



California ISO

Market Performance and Planning Forum

June 16, 2022

CAISO PUBLIC

Objective: Enable dialogue on implementation planning and market performance issues

- Review key market performance topics
- Share updates to 2022 release plans, resulting from stakeholders inputs
- Provide information on specific initiatives
 - to support Market Participants in budget and resource planning
- Focus on implementation planning
 - Clarify timelines
 - Discuss external impacts
 - Policy discussions should occur in the initiative stakeholder process

Reminders:

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



California ISO

Market Performance and Planning Forum

Agenda – June 16, 2021

9 a.m. – 12 p.m.

Time:	Topic:	Presenter:
9:00 – 9:05	Introduction, Agenda	Brenda Corona
9:05 – 10:45	Market Performance Update	Kevin Head Kun Zhao Amber Motley Guillermo Bautista Alderete
10:45 – 11:00	Policy Update	Brad Cooper John Goodin
11:00 – 11:45	Release Update	Trang Vo

Market Performance Update

Market Analysis and Forecasting

Incorrect GHG obligation

- An issue was identified with CAISO's real-time market impacting the transfers serving California demand
- From April 1, 2021 through January 27, 2022 – the market incorrectly included transfers that were part of the base schedules of LADWP in the calculation of the real-time imbalance energy imported into BAAs located within California
- This issue affected the real time energy transfers attributed to EIM participating resources serving California demand as well as payments made to these resources

Incorrect GHG Obligation contd...

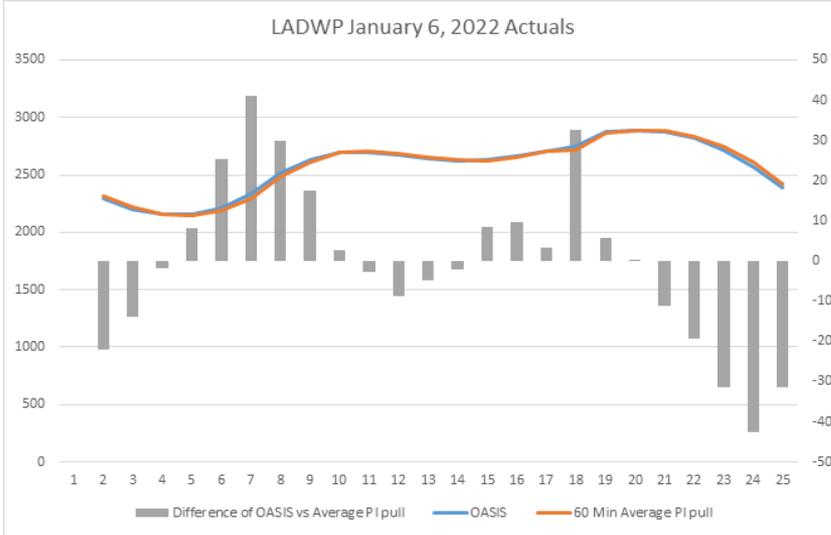
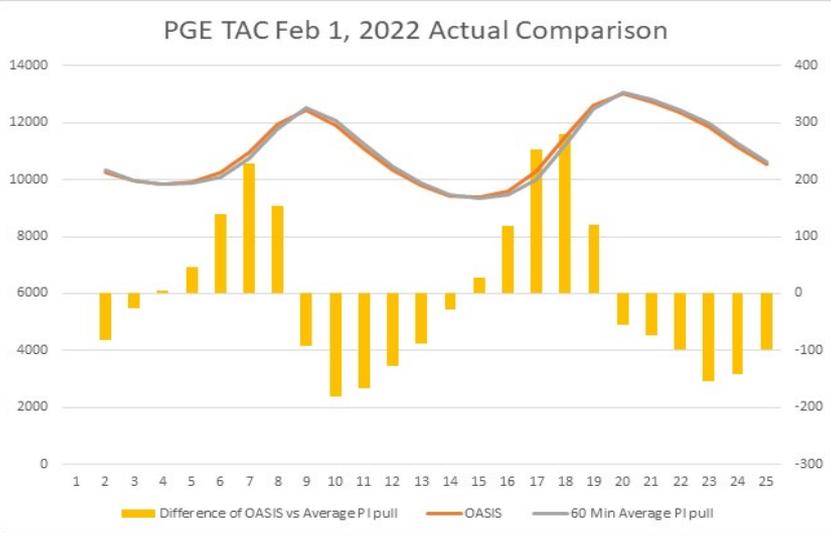
- This issue was not present prior to April 1, 2021 because there were no Base ETSRs between California BAAs and WEIM entities located outside of California
- The CAISO fixed the issue on January 27, 2022 where the real time market excludes the base schedules transfers in the calculation of real time energy transfers into California BAAs
- The CAISO is now assessing what remedial actions might be appropriate for the time period between April 1, 2021 and January 27, 2022.
 - Options could include no market resettlement or restating MWh quantities attributed to EIM participating resources

Discrepancies in Actual Demand reported on OASIS

- The ISO has observed that the values displayed on OASIS for demand actuals of the California ISO and WEIM areas are incorrect.
- The largest discrepancy in values can be observed when the demand is ramping.
 - For example, when load is increasing between intervals, the OASIS value is higher and when decreasing, it's lower.
- The ISO is working on resolving the data issues and providing a backfill following resolution.

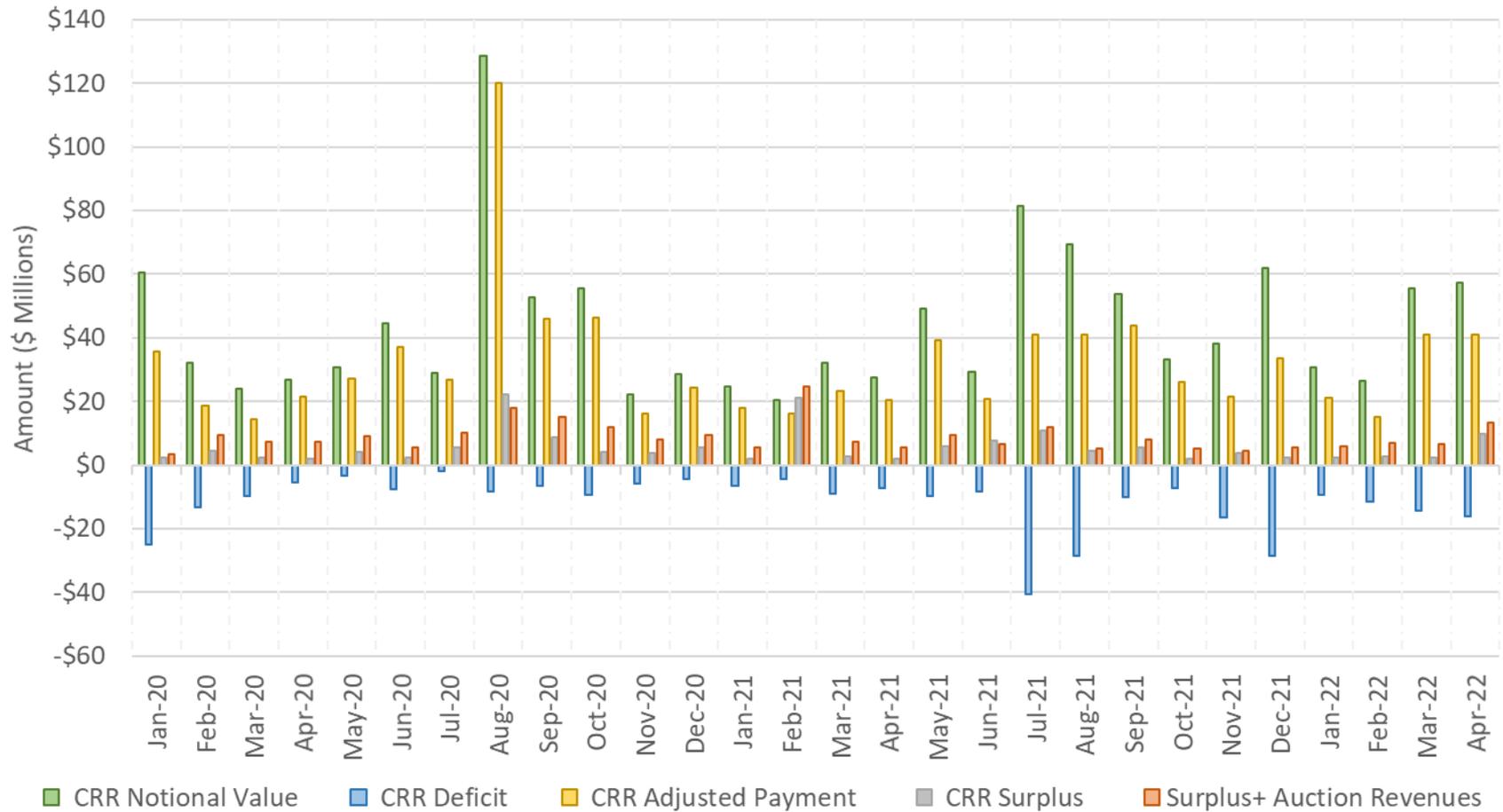
Discrepancies in Actual Demand reported on OASIS

- The actual demand values are found on OASIS under the System Demand, CAISO Demand Forecasts, with the market/process filter of Actuals.
- Please note these reports are informational only, and no actual impact occurred to market operations.
- The ISO will publish another notice after the issues have been resolved and when the backfill is completed.

