California ISO

Market Performance and Planning Forum

Q2

June 27, 2024

Housekeeping Forum 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
- This call is being recorded for informational and convenience purposes only. Any related transcriptions should not be reprinted without ISO's permission.
- Please keep comments brief and refrain from repeating any comments previously made.

Instructions to ask a question

- Select the raise hand icon  located in the lower tool bar. You will hear a beep tone when you are un-muted; at that time please state your name, and question.
- Phone only use *3 when dialed into the meeting.
  - Please remember to **state your name** **and affiliation** before making your comment.
- If you need technical assistance during the meeting, please send a chat to the event producer.
- Do not mute yourself until you have completed your question or comment. WebEx platform will LOCK and mute you if you mute yourself once you have finished your question.

Objective: Enable dialogue on implementation planning and market performance issues

- Review key market performance topics
- Share updates to 2024-2025 release plans, resulting from stakeholders inputs

Market Performance and Planning Forum

Agenda – June 27, 2024
10 a.m. – 3 p.m. (PST)

Time:	Topic:	Presenter:
10:00 – 10:05	Introduction, Agenda	Brenda Corona, Stakeholder Affairs
10:05 – 10:45	Policy Update	Becky Robinson, Market Policy Development
10:45 – 11:30	Release Update	Trang Vo, Project Management
11:30 – 12:00	Market Performance Update - Load Conformance - WEIM transfer limitations - Renewable integration and oversupply	Market Performance and Advanced Analytics
12:00 – 13:00	Break	
13:00 – 14:00	Market Performance Update -Continuation - Storage resource performance - FRP performance - Market Issues - General Market Performance	Market Performance and Advanced Analytics Short Term Forecasting

POLICY UPDATE

Becky Robinson
Director, Market Policy Development

Extended Day Ahead Market (EDAM) & Day Ahead Market Enhancements (DAME)

- On June 11th, FERC issued an order accepting the EDAM Access Charge design.
  - With that order, the EDAM Tariff is fully FERC-approved.
- In July, we plan to hold a DAME implementation stakeholder meeting to provide a testing timeline, testing approach, and set expectations on communications and engagement with stakeholders.
  - This is a precursor to our commitment to hold implementation working groups to test and refine certain “tunable parameters.”
- In July, we plan to initiate a new initiative to enable and support Inter-Scheduling Coordinator Trades in WEIM and EDAM.

WEIM Resource Sufficiency Evaluation Enhancements (RSEE)

- Implementation of enhancements to E-tagging process
  - Align market E-tags to market results to enable identification of lower priority exports in the event post-market curtailments are necessary
  - Expected July 1, 2024
- Planned Q3/Q4 2024 kick-off for RSEE Phase 3
  - Scope will be informed by summer 2023 and winter 2024 lessons learned
  - Proposed Decisional Classification: Joint Authority

Rules of Conduct and Penalty Enhancements

- Rules of Conduct Enhancements Phase 1: Implemented on April 1, 2024
- Penalty Enhancements: Demand Response, Investigations, and Tolling -- Revised Straw Proposal released May 24, 2024
  - Define submission timeline and penalty for demand response monitoring data
  - Streamline Rules of Conduct investigative process
  - Update penalty tolling process
  - Materiality threshold for inaccurate meter data penalty
- Proposed decisional classification: Joint Authority
  - September 2024 (tentative)

Price Formation Enhancements working groups

- Expedited stakeholder process to allow limited energy resources to include their opportunity costs in supply offers when they exceed the $1000 soft offer cap.
  - Approved by the Board/Governing Body in May 2024
  - Filed with FERC on May 31
  - Targeting August 1 effective date

- ISO is evaluating next steps based on working group sessions to date on scarcity pricing, BAA-level market power mitigation, and fast-start pricing, as well as on continuing the conversation on bidding above the soft offer cap.

Greenhouse Gas Coordination (GHG) working group

- The GHG coordination working group meetings are working towards evaluating and evolving the ISO's GHG accounting design.
- The problem statements in development are focused on:
  - Reviewing current GHG design
  - Considering new approaches for states that may not have a price on carbon
  - Developing emissions tracking, additional data transparency, and accounting to support market participants
- The most recent working group meetings have further explored solutions to reflect non-priced state climate policies, using in-market and out-of-market approaches.
- As a result of working group efforts the ISO has published average annual emissions rate data for 2022 and 2023 and has started publishing monthly data for 2024: https://www.caiso.com/library/average-emissions-rate-reports

Gas Resource Management working groups

- Stakeholders identified problem statements, and potential solutions, associated with three main issue areas:
  - Increasing certainty for advance fuel procurement,
  - Precision of gas market inputs used for electricity market operations, and
  - Facilitation of resource-specific cost adjustments.
- Working groups discussed ISO analysis of gas price volatility and cost adjustment functionality to ensure diverse stakeholder experiences are accurately represented.
- Published a working group discussion paper with stakeholder recommendations for policy development in May 2024. Planning an issue paper / straw proposal in July.

Transmission Services and Market Scheduling Priorities (TSMSP)

- Wheeling through priority automated systems implemented seamlessly in April.
  - Support the calculation of ATC and processing of requests for ATC.
  - New functionality for Daily ATC now implemented and market participants can now request to reserve daily ATC.
  - As of June 1 wheel through priority established through the new process (monthly and daily) can be scheduled.
- Petition for a limited waiver of the tariff provisions for the resale of wheeling through priority filed in April.
  - Anticipate implementation of this feature in late Q3 2024.
- TSMSP phase 2, focused on the study and expansion process for establishing wheel through priority on a long-term basis, is being evaluated in light of Order No. 2023 interconnection process enhancements and FERC guidance.

Resource Adequacy (RA) working groups

The working group issued a *Revised Discussion Paper and Draft Recommendations* paper which suggests the following issues move to either policy development or a future working group:

Track 1: Modeling & Default Standards

- LOLE Modeling
- Default PRM and default counting
- UCAP for default counting, in collaboration with the CPUC and other LRAs
- Incorporating ambient derates due to temperature

Track 2: Outage and Substitution & RAAIM Reform

- Reforming the ISO's outage and substitution processes
- Reforming RAAIM

Track 3: Backstop Reform

- Increase the ISO's visibility into available backstop capacity
- Increase transparency to SH on backstop decision making
- Updating the current backstop product
- Longer term solutions to the ISO BAA RSE in curing deficiencies and assigning costs

Continued Working Group Topics

- Requirements for RA Capacity (energy sufficiency, Flex RA)
- Deliverability
- Continual assessment of interoperability with existing and emerging RA programs

ISO BAA Day-Ahead Sufficiency

- Straw Proposal posted on May 6th covering three main areas:
  - Process for making the 9 AM advisory ISO BAA day-ahead Resource Sufficiency Evaluation (RSE) a meaningful estimate of available supply across market participants,
  - Accounting for Reliability Demand Response Resources (RDRR) and Strategic Reliability Reserve (SRR) resources in the advisory RSE, and
  - Curing forecasted RSE shortfalls.
- Stakeholder call on the Straw Proposal held on May 13th
- Stakeholder comments on the Straw Proposal received May 28th

Policy initiative process

Stakeholder meetings, working groups and workshops may occur throughout the process

This represents the typical process, and often stages run in parallel.

**Discussion papers and working groups will be incorporated into the process as needed.*

Current policy initiative status

	2024			
	Q1	Q2	Q3	Q4
Items under Joint Authority				
DAME				Implementation working groups
EDAM	Implementation activities			
Gas Resource Management	Working groups	Discussion paper	Issue paper Straw proposal	Final Proposal Decision Decision
Greenhouse Gas Coordination	Working groups		Action plan	Action plan
Penalty Enhancements: Demand Response, Investigation, and Tolling		Straw proposal	Final proposal Decision	
Policy Catalog & Roadmap	Working groups		Final Catalog	Final Roadmap

California ISO

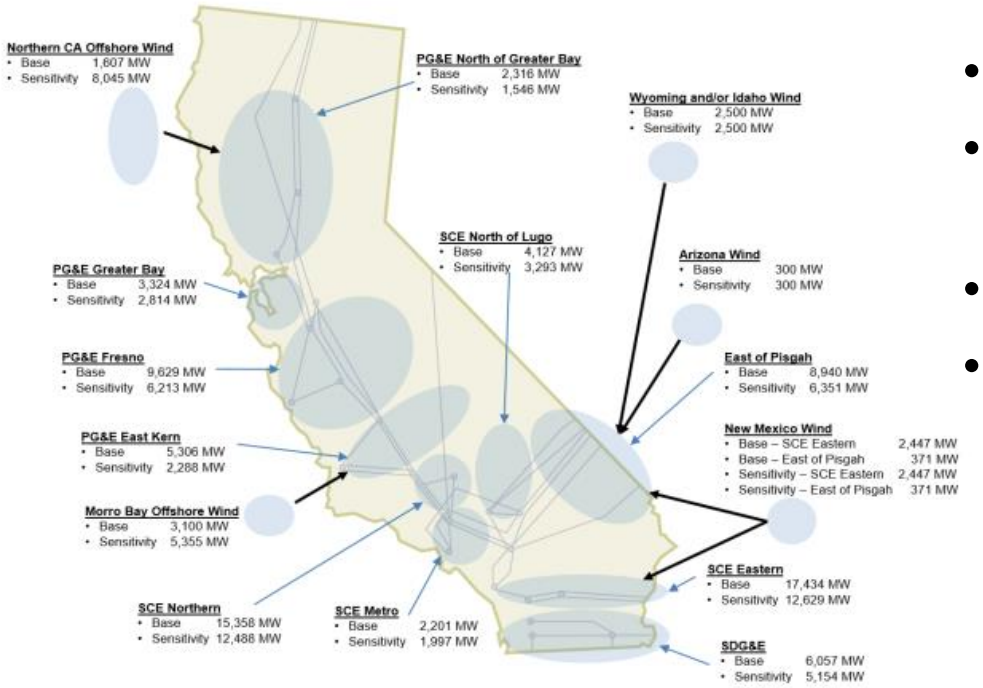
Pre-proposal development
Proposal development
Decision
Implementation

Current policy initiative status

Price Formation Enhancements	**Working groups**		**Straw proposal**	
Rules for Bidding Above Soft Offer Cap		**Straw proposal Final Proposal**	**Implementation**	
		Decision		
Rules of Conduct Enhancements		**Implementation**		
WEIM Resource Sufficiency Evaluation Enhancements		**Phase 2 implementation enhancements**	**Phase 3 issue paper**	
Items not under Joint Authority				
Day-Ahead Sufficiency		**Straw proposal**	**Final proposal**	**Decision**
Resource Adequacy Modeling and Program Design	**Working groups**		**Issue paper Straw proposal**	
		Policy recommendations		
Transmission Services and Market Scheduling Priorities	**Manual implementation activities**	**Automated implementation & tariff changes effective**		

2023-2024 TRANSMISSION PLAN

The 2023-2024 Transmission Plan enables reliability and policy goals.

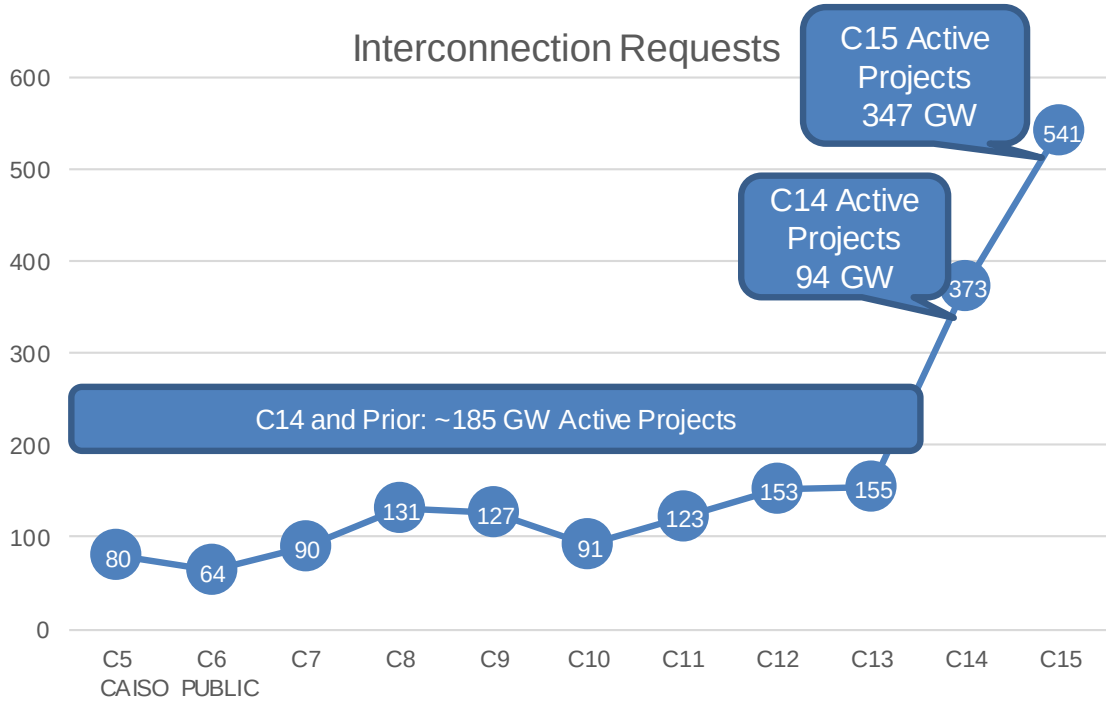


- Over 85 GW of capacity by 2035 reflecting GHG reduction goals and load growth due to electrification
- 26 transmission projects
- $6.1 billion total infrastructure investment
- Phased in over 8-10 years
- Considered transmission upgrades, preferred resources (e.g. storage), grid-enhancing technologies (GETs), and remedial action schemes.
- New reliability-driven and policy-driven projects, notably to integrate offshore wind in the North Coast.

INTERCONNECTION PROCESS ENHANCEMENTS TRACK 2

Current circumstances necessitate transformative changes to the interconnection process

- CPUC resource portfolios call for over 7,000 MW per year for the ISO's 2023-2024 planning cycle
- Interconnection requests continue to skyrocket
  - Many in areas not part of state resource plans, and in high volumes even in those areas
  - Cluster 15 in April 2023 vastly exceeded expectations
  - The queue now has roughly three times the capacity of that which will be needed to achieve California's 2045 requirements



Transformative change is critical to adapting to increased demand and competition for new generation

- Final proposal prioritizes
  - alignment with state and local resource plans
  - transmission availability
  - procurement needs
  - project readiness
- Queue management reforms will drive continued advancement of projects in the queue and provide clear authority for the ISO to withdraw stagnant projects
- Action is critical to address lengthening interconnection delays
- The ISO will continue to explore outstanding issues around deliverability in Track 3 this summer and fall.

Release Plan Update

Trang Vo
Release Manager,
Project Management

Release Plan Summary

Summer 2024 Release

- ✓ Transmission Service & Market Scheduling Priorities Phase 2 (✓ Monthly & ✓ Daily)
- ✓ ASSOC Retroactive Enhancement – Settlements (retro to 7/1/23)

Independent 2024 Releases

- ✓ Operations Foundational Improvements – CIRA Enhancement for Automation of Import Allocation Process
- ✓ CAISO Website Replacement
- URL & IP Changes (& AUP Changes) – Application Delivery Resiliency
- WEIM Resource Sufficiency Evaluation Enhancements Phase 2 Track 2 – Post HASP Curtailments
- Advisory Shutdown Flag Data
- Price Formation Enhancements
- Highest Emergency Rating
- Transmission Service & Market Scheduling Priorities Phase 2 – Resale Scope
- Hybrid Resources Phase 2C – RIMS
- Transmission Exchange Agreement
- Congestion Revenue Rights System Upgrade
- FERC 881 – Managing Transmission Line Ratings Track 2 – Operational/EMS Model Data & Applications

Spring 2026 Release

- Day-Ahead Market Enhancements Activation
- EDAM ISO BAA Participation Rules Track A
- Extended Day-Ahead Market Activation
- EDAM Onboarding Pacificorp & BANC
- WEIM BHE Montana

Future Release

- Settlement Upgrade Project – Next RUG/SUG quarterly update July 2024

Summer 2024 Release

Summer 2024 – Transmission Service & Market Scheduling Priorities Phase 2

Project Information	Details
High Level Business Need	Presents a long-term, durable framework to establish wheeling through scheduling priorities in the ISO markets that can further evolve with operational experience. It does not focus on, nor does it change, the processes for wheeling out or exporting from the ISO BAA. This project introduces a design to identify Available Transfer Capability (ATC) that can be allocated to Priority-Wheeling-Through (PWT) across the ISO system. This project also provides opportunity for external entities to drive transmission upgrades across the ISO system to support a wheeling-through . Will result in updates to the Wheel Export Quantity PC. The Original Wheeling Priority SC should be charged WAC for the Maximum of Wheeling Priority Quantity and scheduled export. If a resale should occur the purchaser of the resale Wheeling Priority Quantity should be assessed WAC on the maximum of schedule export less purchased Wheeling priority MW and zero.
High Level Project Scope	The following are the key design elements for Priority-Wheeling-Through (PWT) : • Calculating PWT Available Transfer Capability (ATC) • Awarding PWT ATC to PWT Requests • Using PWT Awards in Market Operations • Settling PWT Awards and Schedules • Transmission Planning for PWT Capacity
BPM Changes	• Market Instruments – MF & SIBR Changes • Market Operations – ITS, DAM, RTM Changes • Reliability Requirements – Internal System Changes • Settlements and Billing – Settlements Changes • Transmission Planning Process – Impact for long term ATC • Generator Interconnection and Deliverability Allocation Procedures – Impact for long term ATC
Tariff Changes	• §23.1, §23.2, §23.3, §23.4, §23.5, §23.6, §23.7 • §26.1.4.5 • §30.5.1 • §34.12.3 • §Appendix A • §Appendix L • §Appendix DD • § New Appendix GG Long-Term Transmission Service & Market Scheduling Priorities
Impacted Systems	• AIM • CIRA • MF • New system for ATC calculation, access, and reservation • SIBR • RTM • Settlements • OASIS • RIMS

Summer 2024 – Transmission Service & Market Scheduling Priorities Phase 2

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Feb 01, 2023	✓
External BRS	Post External BRS	Jan 31, 2024	✓
Settlements	Tech Doc	Feb 12, 2024	✓
Config Guides	1st Draft Config File & Release Component Summary	March 4, 2024	✓
Tech Spec	Create ISO Interface Specifications – OASIS	Jan 12, 2024	✓
Tariff	Filed ER23-2510 for Wheeling Through	Jul 28, 2023	✓
	FERC Acceptance of ER 23-2510 (calculation of available transfer capability (ATC) and the process for establishing market scheduling priority for wheeling through the ISO transmission system)	Oct 30, 2023	✓
	Compliance Filing	Nov 29, 2023	✓
	Petition for Limited Waiver for resale or assignment of monthly Wheeling Through Priority	**Apr 12, 2024**	✓
	Track 2 DTL	Jul 14, 2023	✓
	Track 2 Revised DTL	Oct 05, 2023	✓
	Track 2 Final DTL	Dec 19, 2023	✓
	File Track 2 (study and expansion process for establishing wheel through priority on a long-term basis)	2024	
BPMs	Draft BPM changes – Market Instruments (PRR1558)	Mar 20, 2024	✓
	Draft BPM changes – Market Operations (PRR1548)	Jan 16, 2024	✓
	Draft BPM changes – Market Operations (Automation) (PRR 1570)	Apr 19, 2024	✓
	Draft BPM changes – Reliability Requirements		
	Draft BPM changes – Settlements and Billing (PRR1560)	Mar 20, 2024	✓
	Draft BPM changes – Transmission Planning Process		
	Draft BPM changes – Generator Interconnection and Deliverability Allocation Procedures		
Training	Training (Monthly)	Feb 27, 2024	✓
	Training (Daily)	Apr 04, 2024	✓
Production Activation	Implementation of wheeling through priority process supports load service planning for Summer 2024		
	ISO begin implementation thru manual processes		
	- Publication of Monthly ATC values for June 2024 to January 2025 (13-month horizon)	Jan 16, 2024	✓
	- Request window opened (Submit via CIDI)	Jan 18 – Jan 31, 2024	✓
	- Results communicated	Feb 5, 2024	✓
	Monthly Scope: New automation functionality available to support reservation of Monthly and Daily ATC in June 2024 and beyond	Apr 19, 2024	✓
	Daily Scope: Transmission Service & Market Scheduling Priorities Phase 2 – Activate daily and long-term increment calculations	May 24 for Jun 01, 2024	✓
	Resale Scope: Resale or Assignment of Monthly Wheeling Through Priority	**Q3-Q4 2024**	
	OASIS ETC Data	**2024**	
	2024 Monthly Wheeling Through Priority Request Due Dates		

Independent 2024 Releases

2024 - UI & API URL & IP Changes (Application Delivery Resiliency)

- UI:
  - ✓ All new UIs available now
  - ✓ Old UI URLs decommissioned 2/6/24 except BAAOP/BSAP UIs
  - ***> Old UI URLs for BAAOP/BSAP to be decommissioned July 01, 2024***
  - ***> Portal and PortalEIM cutovers July 01, 2024***
- API:
  - ✓ All new API URLs available now
  - ***> Old API URLs to be cutover July 2024***

System	UI - New	UI - Old	API - New	API - Old
BAAOP	https://baaop.caiso.com		https://ws.prod.caiso.com/sst/baaop	https://ws.caiso.com/sst/baaop
BSAP	https://bsap.caiso.com		https://ws.prod.caiso.com/sst/bsap	https://ws.caiso.com/sst/bsap
CIRA	https://cira.caiso.com	NA - Cutover	https://ws.prod.caiso.com/sst/cira	https://ws.caiso.com/sst/cira
CMRI	**https://cmri.caiso.com**	**Cutover Complete**	https://ws.prod.caiso.com/sst/cmri	https://ws.caiso.com/sst/cmri
DRRS	https://drrs.caiso.com	NA - Cutover	https://ws.prod.caiso.com/sst/drrs	https://ws.caiso.com/sst/drrs
EIDE	NA	NA	https://ws.prod.caiso.com/sst/eide	https://ws.caiso.com/sst/eide
ALFS (& FDR)	NA	NA	https://ws.prod.caiso.com/sst/runtime.asvc	https://ws.caiso.com/sst/runtime.asvc
MF	**https://mf.caiso.com**	**Cutover Complete**	https://ws.prod.caiso.com/sst/runtime.asvc	https://ws.caiso.com/sst/runtime.asvc
PISOA	NA	NA	https://ws.prod.caiso.com/sst/runtime.asvc	https://ws.caiso.com/sst/runtime.asvc
RCBSAP	**https://rcbsap.caiso.com**	**Cutover Complete**	https://ws.prod.caiso.com/sst/rcbsap	https://ws.caiso.com/sst/rcbsap
RCSERVICES (RCEIDE)	NA	NA	https://ws.prod.caiso.com/sst/rcservices	https://ws.caiso.com/sst/rcservices
SIBR	**https://sibr.caiso.com**	**Cutover Complete**	https://ws.prod.caiso.com/sst/sibr	https://ws.caiso.com/sst/sibr
STLMT	https://stlmt.caiso.com	NA - Cutover	https://ws.prod.caiso.com/sst/stlmt	https://ws.caiso.com/sst/stlmt
OMS	https://weboms.caiso.com	NA - Cutover	https://ws.prod.caiso.com/sst/weboms	https://ws.caiso.com/sst/weboms
ECIC	NA	NA	https://ws.prod.caiso.com/sst/ecic	https://ws.caiso.com/sst/ecic
CRR	**https://crr.caiso.com**	**Cutover Complete**	NA	NA
PLC	**https://plc.caiso.com/**	**Cutover Complete**	NA	NA
TR	**https://tr.caiso.com**	**Cutover Complete**	NA	NA
ADS	https://ads.caiso.com	NA - Cutover	https://adsws.prod.caiso.com/	NA - Cutover
OASIS	http://oasis.caiso.com	NA - Cutover	http://oasis.caiso.com	NA - Cutover

Key
NA - Interface doesn't exist or already cutover
Available for Transition - Users should be using now, cut over to these now
Will be cutover - Users should move off these right away
Cuotover complete

2024 – WEIM Resource Sufficiency Evaluation Enhancements Phase 2 Track 2

Project Information	Details

High Level Project Scope	• **Track-2**
	  • Item2A – Clarification of Post-HASP Block Hour Low-Priority Export
	  • Operator-Driven Low-Priority Export Curtailment
	  • CAISO operator's ability to initiate pro-rata curtailment based on identified MW, given the following priority order:
	  • RTECON (RT economic hourly block export schedules that clear HASP).
	  • RTLPT (RT Self-Schedule hourly block export schedules not backed by Generation from non-RA Capacity and cleared HASP).
	  • Non-high-priority DA export [i.e. DAECON (DA economic hourly block export schedules that clear both RUC and HASP), or DALPT (DA hourly block export schedules not backed by Generation from non-RA Capacity that also cleared both RUC and HASP and are protected Self-Schedules)]
	  • CAISO operator's ability to identify/filter exports by market priority types as well as "Firm Provisional Energy (G-FP)" eTag identifier.
	  • Publish resource-specific market priority types and their associated MW data to ADS.
	• Item2B – Develop MF resource identification Capacity Test Failed-to-Start Rule Exemption flag to allow SCs of WEIM and CISO short start units that start with non-positive telemetry to identify specific resources that will be exempted from this functionality in RSE Capacity test. (Implemented in Phase 1 – enhancements needed)

BPM Changes	WEIM, Market Instruments, Market Operations
Tariff Changes	Yes
Impacted Systems	MF, Market, ITS, ADS

2024 – WEIM Resource Sufficiency Evaluation Enhancements Phase 2 Track 2

System	High Level Changes
MF	• Definition and Submission of Resource-Specific Capacity Test Failed-to-Start Rule Exemption Flag via GRDT • Make Resource-Specific Capacity Test Failed-to-Start Rule Exemption flag accessible to downstream systems.
ITS	• Clarification of Post-HASP Block Hour Low-Priority Export • Consume DAM Resource-Specific Market Priority Types and Resource-specific RUC Energy Awards from RUC. • Consume All Resource-Specific Market Priority Types from RTM. • SCs shall be required to submit Misc Info field Prior Type attribute for “Firm Provisional Energy (G-FP)” e-tags to identify RTECON, DAECON, RTLPT, DALPT. • SCs shall be required to submit Misc Info field Prior Type attribute for “Firm Energy (G-F)” e-tags to identify RTPT, DAPT. • Validate submitted export e-Tags against data received from RUC and RTM to approve/deny and adjust (if warranted) the submitted e-Tags.
Market	• Access Resource-Specific Capacity Test Failed-to-Start Rule Exemption flag from MF. • Exempt Specific Resources from Capacity Test Failed-to-Start Rule/Functionality. • Clarification of Post-HASP Block Hour Low-Priority Export • Broadcast All Resource-specific market priority types to ITS (from RTM).

ADS	• Clarification of Post-HASP Block Hour Low-Priority Export
	  • Consume Resource-Specific Market Priority Types and their Associated MW Data from RTM.
	  • Publish Resource-Specific Market Priority Types and their Associated MW Data.
	  • Include Resource-Specific Market Priority Types in ADS Query Functionality.

2024 – WEIM Resource Sufficiency Evaluation Enhancements Phase 2 Track 2

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval WEIM Governing Board Approval	Dec 14, 2022	✓
External BRS	Post External BRS Post External BRS v1.1 Post External BRS v1.2 Post External BRS v1.3 Post External BRS v1.4 Post External BRS v1.41	Mar 10, 2023 Mar 31, 2023 Jun 27, 2023 Sep 05, 2023 Sep 20, 2023 Sep 21, 2023	✓ ✓ ✓ ✓ ✓ ✓
Settlements Config Guides	NA	NA	
Tech Spec	ADS CMRI MFRDT Tech Spec MFRDT File Draft RDT Definitions Draft	Aug 10, 2023 Aug 10, 2023 Aug 10, 2023 Aug 22, 2023 Aug 29, 2023	✓ ✓ ✓ ✓ ✓
Tariff	Tariff (NA, and NA for activation change from Fall 2023 Release to 2024)	NA	
BPMs	Draft BPM changes – Market Instruments PRR 1531 Draft BPM changes – WEIM PRR 1532 Draft BPM changes – Market Operations PRR 1533 Draft BPM changes – Market Instruments PRR 1537 Draft BPM changes – Market Operations PRR 1536 Draft BPM changes – Market Operations PRR 1568	Aug 23, 2023 Aug 24, 2023 Aug 24, 2023 Aug 25, 2023 Aug 24, 2023 Mar 28, 2024	✓ ✓ ✓ ✓ ✓ ✓
Training	Training Low Priority Transaction (LPT) Export E-tagging Training Refresher Training (includes LPT Export E-tagging)	Sep 13, 2023 Feb 14, 2024 Mar 14, 2024	✓ ✓ ✓
Market Sim	Market Sim Window Market Sim – Pro Rata Curtailment	Sep 25, 2023 – Oct 13, 2023 Mar 19, 2024 – May 03, 2024	✓ ✓
Production Activation	Resource Sufficiency Evaluation Enhancements Phase 2 Track 2	Jul 01, 2024 (tentative)	

2024 – Advisory Shutdown Flag Data

Project Information	Details/Date
High Level Business Problem or Need	Problem: Missing input data value for existing BD, BA_5M_RSRC_ADVISORY_SHUTDOWN_FLAG, prevents CAISO from qualifying Minimum Load Cost consistent with Tariff 11.17.2.1, even if Settlements formulations currently exist. Solution: Work with upstream units to ensure advisory shutdown instruction data is broadcasted so that advisory shutdown flag BD can be created Use the input and reflect Minimum Load Costs qualification in Settlements
BPM Changes	Settlements & Billing, Market Instruments
Impacted Systems	Settlements, CMRI

Milestone Type	Milestone Name	Dates	Status
Board	Board	NA	
BRS	BRS BRS 1.1: BRAs 045 + 046: Add Instruction Cost field to CMRI	May 09, 2024 May 30, 2024	✓ ✓
BPM	Settlements & Billing PRR 1571 - Updating SUC MLC PC BPM documentation for Advisory shutdown flag for MLC qualification Market Instruments PRR 1574 - Addition of new Real Time Advisory Shutdown Instructions Customer Market Results Interface report	Apr 26, 2024 May 21, 2024	✓ ✓
Tech Spec	CMRI Tech Spec	May 13, 2024	✓
Training	Training	Jun 11, 2024	✓
Market Simulation Scenarios	Market Simulation Scenarios	Jun 10, 2024	✓
Market Simulation	Market Simulation	Jul 01 – Jul 12, 2024	
Production	Production	By Aug 1, 2024	

Additional slides were covered in the Apr 24, 2024 Settlement User Group (SUG), presentation and recording available here: www.caiso.com > Stay Informed > Meetings & Events > User groups and recurring meetings > Settlement User Group

2024 – Advisory Shutdown Flag Data Additional implementation details

1. A CMRI Report will be added to indicate advisory shutdown instructions used to create Advisory Shutdown Flag BD.
   - Per resource, indicates instruction time and corresponding time interval where an advisory shutdown flag will be applied.
2. Production effective date is **NLT Aug 1, 2024**. (Firmer date to be provided as we get closer.)
3. Unstructured market simulation prior to effective date.
4. ISO will be monitoring for incorrect usage of MLC and will take appropriate action if that behavior is observed, including referrals to DMM
5. Training was provided prior to market simulation.

2024 - Price Formation Enhancements – Rules for Bidding Above Soft Offer Cap

➢ Project Information	➢ Details/Date
➢ **High Level Project Scope**	➢ This initiative will explore several topics related to price formation in the California ISO markets focused on real-time market pricing. Scarcity prices are important to attract supply and incent resources to be available and perform. They are also important to provide appropriate price signals to reduce demand. Recent energy shortages and associated prices in the ISO real-time market have emphasized the need for the ISO to review and enhance its scarcity pricing provisions. Consequently, the ISO plans to consider the following topics in this initiative: (1) enhance real-time market scarcity pricing to better reflect tight supply conditions, (2) consider fast-start pricing, and (3) enhance how the real-time market uses advisory prices to dispatch resources.

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board approval	May 22, 2024	✓
Tariff	Draft Tariff Language Revised Draft Tariff Language **File with FERC**	May 13, 2024 May 20, 2024 **May 31, 2024**	✓ ✓ ✓
Policy	Final Proposal	May 17, 2024	✓
Workshop	Maximum Import Bid Price Workshop – Analysis on MIBP Shaping Factor	May 28, 2024	
BRS	**BRS**	**Jun 25, 2024**	✓
Training	Training	Jul 11, 2024	
Market Simulation	Market Simulation	Jul 16 – Jul 22, 2024	
Production	Production	Aug 01, 2024	

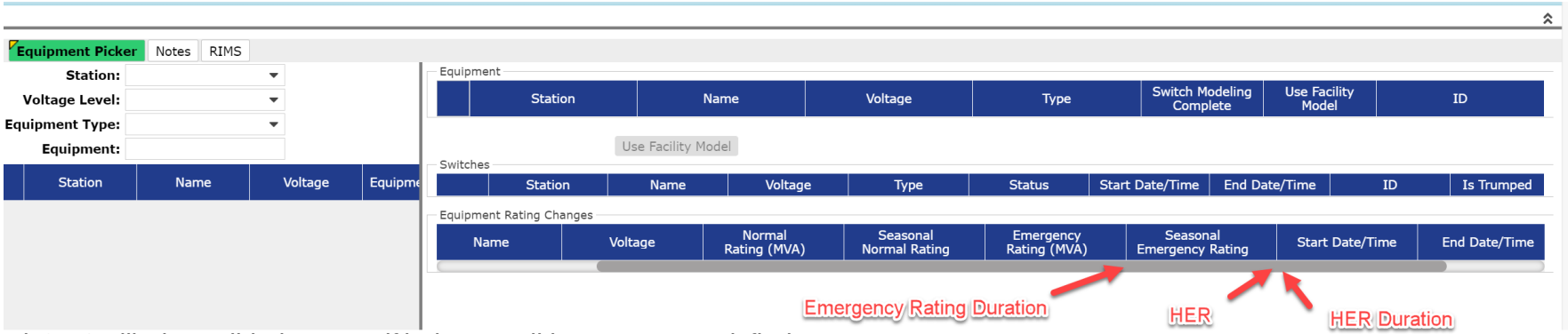
2024 – Highest Emergency Rating

Project Information	Details/Date
High Level Business Problem or Need	The project aims to primarily 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 minor defects or functionality enhancements identified in by the business units.
High Level Project Scope	This enhancement focuses specifically on internal ISO users and RC Customers having the capability to adjust the HER and ER duration in OMS. **Step 1 – HER data cleanup** • Load HER in EMMS in one of the existing slots • Transfer HER to RTCA during the network model build process **Step 2 – Use RTCA to update HER** • For interim changes to HER in between models, change the data directly in RTCA • Make the ER and HER duration and value fields editable • Include validation to make sure HER is not less than the emergency rating **Step 3 – WebOMS changes** • Work with OATI to include a new field for HER • HER can be updated in WebOMS in between model promotions • Updates to HER will be sent to downstream systems
BPM Changes	Not Impacted
Tariff Changes	Not Impacted
Impacted Systems	webOMS, HANA, Market

Milestone Type	Milestone Name	Dates	Status
Board	Board	NA	
BRS	BRS BRS 1.1	Feb 15, 2024 Apr 10, 2024	✓ ✓
Tech Spec	Present OMS in TUG OMS	Feb 27, 2024 Yes	✓
Market Simulation	Market Simulation	Aug 2024	
Production	Production	Q4 2024	

2024 - Highest Emergency Rating - OMS

- Three new fields will be added on the current OMS Derate User Interface and user will have capability to adjust the values through UI and API:
  - "Emergency Rating Duration" as integer, set in minutes.
  - "Highest Emergency Rating" as a numeric input.
  - "Highest Emergency Rating Duration" as integer, set in minutes.



WebOMS will give validation error if below conditions are not satisfied:

Rating Limits and Durations are not defined for ERC.
Highest Emergency Rating is less than active Emergency Rating.
Highest Emergency Duration is greater than Emergency Rating Duration.
If HER Limit and Duration values are partially complete.
If user want to enter ER greater than the current HER then would first have to adjust HER then update ER.

- If neither HER Limit and Duration values are defined, system should auto-fill the HER Limit and Duration values to match their associated Emergency Rating Limit and Duration values.
- Emergency Rating (ERC) flows to Market, RTCA, and EMS; and HER only flows to RTCA, and EMS. WebOMS will display a pop-up notification on submitting the ERC or HER through UI,API akin to SUCCESS message

- There will be XSD update on below services :

SubmitTransmissionOutage_v3-Regular and DocAttach
SubmitTransmissionOutageChangeRequest_v3-Regular and DocAttach
RetrieveTransmissionOutage_v3 - Regular and DocAttach
RetrieveTransmissionOutageChangeRequest_v3 - Regular and DocAttach.

2024 – Hybrid Resources 2C RIMS

Project Information	Details/Date
High Level Business Problem or Need	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 (hybrid and co-located resources) project participation in the ISO markets. Prior to this initiative, Phase 1 identified a first set of modifications generally concerned with setting up and operating co-located resources. Building on phase 1, 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.
High Level Project Scope	With this initiative, there's an opportunity to increase storage and the number of hybrid resources that can connect to the ISO grid. Currently the interconnection queue includes more than 24,000 MW of mixed fuel projects and nearly 20,000 MW of storage which represents roughly half of all generation in the current interconnection queue.
BPM Changes	Settlements & Billing
Impacted Systems	Summer 2023: Settlements Fall 2023: Metered Quantities for Hybrids **Independent 2024: RIMS** Completed: Today's Outlook, ISO Today Mobile Application, Reports
Requirements	http://www.caiso.com/Documents/BusinessRequirementsSpecifications-HybridResourcesPhase2.pdf

2024 – Hybrid Resources 2C RIMS

Milestone Type	Milestone Name	Dates	Status
External BRS	Publish External BRS Revision – Add 4 Market Simulation Business Requirements	Jan 31, 2023 Jan 04, 2024	✓ ✓
Settlements Config Guides	NA for RIMS	NA	
Tech Spec	Create and Publish ISO Interface Spec (Tech Specs)	NA	
Market Sim	Market Sim Window – RIMS	Q3 2024	
Production Activation	Hybrid Resources 2C – RIMS	Oct 1, 2024	

2024 – Transmission Exchange Agreement

Project Information	Details/Date
High Level Business Problem or Need	The ISO is committed to develop a process or system that allows Western Area Power Administration – Sierra Nevada Region ("WAPA") to resell some or all of their 400 MW ownership rights on the PACI#1 line to other SCIDs and retain the perfect hedge and scheduling priority to further contract negotiations to extend the term of the Transmission Exchange Agreement. The Transmission Exchange Agreement ("TEA") with WAPA-SNR, PG&E and ISO is scheduled to expire 9/30/2024. A term of the original agreement executed in 2004, was that the ISO would develop a system that allowed WAPA to sell their unused capacity on their line. This project provides solution to the scheduling issue which needs to be in place by June 2024 to ensure that the ISO has solved the problem and support filing an amendment and extension of the TEA at FERC.
High Level Project Scope	• WAPA needs functionality to sell their TOR to other parties on their OASIS. • If the TOR rights are sold then WAPA will notify the CAISO to provide the purchaser the hedging and scheduling priority opportunity provided all ETCs/TORs. • The market and settlement systems need to be able to "move" the Contract Reference Number ("CRN") from the WAPA CRN to the purchaser SCIDs so that the settlement to the purchaser SCID reverses the costs of the transmission access charge and congestion (aka the perfect hedge) and provides a high scheduling priority in the IFM and RTM. • WAPA will not take on the obligation to settle with their purchaser. • WAPA can sell any increments of MWs up to their 400 MW ownership rights. Therefore, the solution needs to be flexible enough to allow the "existing" TORs to vary the MWs capabilities. [Note: The MW increments to be sold can be no less than 5 MW.] • WAPA's functionality allows them to schedule between Malin and Round Mountain, Malin and PG&E DLAP, and Malin and Tracy. This would be the source and sink that that functionality needs to provide. • If there are outages on the line, the curtailment should be consistent with current practice.
BPM Changes	Settlements Configuration Guides
Tariff Changes	N/A
Impacted Systems	AIM, MF, CMRI

2024 – Transmission Exchange Agreement

Milestone Type	Milestone Name	Dates	Status
External BRS	Post External BRS	NA	
BRS	Provide to WAPA	Jan 23, 2024	✓
Settlements Config Guides	Tech Doc 1st Draft Config File & Release Component Summary	Feb 12, 2024 Mar 04, 2024	✓ ✓
Tech Spec	Create ISO Interface Specifications – CMRI UI: The current CMRI CRN report is not being changed. WAPA will be able to see Sub CRNs mapped to its own Parent CRN	Mar 26, 2024	✓
Tariff	NA	NA	
BPMs	Draft BPM changes – Settlements & Billing PRR 1559	Mar 20, 2024	✓
Market Simulation	Market Simulation – WAPA	Sep 16 – Oct 11, 2024	
Production Activation	Transmission Exchange Agreement Renegotiation	Q4 2024	

2024 - Congestion Revenue Rights (CRR) Upgrade

Project Information	Details/Date
High Level Project Scope	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. 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. **Congestion Revenue Rights (CRR) system replacement project scope is the roll-out of a:** • Brand new user-interface (UI) system with an updated new look-and-feel, to replace the existing legacy system implemented during the MRTU 2008 go-live and brought up to current ISO technology standards • Set of application-programming interfaces (APIs) to enable integration between ISO and market participant systems **Overall, to support the following in one consolidated CRR external-facing system:** • Annual/Monthly Auction and Allocation market participant bid submission and results retrieval • Load data submission by CRR LSEs, CEC • Load migration data submission by CRR UDCs • Secured "Congestion Revenue Rights Full Network Model" information access • Private and public access of CRR market input and output information
BPM Changes	Congestion Revenue Rights • Enhancements made to the new CRR product. • 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. • New CRR market results interface. • Load Migration
Tariff Change	No
Impacted Systems	CRR, AIM, CMRI, OASIS, CTS, Market Clearing, EMMS, IFM/RTN, MQS, Master File, MPP, Settlements, WebOMS, ETCC.

2024 - Congestion Revenue Rights (CRR) Upgrade

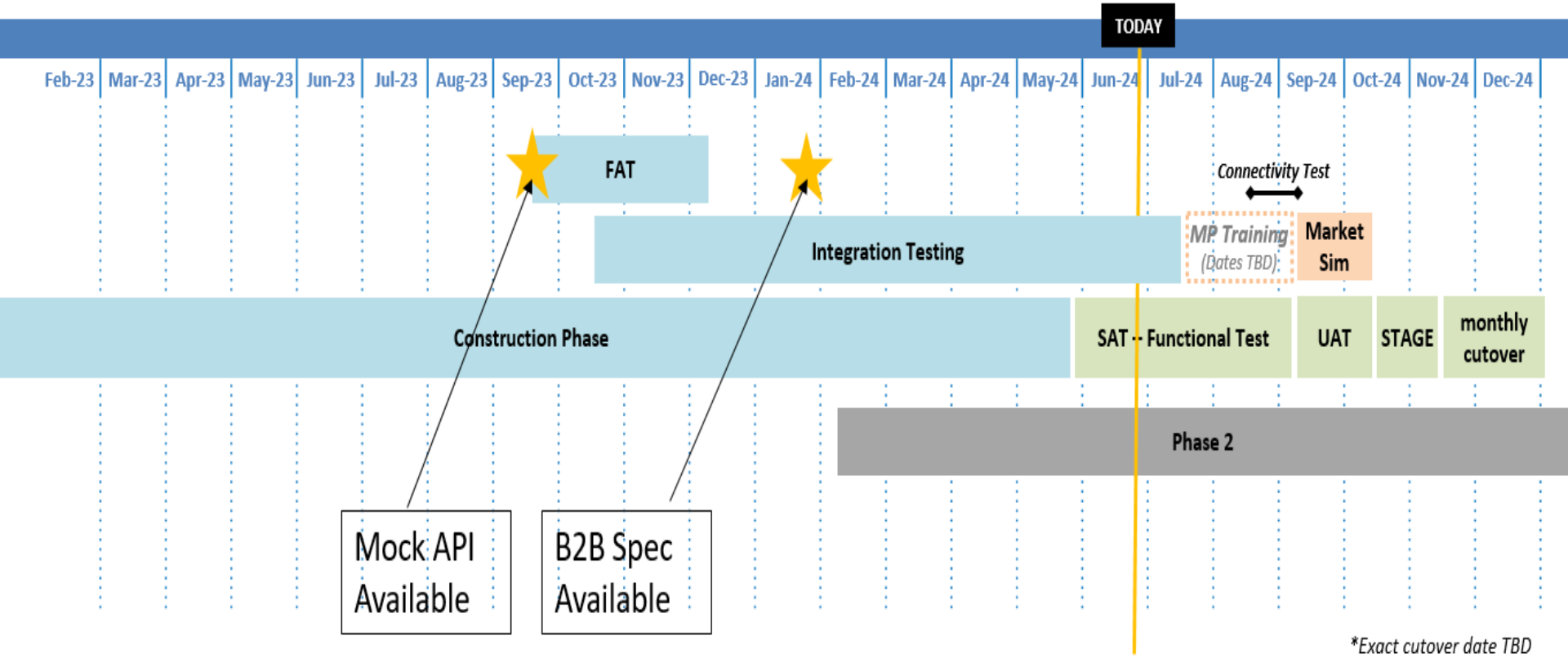
System	High Level Changes
CRR	Significant system upgrade including: • Enhancements made to the new CRR application. • Automatic publishing of CRR market results. • Automatic CRR notification. • New CRR schedule calendar. • New CRR FNM access. • New CRR data submission and download interface UI/API. • Other TBDs identified through BRS development.
AIM	• New users and roles to support new CRR functionality
CMRI	• 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	• 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	• Broadcast
EMMS	• CRR will consume data from EMMS
IFM/RTN	• CRR will consume data from IFM/RTN
MQS	• MQS will consume and process SCID in a new format • MQS will consume ownership payload in bulk
Master File	• Master File will be modified as needed to support the new CRR functionality
MPP	• CRR will provide pre-configured external reports
Settlement	• Settlements will be modified as needed to support the new CRR functionality
WebOMS	• CRR will consume data from WebOMS
ETCC	• CRR will consume data from ETCC

2024 - Congestion Revenue Rights (CRR) Upgrade

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	NA	
External BRS	Publish External BRS BRS Revision v1.3	Nov 16, 2022 Mar 29, 2023	✓ ✓
Config Guides	Post Draft Config Guides	Yes	
Tech Spec	Publish Technical Specification	Feb 24, 2023	✓
Deployment Plan	Draft Deployment Plan	Yes	
Training	Training	Yes	
Customer Partnership Group	**Last CPG** **Next CPG**	**May 30, 2024** **Jul 25, 2024**	✓

2024 - Congestion Revenue Rights (CRR) Upgrade

- Construction Phase is complete and Functional System Acceptance Testing (SAT) started
- Connectivity Testing starts in August
- Market Sim starts in September
- Annual Cycle Cutoff will be on current CRR System
- Monthly Cycle Cutoff will still be for Jan 1st 2025 on new CRR System



2024 - CRR System Upgrade – Get Connected

- CRR 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**
    - **Last CPG May 30, 2024; recording available**
    - **Next CPG meeting is Thursday, Jul 25, 2024**
    - Monthly
    - Meetings available on the CAISO calendar on www.caiso.com
    - Meeting details and presentation materials are available on www.caiso.com > Stay Informed > Meetings & Events > Customer Partnership Groups

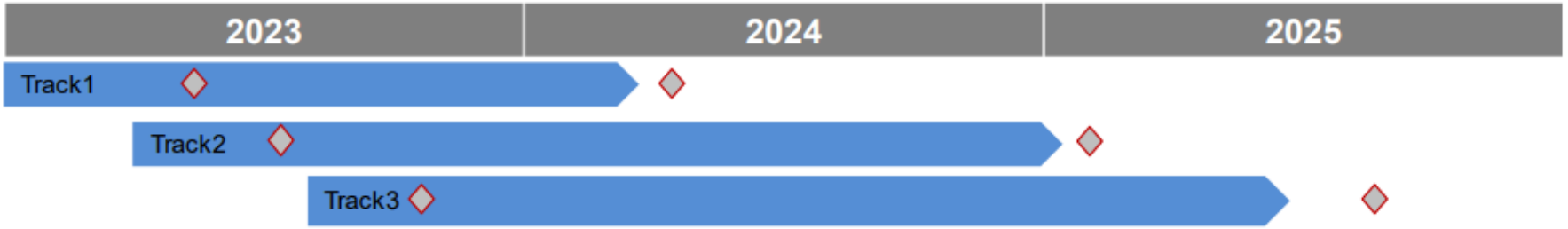
2024 – FERC 881 – Managing Transmission Line Ratings

Project Information	Details/Date

High Level Project Scope	This initiative will address the California ISO's compliance with FERC Order No. 881 in establishing new transmission line rating requirements
	
	Order No. 881 establishes new transmission line rating requirements for public utility transmission providers
	• Establish and use ambient-adjusted ratings and seasonal ratings for all transmission lines unless excepted
	  • Use AARs for near-term transmission service requests
	  • Use seasonal rating for long-term transmission service requests
	• RTOs/ISOs must implement systems and procedures to allow transmission owners to electronically update transmission line ratings at least hourly
	• Use uniquely determined emergency ratings for contingency analysis in the operations horizon and in post-contingency simulations of constraints
	• Implement transparency reform

Milestone Type	Milestone Name	Dates	Status
Tariff	Draft Tariff Language	May 20, 2022	✓
	Revised Draft Tariff Language	Jun 23, 2022	✓
	FERC Filing ER22-2362	Jun 16, 2022	✓
	FERC Acceptance ER22-2362	Apr 20, 2023	✓
	FERC Acceptance Tariff Revisions	Dec 13, 2023	✓
BRS	Publish BRS – Track 1 **Publish BRS – Track 1 (Updates & Added FAC-011)**	Jan 30, 2024 **Jun 11, 2024**	✓ ✓
Market Simulation	Market Simulation	NA	
Production	Track 1 Real-Time Reliability Applications	Apr 1, 2024	✓
	Track 2 Operational/EMS Model Data & Applications	2024/early 2025	

FERC 881 Project Timelines by Tracks



- **Track 1 – Real Time Reliability Applications**
  - Minor delays in application deliver timeline with FAC-11 additions to the project
  - Estimated - Target Capability to be ready by Q2 2024

- **Track 2 – Operational/EMS Model Data and Applications**
  - July 2023 - Complete Business Requirements
  - OATI WebLineR product will be utilized for receiving Look ahead ratings.
  - Estimated - Target Capability to be ready in late 2024/early 2025

- **Track 3 – Market Application and Look Ahead Applications**
  - Requirements phase will be started in Jan 2024.
  - Based on requirements gathering and vendor/internal resources constraints potential for delay in some aspects of implementation.
  - Estimated - Target Capability to be ready in Q2 2025.

Spring 2026 Release

DAME/EDAM implementation documents

- Notice: https://www.caiso.com/Documents/dame-edam-business-requirements-specifications-revisions-draft-parallel-operations-plan-dame-business-practice-summary.html
- Day-Ahead Market Enhancements and Extended Day-Ahead Market: Business Requirements Specifications Revisions and Draft Parallel Operations Plan; Day-Ahead Market Enhancements Business Practice Summary posted

The California ISO has posted the Day-Ahead Market Enhancements (DAME) and Extended Day-Ahead Market (EDAM) Business Requirements Specifications (BRS) revisions and Draft Parallel Operations Plan and the DAME Business Practice Summary (BPS) to the **Release Planning webpage**.

DAME BRS version 1.2

EDAM BRS version 1.2

Draft Parallel Operations Plan for DAME/EDAM

The objective of this document is to provide the information needed by market participants in order to engage in the parallel operation's activities for the DAME/EDAM release initiatives, enabling market participants to smoothly transition and utilize the new features.

The ISO conducts parallel operation activities on a regular basis as part of its bringing new capabilities to its markets. This provides market participants an opportunity to test their systems and procedures in advance of the market implementation. The parallel operation process facilitates an effective market operations "dress rehearsal" and helps expedite a smooth production launch.

DAME Business Practice Summary (BPS)

The Business Practice Summary is intended to introduce participants to upcoming requirements for the project prior to its implementation.

This Business Practice Summary covers the rules, design, and operational elements of the ISO Markets. The Business Practice Summary is intended for those entities that expect to participate in the ISO Markets, as well as those entities that expect to exchange Power with the ISO Balancing Authority Area.

Day Ahead Market Enhancements

Project Information	Details/Date
High Level Business Problem or Need	In recent years, Variable Energy Resource (VER) have gained significant traction in the energy grid, playing a crucial role in achieving renewable energy targets and reducing greenhouse gas emissions. However, their increasing presence has introduced a new challenge energy imbalances between the Day Ahead and Real Time markets. Another reason for the energy imbalance is the day-ahead market operates on hourly time increments, whereas real-time market schedules energy in 15 and 5-minute intervals. This discrepancy in granularity results imbalances since the rea-l-time market schedules fluctuate within the hour while day-ahead market schedules remain fixed for the entire hour. These imbalances necessitates out-of-market interventions by operators, such as forecast biasing and dispatches, to uphold grid reliability. However, this situation presents an opportunity to improve our market software, enabling us to achieve a more efficient and economical solution while addressing the variability and reliability concerns within the market.
High Level Project Scope	Enhance the California ISO's (CAISO's) day-ahead market by: • Introducing an imbalance reserve (IRU/IRD) product to provide flexible capacity to account for real-time ramping needs • Enhancing the residual unit commitment process to also ensure there is sufficient downward dispatch capability (RCU/RCD) • Enhancing the day-ahead market to maximize benefits of greater West-wide diversity in the day-ahead optimization for Western Energy Imbalance Market participants
BPM Changes	Settlements and Billing, Market Instruments & Market Operations
Tariff Changes	Sections 27, 31, 34, 39
Impacted Systems	MF, SIBR, DAM, OASIS, CMRI, Settlements & Internal Systems

Day Ahead Market Enhancements

System	High Level Changes
MF	• Define IRU, IRD, RCU, RCD eligibility for the resource ID in MF.
SIBR	• IRU,IRD,RCU,RCD bid rules
DAM	• Calculate IRU/IRD requirements • MPM: Market Power Mitigation for IRU/IRD • IFM: procure IRU/IRD • IRU/IRD deployment scenarios • IRU/IRD requirement distribution • IRU/IRD in NA-AC power flow • Include IRU/IRD in constraints • RCU/RCD procurement • RUC-MPM pass • Impact on RUC performance with additional MPM pass • LMP for EN, IRU/IRD, RCU/RCD
OASIS	• IRU, IRC, RCU,RCD related public reports
CMRI	• IRU, IRC, RCU,RCD related private reports
Settlements	• IRU, IRC, RCU,RCD Settlements

Day Ahead Market Enhancements

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board briefing/approval	May 17, 2023	✓
External BRS	Publish External BRS v1.0	Jul 25, 2023	✓
	Publish External BRS v1.1	Dec 22, 2023	✓
	Publish External BRS v1.2	Apr 24 2024	✓
Settlements Config Guides	Post Draft Config Guides - First set of charge codes	Jan 16, 2024	✓
	Post Draft Config Guides - Second set of charge codes	Mar 26, 2024	✓
	Post Draft Config Guides - Third set of charge codes	Aug 26, 2024	
Tech Spec	Publish Technical Specifications - OASIS	Nov 09, 2023	✓
	Publish Technical Specifications – MF Publish MF GRDT v19.0 DRAFT	Nov 21, 2023	✓
	Publish Technical Specifications - SIBR	Nov 28, 2023	✓
	Publish Technical Specifications - CMRI	Dec 15, 2023	✓
Tariff	First Draft Tariff Posting	Jun 02, 2023	✓
	Second Draft Tariff Posting	Jul 11, 2023	✓
	FERC Filing	Aug 22, 2023	✓
	Receive FERC order – Acceptance in part	Dec 20, 2023	✓
	Draft Compliance Filing Posting	Feb 05, 2024	✓
	Compliance Filing	Feb 16, 2024	✓
BPMs	Post Draft BPM – Market Instruments	TBD	
	Post Draft BPM – Market Operations	TBD	
	Post Draft BPM – Settlements and Billing	TBD	
	Post Draft BPM – Definitions and Acronyms	TBD	
	Business Practice Summary (New)	Apr 25, 2024	✓
Implementation meeting	Implementation meeting	Jul 2024	
Implementation Working Groups	Implementation Working Groups	Start Q4 2024	
External Training	External User Training	May 08, 2025	
Market Sim	Fall 2025 Release Market Simulation Plan	Jan 24, 2024	✓
	Market Sim Scenarios	Aug 04, 2023	✓
	Market Sim Window	Jun 02, 2025 - Aug 22, 2025	
Production Deployment	Day Ahead Market Enhancements (Inactive)	Oct 01, 2025	
Production Activation	Day Ahead Market Enhancements (Financially Binding)	May 01, 2026	

Day Ahead Market Enhancements Business Practice Summary (BPS) - New

- The Business Practice Summary is intended to introduce participants to upcoming requirements for the project prior to its implementation.
- This Business Practice Summary covers the rules, design, and operational elements of the ISO Markets. The Business Practice Summary is intended for those entities that expect to participate in the ISO Markets, as well as those entities that expect to exchange Power with the ISO Balancing Authority Area.
- This BPS benefits readers who want answers to the following questions:
  - What are the roles of the ISO and the Scheduling Coordinators in the ISO Markets?
  - What are the concepts that an entity needs to understand to engage in the ISO Markets?
  - What does a Market Participant need to do to participate in the ISO Markets?
  - What are the market objectives, inputs, and outcomes?

Day Ahead Market Enhancements BRS Revisions 1/4

- BRS v1.2 published 4/25/24
- Updated for the following
  1. Clarified, corrected typos and cleaned up the document.
  2. Moved some requirements from DAME BRS to BRS of other projects.
  3. Moved some requirements from one system to another.
  4. Split BRQs.
  5. Added surplus zone functionality
  6. Added EDAM participation Flag definition in MF.
  7. Removed storing uncertainty.
  8. Removed D+2 calculation, broadcast and consume for IRR Thresholds, IRR Input Polynomials, IRR Uncertainty Histograms, IR Forecasts, IR Demand Curves and only keep IRR, IRS and RC Awards.
  9. Added D+3 calculation, broadcast and consume for IRUR/IRDR.
  10. Applied insertion logic to non-VERs and replaced UEL with VER forecast with lower of energy bid range and RCU Certified Capacity.
  11. Removed extension/insertion of RCU bids to Forecast output for VERs.
  12. Deleted setting UEL to 0 if IRU and/or RCU eTagging validations fails for System Resources.
  13. Updated logic/formula for Settlements.
  14. Updated to replace RA showing with monthly Generic and Flex (across all categories) RA showing in the pro-rata settlements allocation.
  15. Added HASP Reversal application to CAISO BAA IFM Intertie Schedule.
  16. Deleted OASIS report that publishes aggregated BAA Forecasted Movement Data by resource category.
  17. Published REN (aka RUC schedules) to Forecasted Generation report (existing).
  18. Published nodal by SC DA Schedule Virtual Forecasted Movement via CMRI.
  19. Published Shift Factors (SF) for IRU/IRD via MPP.
  20. Updated data published to FERC.
  21. Updated market sim scenarios.

Day Ahead Market Enhancements BRS Revisions 2/4

- BRS v1.2 published 4/25/24

Section	Overview of Changes	Reason for Update	Updated	New	Removed
1 Introduction, 3 Details of Business Need/Problem, 5.2 Manage the Balancing Authority Requirements Calculator, 5.3 Calculate & Monitor Energy Costs & Indices, 5.4 Manage DAM – IFM, 5.5 Manage DAM – RUC, 5.9 Manage Market Reporting, 5.10 Manage FERC Reporting, 6.1 Appendix-A - Acronym Definition	1. Clarified, corrected typos and cleaned up the document.	Clean Up	§1.1, §3.1, BRQ-02300, BRQ-02310, BRQ-02320, BRQ-03070, BRQ-04030, BRQ-04080, BRQ-04090, BRQ-04134, BRQ-04331, BRQ-04331A, BRQ-05002, BRQ-05090, BRQ-05130, BRQ-05144, BRQ-10160, BRQ-10700, BRQ-11420, §6.1,		
5.4 Manage DAM – IFM, 5.6 Manage RTM	2. Moved some requirements from DAME BRS to BRS of other projects or vice versa.	Reorganization			BRQ-04334, BRQ-04337, BRQ-06075
5.1 Resource Management, 5.2 Manage the Balancing Authority Requirements Calculator, 5.8 Manage Market Billing and Settlements	3. Moved some requirements from one system to another.	Reorganization	BRQ-09160	BRQ-02005, BRQ-02011	BRQ-01180, BRQ-02010, BRQ-09530
5.4 Manage DAM – IFM, 5.9 Manage Market Reporting,	4. Split BRQs.	Reorganization	BRQ-04150, BRQ-10160, BRQ-10180, BRQ-10200, BRQ-10220, BRQ-10260	BRQ-04155, BRQ-10160A, BRQ-10160B, BRQ-10180A, BRQ-10180B, BRQ-10200A, BRQ-10200B, BRQ-10200C, BRQ-10220A, BRQ-10260A	
5.1 Resource Management, 5.4 Manage DAM – IFM, 5.7 Manage Market Quality System, 5.9 Manage Market Reporting, 5.10 Manage FERC Reporting, 5.12 Market/Business Simulation	5. Added surplus zone functionality	ISO SME Feedback	BRQ-04454, BRQ-07860, BRQ-10260, BRQ-11420, MSIM-15020,	BRQ-01160, BRQ-04134A, BRQ-04135, BRQ-04136, BRQ-04137	

Day Ahead Market Enhancements BRS Revisions 3/4

- BRS v1.2 published 4/25/24

Section`	Overview of Changes	Reason for Update	Updated	New	Removed
5.1 Resource Management	6. Added EDAM participation Flag definition in MF.	ISO SME Feedback		BRQ-01200	
5.2 Manage the Balancing Authority Requirements Calculator	7. Removed storing uncertainty.	ISO SME Feedback	BRQ-02040		
5.2 Manage the Balancing Authority Requirements Calculator, 5.4 Manage DAM – IFM, 5.9 Manage Market Reporting, 5.10 Manage FERC Reporting	8. Removed D+2 calculation, broadcast and consume for IRR Thresholds, IRR Input Polynomials, IRR Uncertainty Histograms, IR Forecasts, IR Demand Curves and only keep IRR, IRS and RC Awards.	ISO SME Feedback	BRQ-02060, BRQ-02070, BRQ-02090, BRQ-02100, BRQ-02110, BRQ-02120, BRQ-02130, BRQ-02140, BRQ-02150, BRQ-02310, BRQ-02320, BRQ-02340, BRQ-04140, BRQ-10280, BRQ-10300, BRQ-10320, BRQ-10340, BRQ-10360, BRQ-11420		
5.9 Manage Market Reporting, 5.10 Manage FERC Reporting	9. Added D+3 calculation, broadcast and consume for IRUR/IRDR.	ISO SME Feedback	BRQ-10260, BRQ-11420		
5.5 Manage DAM – RUC	10. Applied insertion logic to non-VERs and replaced UEL with VER forecast with lower of energy bid range and RCU Certified Capacity.	ISO SME Feedback	BRQ-05000		
5.5 Manage DAM – RUC	11. Removed extension/insertion of RCU bids to Forecast output for VERs.	ISO SME Feedback	BRQ-05005		
5.6 Manage RTM	12. Deleted setting UEL to 0 if IRU and/or RCU eTagging validations fails for System Resources.	ISO SME Feedback			BRQ-06065
5.8 Manage Market Billing and Settlements	13. Updated logic/formula for Settlements.	ISO SME Feedback	BRQ-09160, BRQ-09180, BRQ-09540		
5.8 Manage Market Billing and Settlements	14. Updated to replace RA showing with monthly Generic and Flex (across all categories) RA showing in the pro-rata settlements allocation.	ISO SME Feedback	BRQ-09380		
5.8 Manage Market Billing and Settlements	15. Added HASP Reversal application to CAISO BAA IFM Intertie Schedule.	ISO SME Feedback		BRQ-09610	
5.9 Manage Market Reporting	16. Deleted OASIS report that publishes aggregated BAA Forecasted Movement Data by resource category.	ISO SME Feedback			BRQ-10380

Day Ahead Market Enhancements BRS Revisions 4/4

- BRS v1.2 published 4/25/24

Section	Overview of Changes	Reason for Update	Updated	New	Removed
5.9 Manage Market Reporting	17. Published REN (aka RUC schedules) to Forecasted Generation report (existing).	ISO SME Feedback		BRQ-10730	
5.9 Manage Market Reporting	18. Published nodal by SC DA Schedule Virtual Forecasted Movement via CMRI.	ISO SME Feedback		BRQ-10810	
5.9 Manage Market Reporting	19. Published Shift Factors (SF) for IRU/IRD via MPP.	ISO SME Feedback		BRQ-10880	
5.10 Manage FERC Reporting	20. Updated data published to FERC.	ISO SME Feedback	BRQ-11420		
5.12 Market/Business Simulation	21. Updated market sim scenarios.	ISO SME Feedback	MSIM-15020		

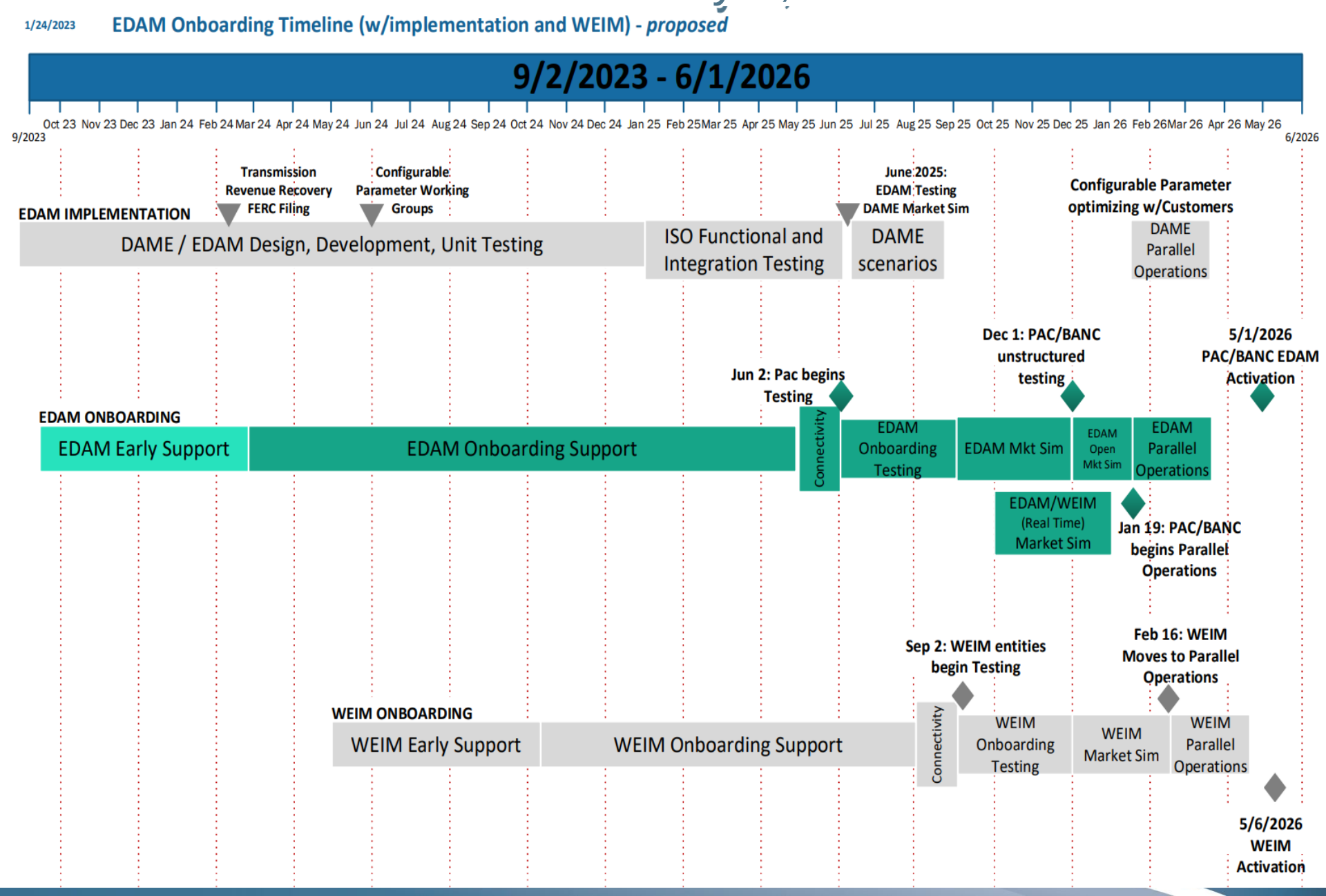
Extended Day Ahead Market (EDAM) Implementation

Project Information	Details/Date
High Level Business Problem or Need	The purpose of this initiative is to create a comprehensive extended day-ahead market that extends over multiple balancing authority areas (BAAs) participating in the Western Energy Imbalance Market (WEIM). EDAM is a voluntary day-ahead electricity market with the potential to deliver significant economic, environmental, and reliability benefits for participants across the West. EDAM will more efficiently and effectively integrate renewable resources and address the significant operational challenges presented by a rapidly changing resource mix, emerging technologies, and the impacts of climate change. EDAM will enable procurement of robust supply and flexible capacity that will position EDAM participants to effectively address changes in conditions from day-ahead to real-time, improving their response to potential reliability challenges. EDAM builds upon the proven ability of the WEIM to increase regional coordination, support state policy goals, and cost effectively meet demand.
High Level Project Scope	The EDAM design leverages existing features of the ISO day-ahead market that are common in other day-ahead markets across the country. The design also considers enhancements proposed in contemporaneous stakeholder initiatives that will harness flexibility across the larger footprint by incorporating an imbalance reserve product that will enhance price formation. EDAM introduces new products, imbalance reserve and reliability capacity, as well as new penalties, and a Resource Sufficiency Evaluation (RSE) surcharge.
BPM Changes	Definitions and Acronyms Energy Imbalance Market (EIM) Market Instruments Market Operations Settlements and Billing EDAM
Impacted Systems	MF, ALFS, ALFS-SOA, SIBR, RTSI, RTBS, BSAP, DAM (IFM and RUC), DA-RSE (new), RTM (RTPD and RTD), STUC, MPM, ITS, BARC, GHG Pass (new), Settlements, CMRI, OASIS, ADS, WebOMS, Internal ISO Systems

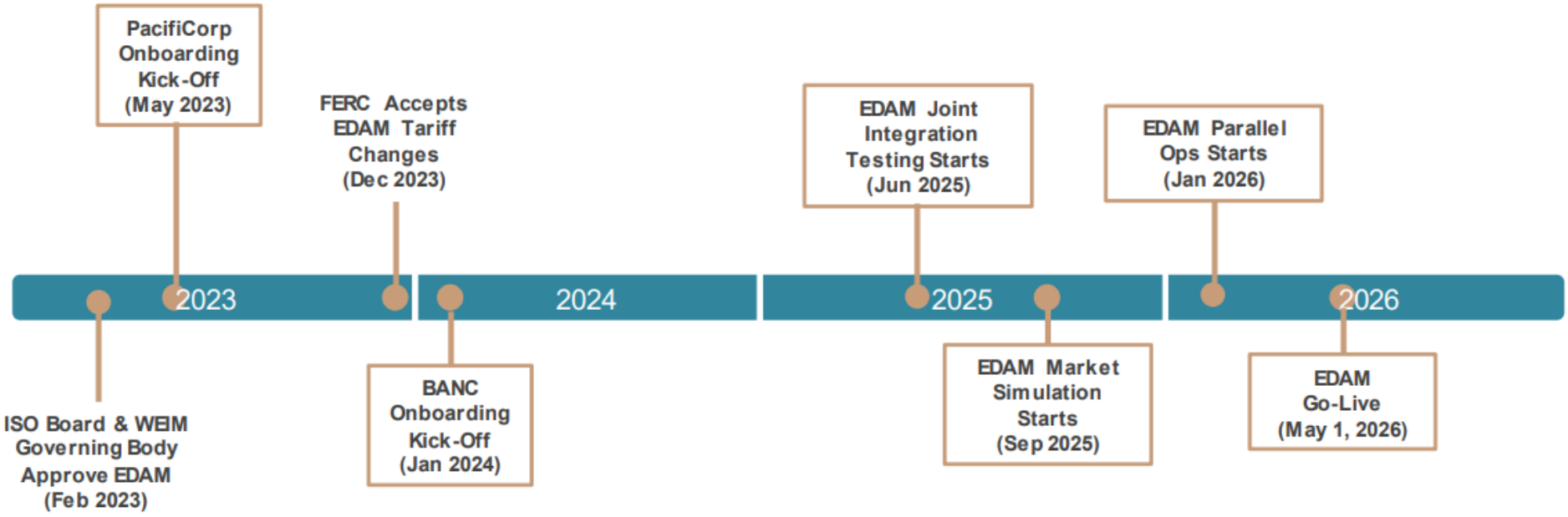
Extended Day Ahead Market (EDAM) Implementation

