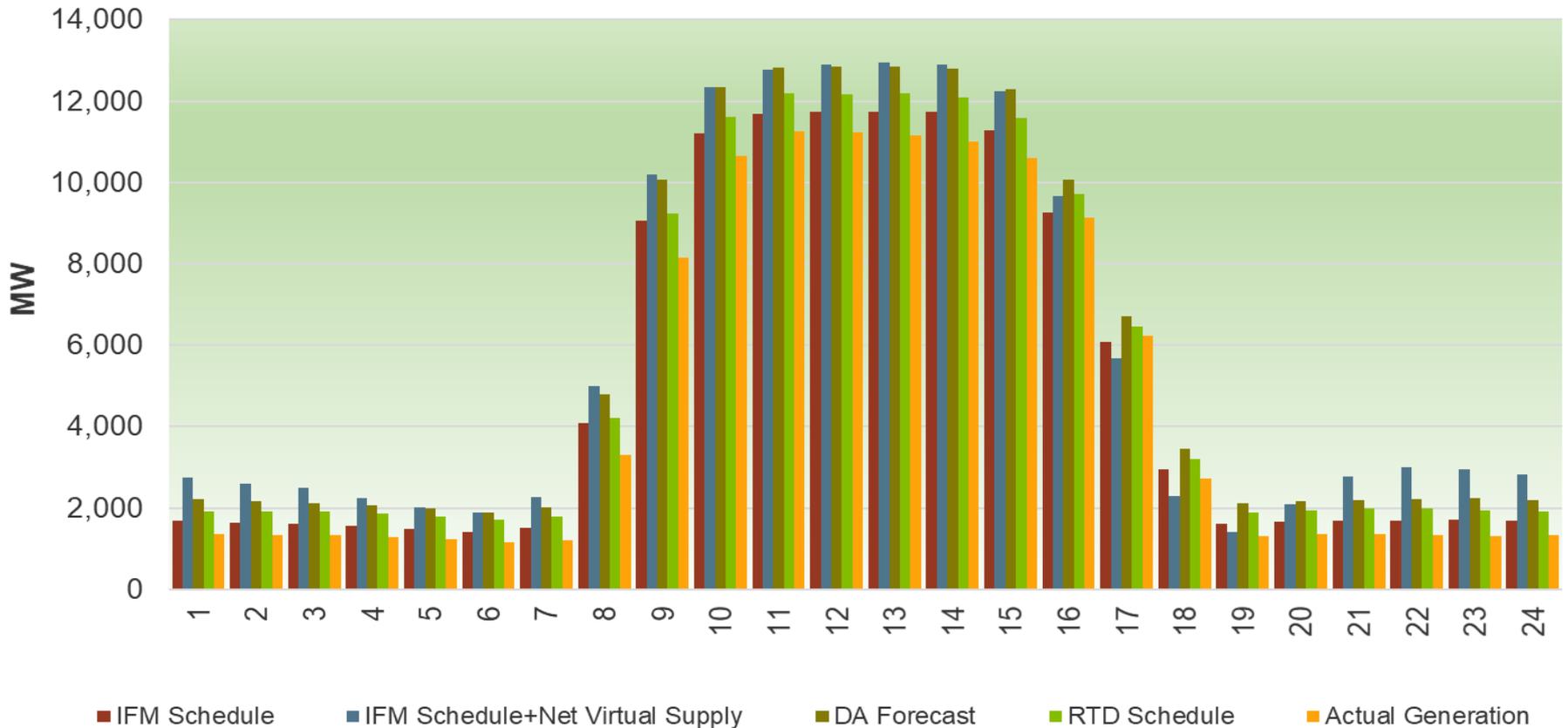
Hydro production relatively low, similar to previous year



ISO total monthly VERS schedules and forecasts compared to actuals

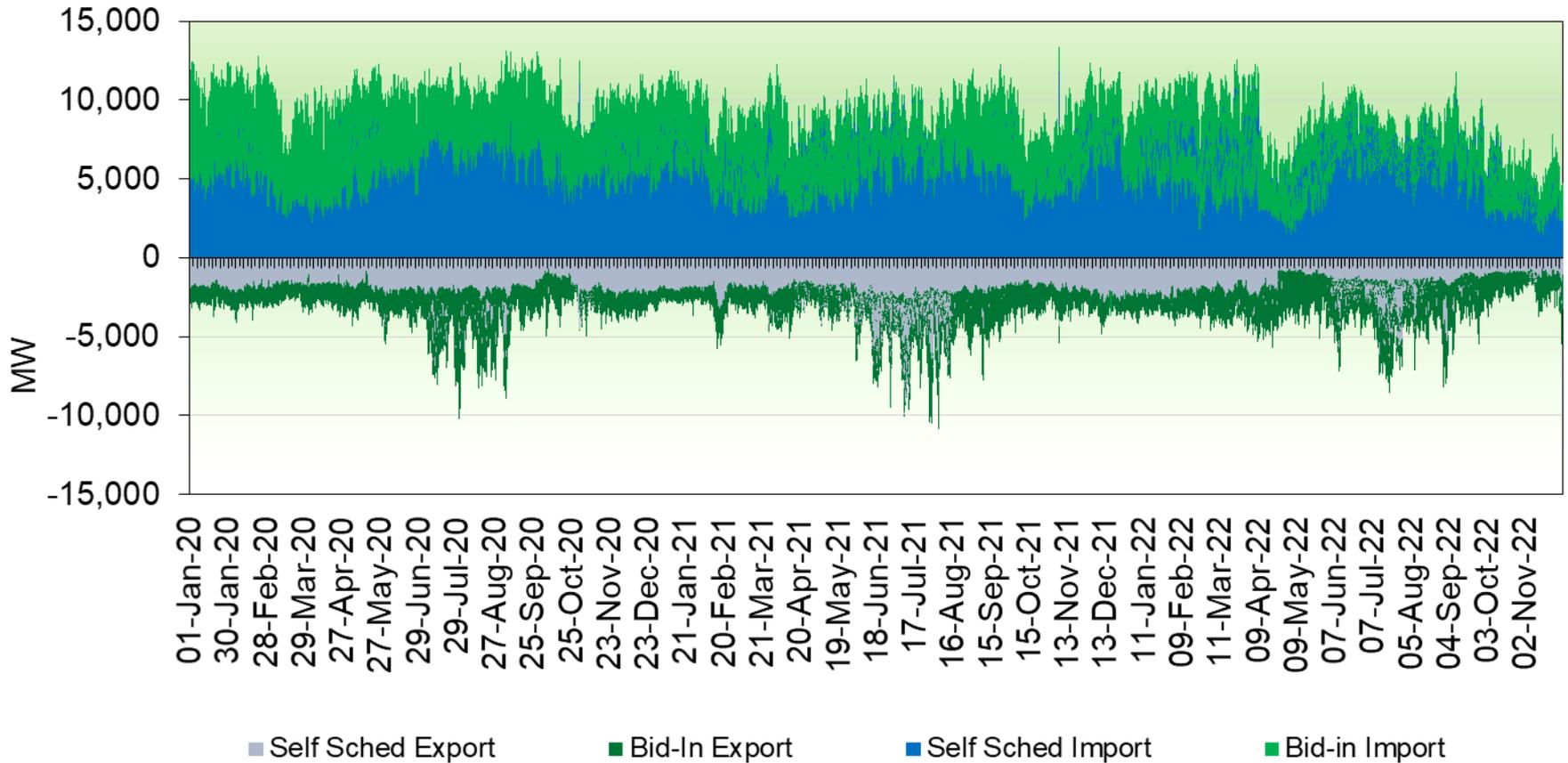


Renewable (VERS) schedules including net virtual supply aligns with VER forecast in October and November

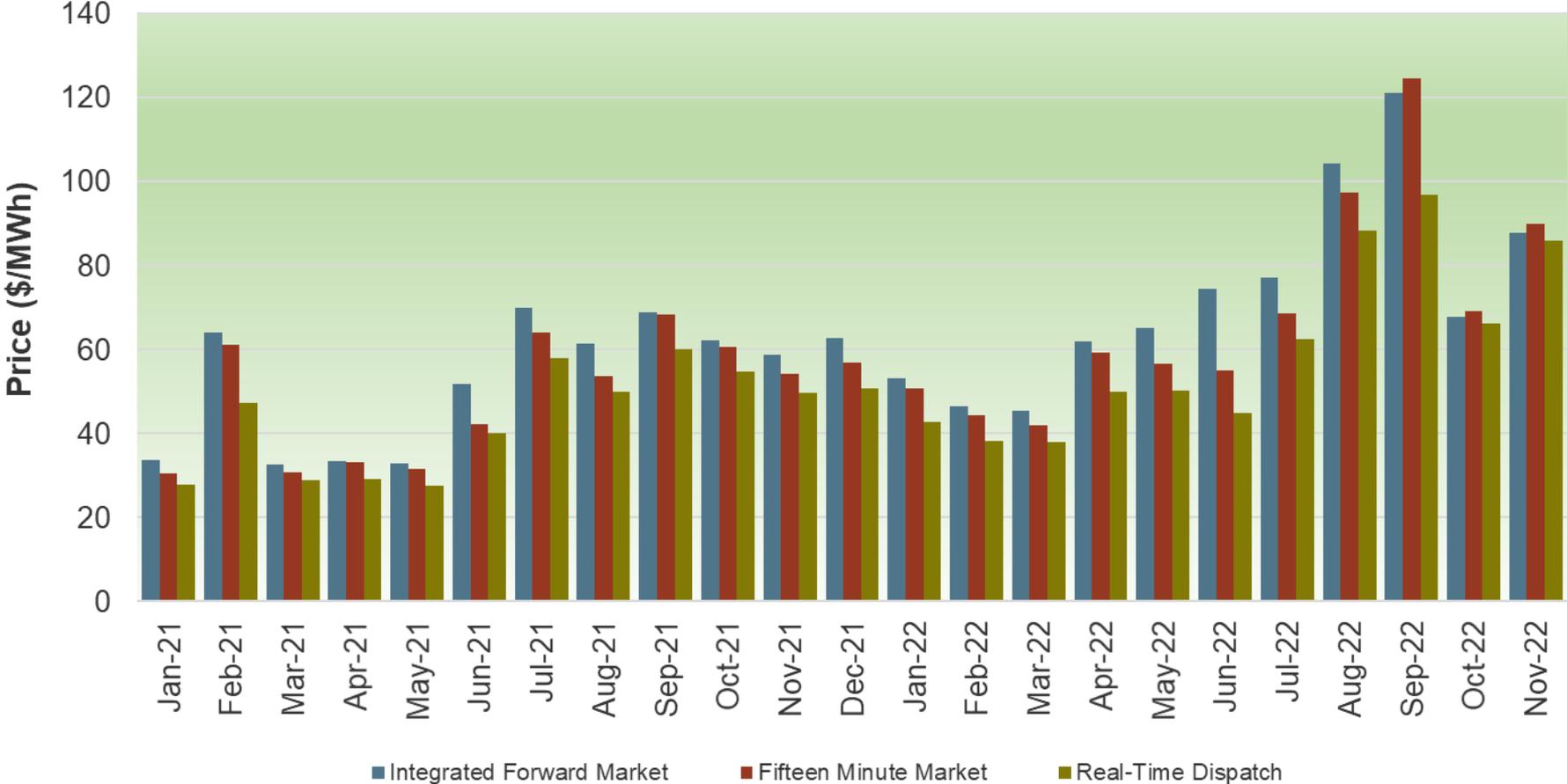


<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=EFF75C2E-F28E-4087-B88B-8DFFAED828F8>

Self scheduled exports trended downward since September

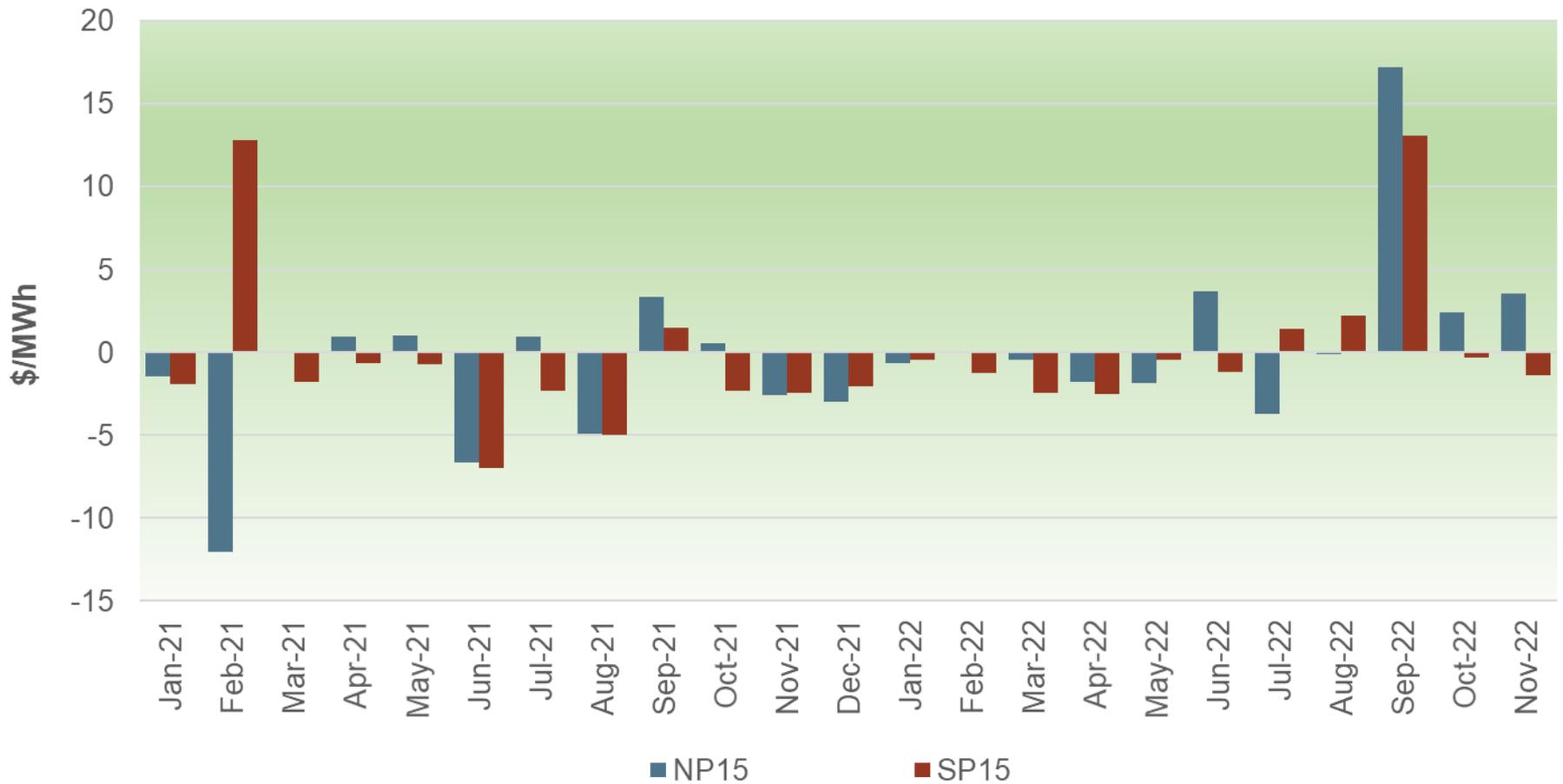


High prices in September due to heat wave

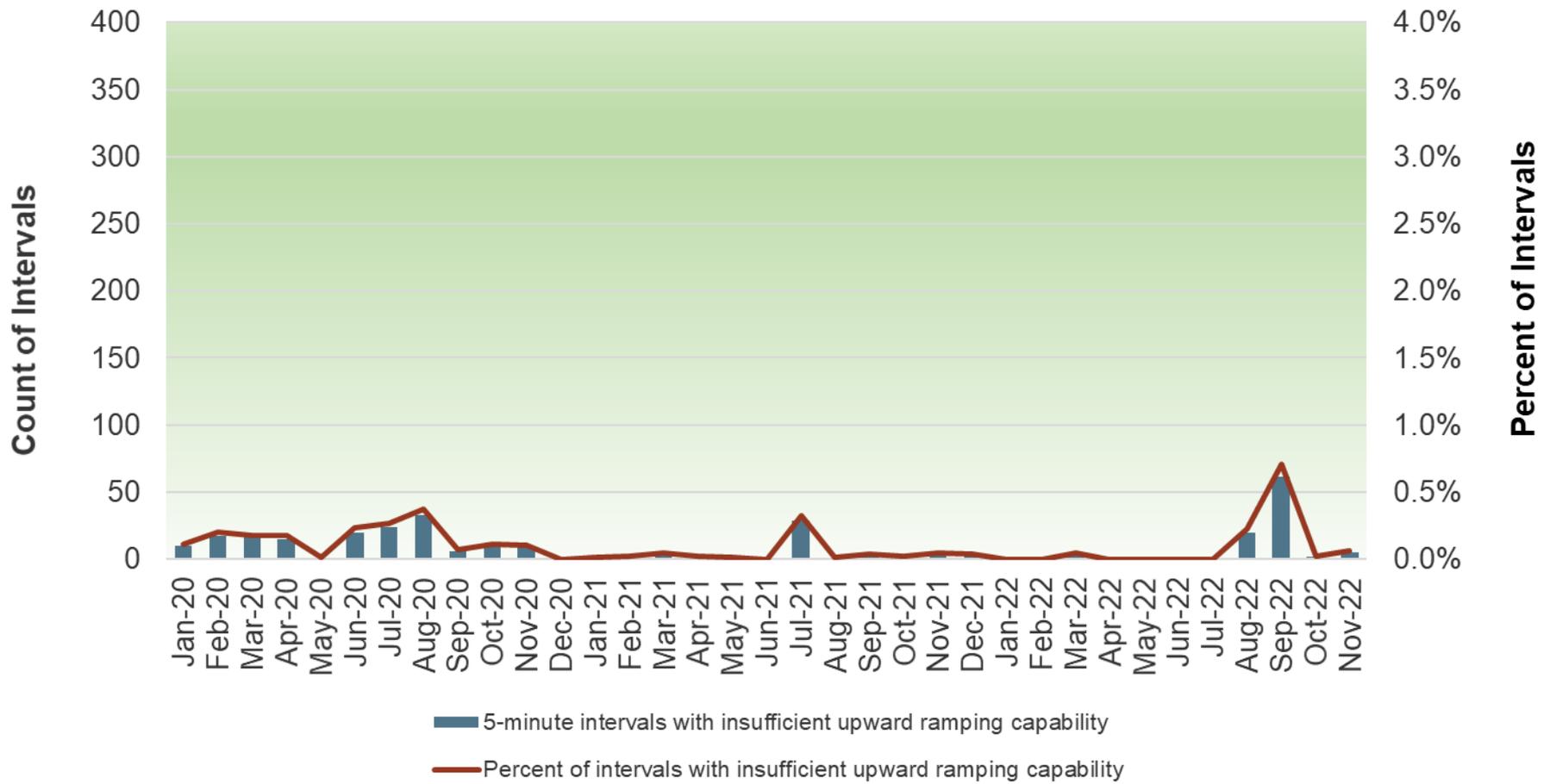


Note: Metric Based on System Marginal Energy Component (SMEC)