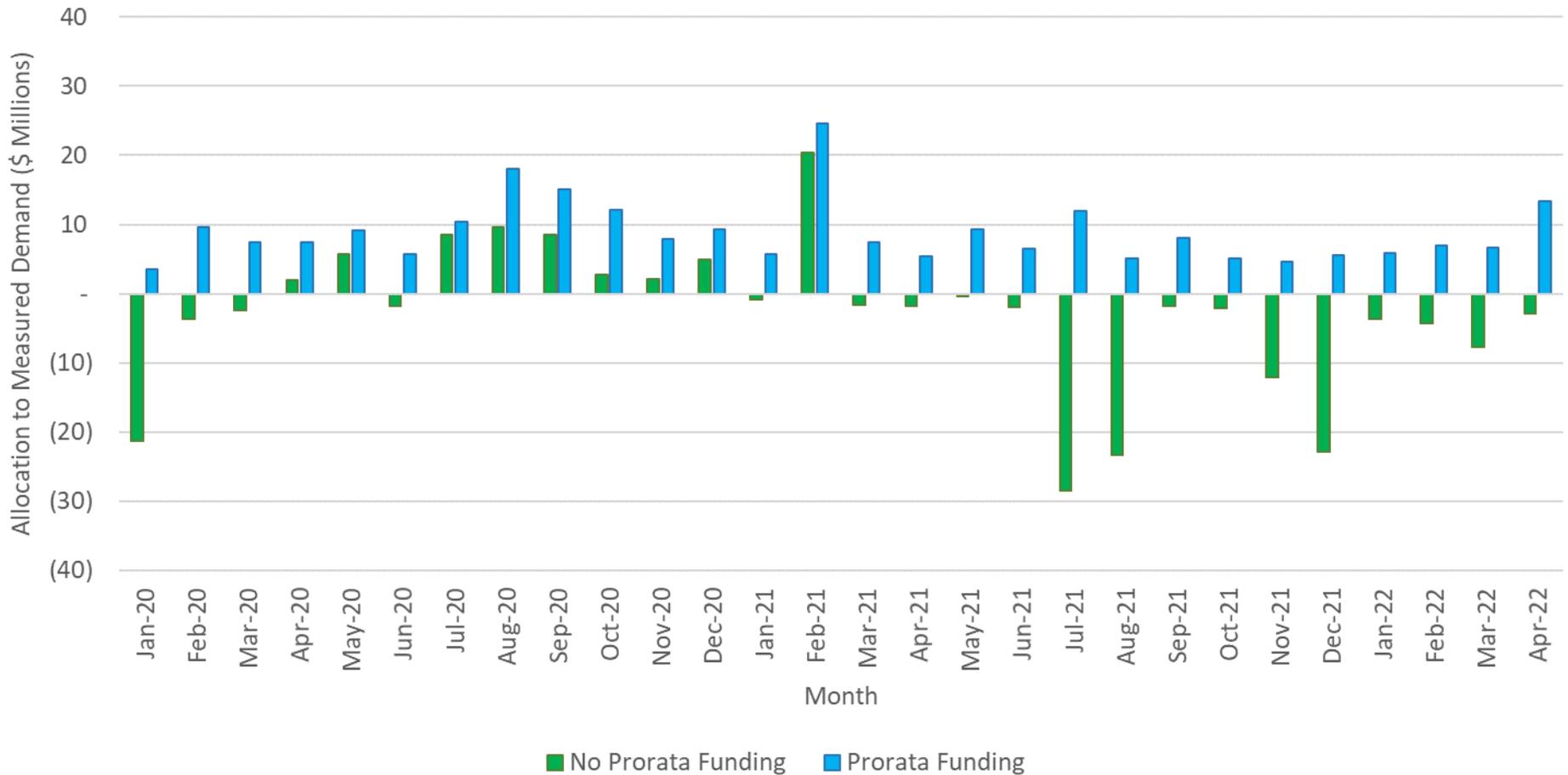


Congestion Revenue Rights

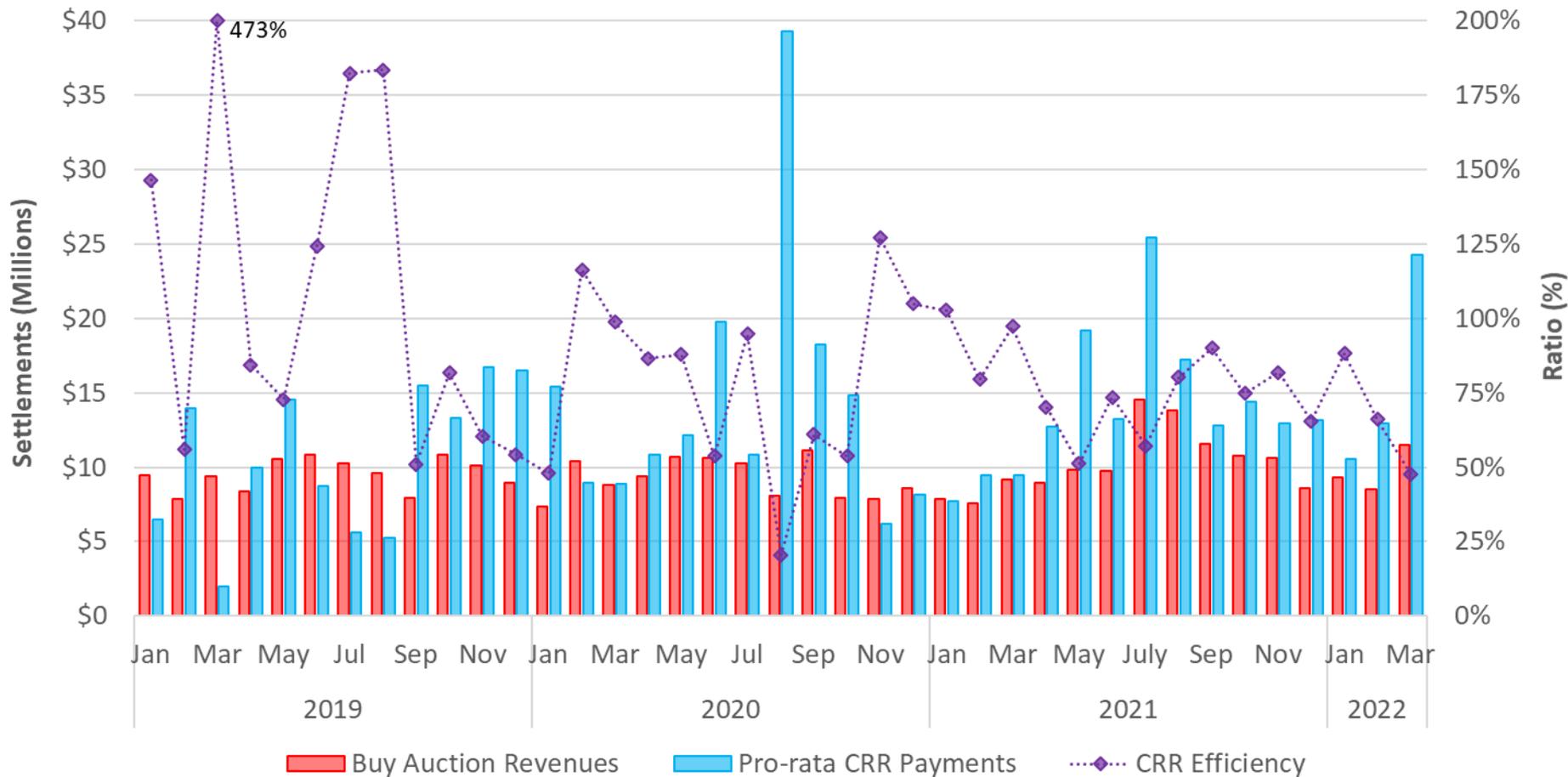
The magnitude of the overall CRR settlements has decreased after summer