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board approval	Feb 01, 2023	✓
External BRS	Publish External BRS v1.0	Aug 02, 2023	✓
	Publish External BRS v1.1	Dec 22, 2023	✓
	Publish External BRS v1.2	Apr 25. 2024	✓
Tariff	Draft Tariff Language	Mar 30, 2023	✓
	Revised Draft Tariff Language	Jun 08, 2023	✓
	Updated Revised Draft Tariff Language	Jul 25, 2023	✓
	FERC Filing	Aug 22, 2023	✓
	Receive FERC order – Acceptance in part	Dec 20, 2023	✓
	Requested effective date for tariff changes for EDAM agreements and onboarding provisions	Dec 21, 2023	✓
	Draft Compliance Filing Posting	Feb 05, 2024	✓
	Compliance Filing; accepted Apr 30, 2024	Feb 16, 2024	✓
	Filing for EDAM access charge	Apr 12, 2024	✓
	Receive FERC order accepting EDAM Access Charge Design (EDAM Tariff fully approved)	**Jun 11, 2024**	✓
Settlements Config Guides	Post Draft Config Guides - First set of charge codes	Jan 16, 2024	✓
	Post Draft Config Guides - Second set of charge codes	Mar 26, 2024	✓
	Post Draft Config Guides - Third set of charge codes	Aug 26, 2024	
Tech Spec	Publish Technical Specifications – RTSI	Dec 5, 2023	✓
	Publish Technical Specifications – MF	Jan 4, 2024	✓
	Publish Technical Specifications – SIBR	Mar 21, 2024	✓
	Publish Technical Specifications – OASIS	Apr 12, 2024	✓
	Publish Technical Specifications – CMRI	Apr 12, 2024	✓
	Publish Technical Specifications – PLC	Q2 2024	
	Publish Technical Specifications – ALFS	NA	
	Publish Technical Specifications – OMS	NA	
BPMs	Post Draft BPM – Energy Imbalance Market (EIM)	TBD	
	Post Draft BPM – Market Instruments		
	Post Draft BPM – Market Operations		
	Post Draft BPM – Settlements and Billing		
	Post Draft BPM – EDAM		
	Post Draft BPM – Definitions and Acronyms		
External Training	Training	TBD	
Market Sim	Fall 2025 Release Market Simulation Plan	Jan 24, 2024	✓
	Market Sim Scenarios	Jan 29, 2024	✓
	Market Sim Scenarios v1.1	Feb 15, 2024	✓
	EDAM Onboarding Market Sim	Sep 01, 2025 – Jan 16, 2026	
Parallel Operations	Draft Parallel Operations Plan	Apr 15, 2024	✓
Production	EDAM Production Deployment - Inactive	Oct 01, 2025	
	EDAM Onboarding (Financially Binding) & Activation (Pacificorp & BANC)	May 01, 2026	

EDAM & DAME Activation May 1, 2026



Key EDAM Onboarding Milestones to Date



Extended Day Ahead Market BRS Revisions

- BRS v1.2 published 04/25/2024

Section	Overview of Changes	Reason for Update	Updated	New	Removed
5.1: Model & Contract Implementation & FNM (Master File)	• Define association between DGAP/SDGAP and TIE, define association between TIE and ITC • Remove TSR Commodity • Clarify that contractual MW obligations are defined on an hourly basis • Allow EDAM entities to submit use-limited data	• ISO SME Feedback • Clarification • Policy/Tariff Alignment	BRQ-02089a, BRQ-02142, BRQ-02190	BRQ-02087, BRQ-02260	BRQ-02120
5.2: Forecasting (ALFS)	• Establish Demand Response Performance Factor • Removal of 5% threshold of LF for DR inclusion • Account for DR LF Adjustment in DA Demand Forecast process • Removal of calculation of Hourly DR LF Adjustment for RSE	• ISO SME Feedback	BRQ-04052, BRQ-04058, BRQ-04060	BRQ-04041	BRQ-04054, BRQ-04059
5.3: BAA Requirement Calculation (Internal ISO System)	Calculate FRUR/FRDE parameter estimates every hour of TD for EDAM up/down pools and AET Y/N sub-pools	• ISO SME Feedback • Policy/Tariff Alignment		BRQ-05075	
5.4: Default Energy Bids (Internal ISO System)	Obtain and store *on-peak* bilateral trading Mid-C, PV Hub prices	• Clarification	BRQ-08060		
5.5: Bid and TSR Submission (SIBR)	• Removal of TSR commodity • Inter-SC Trades shall not apply to EDAM • Access MF defined DGAP/SDGAP-TIE, TIE-ITC mapping • Broadcast all CRN MW entitlements • Allow EDAM entity to submit TSR with RSE eligible AS self-provision	• ISO SME Feedback • Policy/Tariff Alignment	BRQ-11010, BRQ-11014, BRQ-11054, BRQ-11150, BRQ-11190	BRQ-11022, BRQ-11106, BRQ-11150a	

Extended Day Ahead Market BRS Revisions

- BRS v1.2 published 04/25/2024

Section	Overview of Changes	Reason for Update	Updated	New	Removed
5.6: DAM Resource Sufficiency Evaluation (DA-RSE)	• Removal of TSR commodity • Removal of DR inclusion flag • Use same LF for DA-RSE and DAM • Removal of display and accounting for DR LF Adjustments in DAM • Clarify that RSE runs **approximately** every 30 minutes • Include RSE eligible TSR AS self-provision and TSR transfer limits in DA-RSE optimization • Clarify constraints evaluated by DA-RSE • Clarify reporting on RSE required movement between EDAM BAAs	• ISO SME Feedback • Policy/Tariff Alignment • Clarification	BRQ-12008, BRQ-12016D, BRQ-12040, BRQ-12050, BRQ-12180, BRQ-12030	BRQ-12016	BRQ-12016A, BRQ-12016B
5.7: Day Ahead Market (MPM, IFM)	• Clarify that ETSR status remains locked until Operator changes status • Removal of TSR commodity • Clarify enforcement of Net Export Transfer Constraint • Clarify details regarding not allowing simultaneous relaxation of the PBC and Net Export Transfer above RSE eligible energy exported transfers	• ISO SME Feedback • Policy/Tariff Alignment • Clarification	BRQ-13052, BRQ-13054, BRQ-13060a, BRQ-13080, BRQ-13100, BRQ-13120		BRQ-13130
5.8: Residual Unit Commitment (RUC, DAM)	• Clarifications regarding extending RUC to EDAM • Clarify details regarding not allowing simultaneous relaxation of the PBC and Net Reliability Capacity Export/Import Transfer • Removal of application of DR adjustment	• ISO SME Feedback • Policy/Tariff Alignment • Clarification	BRQ-14010, BRQ-14020, BRQ-14030, BRQ-14042		BRQ-14040
5.9: Tagging DAM Schedules (RTSI, ITS, SIBR)	No changes to BRQs in this section				

Extended Day Ahead Market BRS Revisions

- BRS v1.2 published 04/25/2024

Section	Overview of Changes	Reason for Update	Updated	New	Removed
5.10: Real Time Market (RTM-RSE, RTM)	• Clarify WEIM RSE Flex test for EDAM pools with FRU/FRD requirement details	• ISO SME Feedback	BRQ-16015, BRQ-16030, BRQ-16062		
5.11: GHG Model IN DAM and RTM (GHG Pass, DAM, RTM)	• Removal of GHG losses • Clarify GHG transfer definition • Clarify WEIM GHG model changes • Update details regarding the Gross GHG attribution constraint in WEIM • Calculate/broadcast RT GHG marginal price	• ISO SME Feedback • Clarification	BRQ-17030, BRQ-17070a, BRQ-17200, BRQ-17210	BRQ-17230	BRQ-17022
5.12: Market Quality, Validation, and Price Corrections (Internal ISO Systems)	No changes to BRQs in this section				
5.13: Billing and Settlements (MRI-S, Settlements)	• Consume all DA CRN data and entitlements • Consume RSE upward/downward deficiency from DA-RSE (Energy, IRU/IRD) • Define OATT 1 and OATT 2 contract types for Settlements • Clarify Uncertainty Up and Down allocation processes	• ISO SME Feedback • Policy/Tariff Alignment • Clarification	BRQ-19024, BRQ-19026, BRQ-19030, BRQ-19400, BRQ-19420	BRQ-19025, BRQ-19063a	

Extended Day Ahead Market BRS Revisions

- BRS v1.2 published 04/25/2024

Section	Overview of Changes	Reason for Update	Updated	New	Removed
5.14: Market Reporting (CMRI, OASIS, Today's Outlook)	• Clarifications regarding elements of new EDAM transmission CMRI reports • Combine advisory and final RSE results into one CMRI report • Update list of reports extended to EDAM entity BAAs (CMRI) • Removal of DA-RSE aggregate bid information reporting from CMRI (will be shown in SIBR) • Clarify elements of EDAM/WEIM BAA level MPM results reporting in OASIS • Update RSE BAA level report details on OASIS • Extend OASIS Flex Ramp Requirements reporting to EDAM	• ISO SME Feedback • Clarification	BRQ-20010, BRQ-20011, BRQ-20013, BRQ-20050, BRQ-20051, BRQ-20054, BRQ-20068, BRQ-20070, BFQ-20080, BRQ-20082	BRQ-20145	BRQ-20052, BRQ-20053, BRQ-20062
5.15: FERC Reporting (Internal ISO System)	No changes to BRQs in this section				
5.16: Outages (WebOMS)	No changes to BRQs in this section				
5.17: Market Simulation	No changes to BRQs in this section				

Spring 2026 – EDAM ISO BAA Participation Rules Track A

Project Information	Details/Date
Policy Scope	The purpose of this initiative was to define the unique aspects of how the ISO Balancing Authority Area (BAA) will participate in the Extended Day-Ahead Market (EDAM). The policy addressed how to settle Transfer Resources and Transfer Revenue, the criteria to set ISO BAA's net EDAM Export Transfer constraint, how to allocate ISO BAA resource sufficiency evaluation (RSE) failure surcharges and revenues, and the process for calculated historical revenue recovery amounts.
Tariff Changes	**FERC Filing ER24-379 – Sections 11, 26, and 27** **Approved Tariff Changes:** ➢ To allow for the settlement of all Transfer System Resources in the CAISO BA. ➢ To allow for the settlement of EDAM Transfer revenue allocated to the CAISO BA, inclusive of EDAM Transfer revenue and EIM Transfer revenue ➢ To allow the CAISO BA to enable the Net EDAM Export Transfer Constraint, a voluntary, and optional, mechanism that each EDAM Balancing Authority may enable to preserve sufficient supply to meet its projected needs, while managing reliability based on conditions and circumstances anticipated within its balancing area. ➢ To allow an interim solution for the CAISO to distribute all CAISO BA revenues and surcharges for the EDAM RSE Failure Surcharge. **Unapproved Tariff Changes (requires refiling):** ➢ To set forth the calculations for the EDAM Historical Revenue Recovery amounts for transmission owners in the CAISO BA
High Level Project Scope	Based on current approved Tariff changes
Impacted Systems	Internal ISO Systems, Settlement configuration changes

Spring 2026 – EDAM ISO BAA Participation Rules Track A

Milestone Type	Milestone Name	Dates	Status
Policy Development	Track A1 Final Proposal Historical Recovery Revenue policy confirmation	Aug 31, 2023 If needed	✓
Board Approval	Board approval	Sep 21, 2023	✓
Tariff	Draft Tariff Language Revised Tariff Language FERC Filing (CAISO BA Participation in EDAM ER24-379) FERC Order (DAME/EDAM in ER23-2686): *didn't accept EDAM Access Charge* FERC Order (CAISO BA Participation in EDAM ER24-379): *acceptance in part, mooted Historical Recovery Revenue* FERC Filing (EDAM Access Charge ER24-1746) **FERC Order (EDAM Access Charge ER24-1746)** FERC Filing (Historical Recovery Revenue for CAISO BA): *possible policy confirmation*	Aug 25, 2023 Oct 11, 2023 Nov 13, 2023 Dec 20, 2023 Mar 7. 2024 Apr 12, 2024 **Jun 11, 2024** TBD	✓ ✓ ✓ ✓ ✓ ✓ ✓
External BRS	**Publish BRS 1.0** **Publish BRS 1.1** Publish External BRS: *Historical Recovery Revenue policy + tariff dependency*	**Jun 18, 2024** **Jun 25, 2024** TBD	✓ ✓
Draft Settlement Config Guides	Post Draft Config Guides – Third set of charge codes	Aug 26, 2024	
Tech Spec	Part of EDAM framework		
BPMs	Post Draft BPM – Congestion Revenue Rights Post Draft BPM – Definitions and Acronyms Post Draft BPM – Energy Imbalance Market (EIM) Post Draft BPM – EDAM Post Draft BPM – Market Instruments Post Draft BPM – Market Operations Post Draft BPM – Settlements and Billing Post Draft BPM – Transmission Planning Process	TBD	
External Training	Training	TBD	
Market Sim	Coordinated with EDAM market sim	TBD	
Production	EDAM Production Deployment - Inactive EDAM Onboarding (Financially Binding) & Activation	Oct 01, 2025 May 01, 2026	

Spring 2026 – WEIM BHE Montana

Project Info	Details/Date
Application Software Changes	System modifications as needed to accommodate any unique Berkshire Hathaway Energy Montana needs to support their WEIM onboarding.
BPM Changes	WEIM BPM will be updated if needed to reflect changes identified during the onboarding and as required to reflect the unique processes of Berkshire Hathaway Energy Montana.
Market Simulation	December 2025 thru January 2026
Parallel Operations	February 2026 thru March 2026

Milestone Type	Milestone Name	Dates
Market Sim	Market Sim Window	Dec 2025 thru Jan 2026
Parallel Operations	Parallel Operations	Feb 2026 thru Mar 2026
Tariff	File Implementation Agreement FERC acceptance of Implementation Agreement File Readiness Certification	✓ Mar 27, 2024 ✓ May 17, 2024 Mar 2026
Production	Activation	May 2026

Future Releases

Settlement Upgrade Project

April 16, 2024

Settlement Upgrade Project – 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

Settlement Upgrade Project – 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 leverage the Settlement User Group and Technical User Group 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 and timely support to the market participants and their vendors during the testing phase.

Settlement Upgrade Project – Targeted Goals (continued)

- 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.

Settlement Upgrade Project – Targeted Goals (continued)

- 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.

Settlement Upgrade Project – Status

- The ISO is reviewing the overall schedule for implementation. The current schedule is colliding with EDAM and DAME implementation.
- In order to allow customers to have the time to focus on the Settlement Upgrade Project, as well as EDAM and DAME, a new schedule will be developed.
- ISO will provide quarterly updates for the implementation for now and will ultimately increase the frequency of updates and the depth of information provided accordingly as we proceed
- The updates will be provided in the Release User Group and Settlement User Group
- To help ensure alignment of our communications between these two (2) forums, this same update was provided in the next Settlement User Group call on April 24, 2024
- The next Settlement Upgrade Project update will be in July 2024
- For comments or questions, please submit CIDI cases

Stay Informed

Ways to participate in releases

- Visit the Release Planning page
  - http://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx

- Attend meetings
  - Release Users Group (RUG) bi-weekly meetings
    - Initiative status updates
    - System change updates on releases
  - Market Simulation calls
    - Visit the ISO calendar at www.caiso.com for meeting dates and times and add events to your calendar
    - Typically held on Mondays and Thursdays
  - Market Performance and Planning Forum
    - Quarterly review of market performance topics
    - High level discussion of release planning, implementation and new market enhancements

RUG Calendar 2024

January						
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April						
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July						
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October						
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December						
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29	30	31				

CAISO Holiday

RUG Forum

Contact

- tvo@caiso.com
- release@caiso.com
- CIDI
  - Functional Environment (Area)
    - “Release”
    - “Market Simulation”

MARKET PERFORMANCE UPDATE

Load Conformance

Scott Lehman
Guillermo Bautista Alderete
Market Performance and Advanced Analytics

System operators can apply load conformance to their respective balancing area in the various markets

- Day-ahead
  - Only Residual Unit Commitment: Hourly interval
  - Guided by estimates of calculated-based RUC net-load uncertainty
  - Guided also by other operational risks

- Real-time and WEIM markets
  - Hour ahead: 15-minute interval
  - Fifteen minute market: 15-minute interval
  - Real-time dispatch: 5-minute interval
  - Determined by operator's assessment of system conditions

The primary objective of load conformance is different for each market

Residual Unit Commitment (RUC adjustments):

Commit sufficient capacity to meet operational risks, including net-load uncertainty

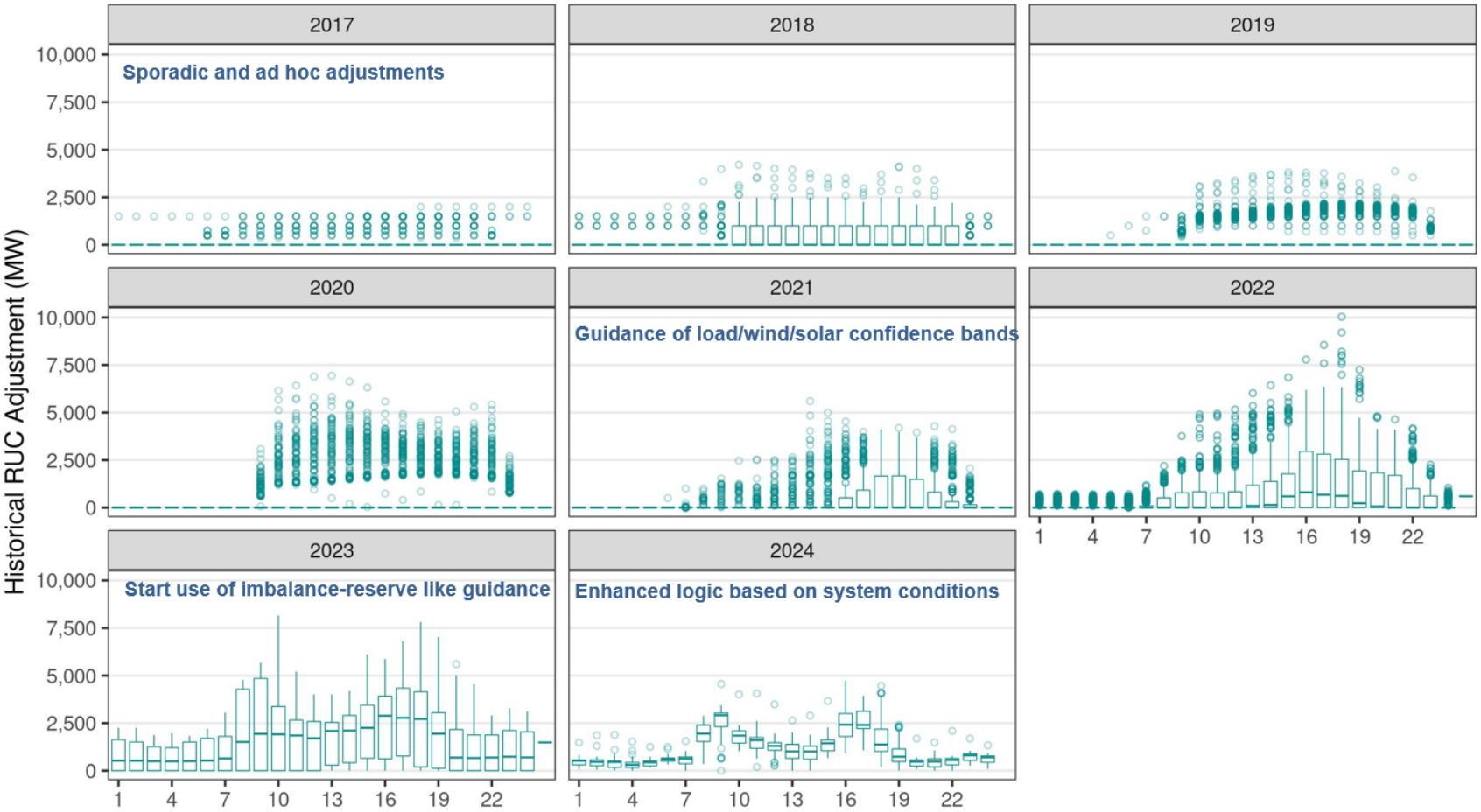
Hour-Ahead/Fifteen minute market:

Position resources to have needed supply and ramp capability

Real-time Dispatch:

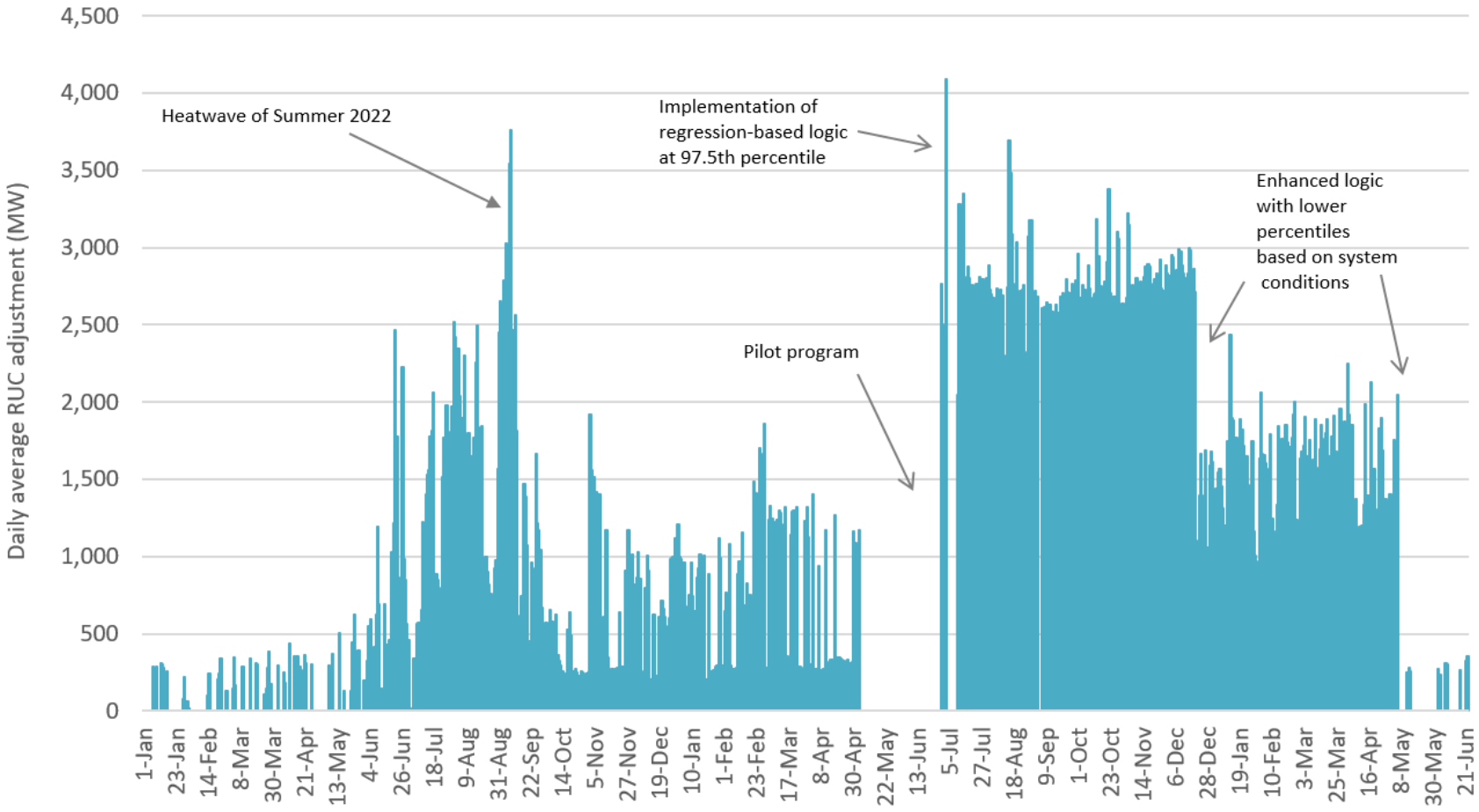
Manage deviations and power imbalances

The guidance, magnitude and frequency of RUC adjustments have evolved over the years



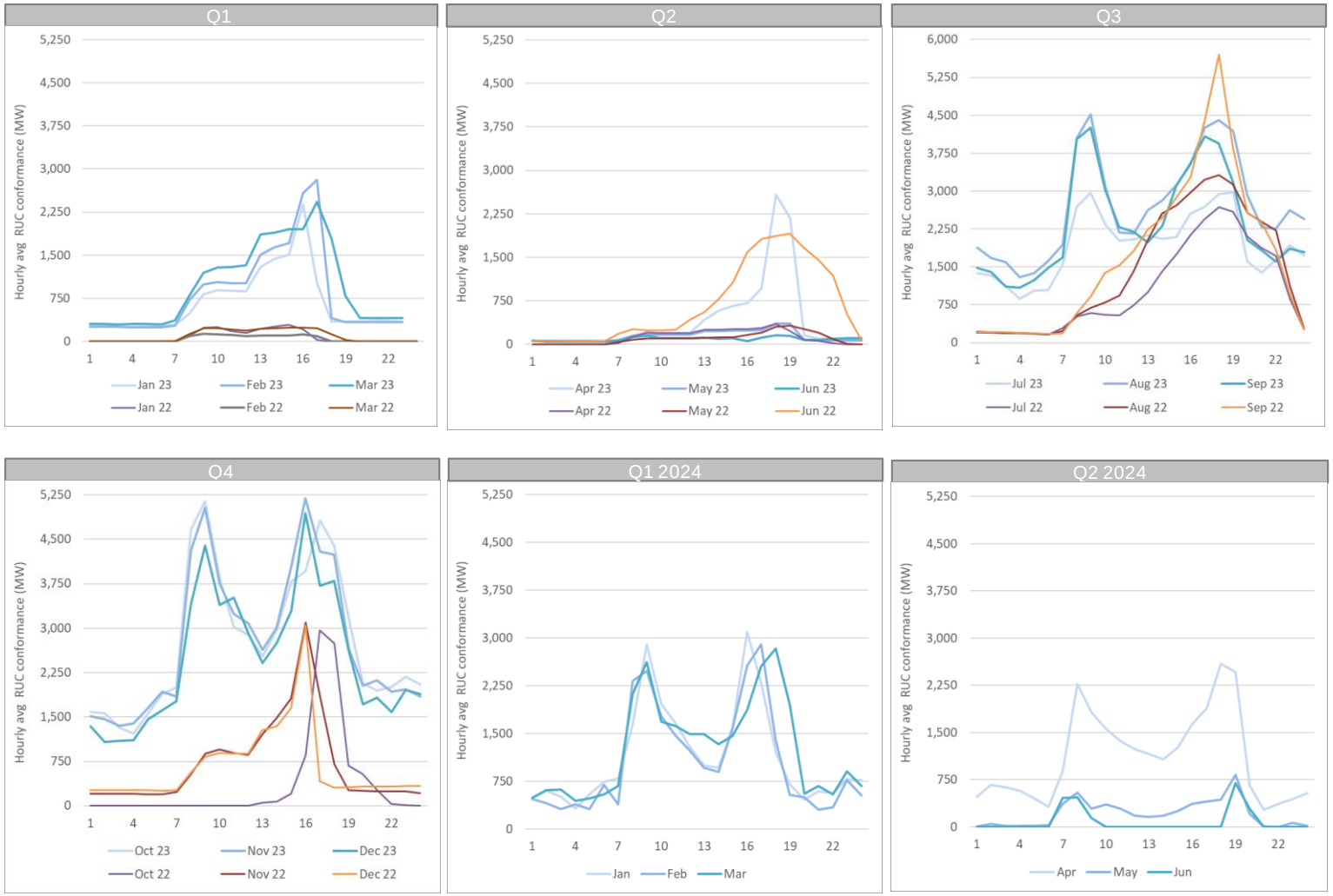
Over this period there has been a significant evolution of the resource mix including growth of utility-based and behind-the-meter solar generation

ISO has continued to enhance the estimates used to guide RUC adjustments to cover for net load uncertainty

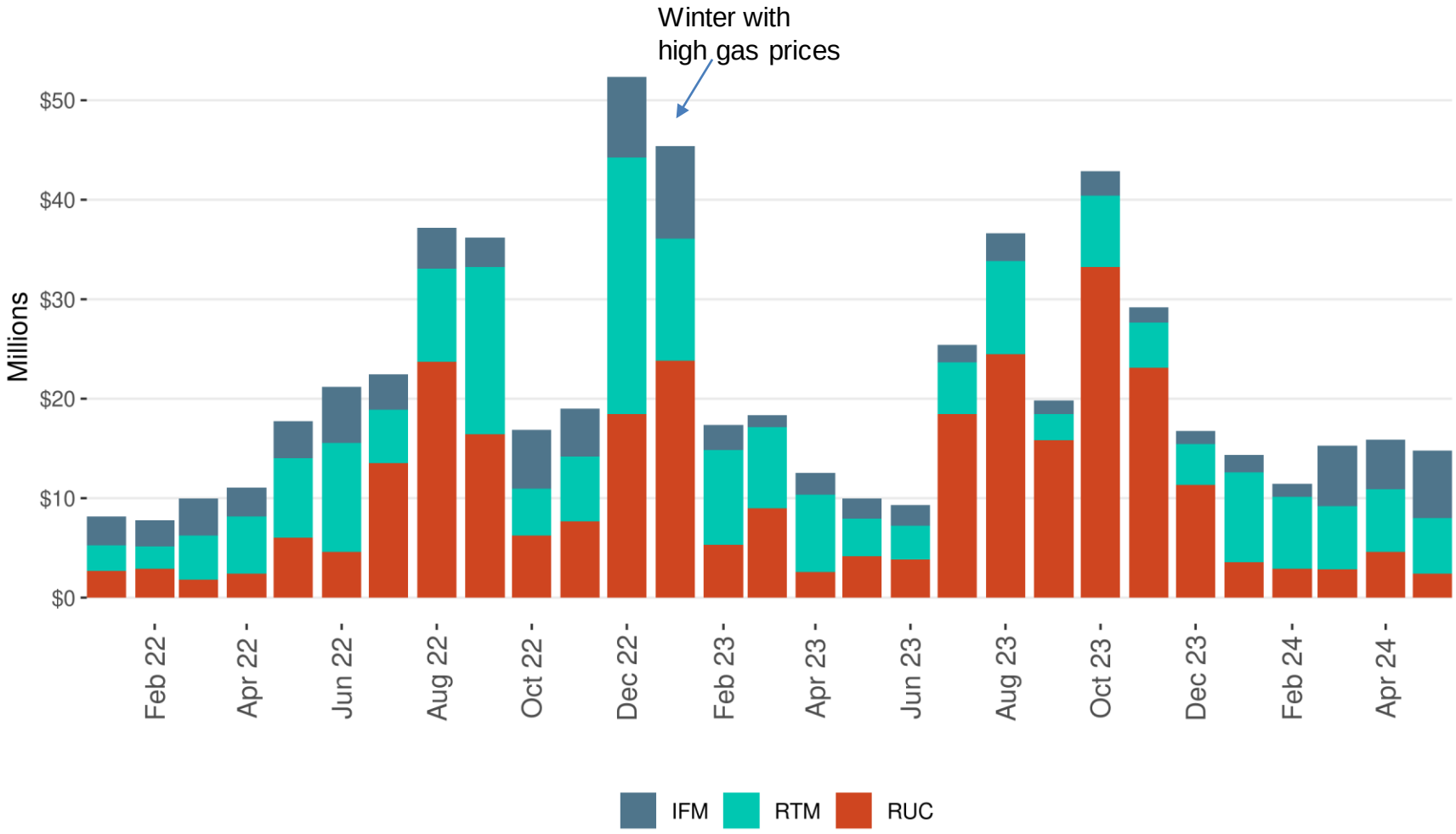


Results of pilot case study provided preliminary insights on the merits of RUC adjustments

Hourly profile of RUC adjustments in Q2 2024 has decreased with the recent enhancement to the logic based on system conditions



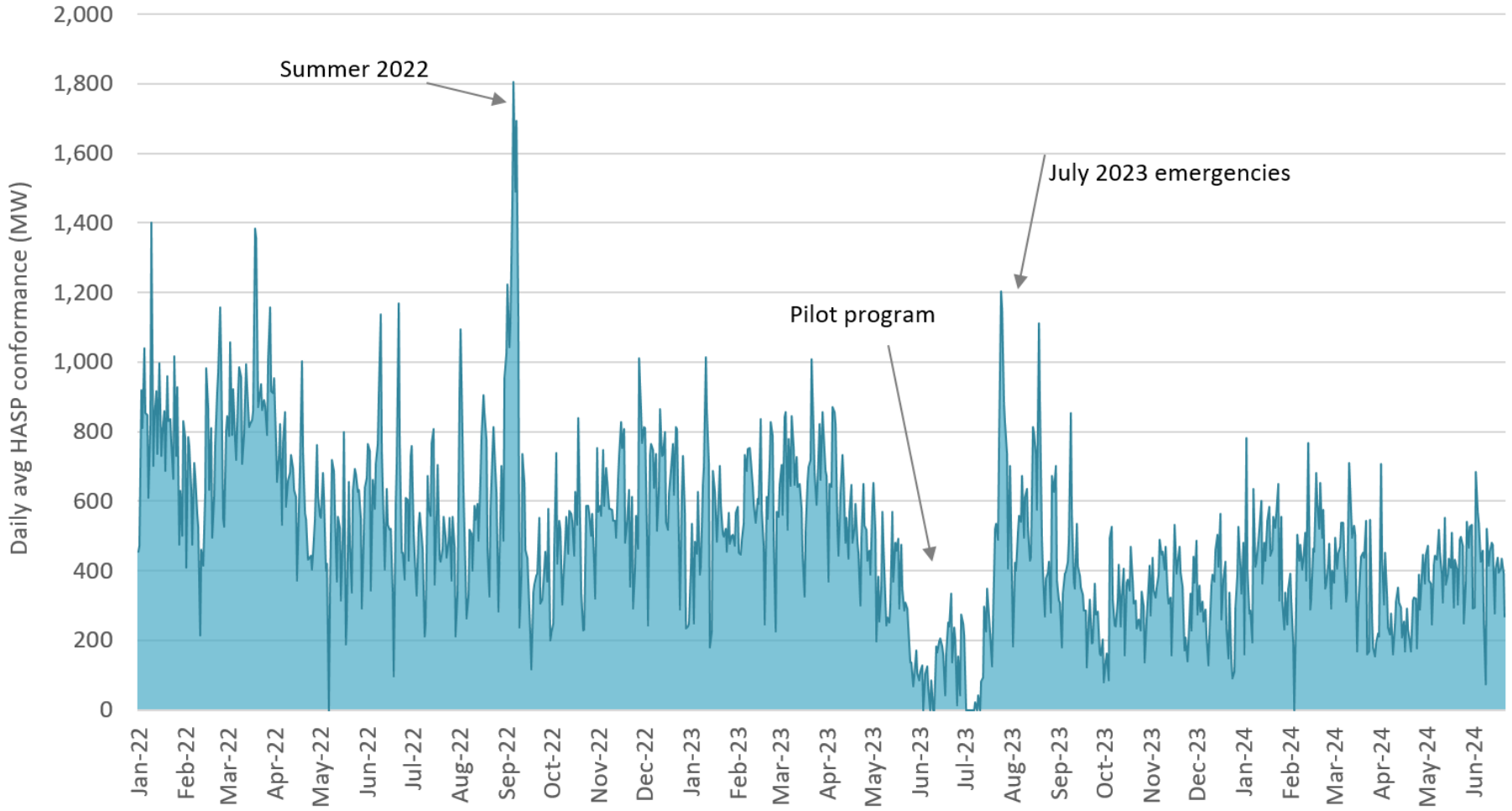
High bid cost recovery in RUC subsided since the enhancement to the requirement estimates in December 21



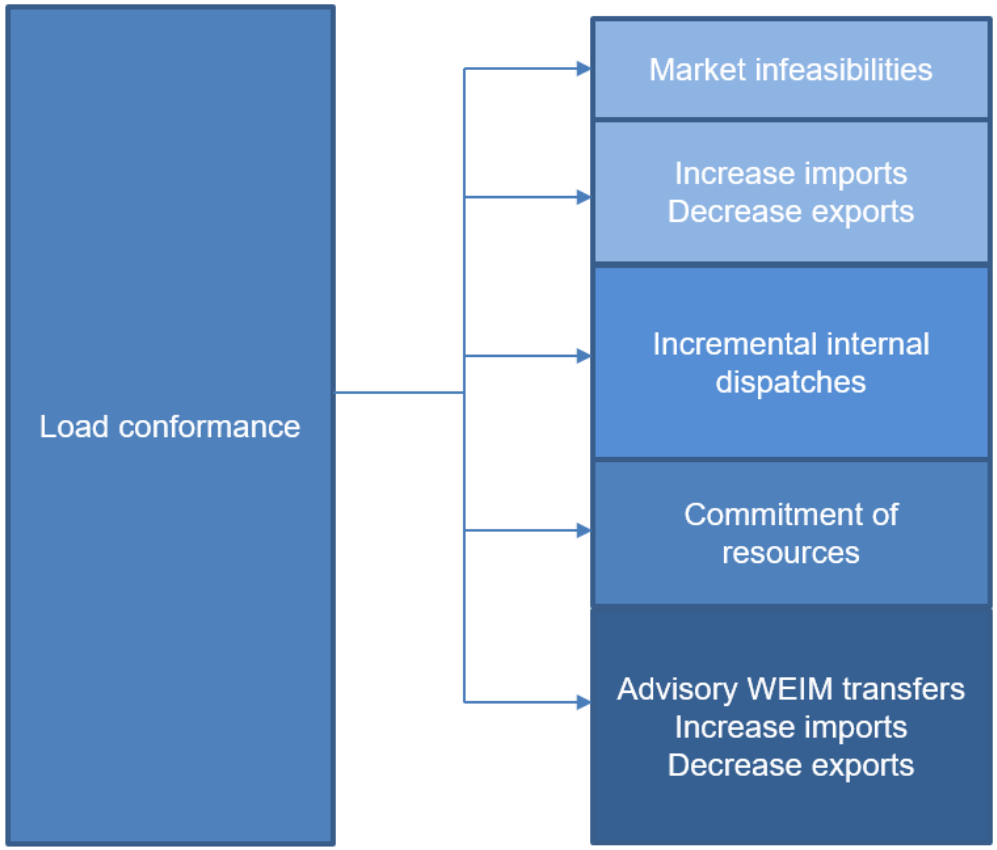
ISO has continued to assess the need to use RUC adjustments in non-summer months and their cost-benefit

- On December 21, 2023, ISO adjusted the logic to use different percentiles based on system conditions
- ISO further tuned the logic on May 7, 2024, reducing further the percentiles and targeting only peak hours
- These enhancements have resulted in lower requirements
- Both enhancements consider projected supply available, and weather conditions in ISO area and the wider footprint
- These logic enhancements were captured in updates to the public ISO Operating Procedure 1210
- RUC adjustments are posted publicly

ISO has been evaluating the use and implications of load conformance in the real-time market as well



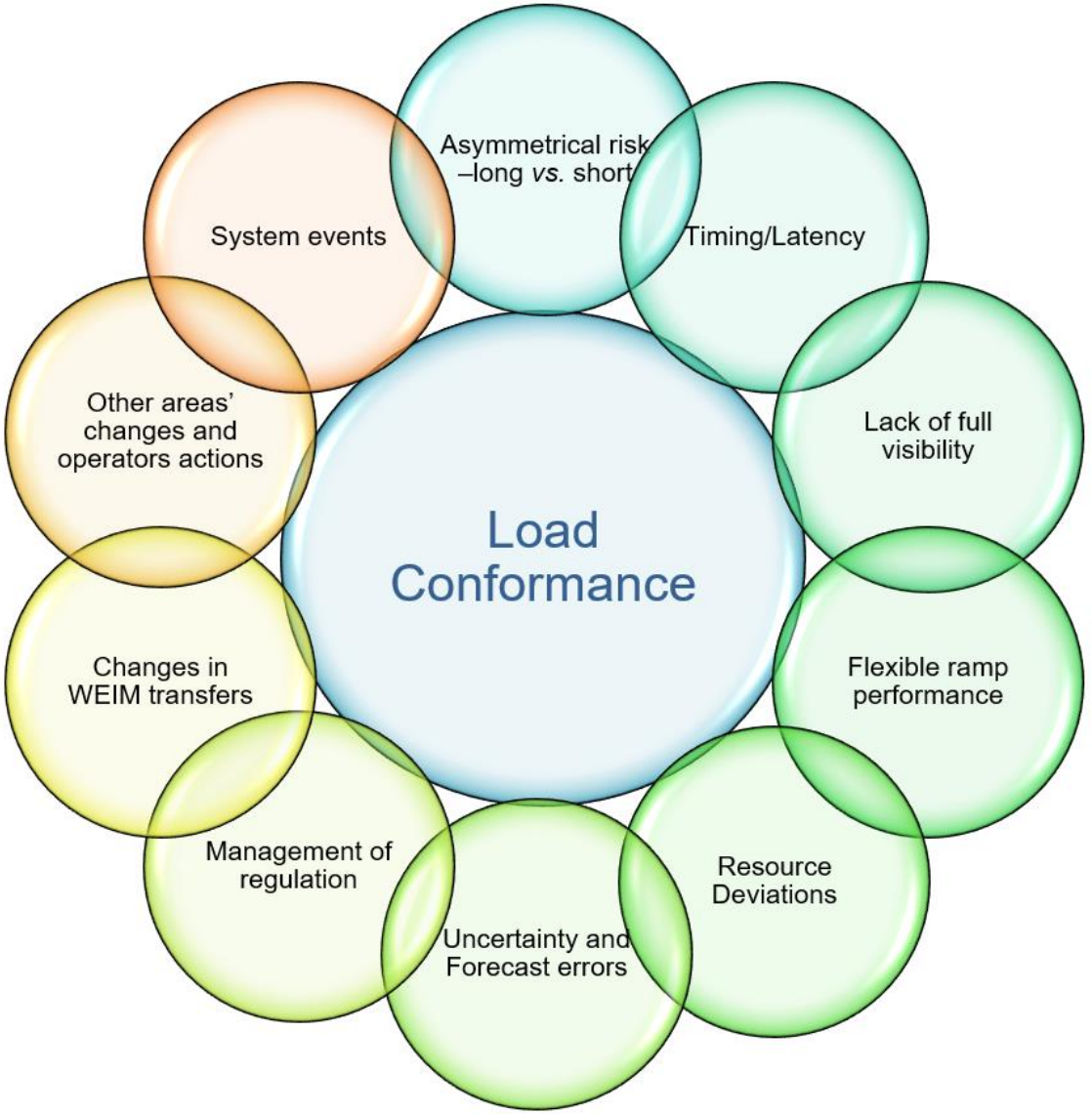
Load conformance adds demand which will be met by supply or identify infeasibilities in the market clearing process



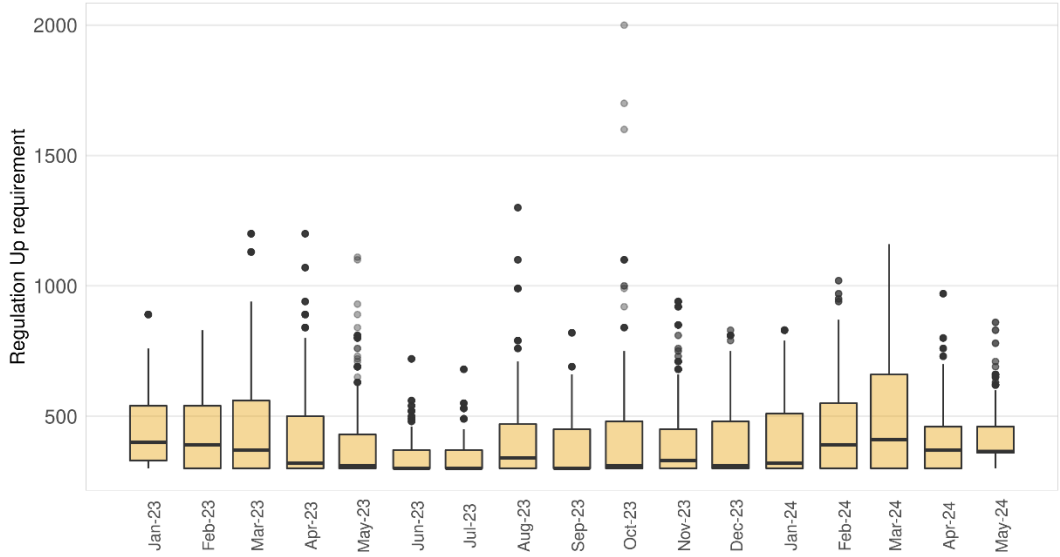
The overall market economics will determine the mix of supply that meets additional demand from load conformance

There are multiple drivers for the use of load conformance

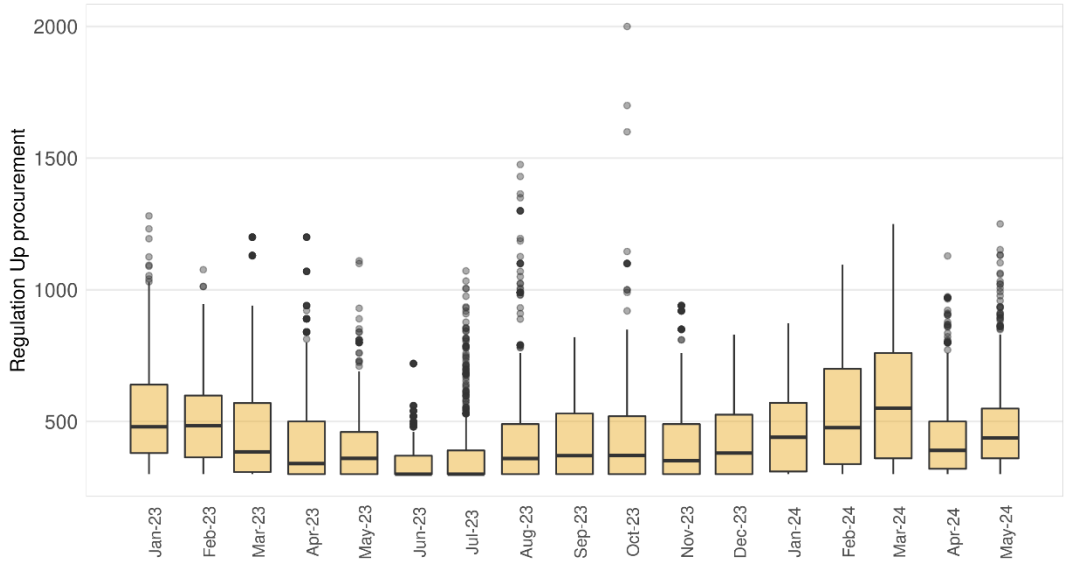
Load conformance is last-opportunity to address current and projected mismatch between markets and the system



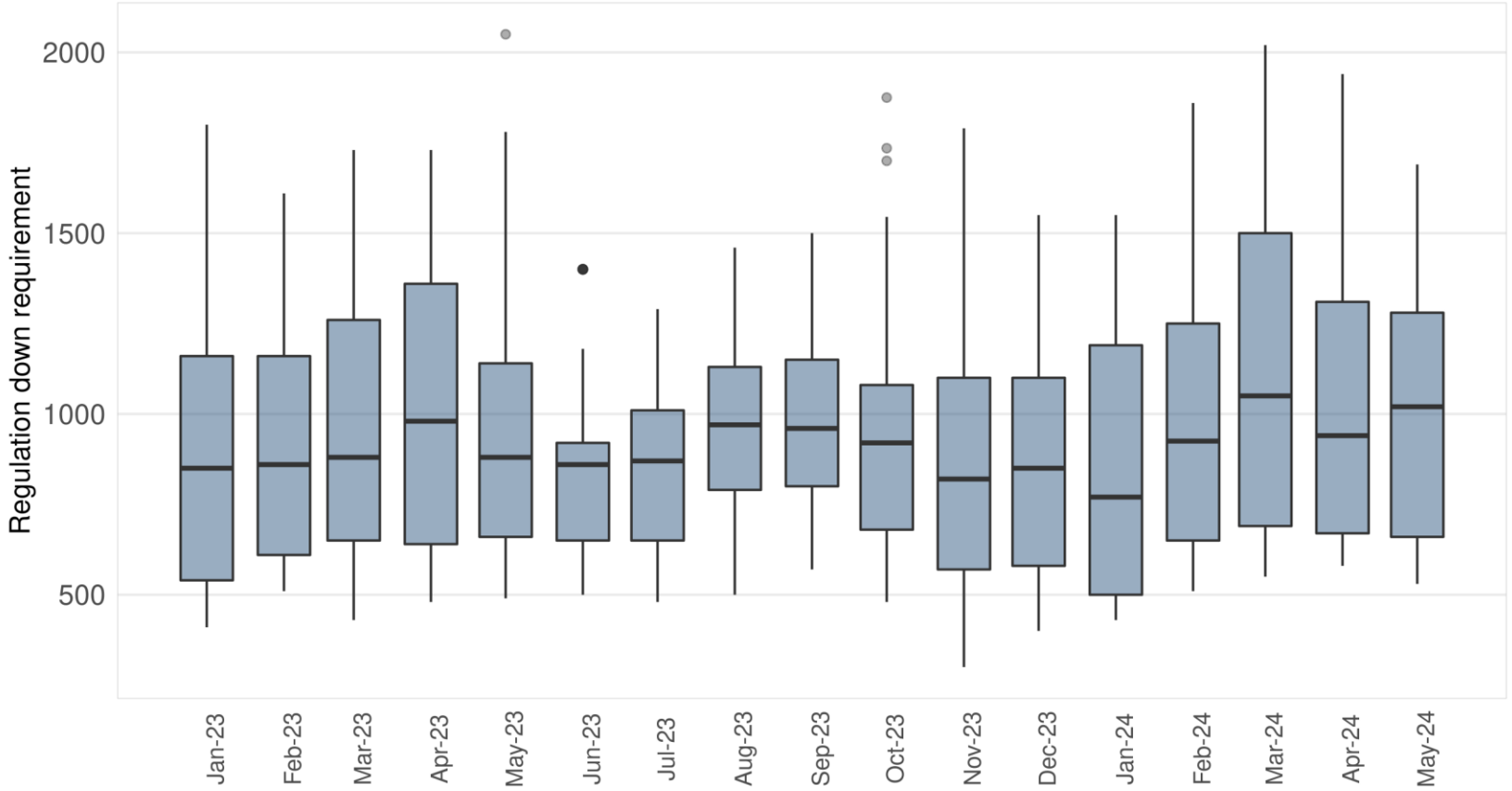
Regulation up requirement tend to be under 700 MW most of the time



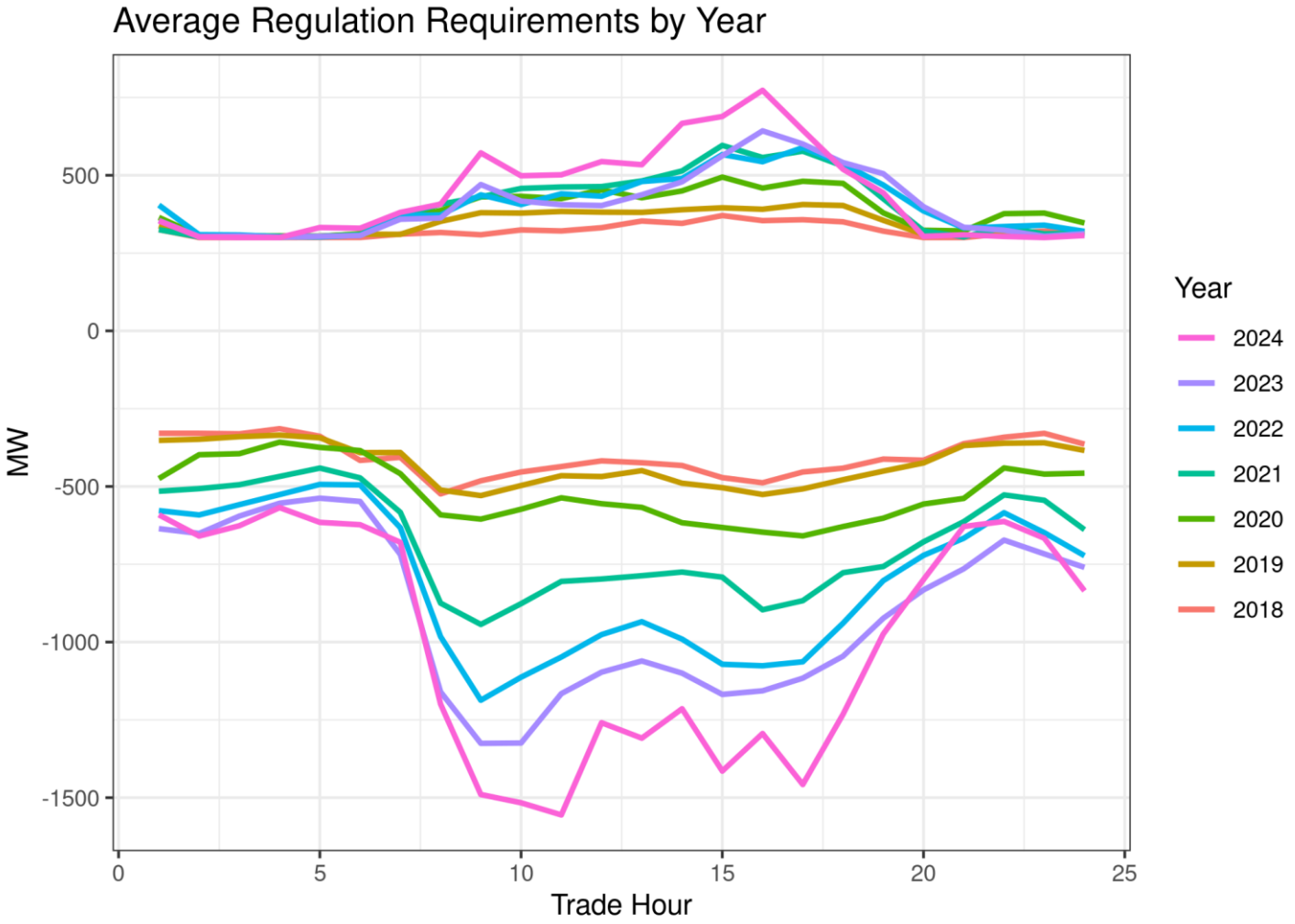
Regulation up procurement may be higher than requirements due to regulation used to meet operating reserves



Regulation down requirement and procurement have been consistently greater than regulation down in recent years



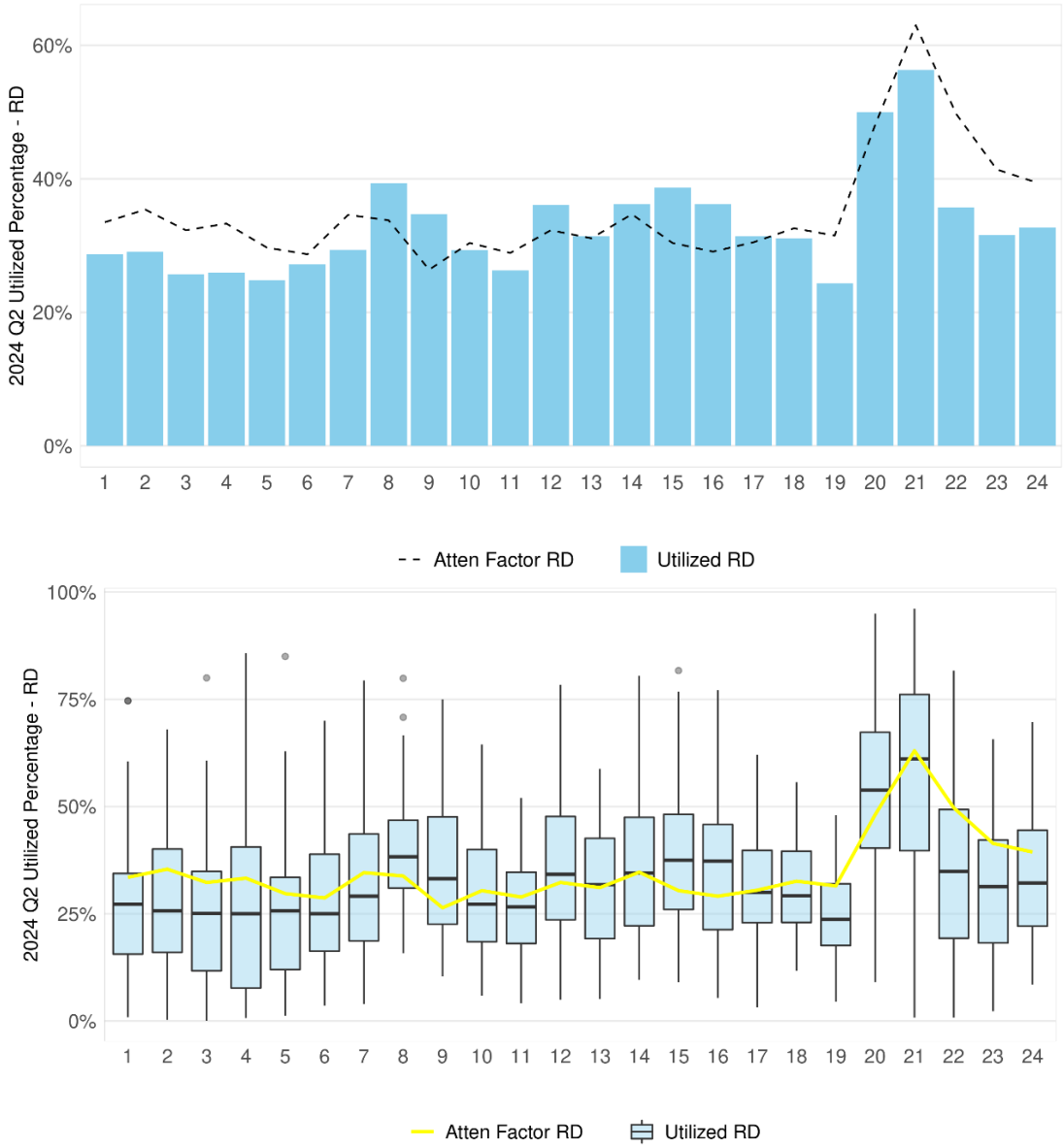
Regulation down requirements have been steadily increasing over the years



Actual utilization of regulation down (April, May 2024) is persistently high

High regulation down usage results in correspondingly high attenuation factors

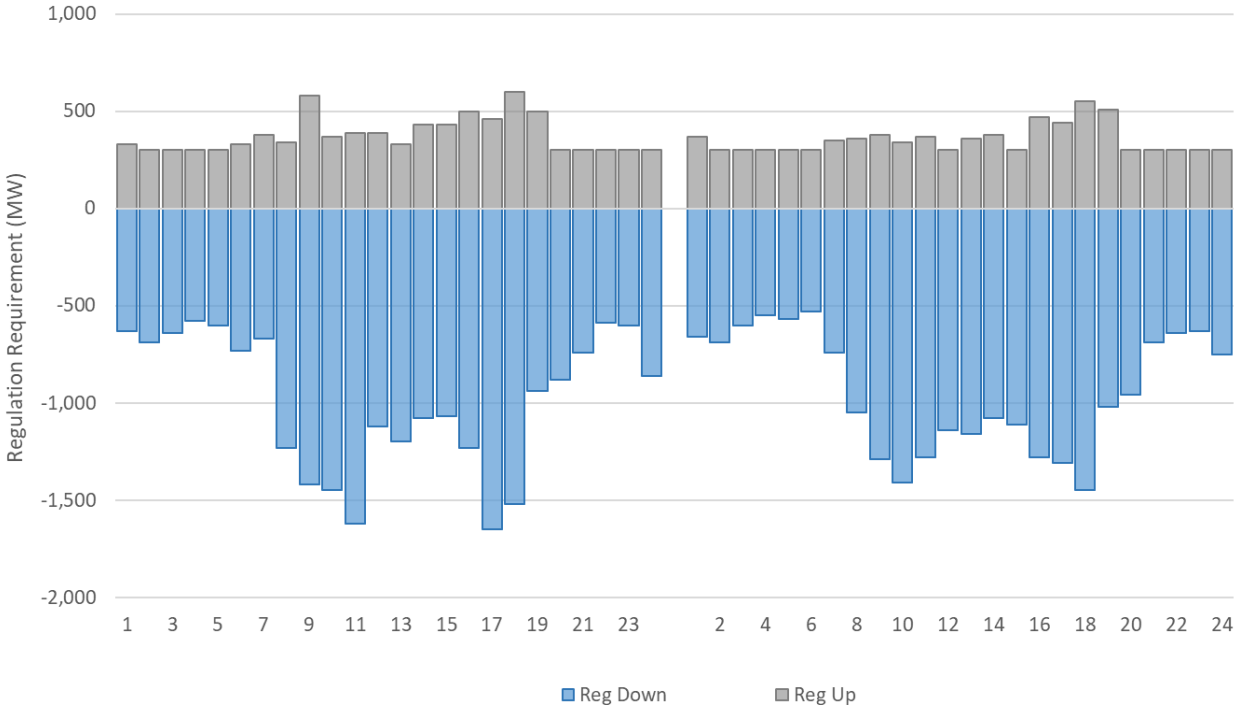
Because regulation requirements are based on historical regulation use, high use will result in high regulation requirements



Connecting the dots among load conformance, storage resources and use of regulation

- The current procurement of regulation is asymmetrical with too little for upward

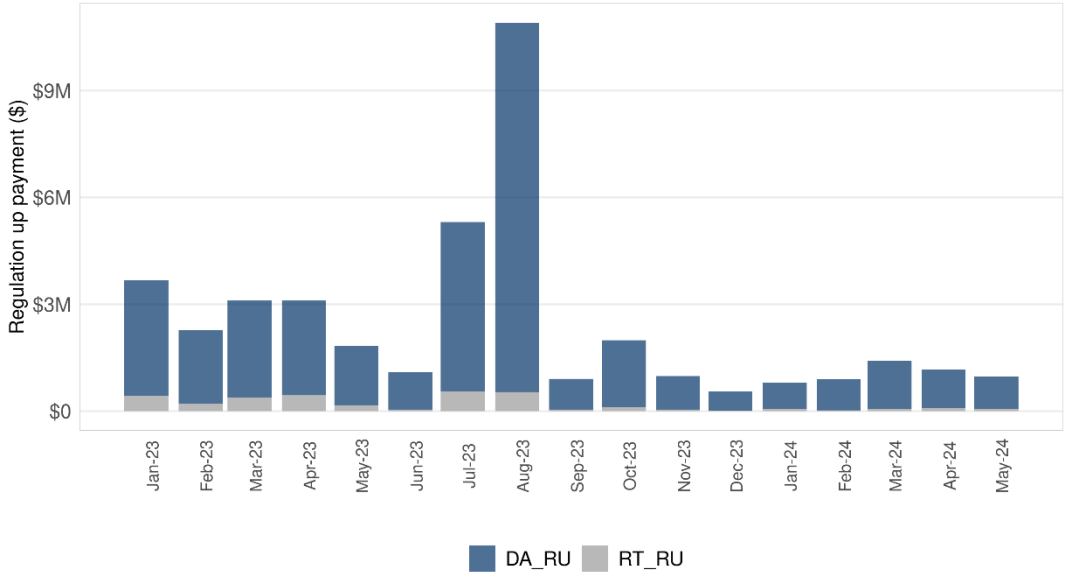
- This is resulting in operators using load conformance to create more headroom for reg up

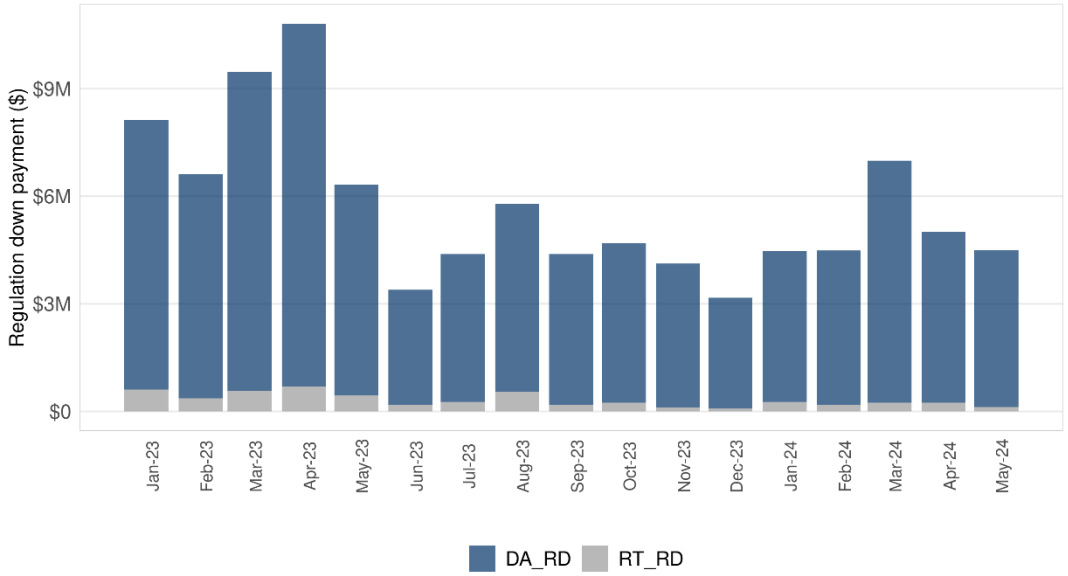


- Load conformance leads to higher energy dispatches such that the system needs to use regulation down more heavily to balance the system

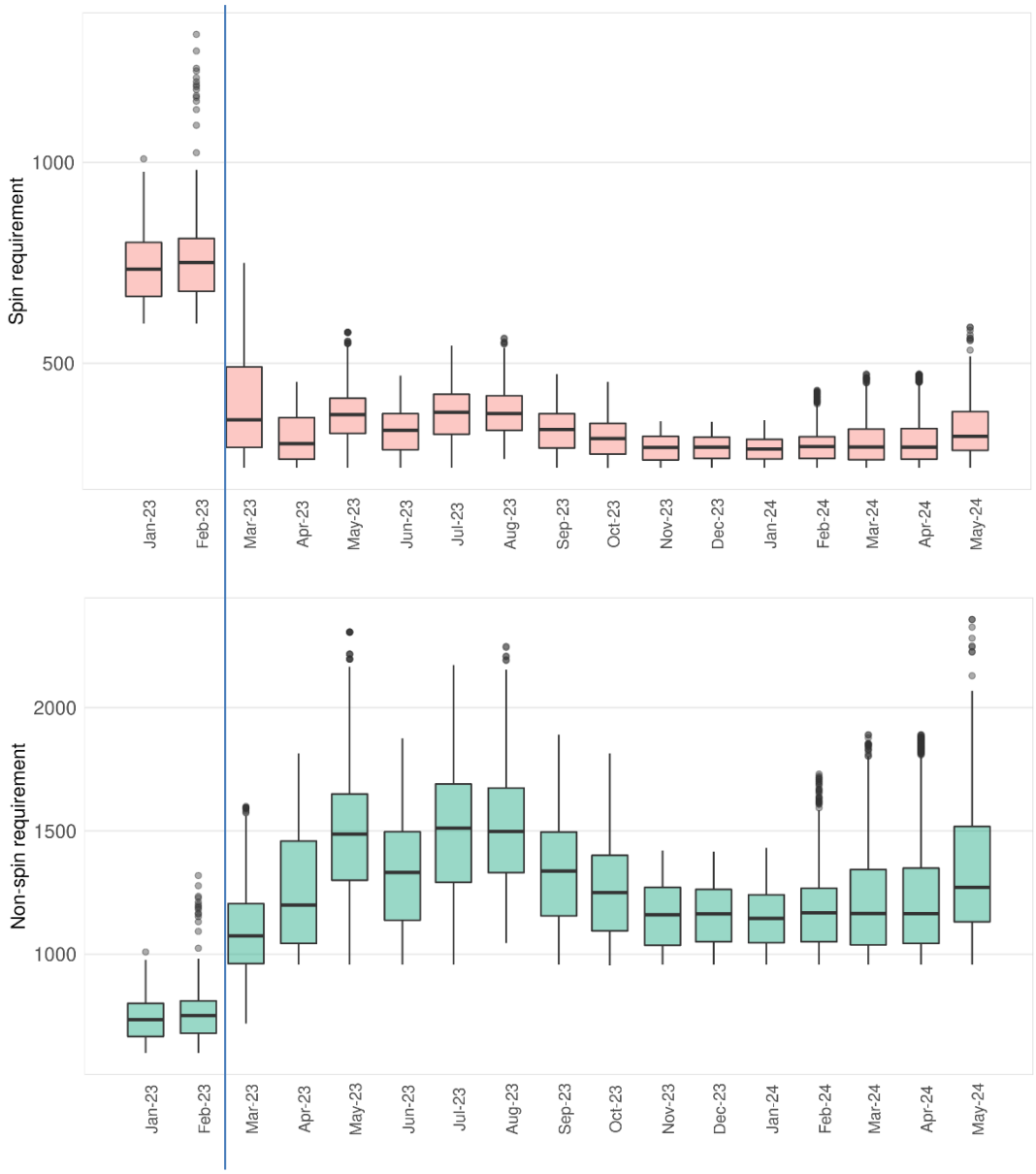
- CAISO is currently assessing this dynamic and other drivers for high use of regulation down

Correspondingly to the higher requirements, the cost of procuring regulation down is significantly higher than the cost for regulation up

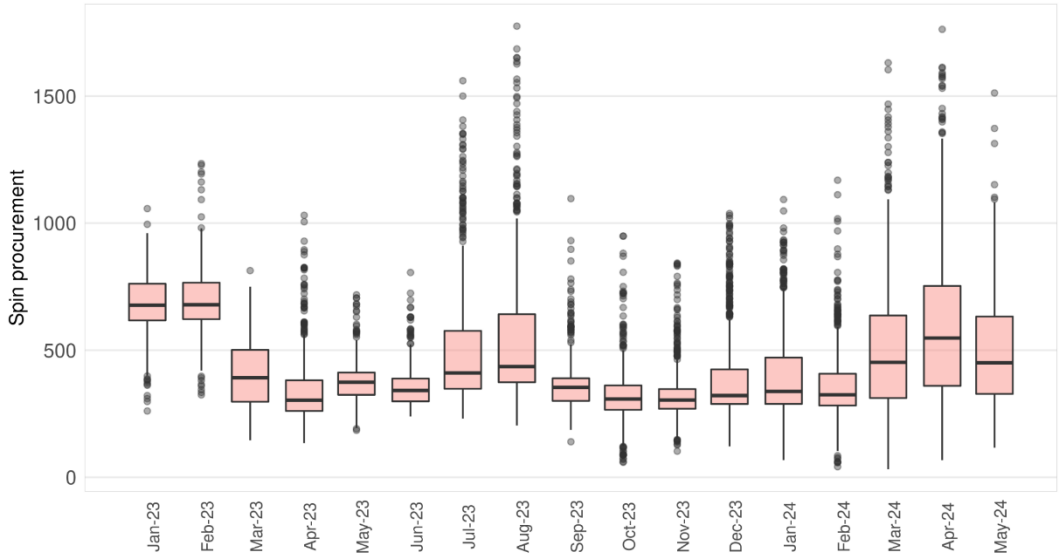


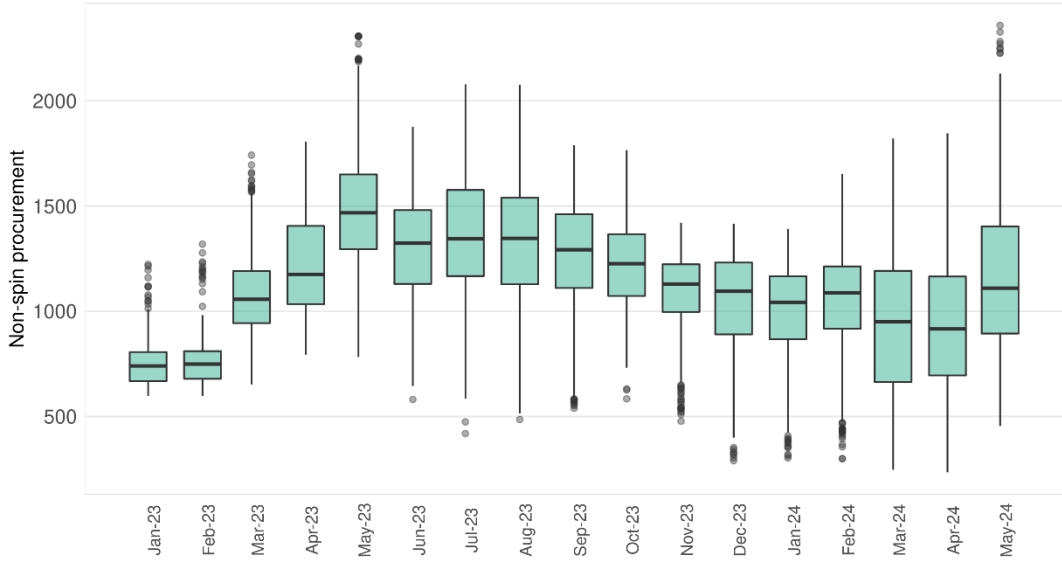


Lower values of spinning reserves are now required and procured after changes in the WECC and NERC standard in March 2023