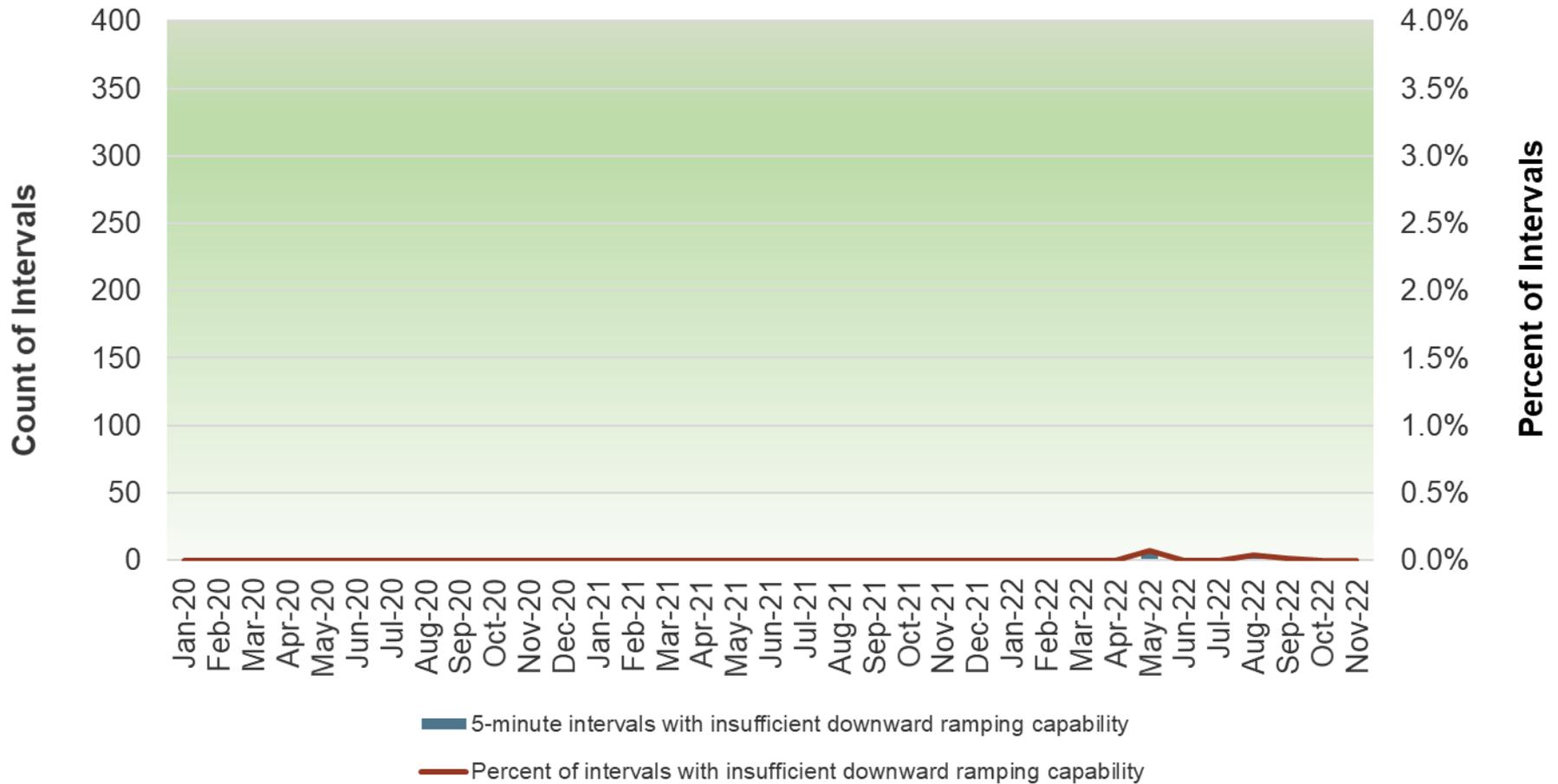
Real-time prices higher than day-ahead prices for both NP15 and SP15 in September



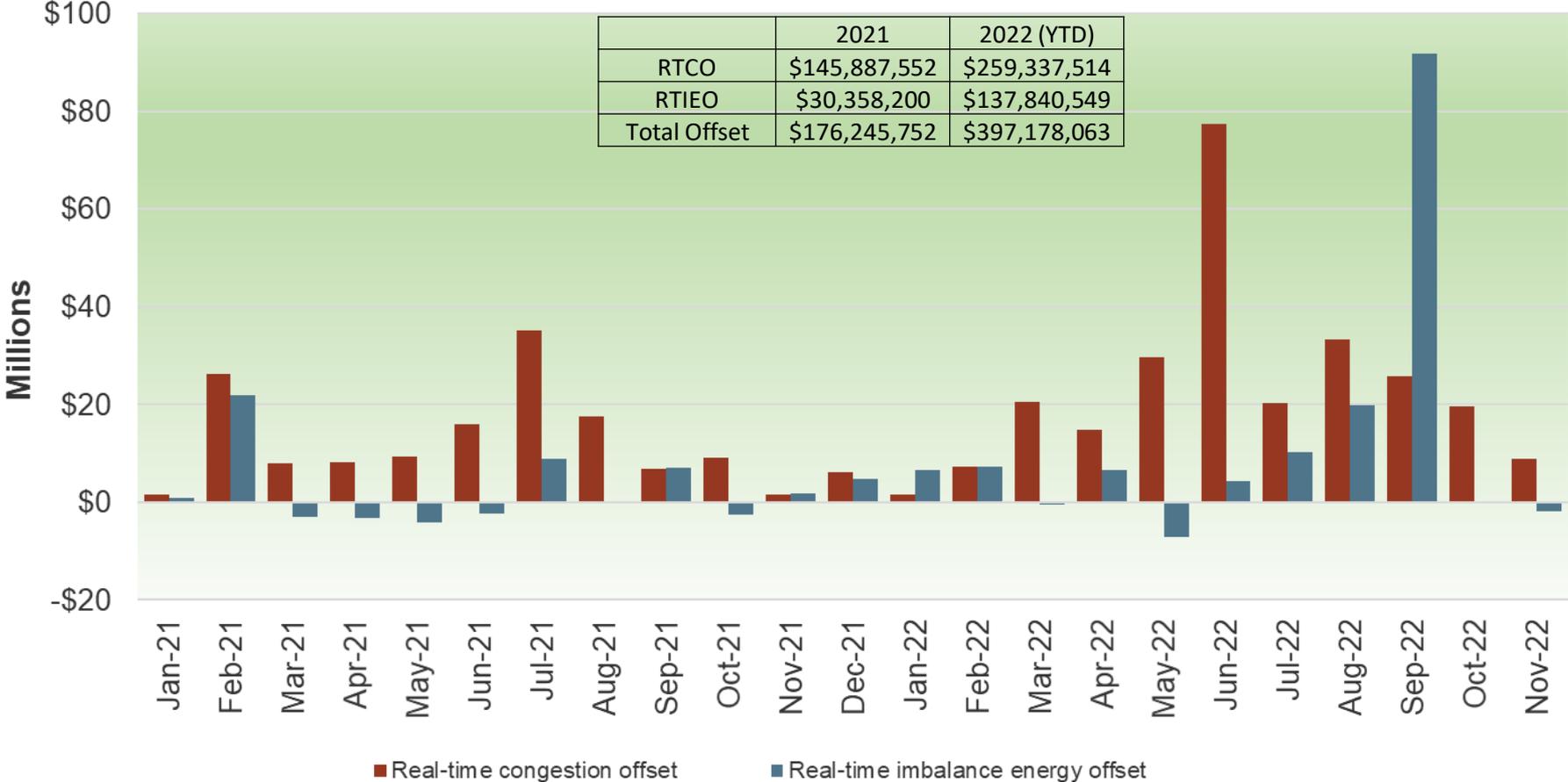
Insufficient upward ramping capacity in ISO real-time increased in September and then fell in October and November



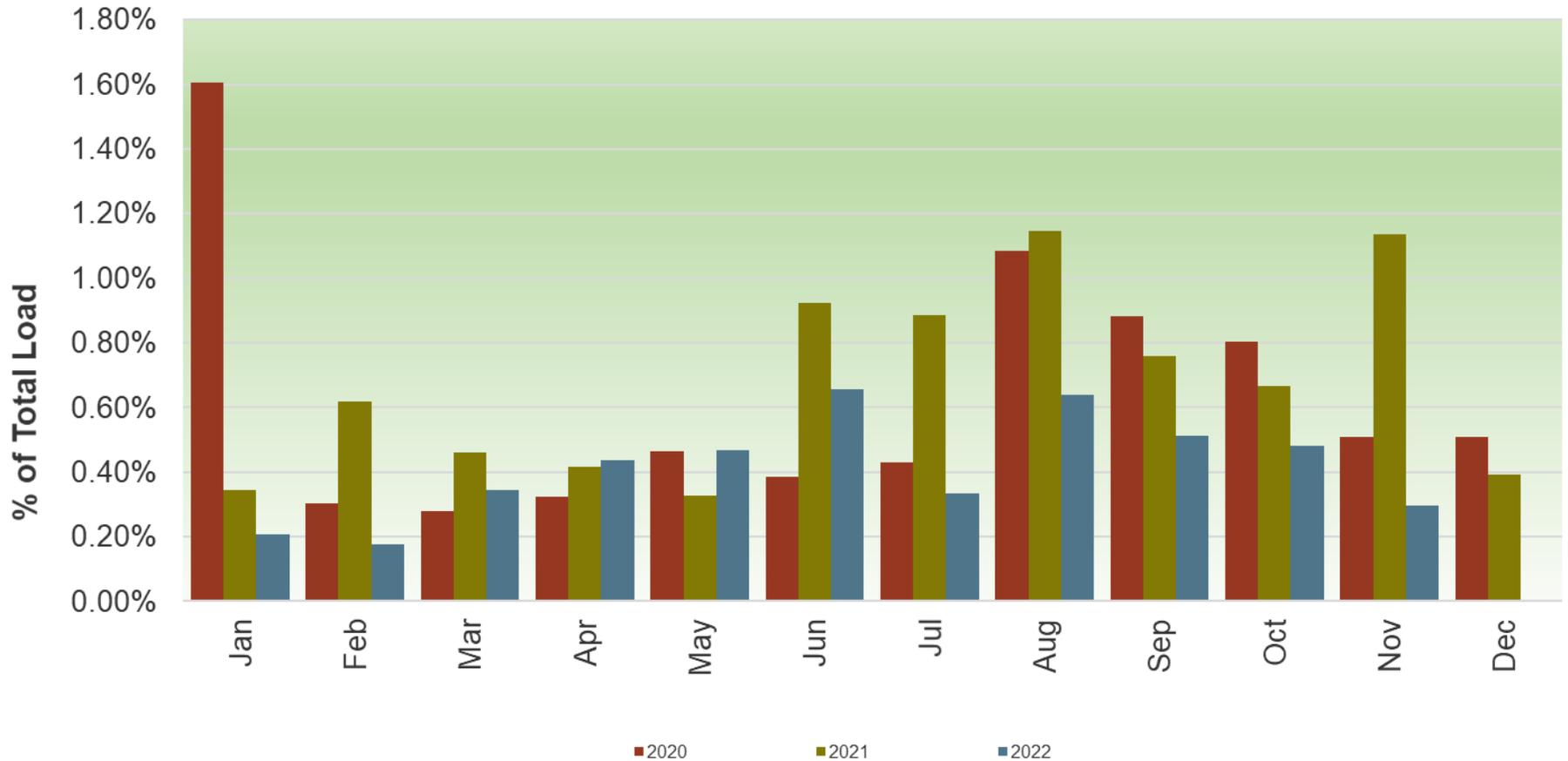
Insufficient downward ramping capacity in real-time stayed low



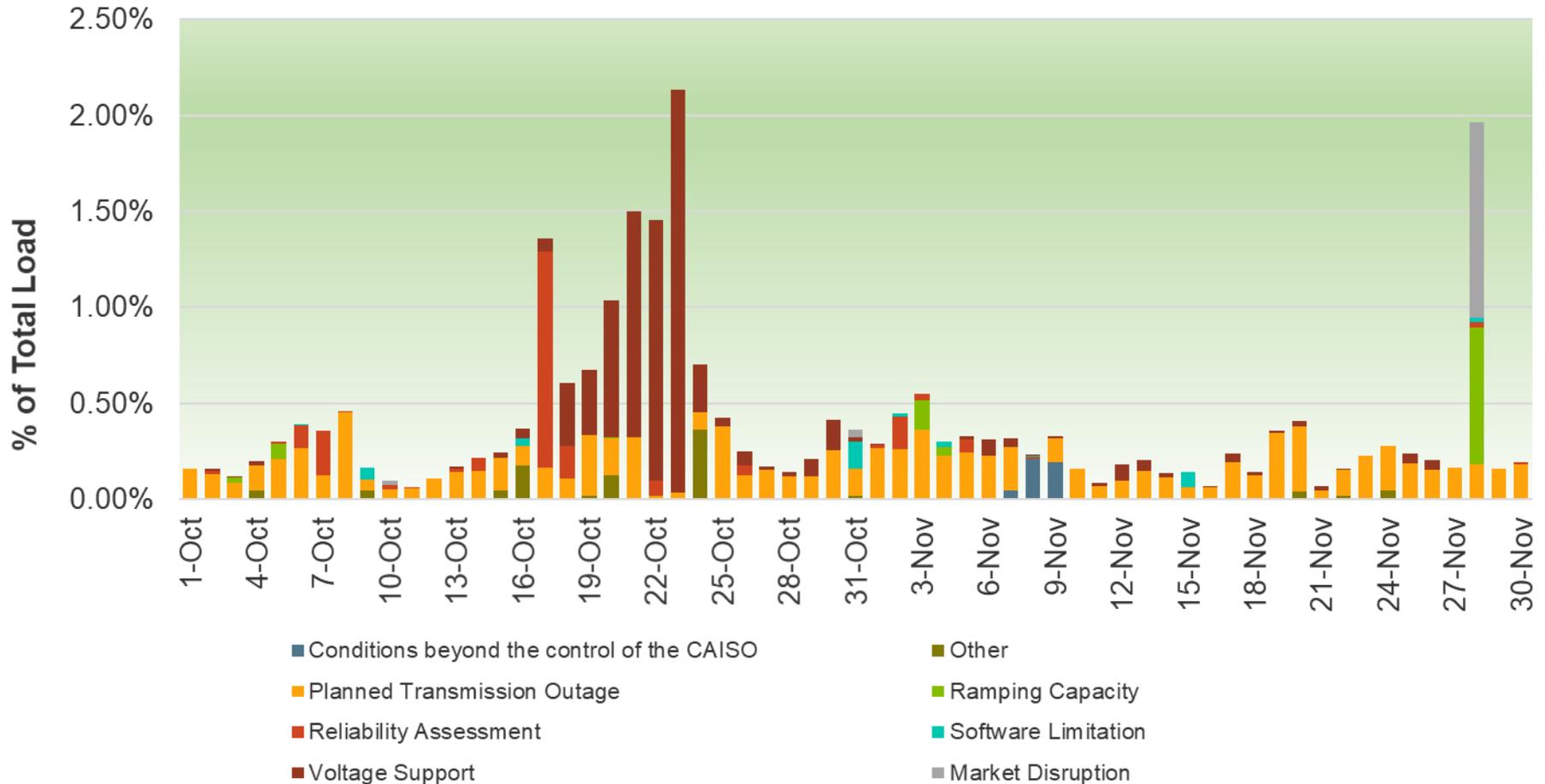
ISO area real-time imbalance offset was high in September following the summer conditions



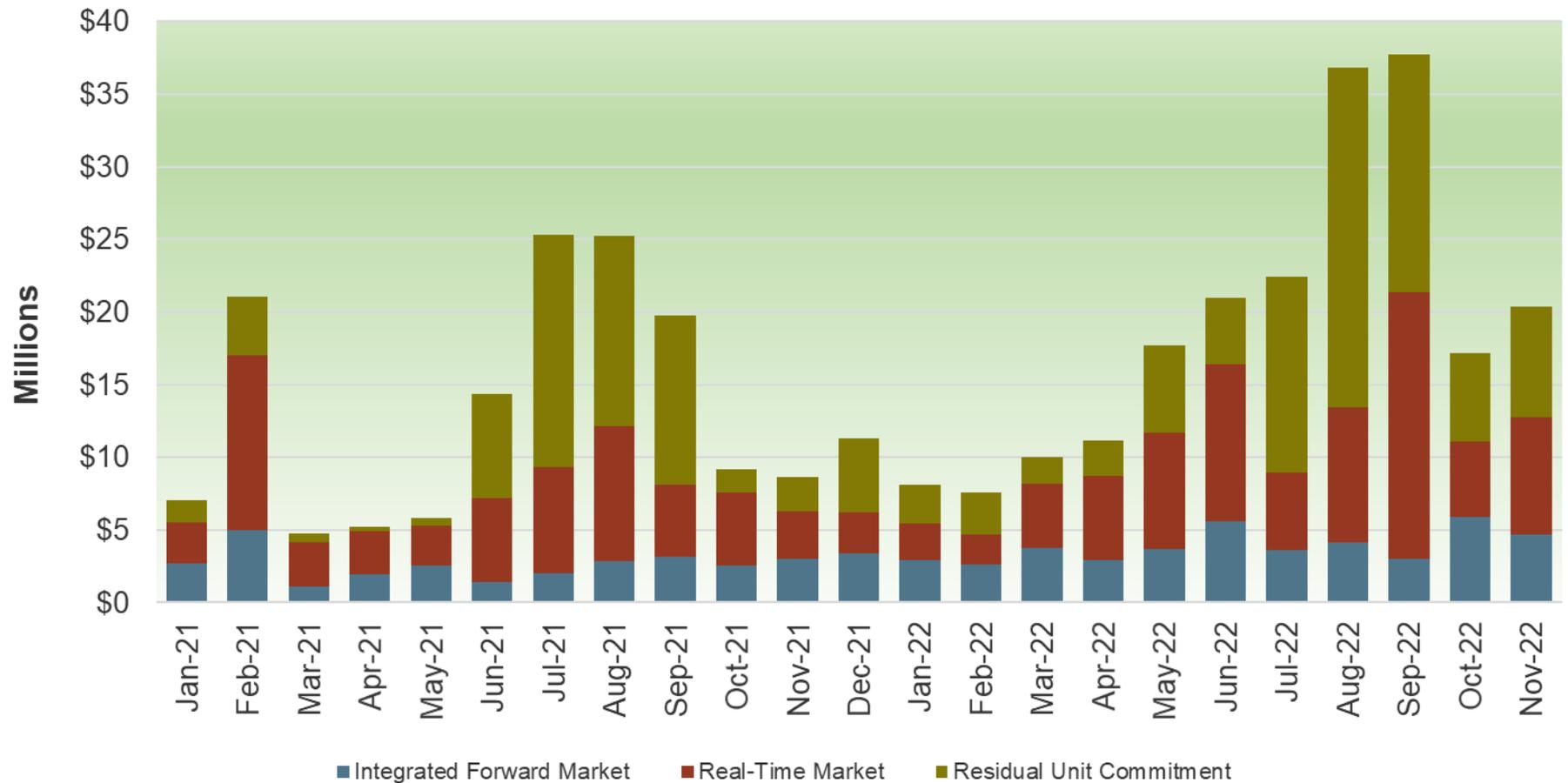
Exceptional dispatch volume in the ISO area are at low levels