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

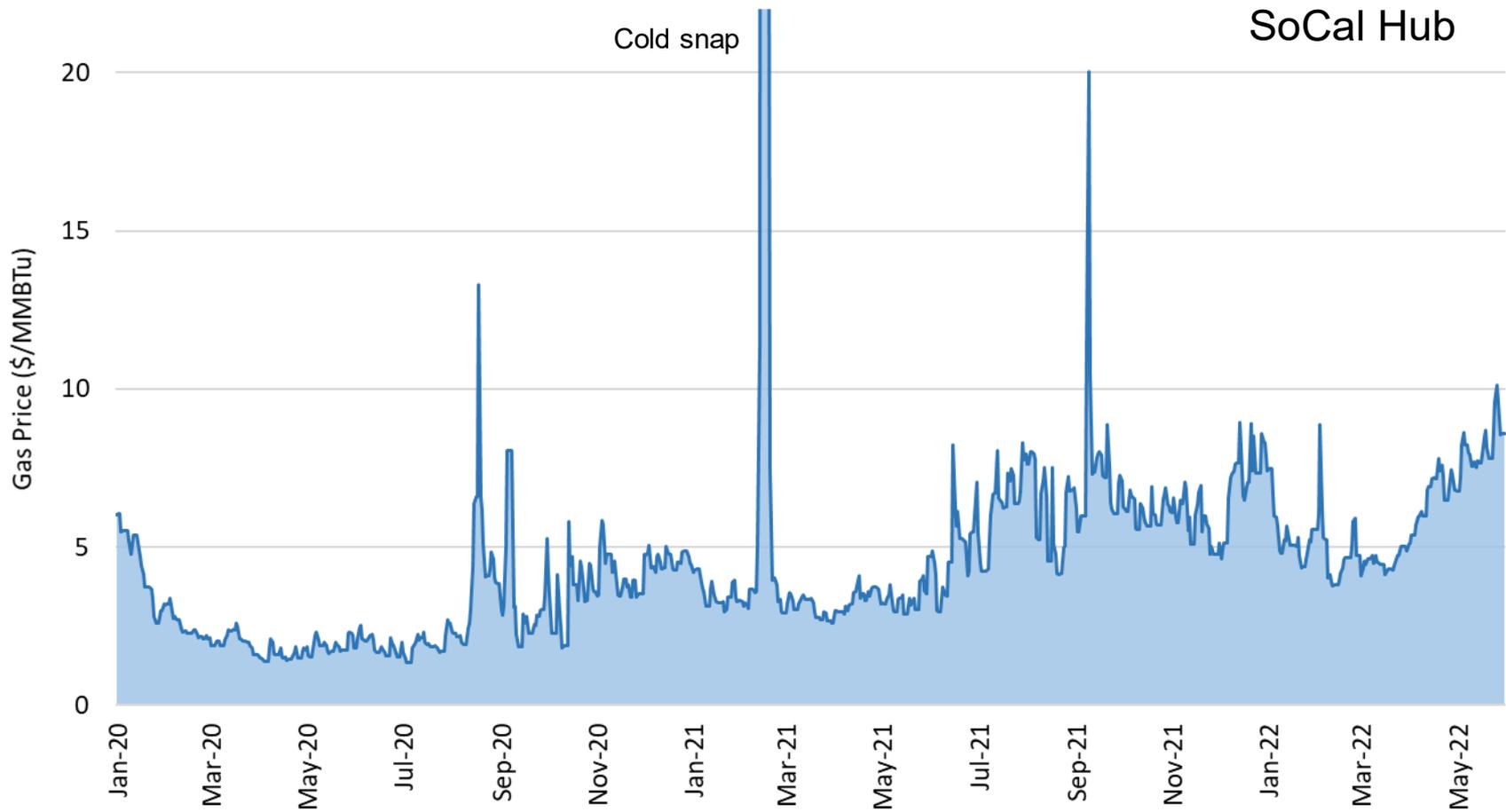


Auction efficiency performance within typical range

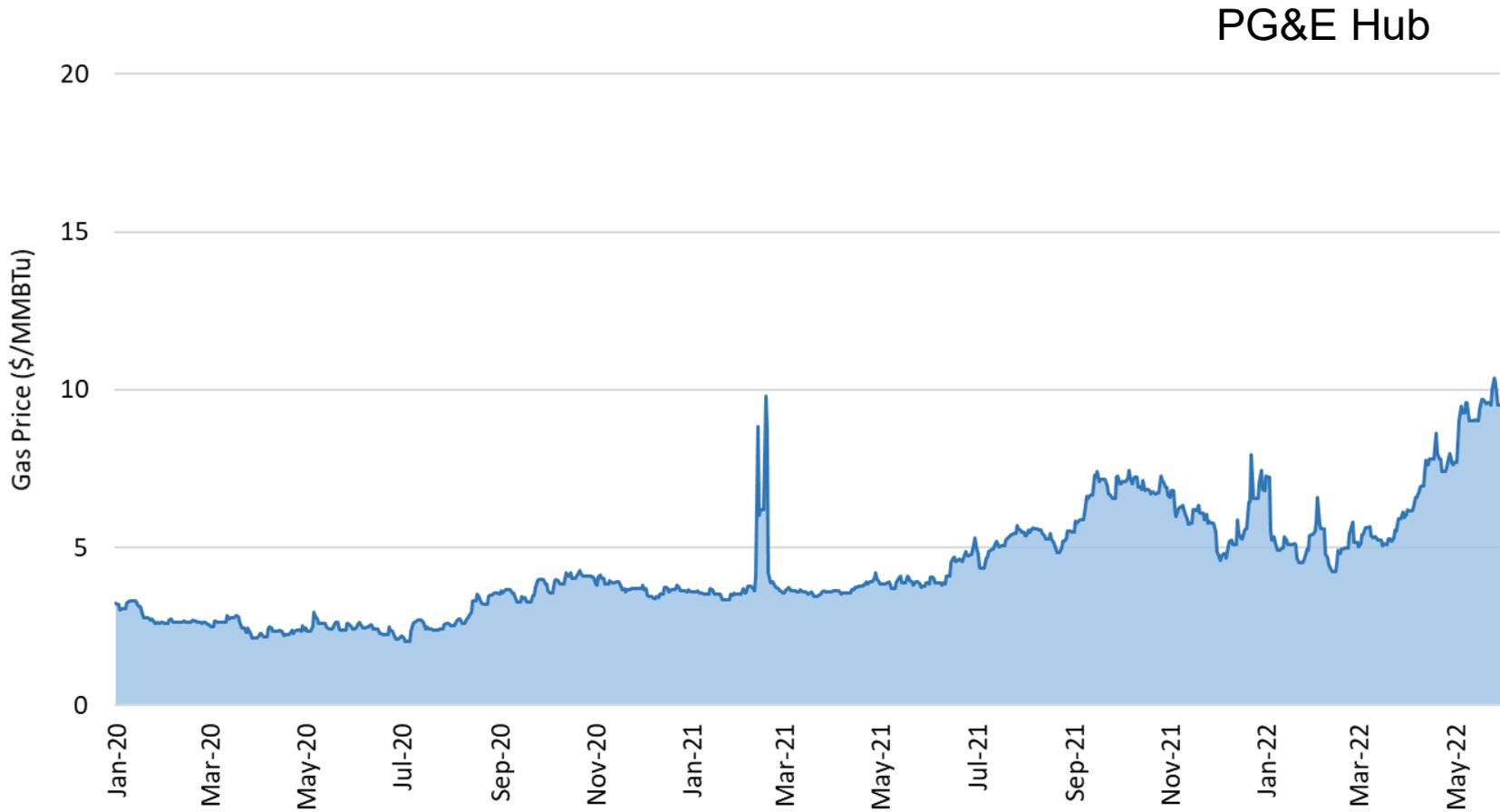


CAISO's Market Prices and Costs

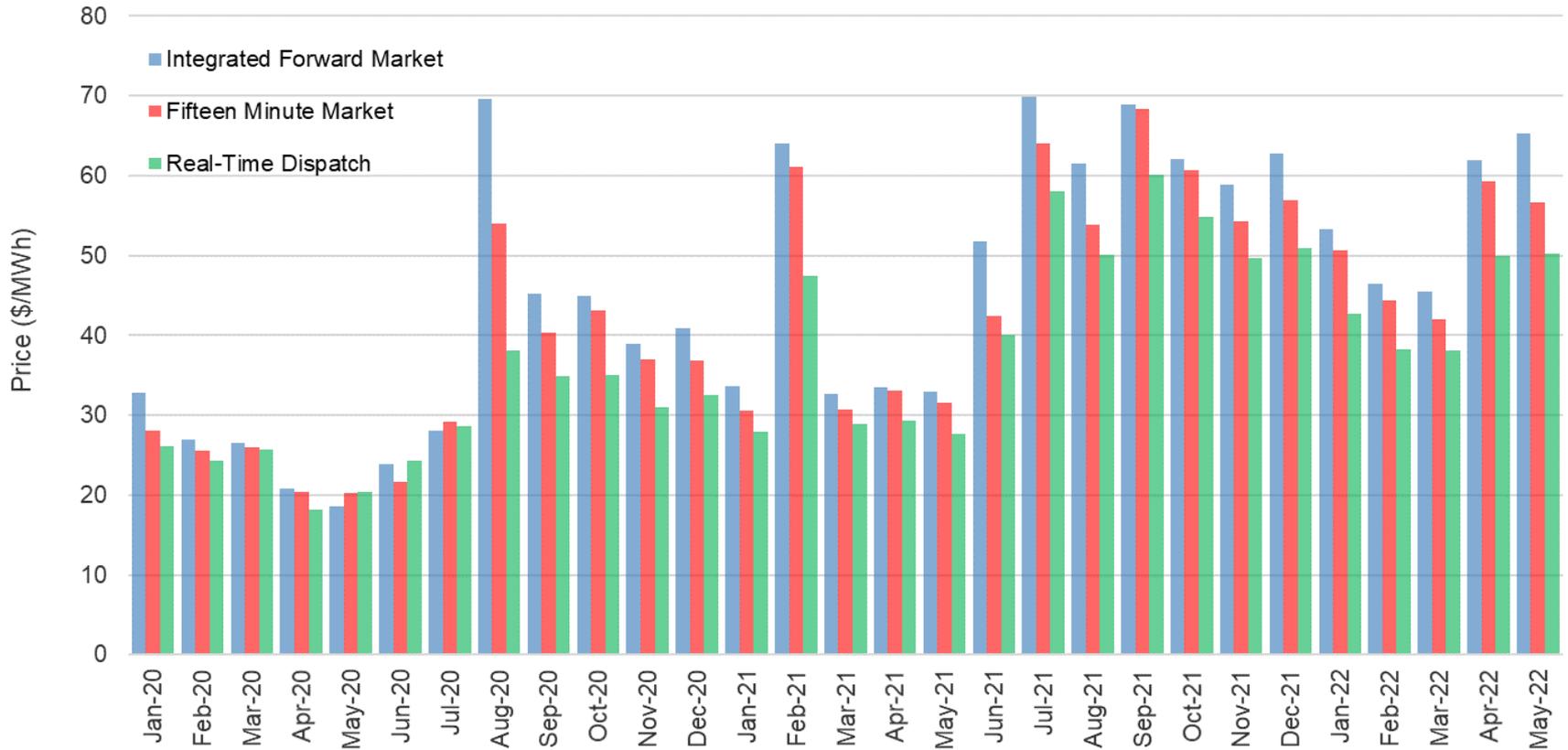
Gas prices continue to be in the high range



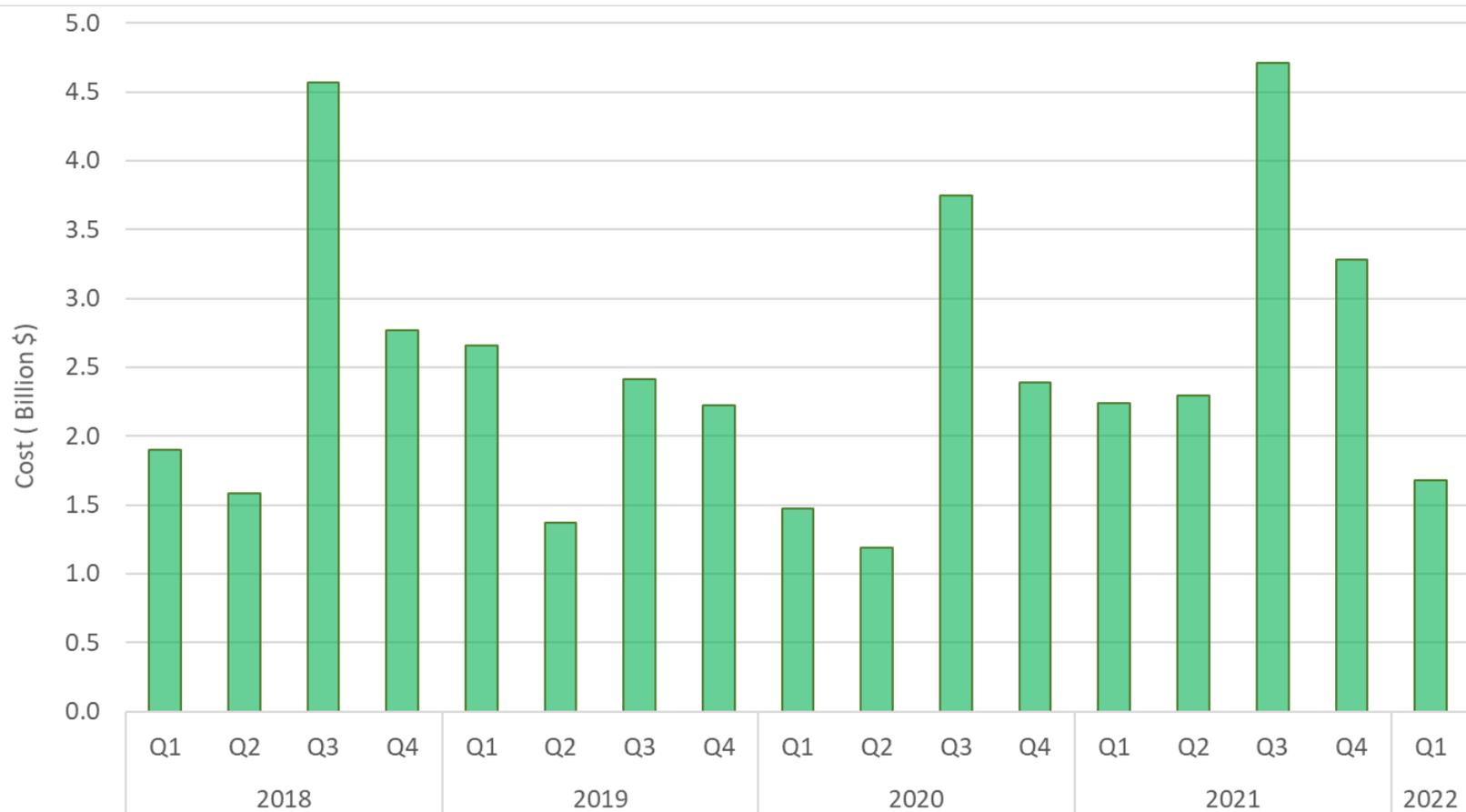
Gas prices continue to be in the high range



CAISO's electric prices have correspondingly been high



Wholesale market costs in 2021 were about \$12.6 Billion, a 43% increase of the \$8.8 Billion in 2020



Settlements data is preliminary and subject to changes
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Default Energy Bid for Storage Resources

Background - Storage Default Energy Bid (DEB)

- The storage DEB was introduced in Nov. 2021, aligning with the introduction of local market power mitigation (MPM) of energy storage resources