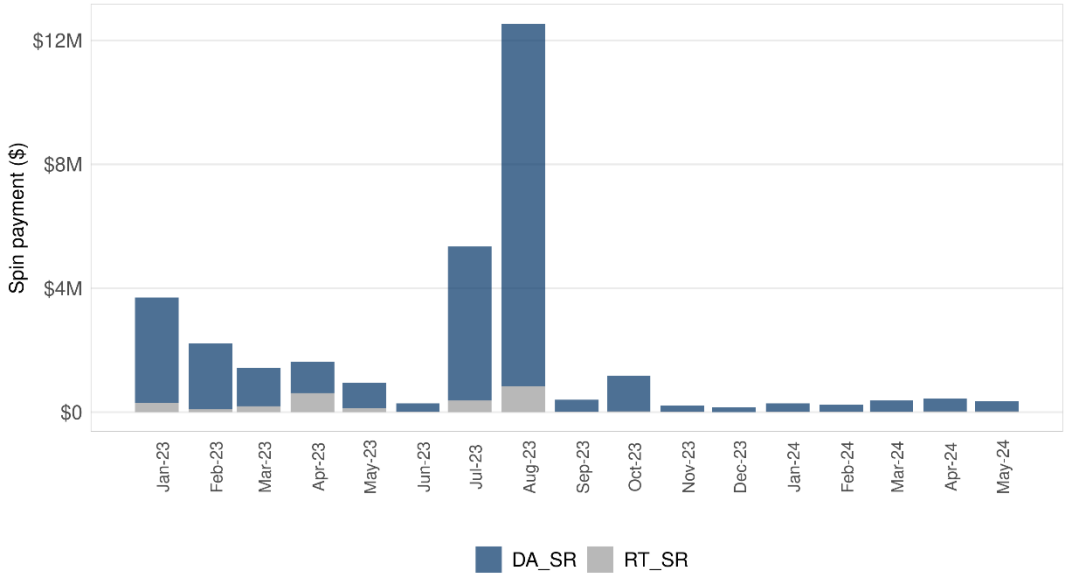


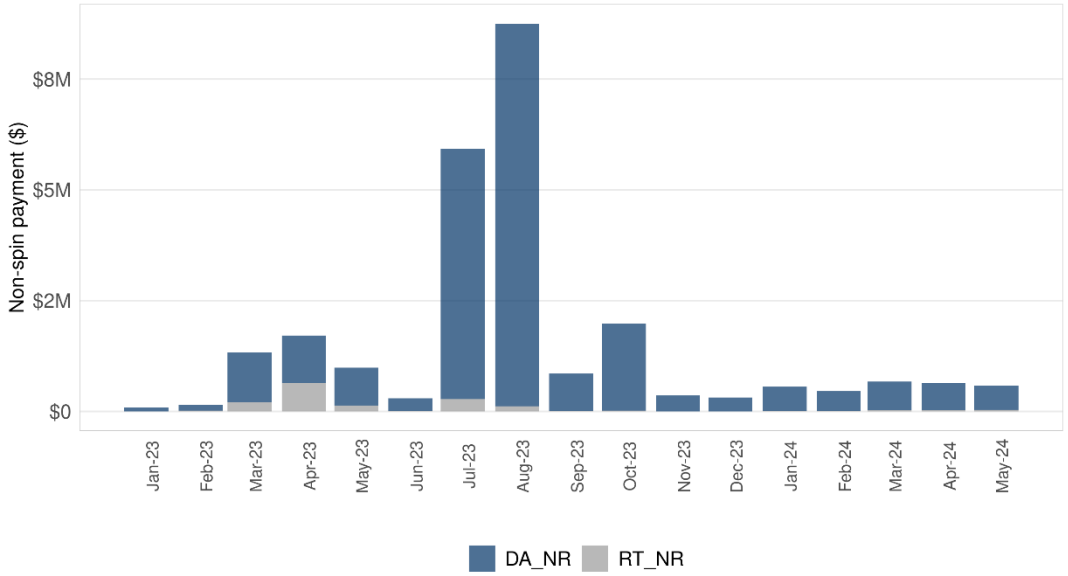
Trends of procurement for spin and non-spin tend to be largely similar to the requirement





The cost for procuring spin and non-spin reserves is relatively low

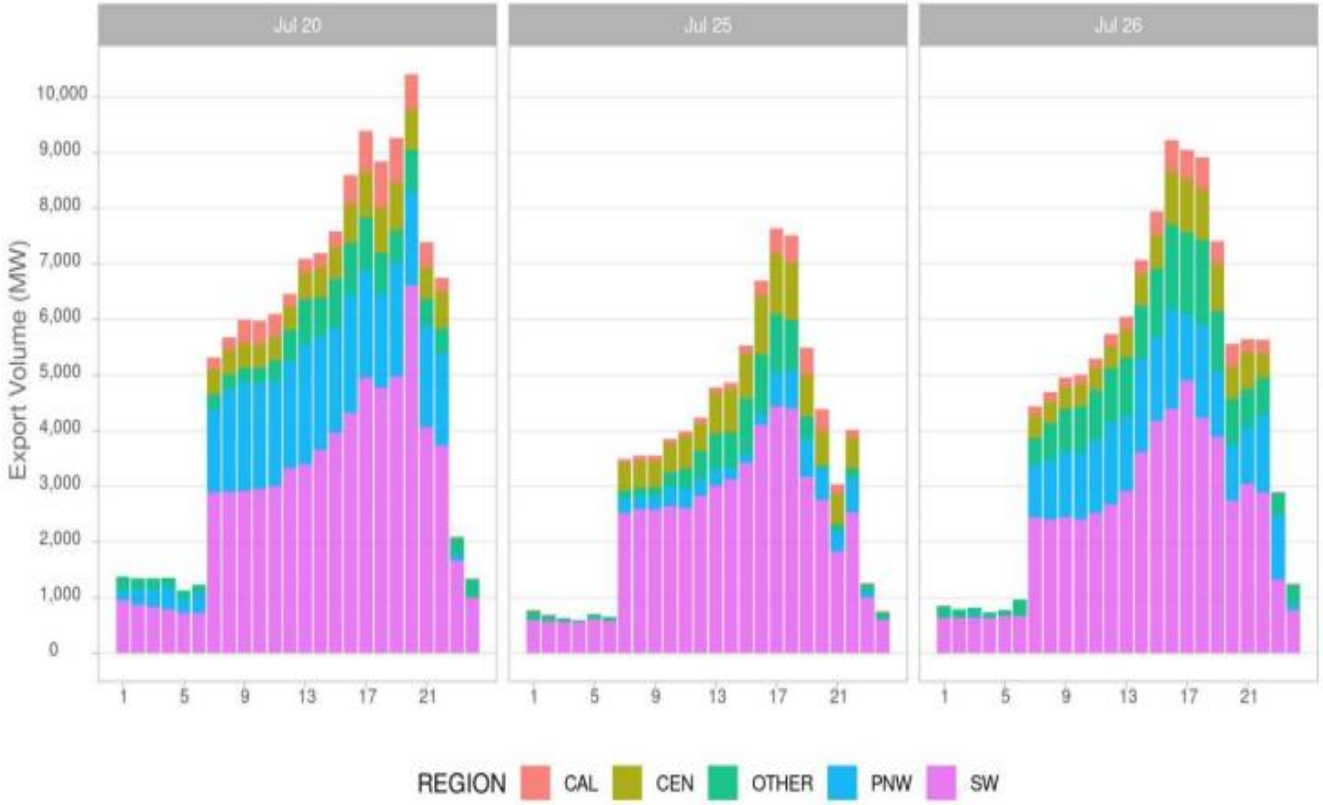




WEIM import transfer limitations

Guillermo Bautista Alderete
Director, Market Performance and Advanced Analytics

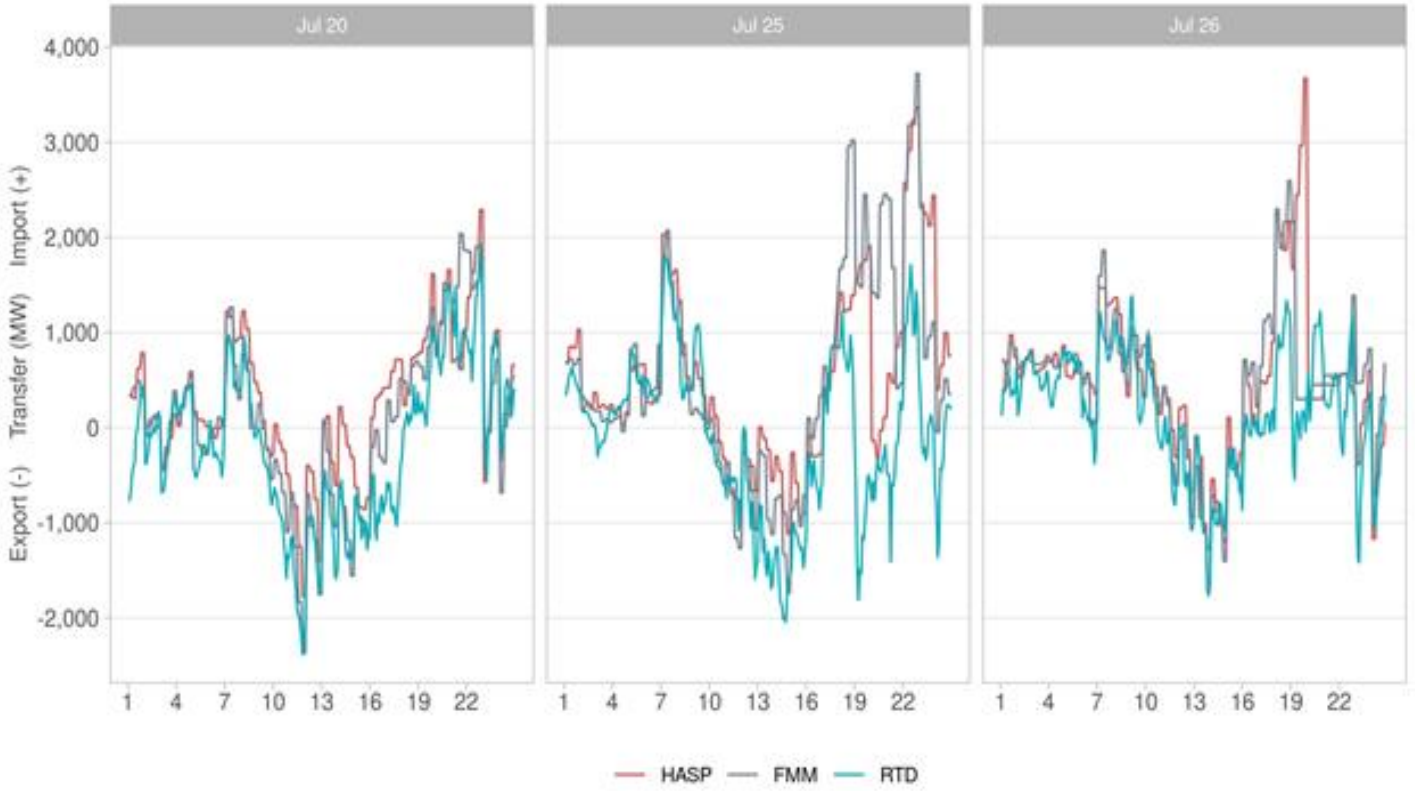
In spite of high demand, the ISO honored large volumes of exports and wheels



Unprecedented volume of exports cleared in July

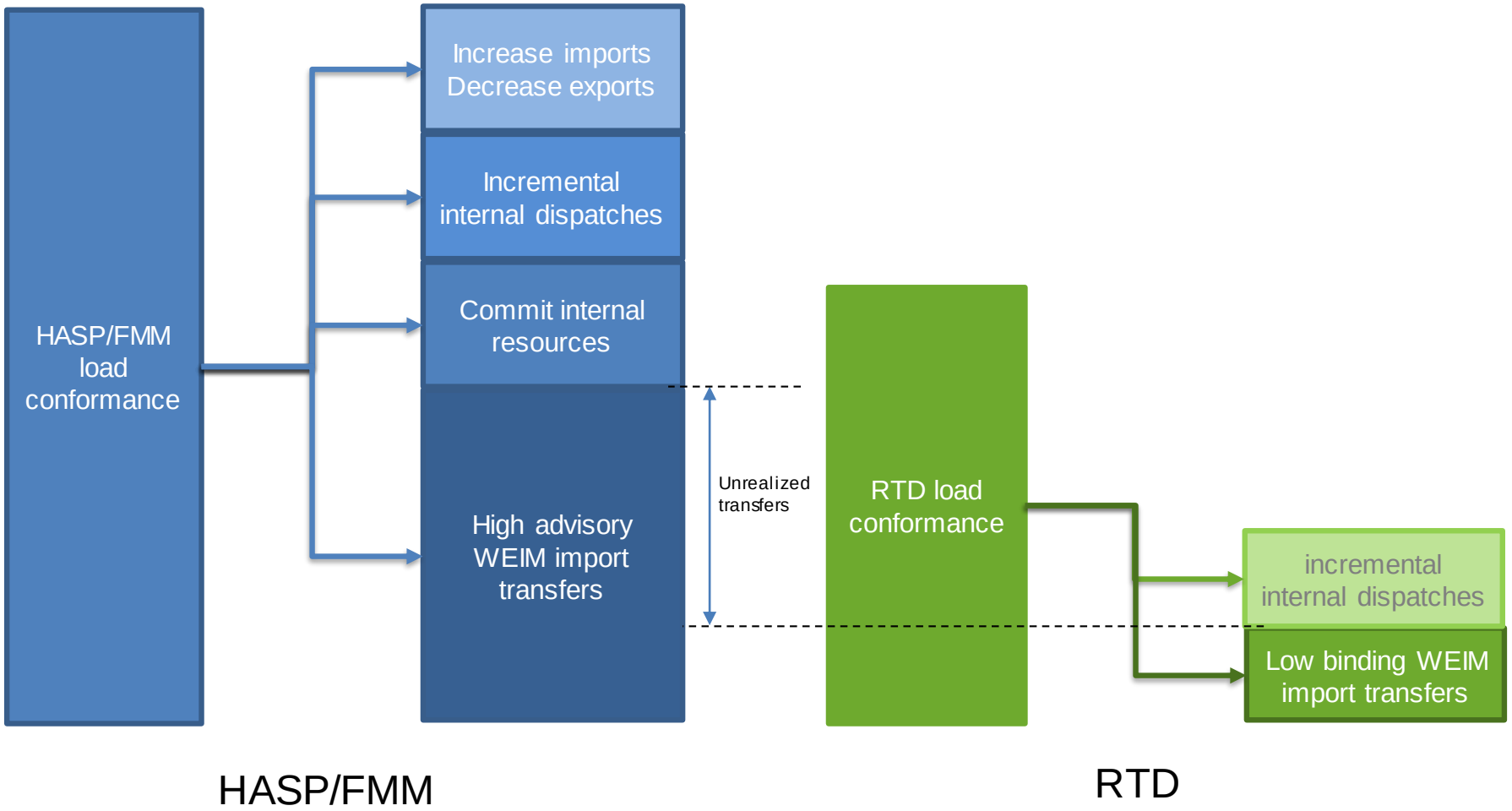
Exports during peak hours were double of those in summers of 2021 & 2022 during strained system conditions

Emerging supply and demand changes in the system-wide area resulted in unrealized WEIM import transfers



- ISO resources were scheduled and exports cleared in the hourly process relying on the availability of the advisory WEIM import transfers
- Transfers in the hourly and pre-dispatch markets are advisory and re-evaluated in the five-minute market, representing a loss of supply for ISO area if they do not materialize

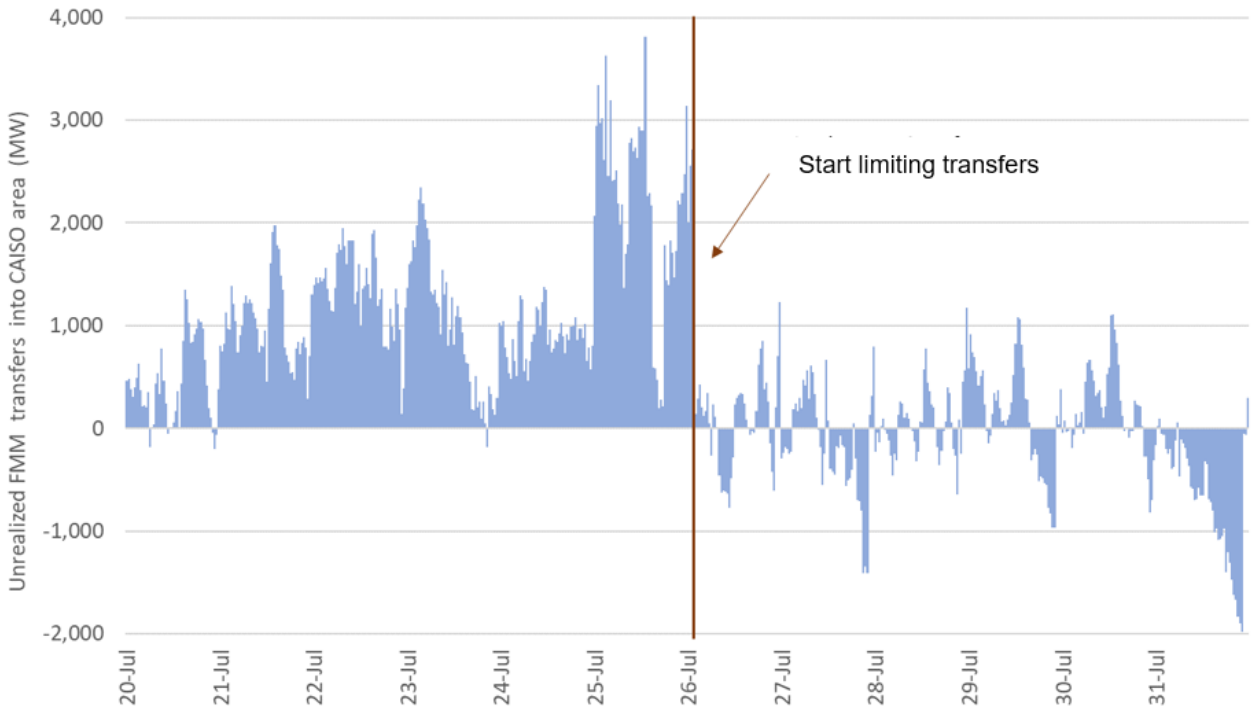
Load conformance adds demand which will be met by supply or identify infeasibilities in the market clearing process



Multiple drivers can cause the HASP/FMM advisory transfer levels to not be realized in RTD market

- Load conformance differences between markets in either WEIM area
- Renewable forecast differences
- Load forecast updates
- Resource deviations
- Supply changes
- Any WEIM area operator actions such as manual dispatches or blocking of transitions

In the evening ramp hours of the emergencies, the unrealized WEIM transfers were over 3,000 MW



On the evening of July 26, ISO started to limit the reliance on dynamic import transfers into the ISO area

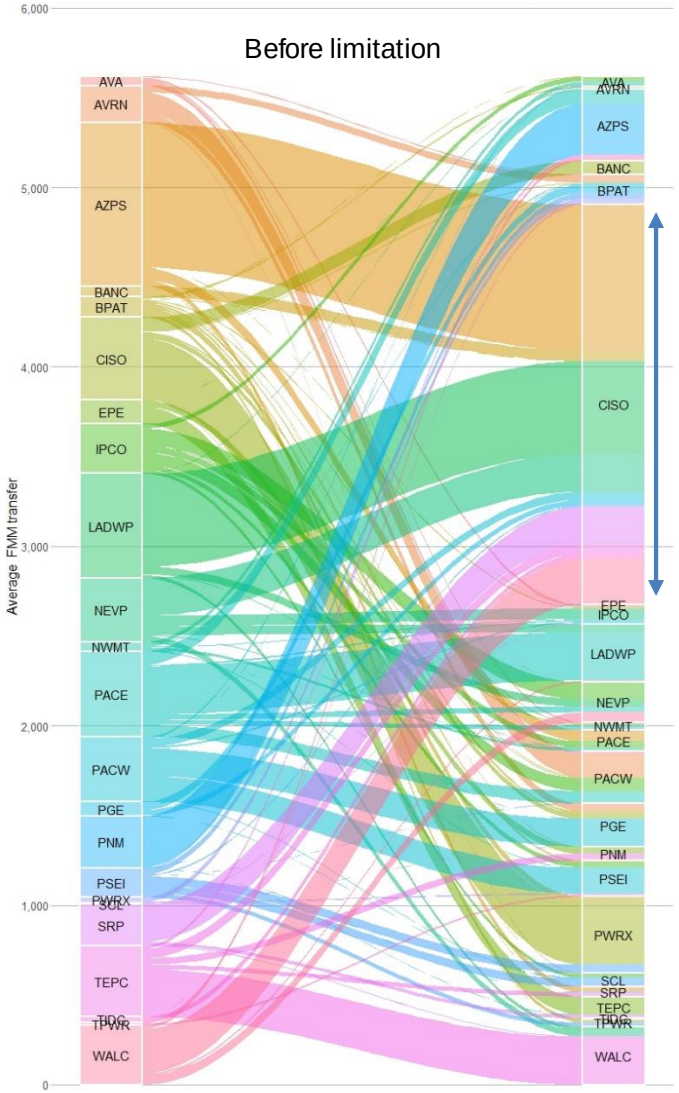
HASP is a process for CAISO area to clear hourly interties

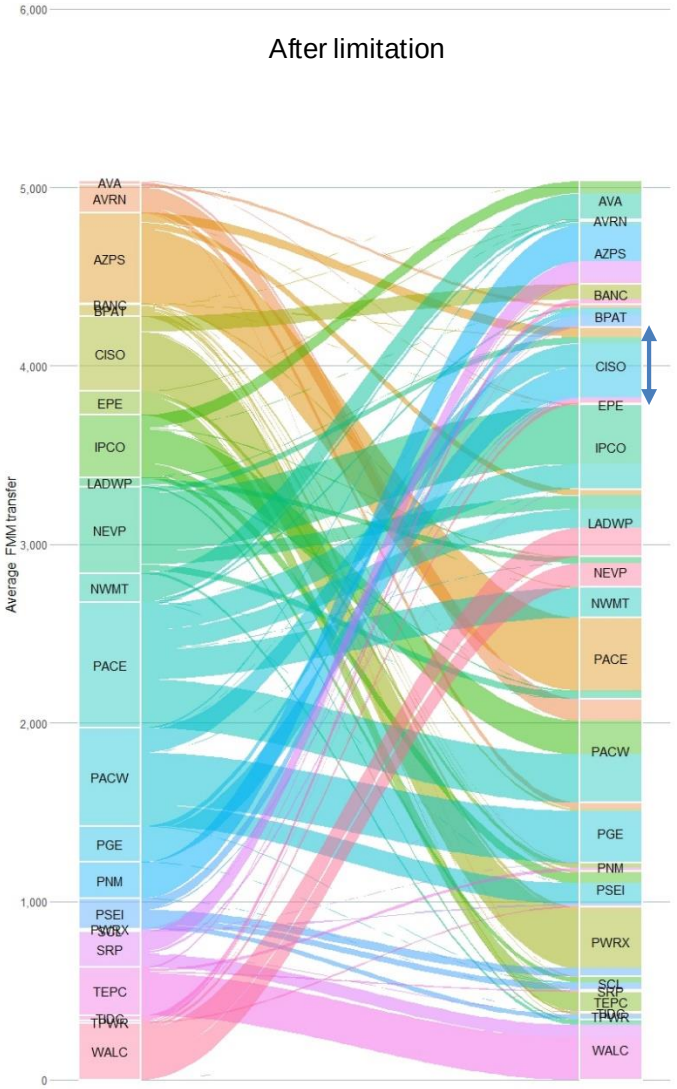
- Limiting dynamic import transfers allowed more reliable market clearing of ISO's load obligation and exports based only on internal resources or supplementary hourly import transactions
- This practice also provided more certainty to flow for cleared exports transactions

Limitation of import transfers into CAISO area led to a redistribution of transfers in the wider footprint

Import limitations:

- reduced opportunity for economic displacement of CAISO supply but
- it did not detrimentally impact other areas balancing because each area needs to pass the resource test to manage oversupply
- Did not represent a lost opportunity for other areas generation sales because prices were due to the limitations



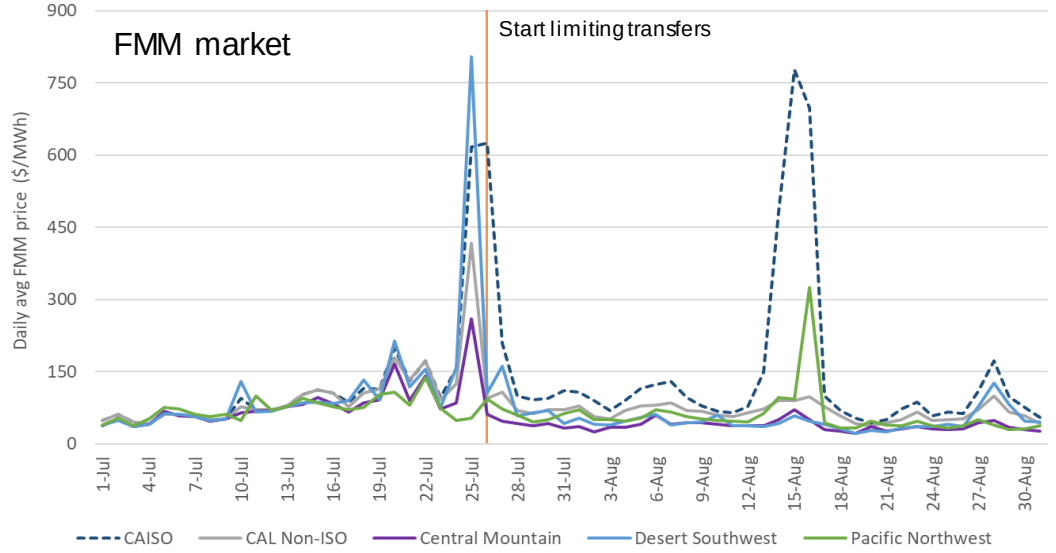


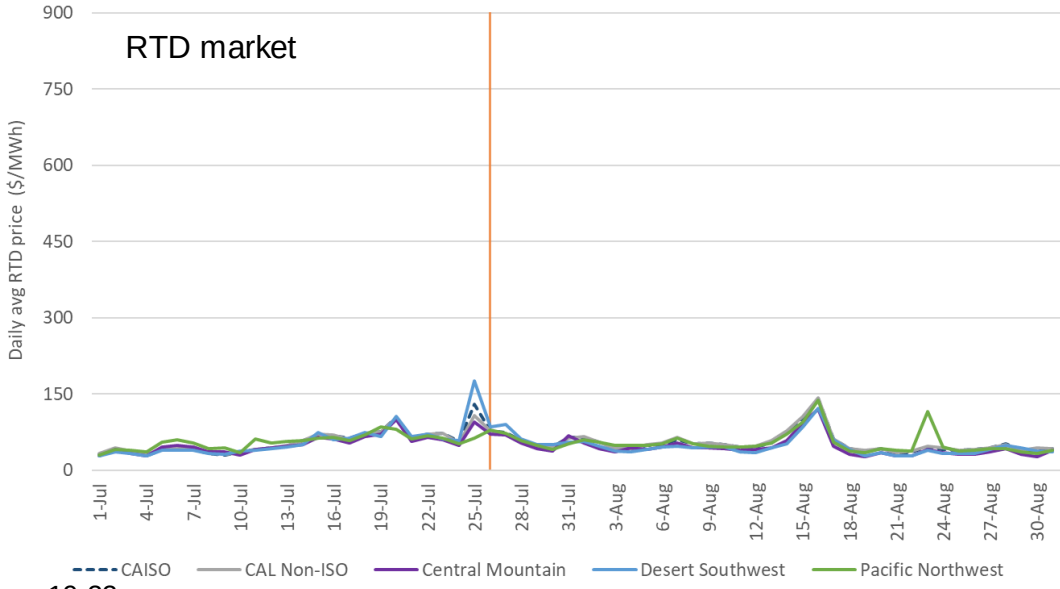
Metrics show two periods: July 19-25 (before) July 26- August 1 (after)

California ISO

WEIM balancing areas have the ability to limit transfers

- CAISO's area limitations led to price separation only in FMM:
  - Higher prices in ISO area (one bubble)
  - Lower and economic prices in other WEIM areas (wider bubble)
  - WEIM areas were not detrimentally impacted as it isolated them through congestion
- Resource in either area were still dispatched in merit
- The higher prices in CAISO did not represent any lost opportunity for other areas generation because high prices were the product of the limitation





California ISO

Plots show averages only for hours 19-22

This practice was very targeted and was in place until November 16

- ISO started to limit presumed WEIM import transfers to ISO area on July 26; the limitation applied to only:
  - import transfers to ISO area; export transfers to other WEIM areas from ISO continued to be available
  - dynamic transfers; static transfers were not limited
  - peak hours HE19-22
  - hourly and pre-dispatch markets; real-time dispatch was not limited
  - hourly ISO intertie transactions were not limited
- This practice was in place until the ISO could address identified market issues that created operational uncertainty
  - Inaccurate display of dispatchable capability in the market
  - Scheduling and tagging processes that had enabled participants to not follow export reductions
  - Inconsistent treatment of intertie transactions between balancing areas that exacerbated congestion

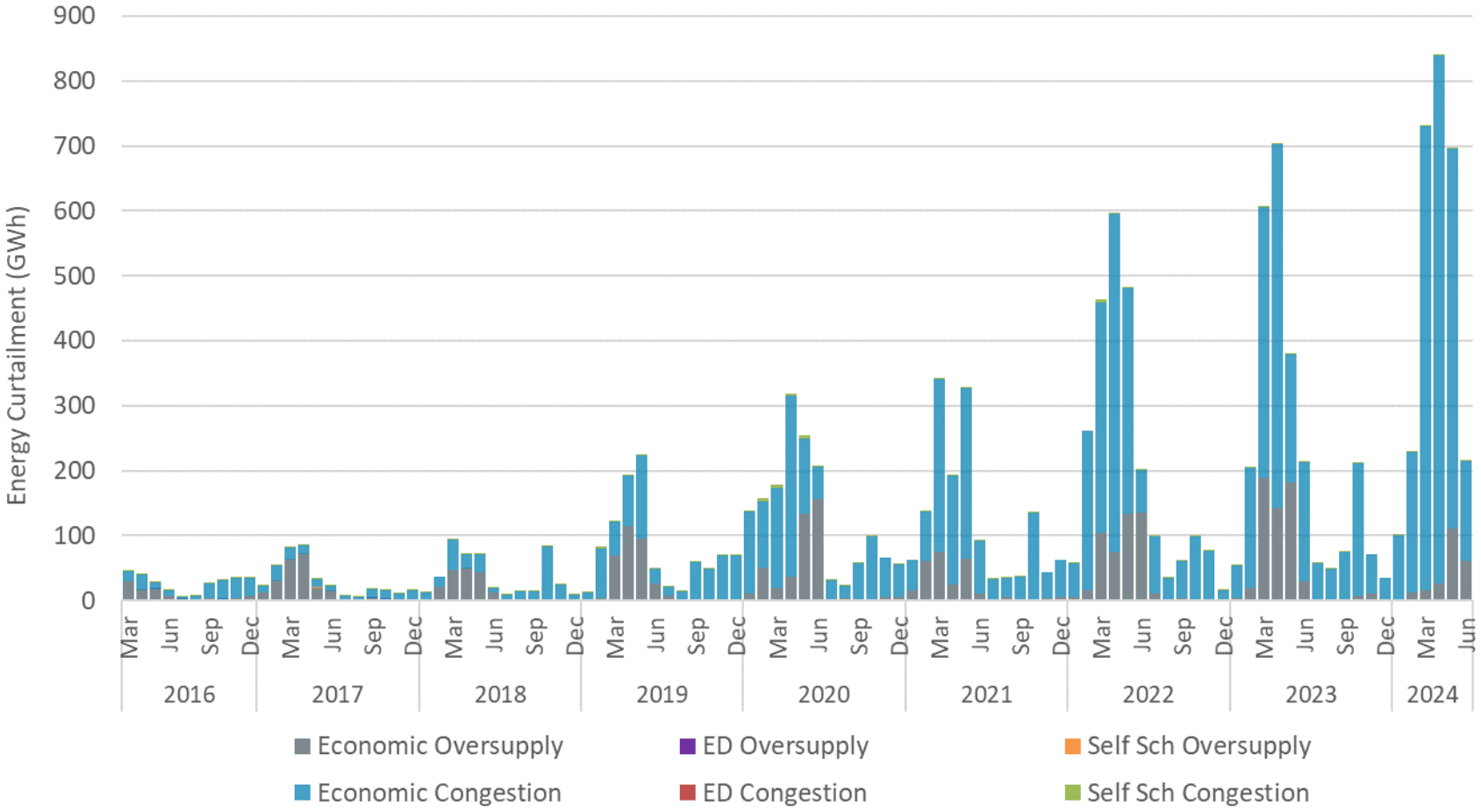
CAISO will add more transparency in communicating when using transfer limitations

- Given dynamic real-time conditions, July emergencies were not projected in the day-ahead market to take actions in advance
- Similar circumstances may arise this summer and the ISO may deploy this limitation again
- ISO expects to use this limitation on targeted intervals based on expected real-time conditions
- ISO does not have a net import/export constraint to use like other WEIM areas have in their toolkit
- Everbridge messages have been used to communicate limitation of transfers
- CAISO will additionally use market messages to communicate transfer limits. These messages become available in OASIS

Renewable Integration and Oversupply Conditions

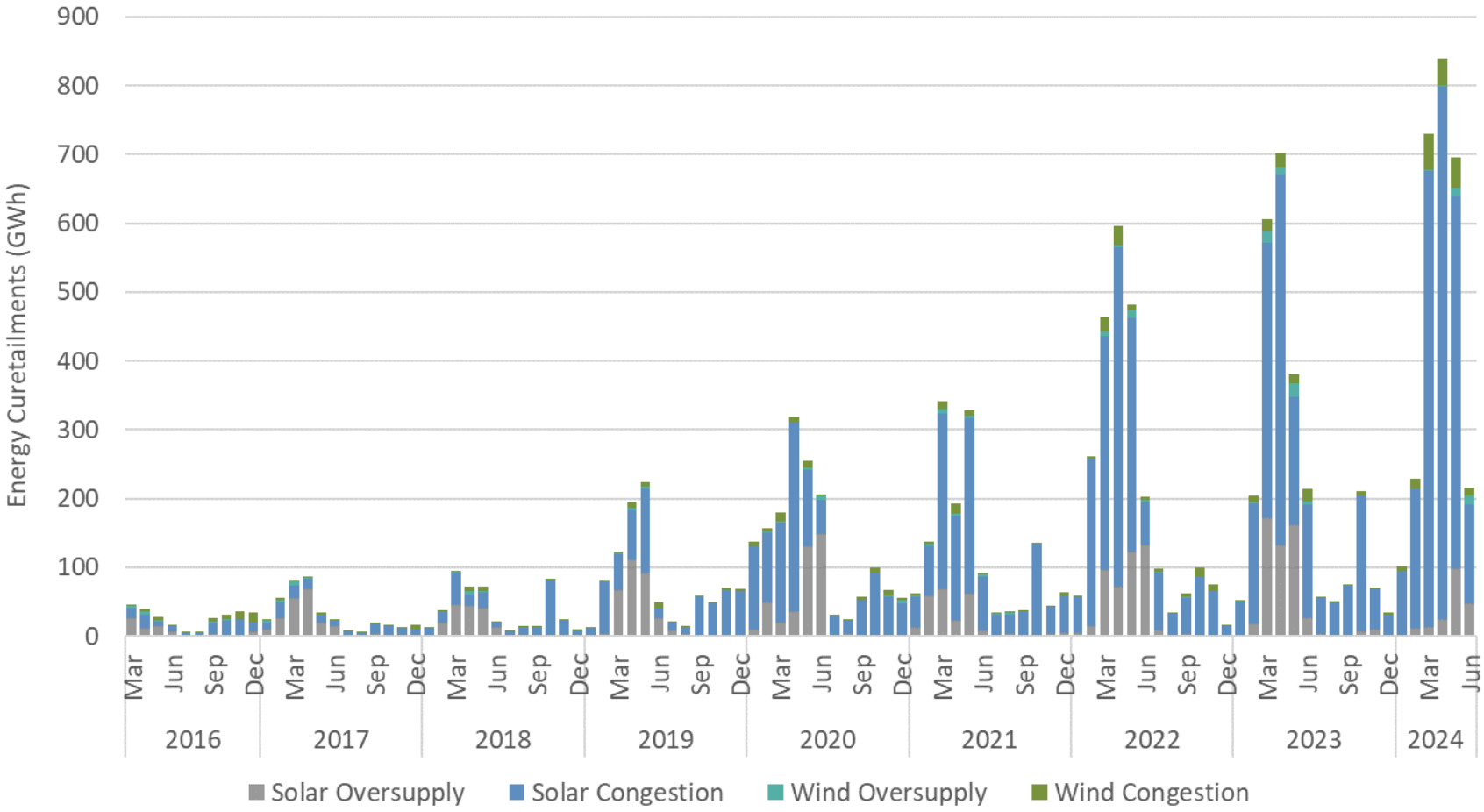
Guillermo Bautista Alderete
Director, Market Performance and Advanced Analytics

About 80 percent of renewable curtailments are due to congestion while 20 percent due to oversupply conditions

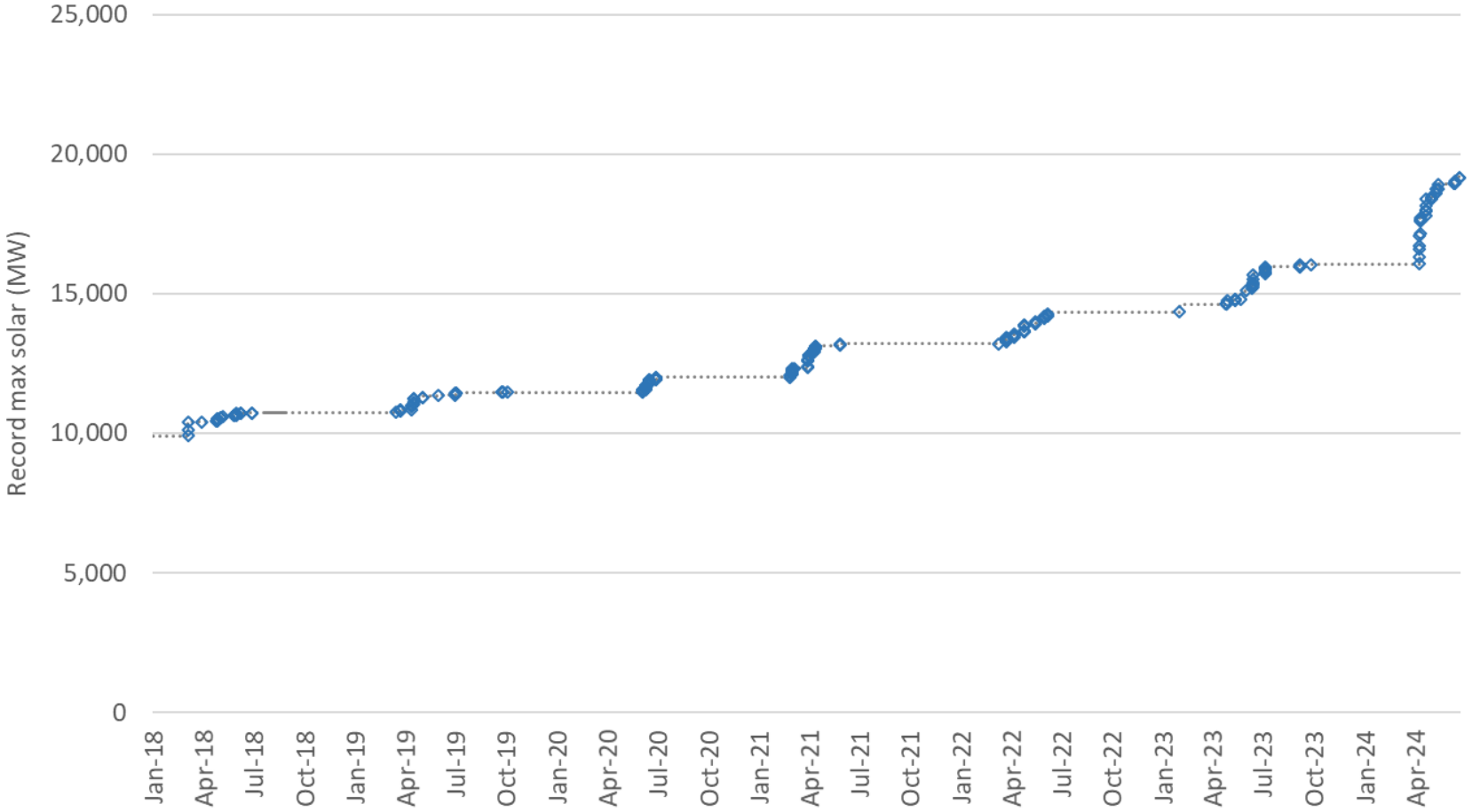


The addition of storage resources charging during hours of excess supply has not reduced the upward trend of curtailments because most of the curtailments are due to congestion rather than oversupply

About 94 percent of curtailments are for solar resources



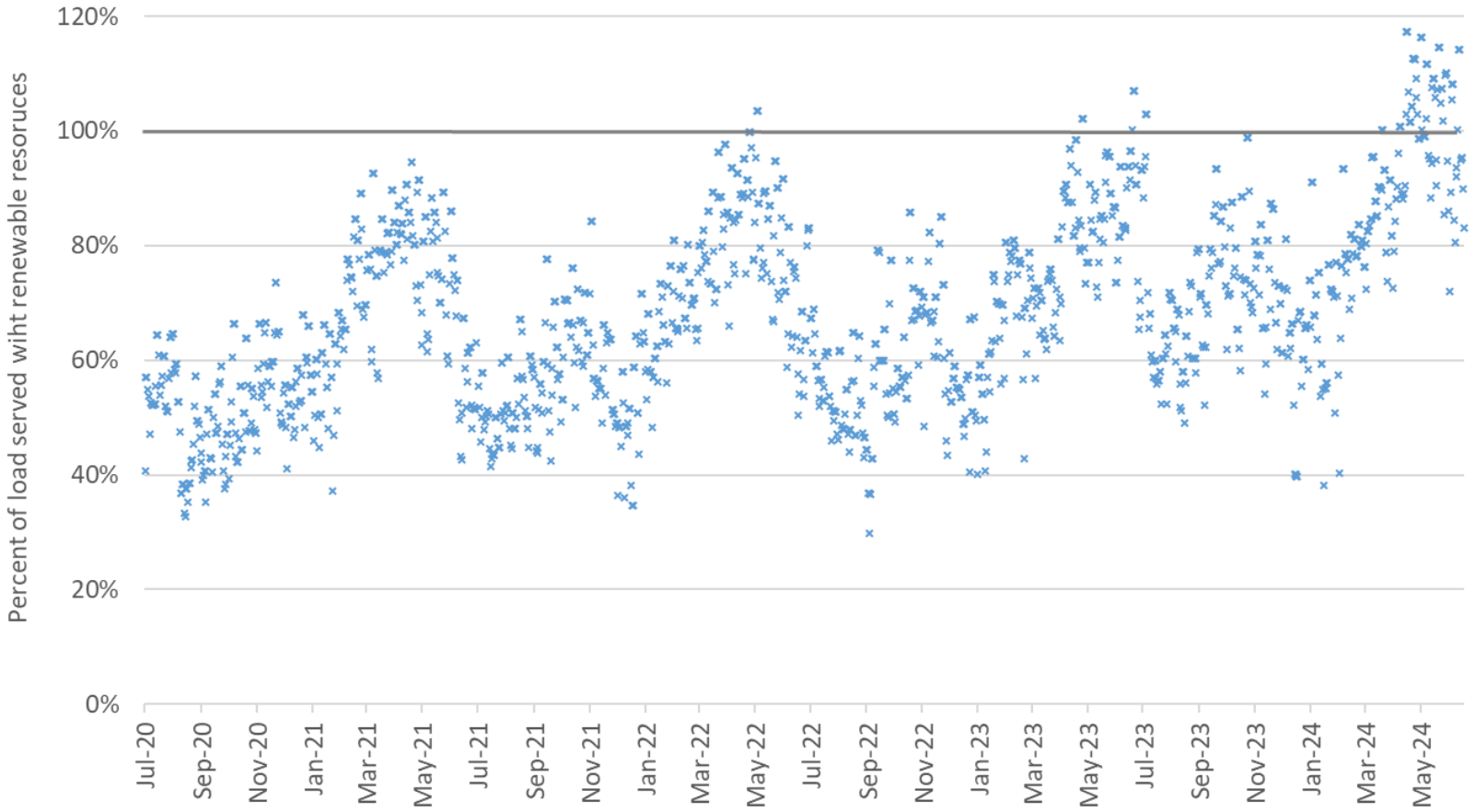
In 2024, there have been more records of max solar production, coming close to 20,000MW



Each dot represents a new max production record over time

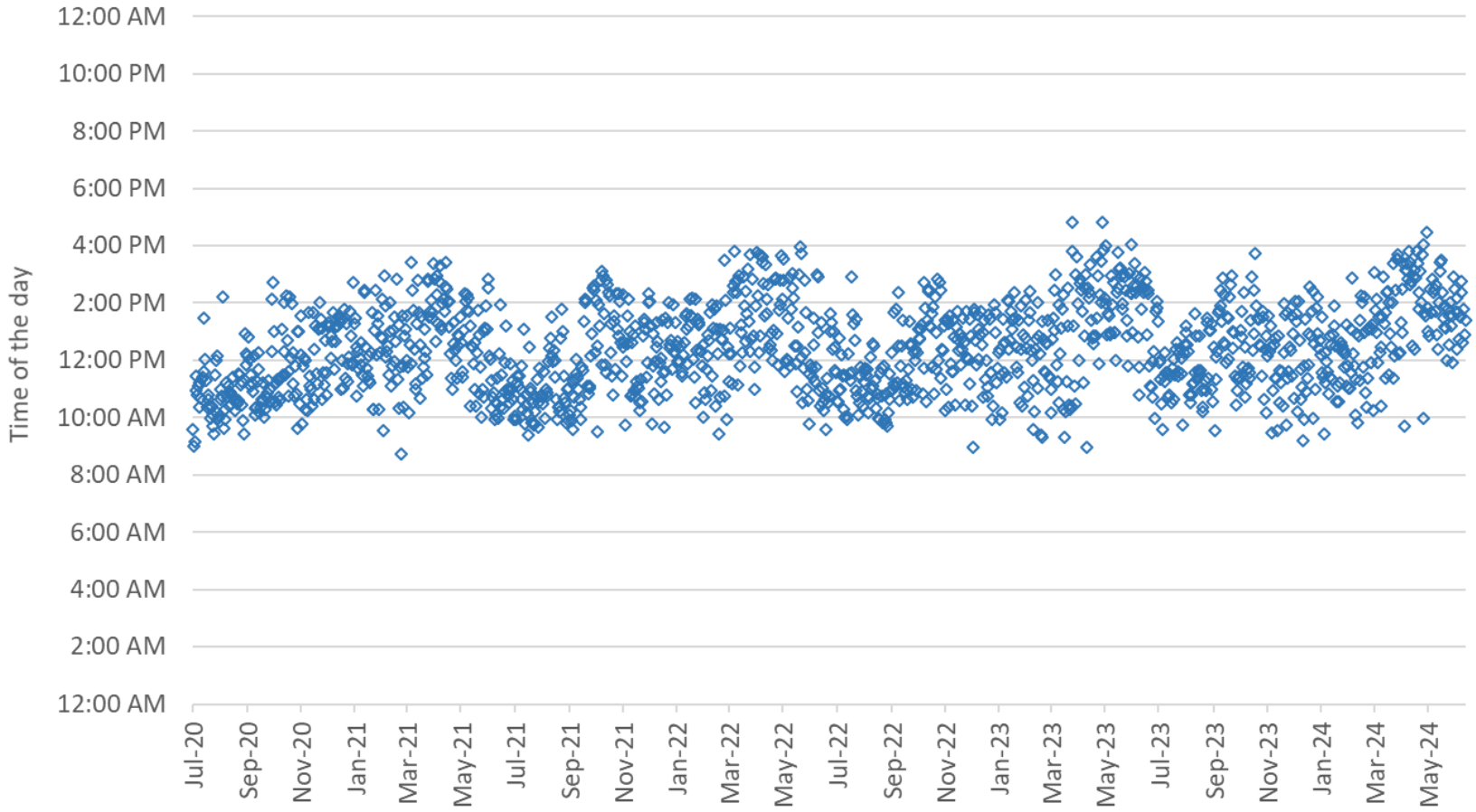
Solar records tend to happen mainly during the shoulder months of April to July

The number of days with load served fully with renewable resources increased to 44 in 2024 from seven in 2023



The maximum level of load served with renewables is just below 120%

The maximum level of load served by renewable resources happens during hours when batteries are charging, solar production is high and demand is low

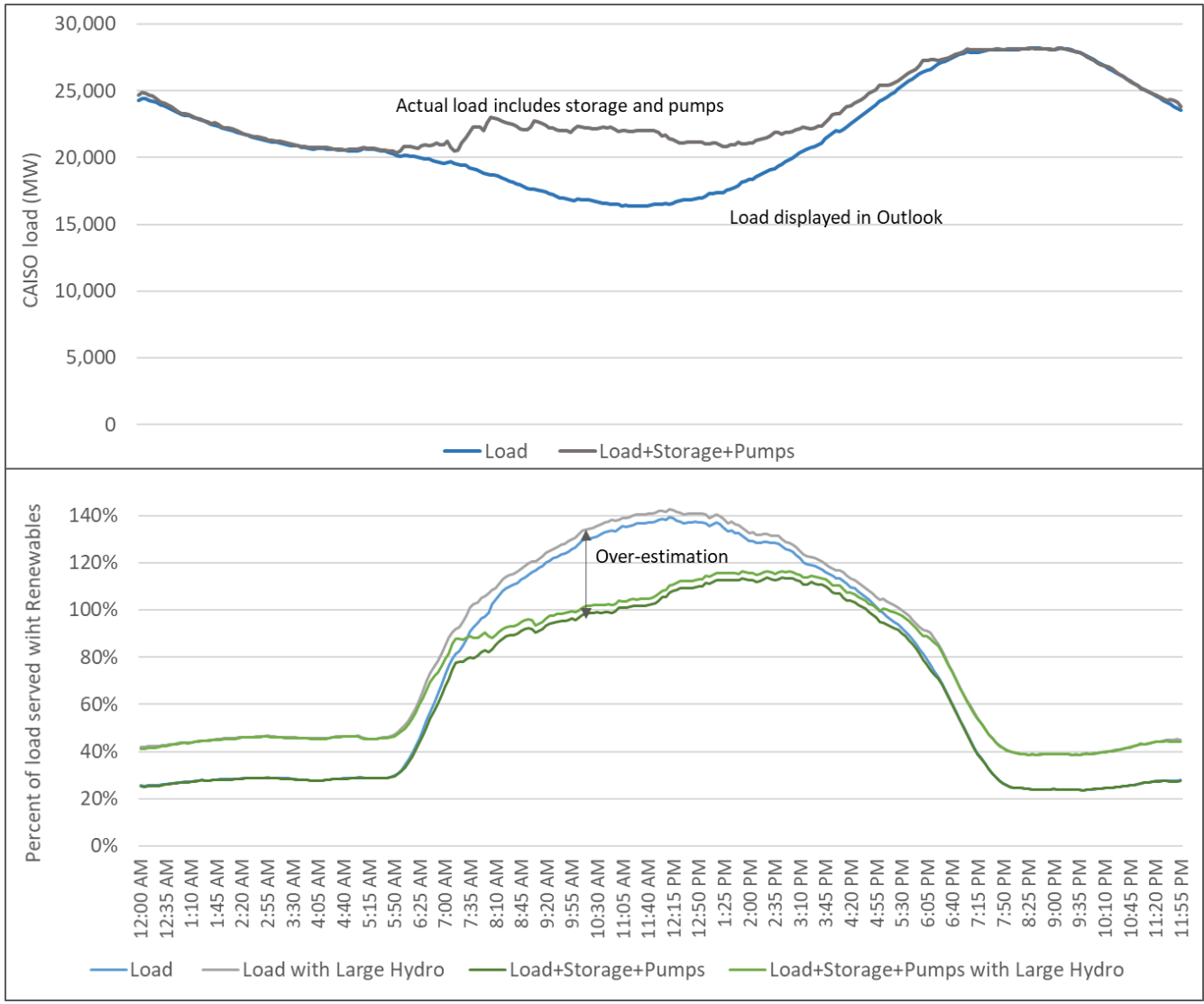


Different statistics of load served with renewables can be derived based on the reference used for load and the definition of renewables

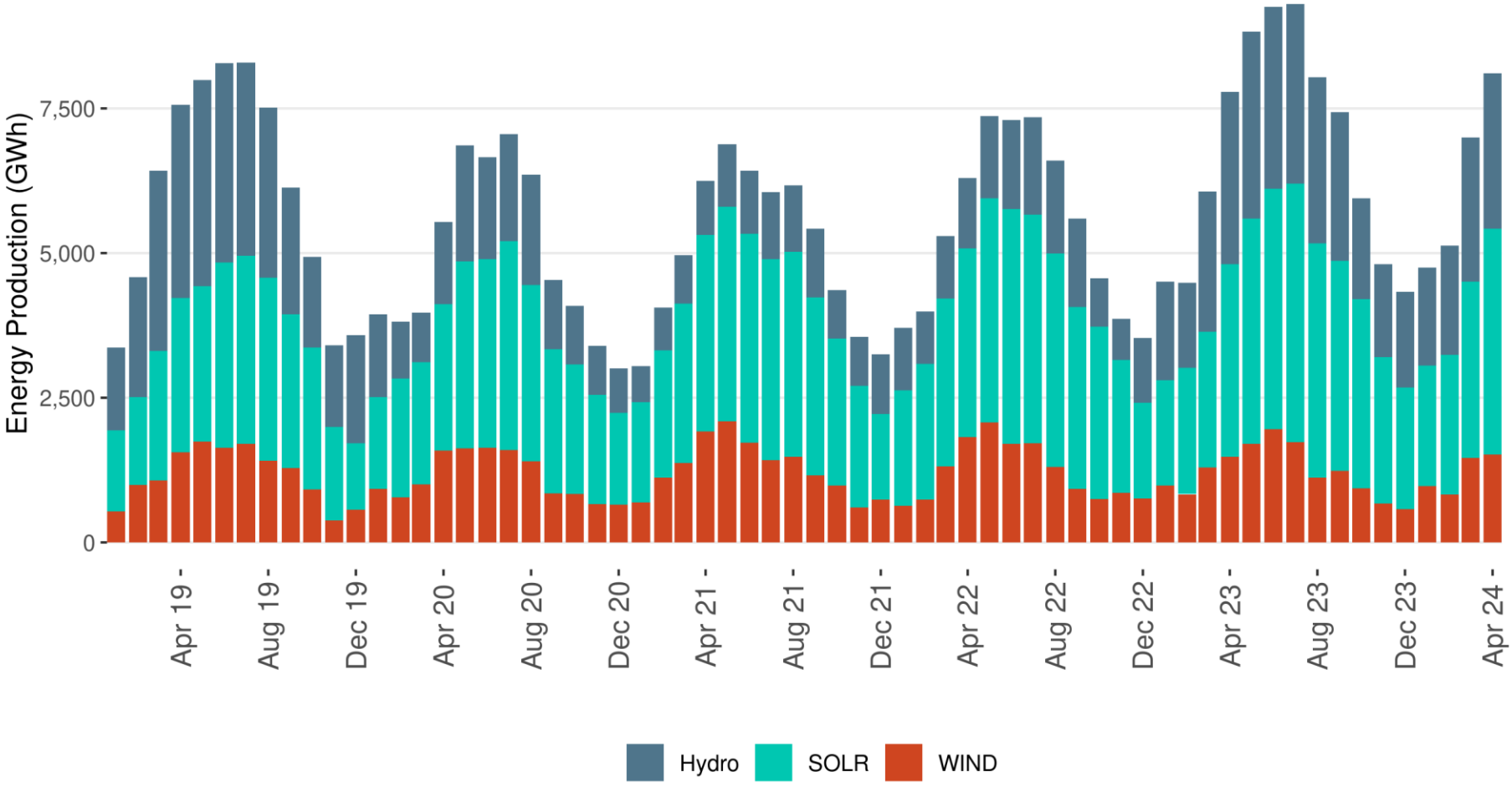
- CAISO's definition of renewable resources does not include large hydro; including large hydro will result in higher percentages
- CAISO's load displayed in Outlook does not include storage or pump resources as it only focuses on load that is forecasted
- The load the CAISO balancing area needs to meet includes forecast load plus storage resources in charge mode plus pumps
- Not including storage and pumps in the load definition will over-estimate the percent of load served with renewables
- This overestimation will be chronic because the time of the day the records are achieved are precisely during hours of storage being charged
- The fact is that supply is dispatched to meet the storage and pumps demand

Considering only the forecast load without storage and pumps will overestimate the load served with renewables by over 30%

The supply used to meet storage and pumps load in midday hours will be to effectively serve load during peak hours



Hydro production trending in 2024 to be higher than previous years, complementing higher solar production



Energy Storage Performance after Fall Enhancements

Kun Zhao
Market Performance and Advanced Analytics

Energy storage enhancements Track 2 was activated on November 1, 2023

- The original state of charge equation

$$SOC_{i,t} = SOC_{i,t-1} - \left(EN_{i,t}^{(+)} + \eta_i \, EN_{i,t}^{(-)}\right) \frac{\Delta T}{T_{60}}$$

$$\underline{SOC}_{i,t} \leq SOC_{i,t} \leq \overline{SOC}_{i,t}$$

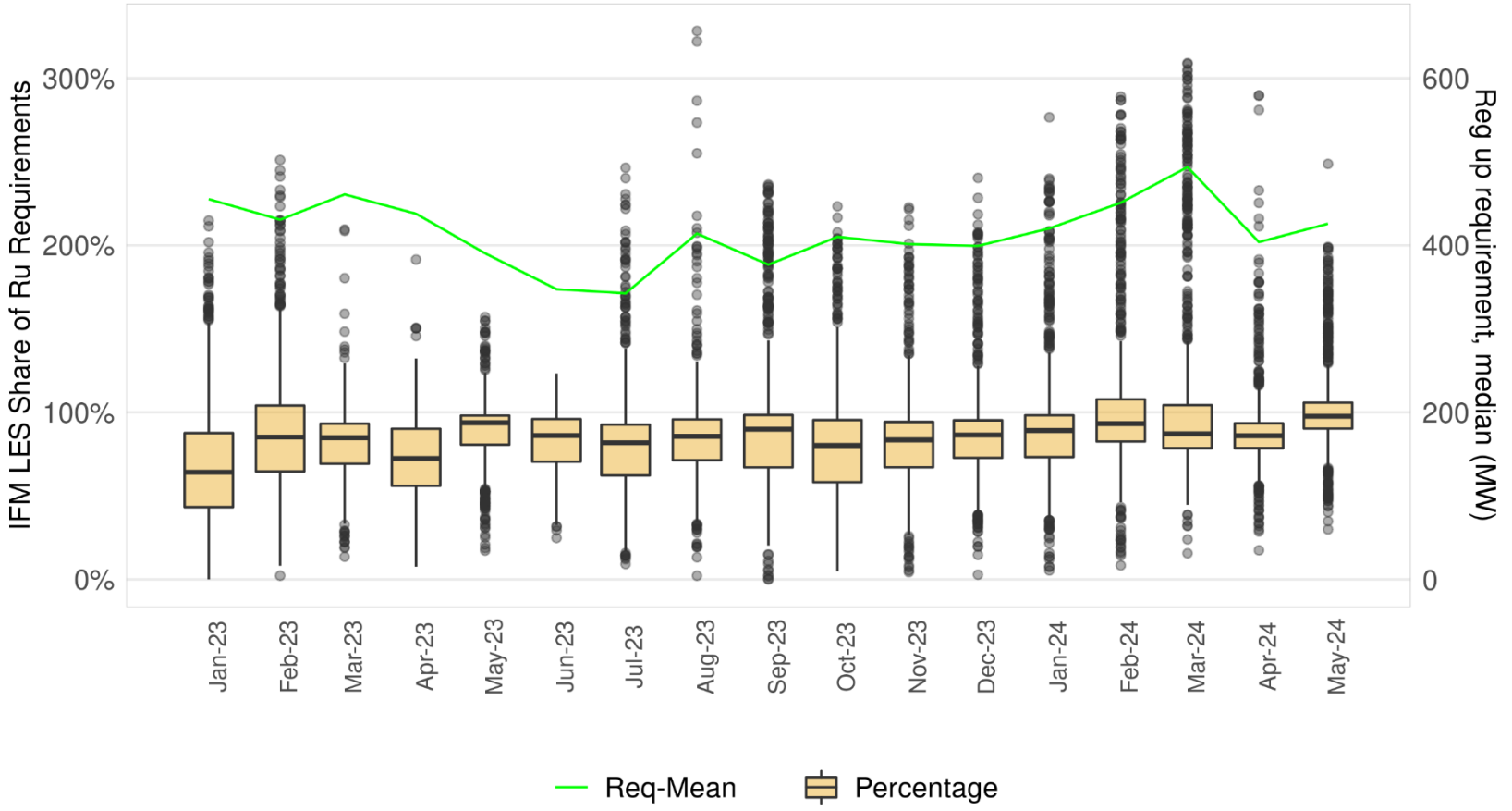
(SOC: original SOC with energy impact only)

- A new set of constraints is introduced

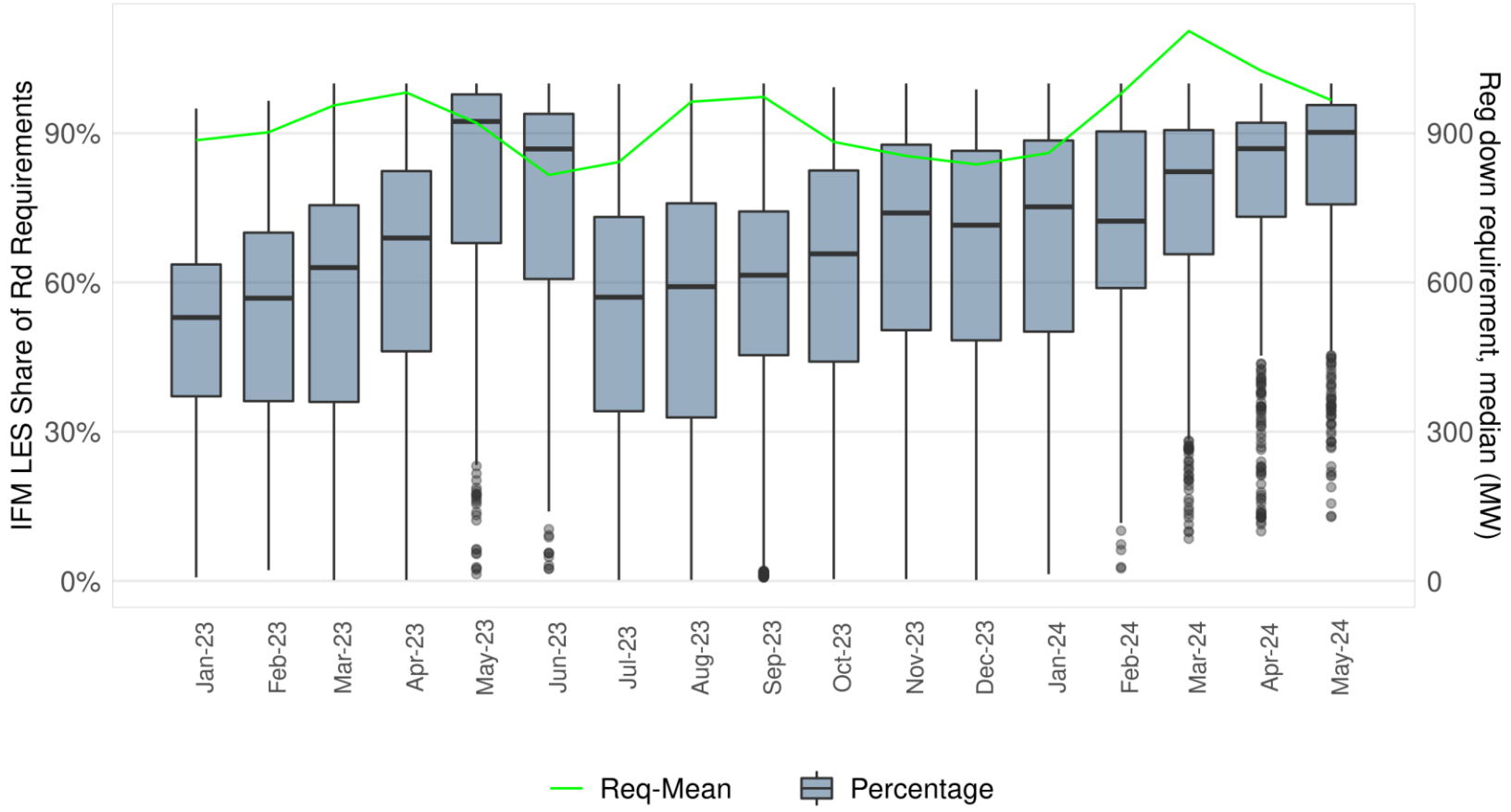
$$SOC_{i,t}^{AT} = SOC_{i,t-1}^{AT} - \left(EN_{i,t}^{(+)} + \eta_i \, EN_{i,t}^{(-)} + \boldsymbol{ATRU_t} \, RU_{i,t} - \boldsymbol{ATRD_t} \eta_i RD_{i,t}\right) \frac{\Delta T}{T_{60}}$$

(SOC^{AT} : SOC with attenuation factors)

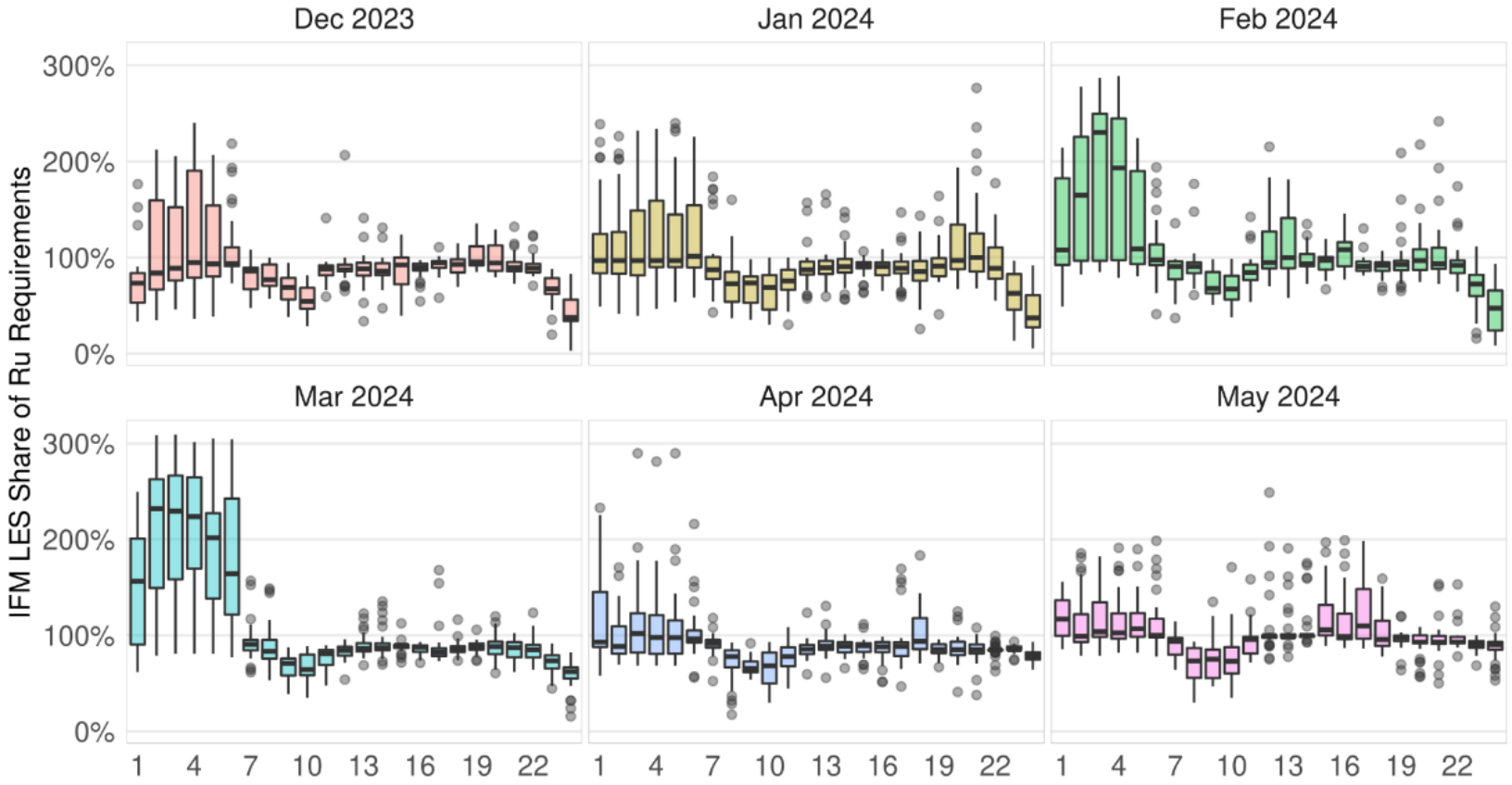
In recent months there is no material change in the share of regulation requirement supported by storage resources



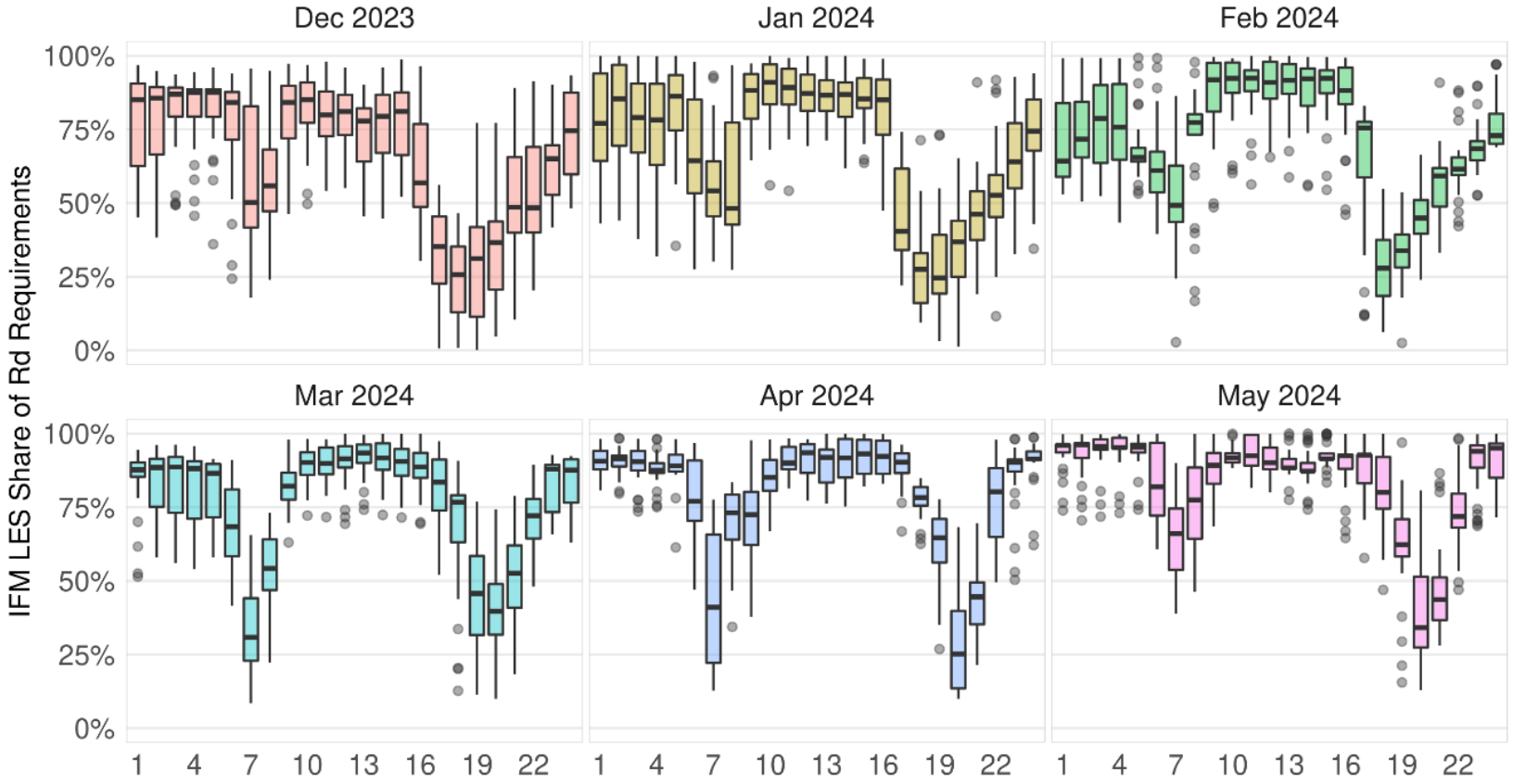
Share of regulation down requirements by storage resources has steadily increased in recent months