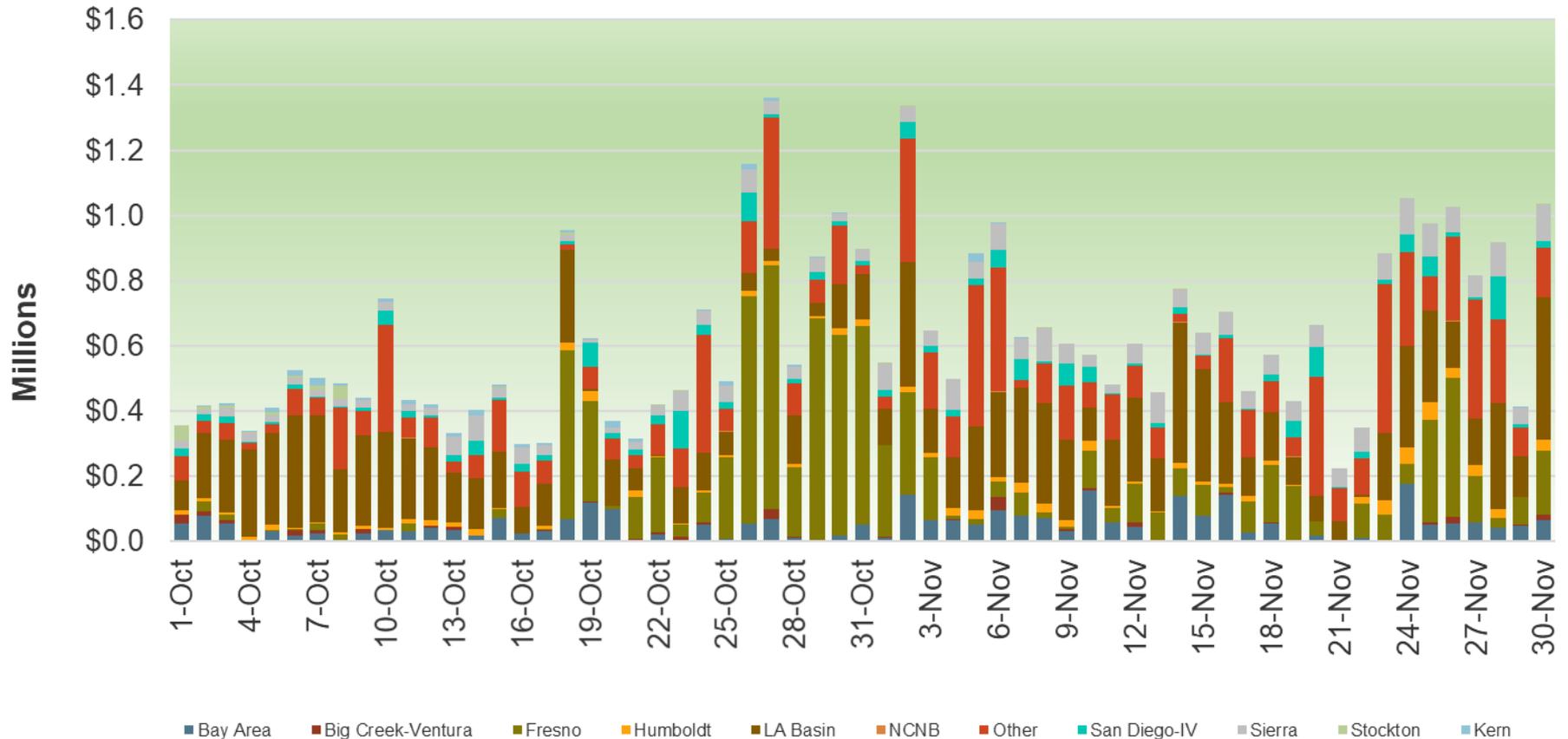
Exceptional dispatches volume driven by a variety of reasons in October and November



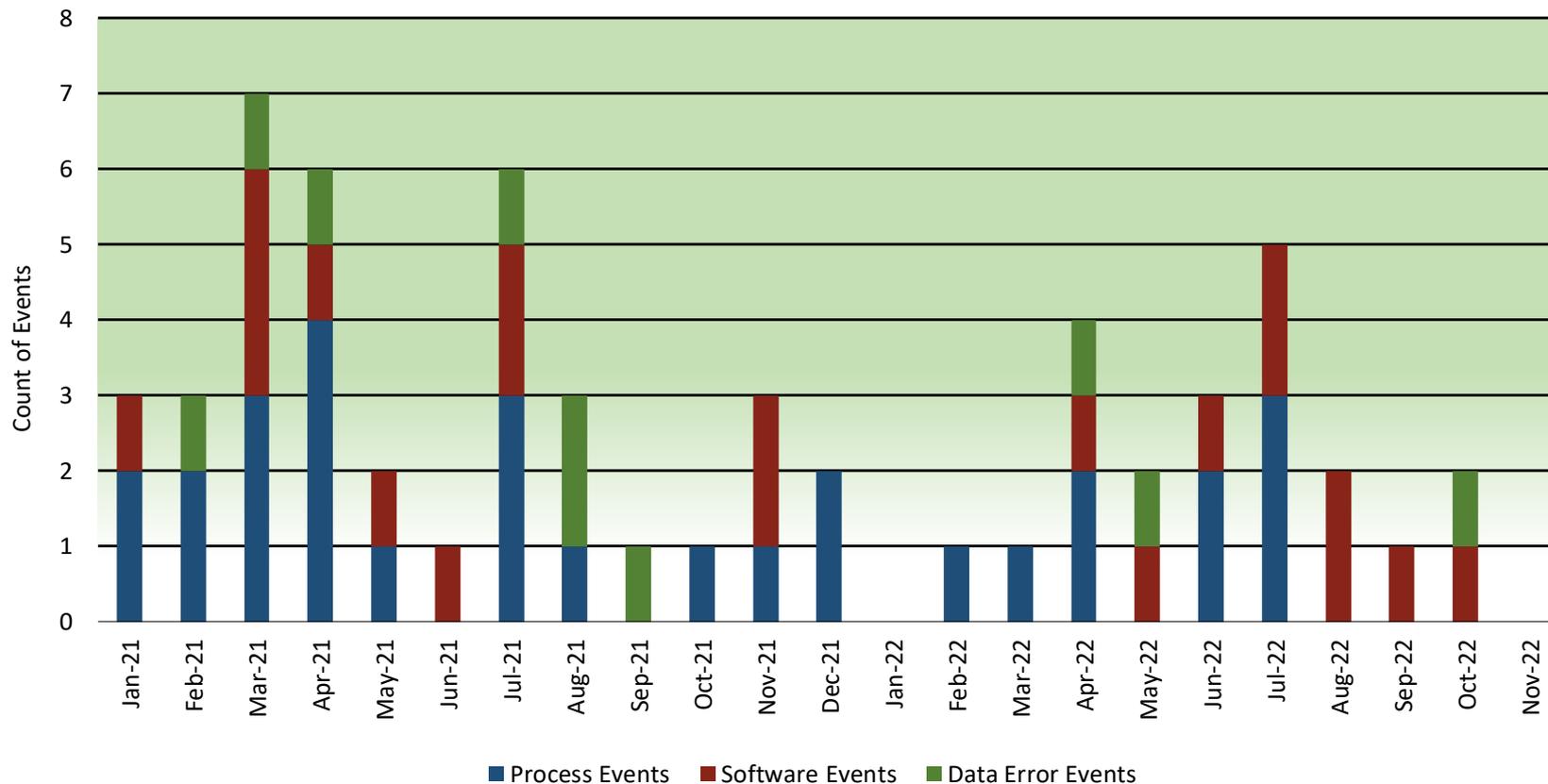
Bid cost recovery was high in August and September



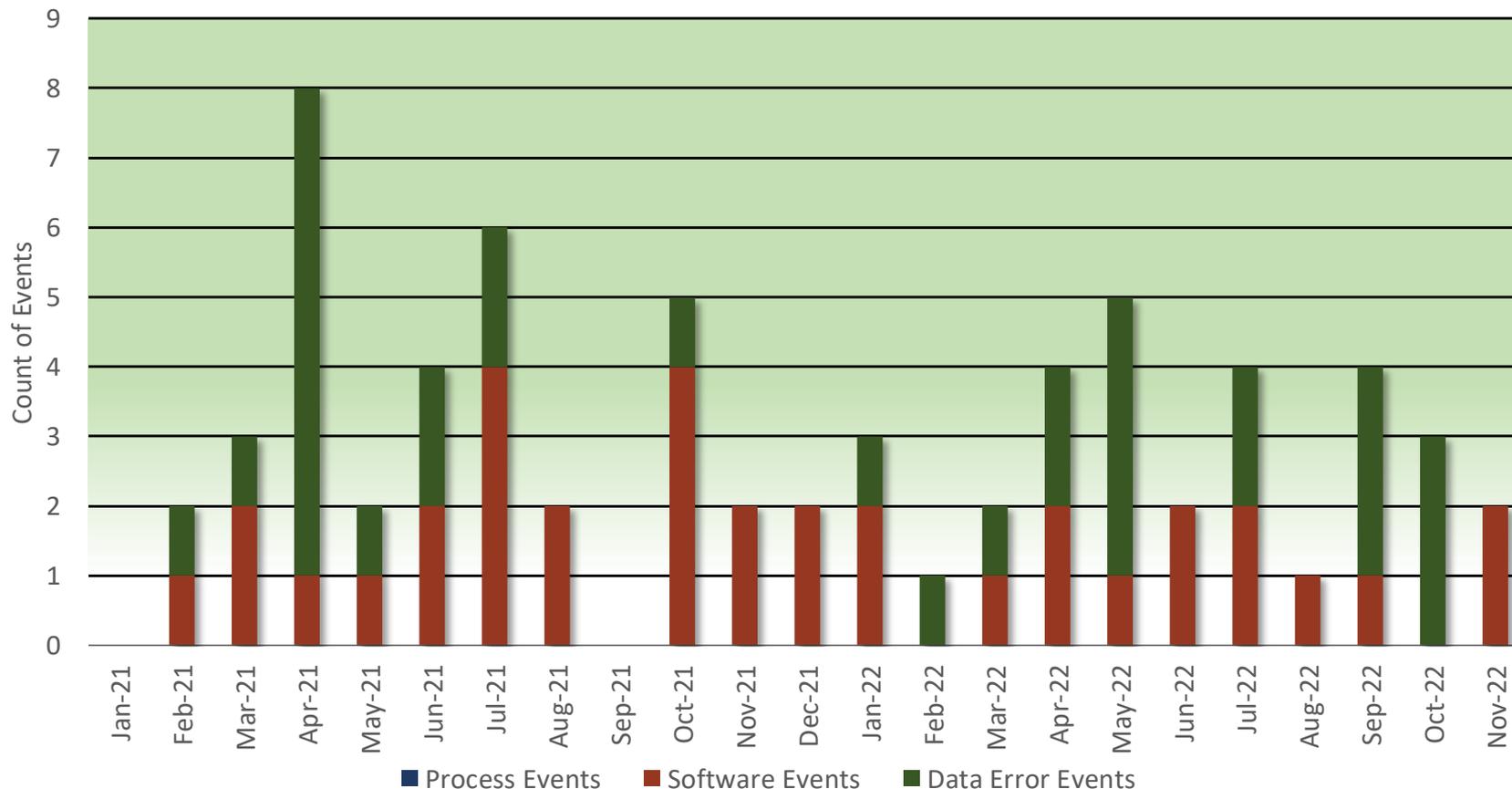
Bid cost recovery (BCR) by Local Capacity Requirement area



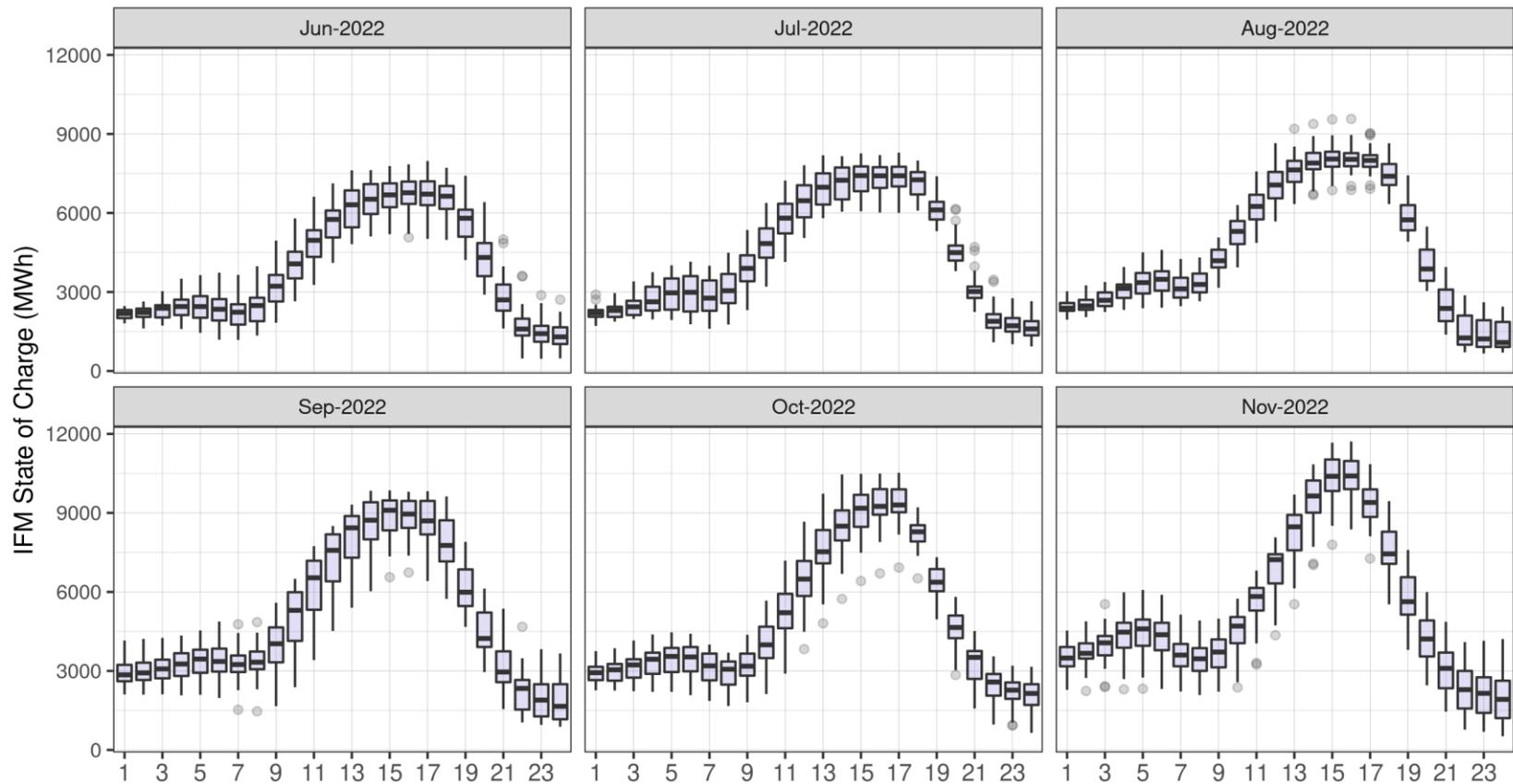
CAISO price correction events decreased in the last quarter



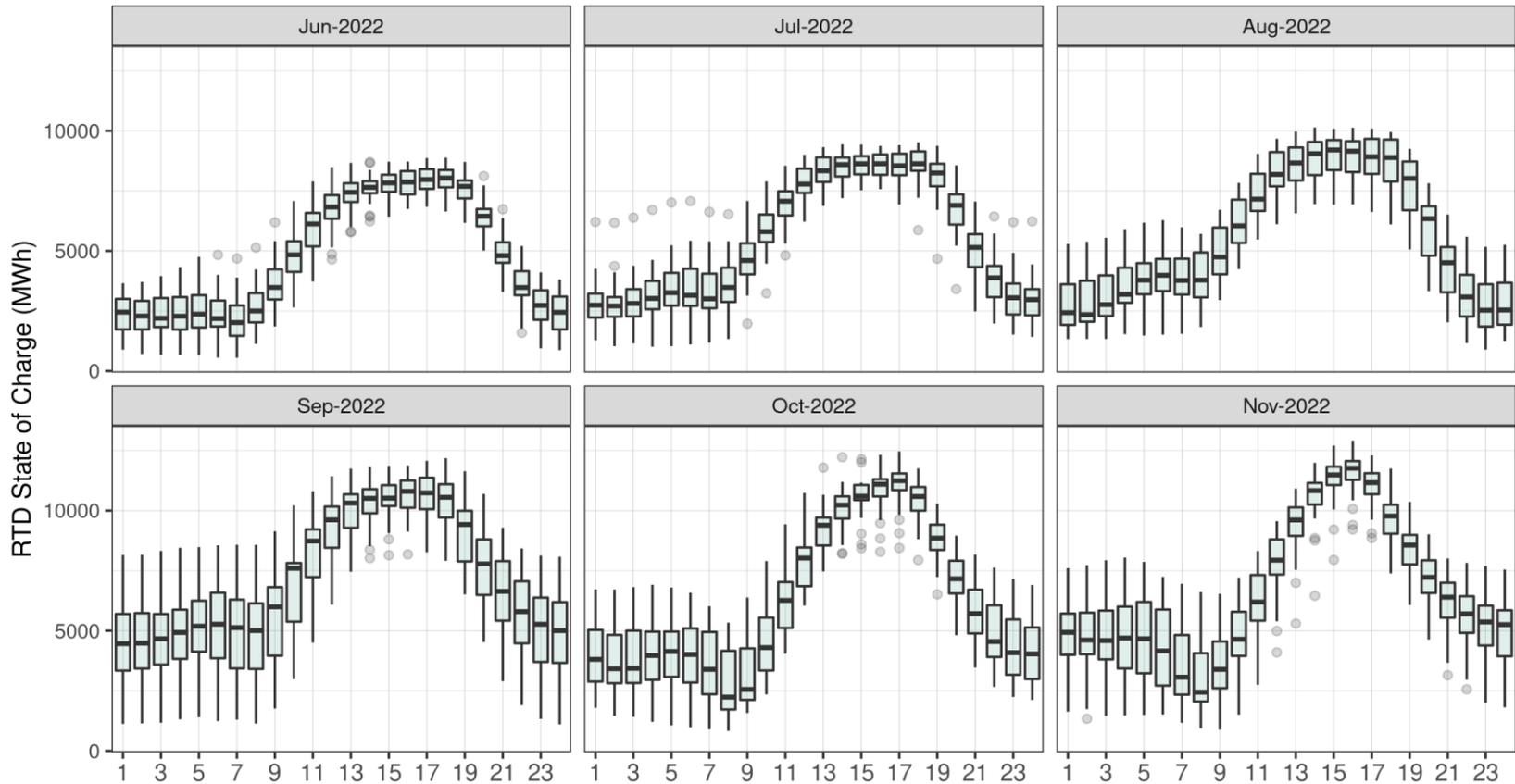
EIM-related price corrections increased in September and October