- Storage DEB has several components which are intended to estimate the costs to charge the resource, operations costs, and market opportunity costs in RTM
- With six months of operational experience accrued, the CAISO examined their performance over the period 11/1/2021 – 4/30/2022

Summary of resources using storage DEB

- About 58% of energy storage resources are using the storage DEB and these represent most of the MW capacity*

	DEB Type			
	Cost	Storage	Negotiated	LMP
# of resources	28	40	0	1
Pmax (MW)	1,162	2,852	0	8

- WEIM energy storage resources only represent 105MW (2.6%) of the ~4GW of storage participating in the market
- 9 energy storage resources representing 21MW are using the <5MW MPM exemption

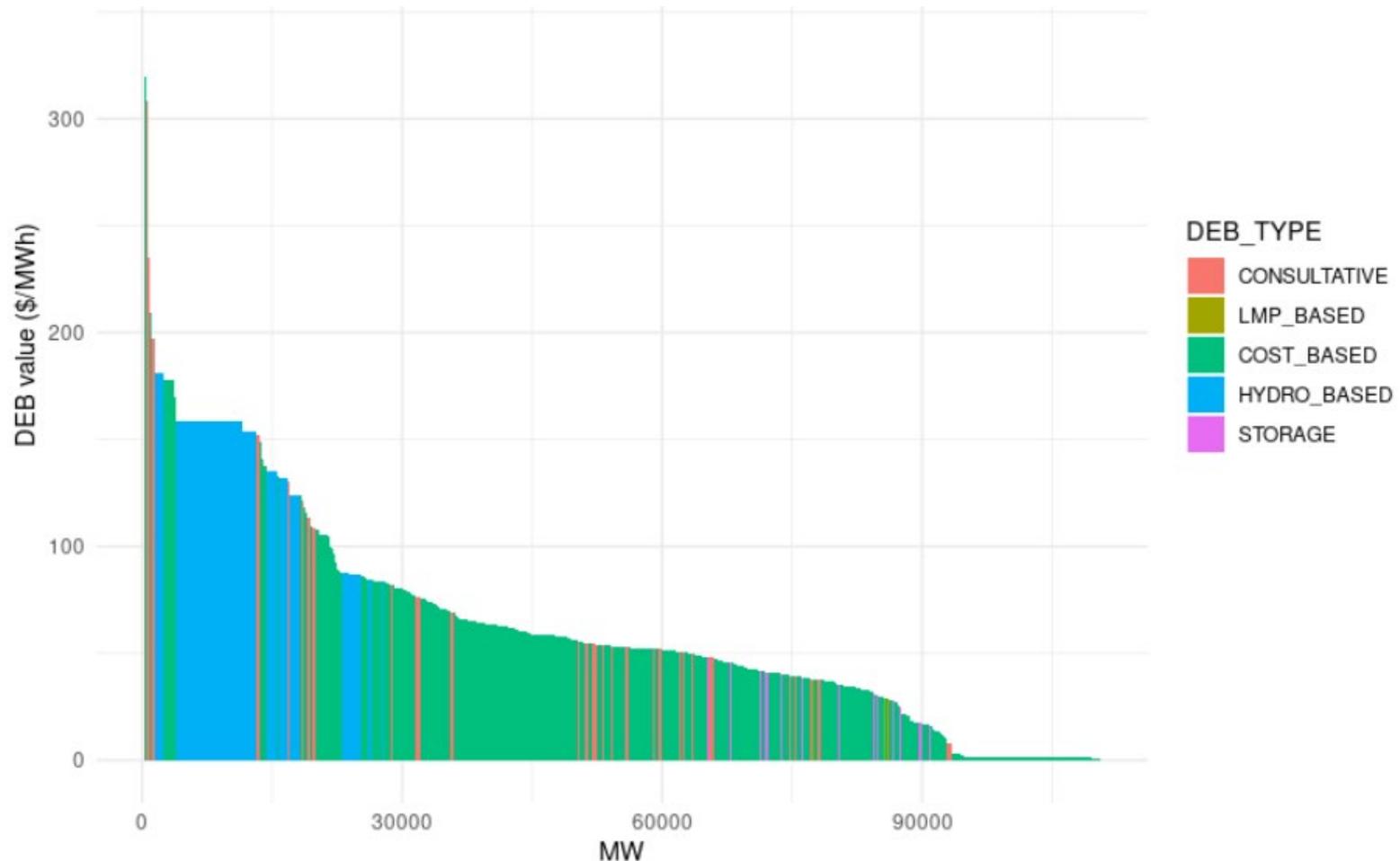
Storage DEB values versus other DEB types