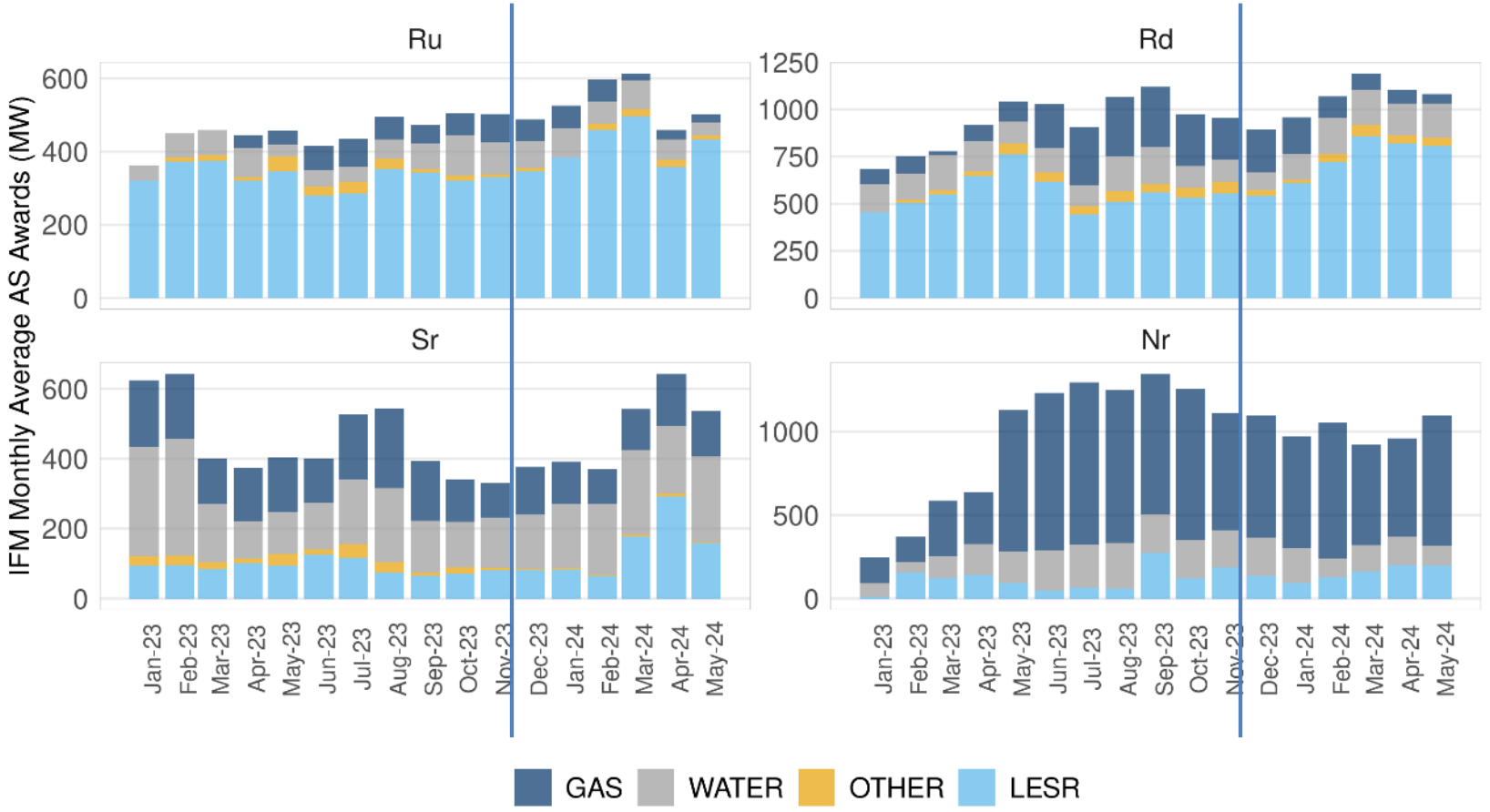
No material change in the hourly profile of the LESR percentage share of the Ru requirement after implementation of enhancements



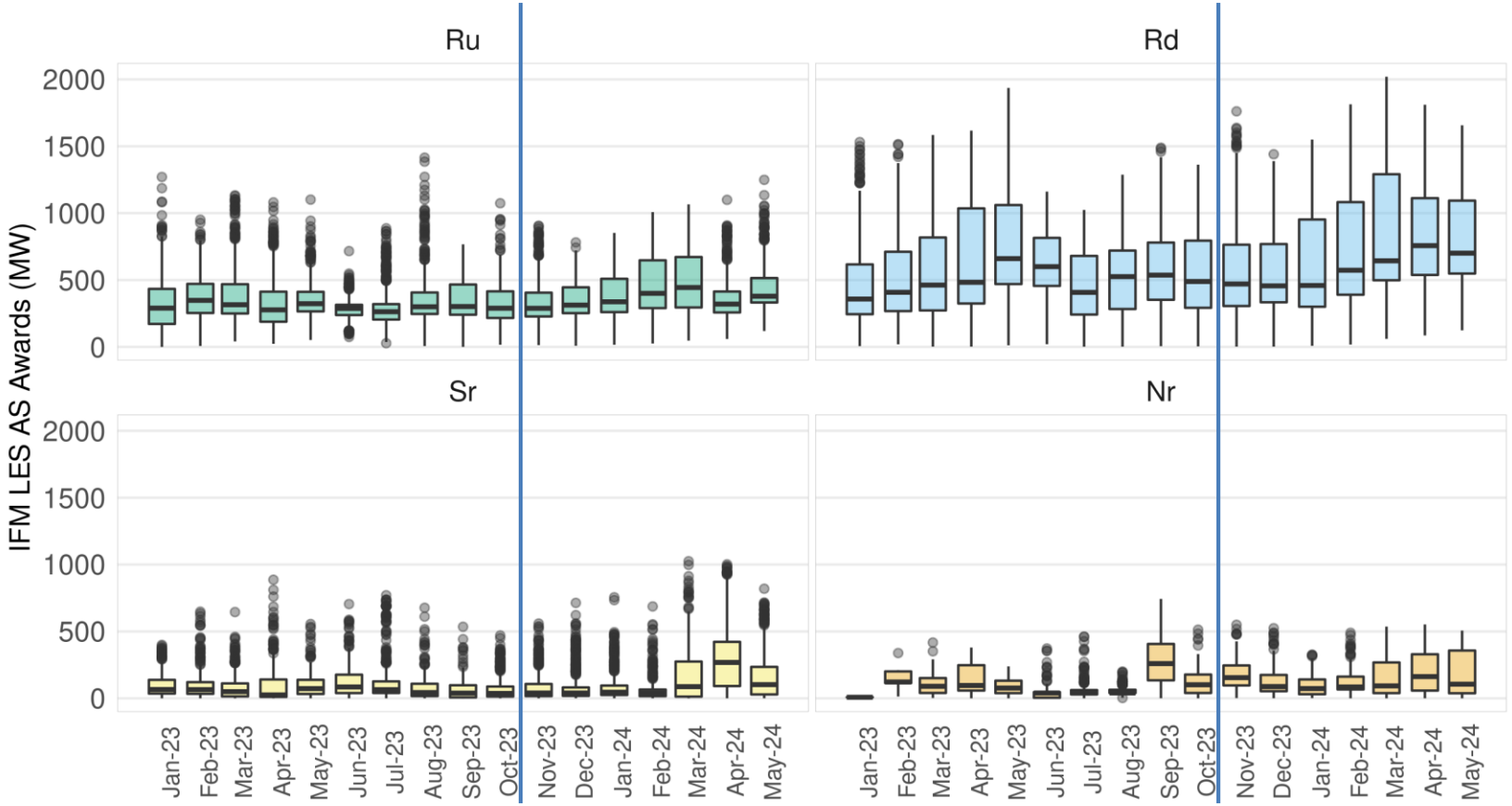
No material change in the hourly profile of the LESR percentage share of the Rd requirement



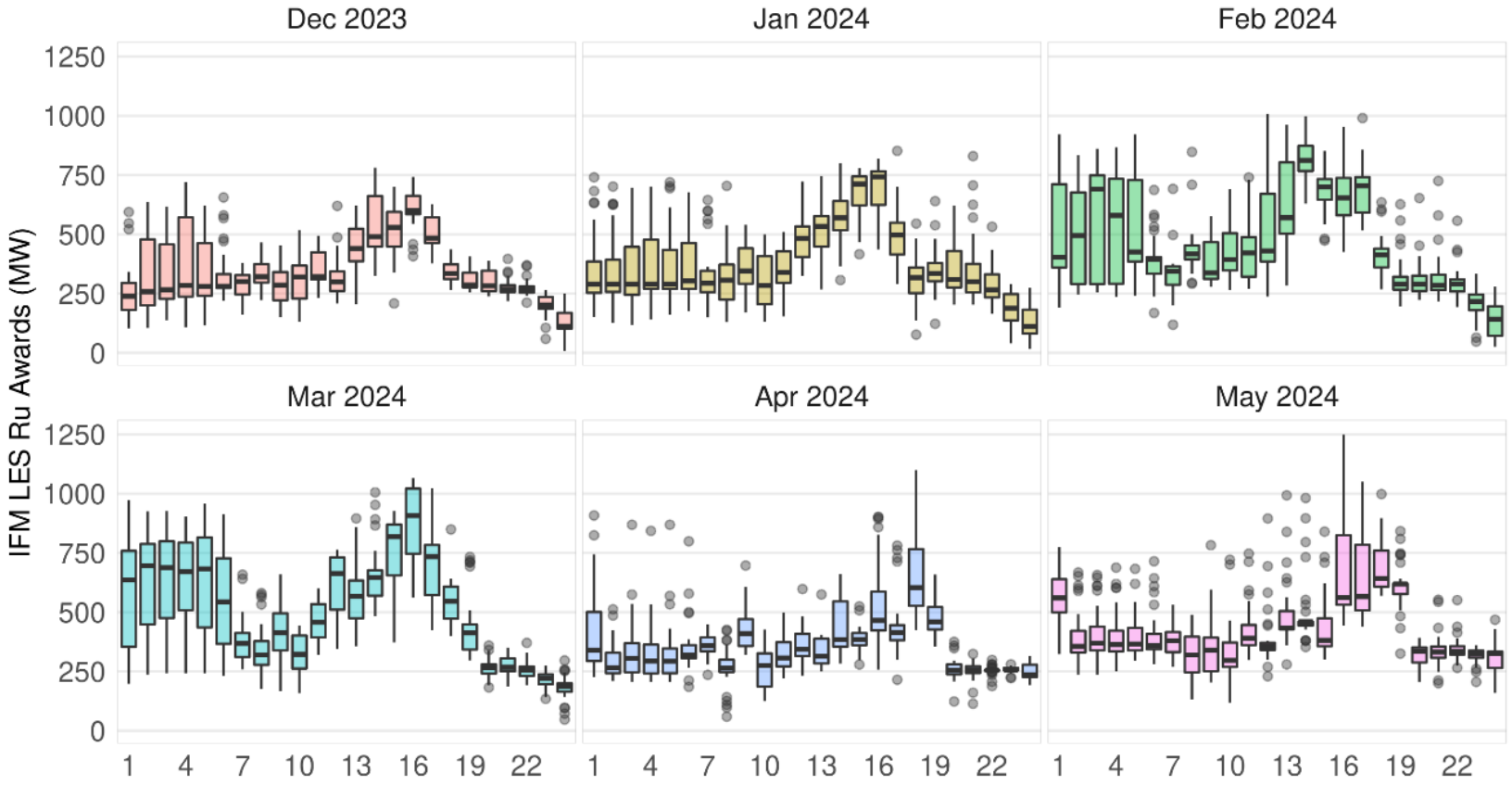
Monthly average IFM AS awards for storage shows no significant change in pattern



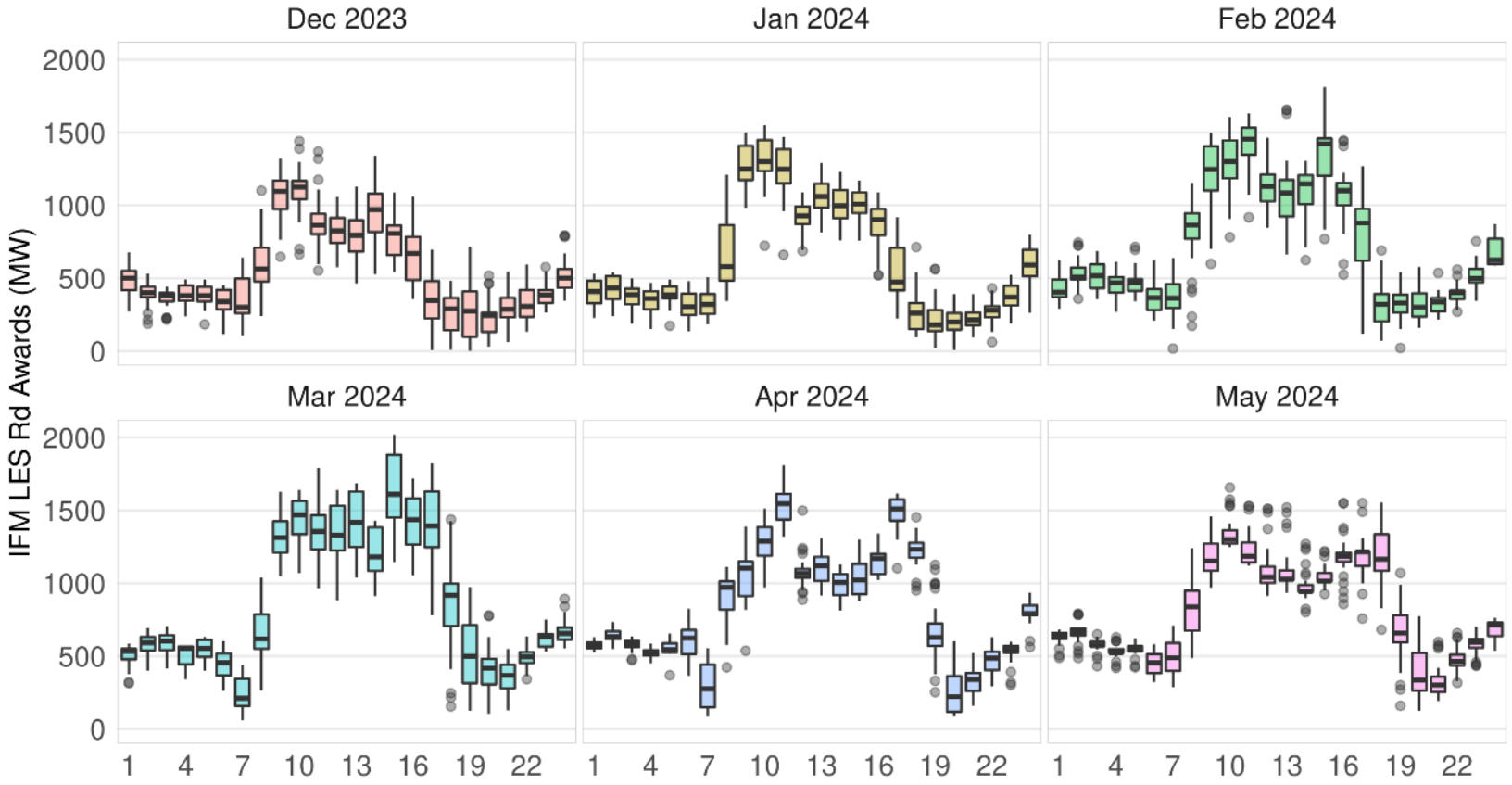
Monthly IFM AS market awards show no significant change in pattern



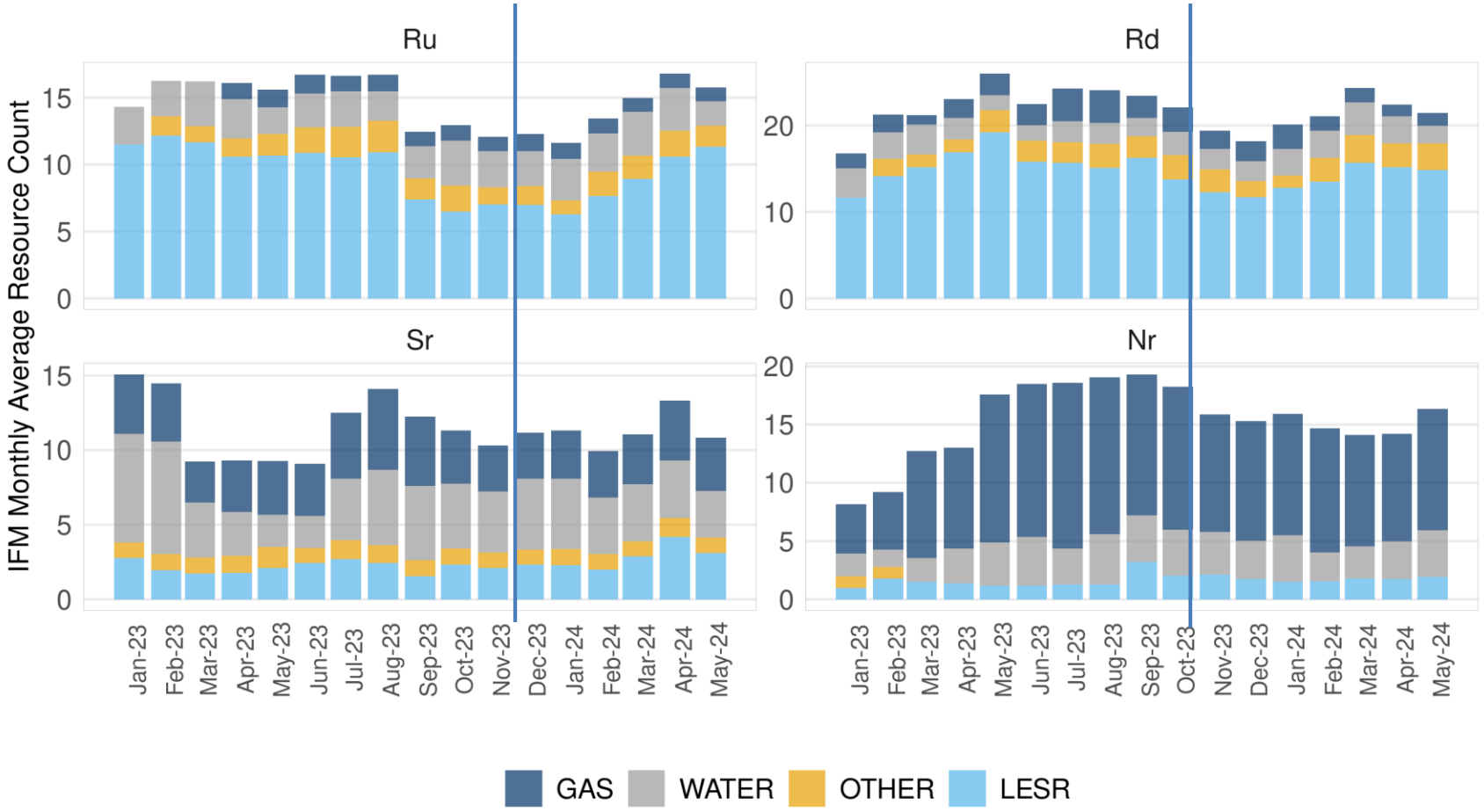
Regulation up awards in the day-ahead market have not seen a material change in trend



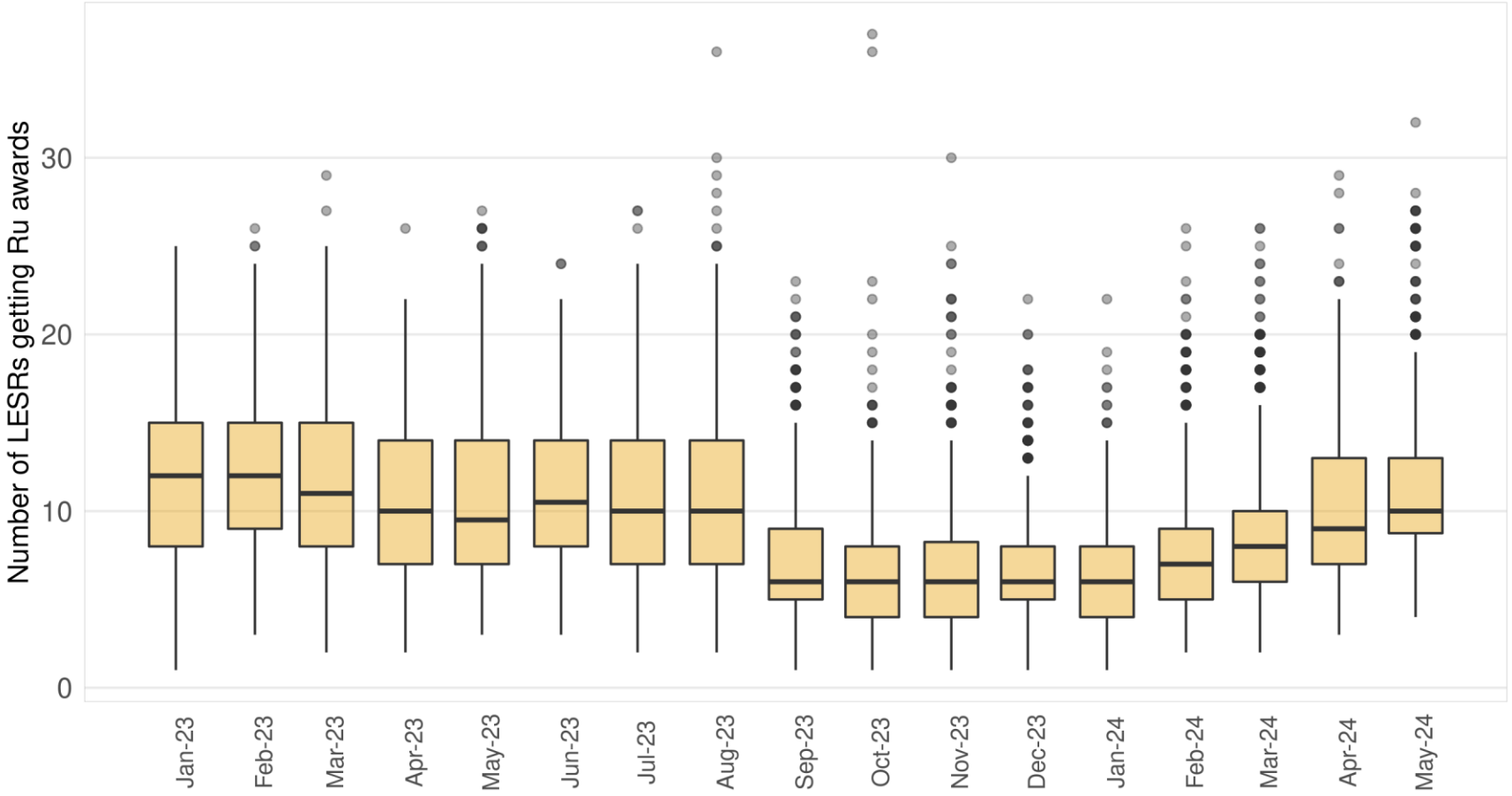
Regulation down awards in the day-ahead market have not seen a material change in trend



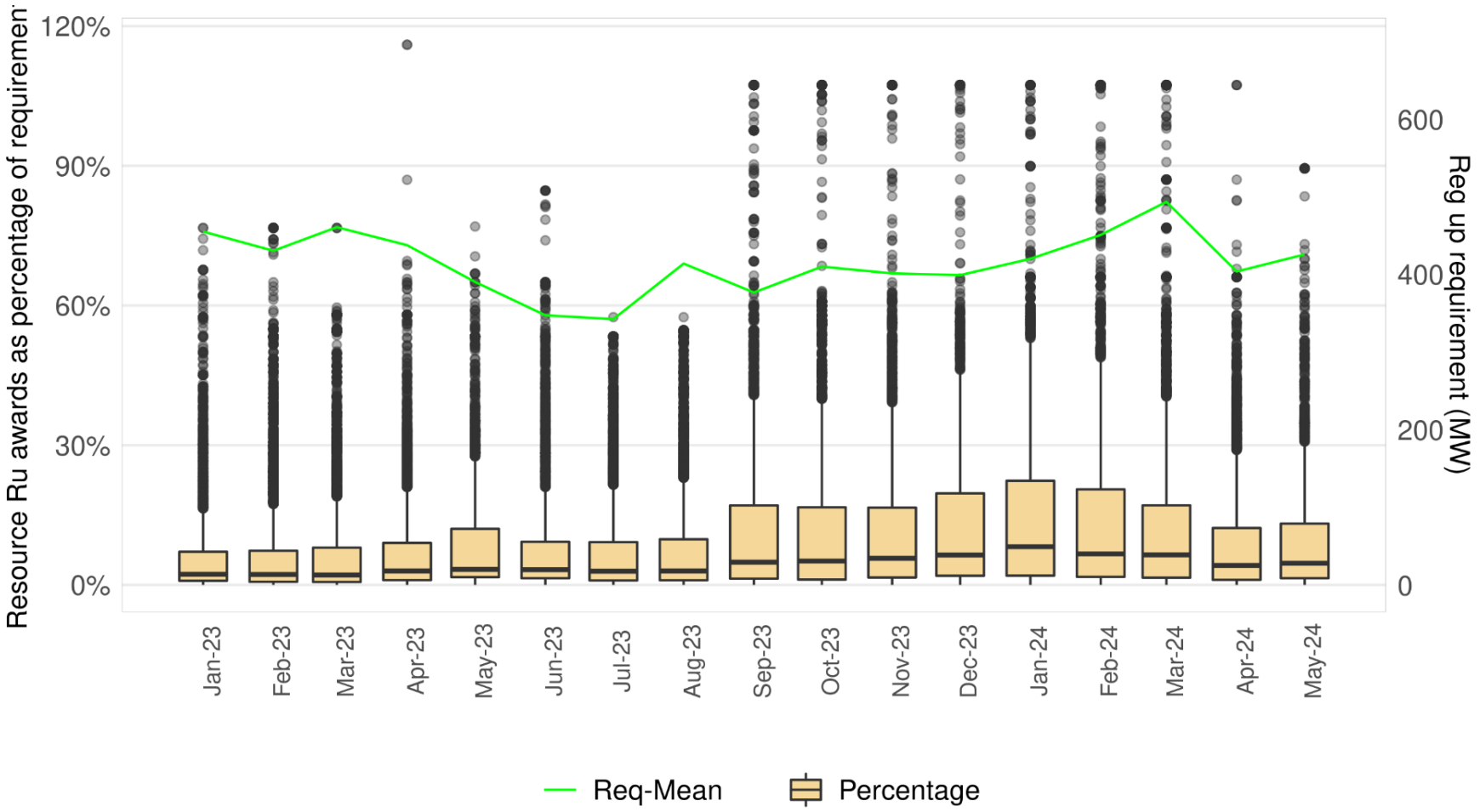
The number of resources supporting regulation has not visibly changed with the winter changes



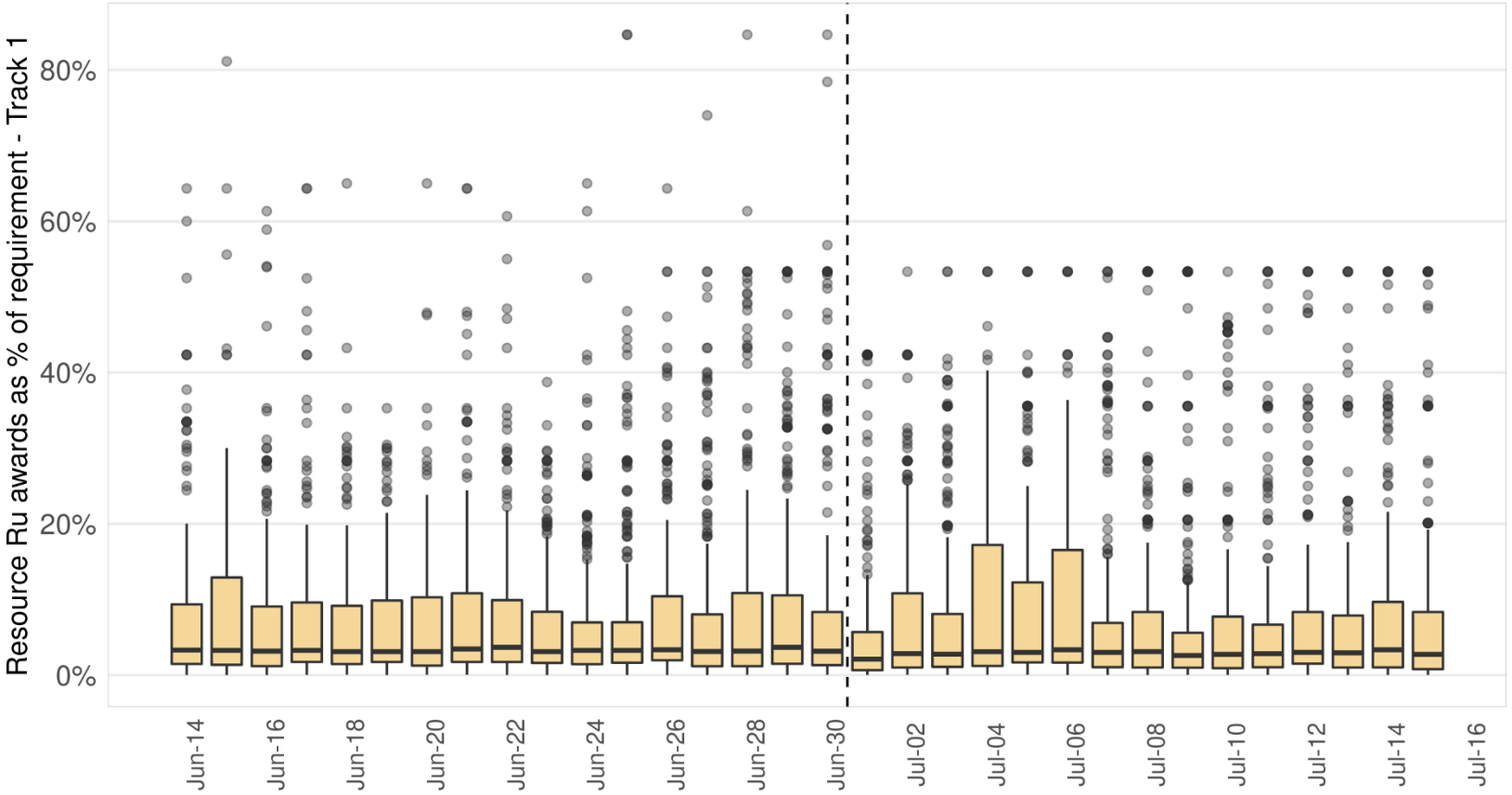
The number of storage resources getting non zero Ru awards remain within typical range



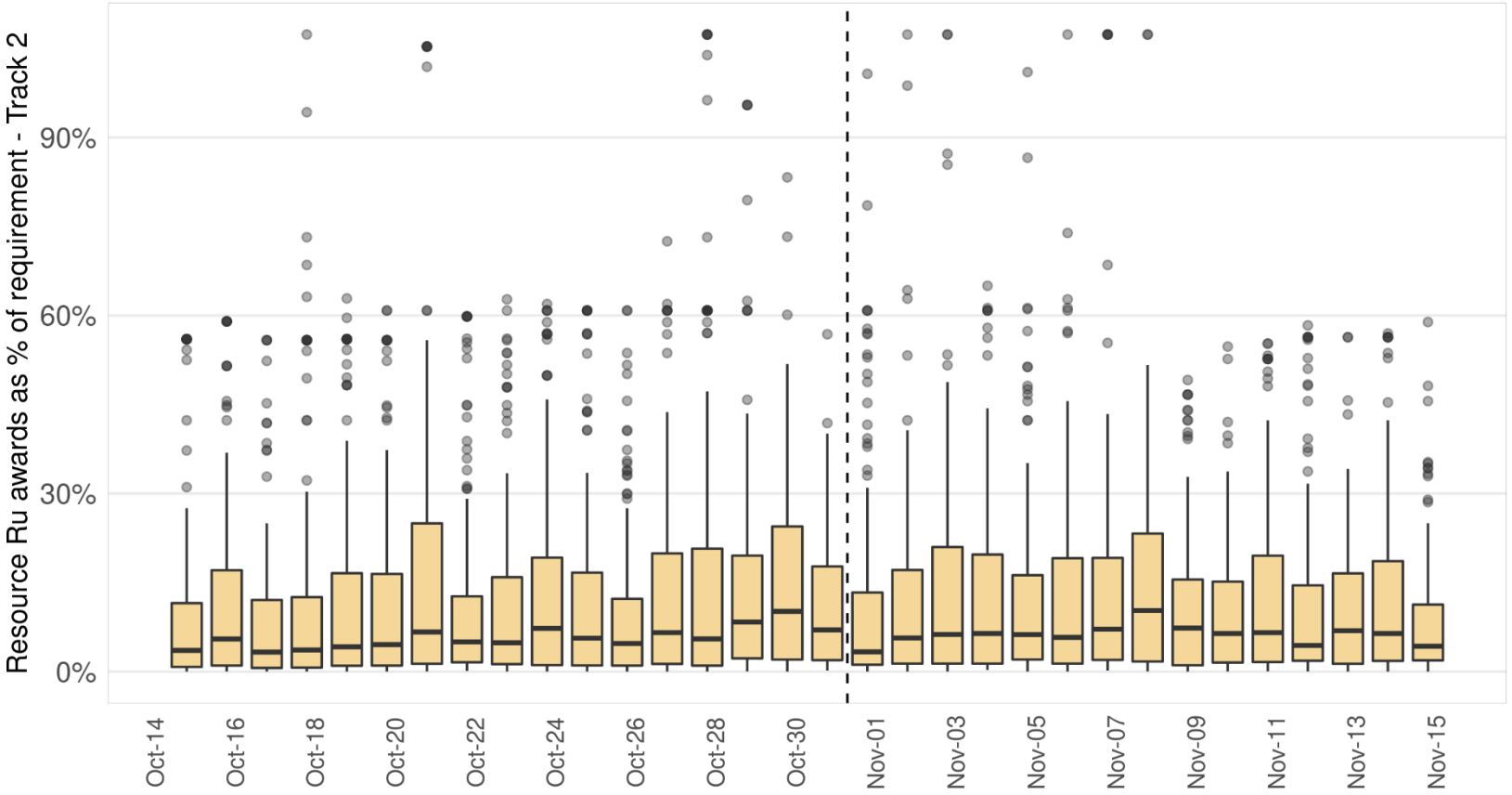
The relative size of Regulation award onindividual resources tends to be within typical ranges



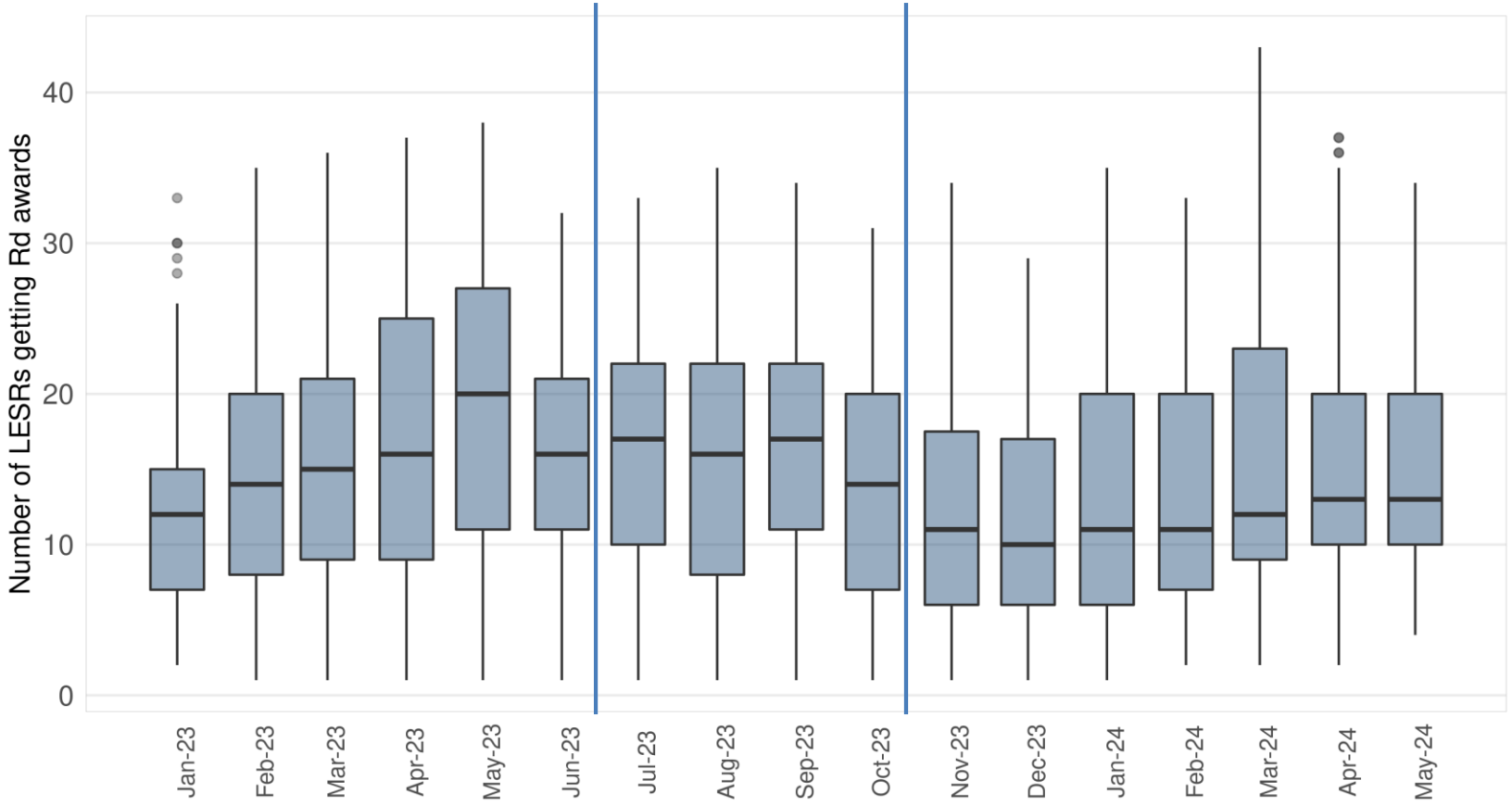
Resource Ru awards as percentage of Ru requirement Track 1 activation shows a reduction in the tail of the sample



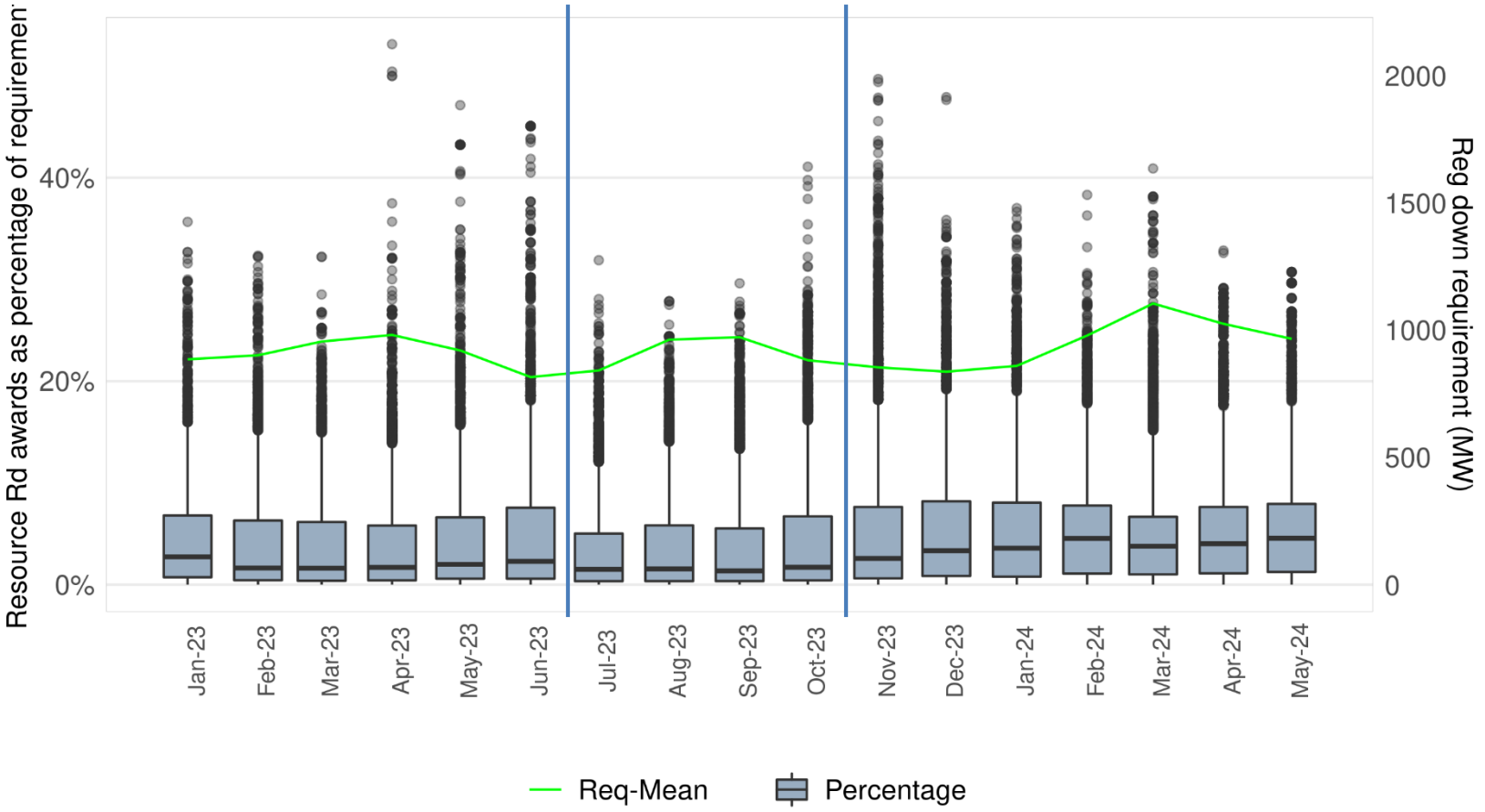
Resource Ru awards as percentage of Ru requirement Track 2 activation does not see any material change



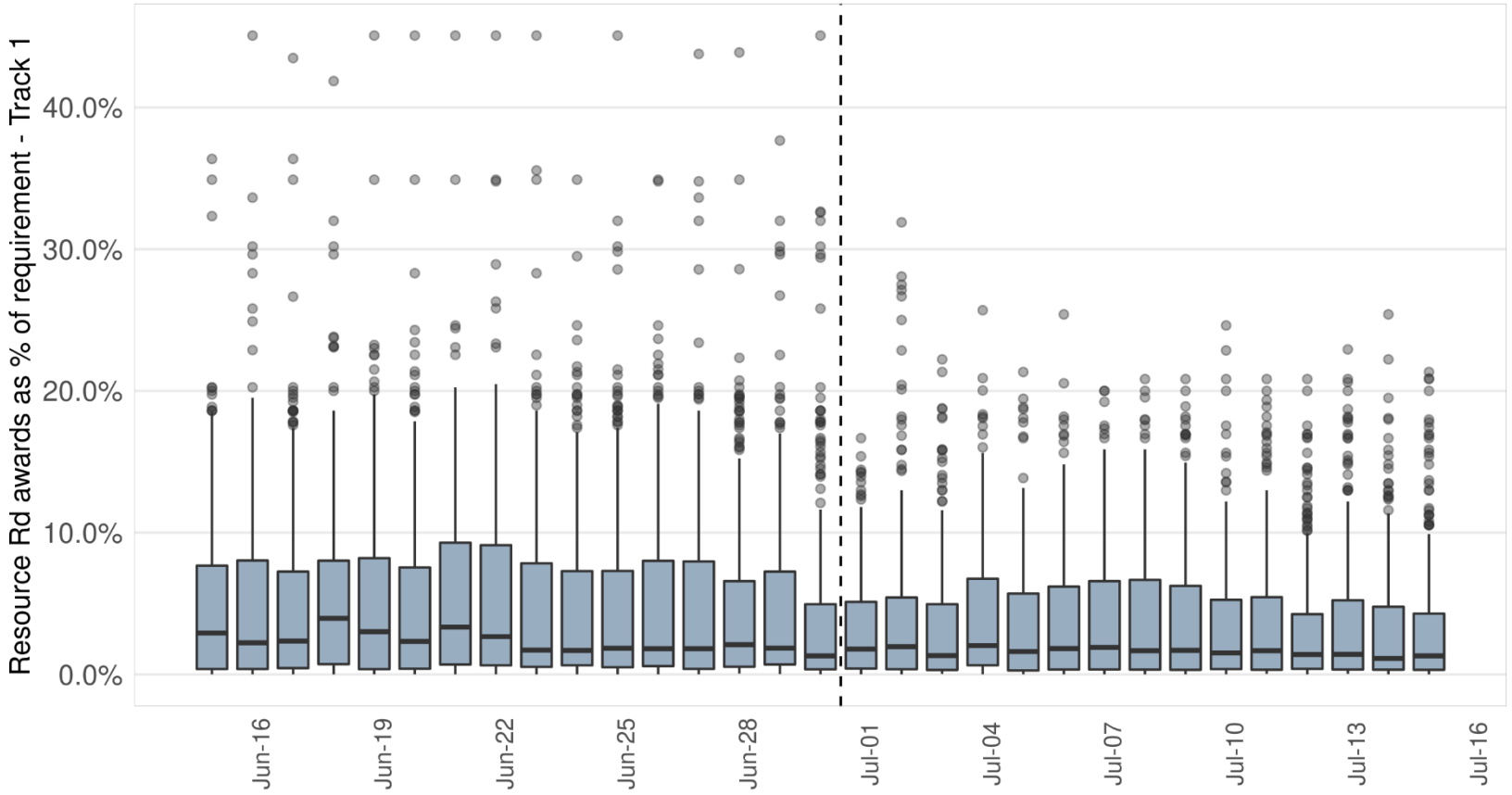
The number of storage resources getting non zero Rd awards in IFM remains steady after the enhancements



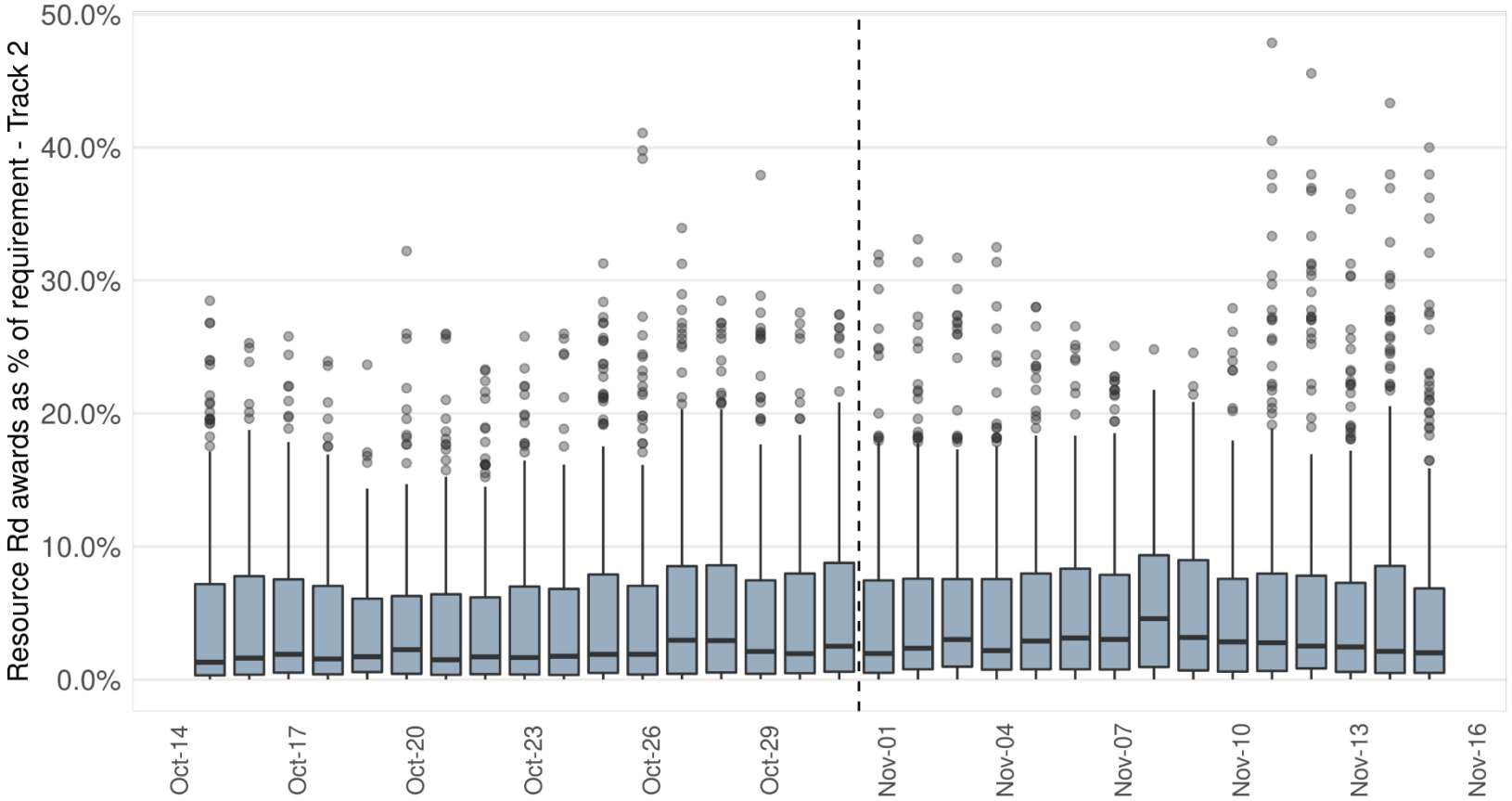
Resource Rd awards as percentage of Rd requirement sees not notable change in pattern with enhancements



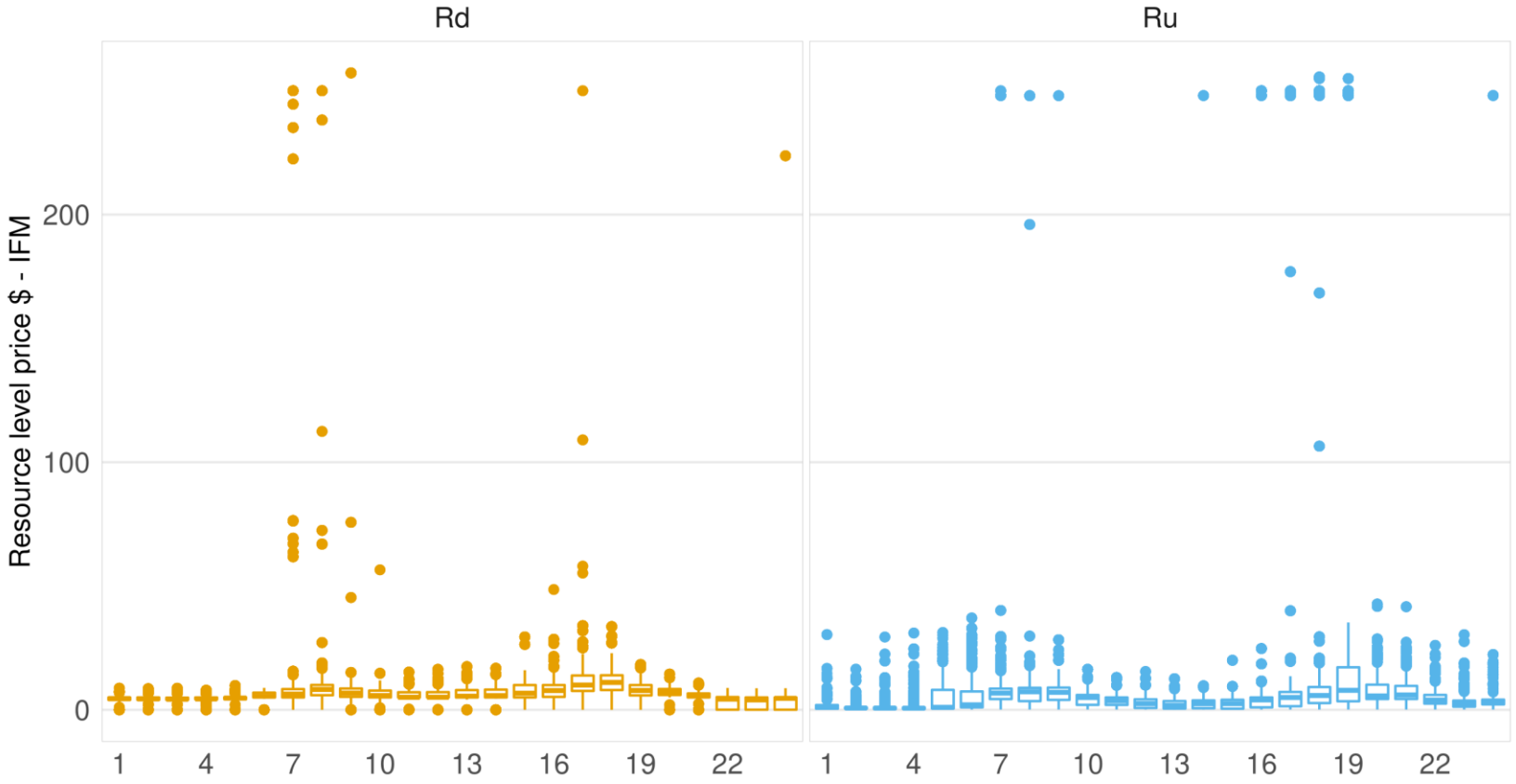
Resource Rd awards as percentage of Rd requirement Track 1 activation sees a reduction with the enhancement implementation



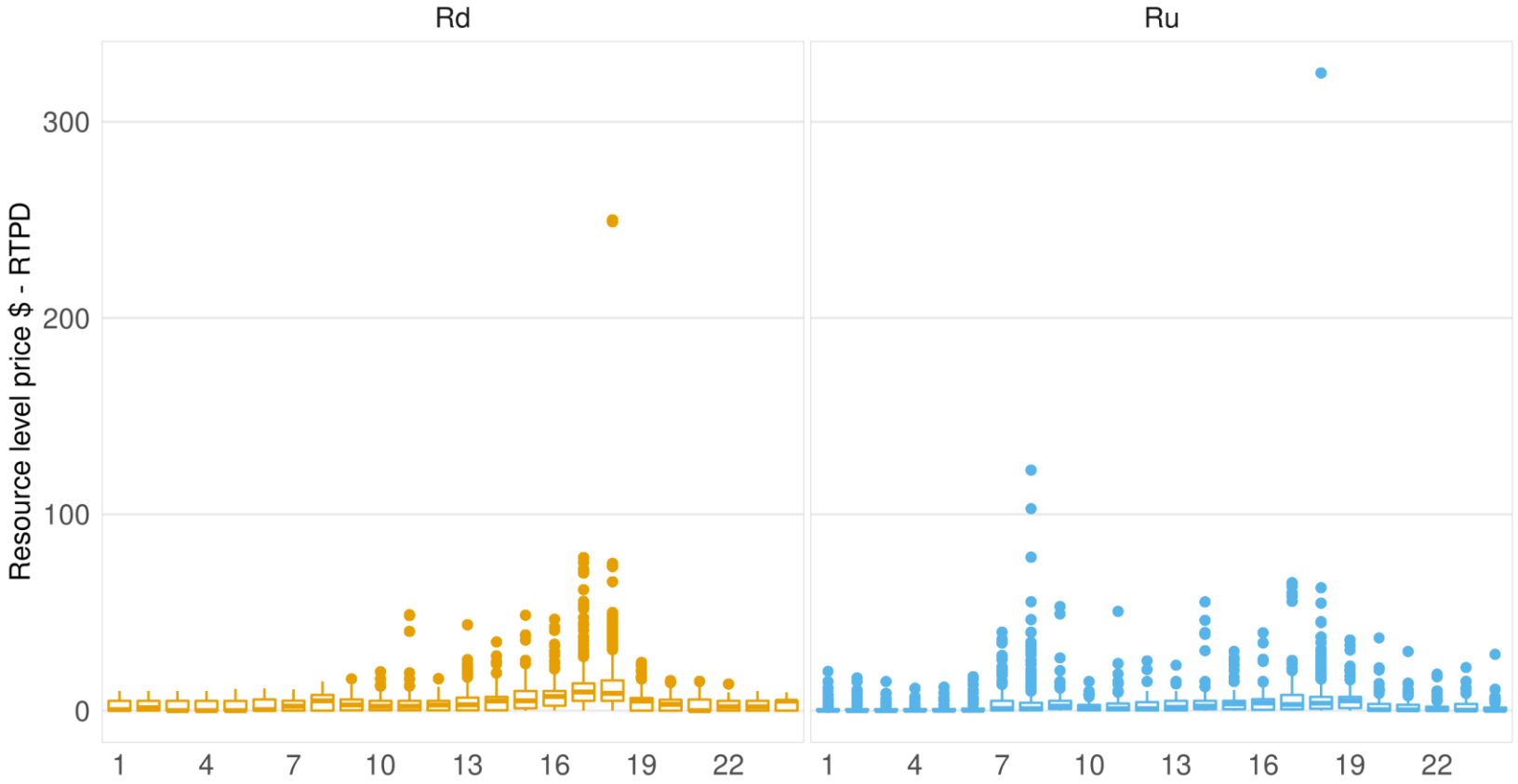
Resource Rd awards as percentage of Rd requirement with the Track 2 activation



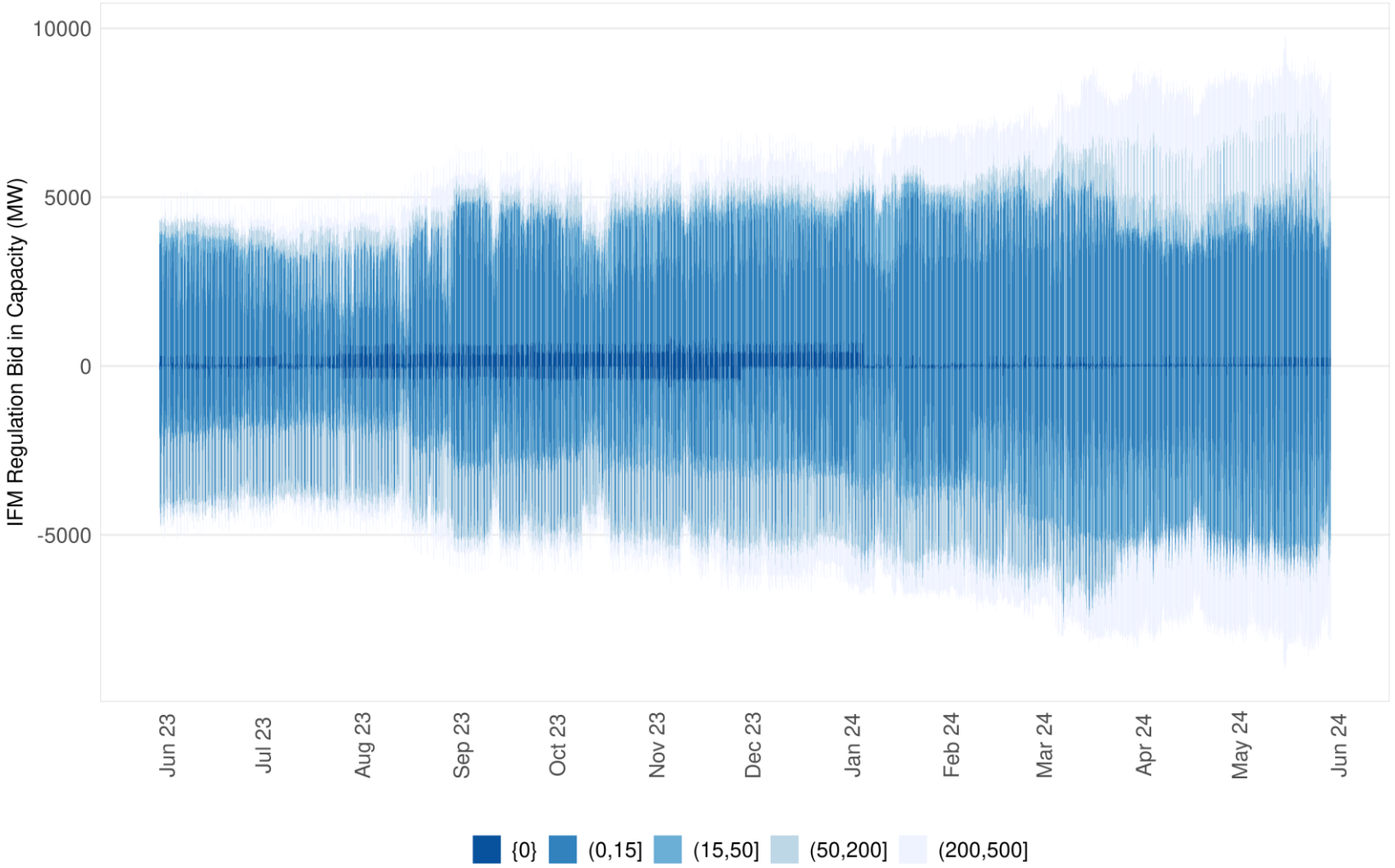
IFM Resource level regulation prices have not seen negative since the implementation of the enhancements



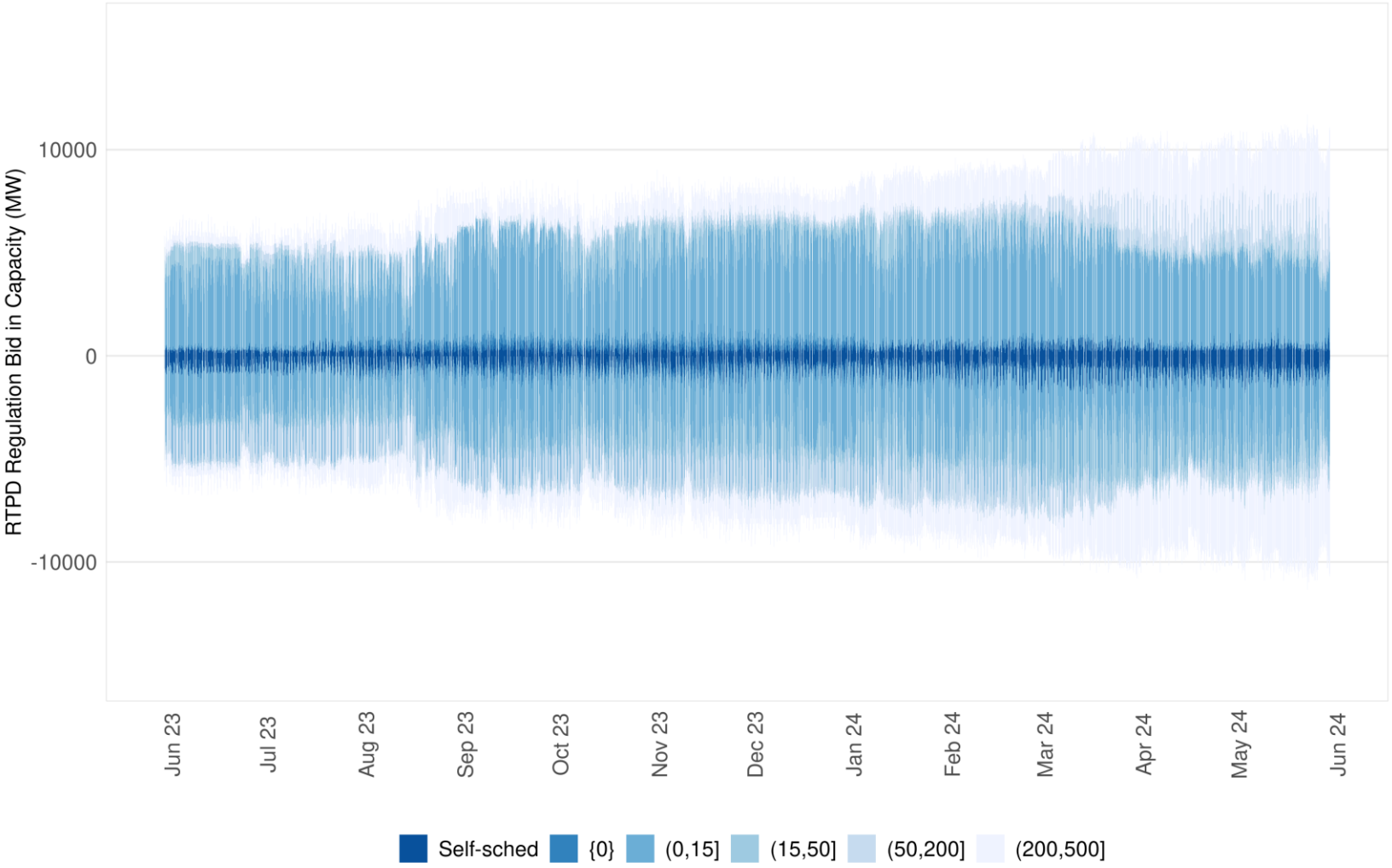
Real-time resource level regulation prices have not been negative since the implementation of the enhancements



IFM regulation bid in capacity shows no significant change after the implementation of enhancements



Real-time regulation bid-in capacity shows no significant change after the implementation of enhancements

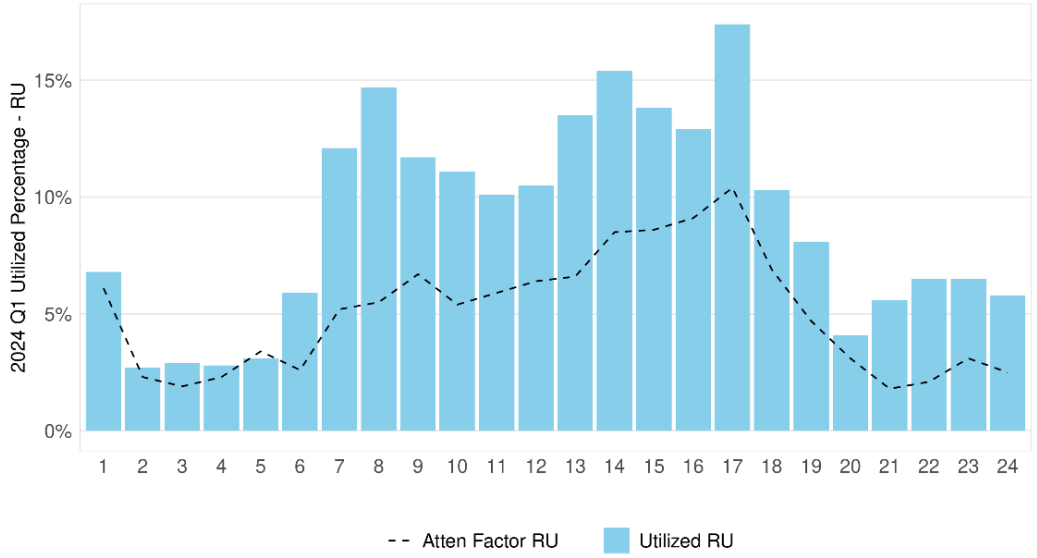


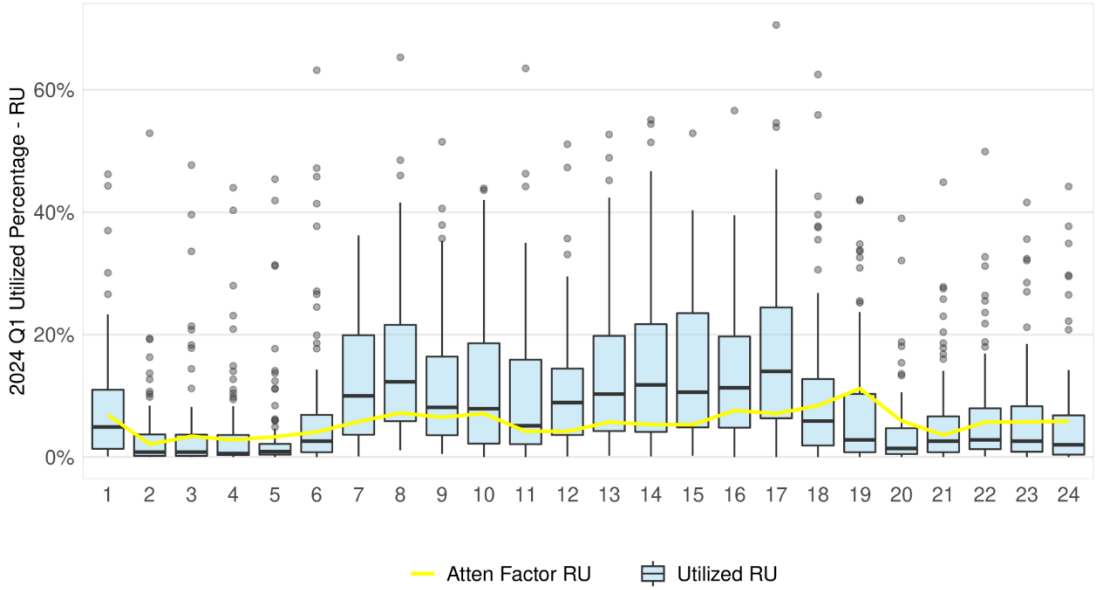
As part of the storage enhancements, CAISO estimates attenuation factors for each calendar season

- Estimating the actual utilization of regulation
- Data: the corresponding quarter from the prior year
- Metric:
  a) Data source: resource level AGC setpoint vs. DOP
  b) Reference: RTPD regulation awards
  c) System aggregated percentages

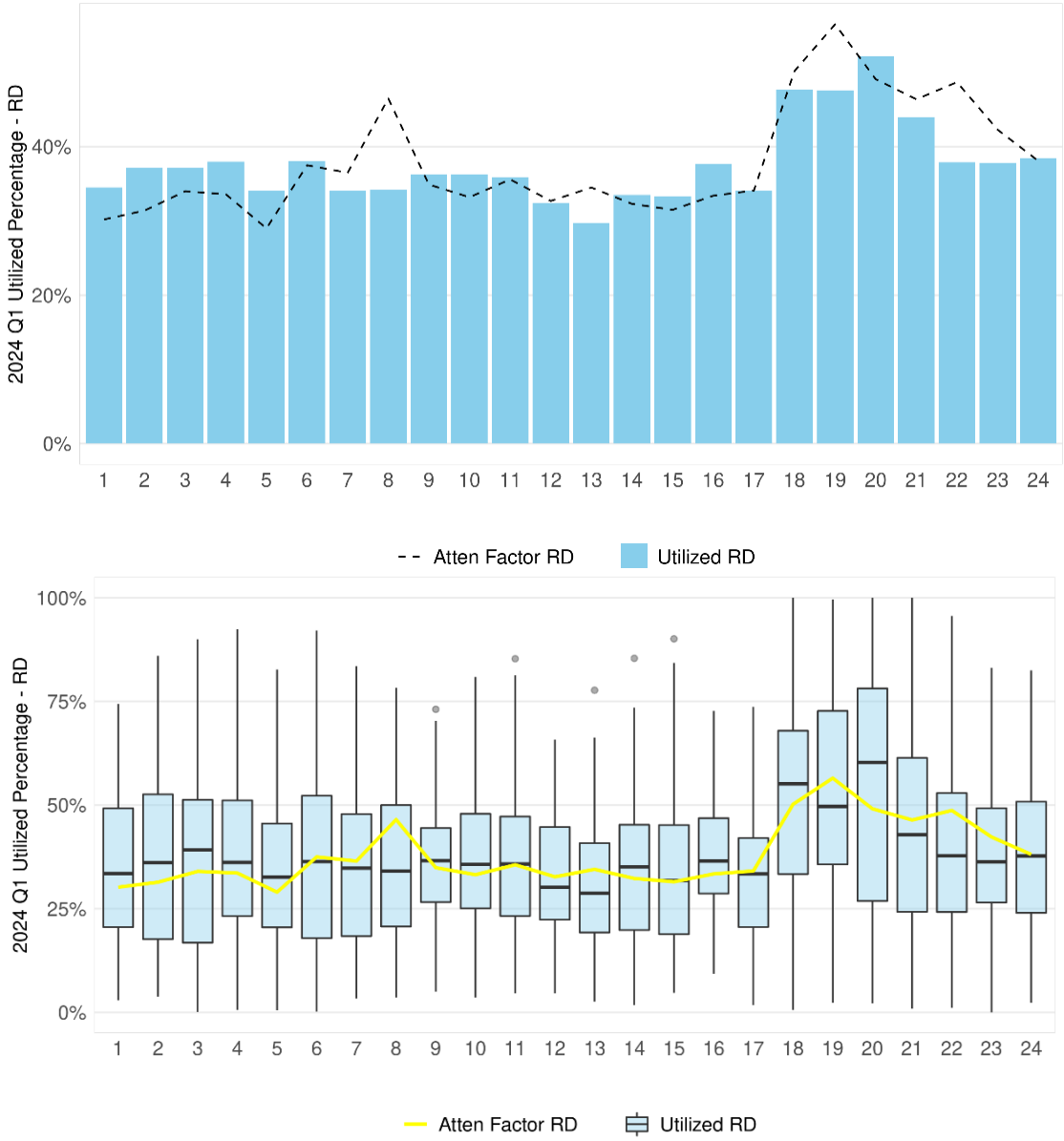
$$Percentage\ utilization\ Ru(Rd) = \frac{Total\ utilized\ Ru(Rd)}{Total\ Ru(Rd) awards}$$