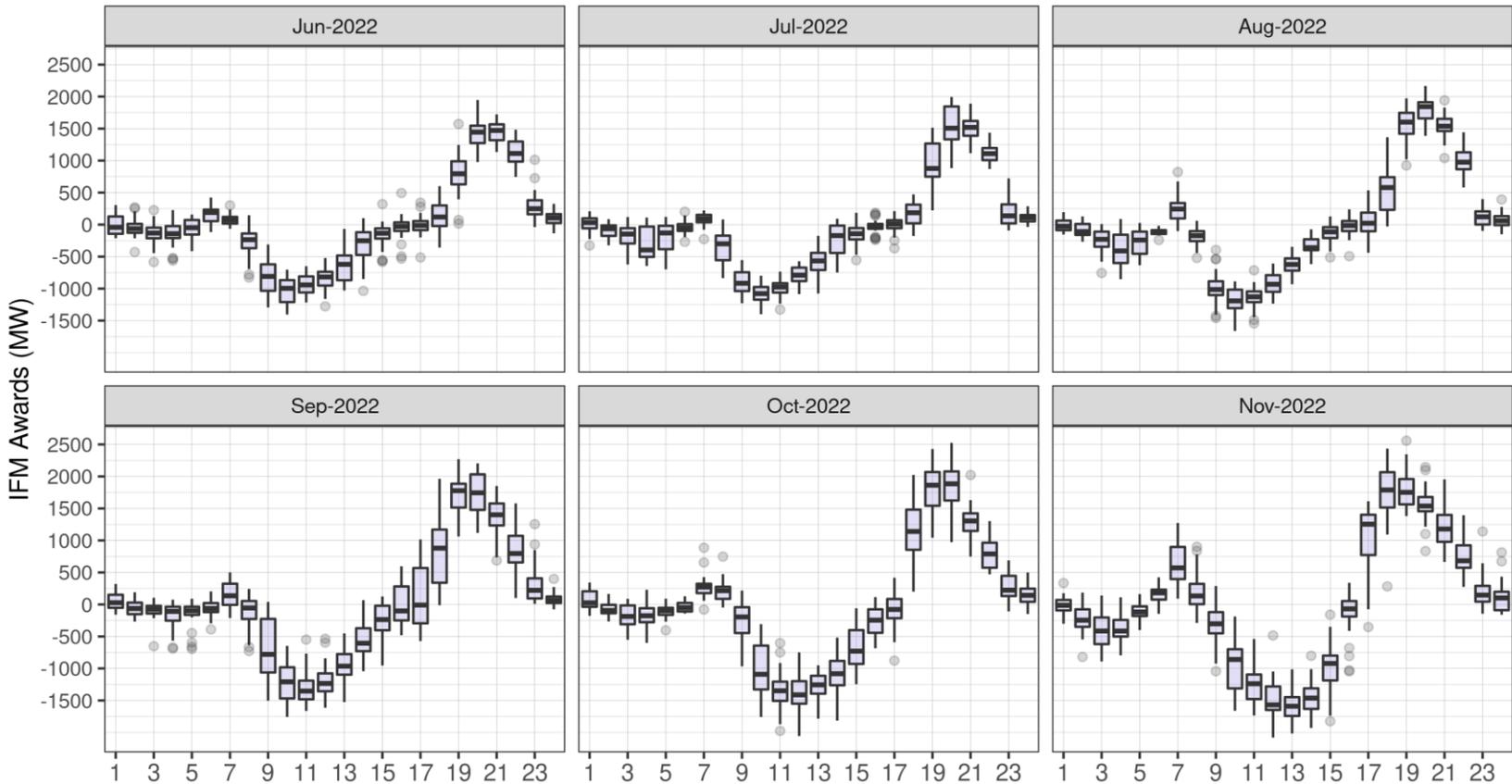
Day-Ahead state of charge for storage resources was the highest in hour ending 14 through 17



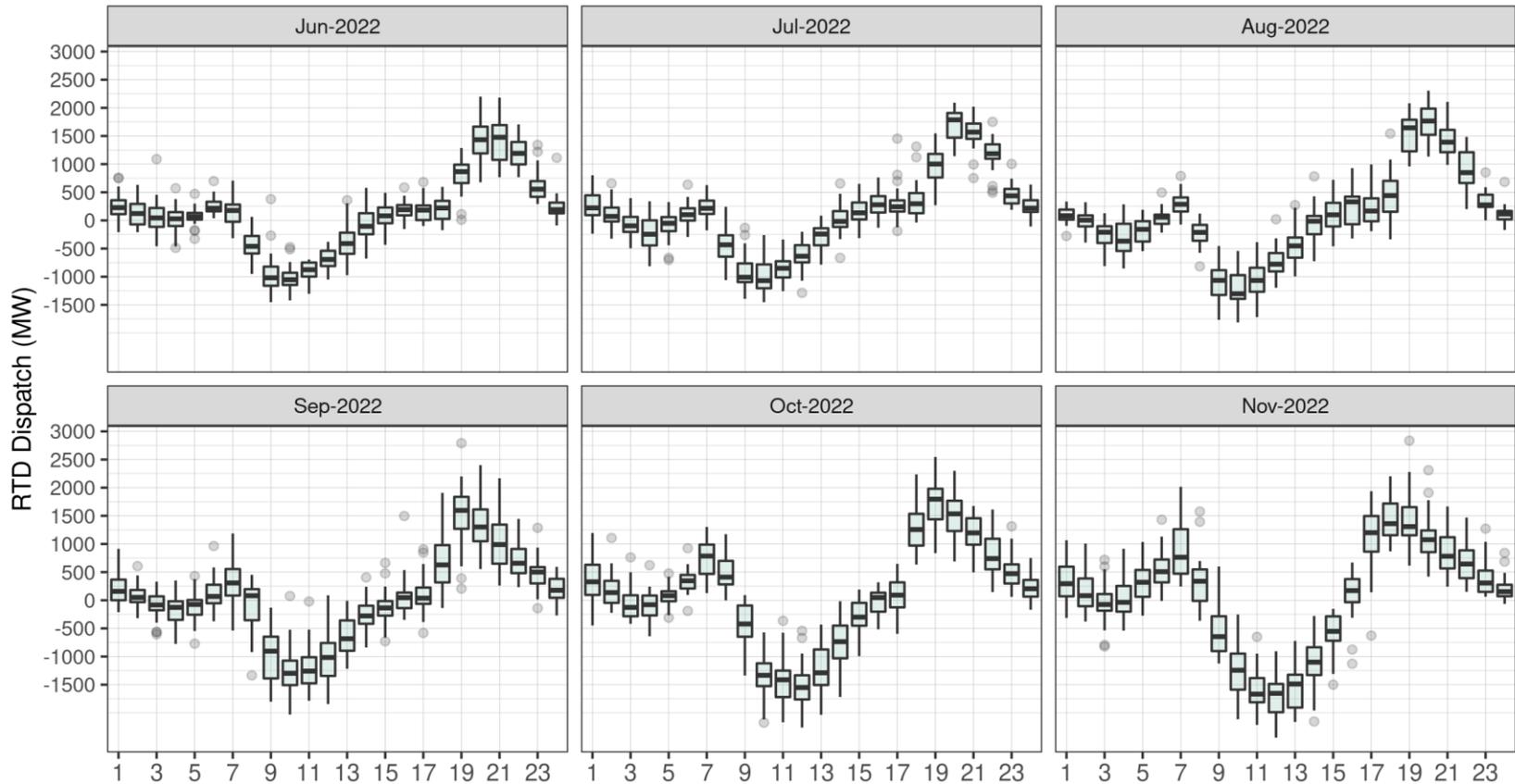
Real-Time State of charge for storage resources was in line with the day-ahead state of charge



Storage resources were consistently charging during solar hours and discharging during net load peaks



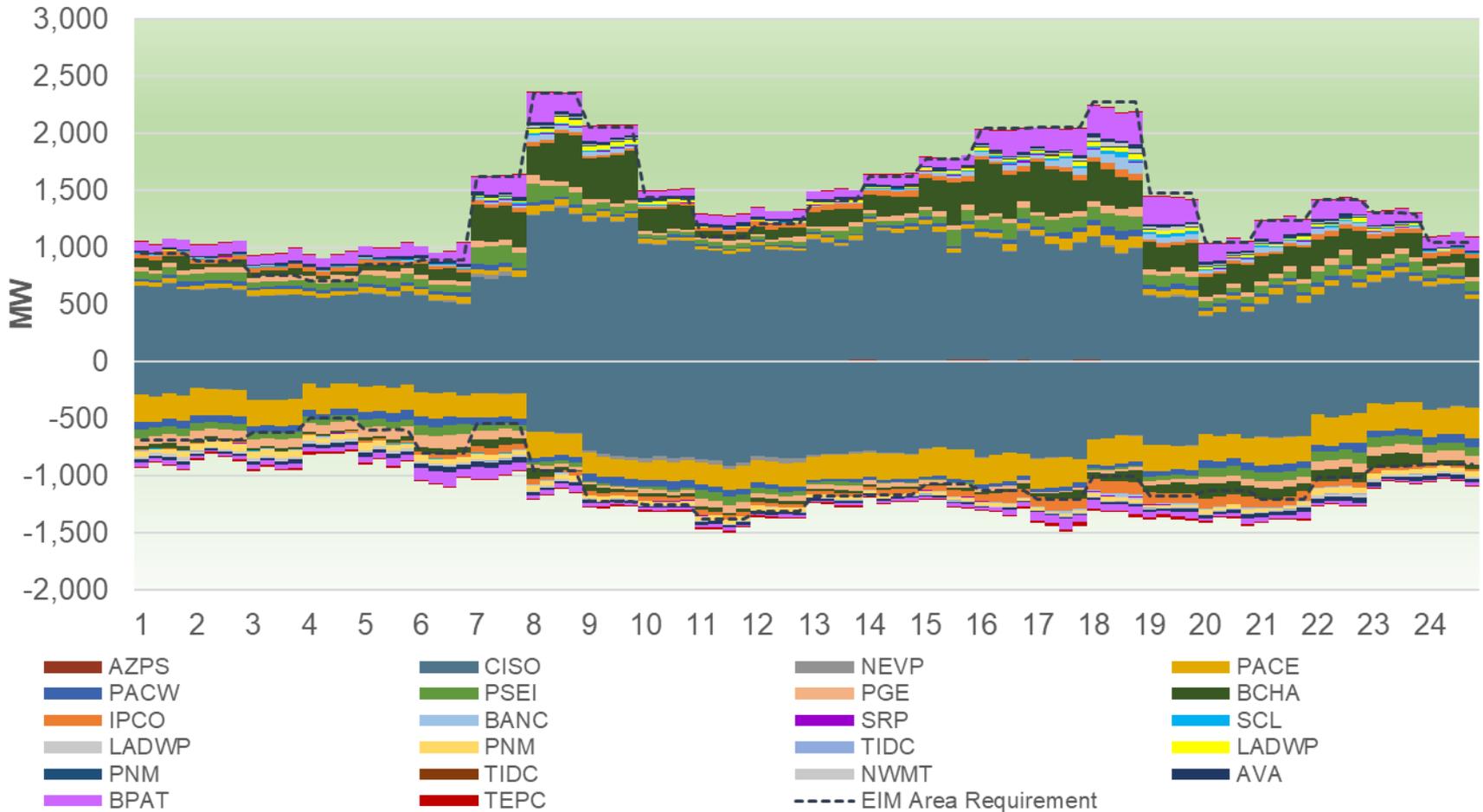
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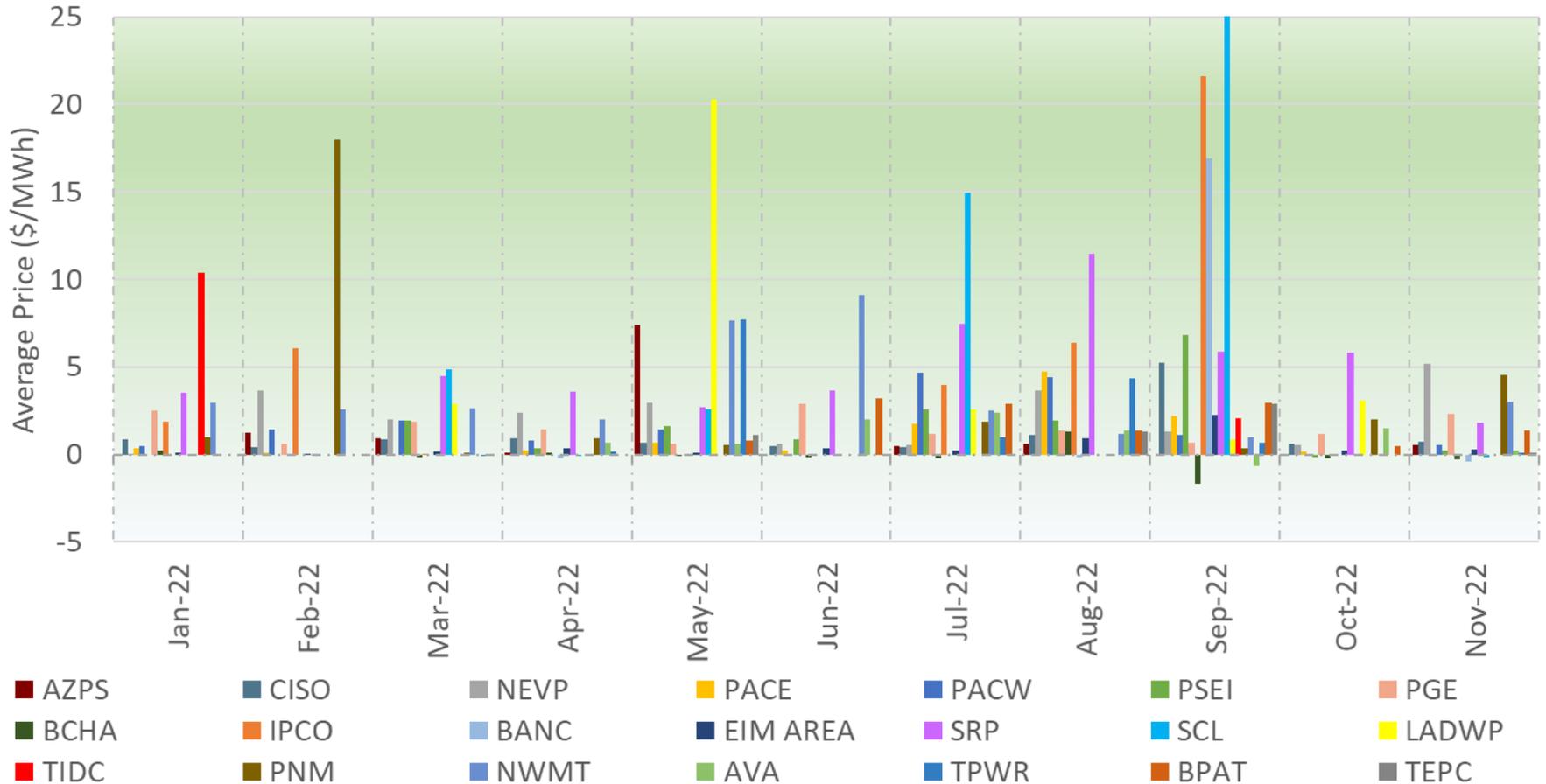
Batteries continue to provide both Regulation up and Regulation down



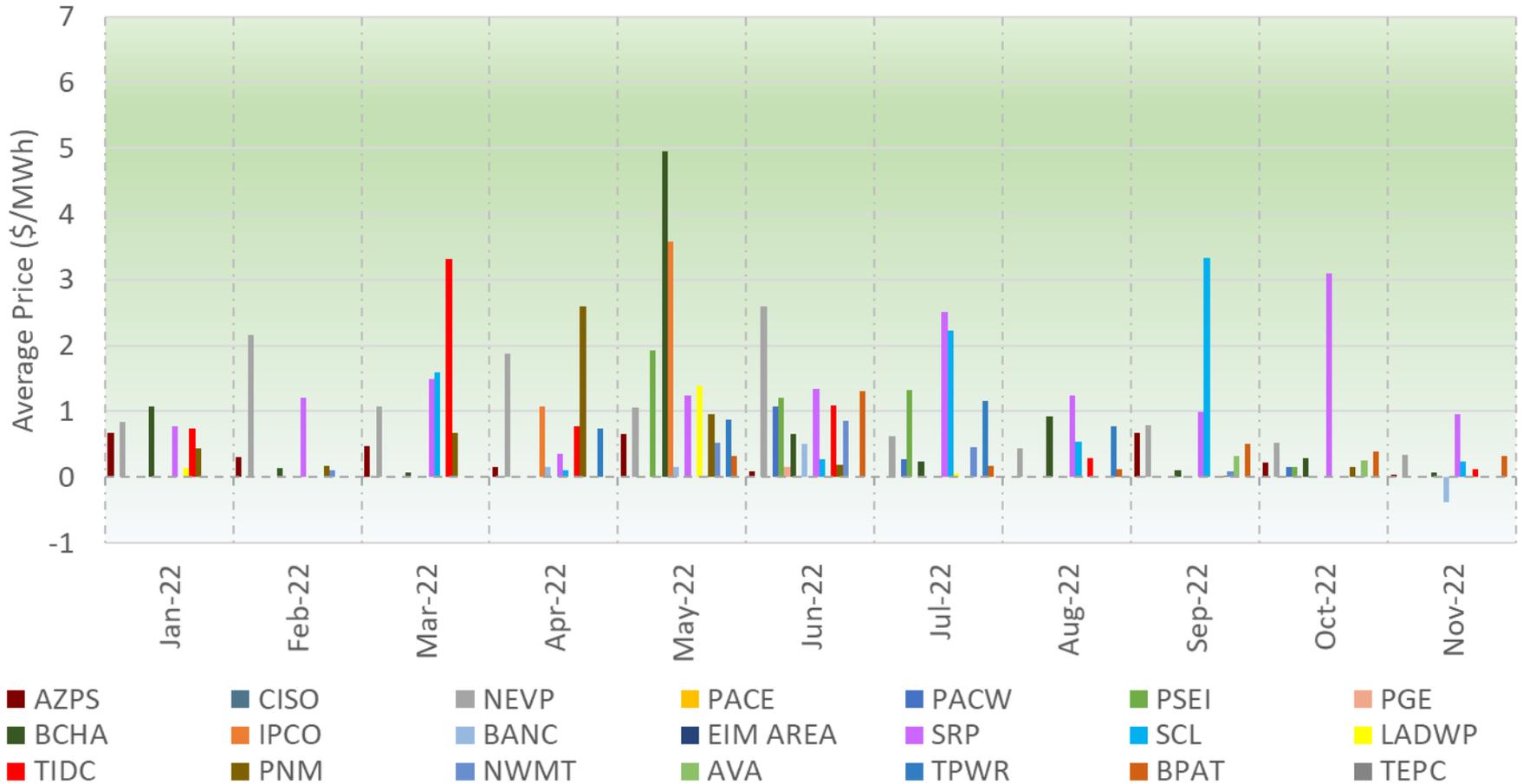
Average flexible ramp product cleared awards for each area with EIM area requirement - Sep 2022 to Nov 2022