- Storage DEB values are higher on average than the cost-based and LMP-based
- Storage DEB values are typically lower than hydro DEB values reflecting their shorter-term time horizon

DEB Type	DAM (\$/MWh)	RTM (\$/MWh)
Storage	40.44	83.93
Cost	37.98	37.99
Negotiated	76.26	76.43
LMP-Based	19.19	26.63
Hydro	140.26	140.32

Storage DEB values versus other DEB types

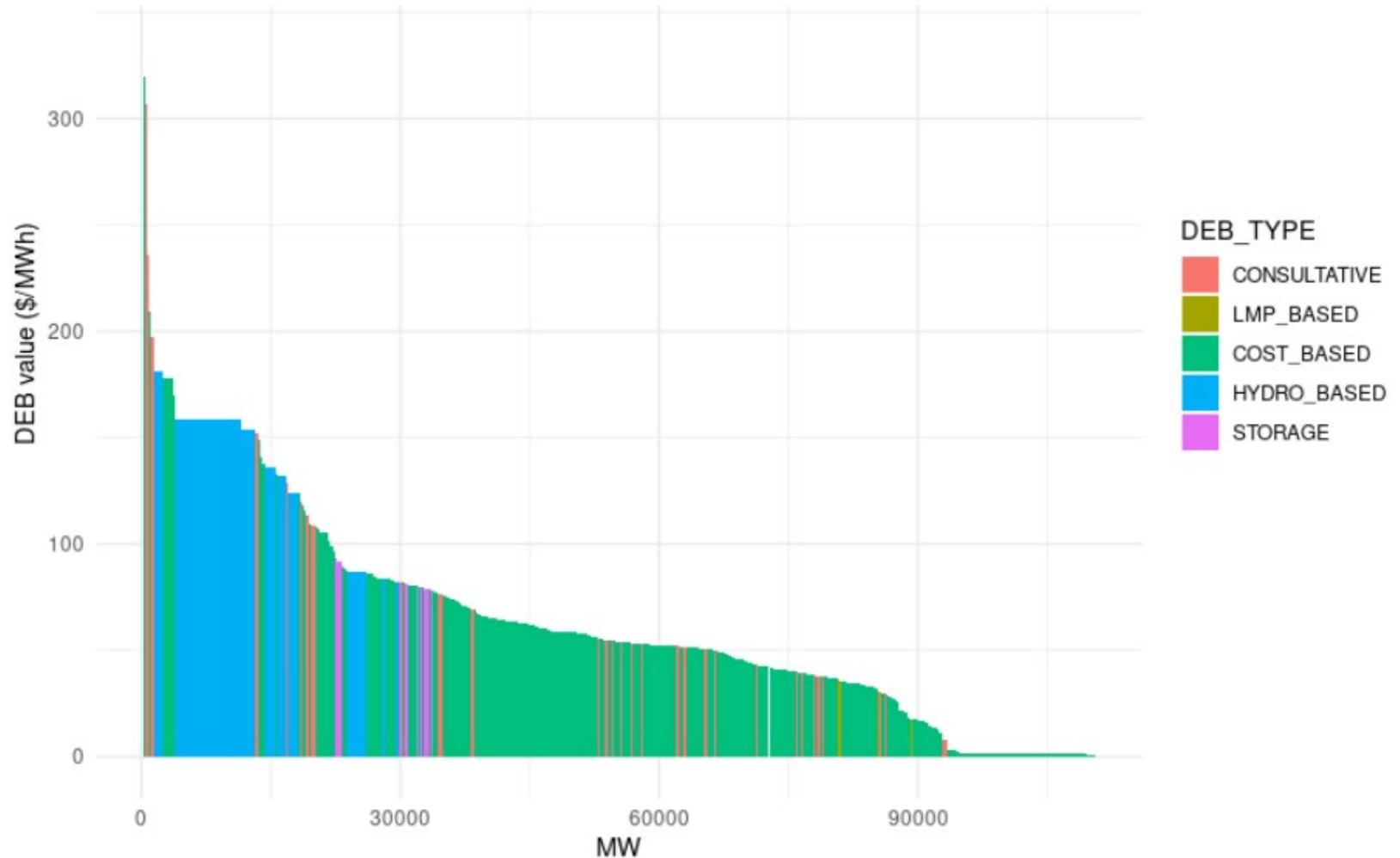
DAM DEBs



Metrics based on all CAISO+WEIM BAAs resources subject to mitigation

Storage DEB values versus other DEB types

RTM DEBs



Storage DEB formulation and binding component

- RTM storage DEBs are higher than DAM storage DEBs because RTM includes a “price-based opportunity cost” component not present in DAM
- RTM storage DEB is set by the price-based opportunity cost component 94% of the time because this component reflects the highest LMPs during the day

$$\text{DAM Storage DEB} = \{\text{Max}(E_n \delta / \eta, 0) + \rho\} * \text{DEB Multiplier}$$

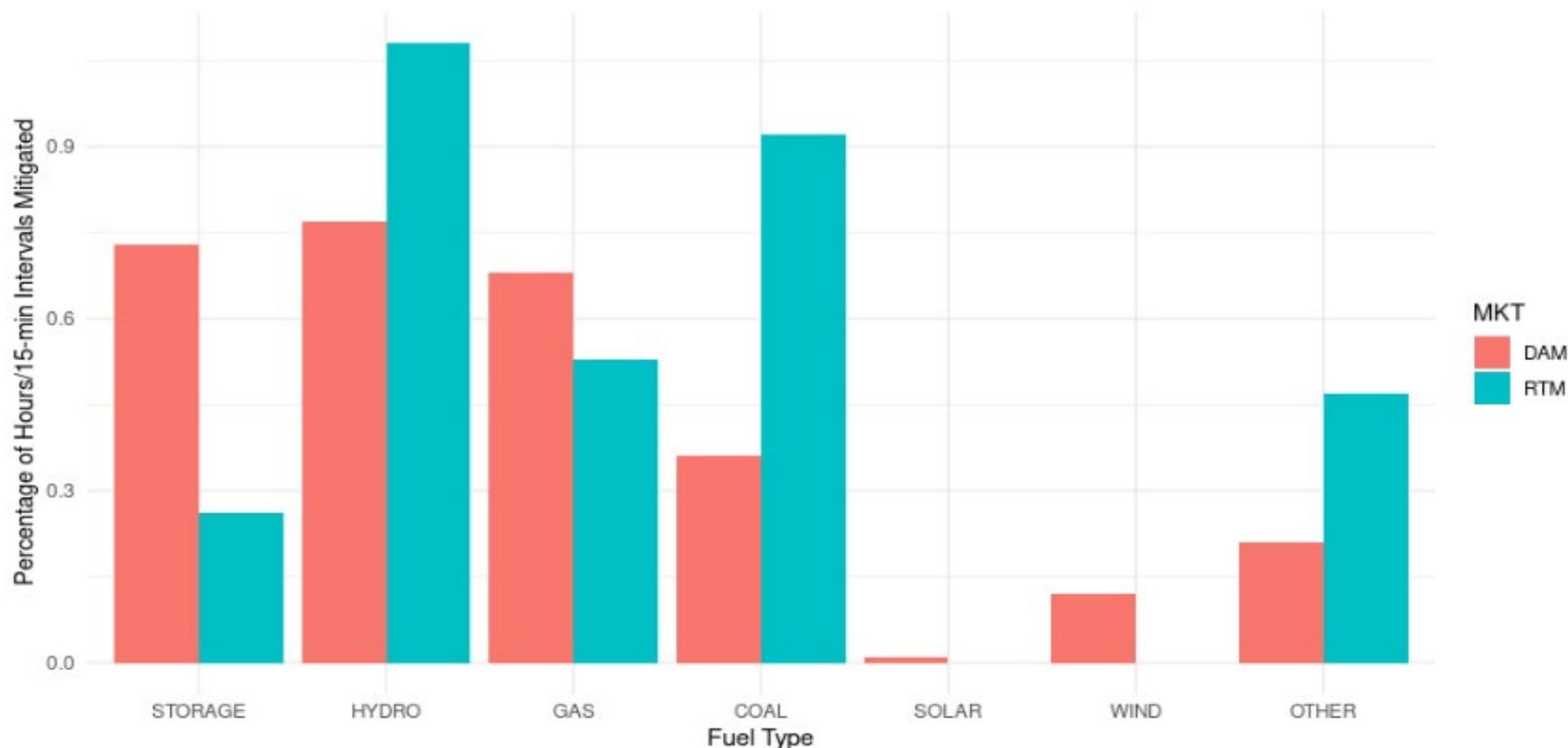
$$\text{RTM Storage DEB} = \text{Max} \{[\text{Max}(E_n \delta / \eta, 0) + \rho], \text{PB_OC}_\gamma\} * \text{DEB Multiplier}$$