2024 Q1 Actual utilization of regulation up remains relatively low

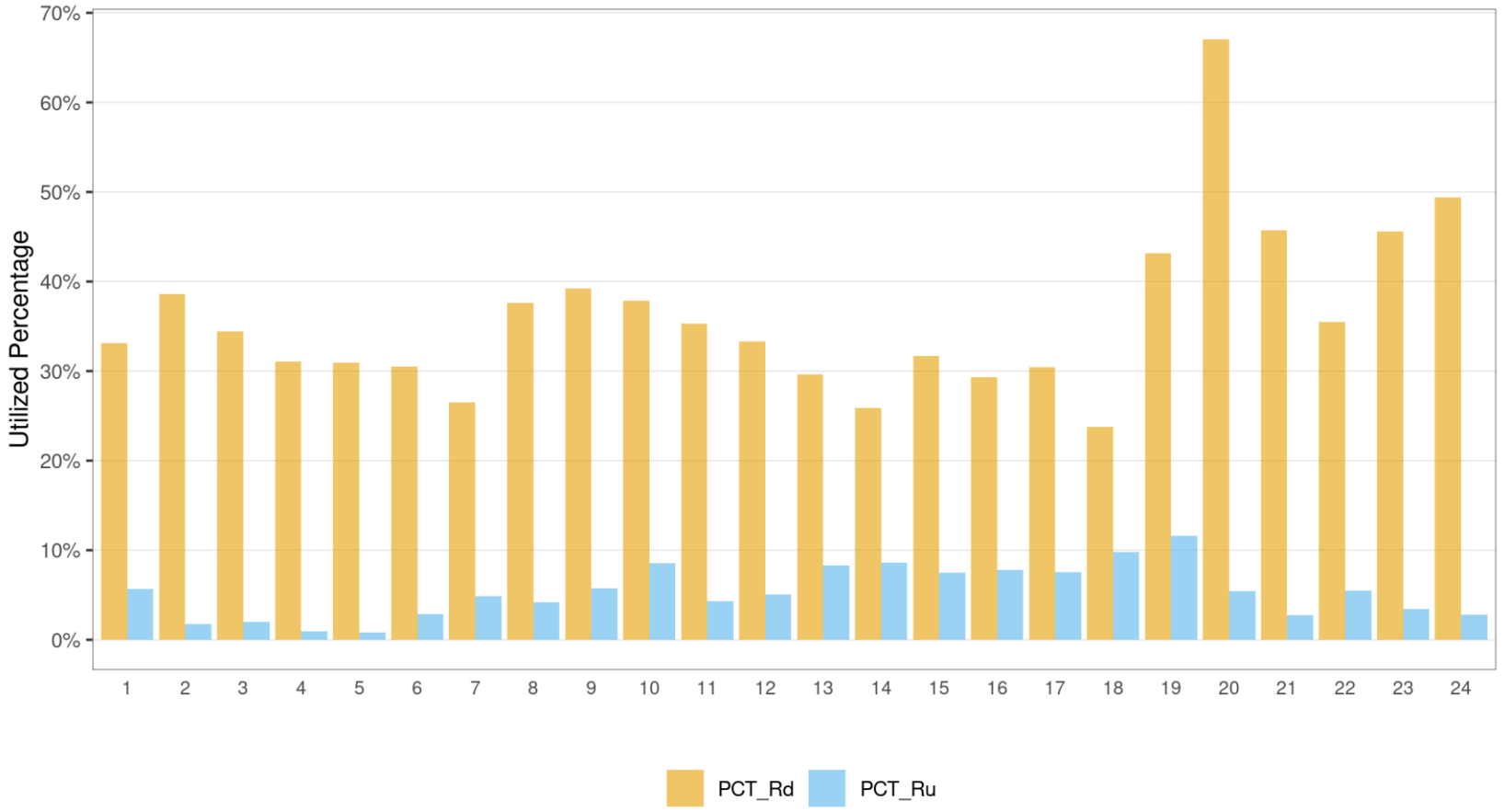




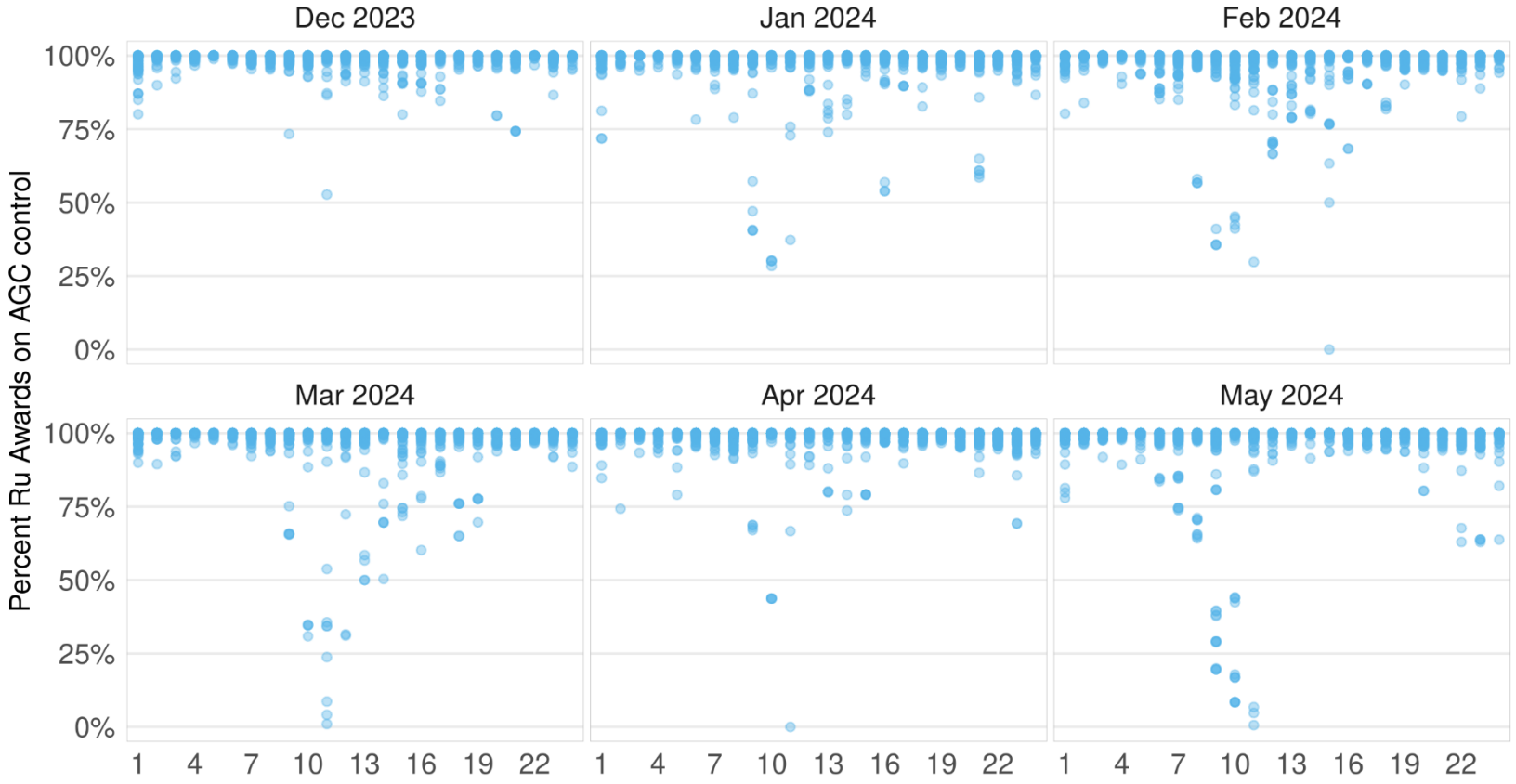
2024 Q1 Actual utilization for regulation down continues to be high



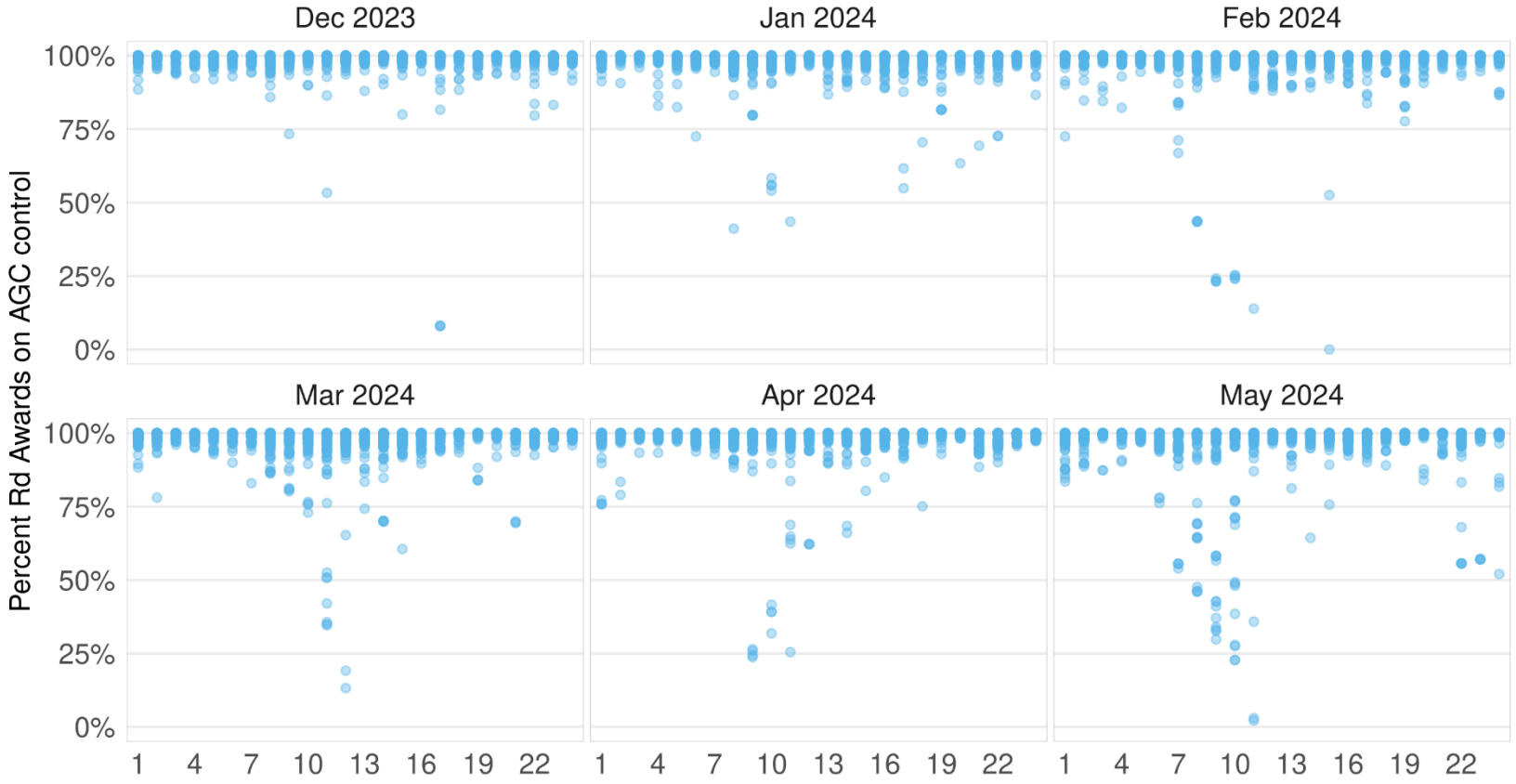
Attenuation factors derived for use in Q3 2024 continue to show high usage of regulation down



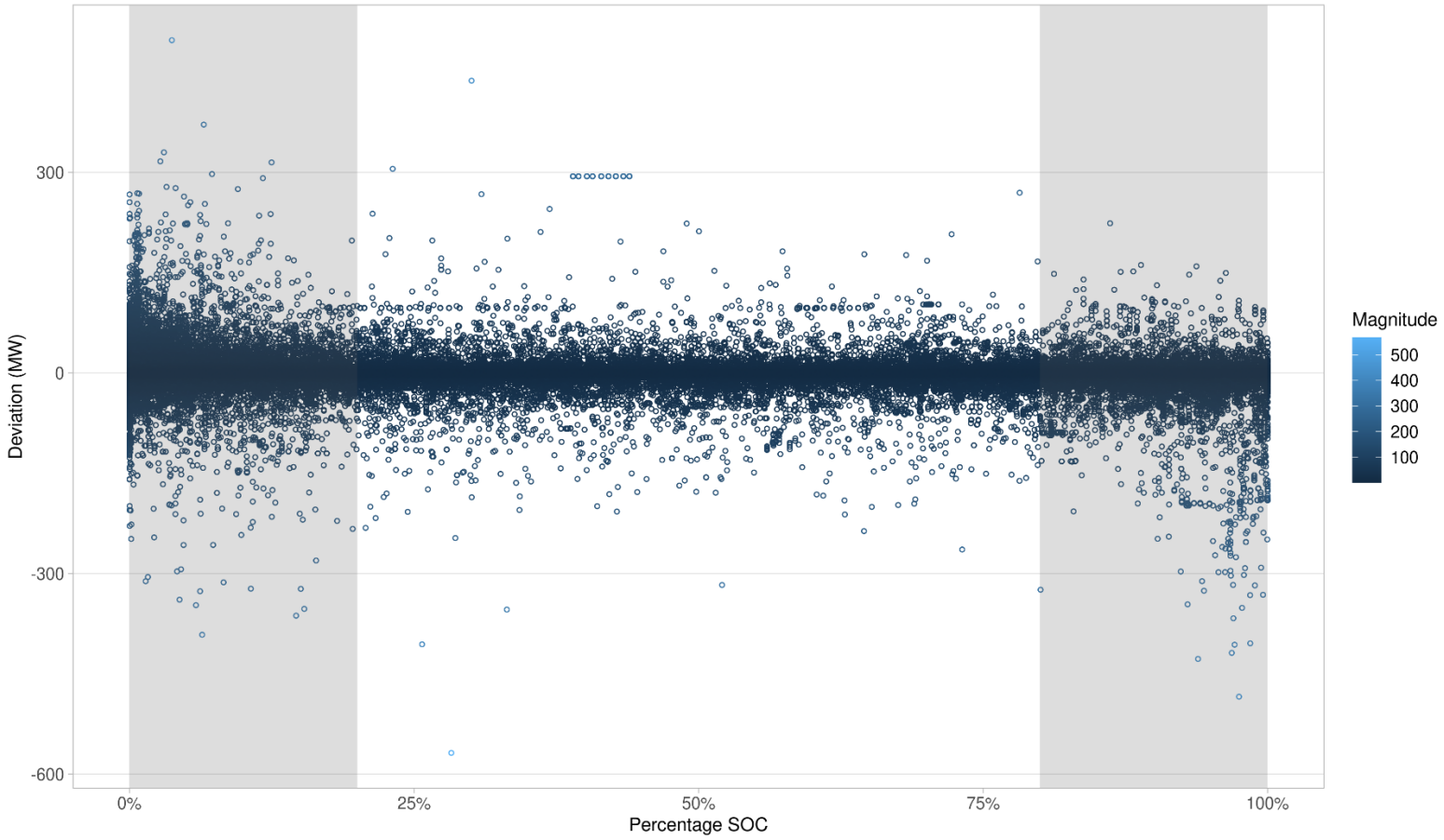
Percent Regulation up awards on AGC control shows a large volume in the high end of the distribution



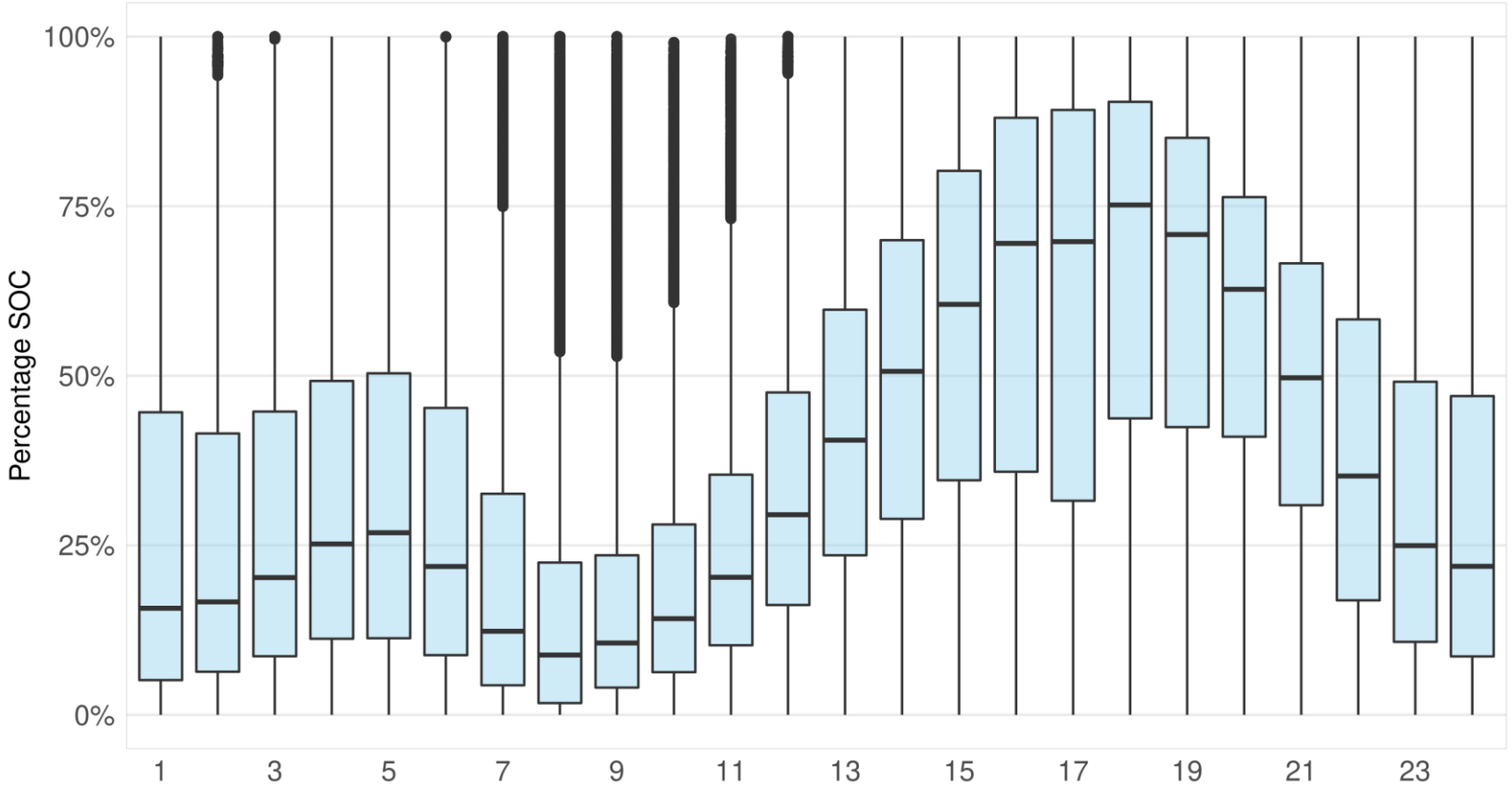
Percent Regulation down awards on AGC control shows the majority of resources in the high end of the distribution



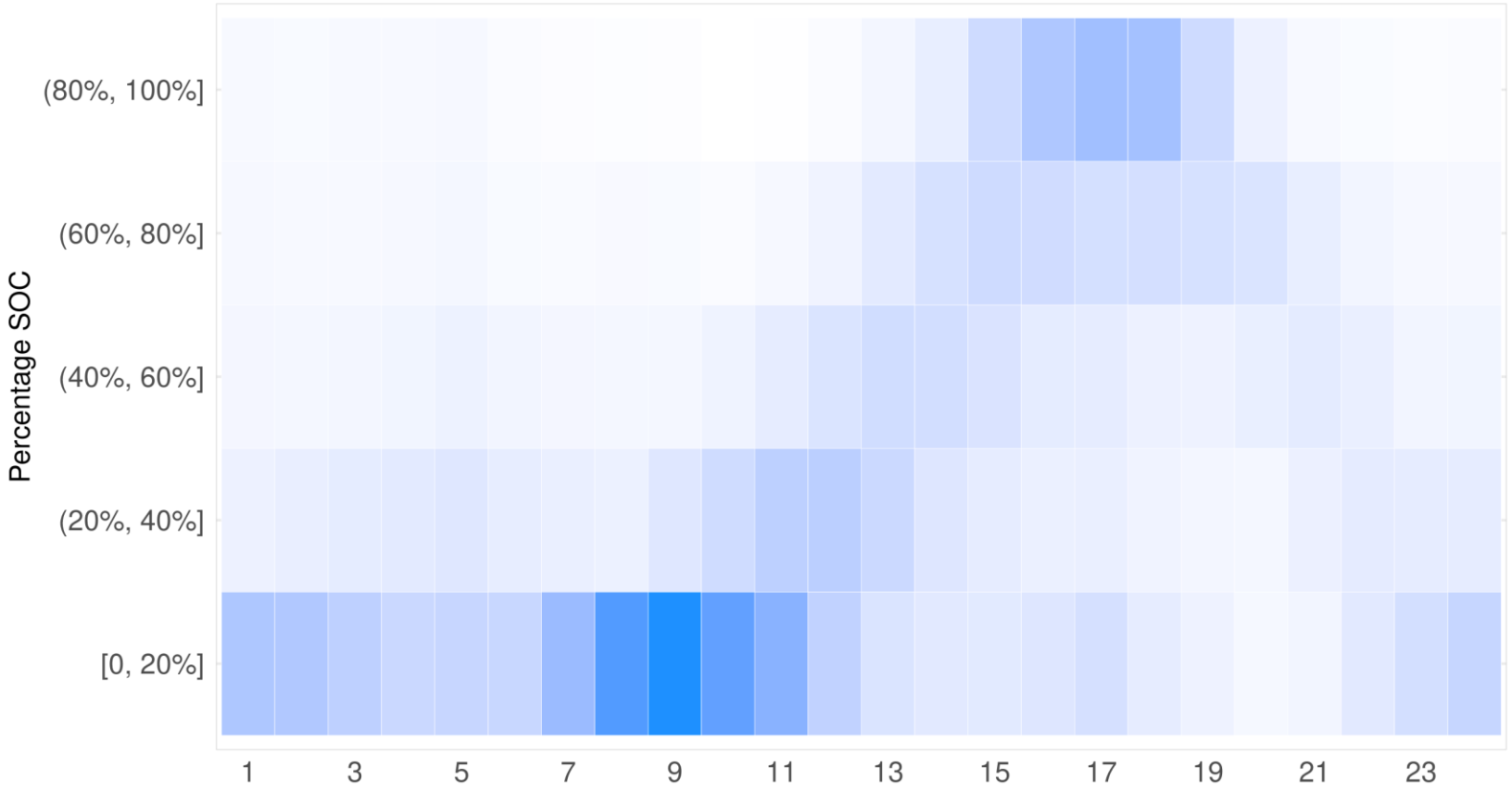
Resource deviation vs. SOC percentage. March – May 2024 shows still deviations in the ends of the SOC range



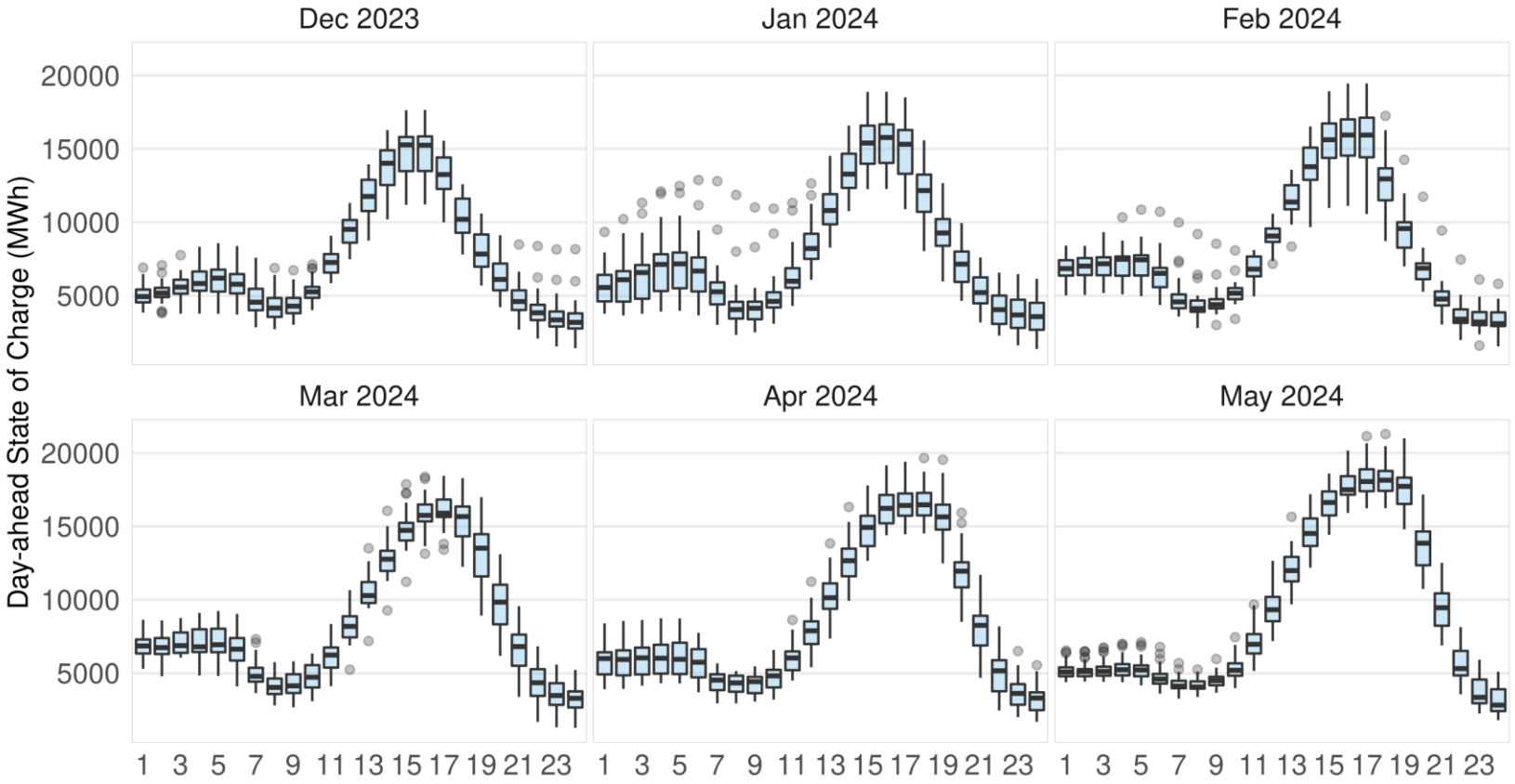
Most of the time storage resources have SOC below full capacity



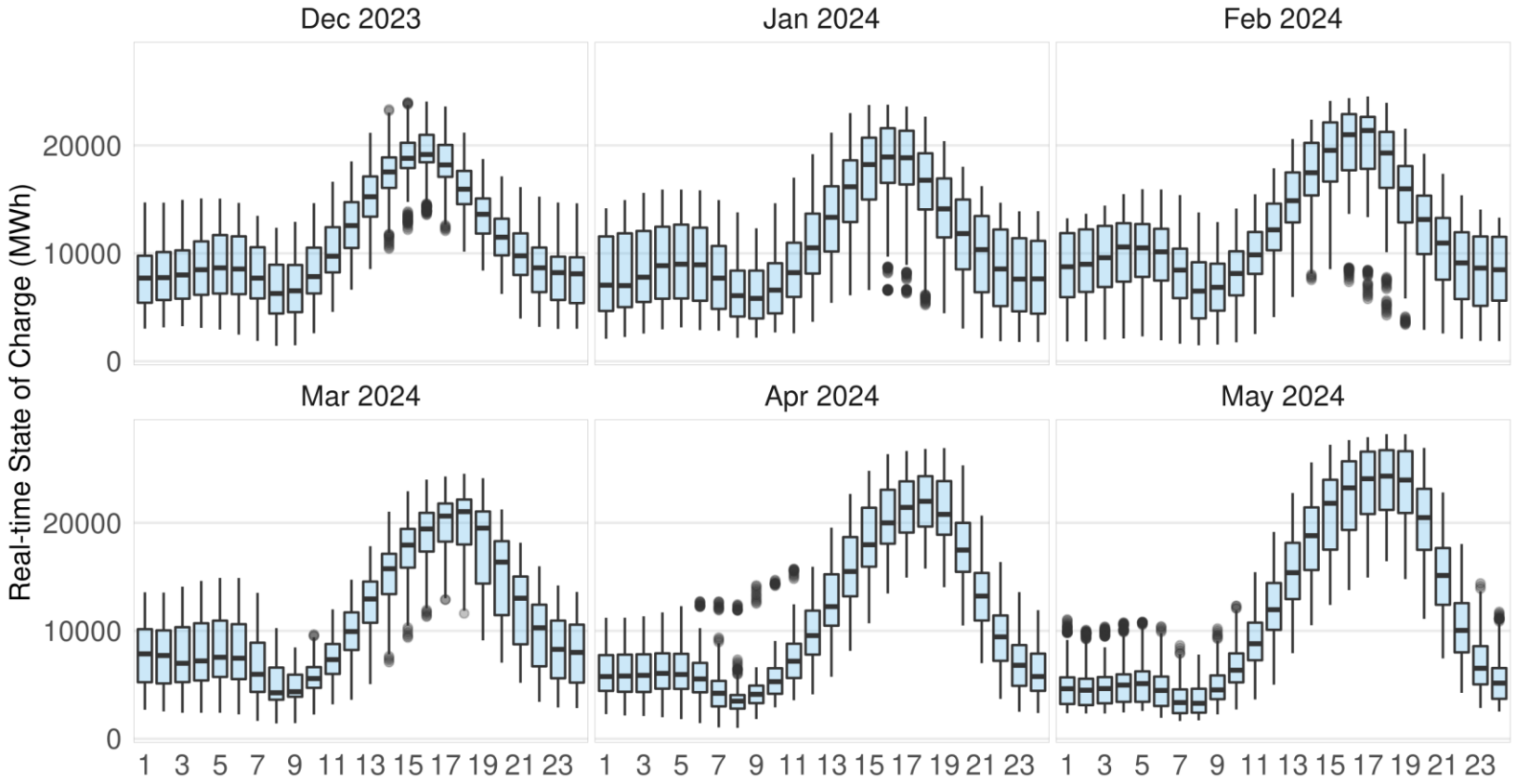
Most of the time storage resources have SOC below full capacity



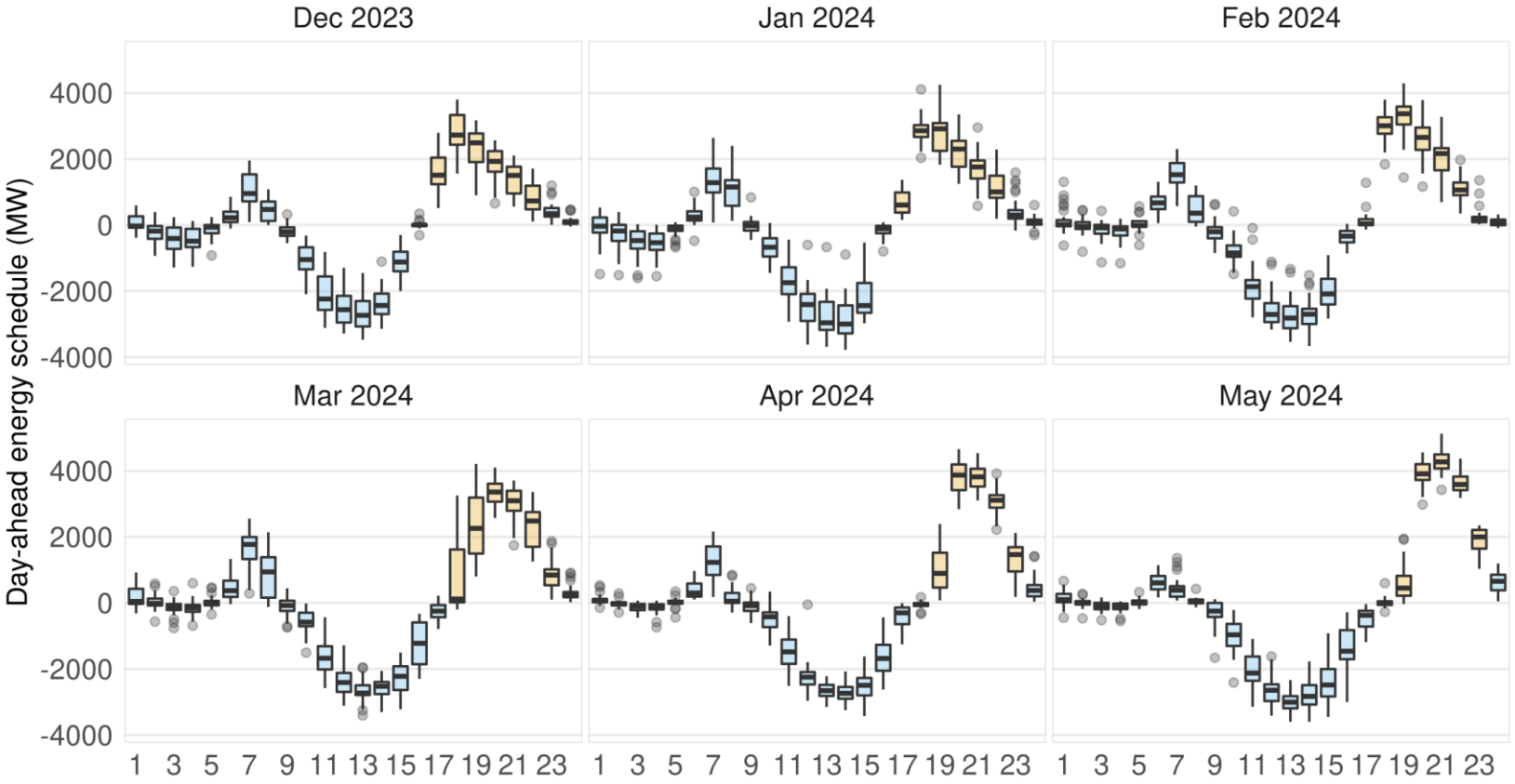
Day-Ahead state of charge for storage resources is typically achieved between hour ending 16 and 18



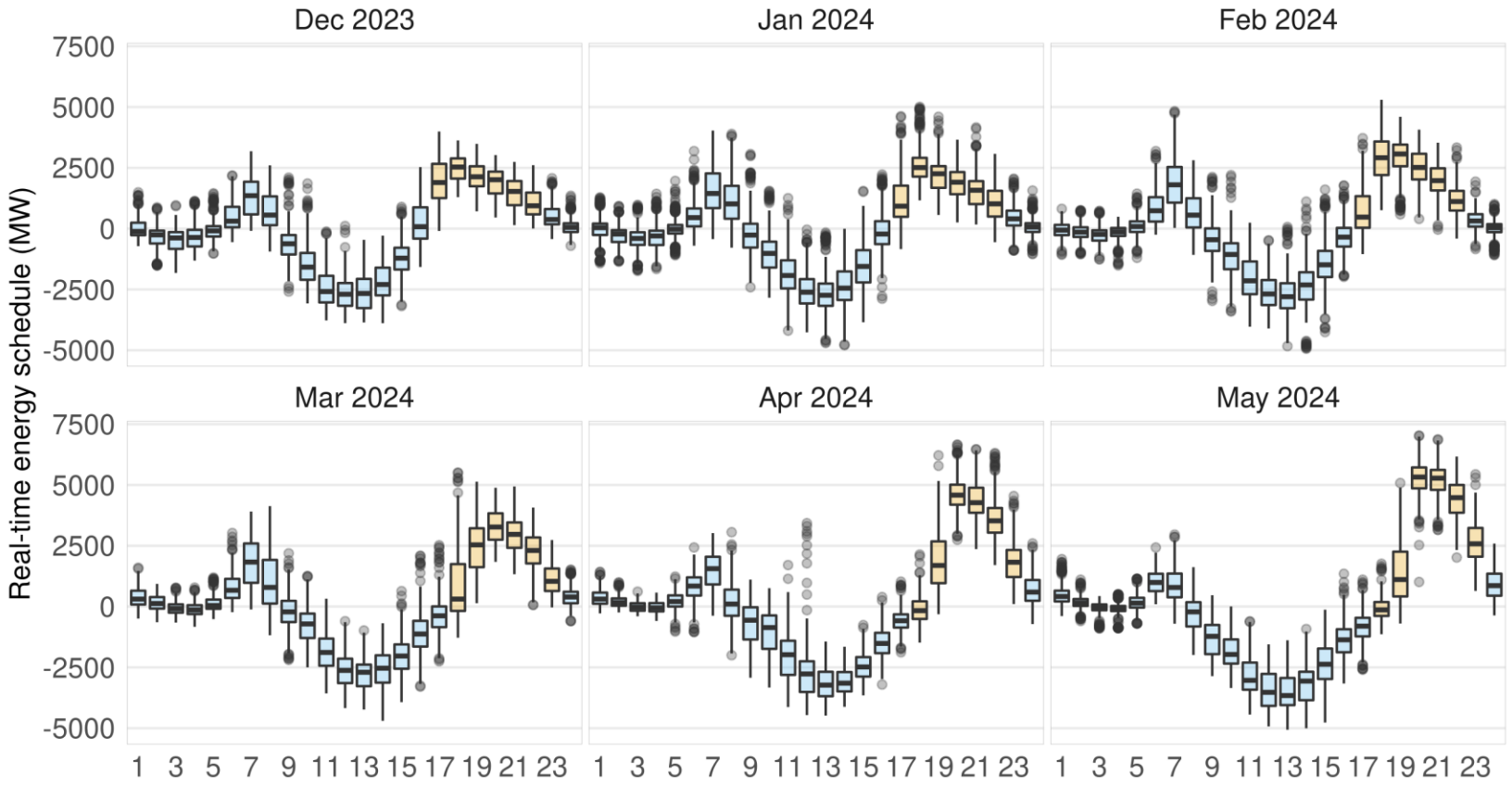
Real-Time State of charge for storage resources was in line with the day-ahead state of charge



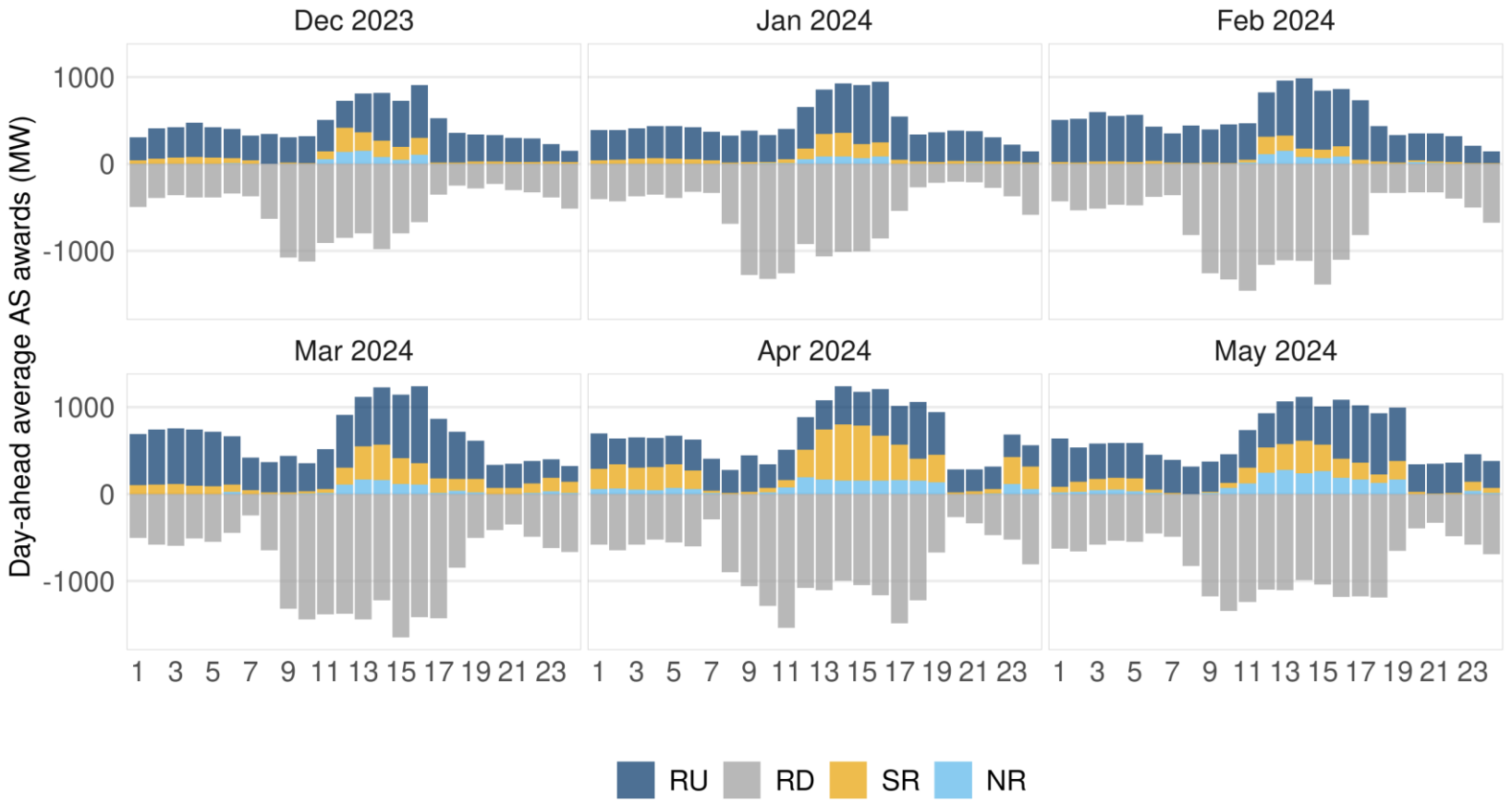
Storage resources were consistently charging during solar hours and discharging during net load peaks



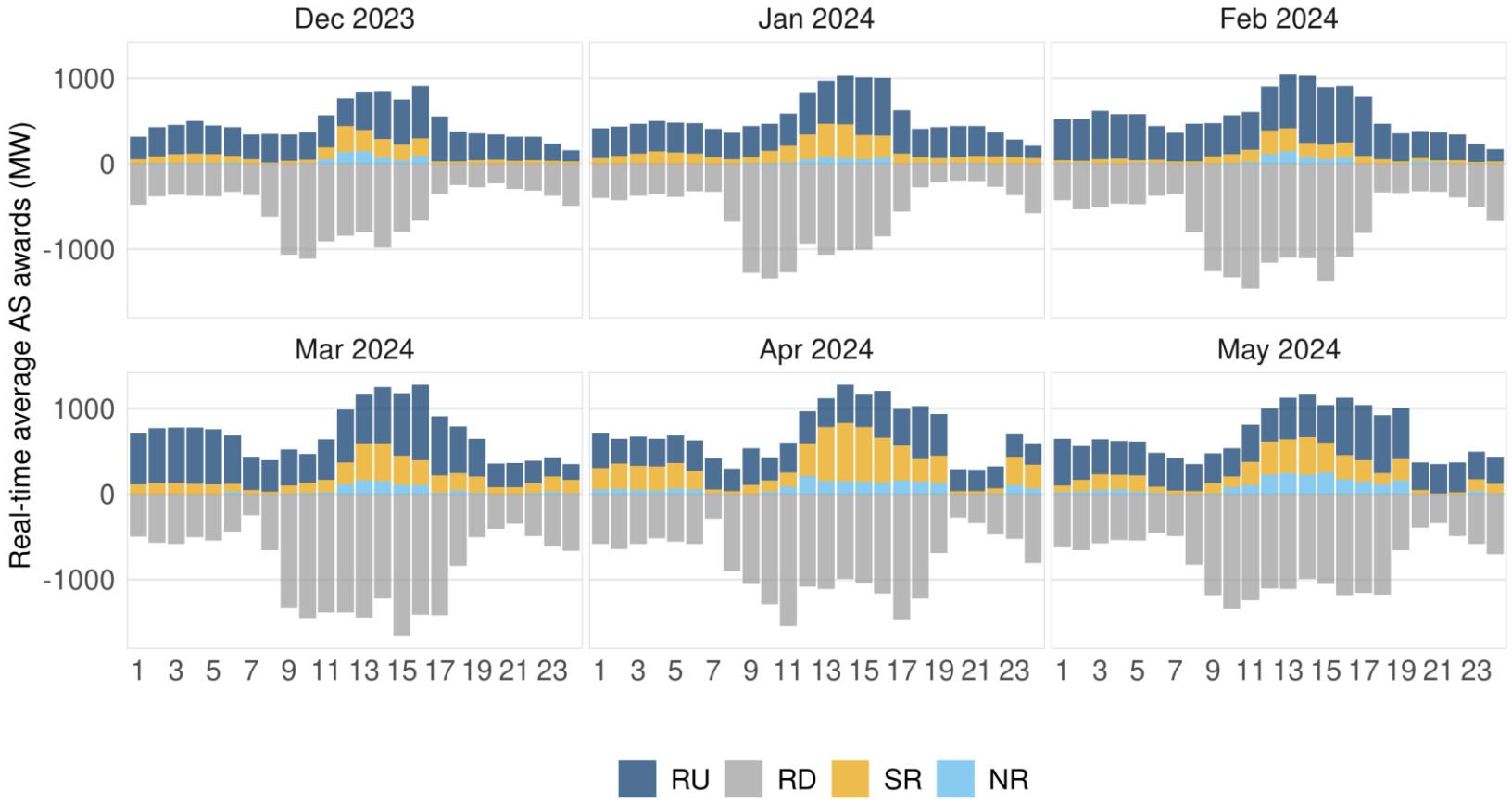
Storage resources were consistently charging during solar hours and discharging during net load peaks, and reached new highs at over 7,000MW in April and May



Storage resources procure mostly regulation while in recent months they have also increased the provision of Spinning reserves. Day Ahead



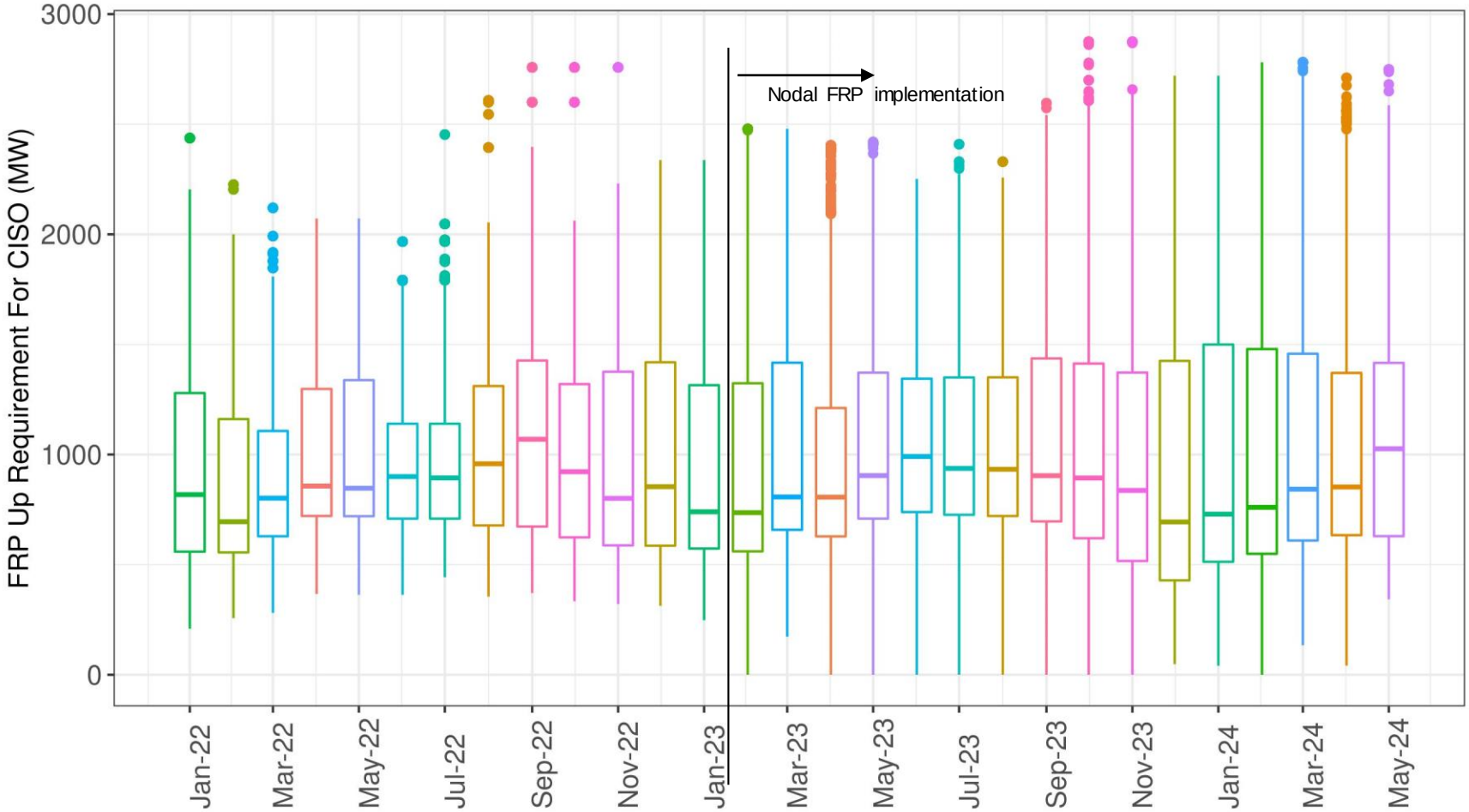
Storage resources procure mostly regulation while in recent months they have also increased the provision of Spinning reserves. Real time



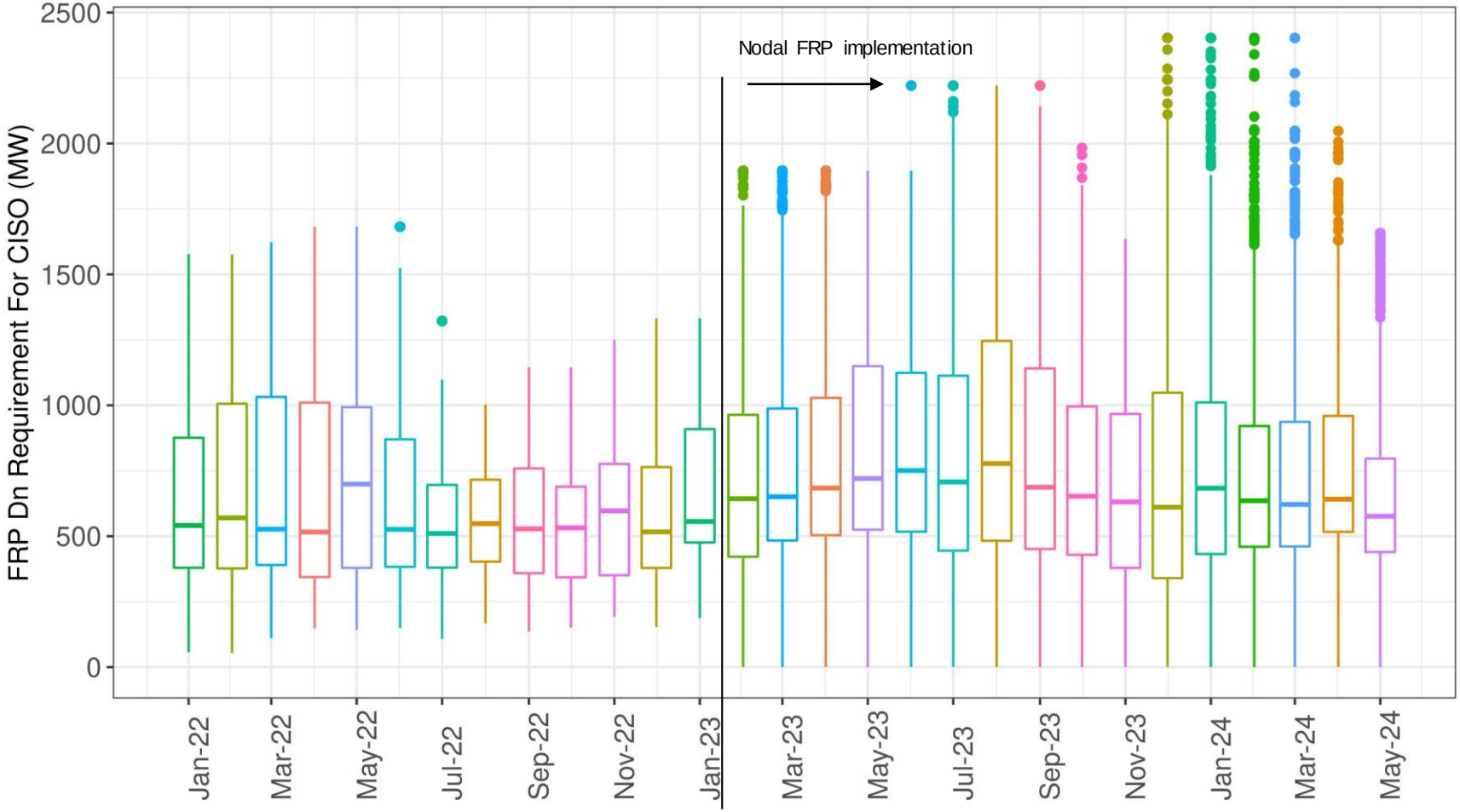
FRP Update

Market Performance and Advanced Analytics Short Term Forecasting

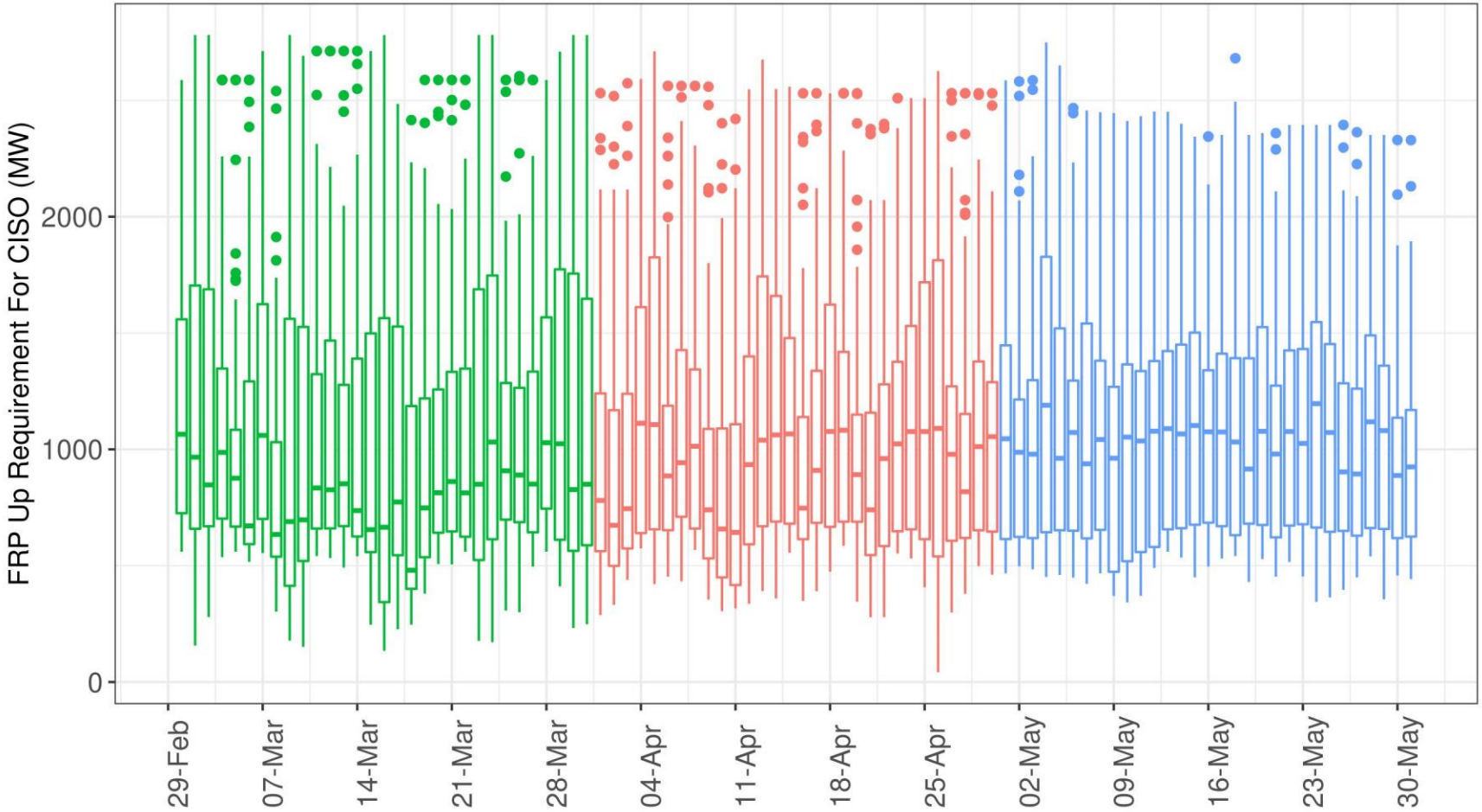
FRP Up Requirement for CAISO area remain within typical ranges



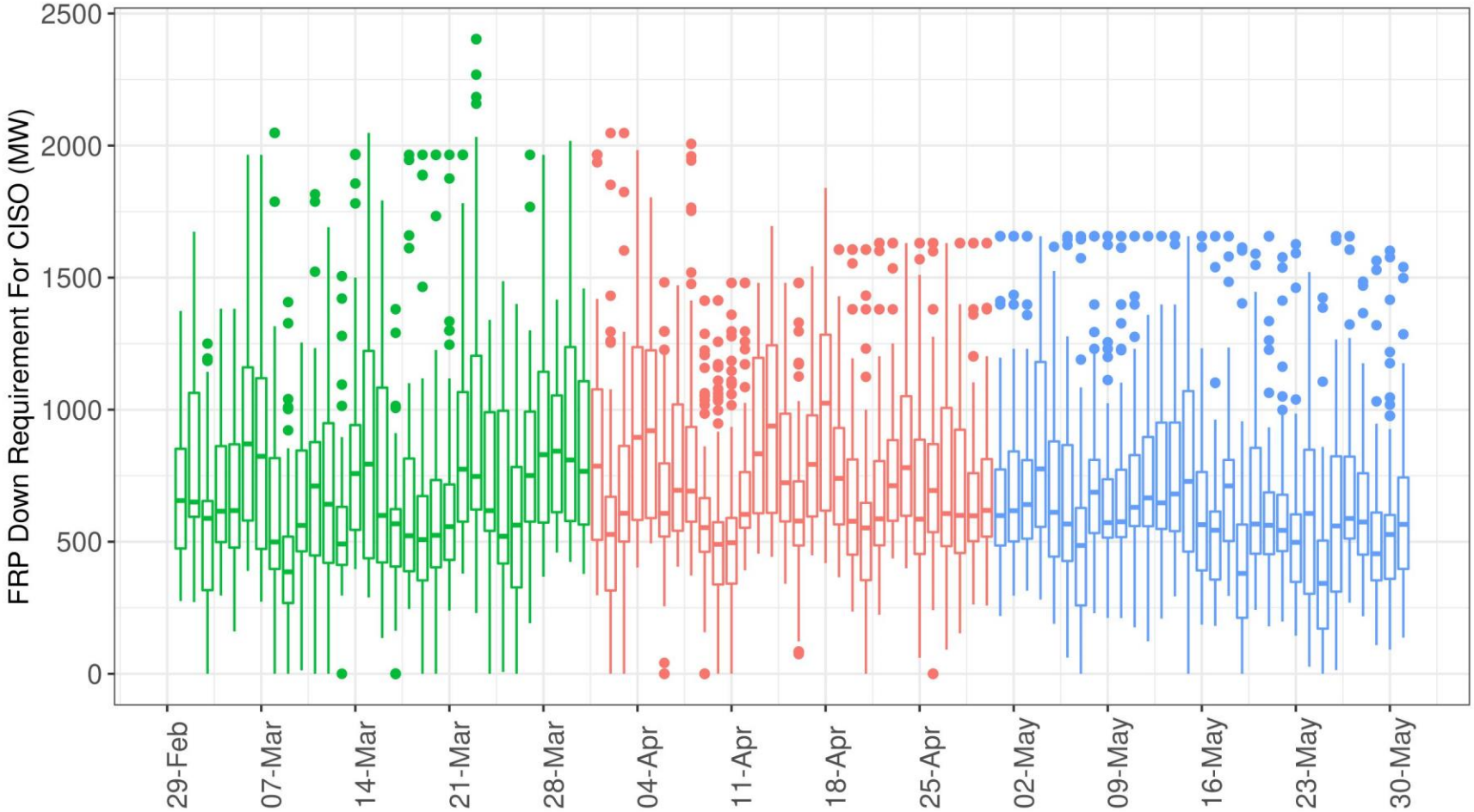
FRP Down Requirement for CAISO area remain within typical ranges



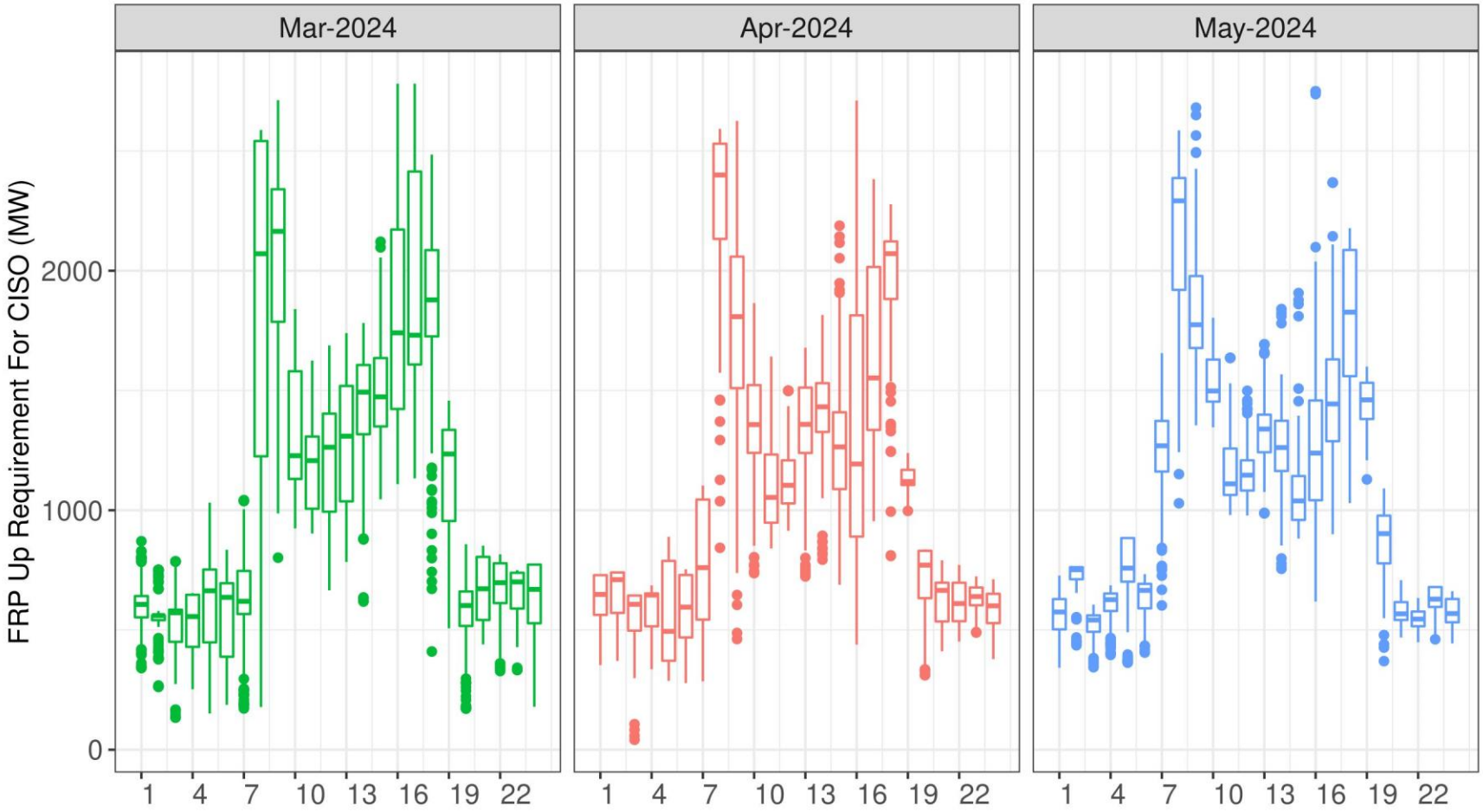
The daily distribution of FRP Up requirement in the last 3 months for CAISO area exhibits a steady trend



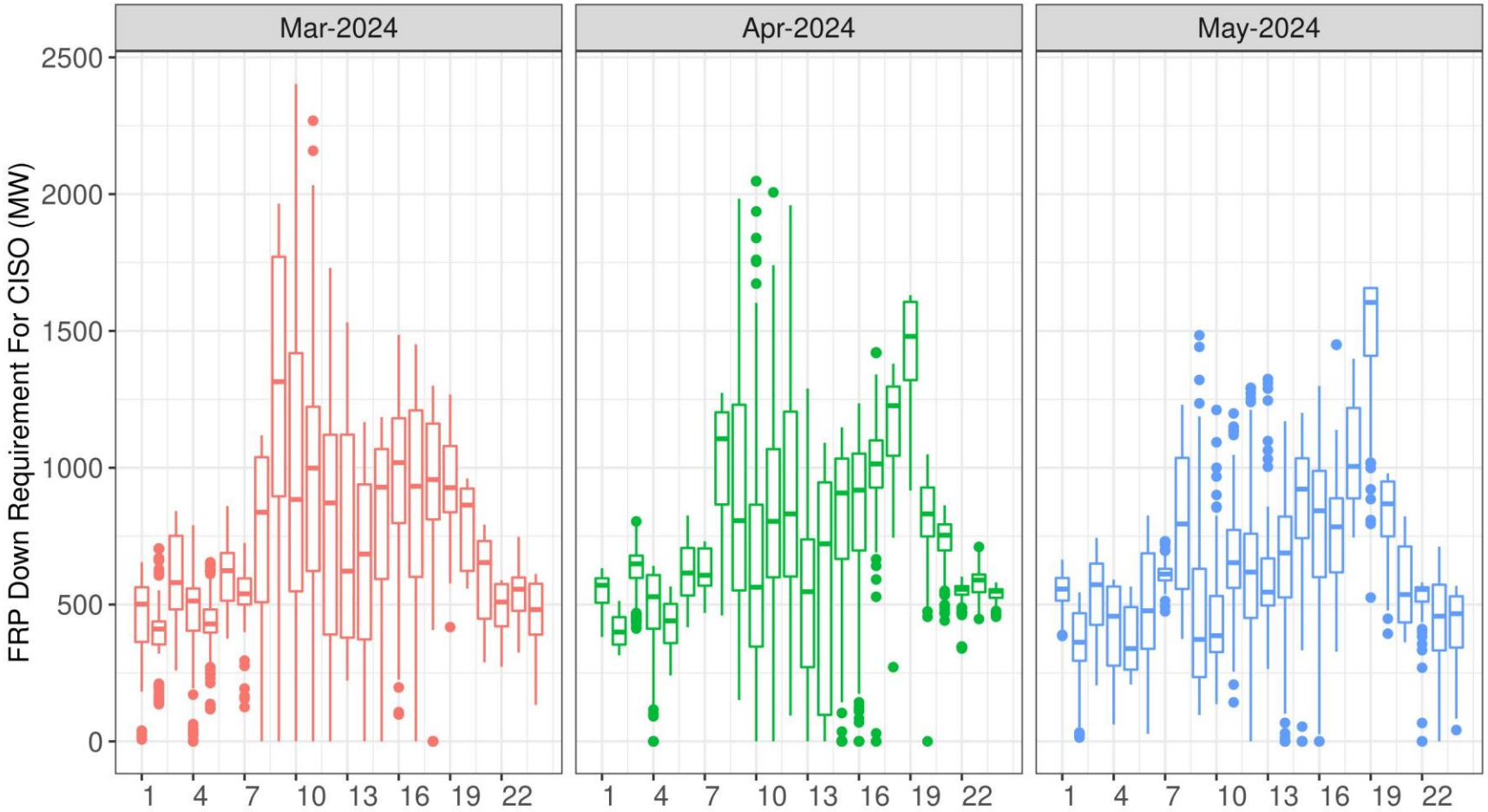
The daily distribution of FRP Down requirement in the last 3 months for CAISO area exhibits a steady trend



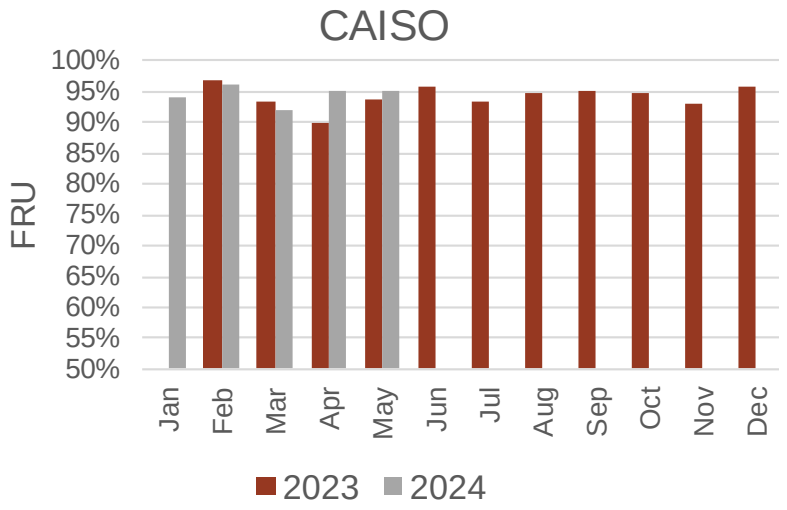
The hourly profile of upward FRP tends to follow a pattern of morning and evening peaks

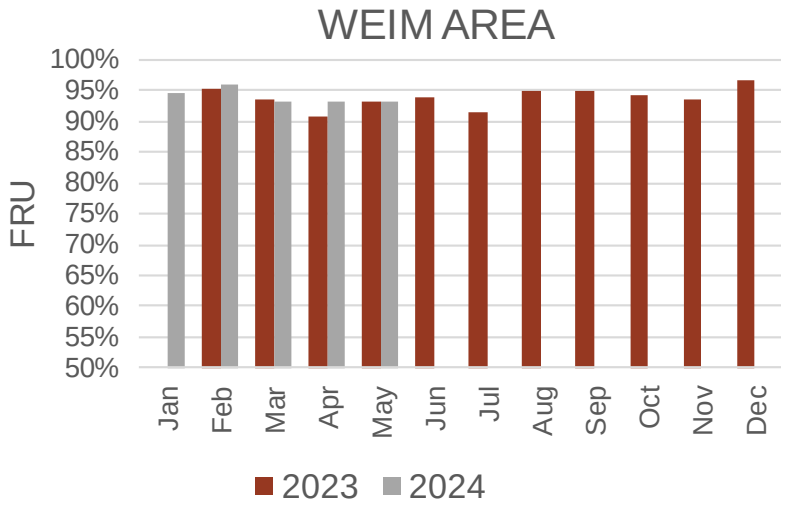


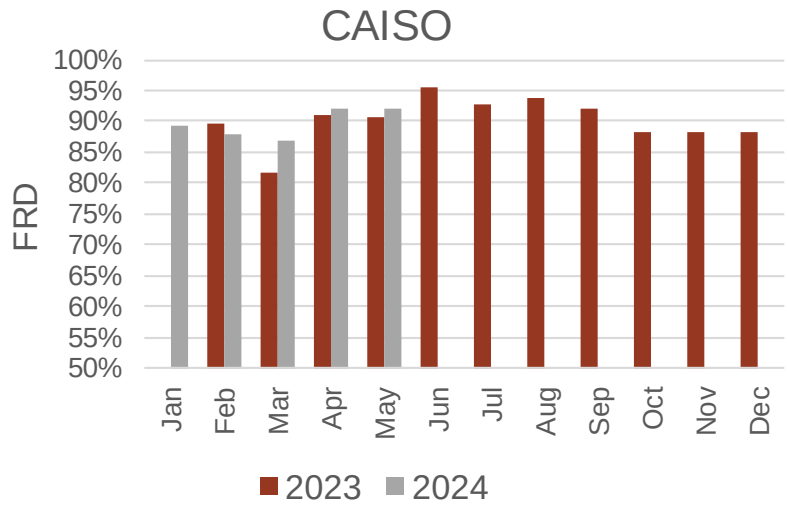
The hourly profile of downward FRP tends to follow a complementary pattern to the upward FRP, with higher values in midday hours