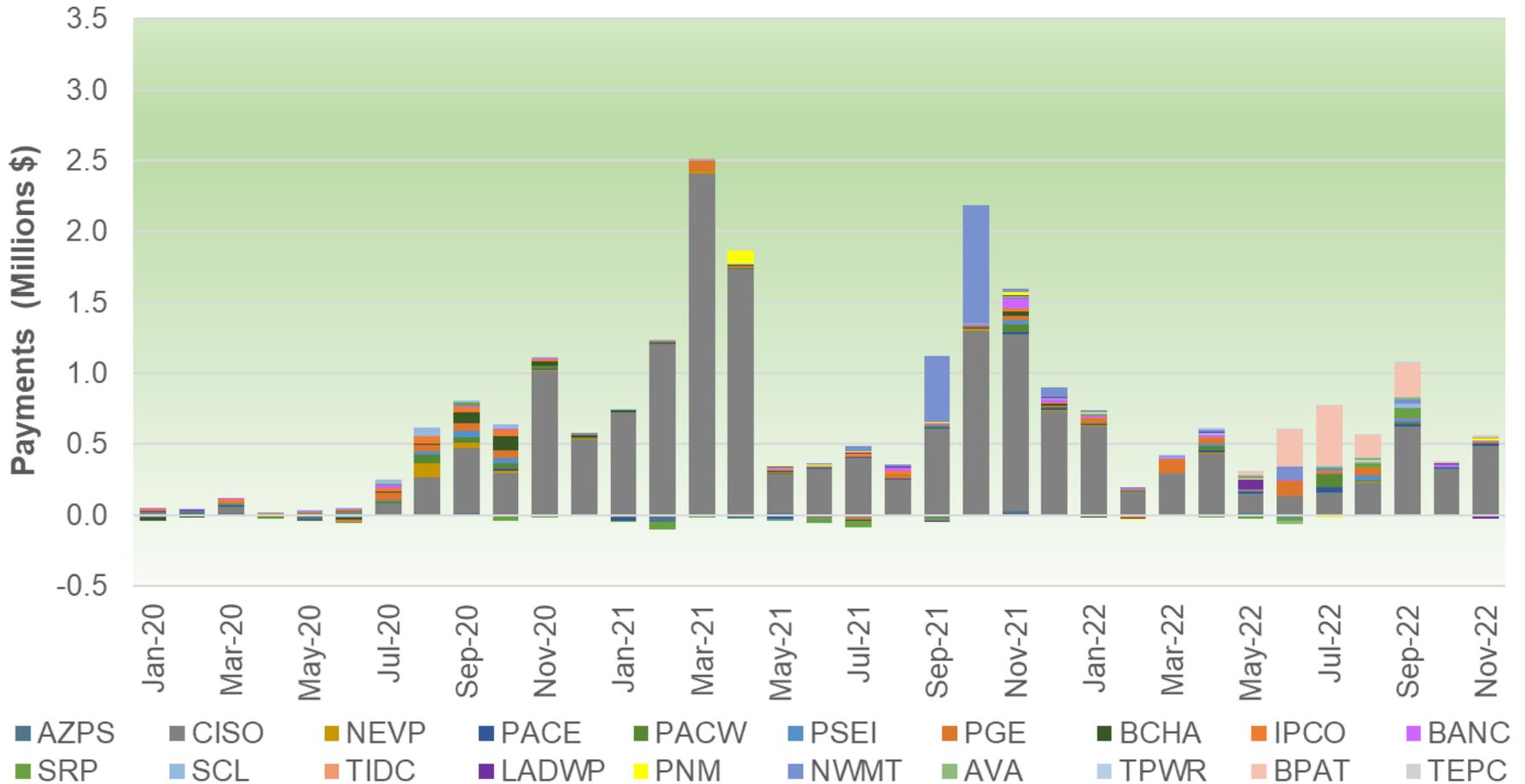
Average flexible ramp up price (\$/MWh)



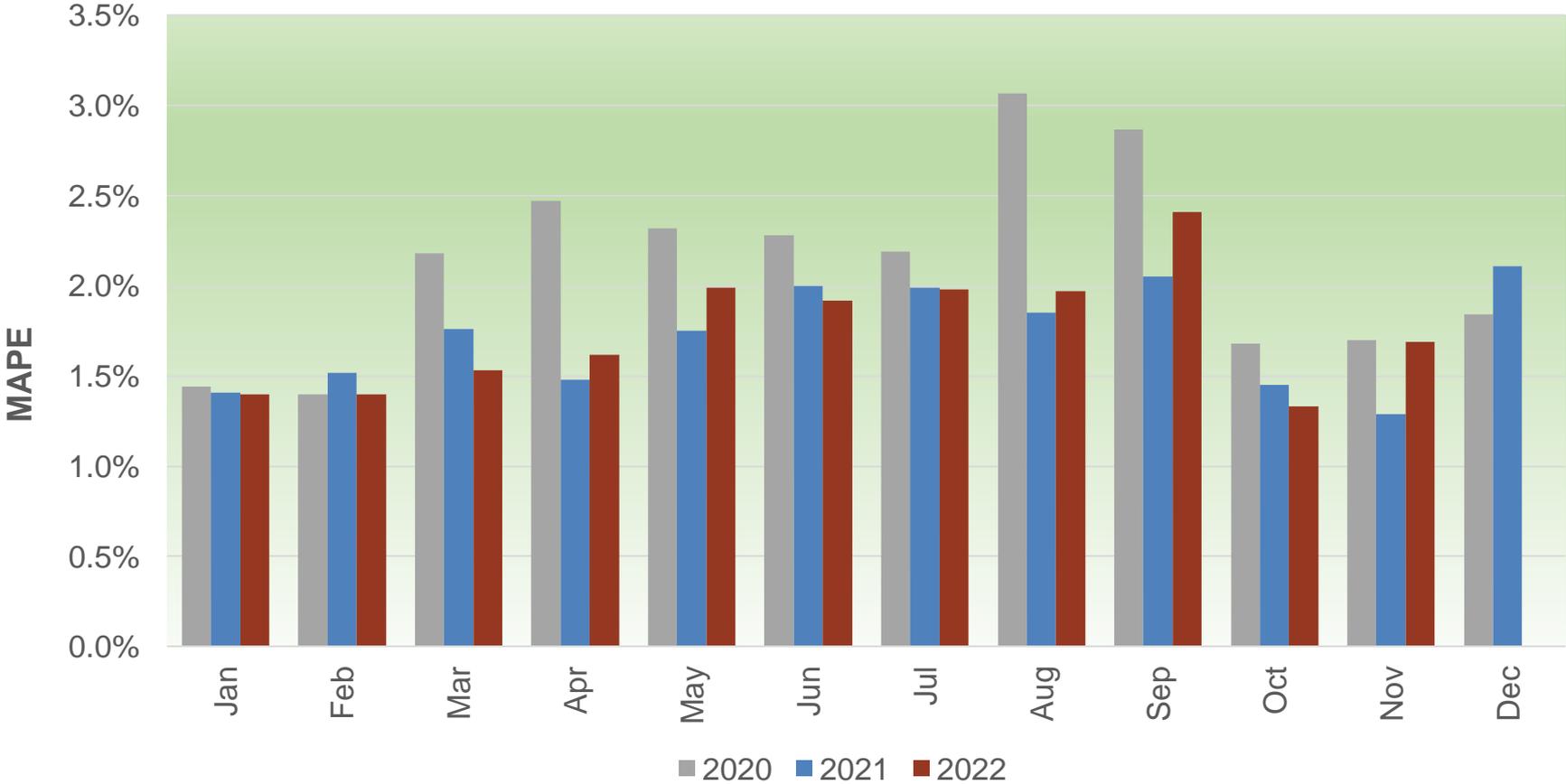
Average flexible ramp down price (\$/MWh)