Where:

E_n :	Energy Cost
η :	Round-Trip Efficiency
δ :	Energy Charging Duration
γ :	Energy Discharge Duration
ρ :	Variable Storage Operations Cost
PB_OC:	Price-Based Opportunity Cost

Frequency of mitigation of energy storage resources

- In DAM, storage resources are mitigated in line with traditional non-renewable resources (i.e. gas and hydro)
- In RTM, they are mitigated less frequently

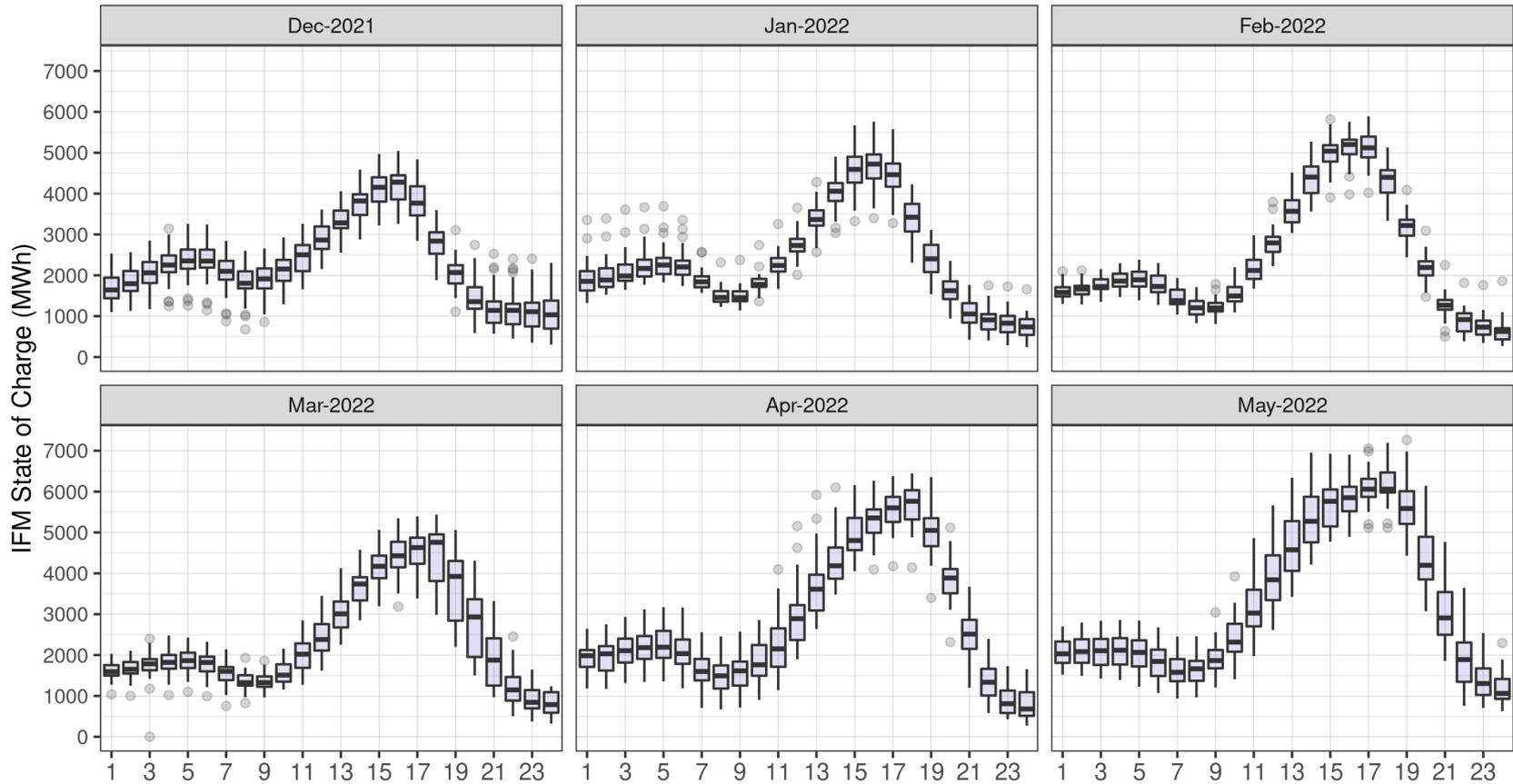


Overall evaluation of first six months

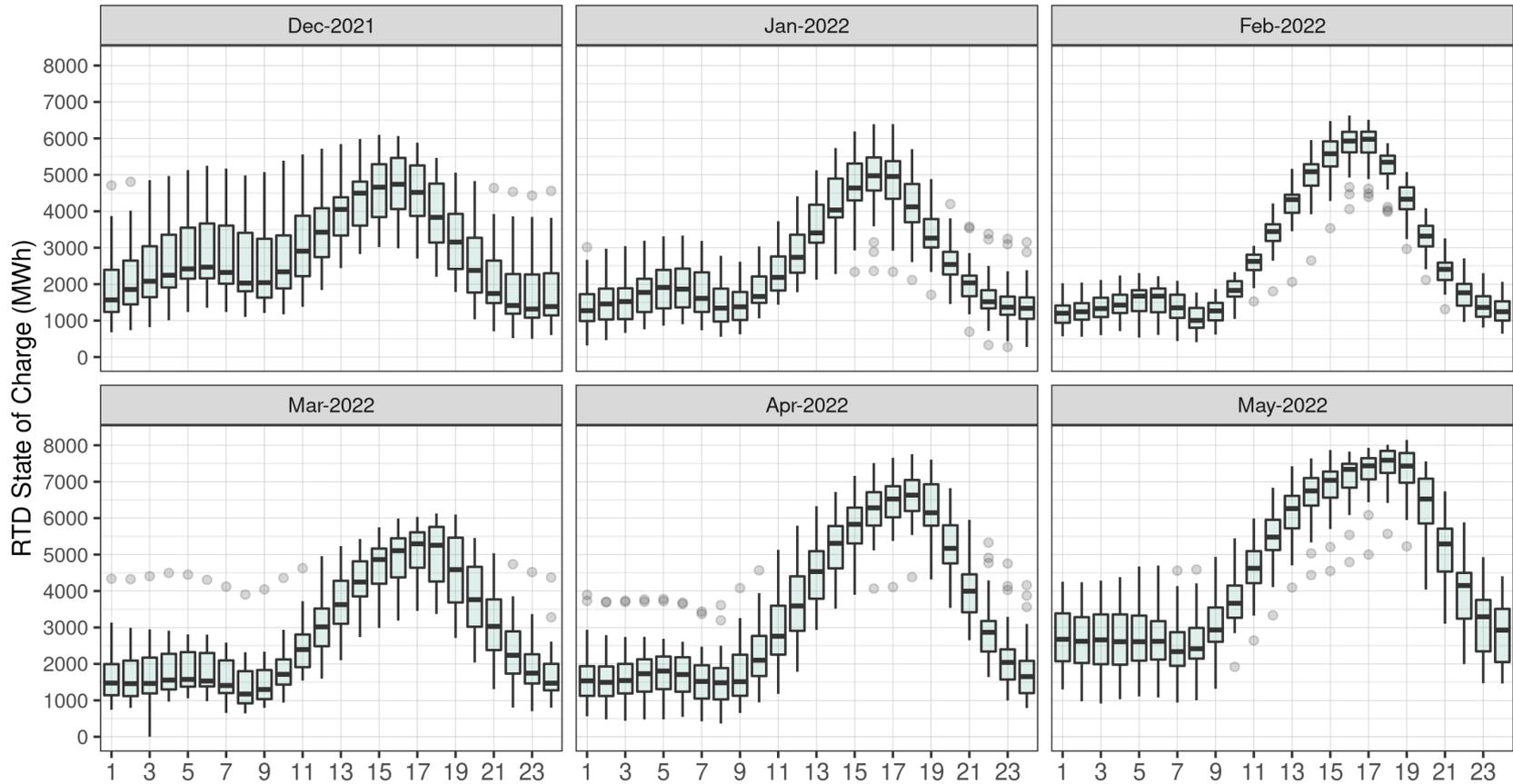
- Storage DEB option is being relatively well-utilized
- Storage DEB values appears to be roughly in line with other DEB types with the exception of the hydro DEB
- In RTM, the price-based opportunity cost component plays a substantial role in setting the DEB value
- Mitigation of storage resources is in line with other resource types