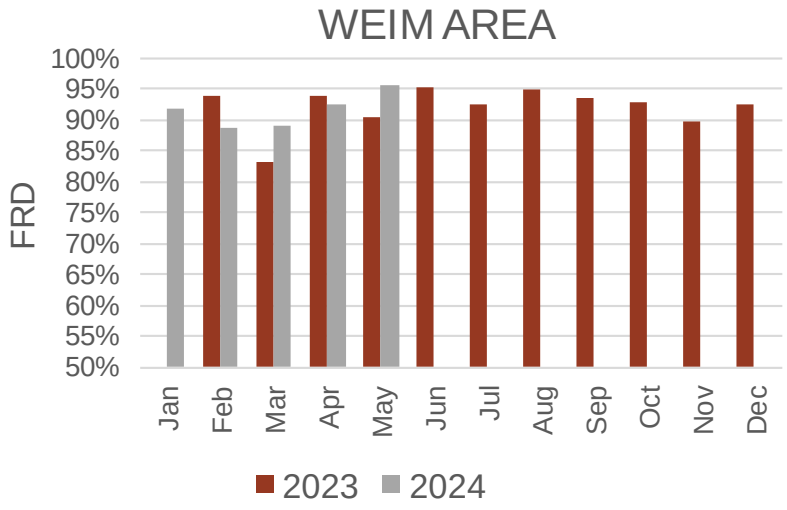


FRP Coverage

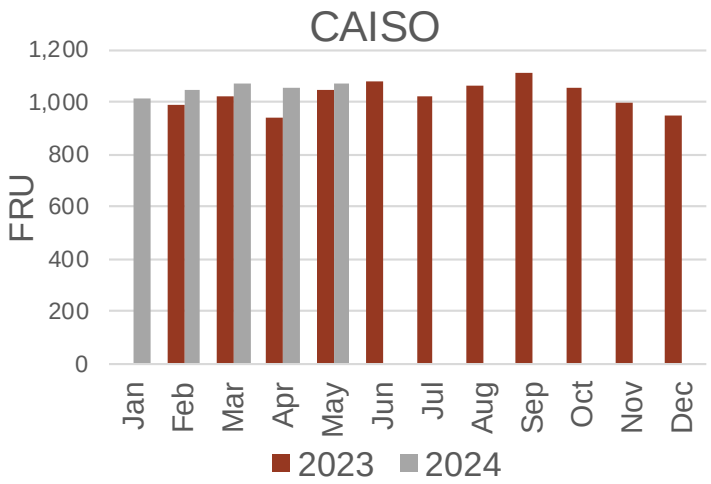


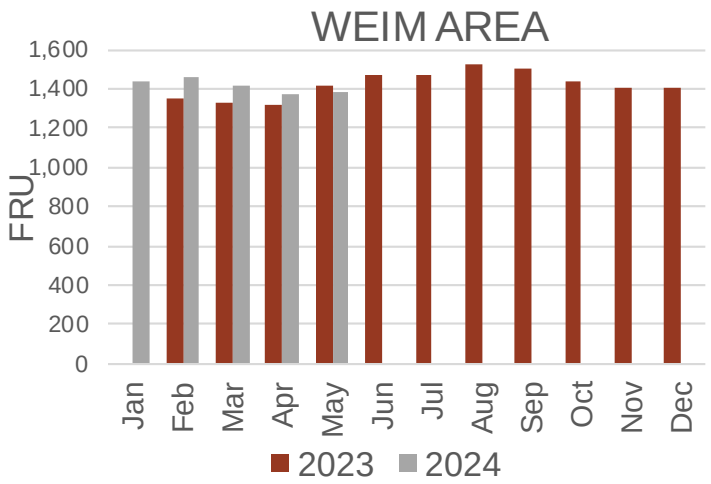


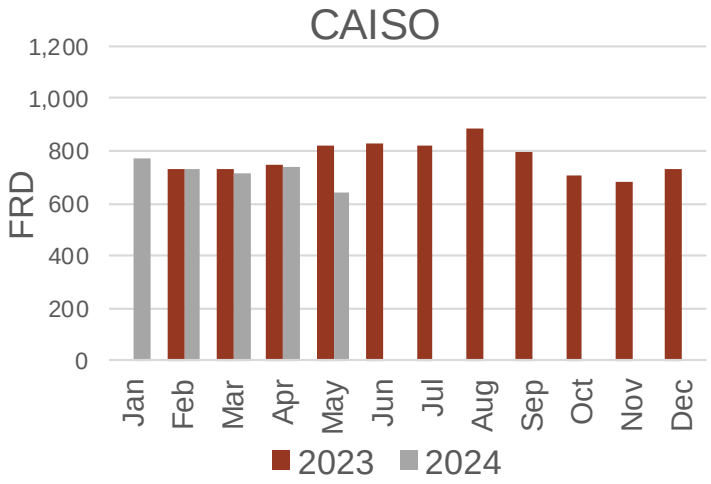


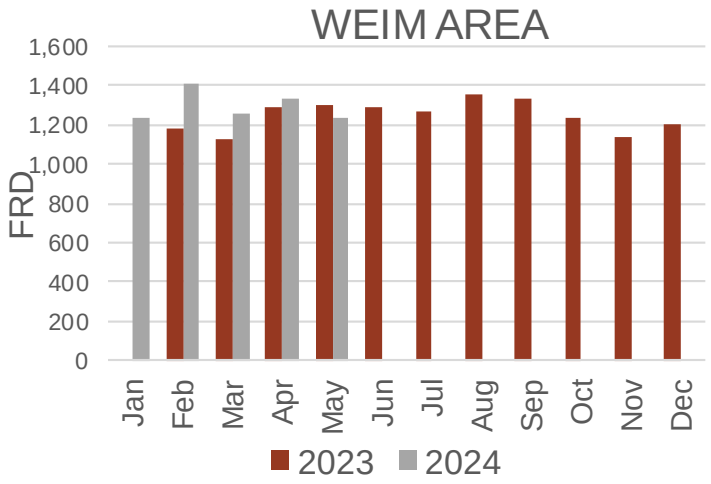


FRP Requirement

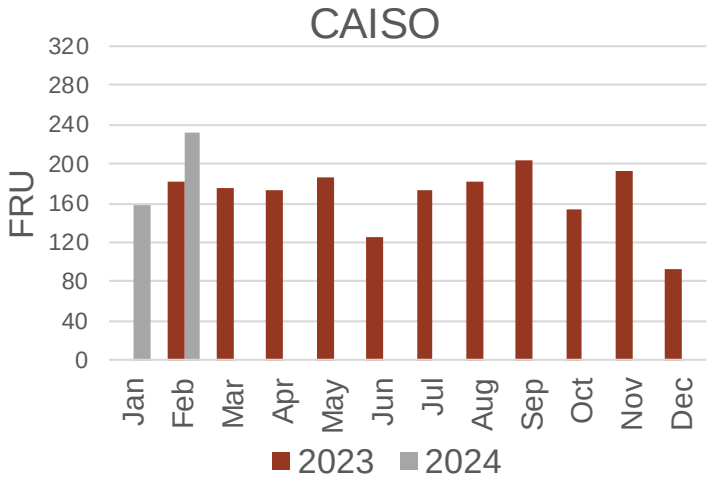


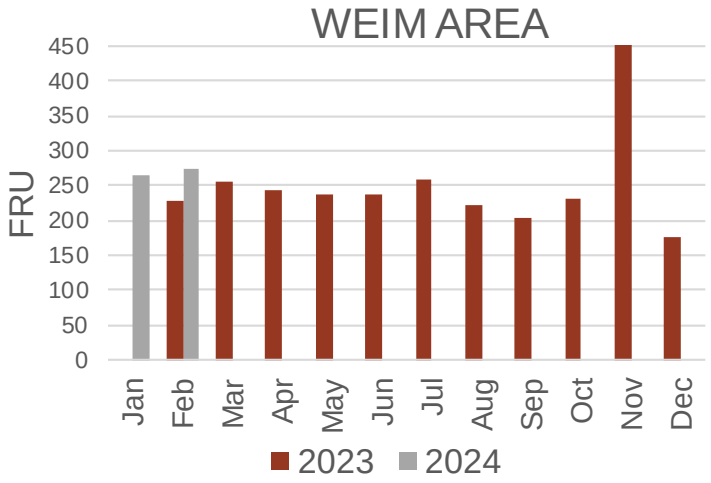


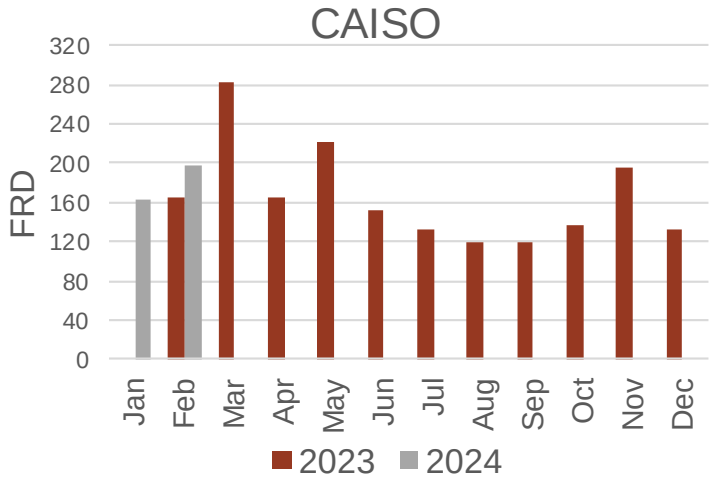


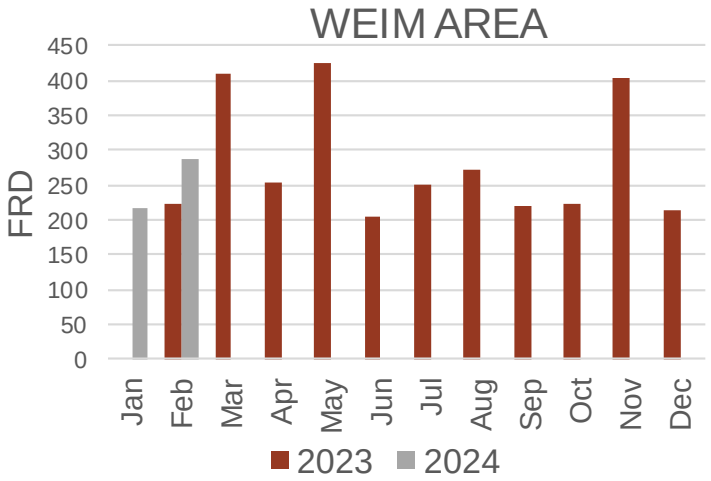


FRP Exceedance



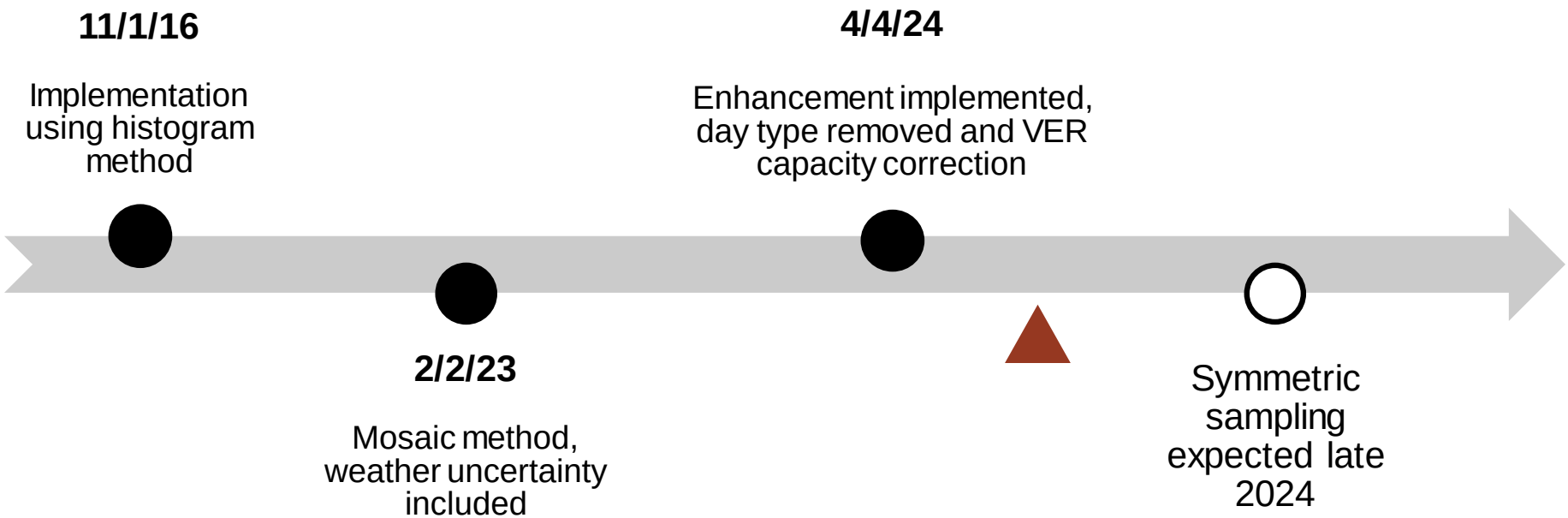






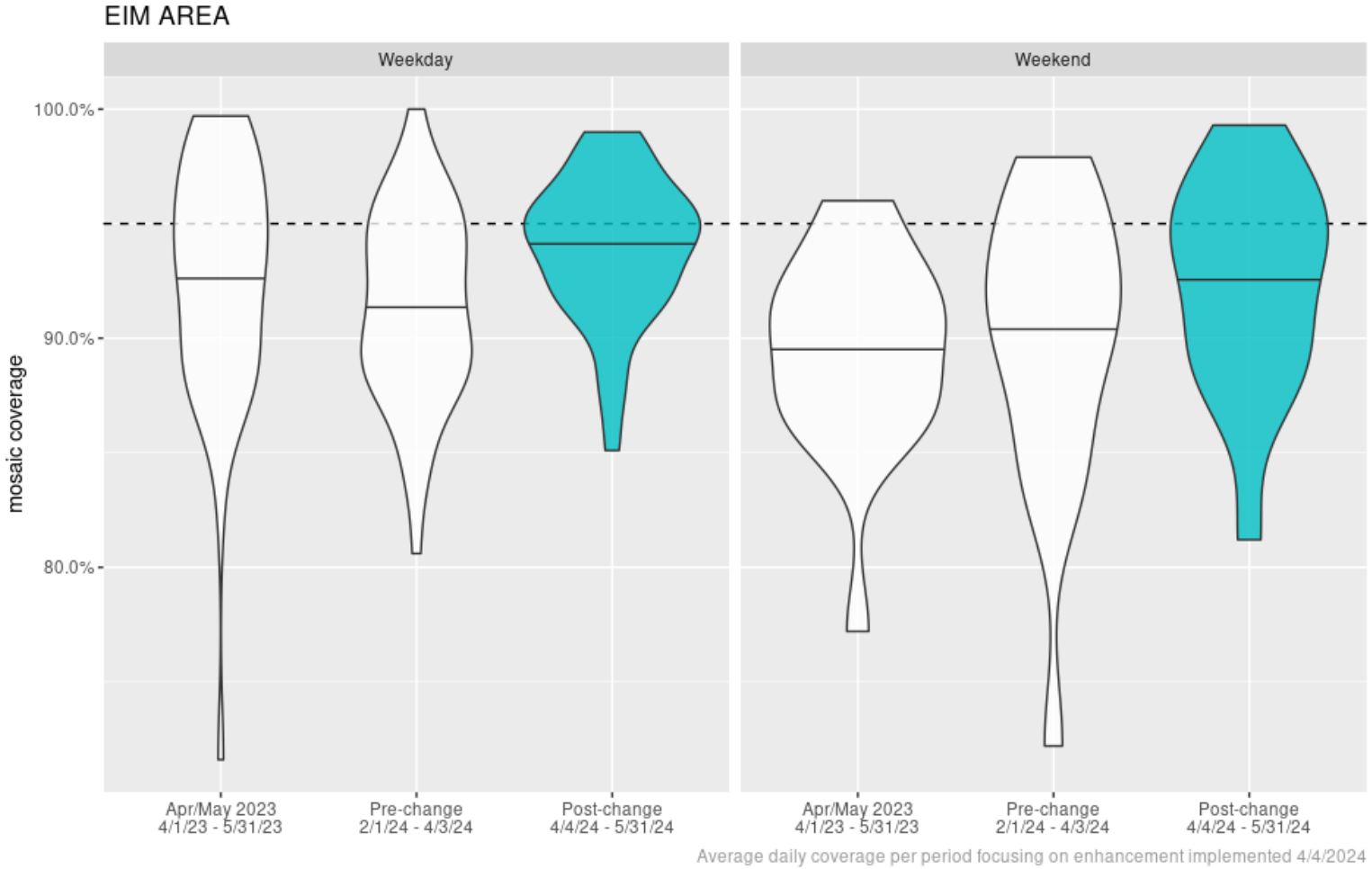
The ISO is working to update the tracking metrics as discussed in the November 29th, MSC.

FRP Timeline



Enhancement implemented 4/4/24 that removed day-type and added handling for capacity factors adjusting for resource onboarding

Weekend coverage increased since enhancement



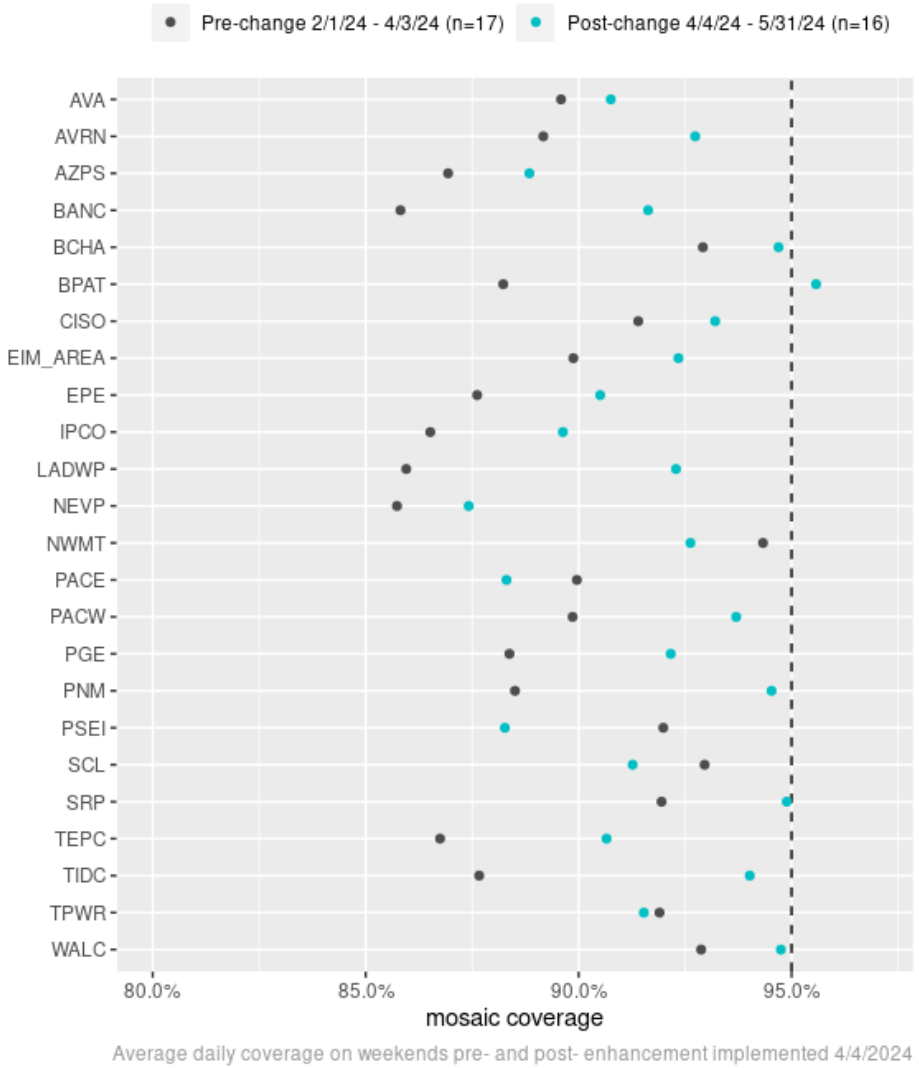
Plot notes:

- Violin plots show distribution of daily average coverage
- Target coverage is 95% for combined FRU and FRD

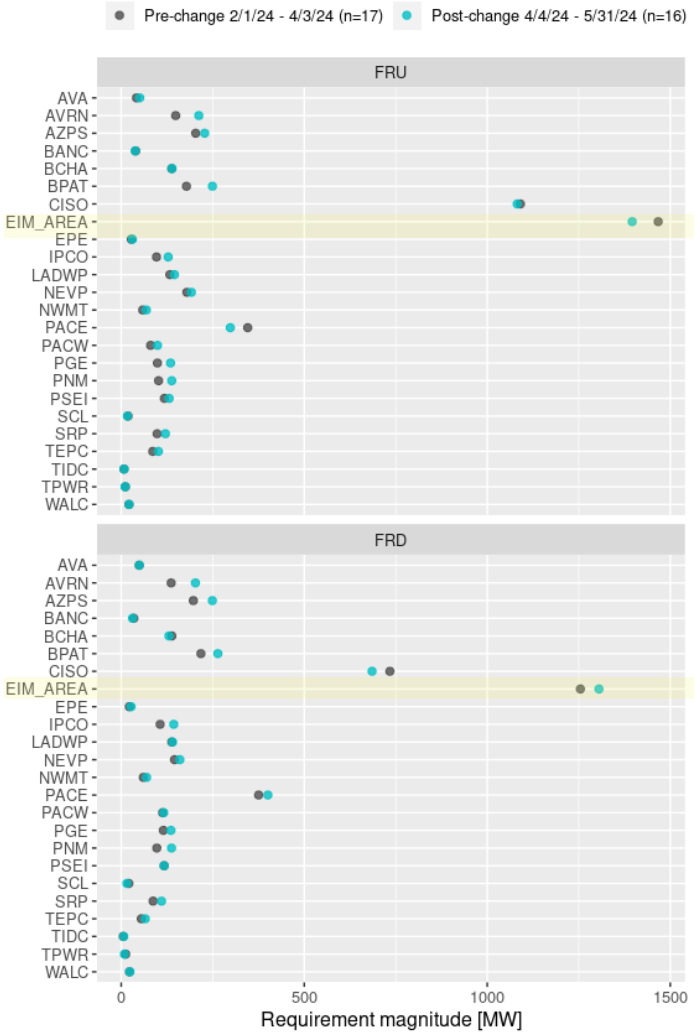
Results show increased coverage across BAAs

Comparing FRP performance over **weekend days only**, we have **17 days** in the pre-enhancement and **16 days** in the post-enhancement sample.

Note that we are making this comparison over the course of a shoulder season and sample sizes for weekend coverage are limited.



Requirements are similar and slightly larger post-change than pre-change at the BAA level, as expected from simulations



Symmetric sampling is currently being trialed and implementation is expected late 2024

Continuing to review simulated performance of proposed change

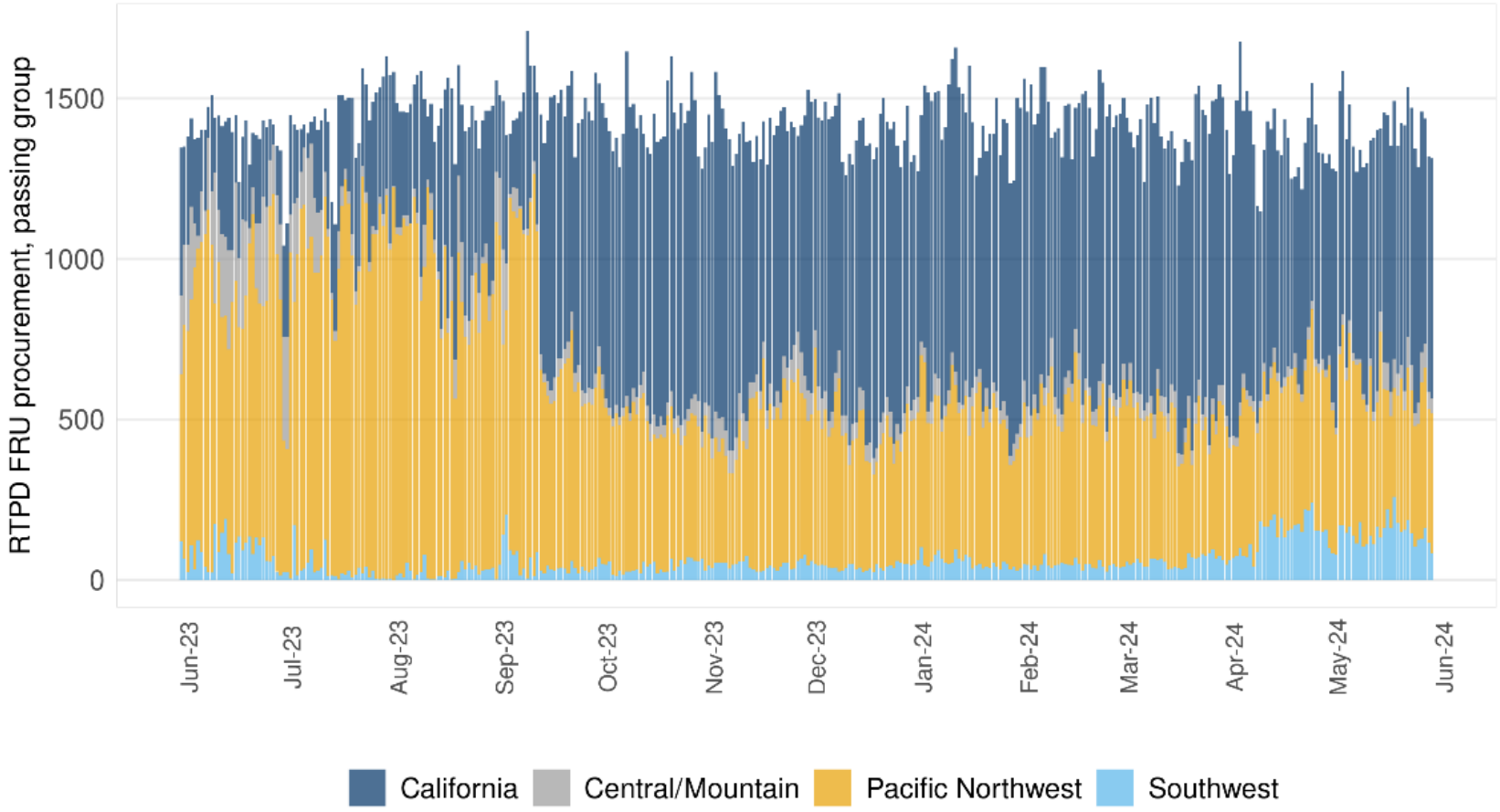
Working with vendor for implementation, targeting Q4

Similar to day-type change, a Market Notice will be issued prior to change

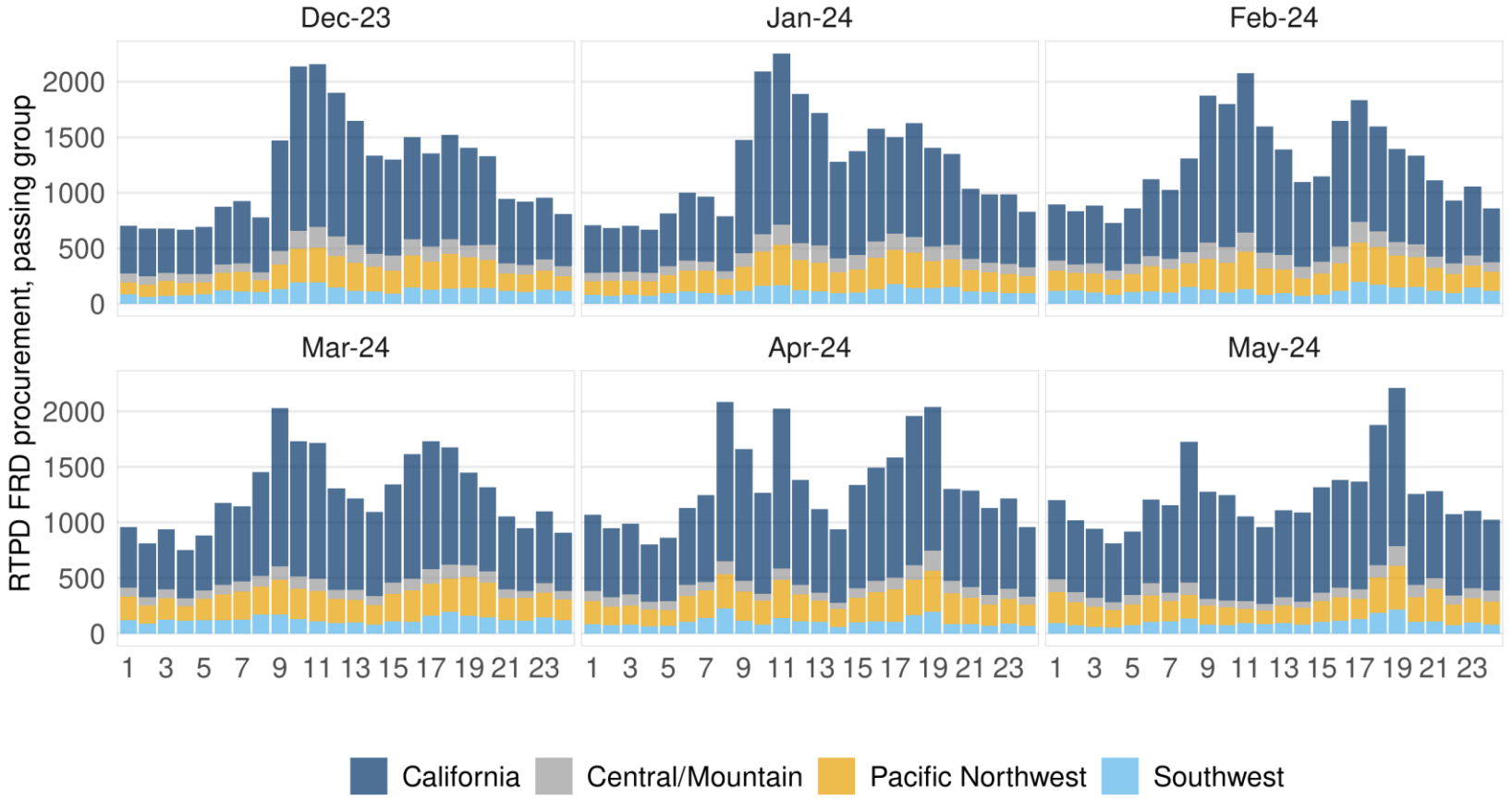
Additional references on change:

- Joint ISO Board of Governors and WEIM Governing Body meeting
  May 22, 2024, Briefing on load conformance presentation
- ISO Board of Governors General Session
  February 7, 2024 Briefing on Mosaic Quantile Regression Analysis
- MSC meetings
  November 29, 2023, Flexible Ramping Product Requirements

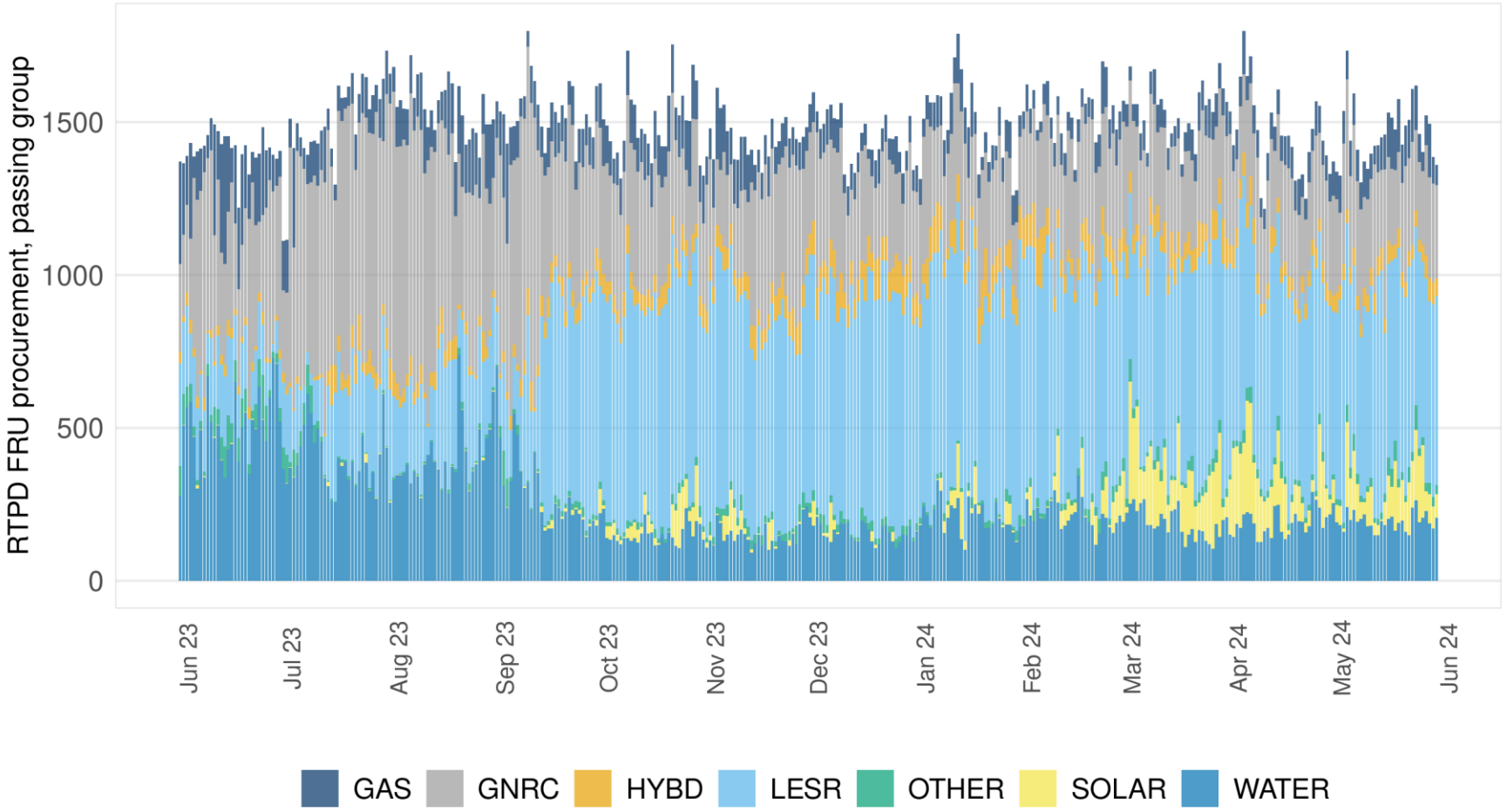
Upward FRP is largely procured from areas in the Pacific Northwest and California



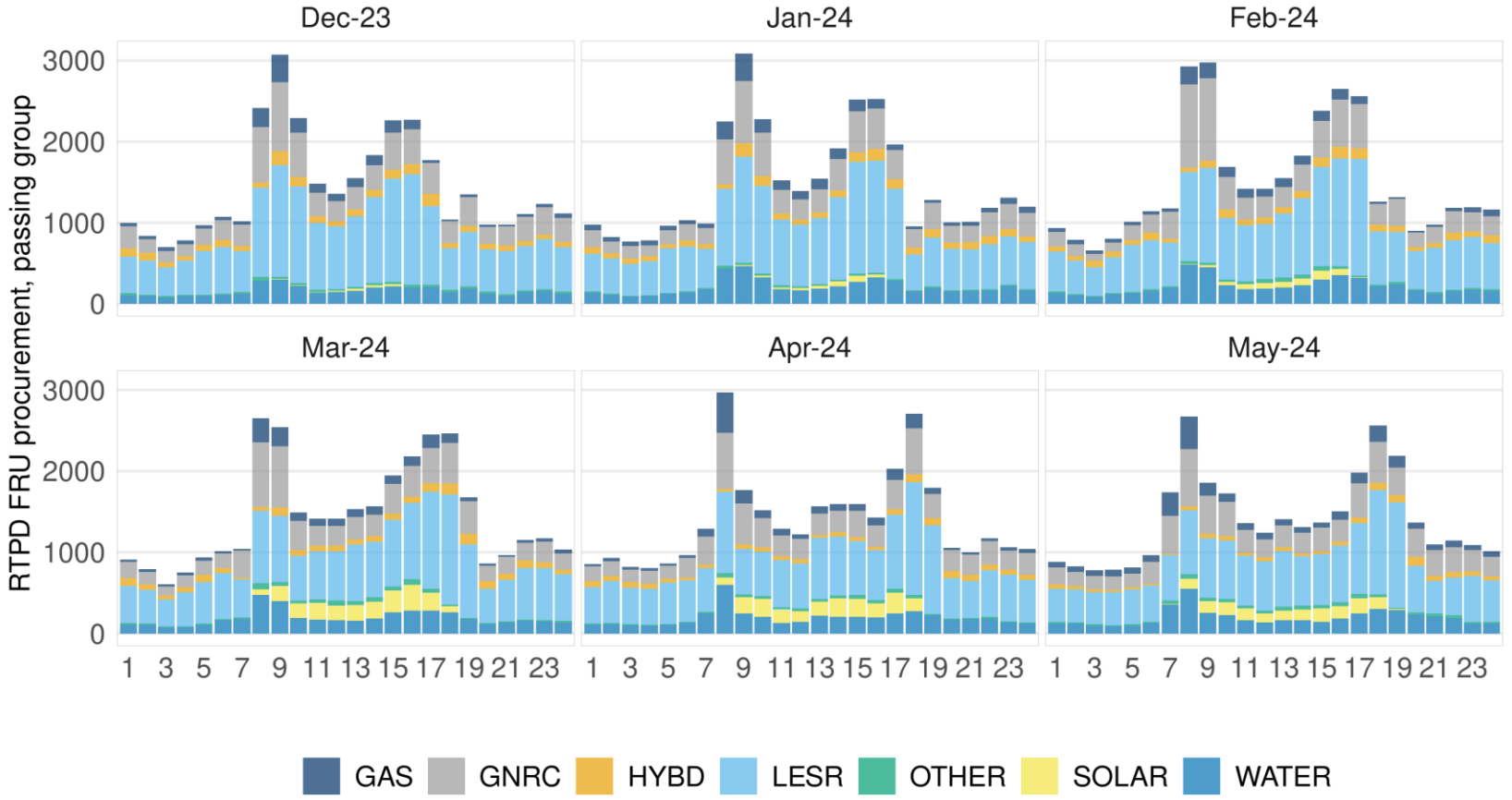
Upward FRP procurement from CAISO area is largely occurring in the peak hours



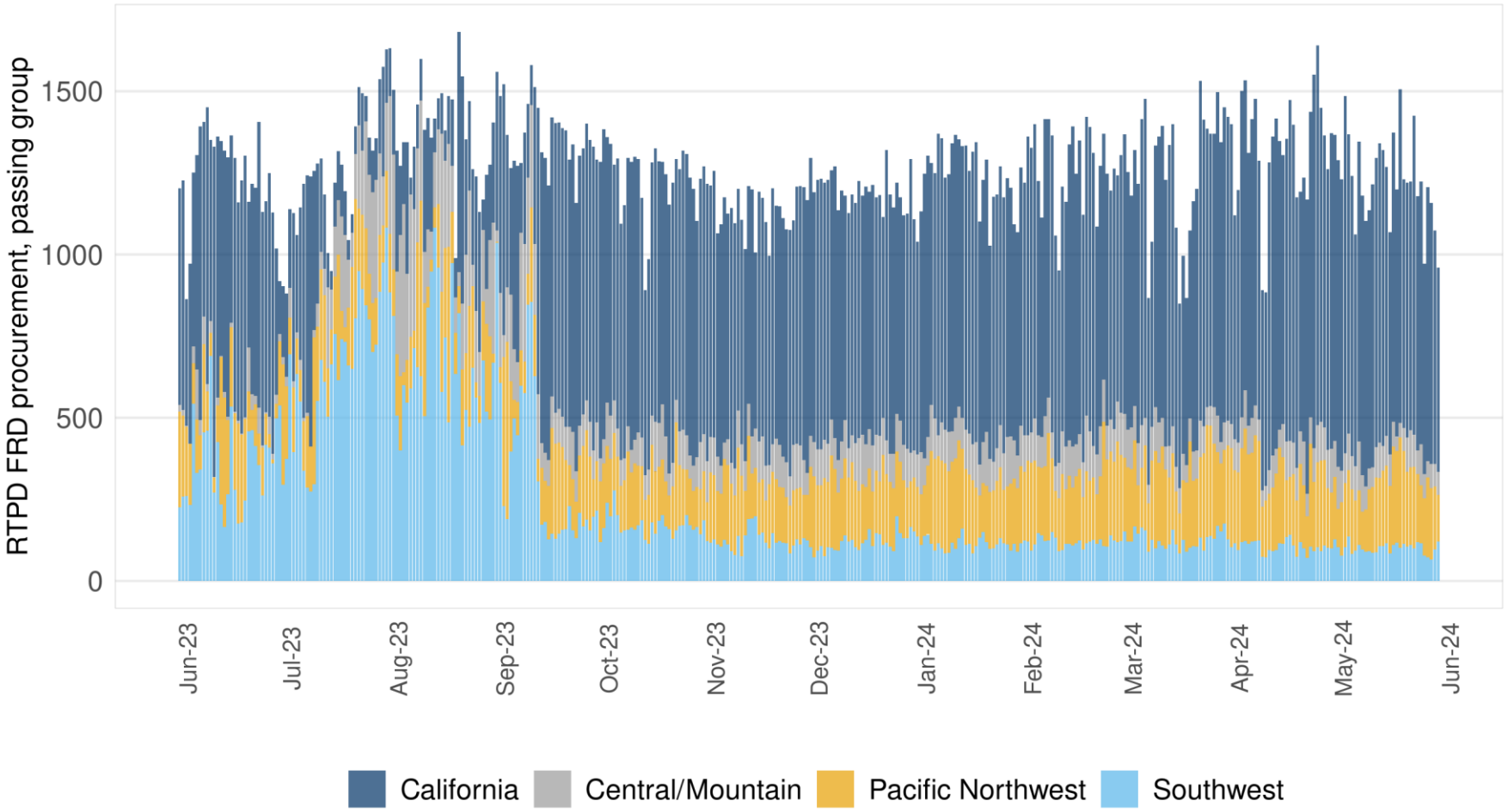
Upward FRP procurement is supported by various types of technologies and more recently mainly by storage resources



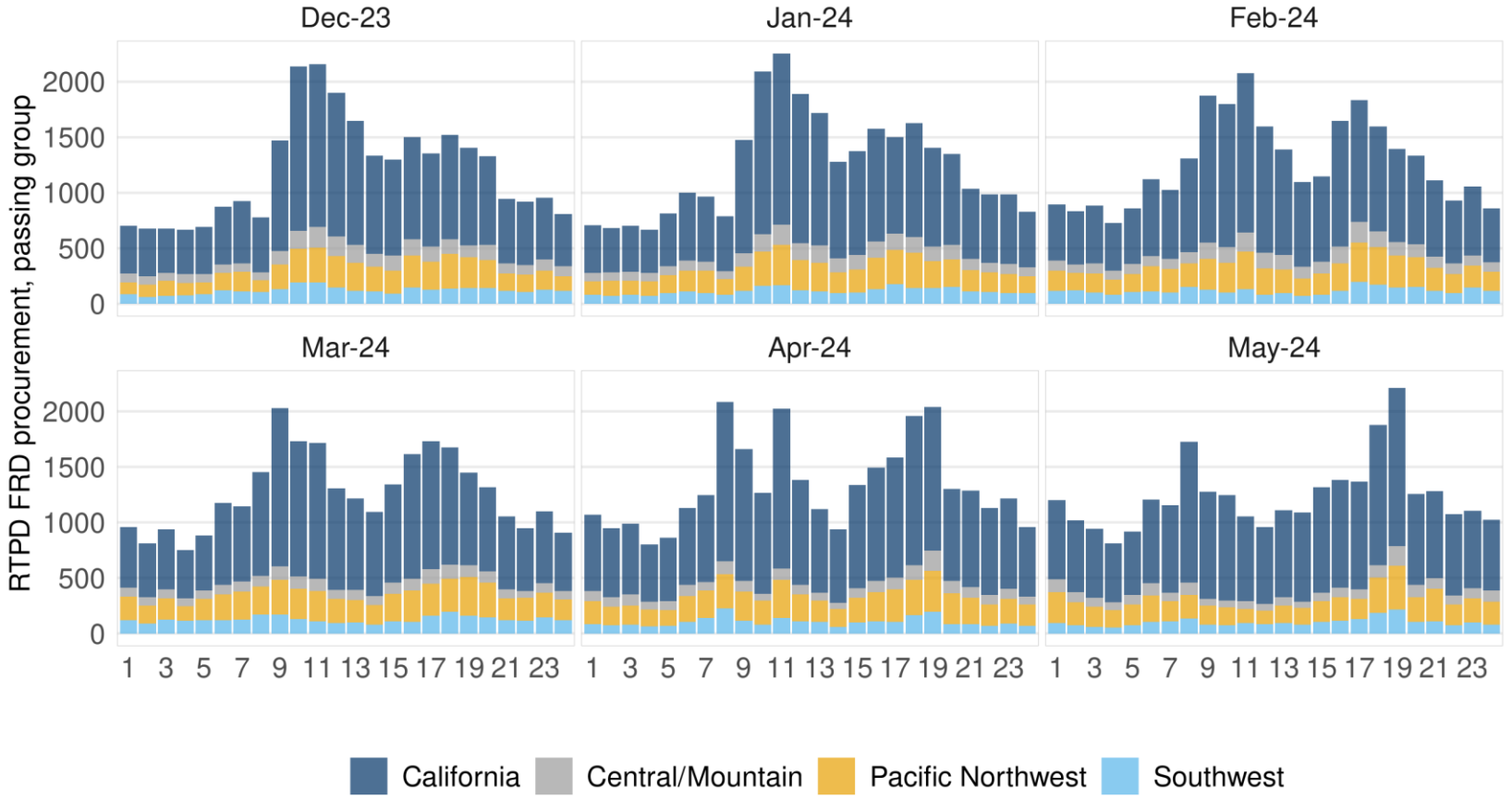
Storage resources tend to support upward FRP procurement for evening ramping hours



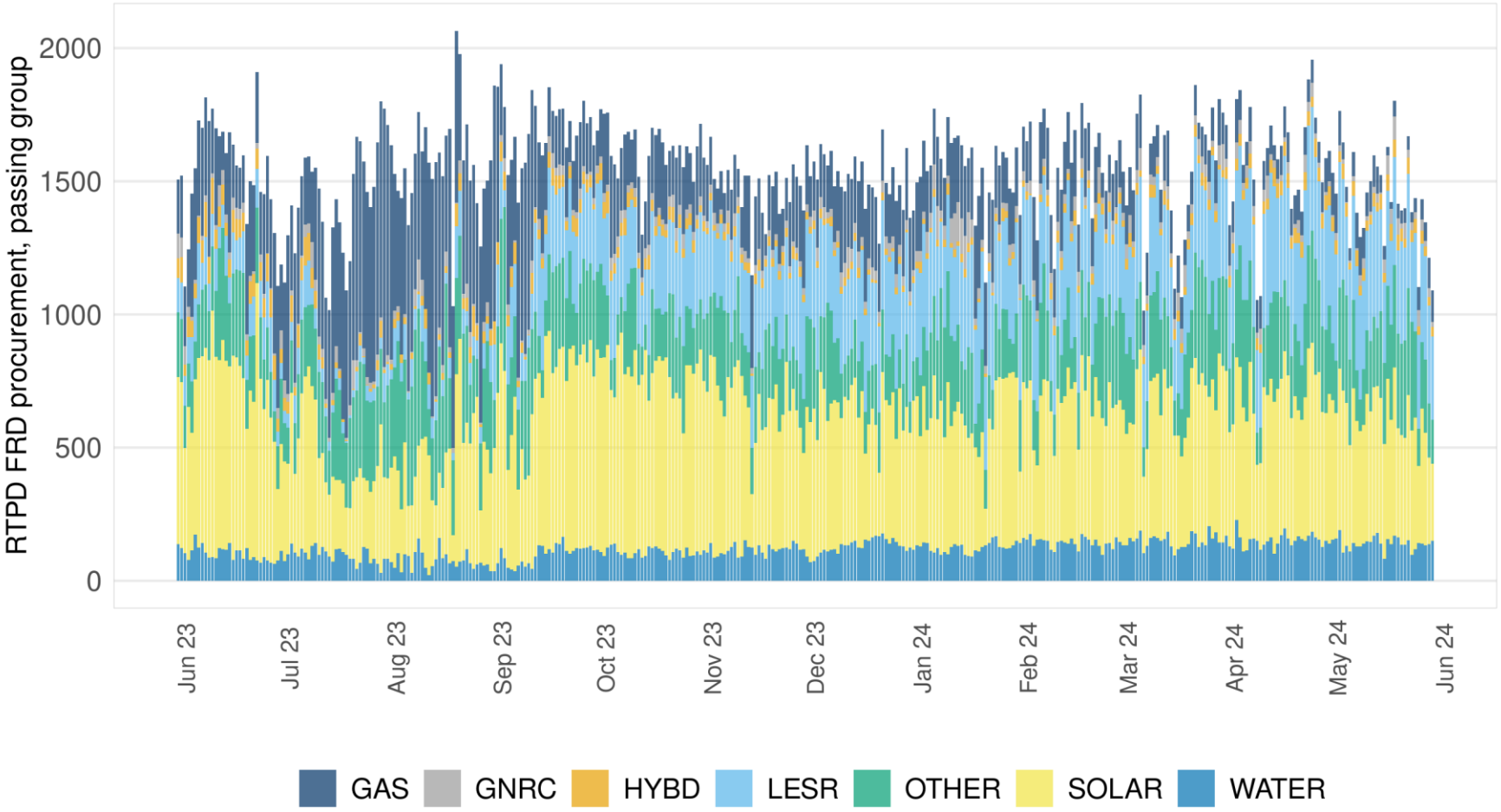
Downward FRP is largely procured from areas in the Southwest, California, and Pacific Northwest



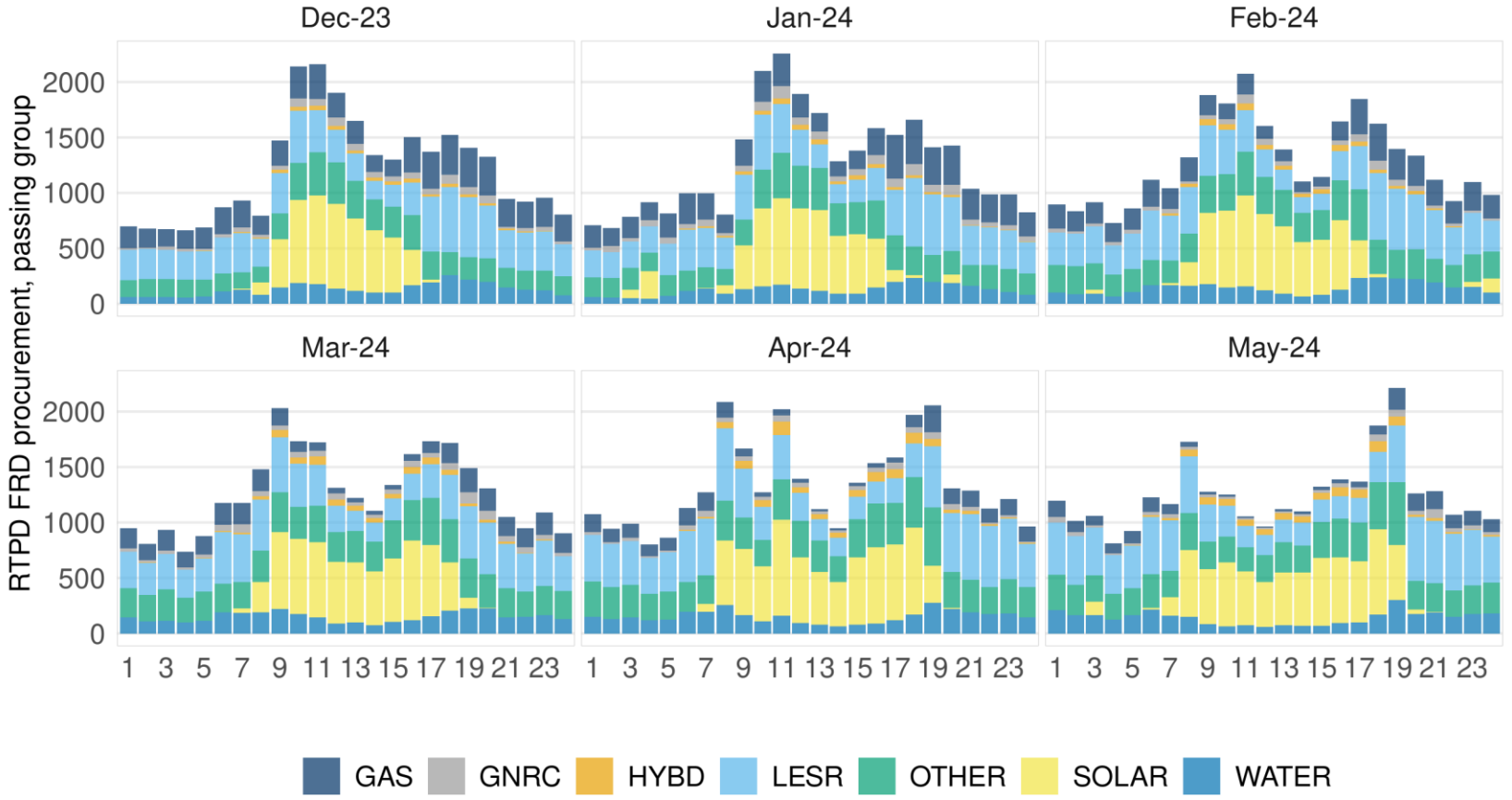
Downward FRP procurement from CAISO area is largely occurring in midday hours when solar production is plentiful and months with modest demand level



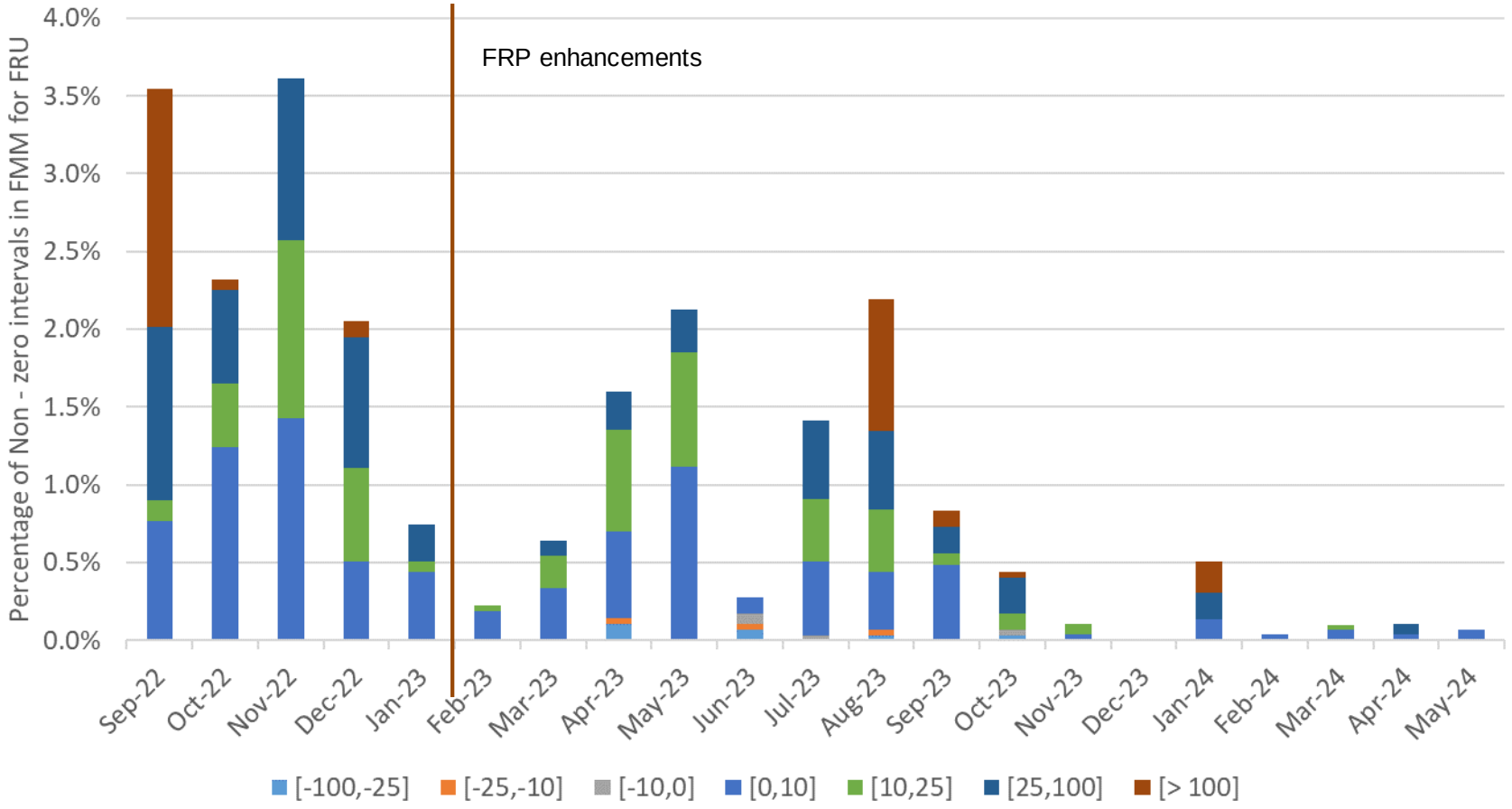
Downward FRP procurement is supported by various types of technologies



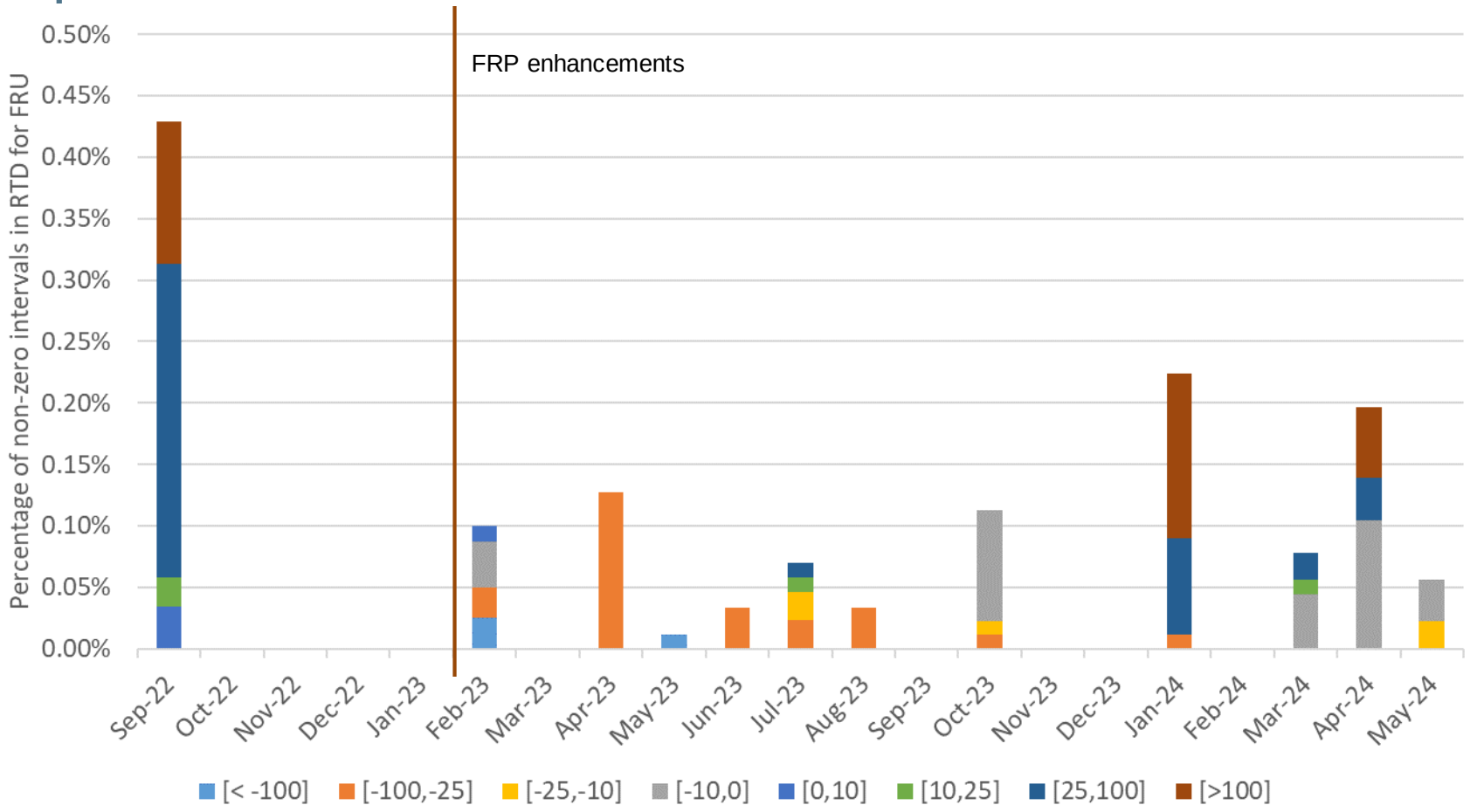
Solar resources tend to support midday hours in the downward direction



Frequency of intervals with non-zero FMM prices for upward FMM continues to be low after nodal implementation



Frequency of intervals with non-zero RTD prices for upward FRP continues to be low after nodal implementation



Market Issues

Market Performance and Advanced Analytics Short Term Forecasting

1. Incorrect GHG awards in the real-time interval dispatch market

- The GHG bid adder is used by the WEIM entities outside CA to submit a bid for their energy to serve demand within CA (participating resources)
- There was an issue in the RTD market where VER resources were not getting GHG allocation
- WEIM VER resources were included in the FMM GHG attribution, but then not attributed in the RTD market
- RTD Market used an inaccurate low upper economic limit in the GHG attribution formulation for VER resources, making them ineligible to serve demand in CA.

1. Incorrect GHG awards in the real-time interval dispatch market

- This issue was resolved in June 2023
- The impact analysis was done for the period April 2021 – June 2023
- In April 2021, there was a significant increase in the GHG bid adder for VER resources, marking a notable shift from the previous absence of consistent GHG bid adders
- The impact analysis for this issue estimates that about 240,000 MWh were not attributed to VER resources in the RTD market

1. Incorrect GHG awards in the real-time interval dispatch market

- There was no impact on load or generation
- CAISO estimates a cost impact of about $320,000
- This impacted about 25 different resources in four different balancing areas of the WEIM
- Given the spread and extent of the issue, CAISO cannot feasibly correct for this issue retrospectively

2. Incorrect calculation of the Real-Time Hourly LAP Price

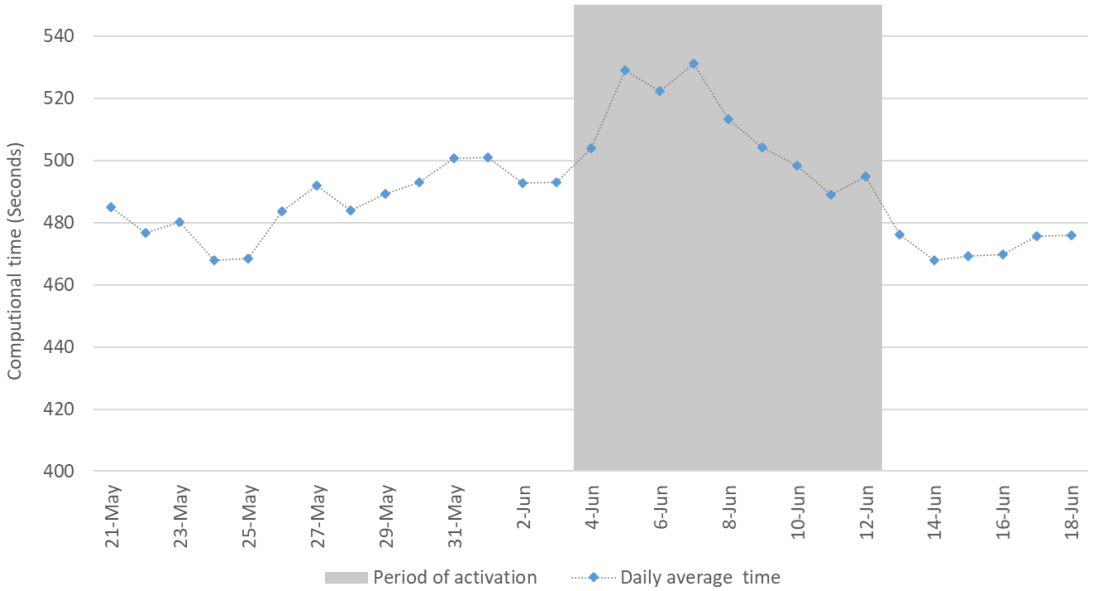
- Due to a software error in the implementation of the Flexible Ramp Product on February 1, 2023, the load weights used in the Real-Time Hourly LAP price were incorrect.
  - For example, load schedules on the VEA aggregate node are typically less than 100 MW, but were over 10,000 MW in many hours during the year.
  - Only load MW weights were incorrect and not the price weights.
- The issue was corrected on February 5, 2024

2. Incorrect calculation of the Real-Time Hourly LAP Price

- The ISO is working to recalculate the Hourly LAP price on 11-month and 21-month settlement statements for trade dates from 2/1/2023 to 2/5/2024.
- More information on the timing of these recalculations will be communicated in the Settlement User Group forum.
- The Hourly LAP price is not directly subject to the price correction process so the five business day price correction window does not apply to this recalculation

3. De-activation of contingencies for flexible ramping product

- FRP enhancements were activated on February 2, 2023
- Only base-flowgates and nomograms have been active

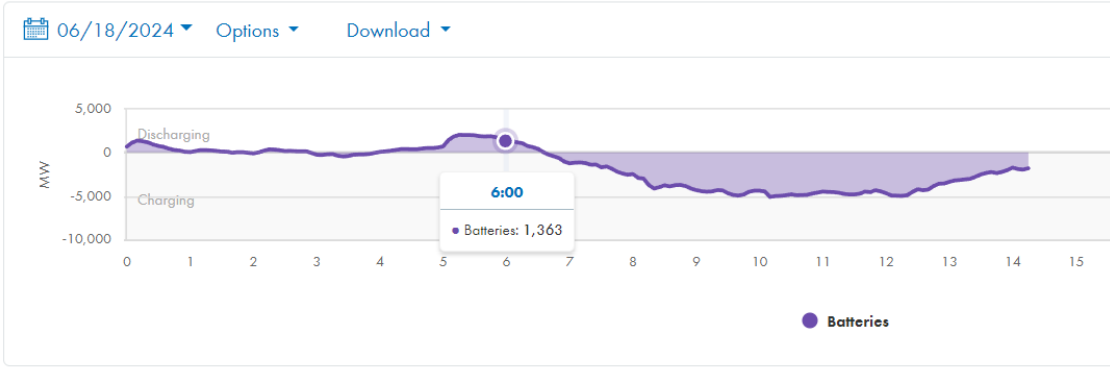


- CAISO has been assessing the feasibility to activate contingency flowgates
- Contingencies for FRP were activated on June 4, 2024
- Including contingencies for FRP resulted in longer computational times
- Some longer running times jeopardized the available review time of results
- CAISO de-activated contingencies for FRP on June 12
- CAISO will continue to assess the computational performance

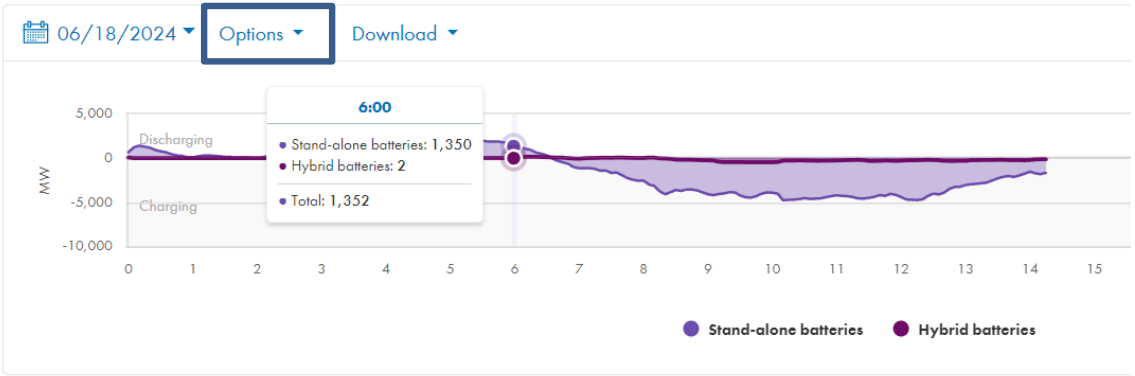
4. Today's Outlook battery summation mismatch

Batteries trend

Energy in megawatts in 5-minute increments. Displays stand-alone battery storage and some hybrids, including renewable components, wind and solar.