Uncertainty Up Settlement Amount

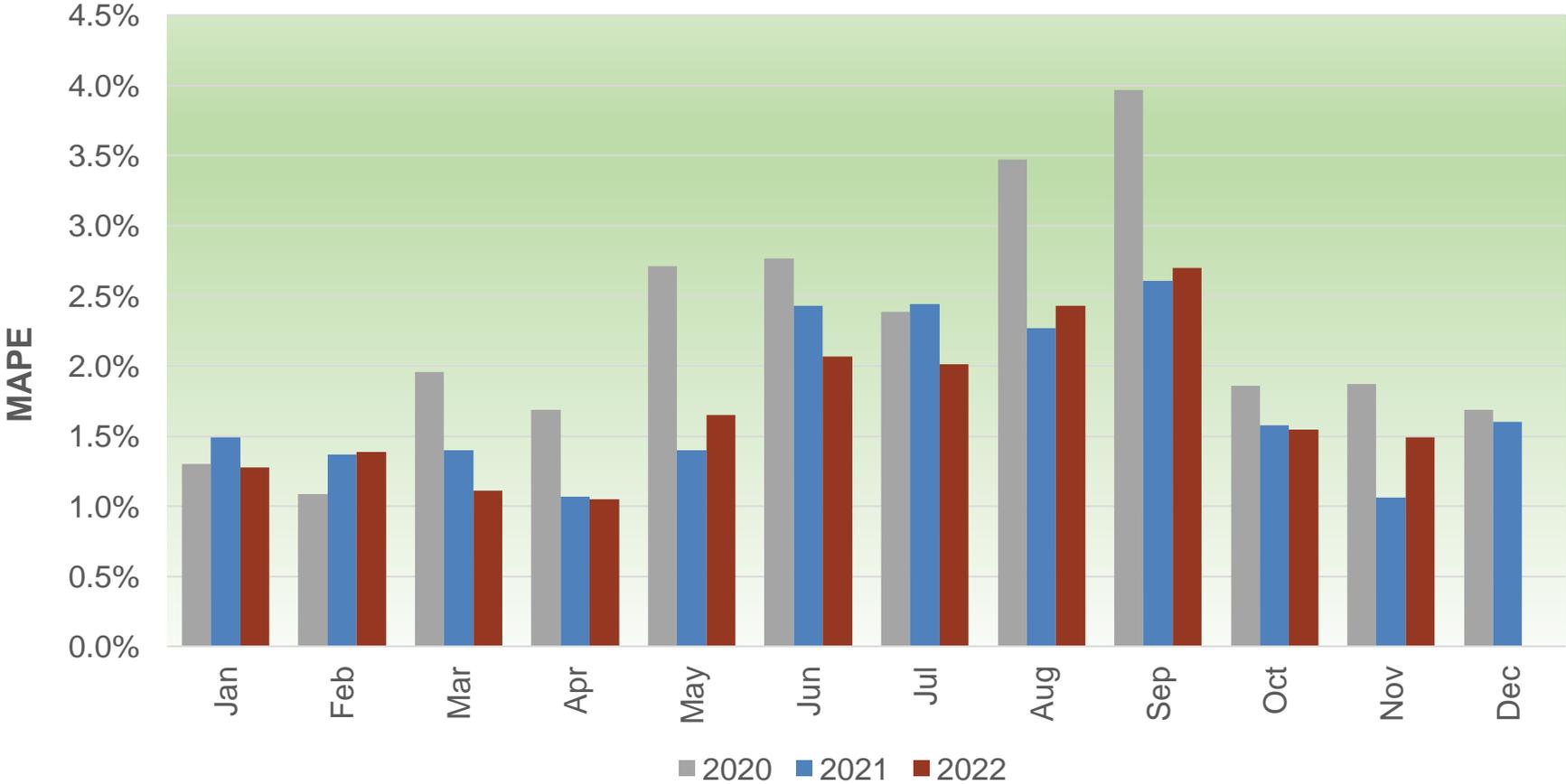


Day-ahead load forecast



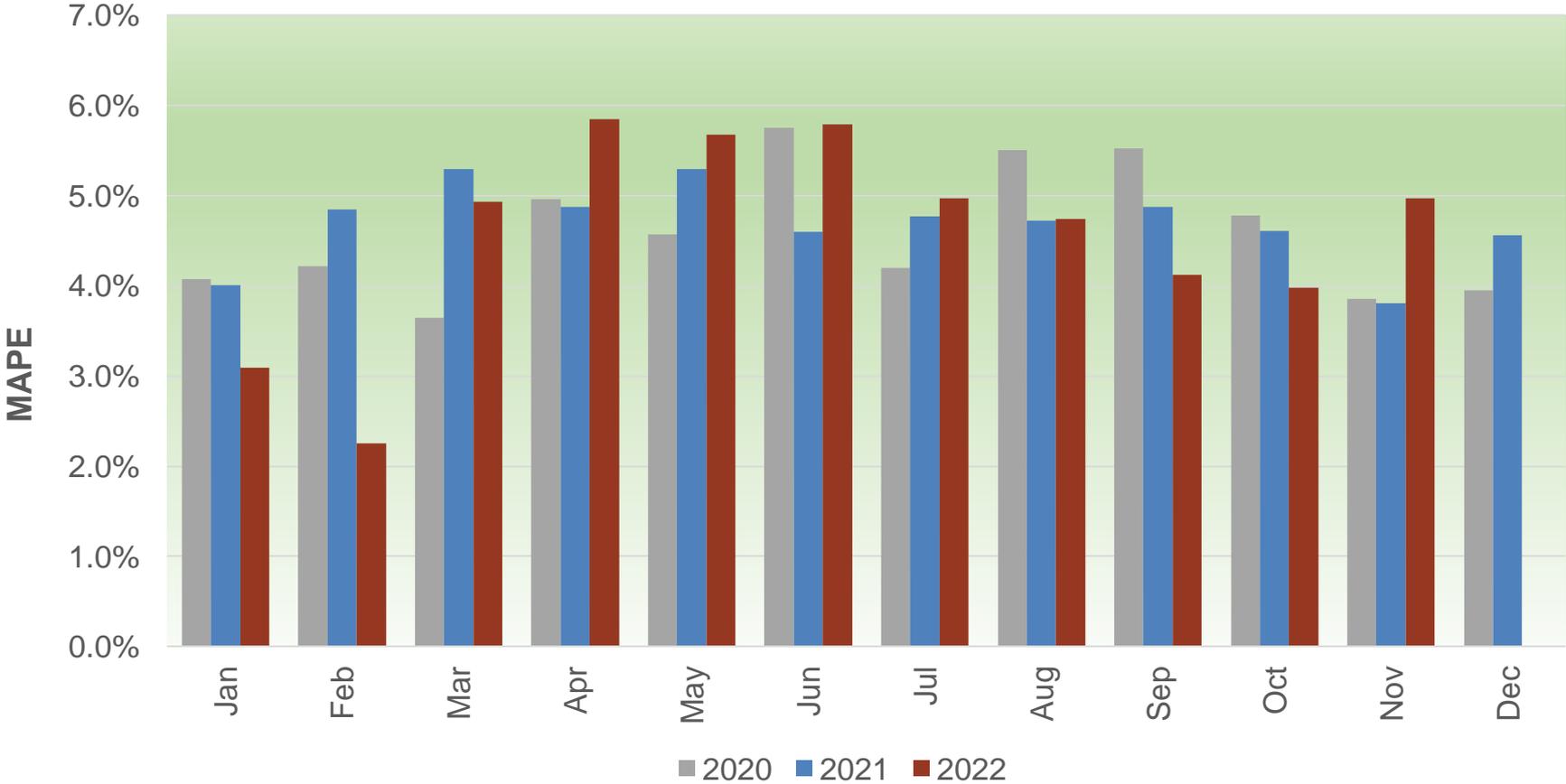
**MAPE = abs(Forecast - Actual)/Actual

Day-ahead peak forecast



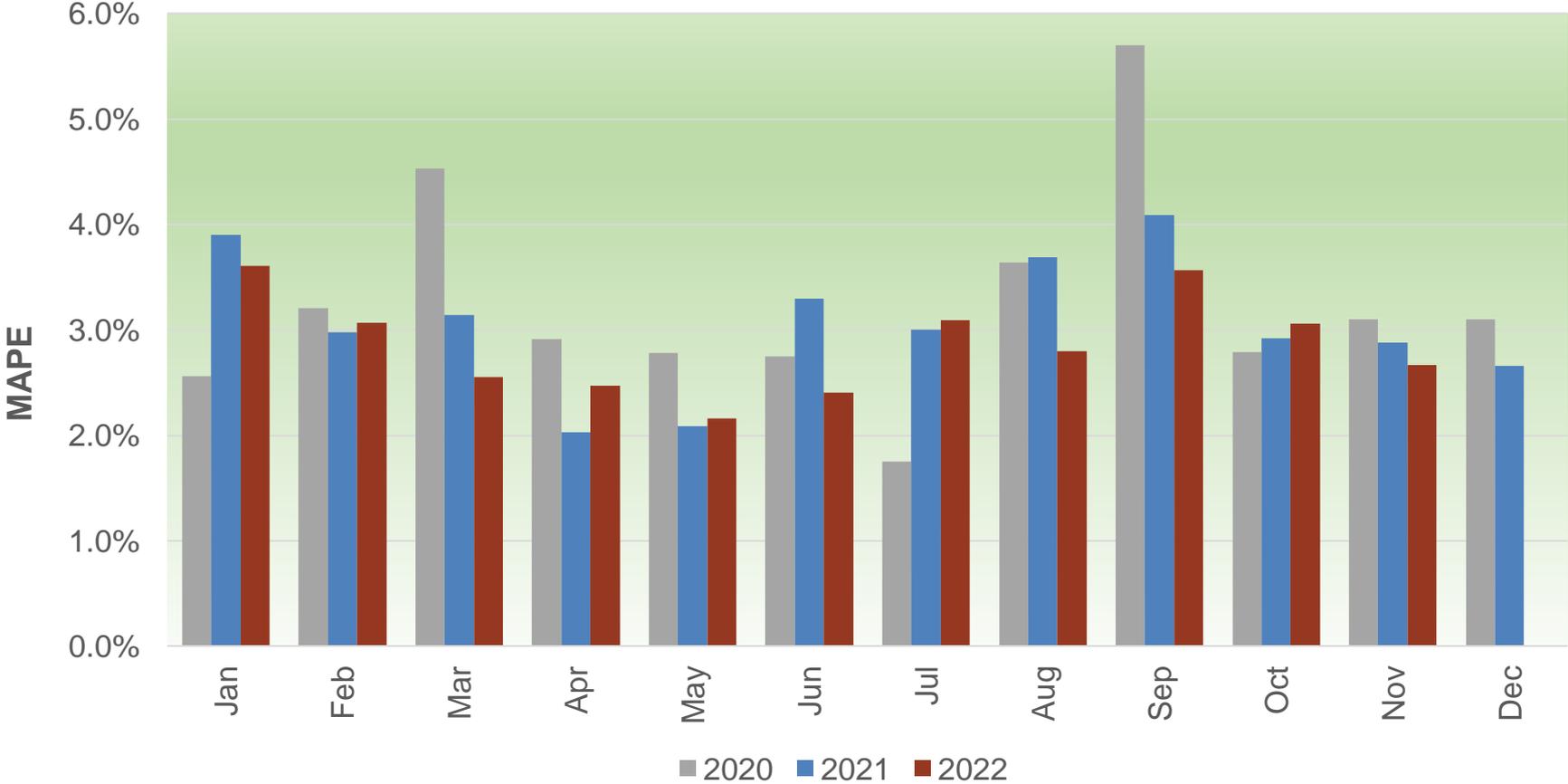
**MAPE = abs(Forecast - Actual)/Actual

Day-ahead wind forecast



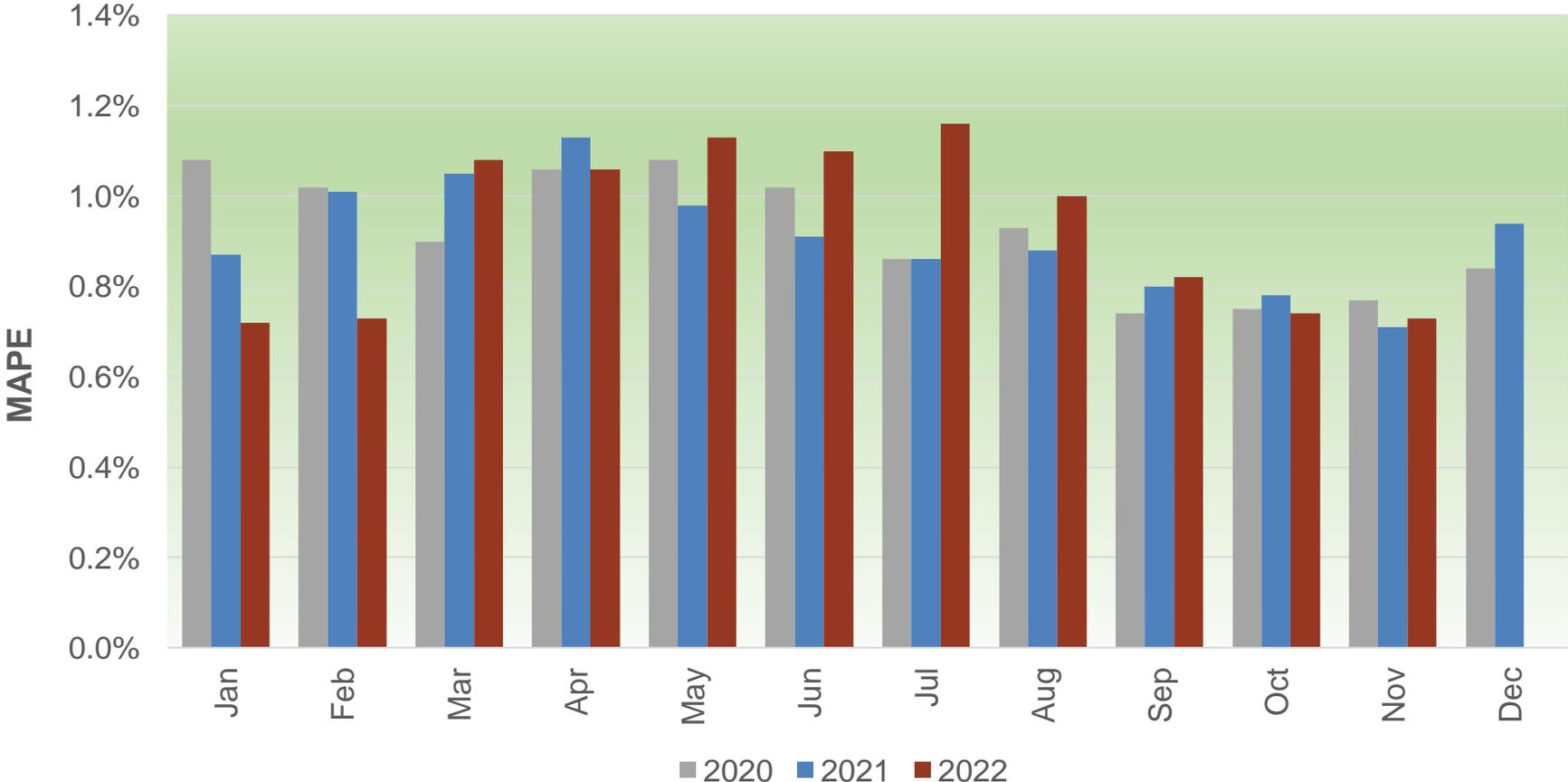
**MAPE = abs(Forecast - Actual)/Capacity

Day-ahead solar forecast



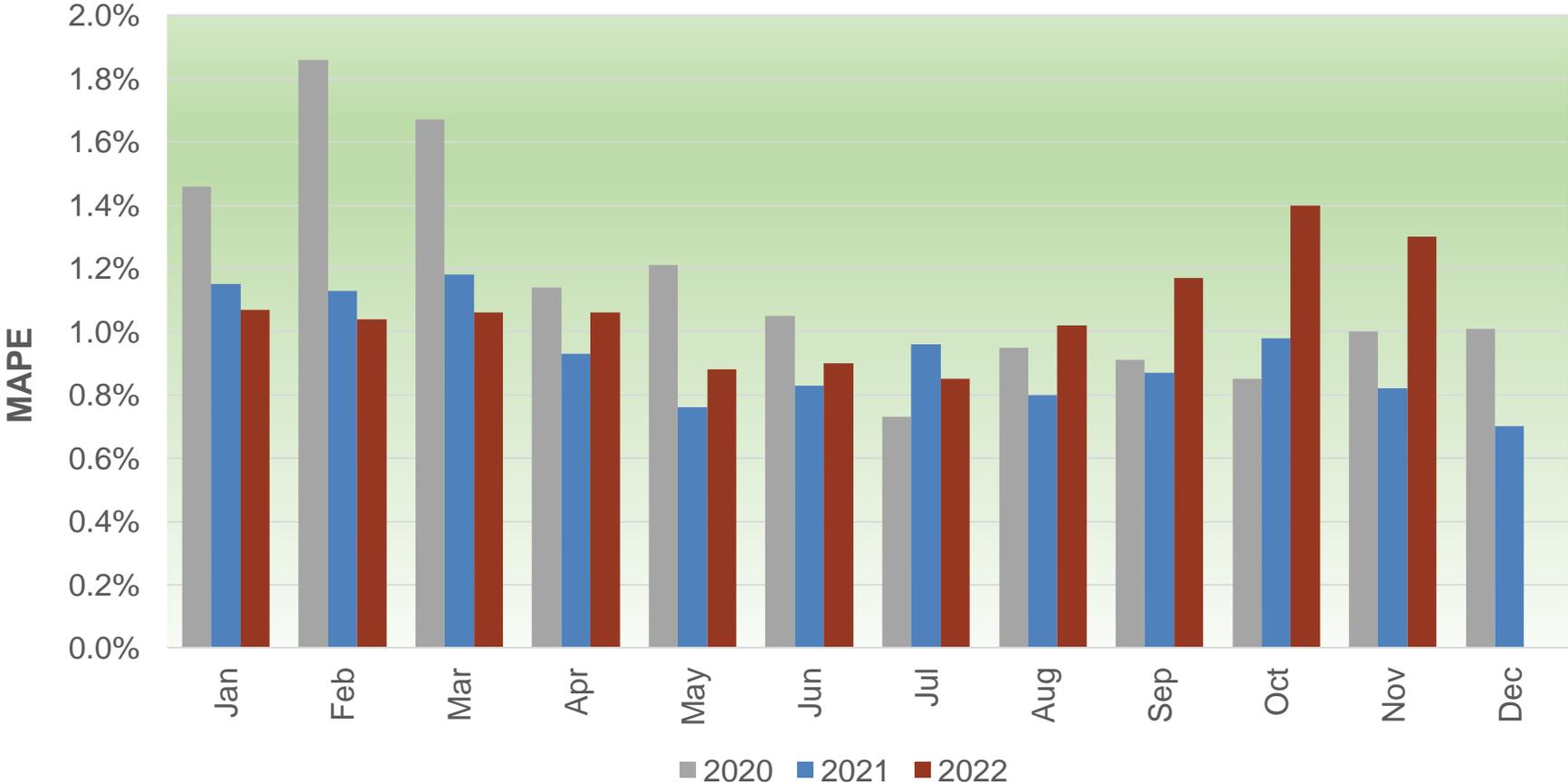
**MAPE = abs(Forecast - Actual)/Capacity

Real-time wind forecast



**MAPE = abs(Forecast - Actual)/Capacity

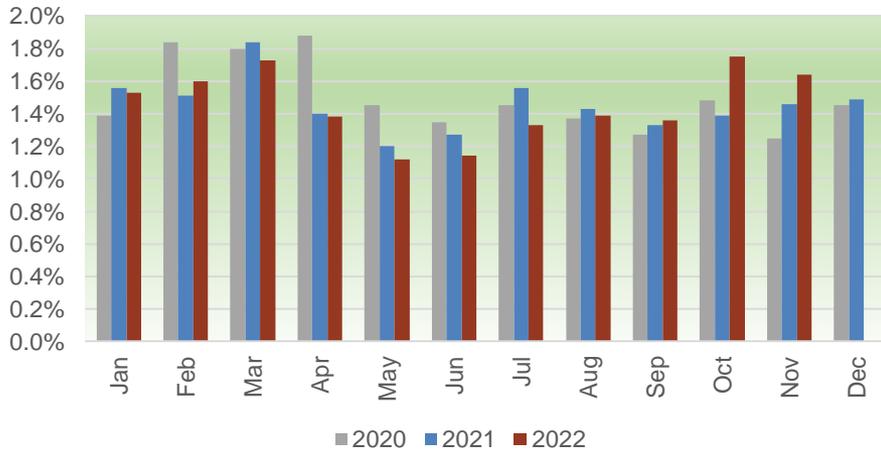
Real-time solar forecast



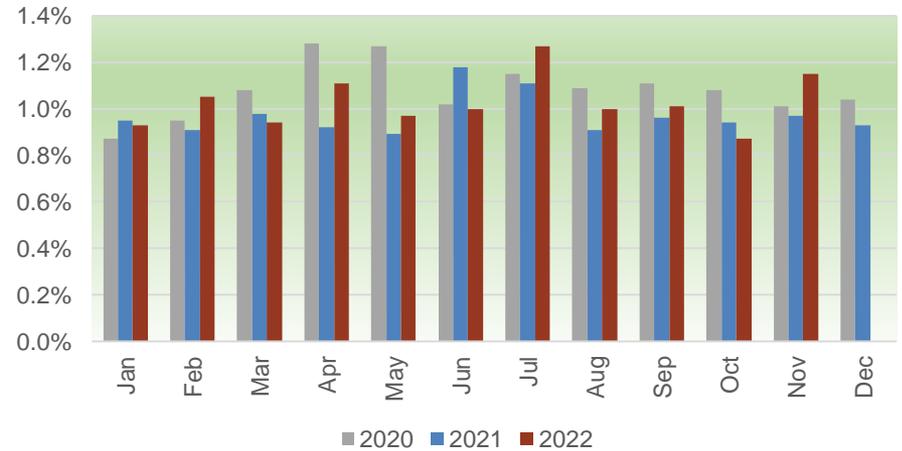
**MAPE = abs(Forecast - Actual)/Capacity