Storage Resources

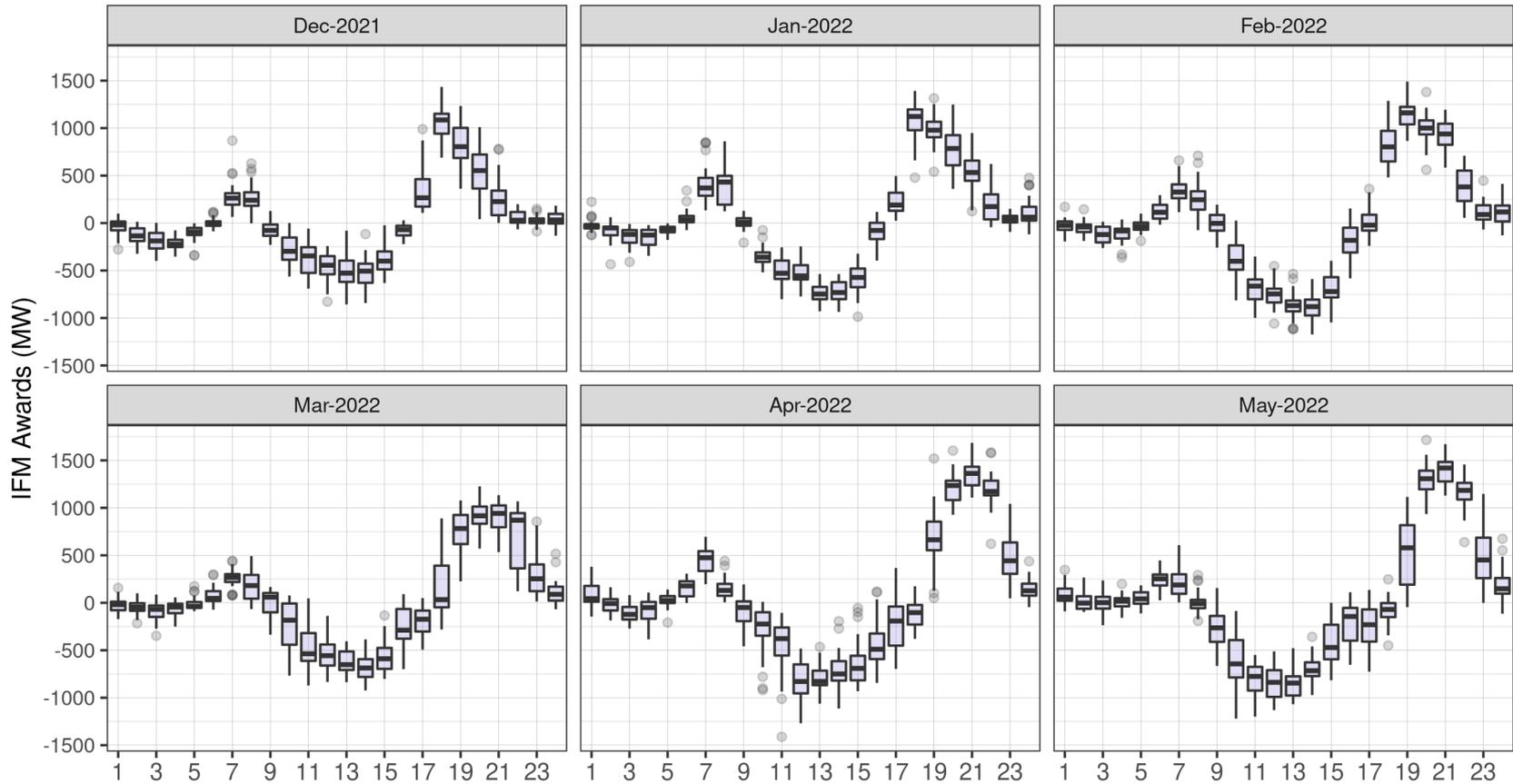
Day-Ahead state of charge for storage resources was the highest in hour ending 14 through 17



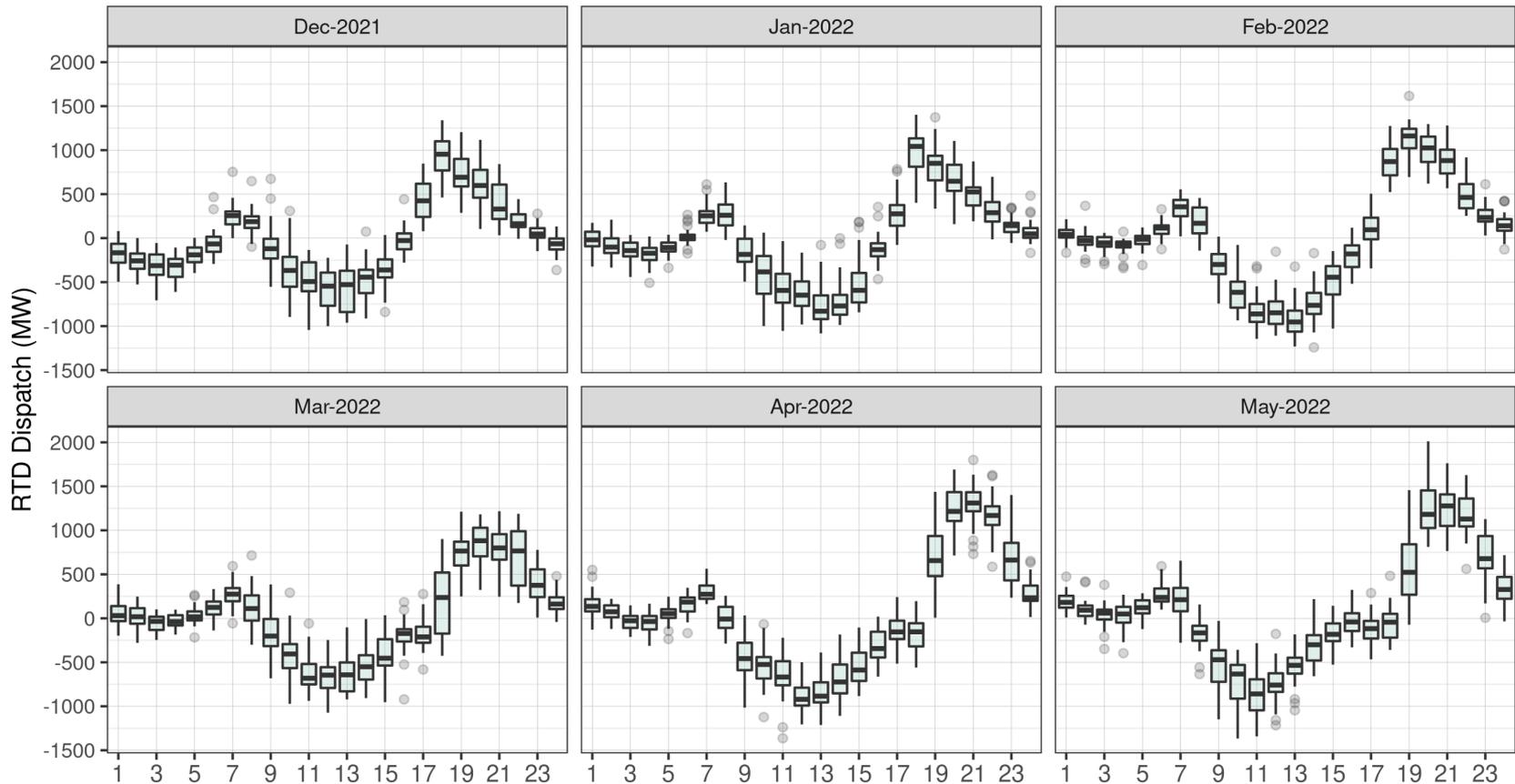
Real-Time state of charge for storage resources was in line with the day-ahead state of charge