Select Options > Toggle Breakdown



Display Issue: Values for Batteries ≠ Stand-alone batteries + hybrid batteries

The stand-alone and hybrid battery values are instantaneous values while the total battery value is an average

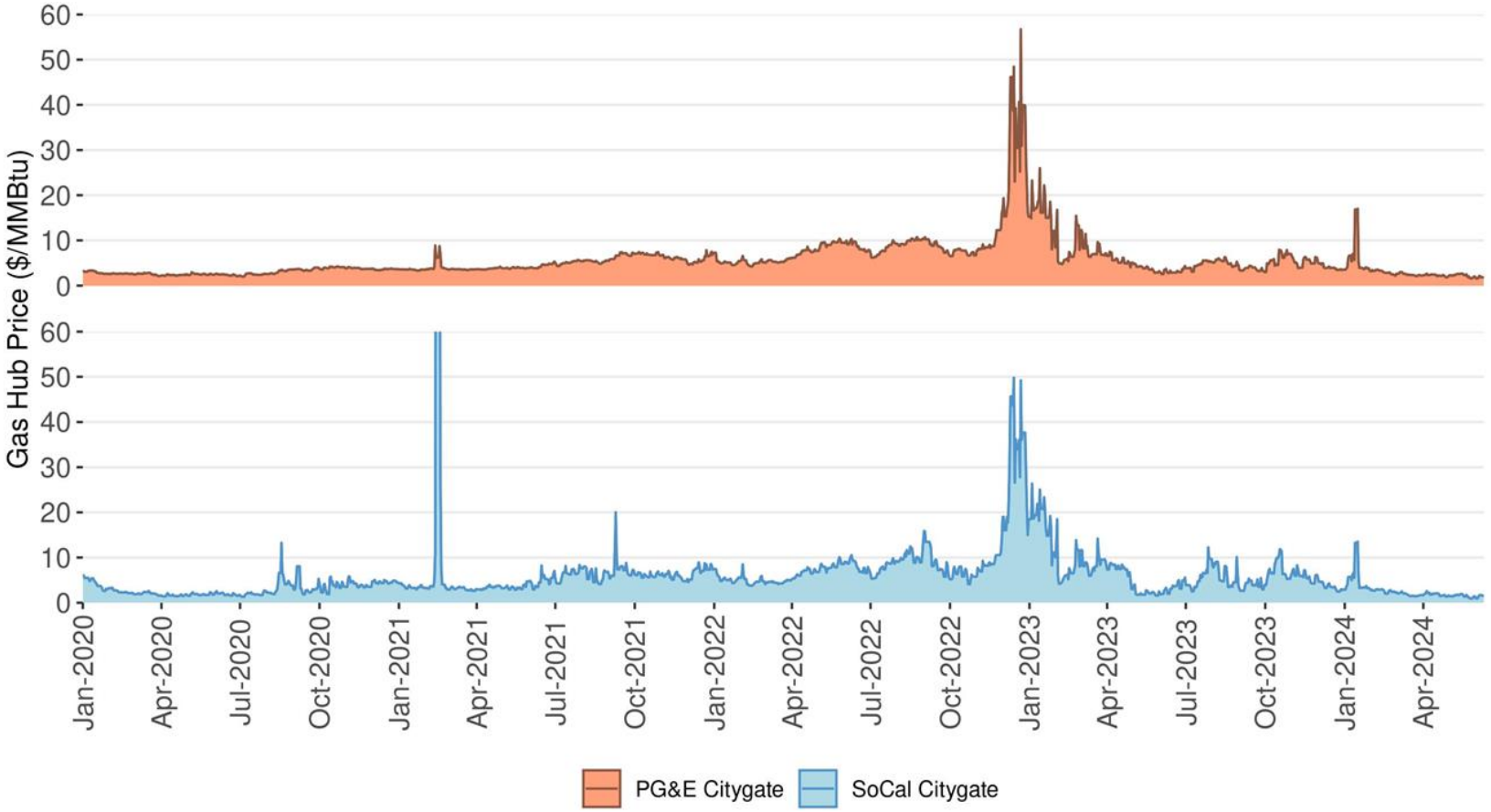
CAISO is exploring alternatives to estimate the aggregate Battery value

CAISO will issue a market notice once there is a solution implemented

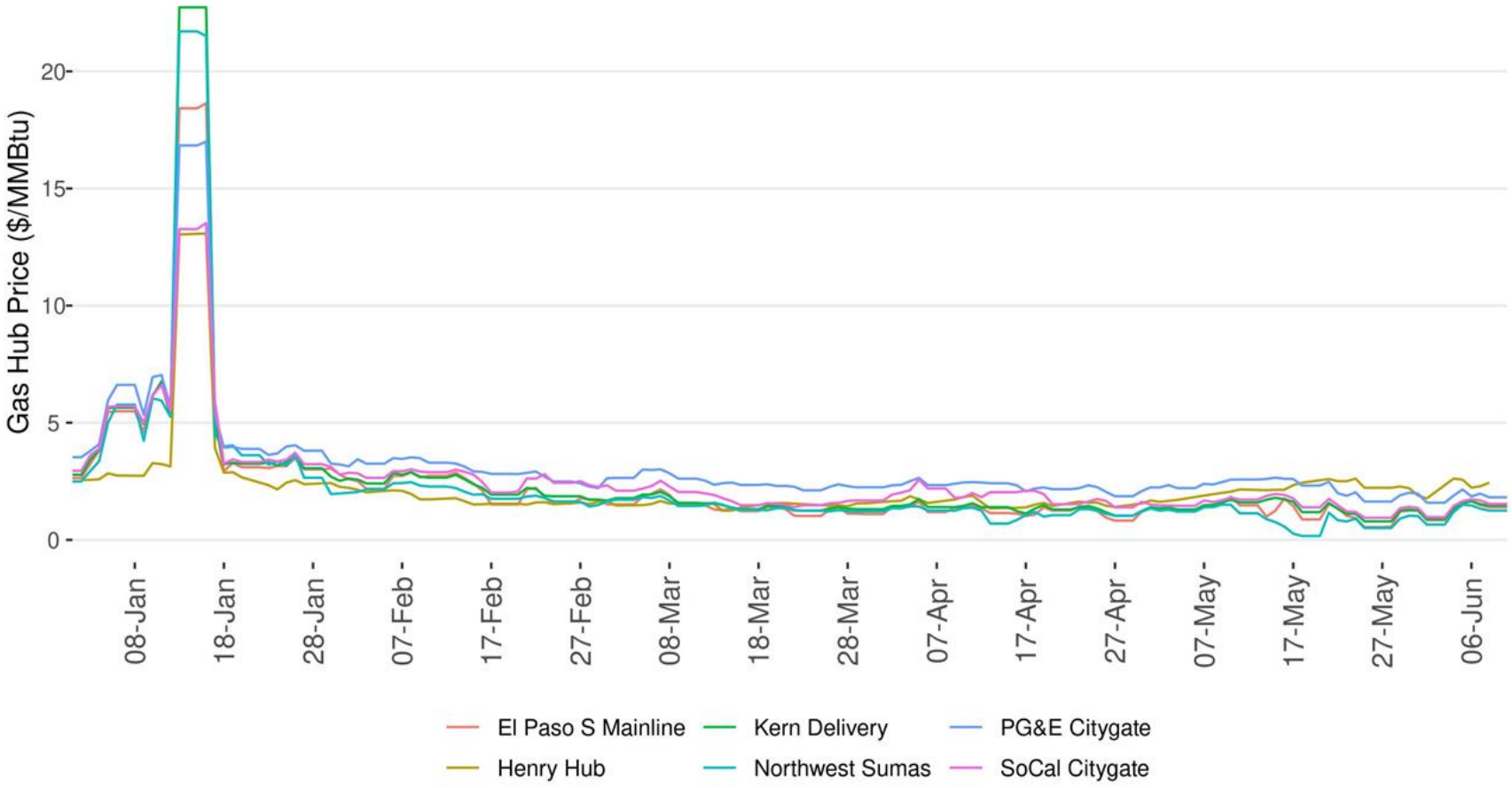
Gas and Power Index Prices
CAISO Market Costs

Katie Wikler
Market Performance and Advanced Analytics

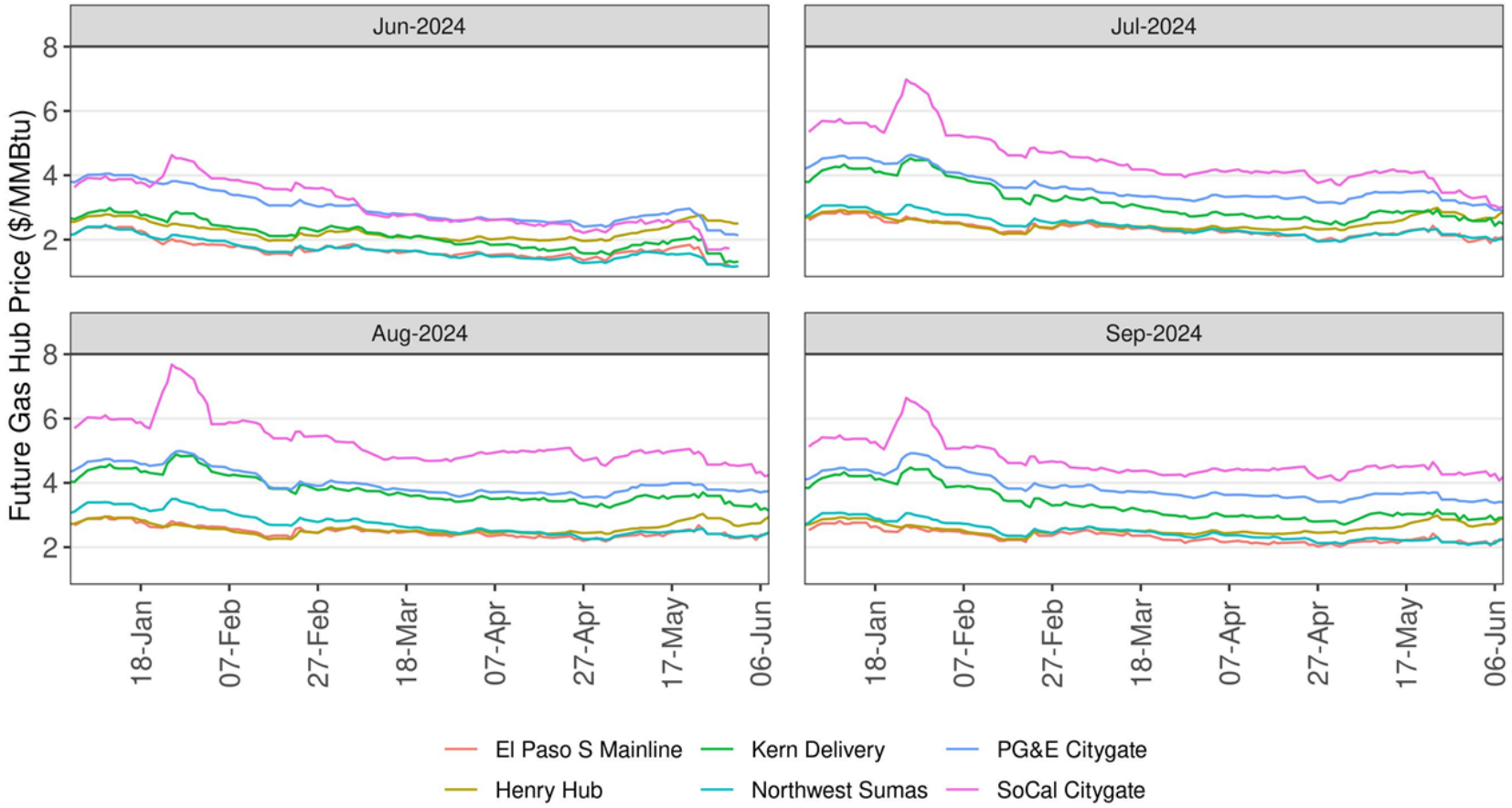
California next-day gas prices saw lower levels in 2024 trading compared to winter 2022 and 2023



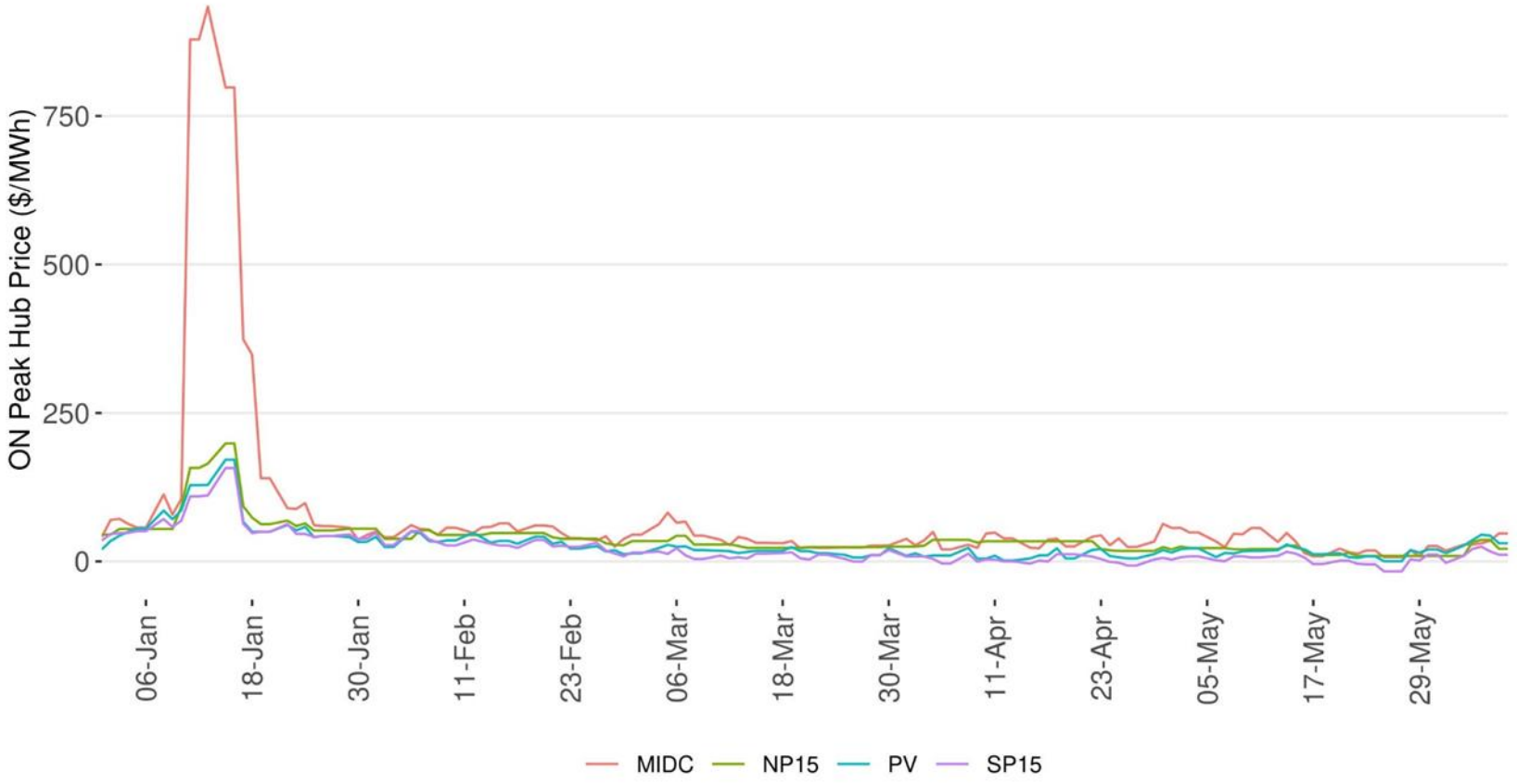
Western next-day gas prices reached elevated levels in mid-January 2024



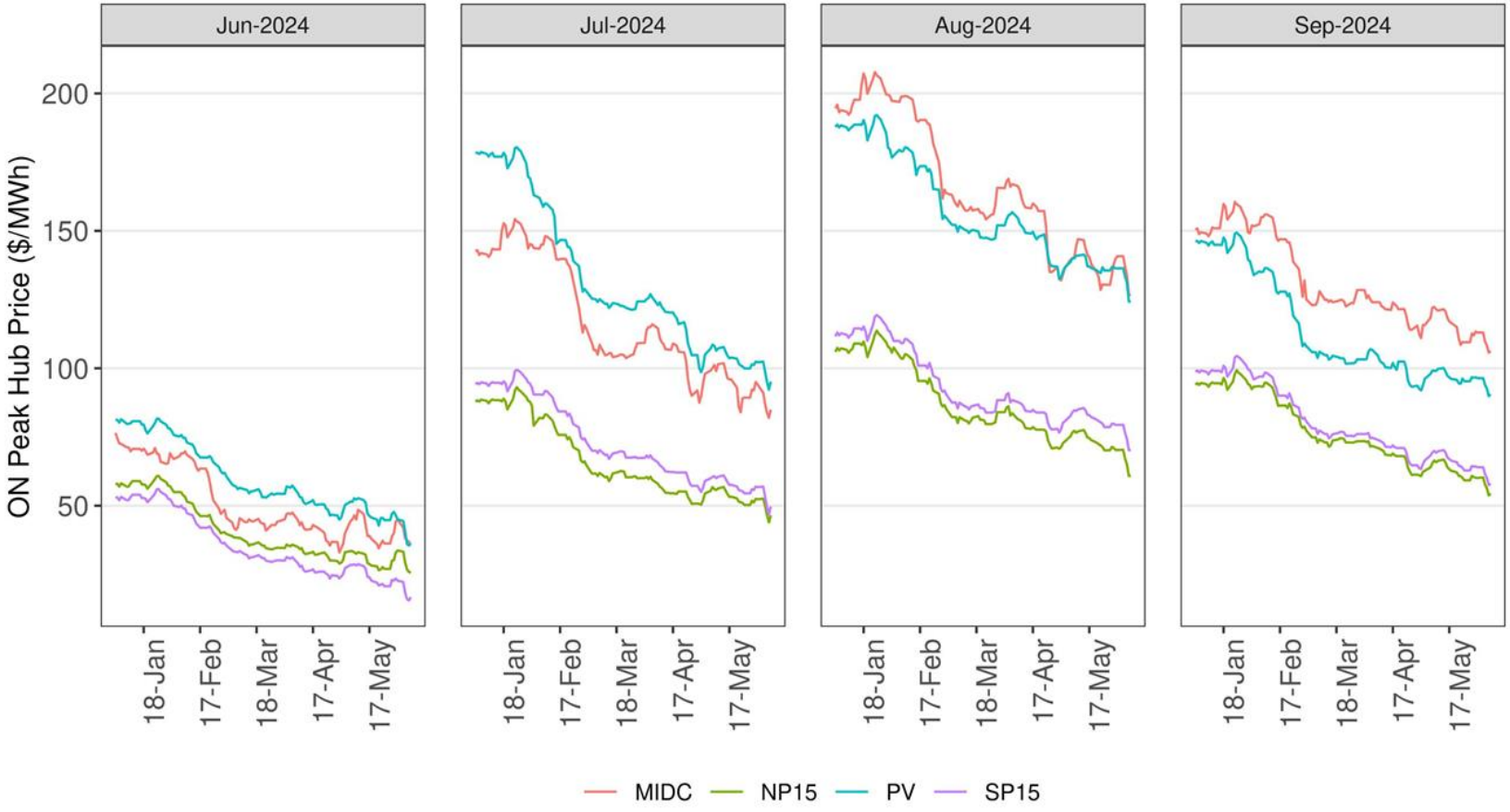
Future gas prices for summer 2024 indicates price stability but spiked in mid-January 2024, corresponding to the cold snap



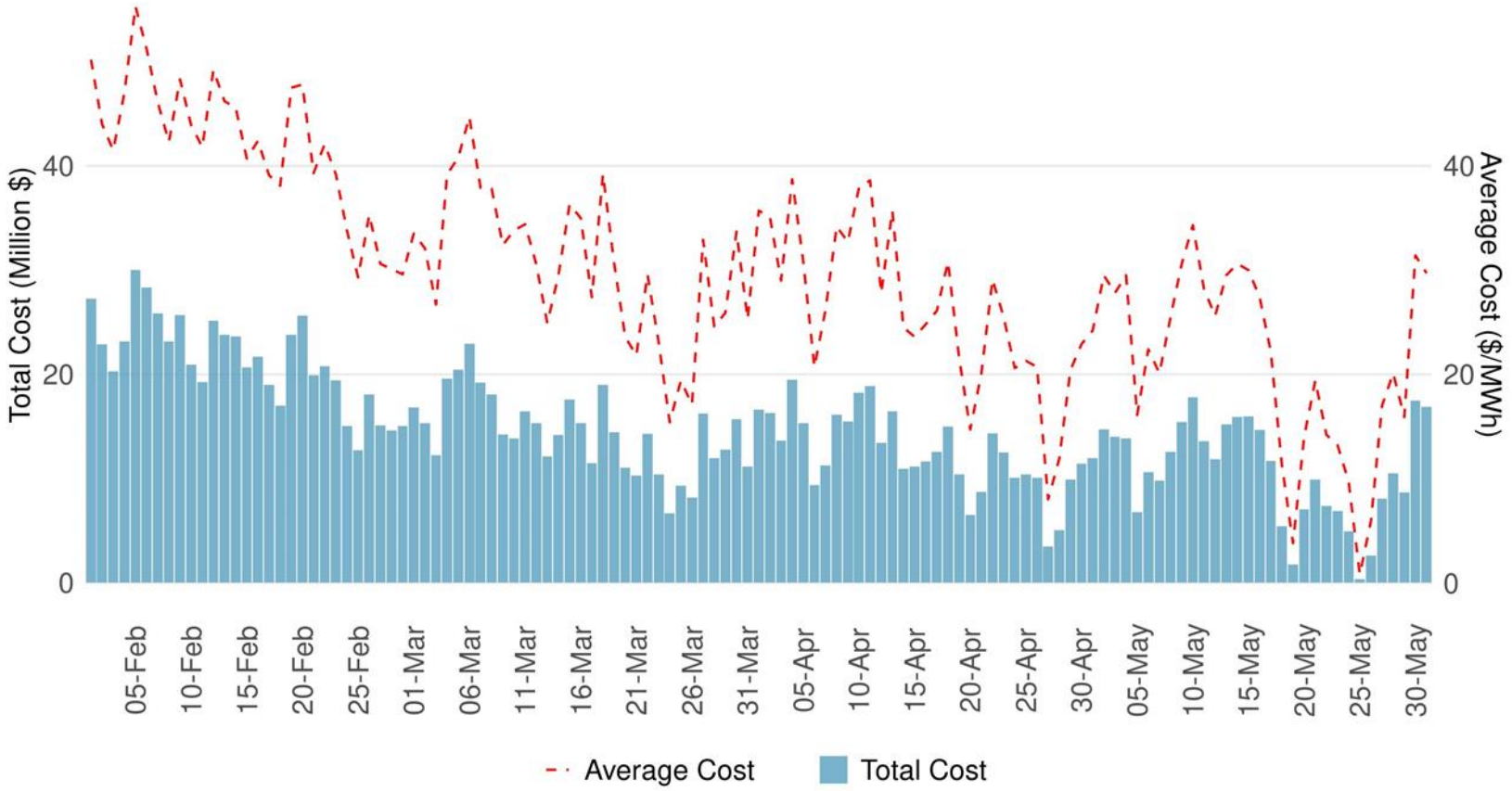
Next-day on-peak bilateral power prices were also responsive to the mid-January cold snap, spiking above $750/MWh at the Mid-C hub



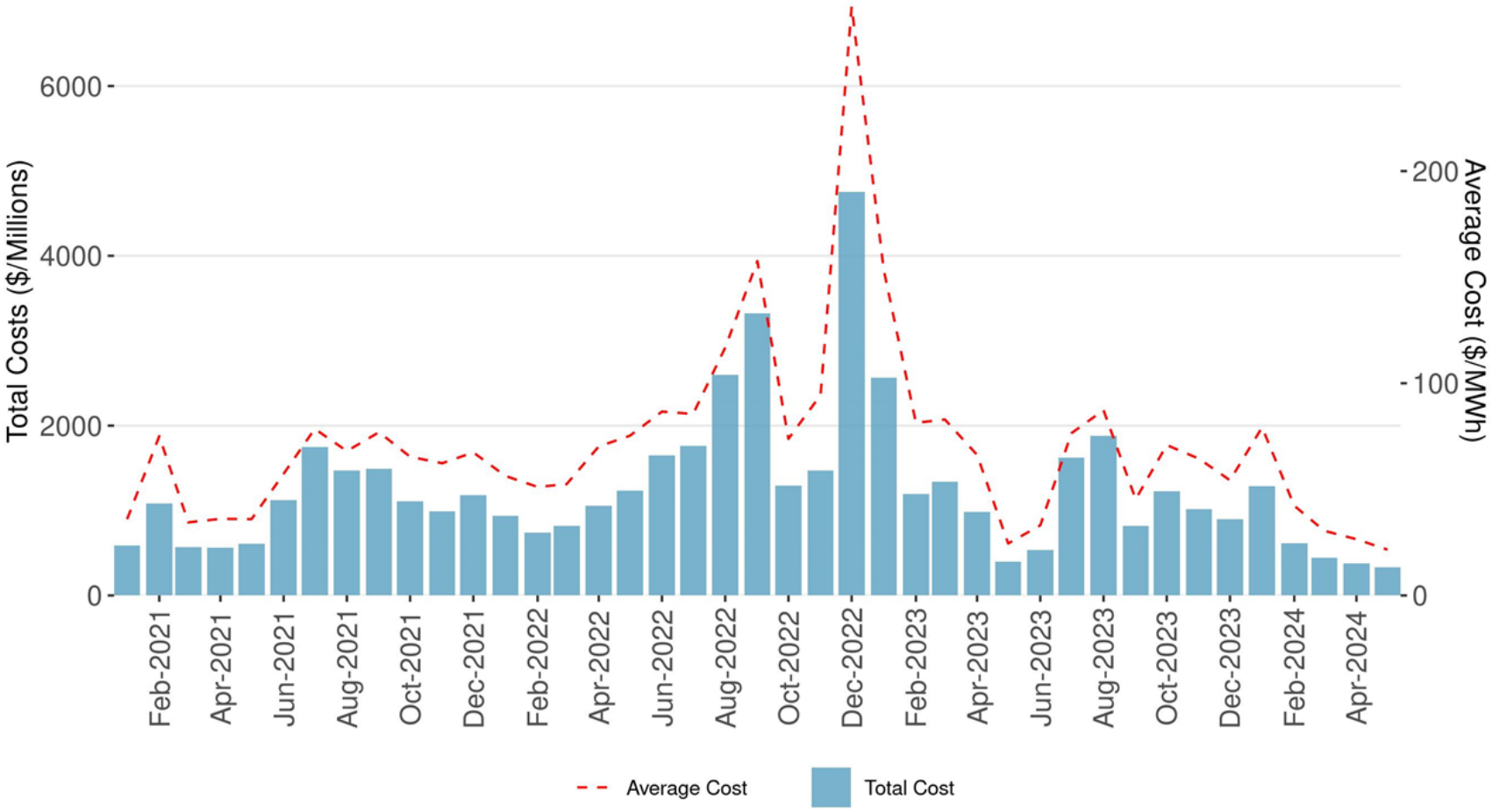
Future on-peak bilateral power prices for Summer 2024 are increasing for July and August, but traded fairly lower for other future months



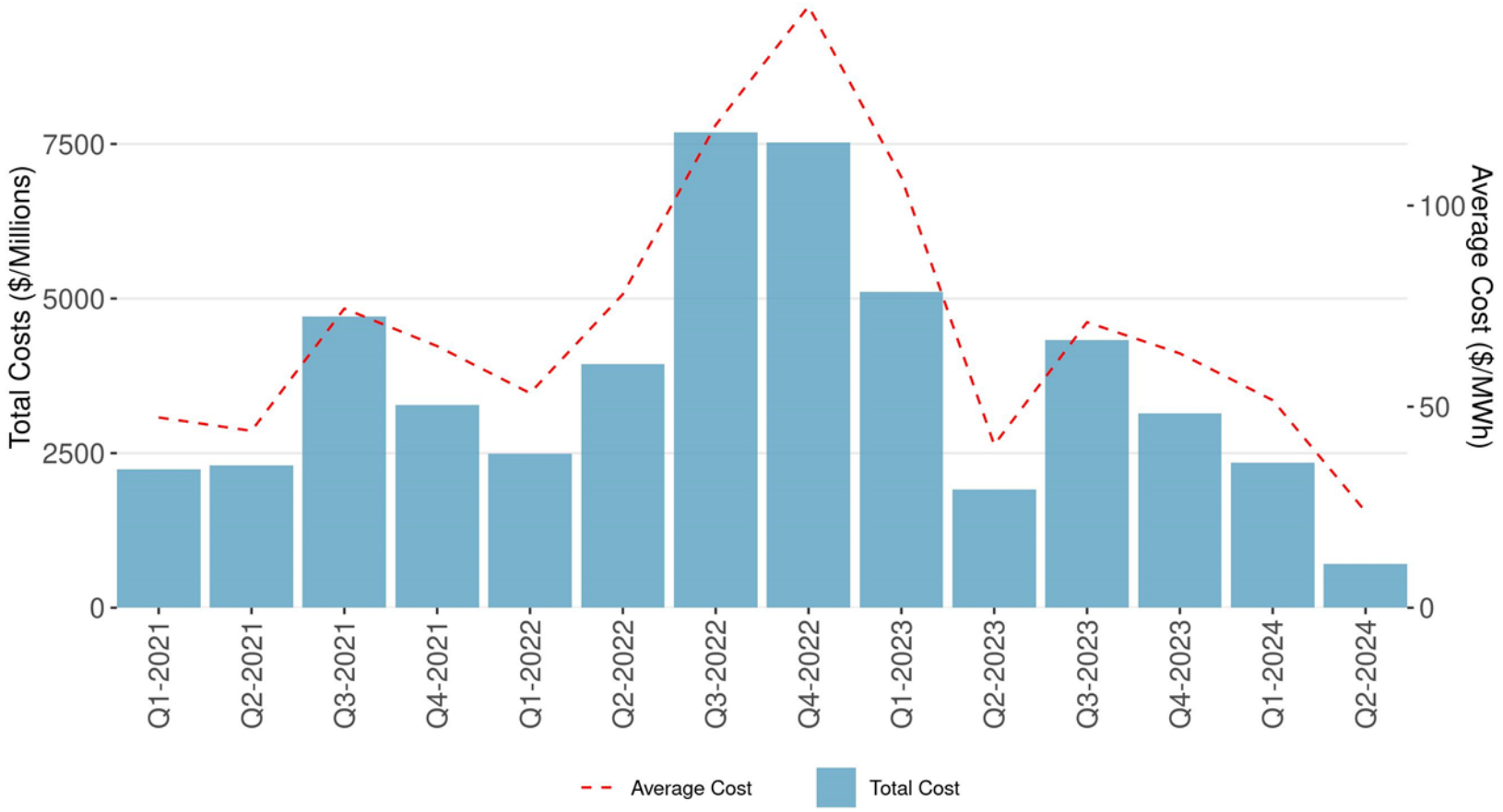
Daily market costs is higher during the winter and reaches the lowest on May 25th, 2024



Monthly totals for 2024 remained low compared to the previous year

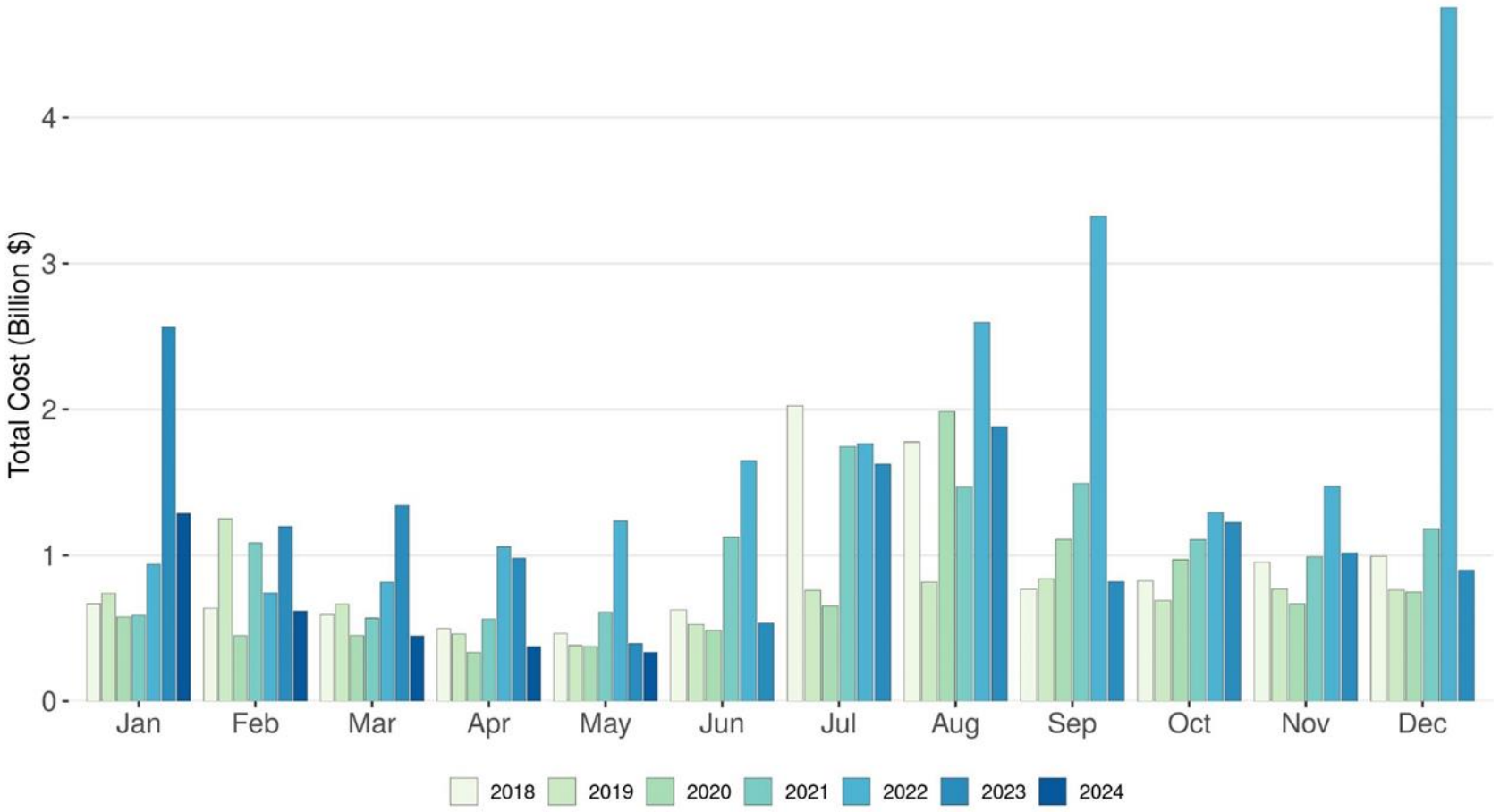


Q1 2024 total costs are $2.3B lower than Q1 2023 total costs.



Note: Q1 2024 includes data for January only

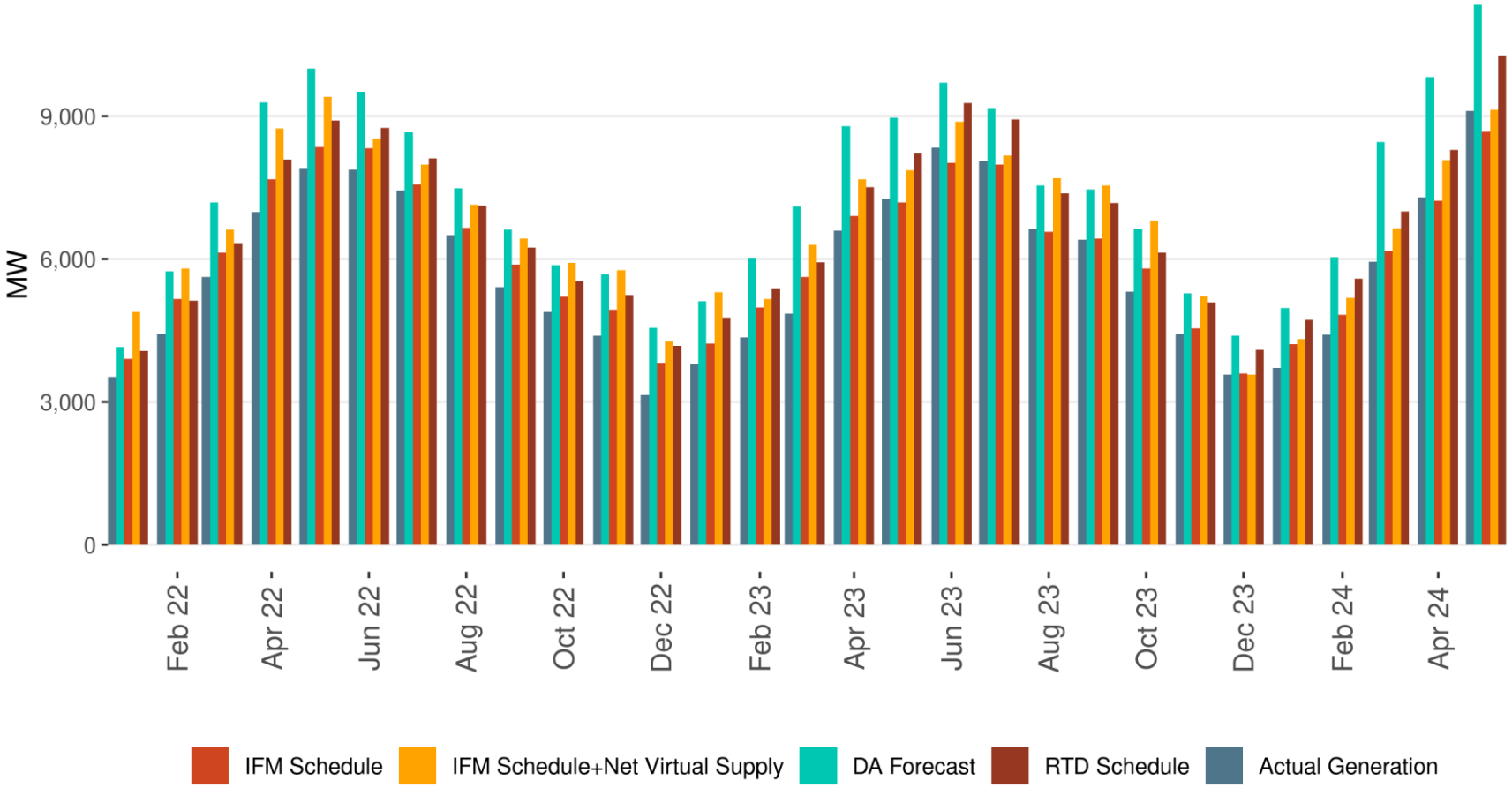
Monthly totals for first Quarter 2024 are lower than previous year.



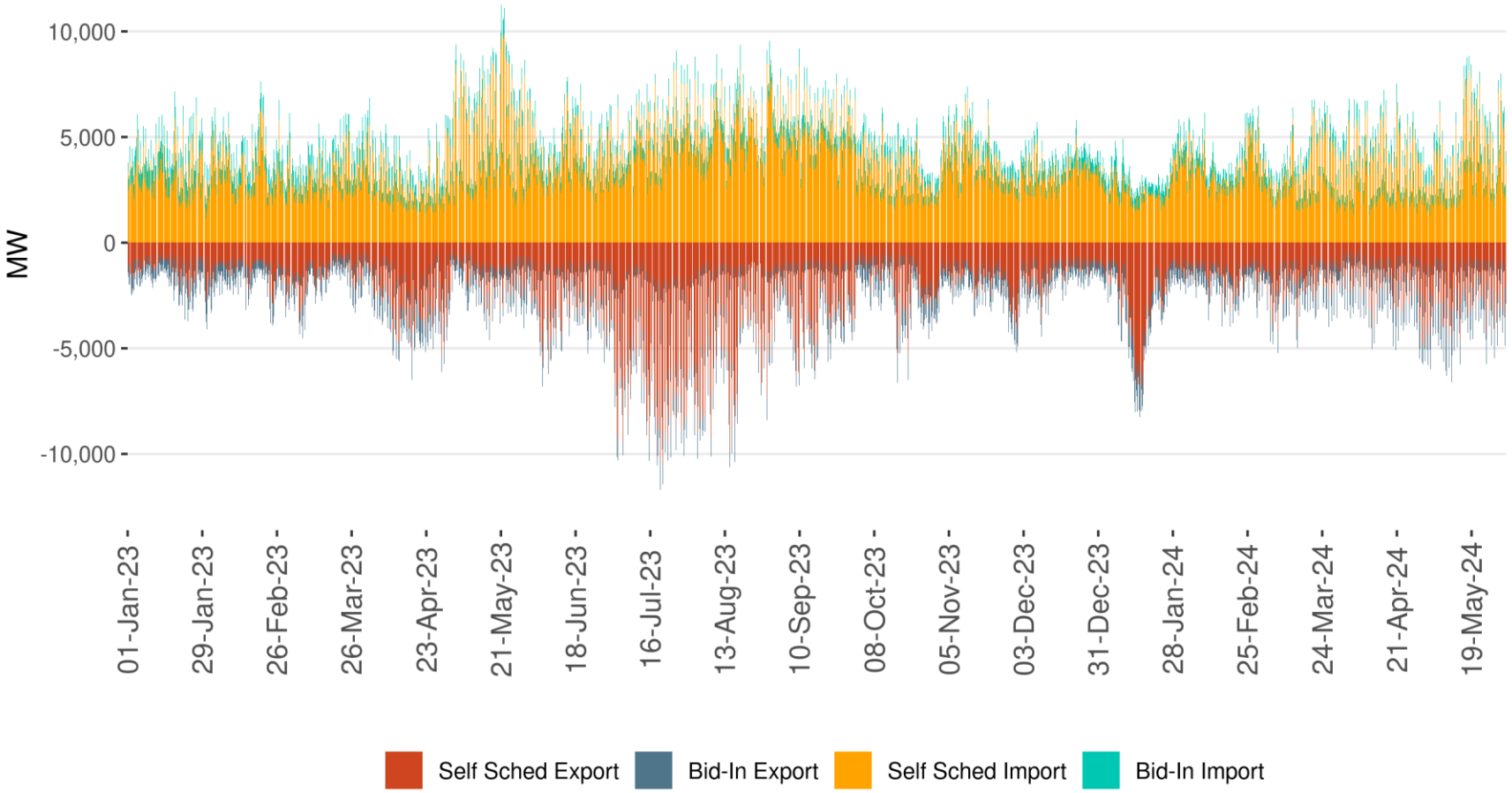
General Market Performance Metrics

Market Performance and Advanced Analytics Short Term Forecasting

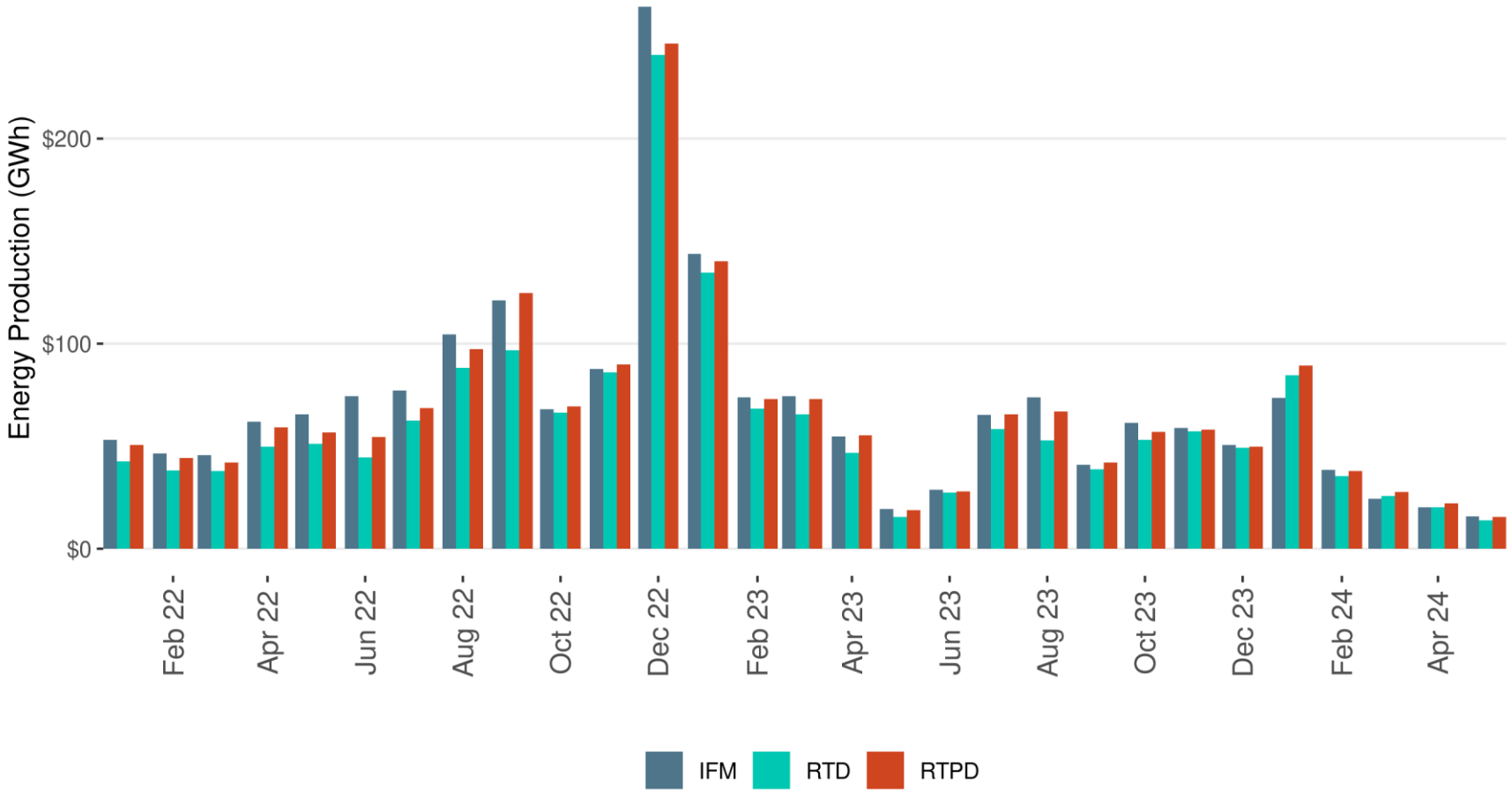
ISO total monthly VERS schedules and forecasts compared to actuals



Self scheduled exports increased in January

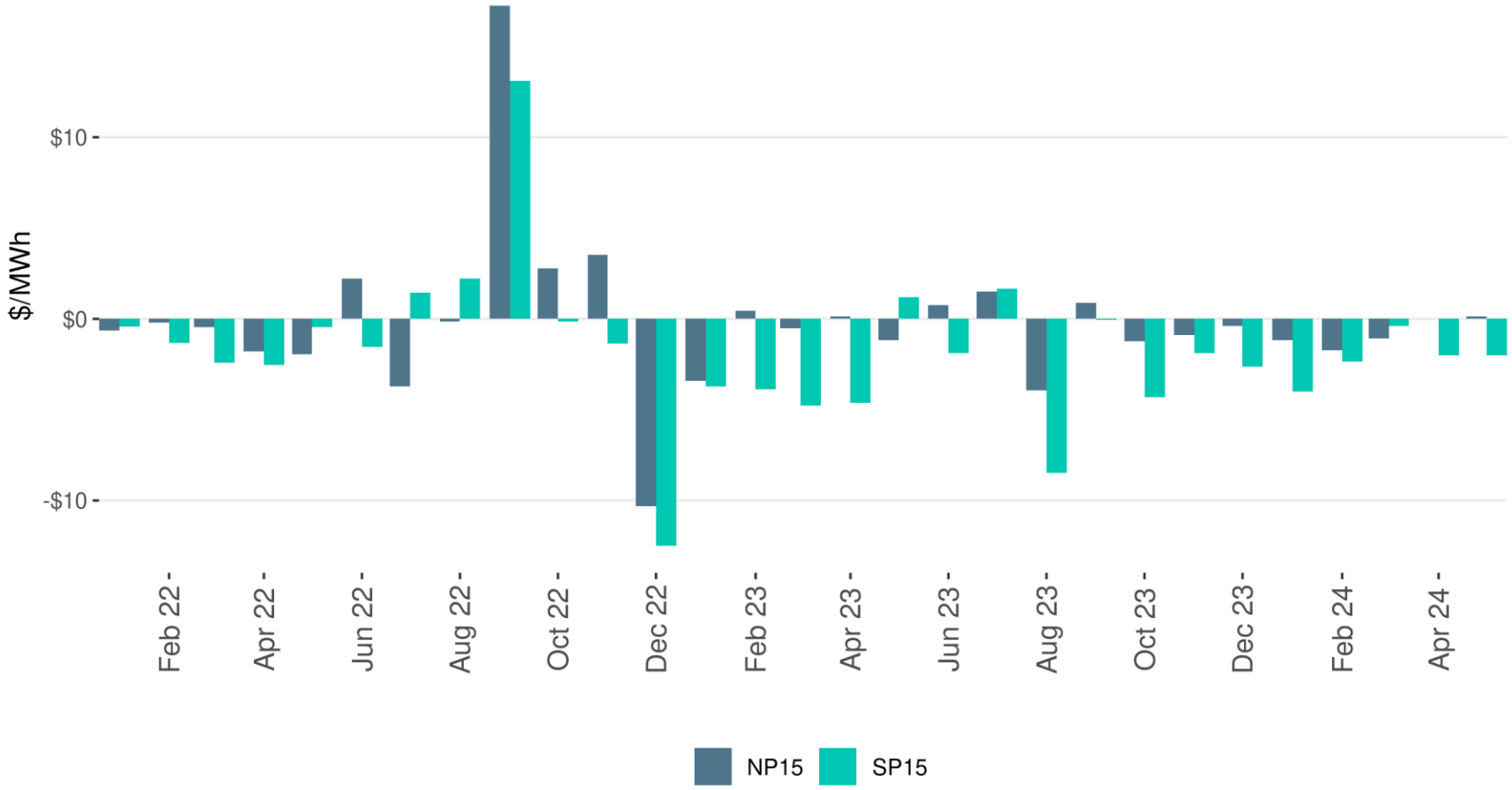


Prices increased in January due to high gas prices

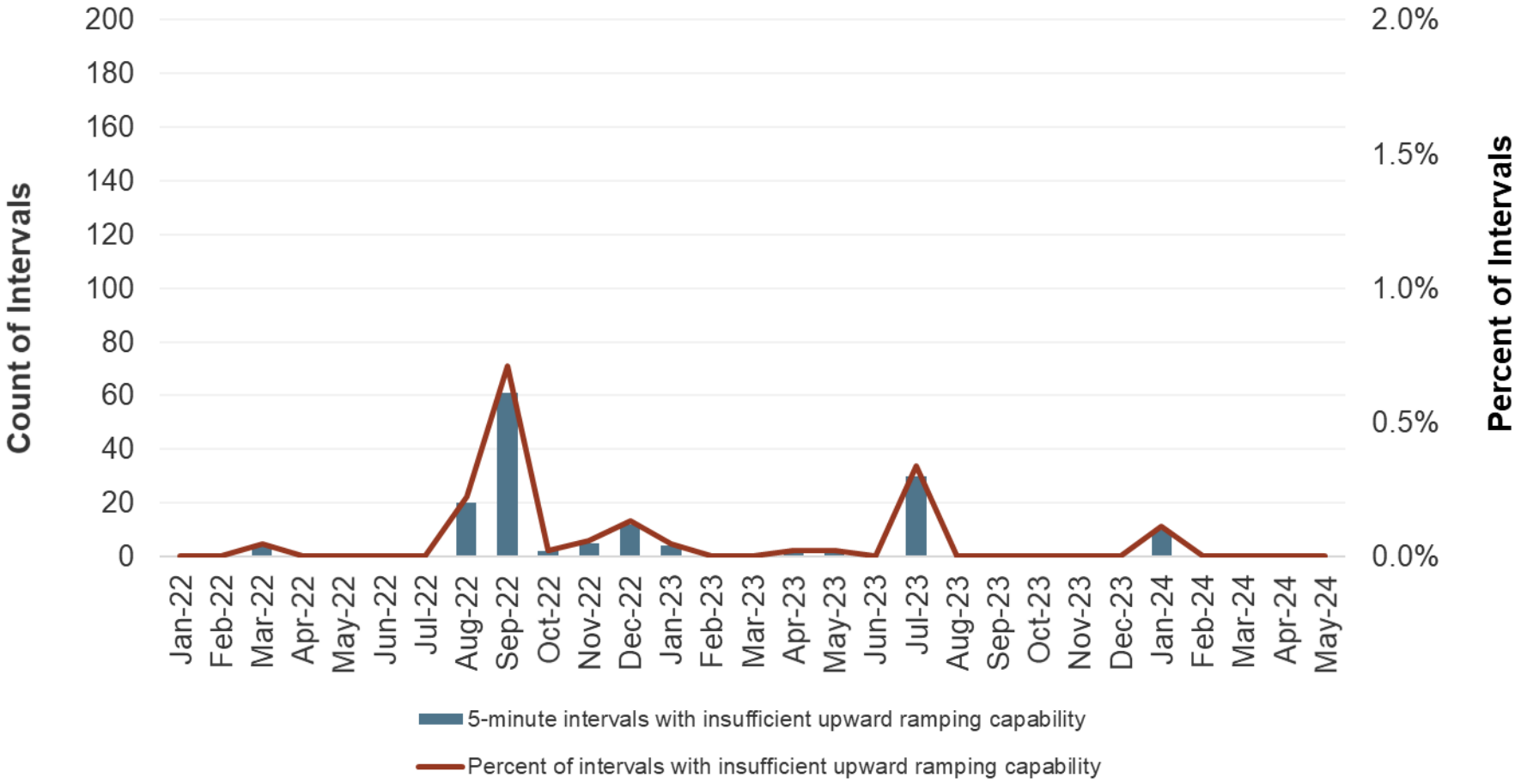


Note: Metric Based on System Marginal Energy Component (SMEC)

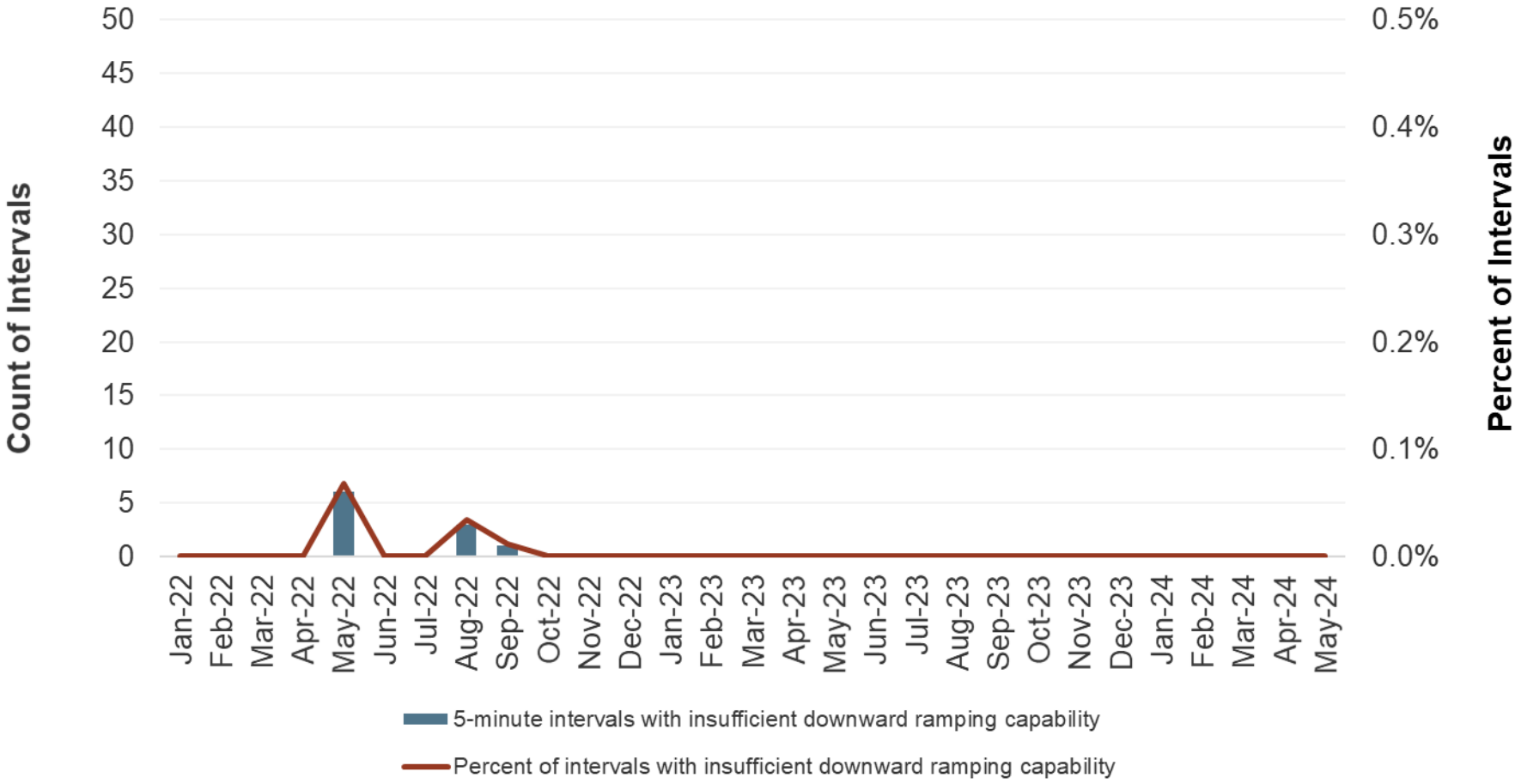
Real-time prices lower than day-ahead prices for both NP15 and SP15 since last October



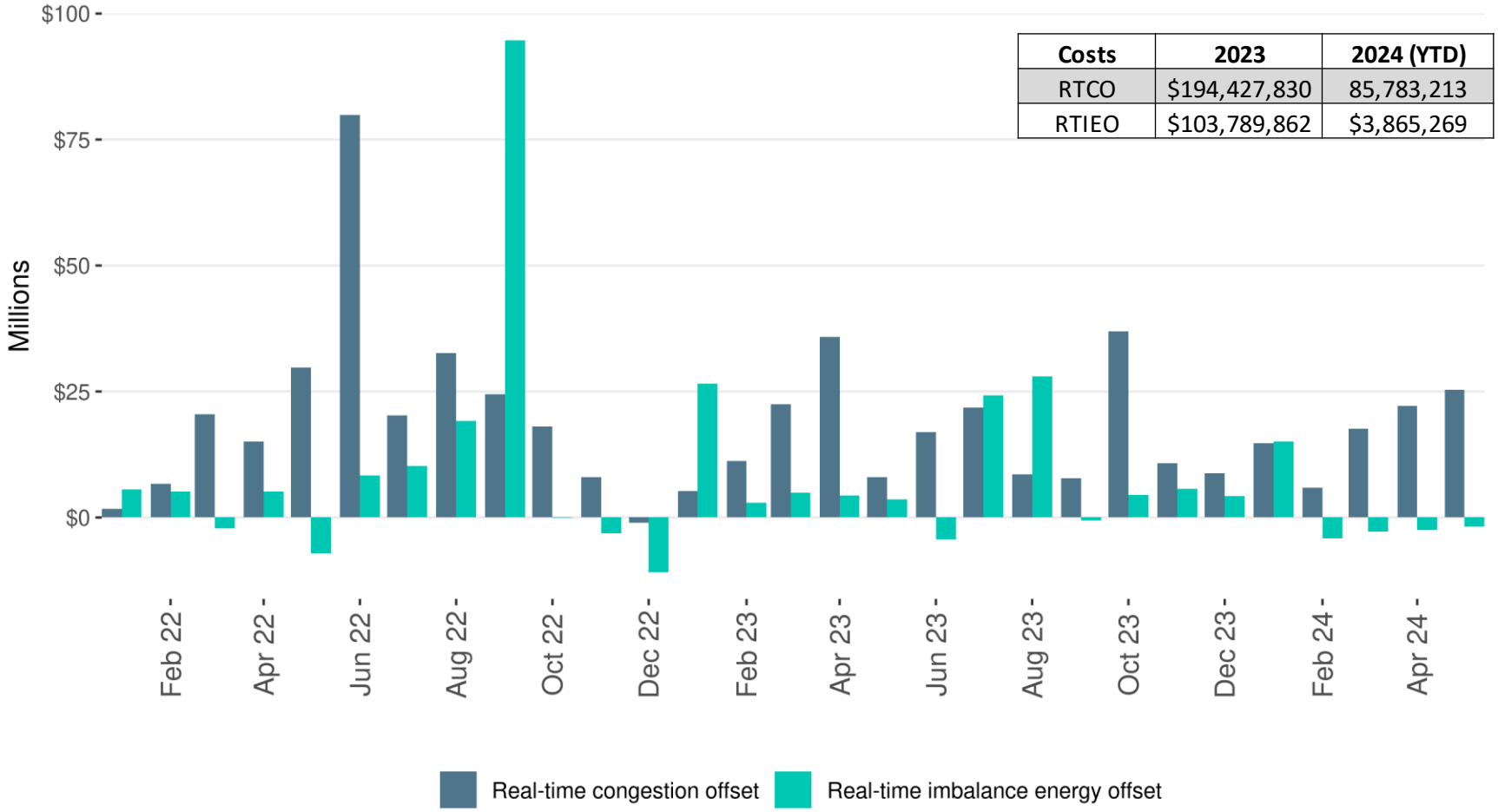
Insufficient upward ramping capacity in ISO real-time remained at low levels



Insufficient downward ramping capacity in real-time stayed low

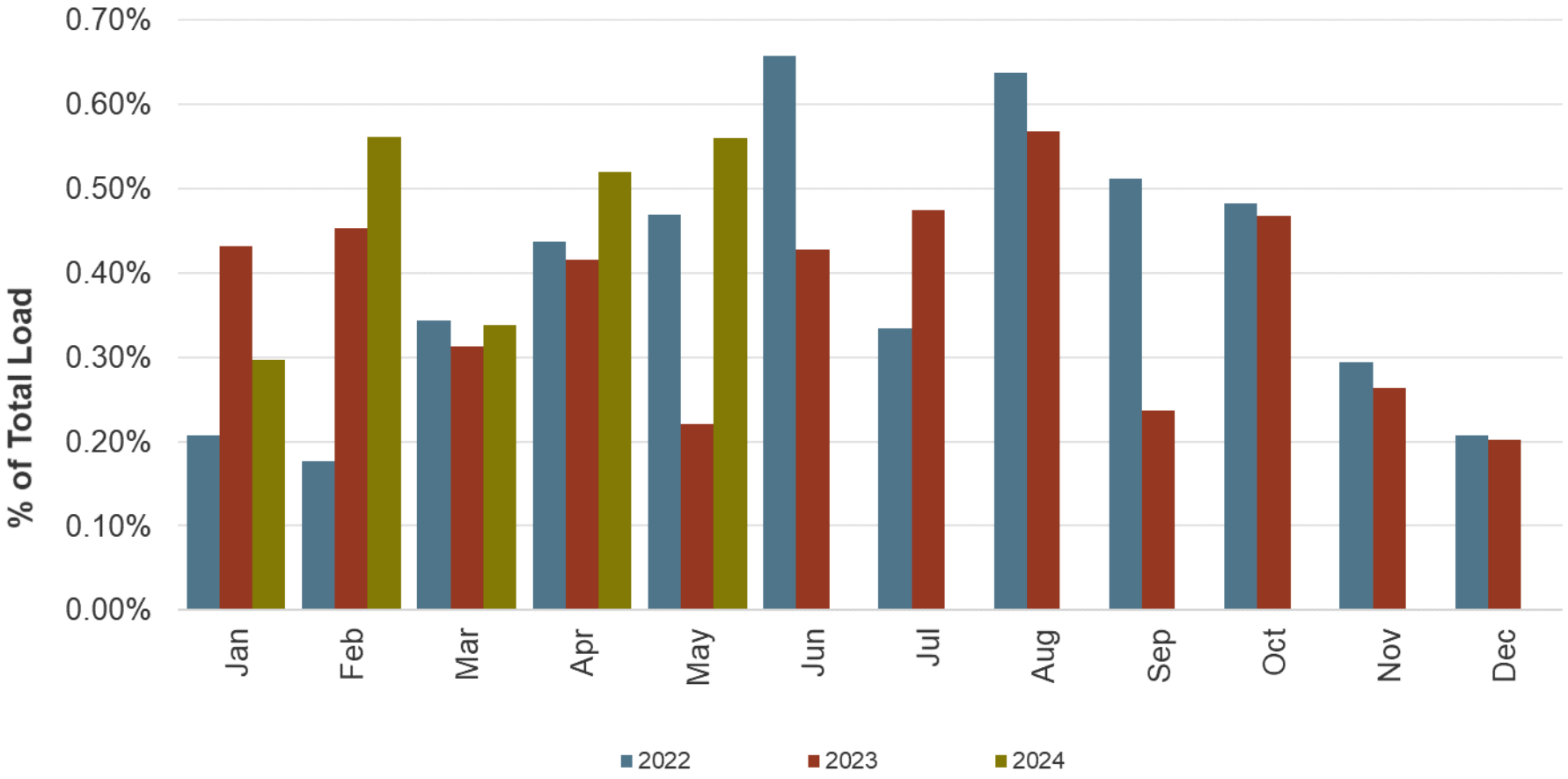


ISO area real-time congestion rose in the last 3 months since January

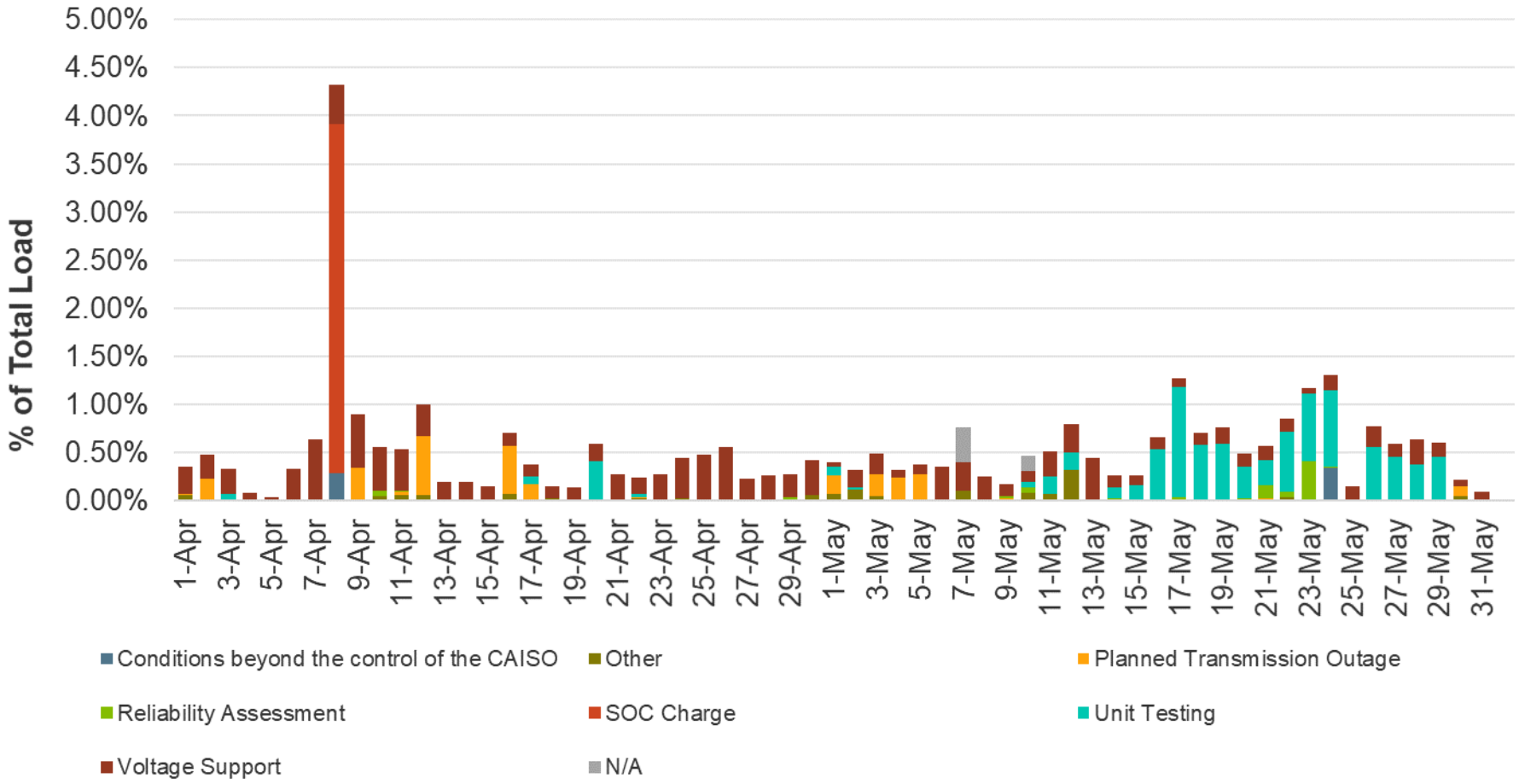


Costs	2023	2024 (YTD)
RTCO	$194,427,830	85,783,213
RTIEO	$103,789,862	$3,865,269

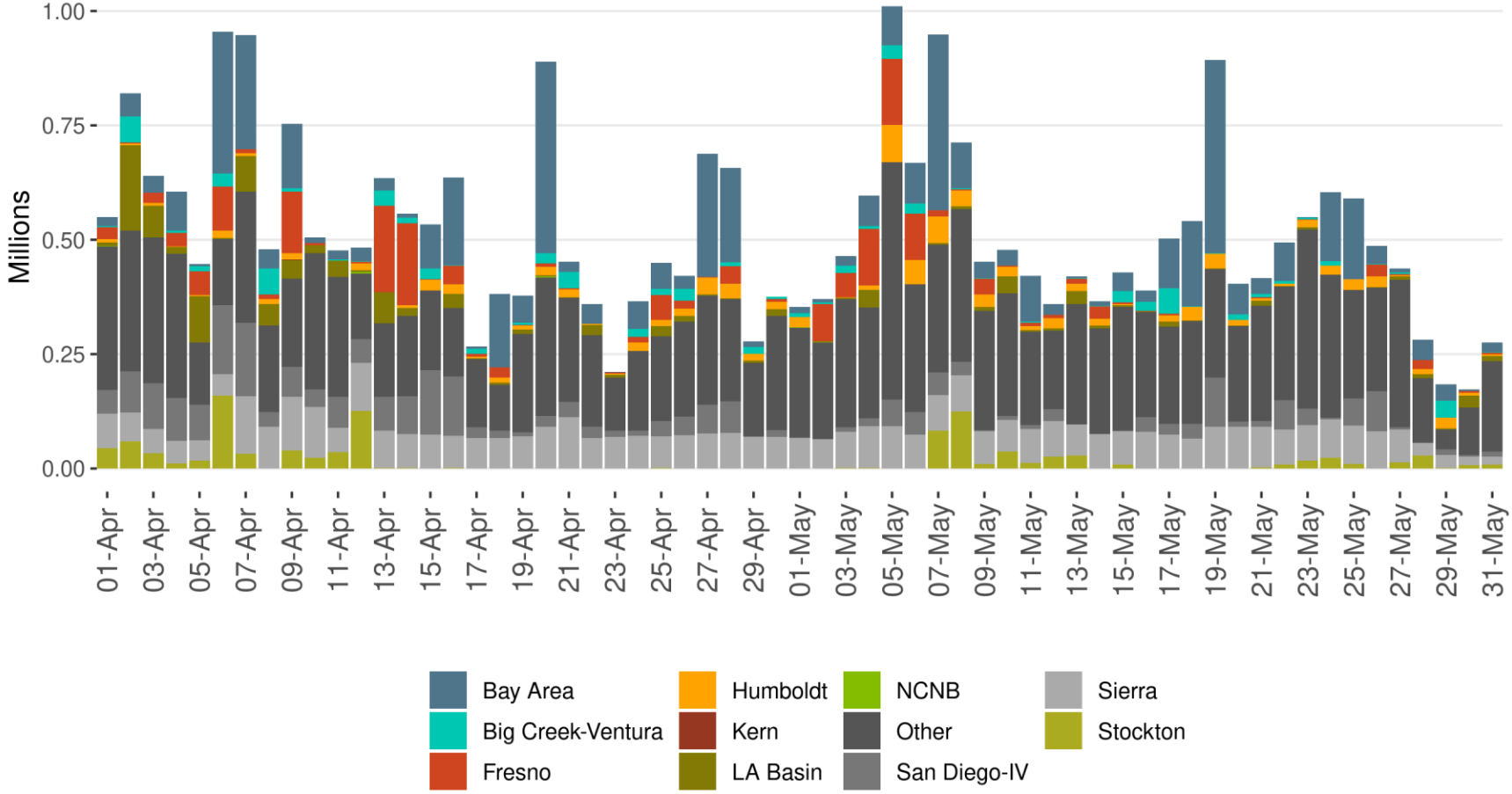
Exceptional dispatch volume in the ISO area are at low levels



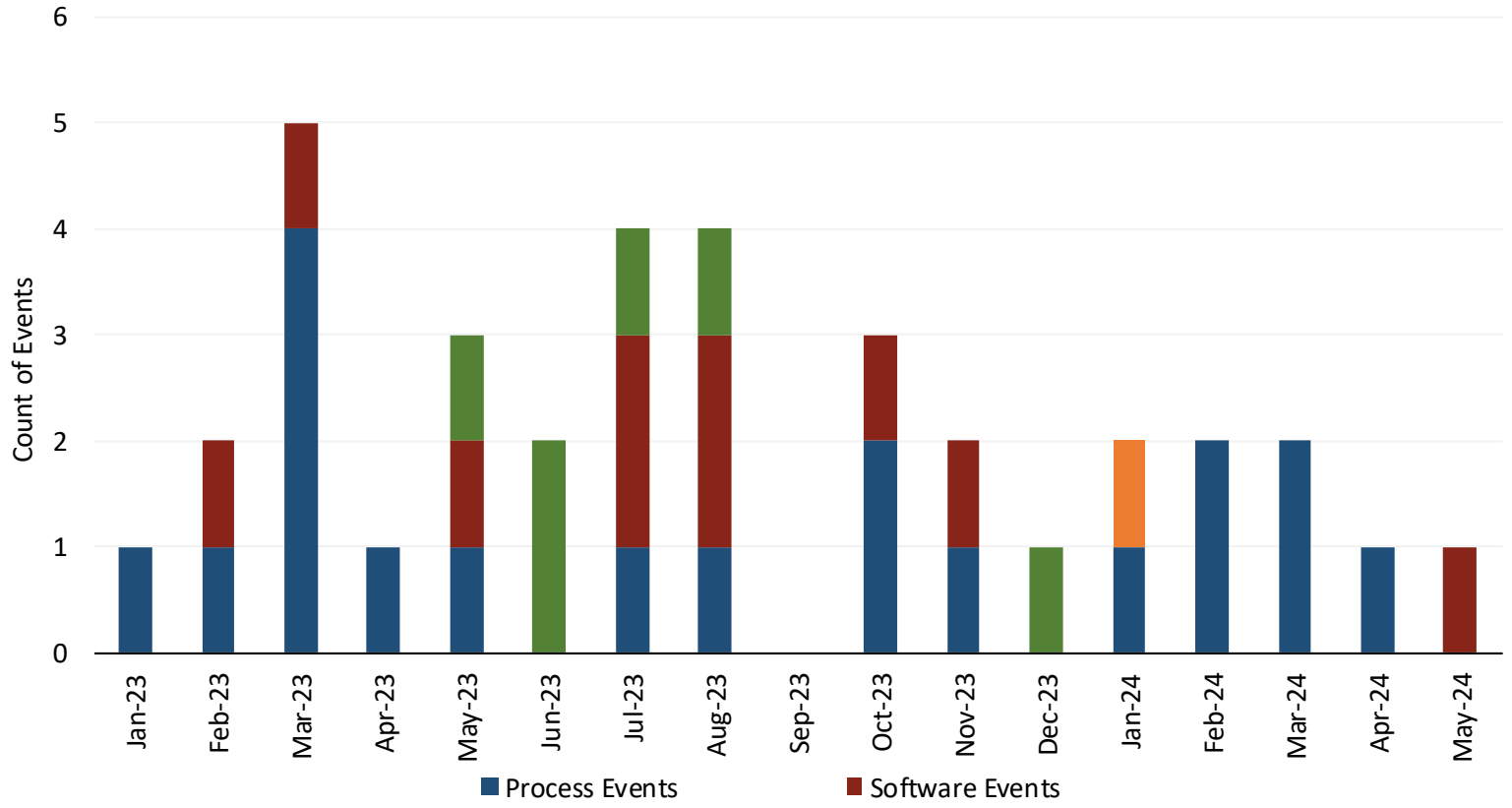
Exceptional dispatches volume driven by a variety of reasons



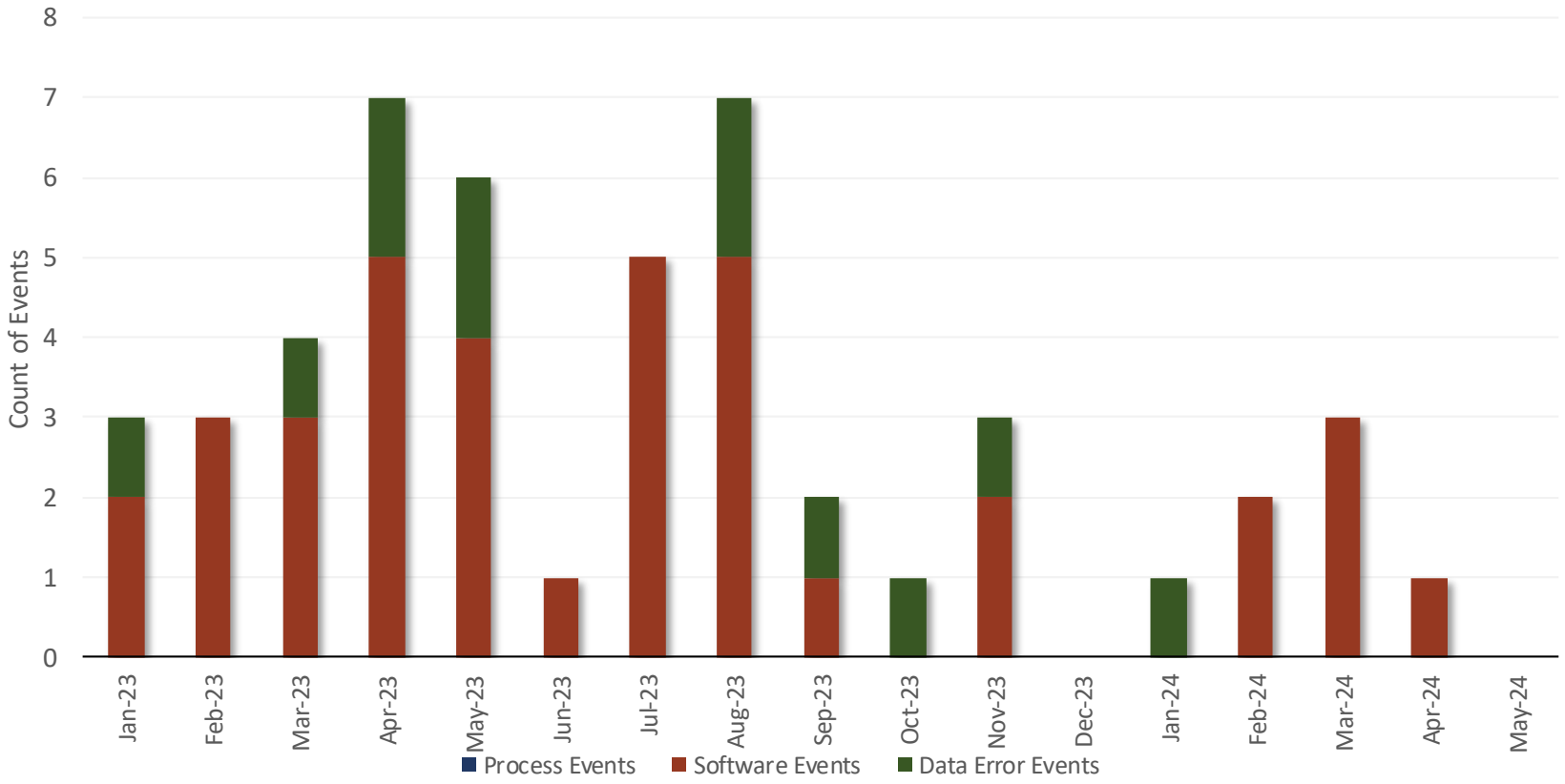
Bid cost recovery (BCR) by Local Capacity Requirement area