EIM T-60 forecast

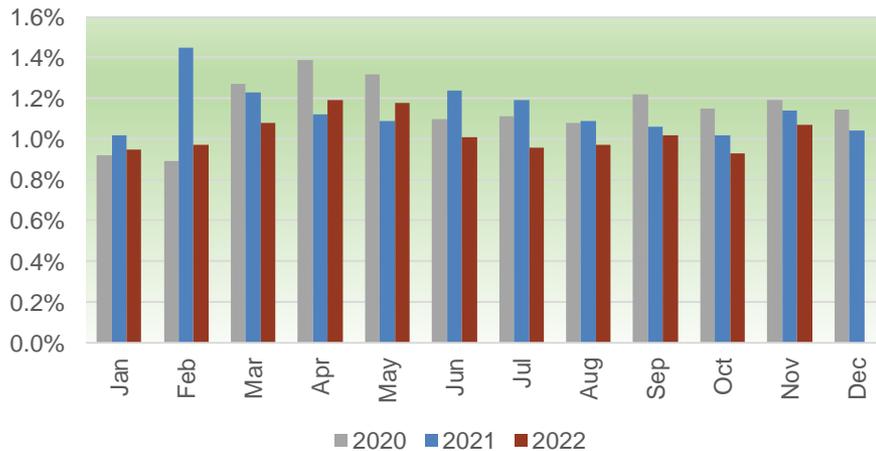
AZPS T-60 Forecast



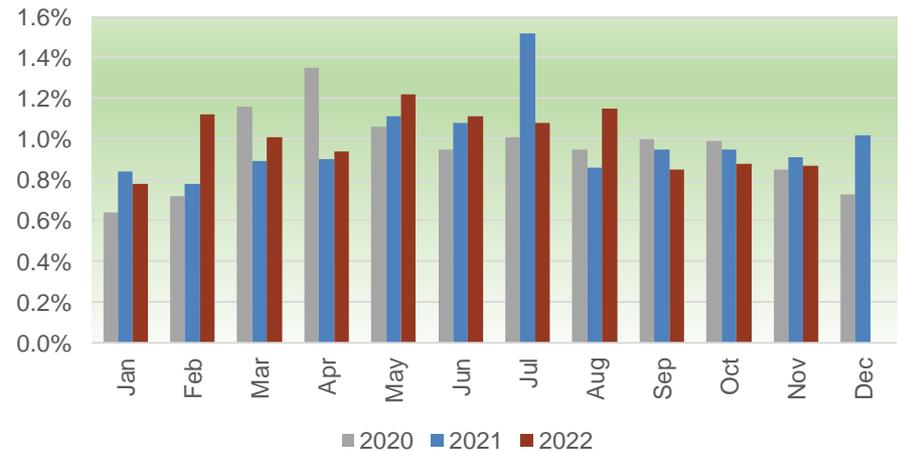
IPCO T-60 Forecast



PGE T-60 Forecast

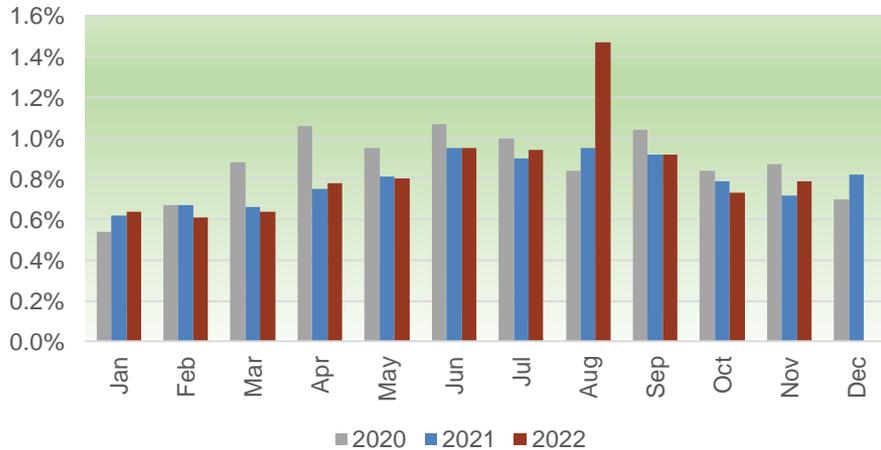


NVE T-60 Forecast

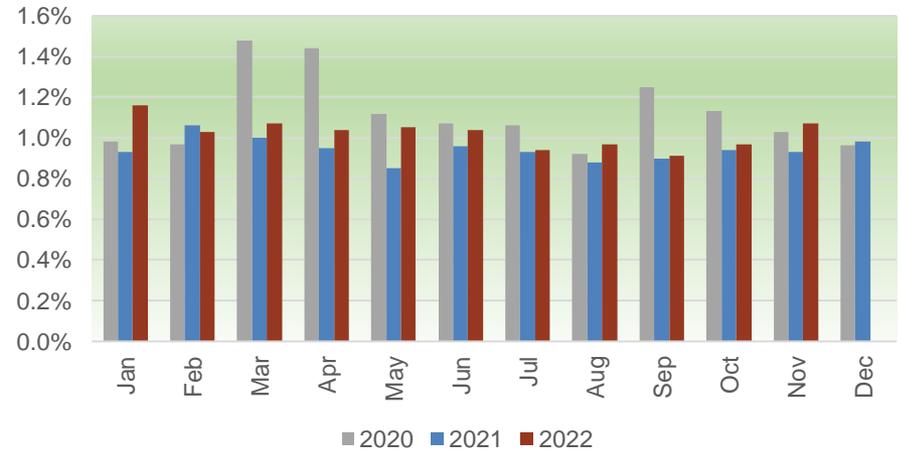


EIM T-60 forecast

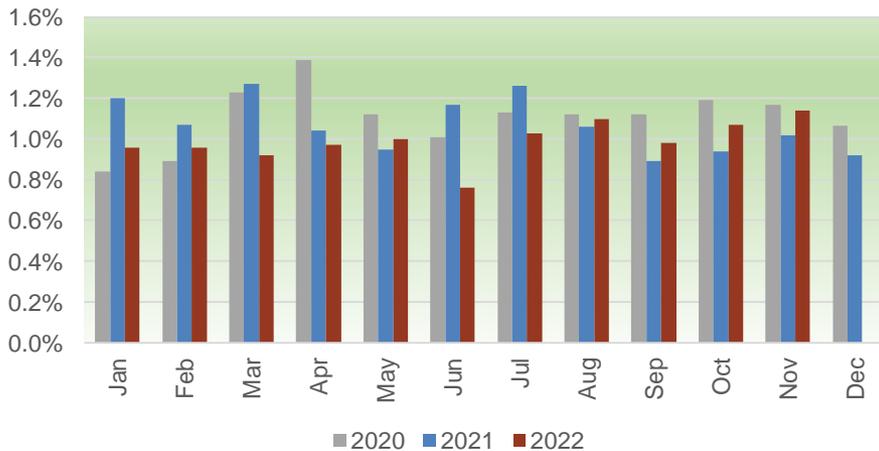
PACE T-60 Forecast



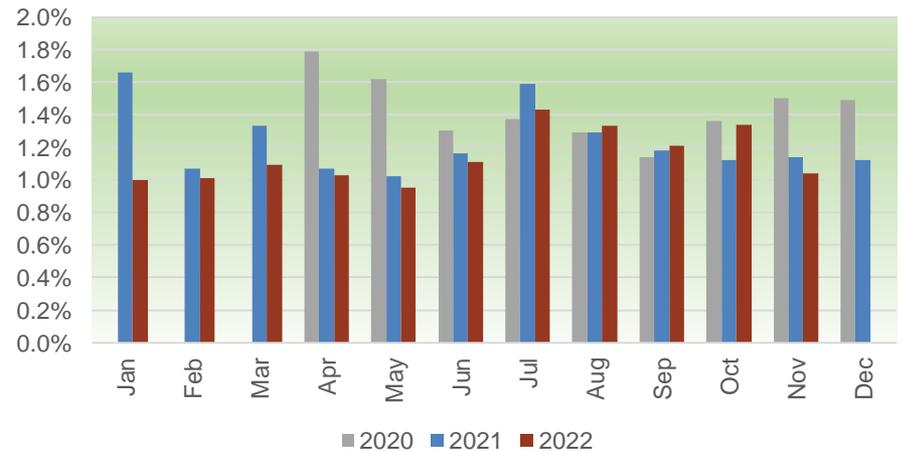
PACW T-60 Forecast



PSE T-60 Forecast

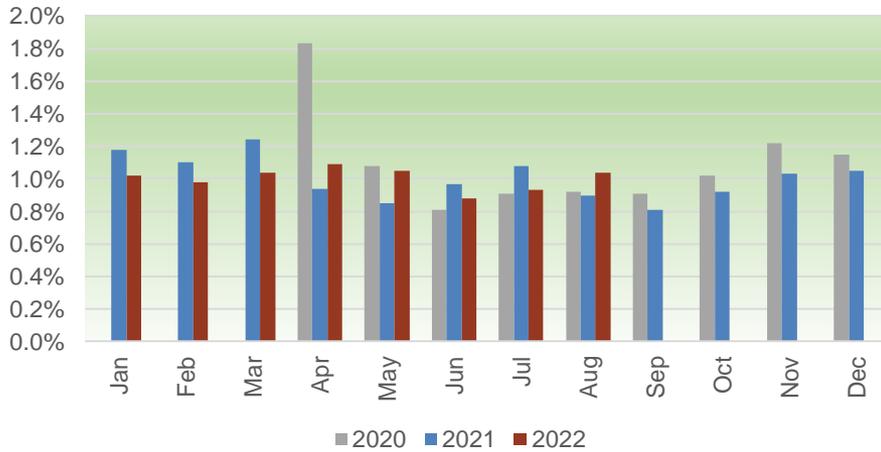


SRP T-60 Forecast

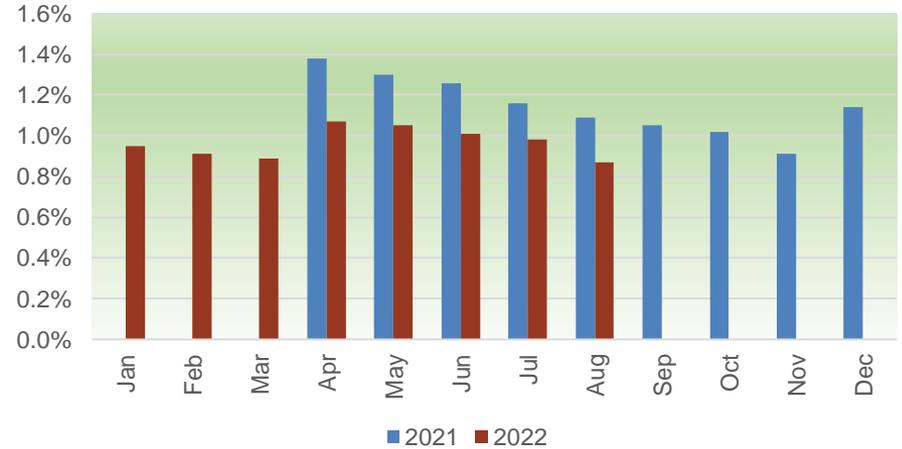


EIM T-60 forecast

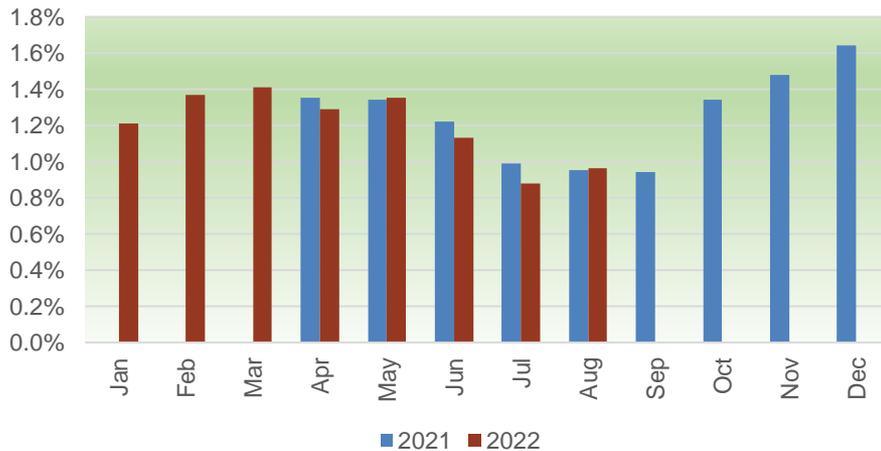
SCL T-60 Forecast



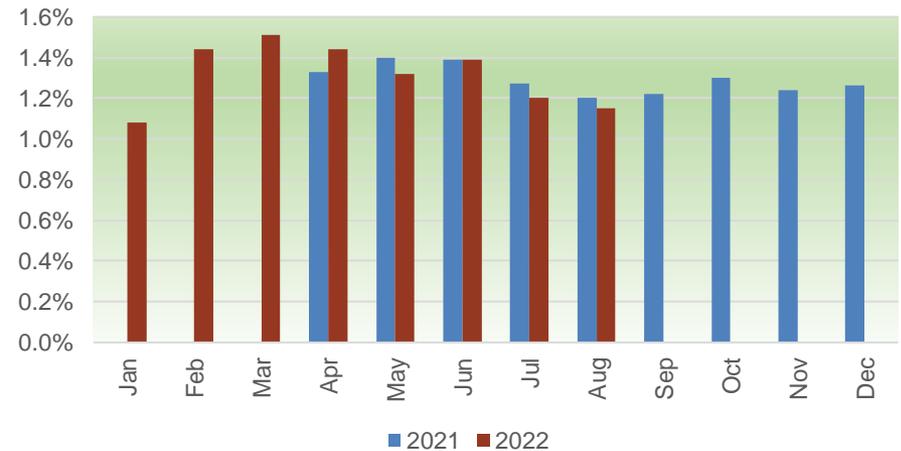
LADWP T-60 Forecast



TIDC T-60 Forecast

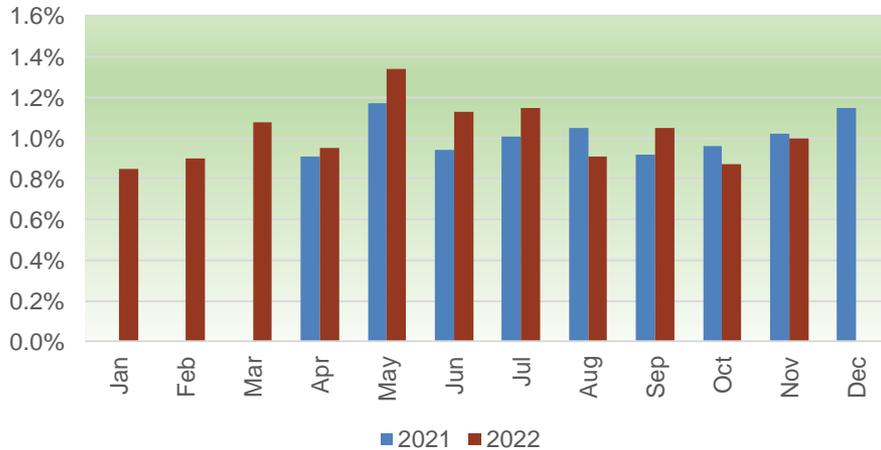


PNM T-60 Forecast



EIM T-60 forecast

BANC T-60 Forecast



NWMT T-60 Forecast



AVA T-60 Forecast



BPA T-60 Forecast



EIM T-60 forecast

TPWR T-60 Forecast



TEP T-60 Forecast



Policy Update



Gillian Biedler

Policy Integration and Governance Manager

Interconnection Process Enhancements

- **Scope:** Enhancing the CAISO's generator interconnection and deliverability allocation procedures
 - Enhancements to address queue overload
 - Broader process reform considerations focusing on aligning the interconnection process with LSE procurement processes
- **Decisional Classification:** CAISO Board only
- **Status:**
 - Phase 1 – Approved at May 2022 CAISO Board meeting
 - Phase 2 – Approved at Oct 2022 CAISO Board meeting
 - FERC filing planned for Q1 2023

Washington WEIM Greenhouse Gas Enhancements

- **Scope:** Market enhancements to support Washington WEIM entities with their reporting of WEIM transactions under Washington's Climate Commitment Act.
- **Decisional Classification:** Joint WEIM Governing Body/CAISO Board
- **Status:**
 - Limited set of changes approved at Oct 2022 CAISO Board and WEIM Governing Body meetings

WEIM Resource Sufficiency Evaluation Enhancements

– Phase 2

- **Scope:**
 - WEIM emergency energy assistance
 - Adjusting RSE obligations to account for low-priority exports
 - Requiring CAISO low-priority exports to be e-tagged as firm provisional
- **Decisional Classification:** Joint WEIM Governing Body/CAISO Board, WEIM Governing Body advisory
- **Status:**
 - MSC opinion adopted Dec 6
 - Second revised final proposal posted Dec 7
 - Dec 2022 CAISO Board and WEIM Governing Body meeting

Capacity Procurement Mechanism – Track 1

- **Scope:** Addresses various Capacity Procurement Mechanism operational and process enhancements
- **Decisional Classification:** CAISO Board only
- **Status:**
 - Revised draft final proposal posted on Nov 29
 - Final proposal in Jan 2023
 - Mar 2023 CAISO Board meeting

Energy Storage Enhancements

- Scope: Market enhancements to efficiently dispatch storage resources in alignment with operational needs.
 - New features for local areas, ancillary services enhancements
 - Enhancements to the co-located resource model
- Decisional Classification: Joint WEIM Governing Body/CAISO Board
- Status:
 - Final proposal posted Oct 27
 - MSC opinion adopted Dec 6
 - Dec 2022 CAISO Board and WEIM Governing Body meetings

Storage Modeling Enhancements

- **Scope:** Continue to pursue enhancements to the CAISO market's energy storage models
 - Potentially incorporating costs based on state of charge into the CAISO's Energy Storage Resource (ESR) market model
 - Potentially potential enhancements to the CAISO's Non-Generation Resource (NGR) model
- **Decisional Classification:** Joint WEIM Governing Body/CAISO Board
- **Status:**
 - Workshops in Q1 2023 to initiate the initiative
 - 2023 CAISO Board and WEIM Governing Body meeting

Ancillary Service State of Charge Constraint

- **Scope:**
 - Follow-up to CAISO's September 19 tariff amendment regarding the ancillary service storage state of charge requirement and related uplift payments
 - Initiative will consider potential additional revisions
- **Decisional Classification: Joint WEIM Governing Body/CAISO Board**
- **Status:**
 - Straw proposal anticipated in Q1 2023

Day-Ahead Market Enhancements

- **Scope:**
 - Co-optimizing supply in IFM based on both cleared demand and imbalance reserve product needs
 - Residual unit commitment process improvements
- **Decisional Classification:** recommending Joint WEIM Governing Body/CAISO Board
- **Status:**
 - Draft final proposal posted Dec 1
 - Dec 2022 CAISO Board and WEIM Governing Body meeting briefing
 - Final Proposal
 - Feb 2023 CAISO Board and WEIM Governing Body meeting decision

Extended Day-Ahead Market

- **Scope:** Extending day-ahead market to WEIM entities. Scope includes:
 - Day-ahead resource sufficiency evaluation
 - Transmission availability
 - Greenhouse gas accounting and costs
- **Decisional Classification:**
 - Proposed that the EDAM initiative fall under CAISO Board/WEIM Governing Body joint authority
- **Status:**
 - Final proposal posted Dec 7
 - Dec 2022 CAISO Board and WEIM Governing Body meeting briefing
 - Feb 2022 CAISO Board and WEIM Governing Body meeting decision

Transmission Services and Market Scheduling Priorities

- **Scope:**
 - Process for wheeling transactions through the CAISO BAA to obtain high-priority scheduling rights
 - Enhancements to processes for exporting from non-resource adequacy resources
- **Decisional Classification: CAISO Board, with WEIM Governing Body advisory role**
- **Status:**
 - Draft final proposal posted Dec 9
 - Dec 2022 CAISO Board and WEIM Governing Body briefing
 - Final proposal in Jan 2023
 - Feb 2023 CAISO Board and WEIM Governing Body decision

Price Formation Enhancements

- Scope:
 - Phase 1
 - Scarcity pricing enhancements that better reflect tight supply
 - Consideration of fast-start pricing in the CAISO markets
 - Improvements to local market power mitigation to more accurately assess transmission constraints between BAAs
 - Phase 2
 - Enhancements to real-time market use of advisory prices
 - Bid cost recovery changes focused on storage resource interaction with the real-time market's multi-interval optimization
- Decisional Classification: WEIM Governing Body advisory
- Status:
 - Stakeholder workshop held Nov 16, upcoming Dec 16
 - Straw proposal Q2 2023

Market Parameter Change Enhancements

- **Scope:**
 - Minimum shift factor used in the CAISO market
 - Procedure for change penalty prices used in the CAISO market
- **Decisional Classification: Joint WEIM Governing Body/CAISO Board**
- **Status:**
 - Straw proposal posted in April
 - Draft final proposal posting in Jan 2023
 - Mar 2023 joint CAISO Board and WEIM Governing Body and meeting

Release Plan Update



Trang Vo
Senior Project Manager,
Strategic Initiative Management

ISO Training Schedule

Training Course	Date and time
Hybrid Resources Phase 2B Refresher	January 24 9am – 11am PPT
ISO Workshop: Introduction to ISO Markets	March 7 and 8 9am – 12pm PPT
ISO Workshop: Market Transactions	March 14 and 15 9am – 12pm PPT
ISO Workshop: ISO Settlements	March 21 and 22 9am – 12pm PPT

Are you looking for more training?

The ISO Learning Center has computer based training available for lots of topics. Check out the Learning Center:

<http://www.caiso.com/participate/Pages/LearningCenter/default.aspx>



Release Plan Summary 2022 - 2023

Fall 2022 Release

Central Procurement Entity Implementation; Effective 1/1/23

Flexible Ramping Product Improvements – Deliverability; Activation 2/1/23

Hybrid Resources Phase 2B; Activation 2/1/23

2022 Independent

WEIM Enhancements: ETSR UI

2023 Independent

Operations Systems Improvements Enhancements

WEIM Enhancements: Shared Ramping Constraint

Release Plan Summary WEIM Spring 2023

WEIM Spring 2023 Release

WEIM 2023 – Avangrid

WEIM 2023 – El Paso Electric

WEIM 2023 – WAPA Desert Southwest Region

2022 Fall Release

Fall 2022 Release Overview

	BRS	Config Guide	Draft Tariff*	BPMs	External Training	Market Sim	Production Activation
Fall 2022 Release							
<u>Hybrid Resources Phase 2B</u>	V1.5 8/25/22 V1.6 10/19/22 (Few RIMS updates)	3 rd draft config output 8/30/22	09/17/21 Accepted 11/30/21	2/14/22 9/29/22 Mkt Ops updates	8/18/22 9/26/22 – Metering 10/6/22 – Add'l Metering	10/11/22 – 11/18/22	02/01/23
<u>FRP Improvements - Deliverability</u>	V1.2 8/22/22	Pre-prod config output file + release artifacts 11/17/22 Prod Deploy 11/30/22 Final Settlement Config Output File 11/30/22	08/31/20 Filed 8/15/22 Accepted 10/18/22	10/24/22 PRR updates in progress	9/07/22	10/11/22 – 11/18/22	02/01/23
<u>Central Procurement Entity Implementation</u>	V1.2 9/14/22		Filed 4/8/22 Approved 7/1/22	Settlements & Billing Reliability Requirements 10/28/22	9/14/22	09/19/22 – 09/30/22	MF/CIRA 10/13/22 Effective Date 1/1/23 for 2023 RA Year

Fall 2022 – Hybrid Resources Phases 2-B - Overview

Project Information	Details/Date
<p>High Level Business Problem or Need</p>	<p>The ISO launched this stakeholder initiative to identify new or enhanced market rules and business processes needed to accommodate hybrid resources, resources that consist of two sets of market rule changes that will facilitate mixed-fuel type project participation (hybrid and co-located resources) in the ISO markets.</p>
<p>High Level Project Scope</p>	<p>Phase 2 focuses on modifications that will explore how hybrid generation resources can be registered and configured to operate within the ISO market. The initiative will further develop solutions allowing developers to maximize the benefits of their resource's configuration. Additionally, hybrid resource configurations also raise new operational and forecasting challenges that the ISO plans to address during this initiative.</p> <p>The Phase 2 project has been split into two separate implementations, phases 2-A and 2-B, to support strategic delivery timing. Phase 2-B information is available under the Spring 2022 release section.</p> <p>Phase 2-A was implemented on December 15, 2021. This phase focuses on implementing Ancillary Services (AS) and High Sustainable Limit (HSL) functionality with a focus on the EMS and IFM/RTM systems.</p> <p>Phase 2-B is scheduled to implement Fall 2022. This project phase focuses on implementing the Hybrid Dynamic Limit functionality, Multiple ACC, along with all remaining project scope to include changes to systems RIMS, Master File, EMS, SIBR, IFM/RTM, OASIS, ALFS, Settlements, MRI-S Metering, CMRI, MPP, Today's Outlook, ISO Today Mobile Application, Monthly Renewables Performance Report, Wind and Solar Real-Time Dispatch Curtailment Report', and the Over Supply Page.</p> <p>External BRS Posting: V1.5 posted on 8/25.</p>
<p>BPM Changes</p>	<p>Direct Telemetry, Market Instruments, Market Operations, Metering, Settlements and Billing</p>
<p>Tariff Changes</p>	<p>Proposed sections 4.18, 34.1.6.3, 30.5.6.1 Sections 27.13, 8.4.1.1(g), 8.4.3, Appendix K, Parts A, B and C, 8.2.3, 8.4.5, 34.7, 11.6.6, 4.8.2, 40.9.2 (b) (D)</p>
<p>Impacted Systems</p>	<p>ALFS, CMRI, Reporting, IFM/RTM, Master File, OASIS, RIMS, Settlements, MRI-S Metering, SIBR, MPP, Today's Outlook, ISO Today Mobile Application, Monthly Renewables Performance Report, Wind and Solar Real-Time Dispatch Curtailment Report, Over Supply Page.</p>

Fall 2022 – Hybrid Resources Phase 2-B

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Nov 18, 2020	✓
External BRS	Post External BRS (Includes Phase 2-A and 2-B)	Aug 3, 2021	✓
	Post BRS v1.3	Mar 10, 2022	✓
	BRS v 1.4	Aug 4, 2022	✓
	BRS v 1.5	Aug 25, 2022	✓
	BRS v 1.6 (few minor RIMS updates)	Oct 18, 2022	✓
Config Guides	Post Draft Config Guides	Jan 25, 2022	✓
Tech Spec	Create ISO Interface Spec (Tech spec)	Sep 10, 2021	✓
Tariff	File Tariff	Sep 17, 2021	✓
	Accepted	Nov 30, 2021	✓
Market Sim Scenarios	Post proposed scenarios (Unstructured)	Feb 8, 2022	✓
BPMs	Publish Final Business Practice Manuals for mkt sim	Feb 14, 2022	✓
	Market Operations BPM update	Sep 29, 2022	✓
External Training	Deliver External Training	Aug 18, 2022	✓
	Deliver External Training - Metering Requirements	September 26, 2022	✓
	Deliver External Training - Metering Requirements additional discussion	October 6, 2022	✓
Market Sim	Market Sim Window	Aug 22, 2022 – Nov 18, 2022	✓
		Start Nov 1, 2022	✓
Production Activation	Hybrid Resources Phase 2-B	Feb 1, 2023	

Fall 2022 – Flexible Ramping Product Improvements Deliverability

Project Information	Details/Date
High Level Project Scope	<p>The scope of the project FRP Deliverability is:</p> <ol style="list-style-type: none"> 1. Procurement of FRP for BAA's that fails the flex test is separate for each BAA. 2. Procurement of FRP for BAA's that pass the flex test for the entire group of BAA. 3. Transmission constraints and transfer limits are enforced in FRP deployment scenarios 4. Distributing the uncertainty requirement in each BAA load and VER locations versus just load 5. Distributing the demand curve surplus variable as a decision variable at load aggregation points (LAP) versus Balancing Authority Areas (BAA) 6. To establish the Locational Marginal Capacity Prices (LMCP) for FRP <p>The scope of the FRP Requirements Enhancements is:</p> <ol style="list-style-type: none"> 1. To enhance the current approach by adopting a quantile regression method to adjust the current flexible ramping product up and down requirement. 2. Calculation of the demand curve.
BPM Changes	Market Instruments, Market Operations
Tariff Change	Yes
Impacted Systems	RTM, Settlements, CMRI/OASIS
System	High Level Changes
Real Time Markets (RTM)	<ul style="list-style-type: none"> • RTM to be impacted based on the change in the FRP procurement systems. • Input data needed for forecasted advisory in the binding interval for RTPD for approx. 40 work days or weekends. • New demand curve calculation is needed.
Settlements	<ul style="list-style-type: none"> • Prices are nodal therefore mechanics for cost allocation pricing to be changed • Nodal FRP prices
CAISO Market Results Interface (CMRI)/ Open Access Same time Information (OASIS)	<ul style="list-style-type: none"> • Publish Resource Nodal prices for the FRP awards (CMRI) • Publish requirements for FRP per BAA and BAA group (OASIS) • Publish surplus by LAP (OASIS) • Publish the nodal FRP prices (OASIS)