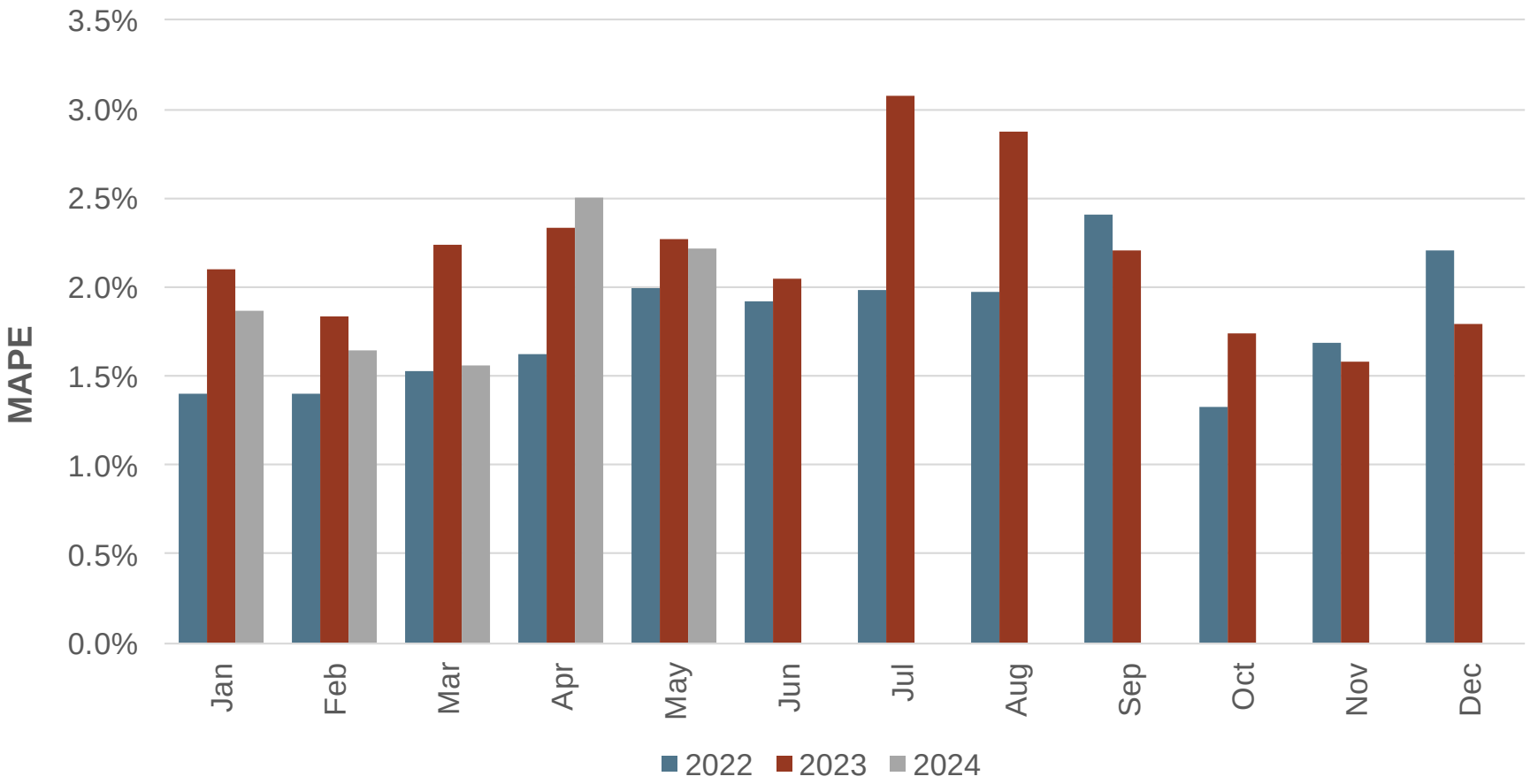
CAISO price correction events decreased in April and May



EIM-related price corrections decreased in April and May



Day-ahead load forecast

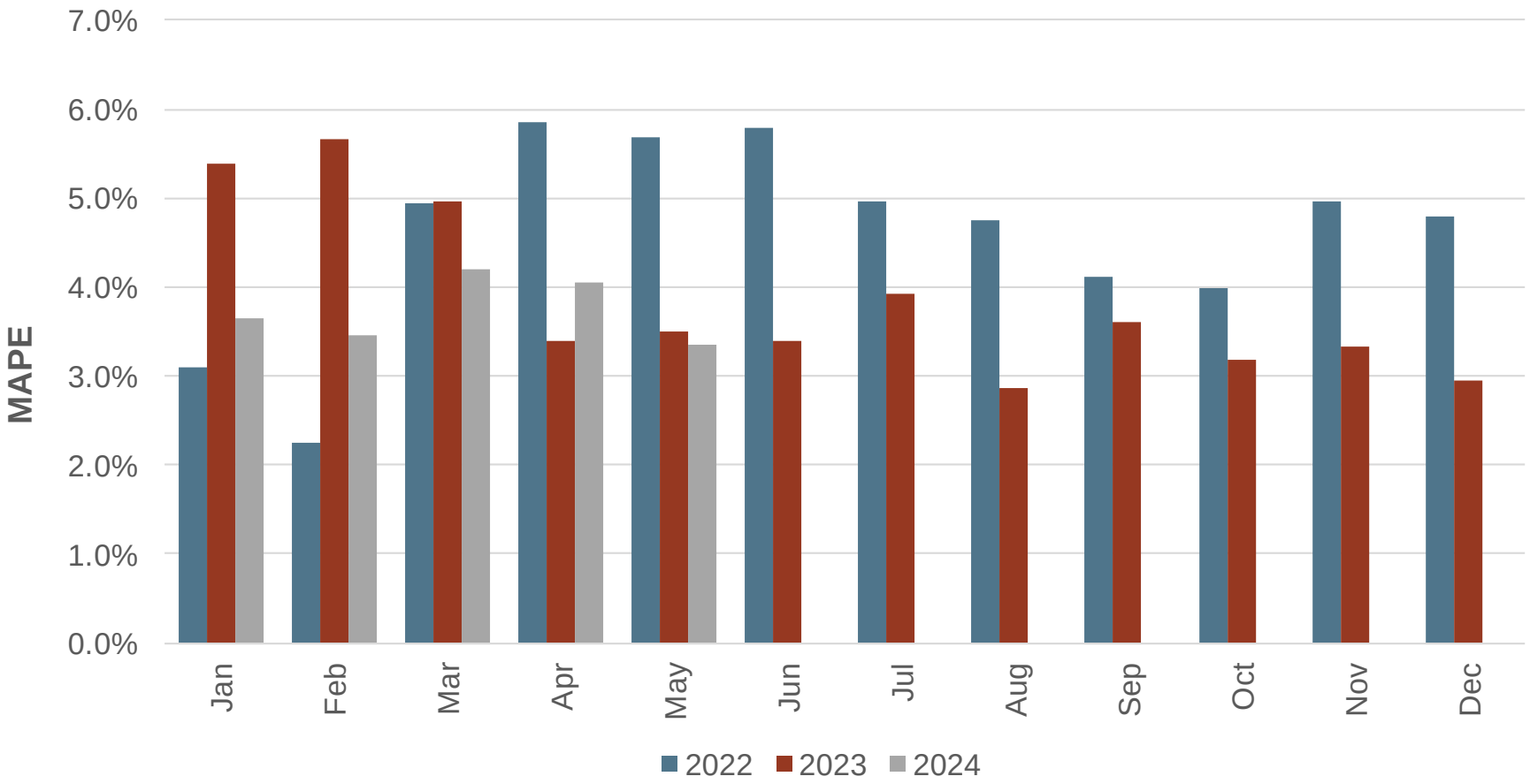


*MAPE = abs(Forecast – Actual)/Actual

Day-ahead peak forecast

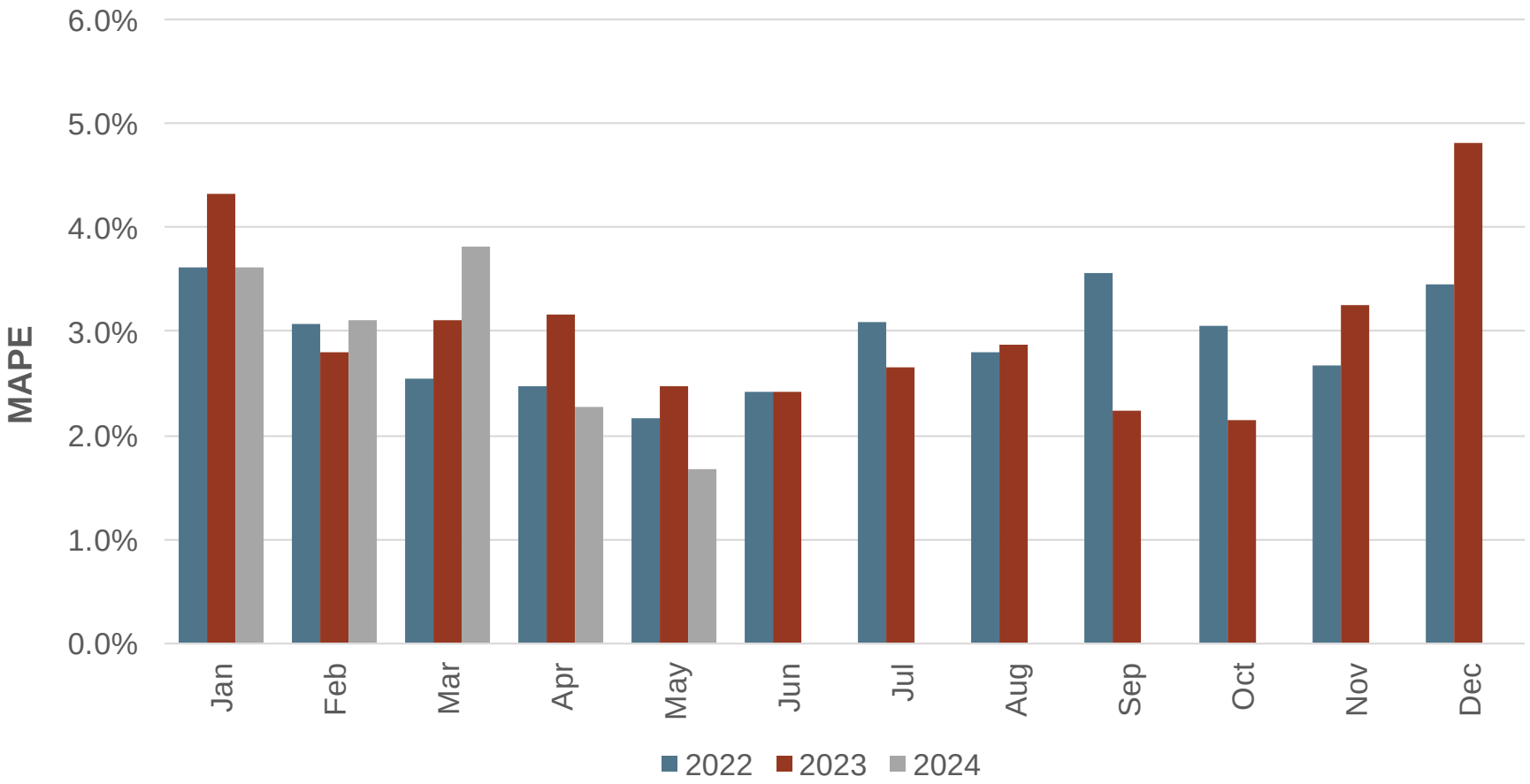
*MAPE = abs(Forecast – Actual)/Actual

Day-ahead wind forecast



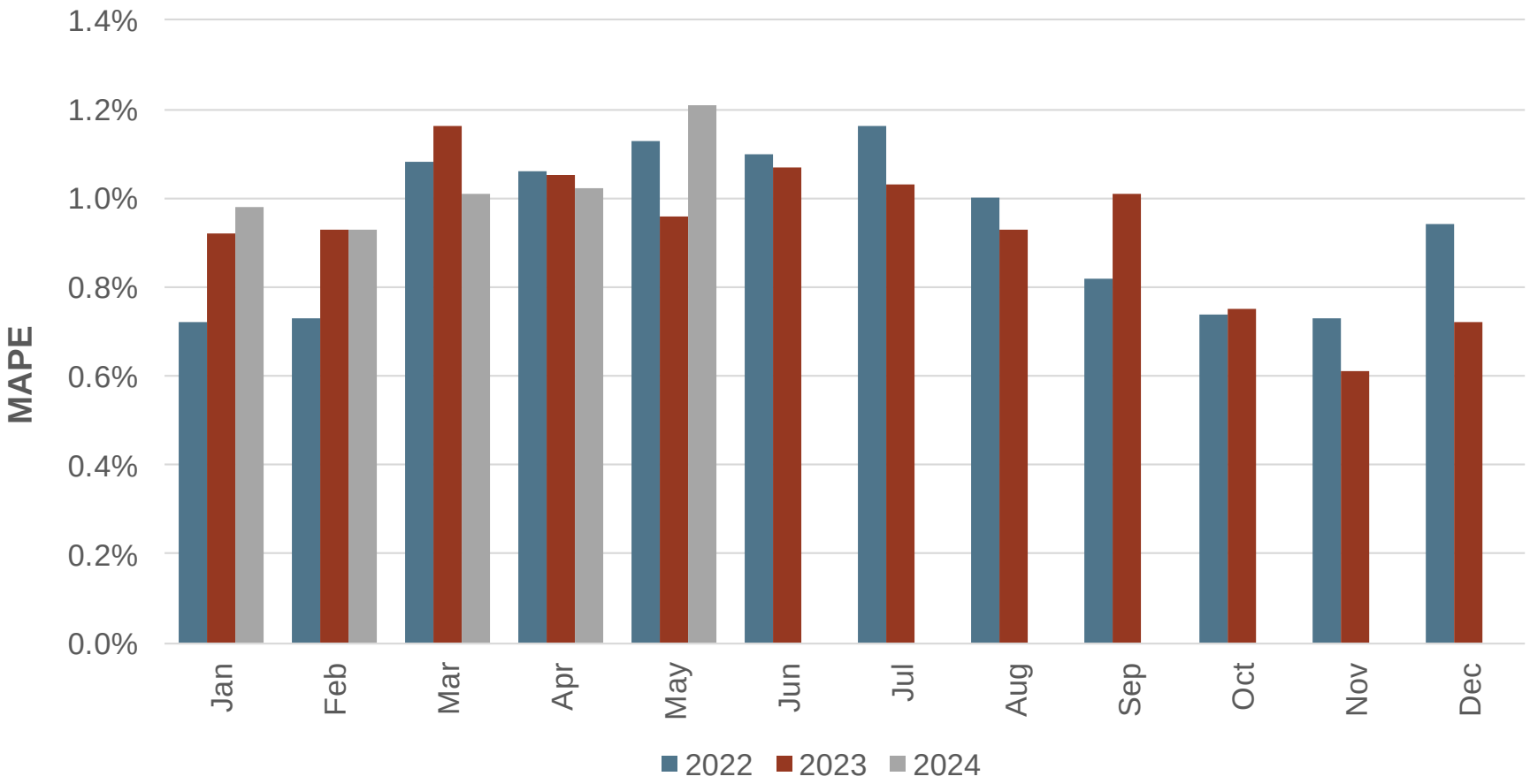
*MAPE = abs(Forecast – Actual)/Actual

Day-ahead solar forecast



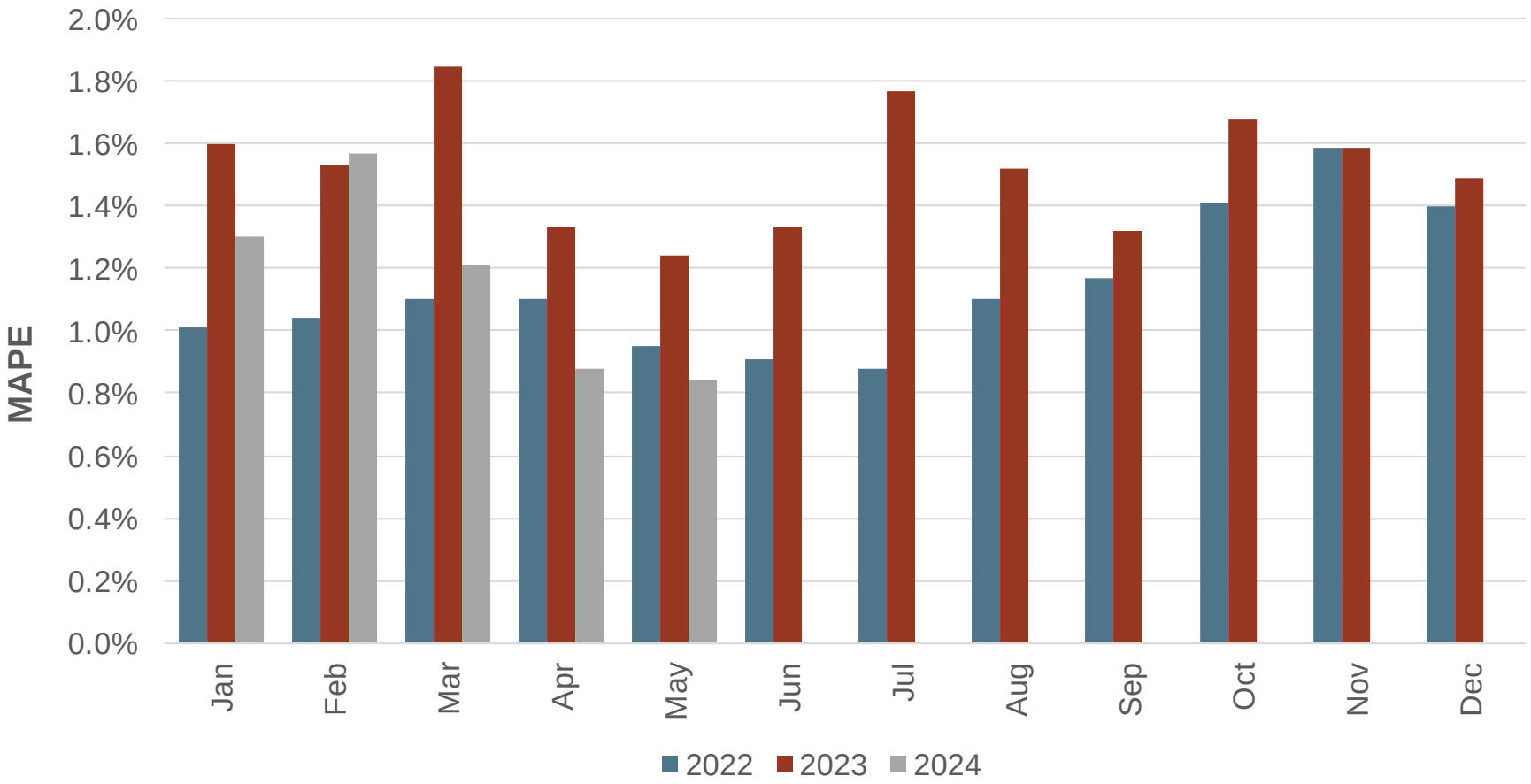
*MAPE = abs(Forecast – Actual)/Actual
**MAPE only calculated for intervals where Forecast > 0

Real-time wind forecast



*MAPE = abs(Forecast – Actual)/Actual

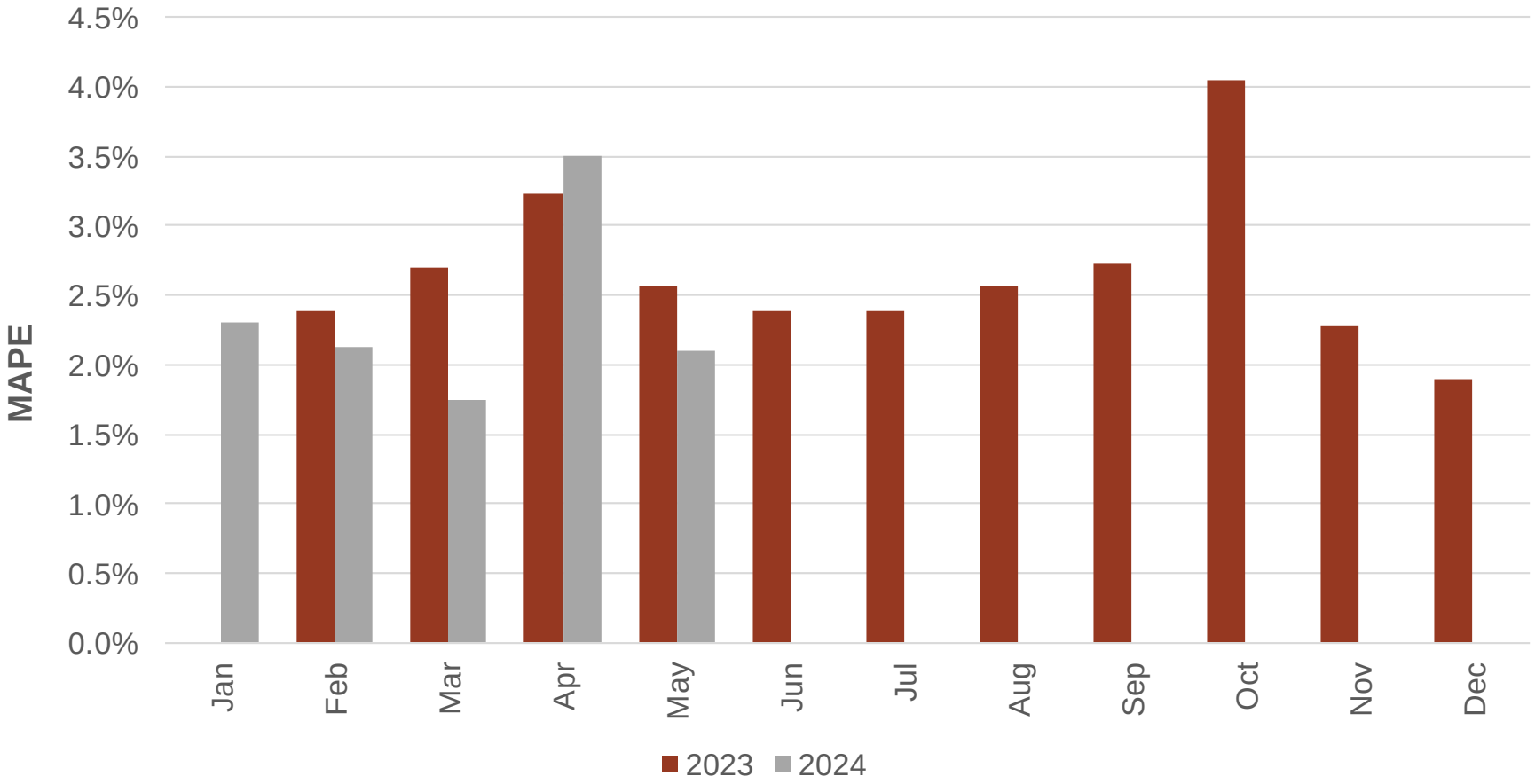
Real-time solar forecast



*MAPE = abs(Forecast – Actual)/Actual
**MAPE only calculated for intervals where Forecast > 0

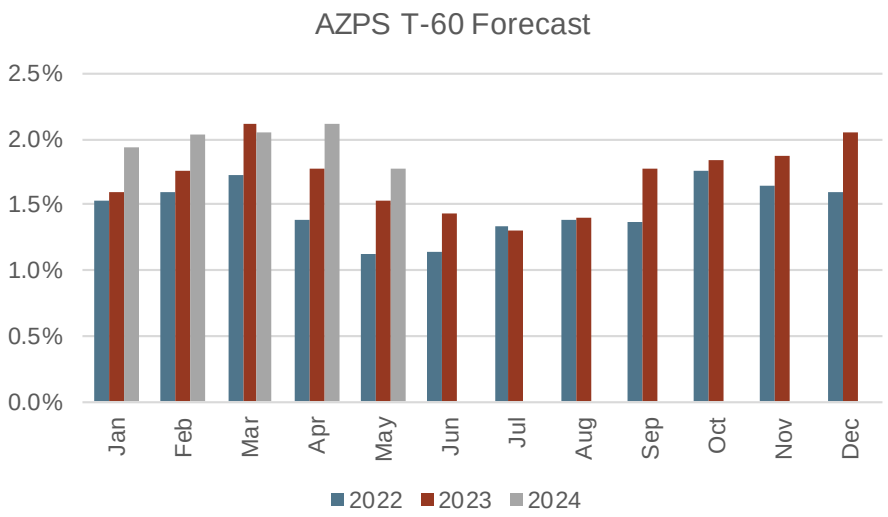
Real Time Solar Hybrid Performance

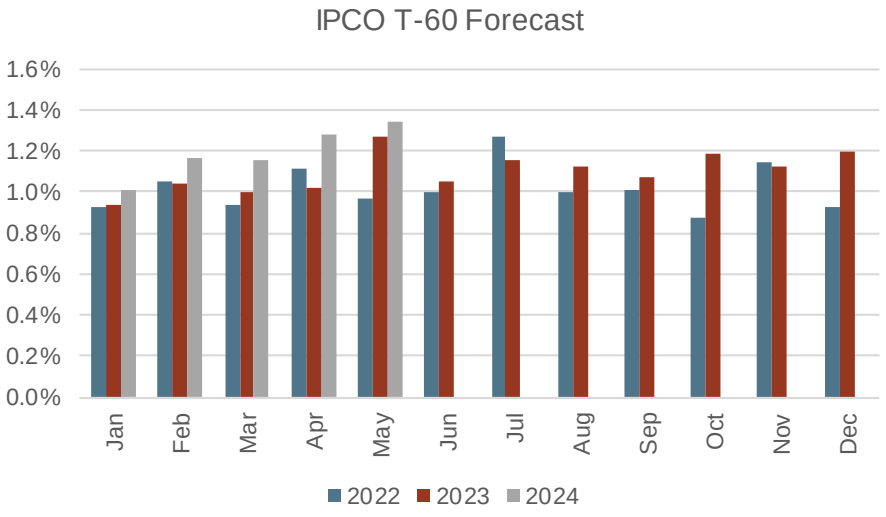
*Comparison of DOT to MW Production

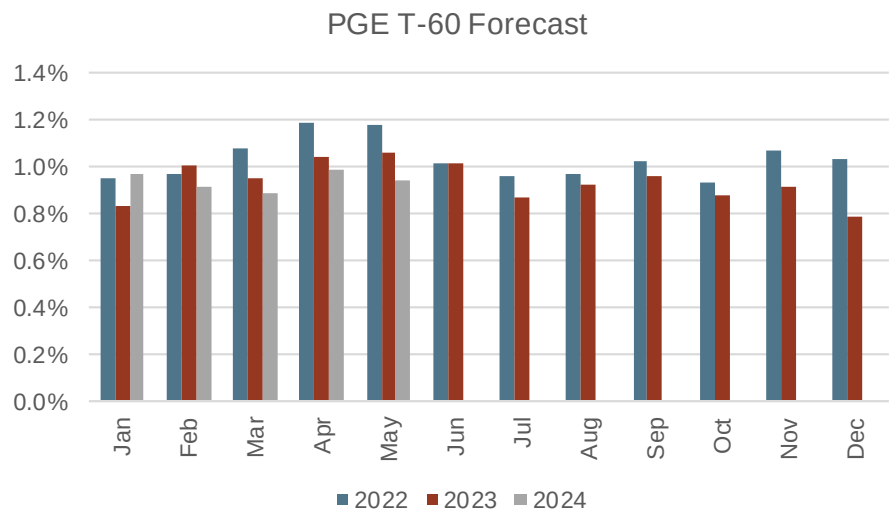


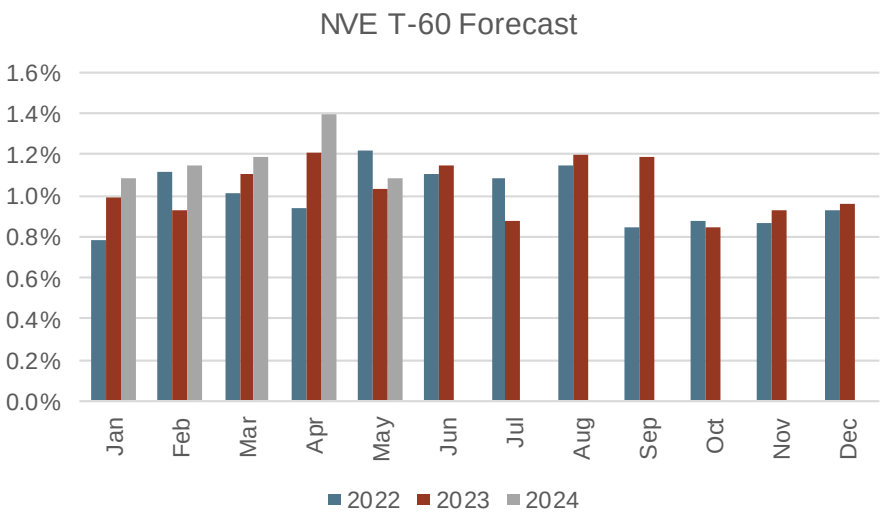
*MAPE = abs(DOT – Actual)/Capacity

EIM T-60 forecast



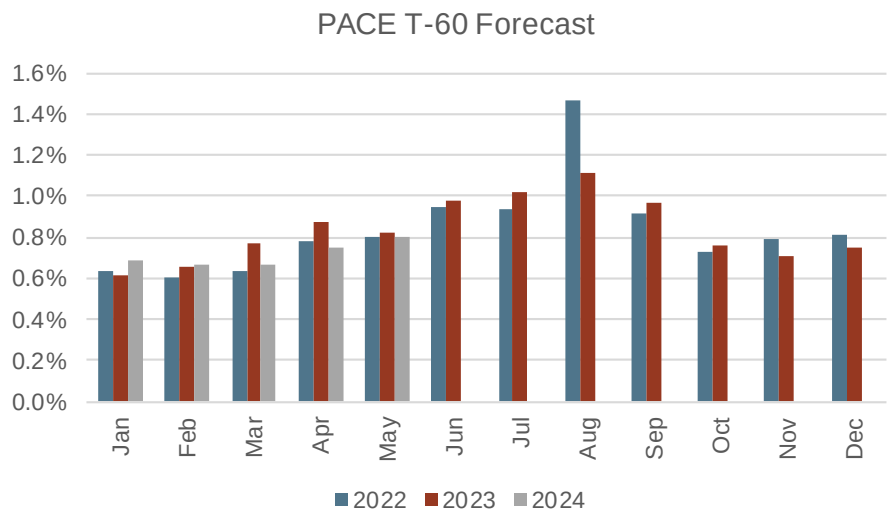


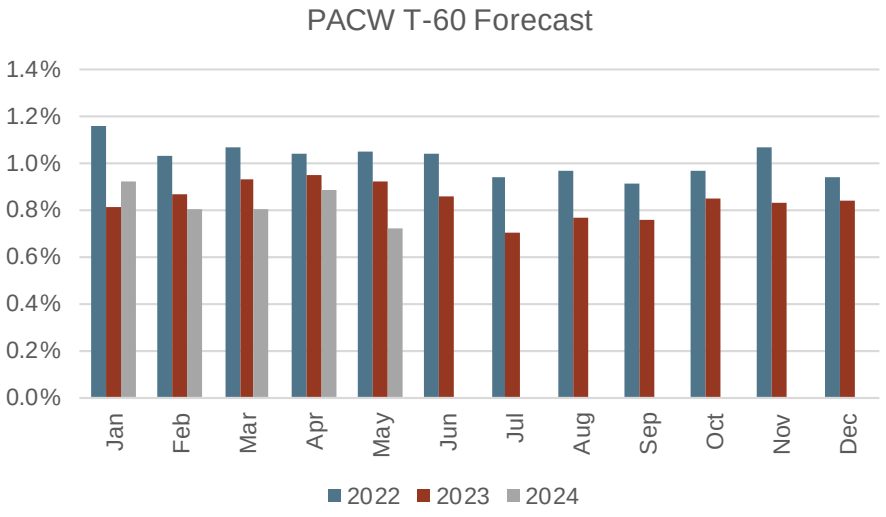


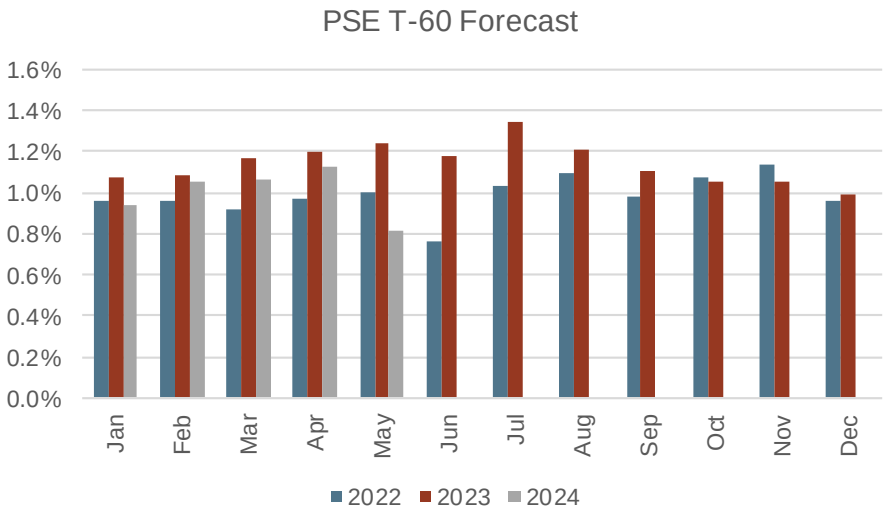


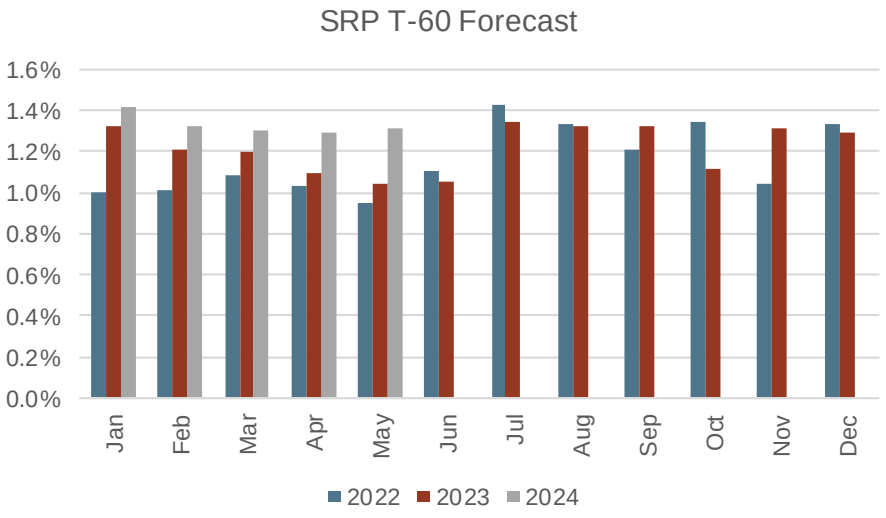
*Feb 2024 values shown for 2/1/24 – 2/27/24

EIM T-60 forecast

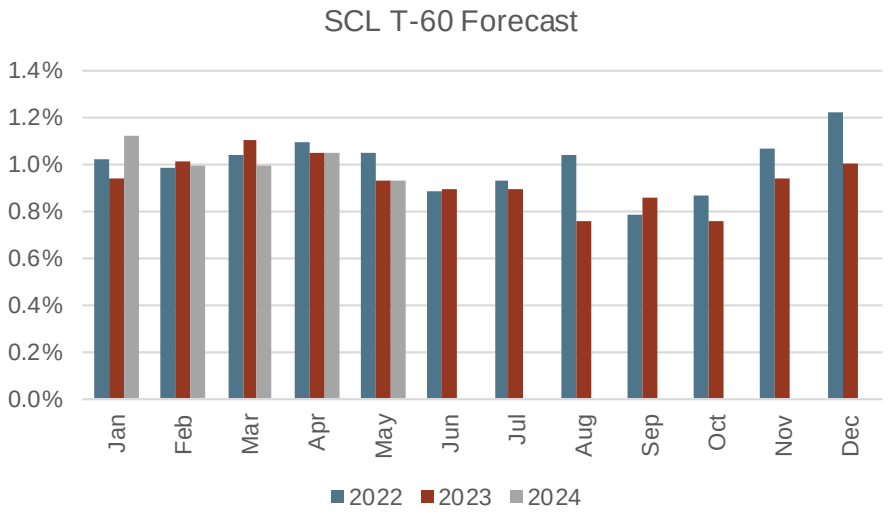


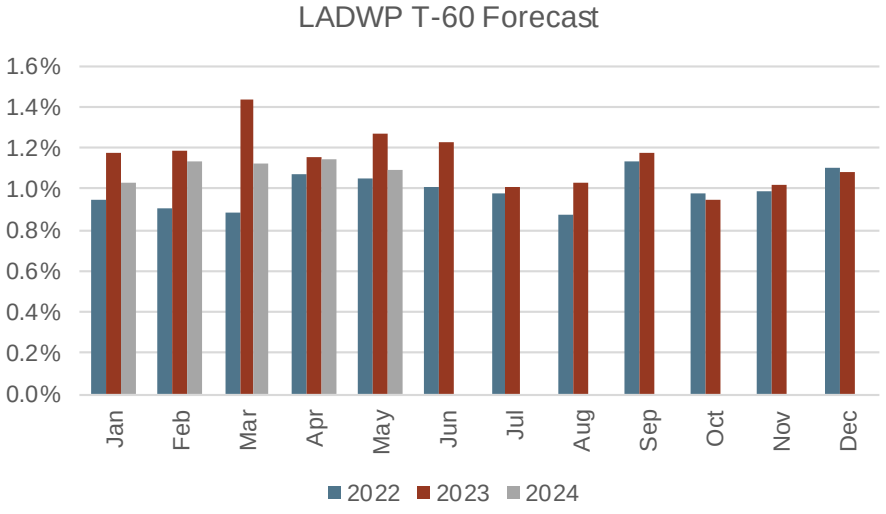


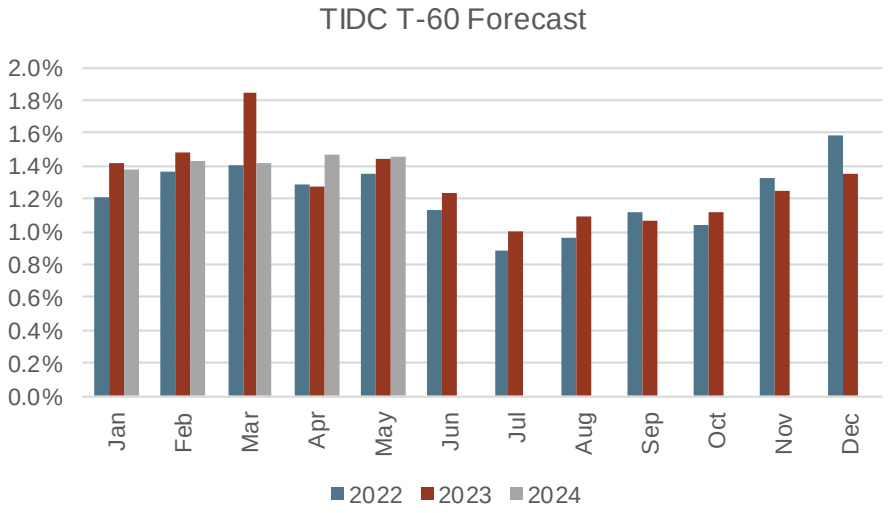


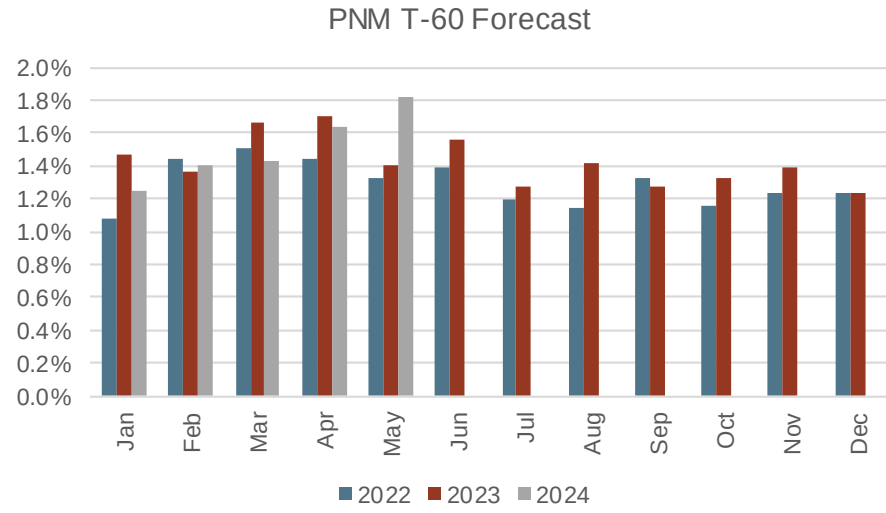


EIM T-60 forecast

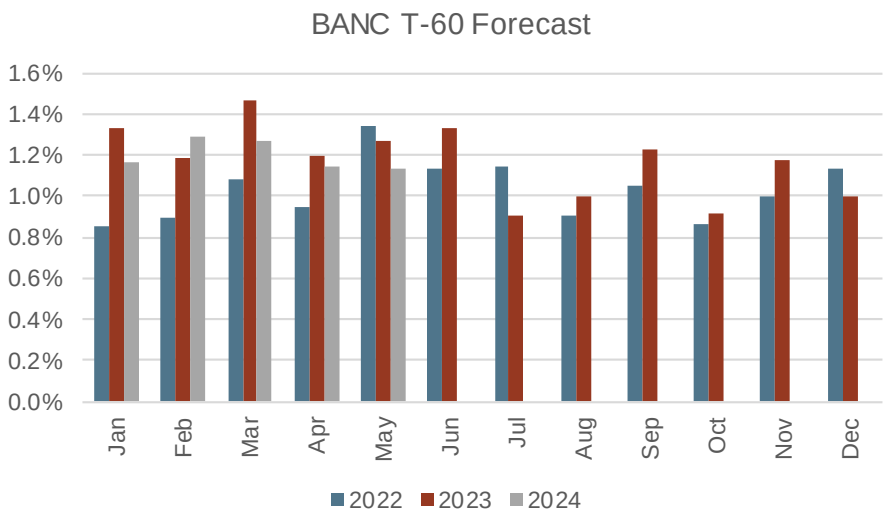


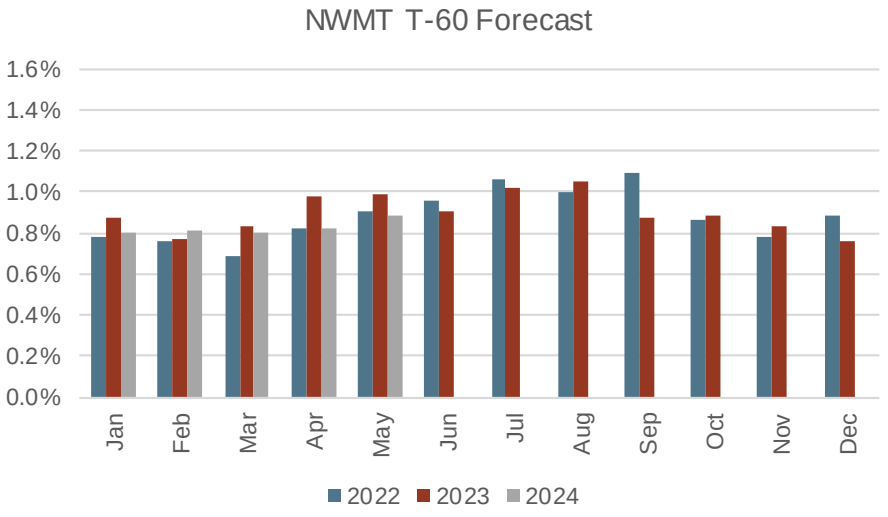


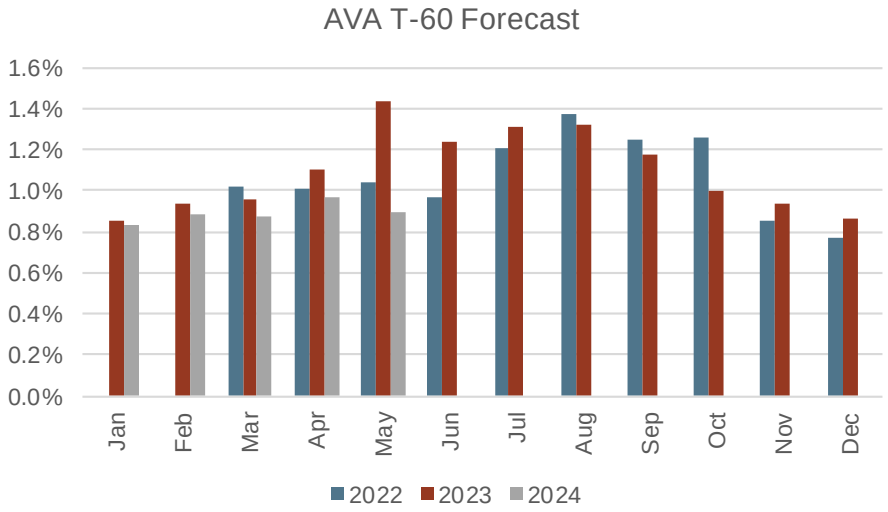


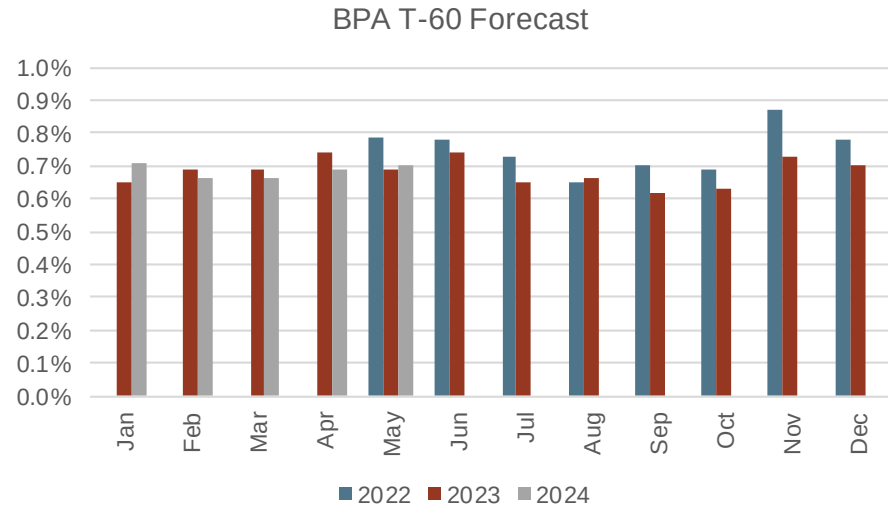


EIM T-60 forecast

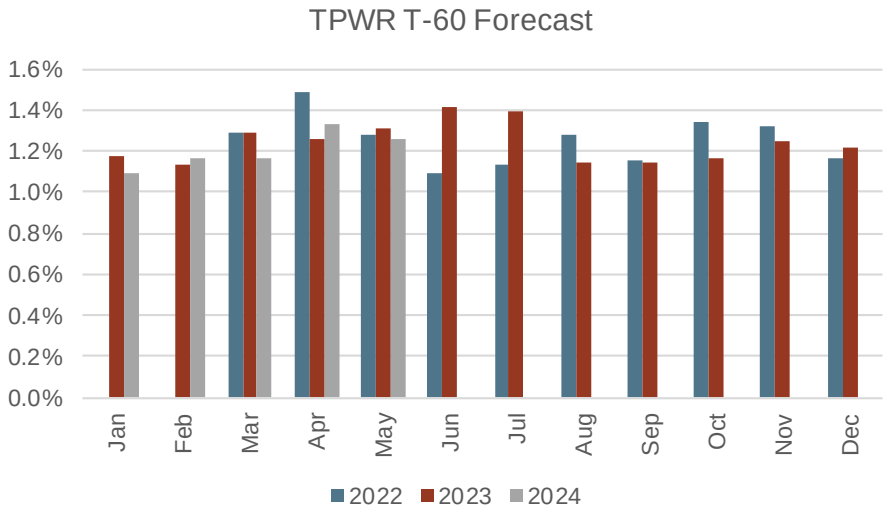


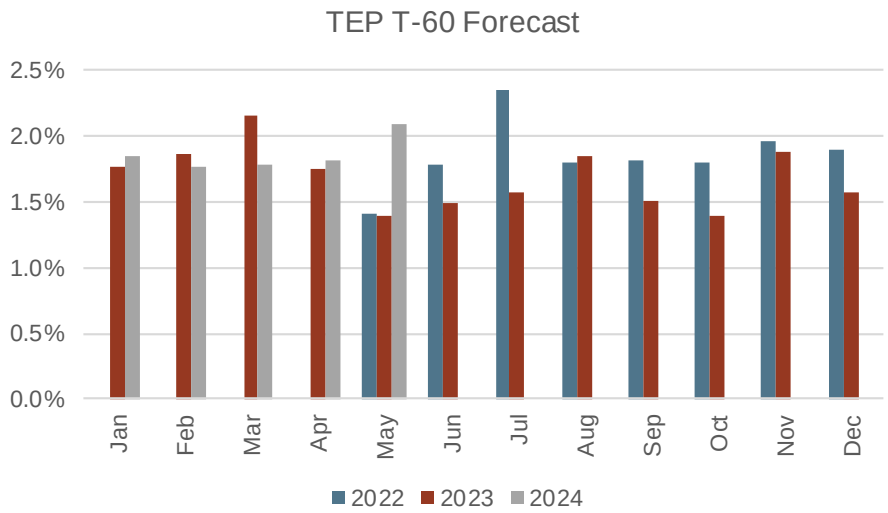




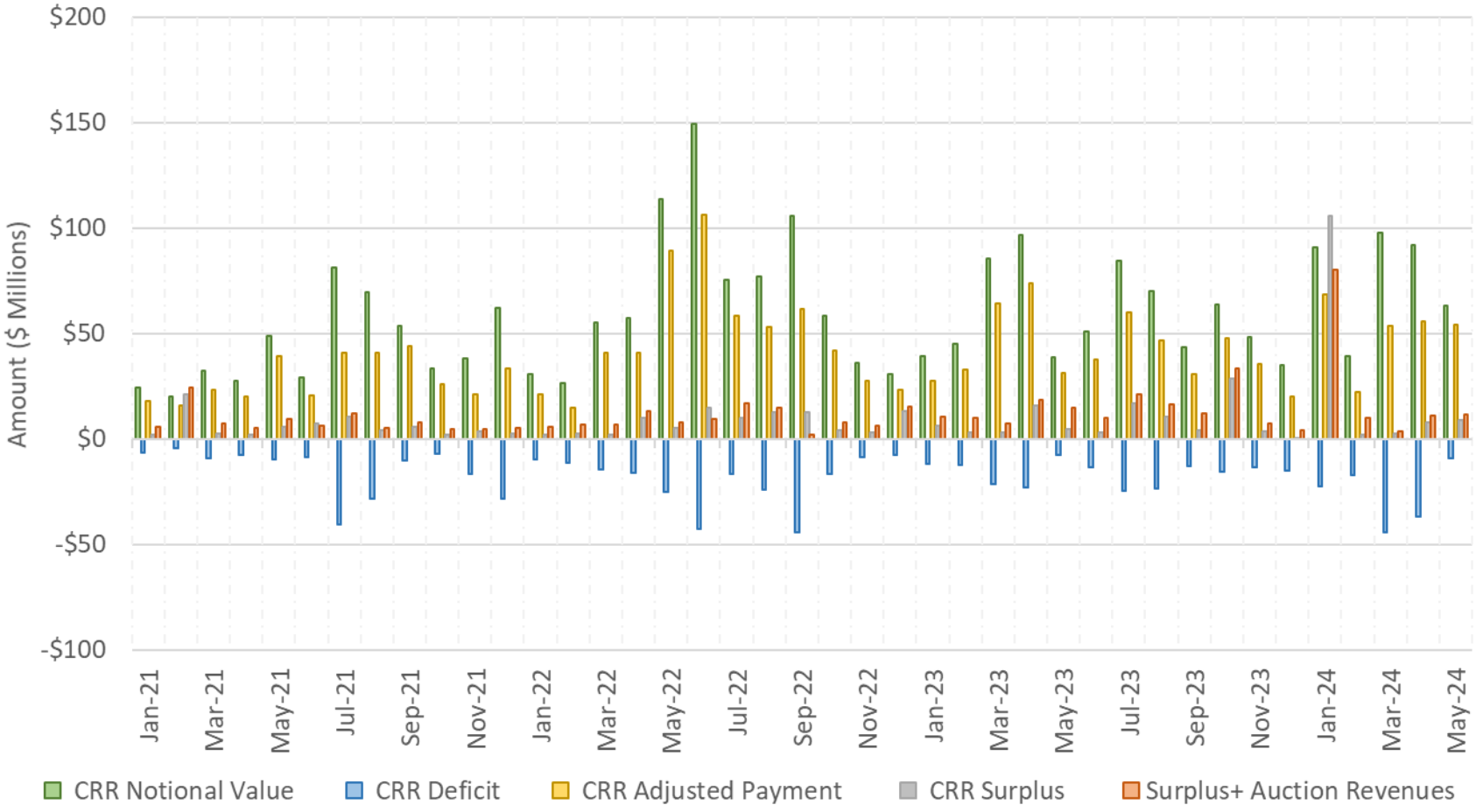


EIM T-60 forecast

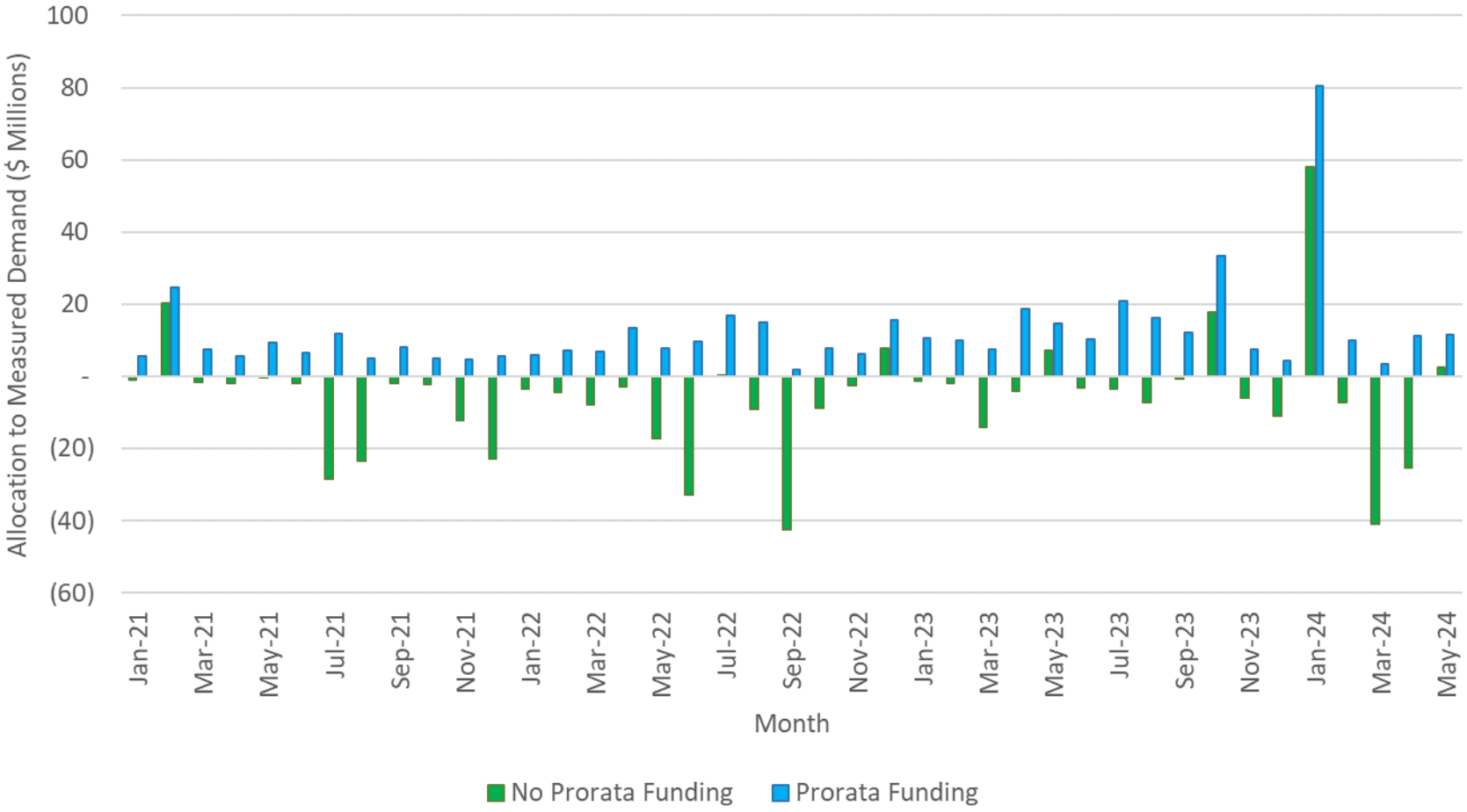




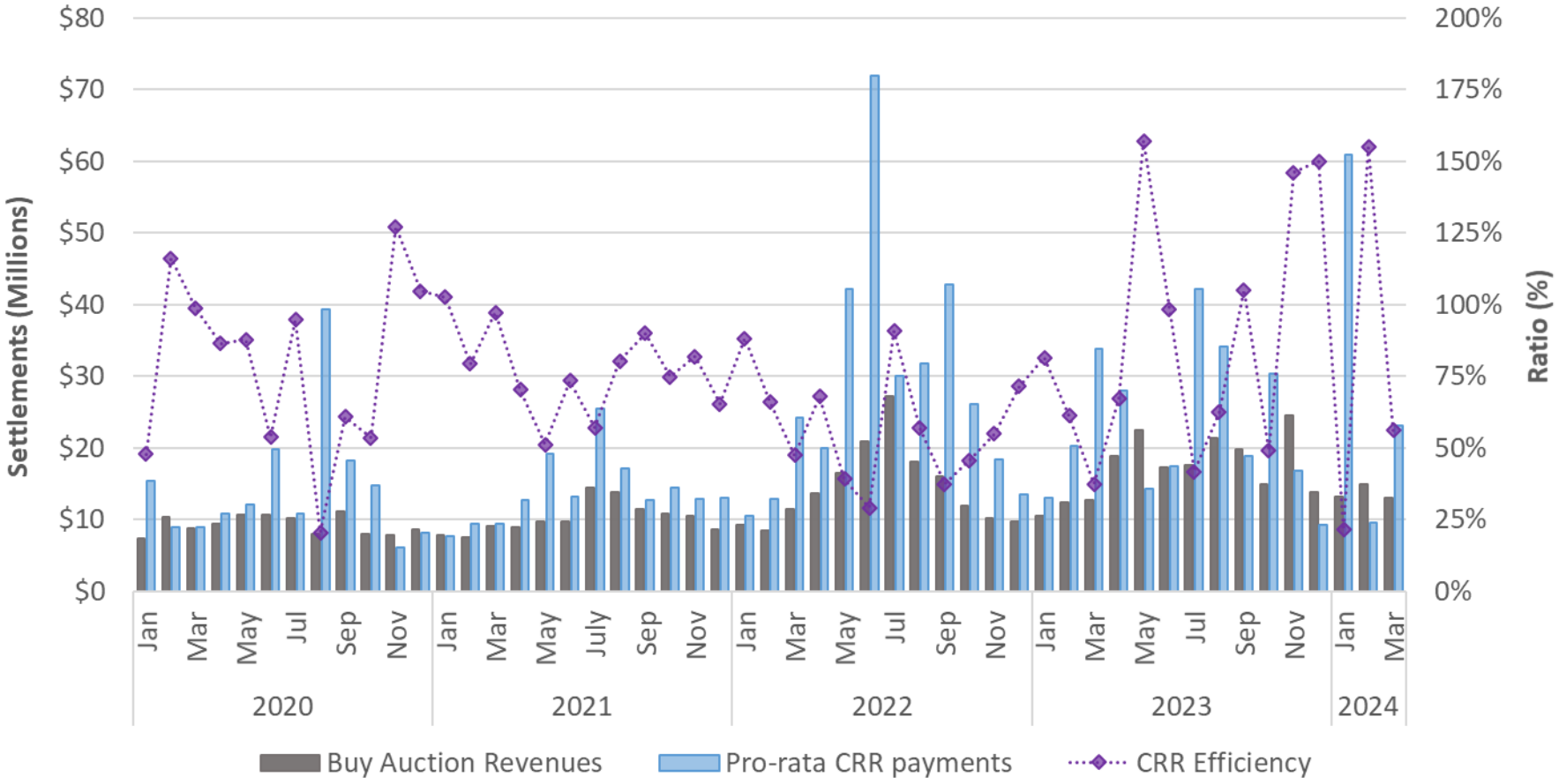
The magnitude of the overall CRR settlements saw an increase in the last 2 months



Implementation of pro-rata funding continues to improve revenue adequacy through 2024



Auction efficiency has been fairly variable based on level of congestion observed



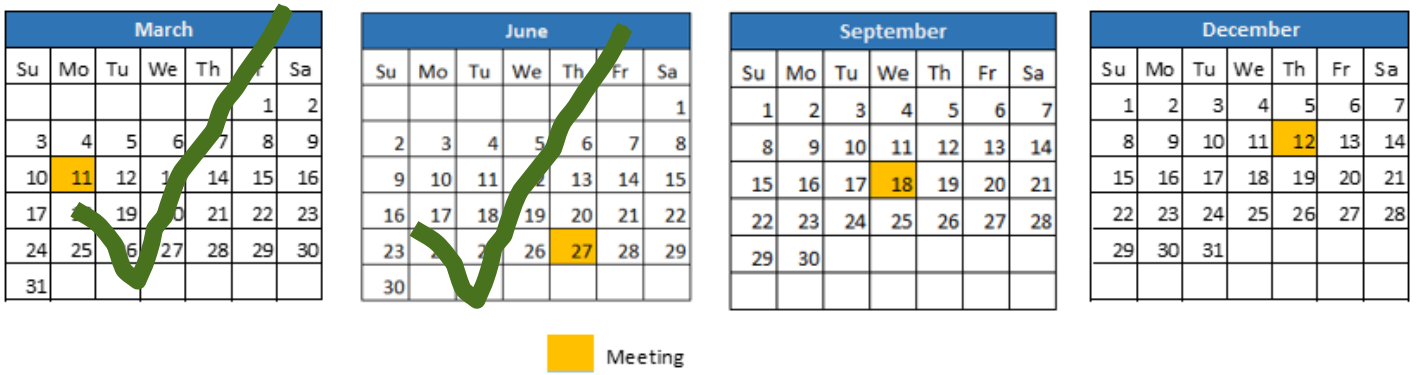
Upcoming MPPF meeting

The next MPPF is scheduled on Sep 18, 2024.
https://www.caiso.com/meetings-events/topics/market-performance-and-planning-forum

2024

Market Performance and Planning Forum Meetings

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

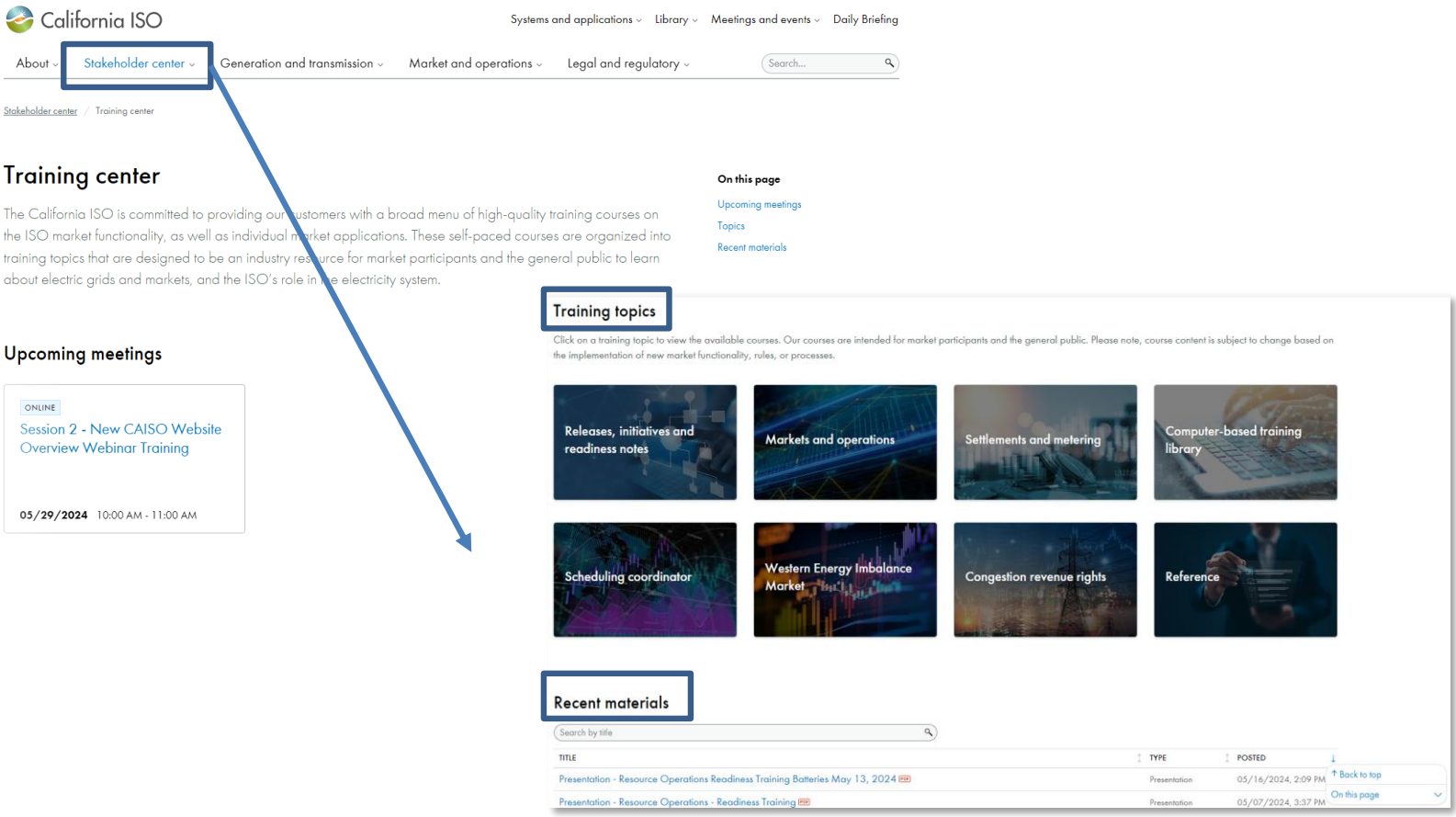


For reference

Visit user group webpage for more information: https://www.caiso.com/meetings-events/topics/market-performance-and-planning-forum

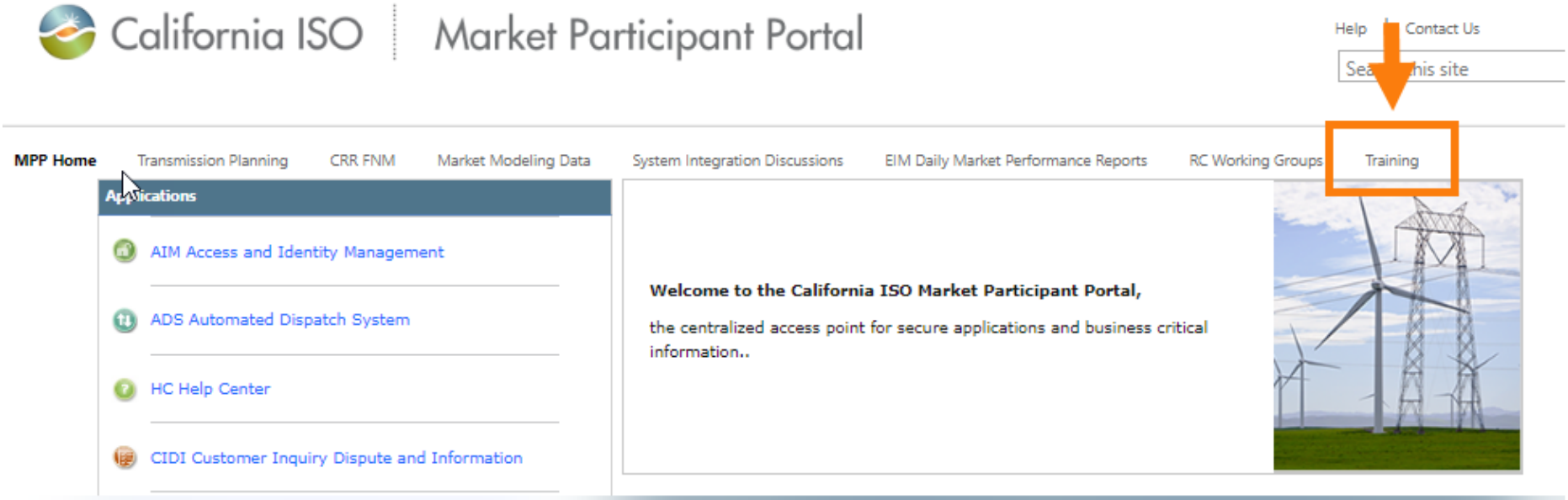
If you have any questions, please contact Brenda Corona at bcorona@caiso.com or isostakeholderaffairs@caiso.com

The ISO Learning Center is now the Training Center!



Find the same great info under the Stakeholder Center tab on the redesigned ISO website

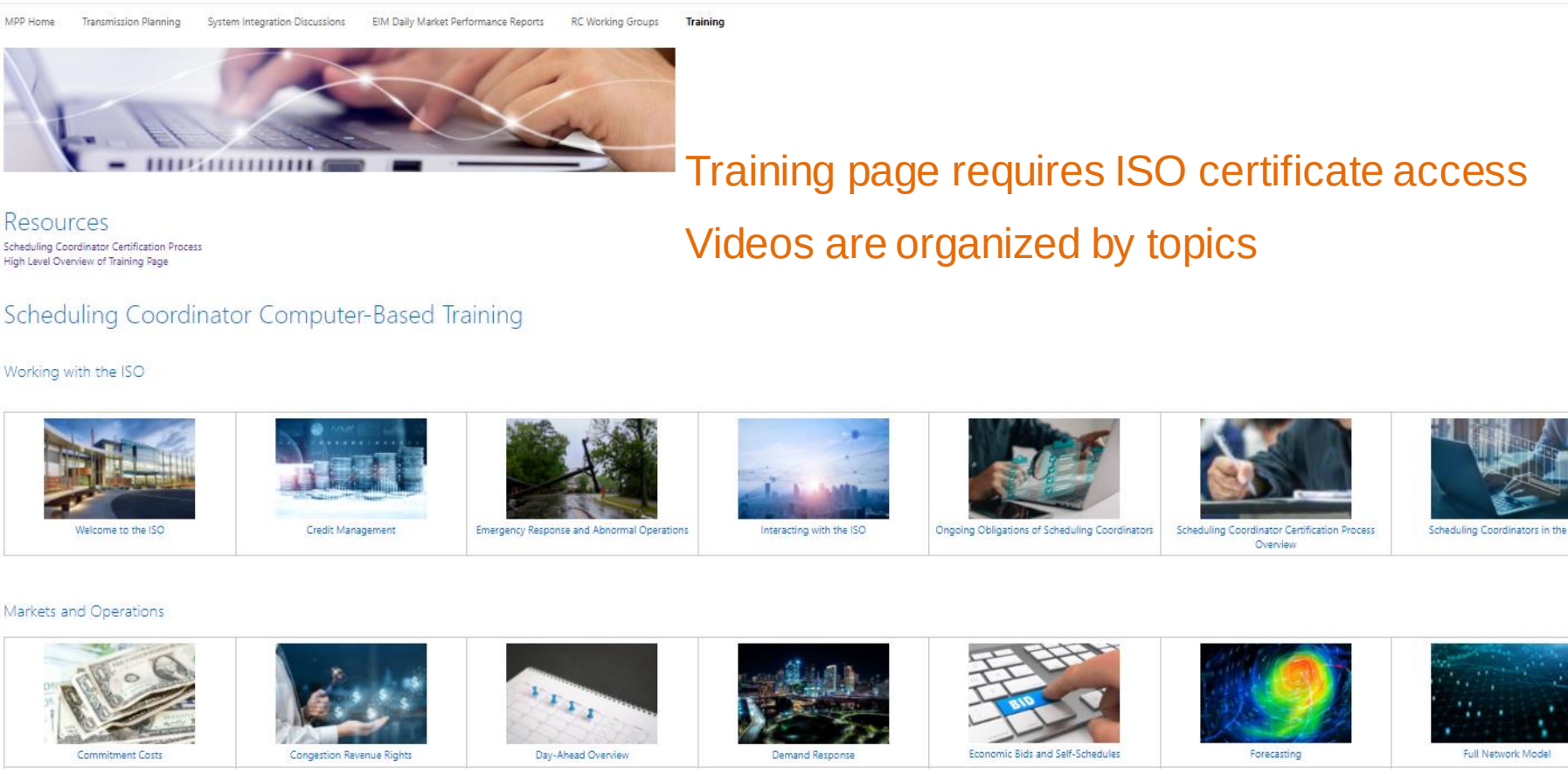
Reminder: New 'Training' page on Market Participant Portal (MPP)



Allows Scheduling Coordinators (SCs) to further their base curriculum knowledge

For any questions or comments please email
CustomerReadiness@caiso.com

Training Page on Market Participant Portal (MPP)



Training page requires ISO certificate access

Videos are organized by topics

High Level Overview of Training Page link - https://www.youtube.com/watch?v=AOmHkoLfTBY

UPDATE: The archived version of caiso.com will be available until July 15, 2024

- *Energy Matters* blog provides timely insights into ISO grid and market operations as well as other industry-related news

[Energy Matters blog | California ISO (caiso.com)]

Read a recent article featured in the blog:

Story | Transmission

GridTECH Connect Forum brings together interconnection experts

By: Jill Powers

06/10/2024

Story | Reports

New renewables records – what they mean for the grid and its carbon-free future

By: Amber Motley

06/06/2024

Story | Inside the California ISO

Welcome to the new CAISO.com

By: Gina Engman

05/16/2024

REGISTRATION IS OPEN

2024 STAKEHOLDER SYMPOSIUM

Welcome reception - Oct. 29
at Kimpton Sawyer Hotel, Sacramento, CA

Symposium program - Oct. 30
SAFE Credit Union Convention Center
Sacramento, CA

Visit the event website: www.reg.eventmobi.com/2024stakeholdersymposium

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