Fall 2022 – Flexible Ramping Product Improvements Deliverability

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Sept 30, 2020	✓
External BRS	Flexible Ramp Product: Deliverability	Jan 28, 2021	✓
	Flexible Ramp Product: Requirements Enhancements	Mar 11, 2022	✓
	BRS 1.1	Aug 1, 2022	✓
	BRS 1.2	Aug 22, 2022	✓
Tariff	File Tariff	Aug 15, 2022	✓
	Tariff Accepted	Oct 18, 2022	✓
BPMs	Publish Draft BPM updates	Oct 24 2022	✓
	PRR Modifications	Dec 2022	
Config Guides	Post Draft Config Guides	Jun 30, 2022	✓
Tech Spec	Publish Technical Specification - OASIS	July 15, 2022	✓
External Training	Deliver External Training	September 7, 2022	✓
Market Sim	Market Sim Window	Oct 11, 2022 – Nov 18, 2022	✓
		Start Oct 18, 2022	✓
Production Activation	FRP Deliverability	Feb 1, 2023	

Fall 2022 – Central Procurement Entity Implementation

Project Information	Details		
High Level Project Scope	<p>The CAISO tariff currently allows LSEs to aggregate responsibilities to procure Local Capacity Area Resources. However, given the unique nature of the CPE as outlined in CPUC D. 20-06-002, relying solely on this existing tariff provision is not sufficient to facilitate implementation of the CPE construct. The CAISO has identified additional needed tariff, software, and business process enhancements. Although the CPUC's CPE order is the impetus for this stakeholder initiative, the CAISO does not propose to limit a CPE to CPUC-jurisdiction LSEs. The CAISO instead proposes to allow all Local Regulatory Authorities (LRAs) to designate a CPE to procure local resources on behalf of its LSEs and that LRAs may designate the same CPE to procure local resources on behalf of the LSEs under the jurisdiction of those multiple LRAs.</p> <p>Scope:</p> <ol style="list-style-type: none"> 1. Recognizing a Central Procurement Entity (CPE) 2. System and Local Obligation for CPE and LSEs with Load in Multiple Transmission Access Charge (TAC) Areas 3. Allocation of System and Flexible Attributes of Local Resource Adequacy (RA) Resources 4. Clarification of Capacity Procurement Mechanism (CPM) Process and Cost Allocations in regards to CPE changes 		
BPM Changes	<ul style="list-style-type: none"> - Reliability Requirements - Settlements and Billing 		
Tariff Change	Yes		
Impacted Systems	MF, CIRA, Settlements		
Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Central Procurement Entity BRS	Apr 8, 2022	✓
Tariff	File Tariff	Apr 8, 2022	✓
BPMs	Publish Draft BPM updates	Aug 26, 2022	✓
Config Guides	Post Draft Config Guides	Jun 30, 2022	✓
Tech Specs	Publish Technical Specifications	N/A	
External Training	Deliver External Training	Sep 14, 2022	✓
Market Sim	Market Sim Window	Sep 19, 2022 – Sep 30, 2022	✓
Production Activation	MF and CIRA availability for registrations	Oct 13, 2022	✓
	RA/Supply Plan due dates for 2023 annual plans	Oct 31, 2022	✓
	RA/Supply Plan due date for Jan 2023 monthly plans	Nov 17, 2022	✓
	Full project activation	Jan 1, 2023	
2023 RA & CSP Due Dates for all LSEs & CPEs	https://www.caiso.com/Documents/2023ResourceAdequacyandCompetitiveSolicitationProcessDueDates.pdf		

Independent 2022 & 2023 Releases

WEIM Enhancements

Project Information	Details/Date
High Level Business Problem or Need	To collectively address important issues identified by WEIM market participants through Customer Inquiry, Dispute and Information system (CIDI) requests to improve the visibility, functions and features in Energy Imbalance Market (WEIM).
High Level Project Scope	<ul style="list-style-type: none"> BAAOP: ETSR detail screen will be available to BOTH RTMO and WEIMs. (First drop for testing will only be available to RTMO). BAAOP: WEIM shared ramping constraint IS NOT editable through UI.
BPM Changes	WEIM, Market Instruments
Tariff Change	Section 29.4
Impacted Systems	RTM/BAAOP, RTM/Integration

System	High Level Changes
Real-Time Market (RTM)	<p>BAAOP: ETSR detail screen will be available to BOTH RTMO and WEIMs. (First drop for testing will only be available to RTMO).</p> <ul style="list-style-type: none"> New ETSR detail screens
Real-Time Market (RTM)	<p>BAAOP: WEIM shared ramping constraint IS NOT editable through UI.</p> <ul style="list-style-type: none"> Shared ramping capability constraint UI for WEIM entity input parameters for ramp sharing Use in the optimization for each resource based on BAA ramp share parameters

Operations Systems Improvements Enhancements

Project Information	Description
High Level Business Problem or Need	<ul style="list-style-type: none"> The goal of this project is to deliver timely systems improvements that support efficient day-to-day work and operations. The project aims to improve market robustness, performance, and the technology foundation for system grid reliability by updating functionality and interfaces to reduce workarounds, automating manual processes and addressing functionality enhancements. A list of specific high priority improvements will be the scope for the project. A number of these improvements may have an impact on the way in which customers interact with CAISO systems.
Affected Systems	<ul style="list-style-type: none"> A preliminary list of enhancements is included on the next slide. <p>PLEASE NOTE: This list may change as the project progresses and priority are factored. The goal is to provide advanced notification of changes whenever possible</p>
Schedule	<ul style="list-style-type: none"> External BRS 2022 External BRS v1.0 Published 5/3 UPDATE v1.1 Published 8/12 MAP Stage Availability Multiple* Customer Training Multiple* PROD Multiple* <p>* The plans for testing and deployment will vary between improvement items as these may be released individually or in groups. More information on specific improvements will be made available as planning and schedules are solidified.</p>

Operations Systems Improvements Enhancements

List of Proposed Improvements*

***PLEASE NOTE: This list may change as the project progresses and priorities are factored. The goal is to provide advanced notification of changes whenever possible**

2023

System	Summary Description	
RC Portal	View-based alerting: Create a view that filters the library and alerts user for changes to that specific view (when documents become available or changed).	Training Materials/Release Notes – 1/3/23
RC Portal	RAS Submit Reports workflow: Track if a report has been reviewed and communicate within the record.	
RC Portal	Add Title to TOP-003 Library: Add Title so name of document isn't only shown	PROD – 1/5/23
Market	Modify Unit Details UI	Outreach/Release Note – 2023 PROD - 2023

2023 CRR System Upgrade

2023 – Congestion Revenue Rights (CRR) Upgrade

Project Information	Details/Date
High Level Project Scope	<p>The Congestion Revenue Rights (CRR) system was implemented by CAISO in 2008 as part of the Market Redesign and Technology Upgrade (MRTU) implementation. The current CRR system is at its end of life, does not have the flexibility to accommodate future policy changes and requires the ISO to calculate data and run processes manually outside the current system to produce a successful CRR Auction.</p> <p>The CAISO has decided on a significant upgrade of the existing CRR system and adopt the latest technology stack aligned with CAISO's technology standards, consolidate all CRR related functions, minimize human errors, reduce processing time, eliminate manual workarounds, and positions the system to accommodate policy changes down the road.</p>
BPM Changes	Yes, details TBD
Tariff Change	No
Impacted Systems	CRR, AIM, CMRI, OASIS, CTS, Market Clearing, EMMS, IFM/RTN, MQS, Master File, MPP, Settlements, WebOMS, ETCC.

2023 – Congestion Revenue Rights (CRR) Upgrade

System	High Level Changes
CRR	<p>Significant system upgrade including:</p> <ul style="list-style-type: none"> • Enhancements made to the new CRR application. • Automatic publishing of CRR market results. • Automatic CRR notification. • New CRR schedule calendar. • New CRR FNM access. • New CRR data submission and download interface UI/API. • Other TBDs identified through BRS development.
AIM	<ul style="list-style-type: none"> • New users and roles to support new CRR functionality
CMRI	<ul style="list-style-type: none"> • Full and incremental Payload publishing • Publish CRR Awards payload on event-driven, ad-hoc or scheduled basis • Publish CRR Awards payload on event-driven, ad-hoc or scheduled basis
OASIS	<ul style="list-style-type: none"> • Publish CRR Calendar, and all available CRR market names, and credit margin information, 3 year historical expected value.. • Allow authorized users to publish CRR inventory payloads • Broadcast the following: set aside values, the results of all CRR markets, retired pnode/anode mapping, binding constraints, initial and updated CRR source and sink list for each CRR market,
CTS	<ul style="list-style-type: none"> • Broadcast
EMMS	<ul style="list-style-type: none"> • CRR will consume data from EMMS
IFM/RTN	<ul style="list-style-type: none"> • CRR will consume data from IFM/RTN
MQS	<ul style="list-style-type: none"> • MQS will consume and process SCID in a new format • MQS will consume ownership payload in bulk
Master File	<ul style="list-style-type: none"> • Master File will be modified as needed to support the new CRR functionality
MPP	<ul style="list-style-type: none"> • CRR will provide pre-configured external reports
Settlement	<ul style="list-style-type: none"> • Settlements will be modified as needed to support the new CRR functionality
WebOMS	<ul style="list-style-type: none"> • CRR will consume data from WebOMS
ETCC	<ul style="list-style-type: none"> • CRR will consume data from ETCC

2023 – Congestion Revenue Rights (CRR) Upgrade

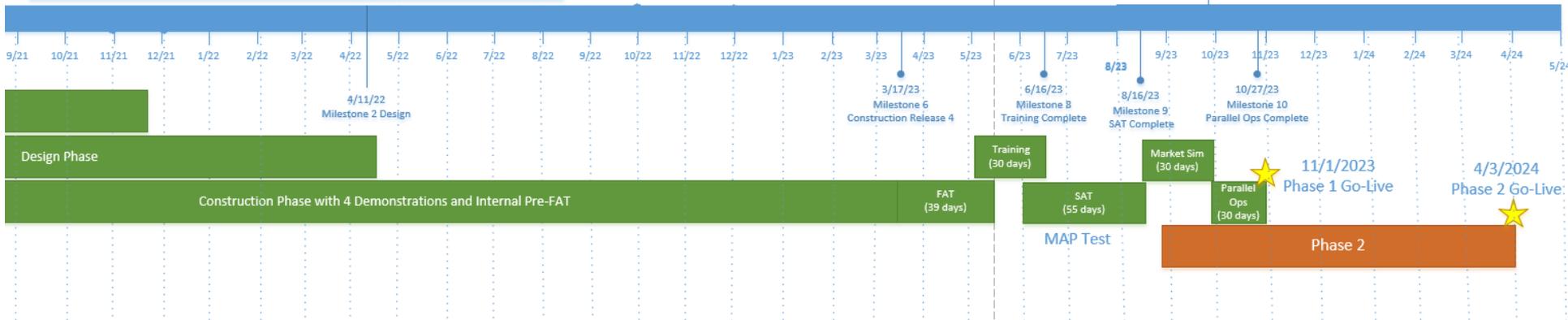
Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Publish External BRS	N/A	
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Publish Technical Specification	Draft 11/5/21	✓
Tariff	File Tariff	N/A	
BPMs	Publish Draft BPM updates	Mar 1, 2023	
External Training	Deliver External Training	May 8, 2023 – Jun 16, 2023	
Market Sim	Market Sim Window	Aug 17, 2023 - Sep 27, 2023	
Production Activation	CRR Upgrade	Nov 1, 2023	
Effective Date	First Trade Date for Monthly Auction results on new system	Jan 1, 2024	
Phase 2 Production Activation	Phase 2 Go-Live	Apr 3, 2024	

2023 CRR System Upgrade – Milestone Schedule

CRR System Replacement Timeline

Schedule approved by CAISO and RI

Contract amendment in progress



Phase 2 scope is being added to the External BRS.

[Link to Business Requirements Specifications - Congestion Rights Revenue Upgrade \(posted 5/10/2022\)](#)

2023 CRR System Upgrade – Get Connected

- CRR External meetings:
 - **Bi-weekly Technical User Group (TUG)** Tue 10 AM, alternates with RUG.
 - Meetings available on the CAISO calendar on www.caiso.com
 - Meeting details and presentation materials are available on the CAISO Developer site at www.developer.caiso.com , which requires an account to be setup for access
 - **CRR Customer Partnership Group**
 - Next CPG meeting is Wed, 1/18/22 @ 10 AM

2024 Settlement Upgrade

2024 - Settlement Upgrade - Overview

The current settlement system, implemented in 2008 as part of the Market Redesign and Technology Upgrade (MRTU) implementation, is nearing its end of life. The CAISO is upgrading existing settlement applications to approved architectural and information security standards.

Benefits for our customers include:

- Improved business efficiency
- Better gathering and analysis for data and front-end improvements for customers interacting with CAISO Settlement Systems
- Increased transparency for some calculations
- Accommodating data processing increases resulting from new market products and an increase in market participants
- Ability to perform complex settlement calculations

2024 - Settlement Upgrade – Get Connected

- Vendors and Market Participants plan to attend:
 - **Settlement User Group (SUG)** 10 AM on Wednesdays, alternating with RUG. (Next meeting 3/2)
 - Schedule updates, request for enhancements, Configuration change details, examples, calendar format differences etc.
- Settlement technical users plan to attend:
 - **Bi-weekly Technical User Group (TUG)** 10 AM on Tuesdays, alternating with RUG. (Next meeting 3/1)
 - B2B Improvements and New API specifications will be presented and discussed in this meeting
 - meeting details and presentation materials are available on the CAISO Developer site at www.developer.caiso.com , requires an account setup for access

Note: Meetings are available on the CAISO calendar on www.caiso.com

2024 - Settlement Upgrade – Targeted Goals

- The ISO will work closely with our market participants to ensure seamless transition from e-terra 2.5 to 3.0 configuration output file.
- The ISO will provide a forum for participants to ask more technical questions.
- The ISO will provide an environment with production-like data allowing customers to validate changes.
- The system will provide settlement outputs in various file formats, allowing all customers to access and use the data in day-to-day operations. The ISO will strive to make formulas and inputs transparent to enable market participants to monitor and/or validate settlement results.
- The ISO will provide market participants with an extended market simulation
- The ISO will give timely support to the market participants and their vendors during the testing phase.

2024 - Settlement Upgrade – Targeted Goals Cont.

- From a vendor perspective:
 - ISO will provide third party vendors with support during the transition period.
 - ISO will provide an extended market simulation and/or parallel statements and invoices during the transition period so vendors can resolve defects on their systems.
 - ISO will provide open communications to resolve settlement differences through a customer forum.

2024 - Settlement Upgrade – We would like to hear from you

- Decomposition of the settlement files
 - Migrating to OpenAPI specifications
 - Upgrading to a new output config file format
 - Any other enhancement requests?
-
- Next steps
 - Use the CIDI process to submit comments and enhancement requests. Your submittal will be reviewed and added to a master list that will be presented at the Settlement User Group (SUG)
 - The CIDI ticket will be closed once added to the SUG master list.

Stay Informed

Ways to participate in releases

- Visit the Release Planning page
 - <http://www.aiso.com/informed/Pages/ReleasePlanning/Default.aspx>
- Attend meetings
 - Release Users Group (RUG) bi-weekly meetings
 - Initiative status updates
 - System change updates on independent releases
 - Market Simulation calls
 - Visit the ISO calendar at www.aiso.com for meeting dates and times and add events to your calendar
 - Typically held on Mondays and Thursdays
 - Market Performance and Planning Forum
 - Bi-monthly review of market performance issues
 - High level discussion of release planning, implementation and new market enhancements

User Group Calendar - 2023



2023

Release User Group Meetings

Note: dates subject to change; for the latest information please visit the Calendar on www.caiso.com

January						
Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February						
Su	Mo	Tu	We	Th	Fr	Sa
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

March						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	



2023

Technical User Group Meetings

Note: dates subject to change; for the latest information please visit the Calendar on www.caiso.com

January						
Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February						
Su	Mo	Tu	We	Th	Fr	Sa
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

March						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	



2023

Settlement User Group Meetings

Note: dates subject to change; for the latest information please visit the Calendar on www.caiso.com

January						
Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

March						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	



What to look for on the calendar...

Calendar of Meetings, Training and Events

Month: February Year: 2018 Calendar View List View Print View

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	5 WebCONF: Market Simulation 2:00pm - 3:00pm	6 Training: Get to Know the ISO - Day 1 9:00am - 4:00pm WebCONF: Imbalance Conformance Enhancements 10:00am - 12:00pm WebCONF: Technical User Group 10:00am - 11:00am	7 Deadline: Comments - Interconnection Process Enhancements 2018 - Issue Paper and Meeting Discussion Training: Get to Know the ISO - Day 2 9:00am - 4:00pm Meeting: Flexible Resource Adequacy Criteria Must Offer Obligation Phase 2 - Revised Draft Flexible Capacity Framework 10:00am - 4:00pm WebCONF: Market Settlement User Group 10:00am - 11:00am	8 Meeting: Audit Committee Teleconference (Executive) 3:30pm - 9:30am Training: Settlements 101 9:00am - 4:00pm Meeting: 2017-2018 Transmission Planning Process 10:00am - 4:00pm WebCONF: Market Simulation 2:00pm - 3:00pm	9 Training: Settlements 201 9:00am - 4:00pm	10
11 WebCONF: Participating Transmission Owner Per Unit Cost Guides 10:30am - 12:00pm WebCONF: Market Simulation 2:00pm - 3:00pm	12 Meeting: Congestion Revenue Rights Auction Efficiency 10:00am - 4:00pm WebCONF: Release User Group 10:00am - 11:00am Call: Energy Imbalance Market Governing Body Teleconference (Executive) 11:30am - 12:30pm	13 Deadline: Submissions - April 2018 Monthly Resource Adequacy and Supply Plans Call: Congestion Revenue Rights 11:00am - 11:30am WebCONF: Outage Management System Customer Partnership Group 2:00pm - 3:00pm	14 Deadline: Comments - Review Transmission Access Charge Structure Straw Proposal and Meeting Discussion Call: Board of Governors Teleconference (General) 3:15pm - 9:00am Call: Board of Governors Teleconference (Executive) 9:00am - 10:00am Call: Market Update 10:15am - 11:00am WebCONF: Market Simulation	15	16	17

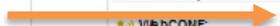
Market Sim



Market Sim



Release Users Group (RUG)



Agenda Topic suggestions

MPPF related materials are available on the ISO website [here](#).

Agenda topic suggestions:

- Submit through CIDI
 - Select the *Market Performance and Planning Forum* category
- Send email to isostakeholderaffairs@caiso.com. Subject MPPF

Upcoming meetings

The next MPPF is scheduled for March 16, 2023.



2023

Market Performance and Planning Forum Meetings

Note: dates subject to change; for the latest information please visit the Calendar on www.caiso.com

March						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June						
Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

September						
Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

December						
Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

 Meeting

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Updated: 12/14/22, BC

Upcoming meetings

The next MPPF is scheduled for March 16, 2023.