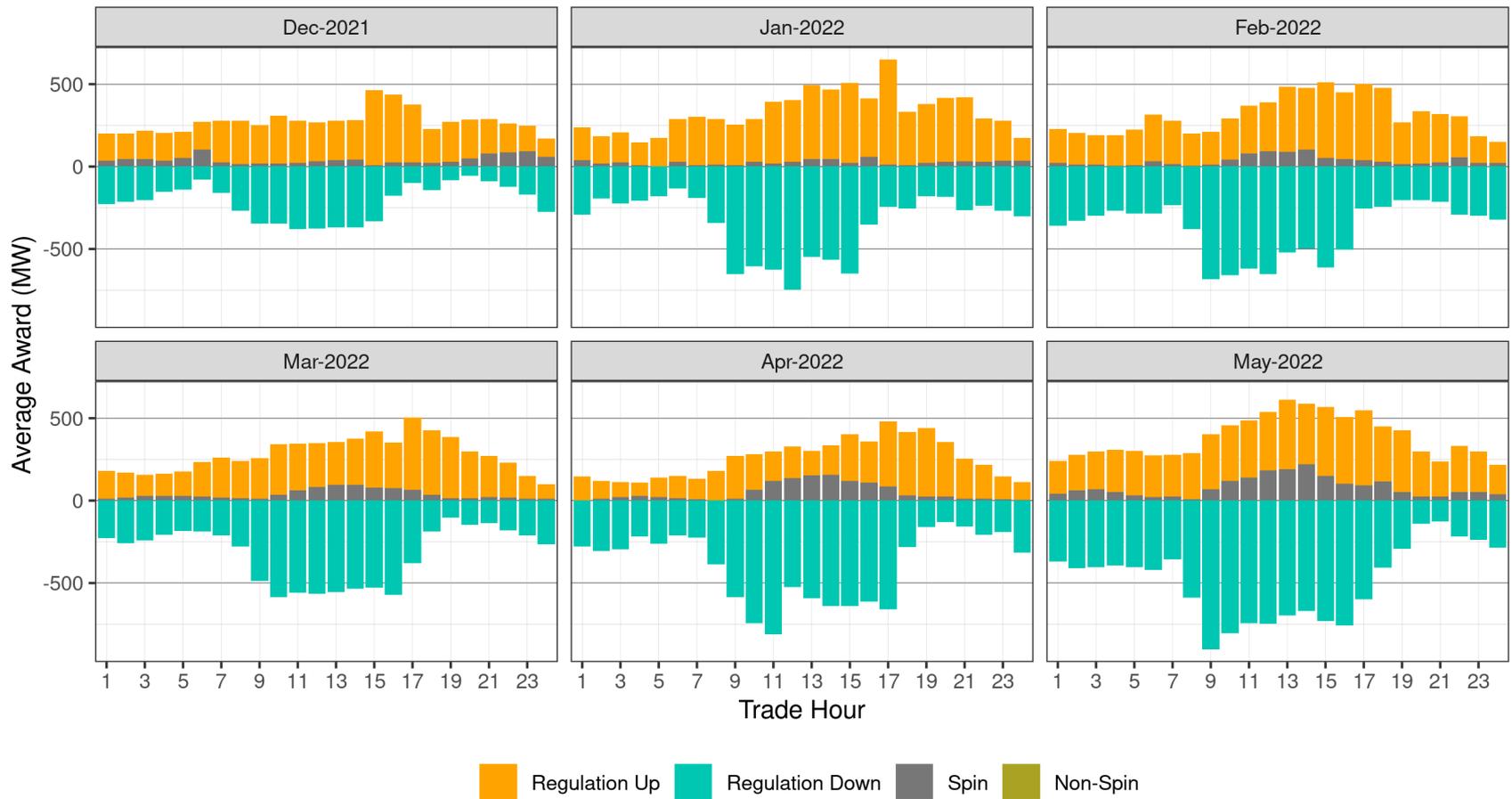
Storage resources were consistently charging during solar hours and discharging during net load peaks



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



Batteries continue to provide both Regulation up and Regulation down



CAISO will start posting a daily report for storage resources

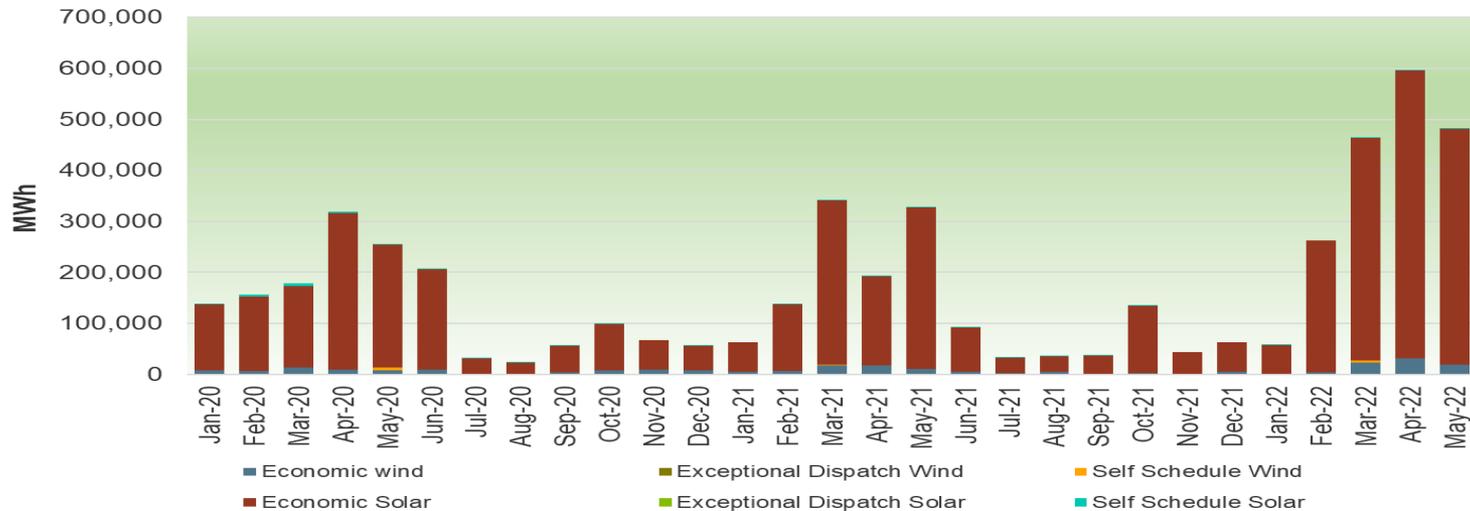
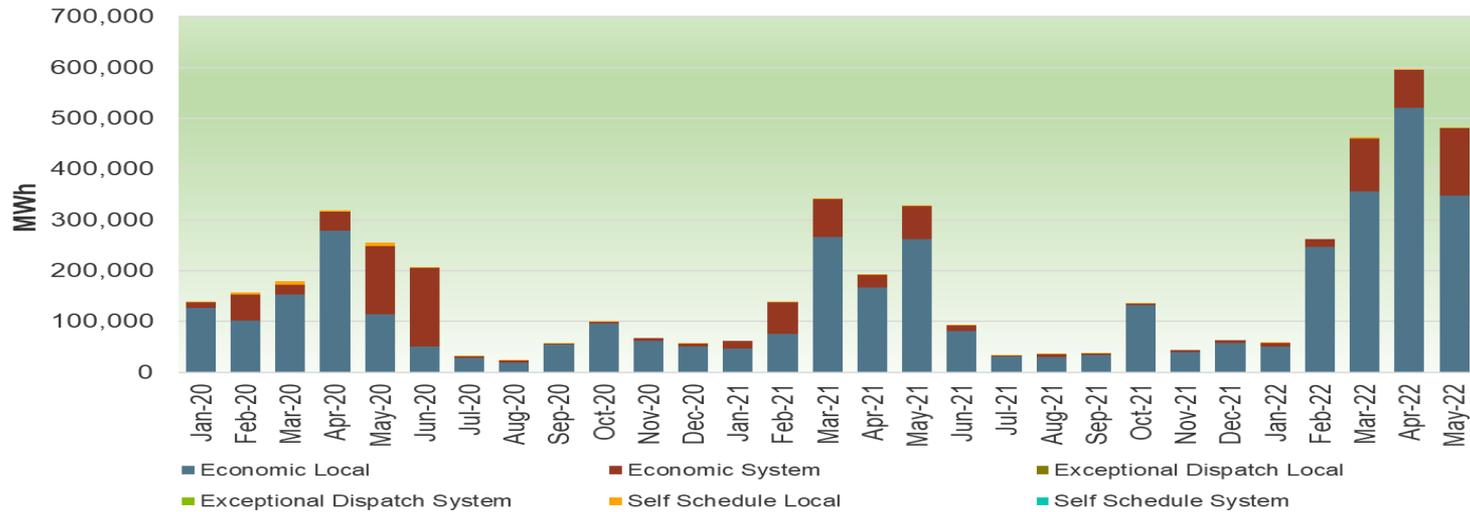


It will provide daily metrics on available capacity, energy, ancillary services and state of charge

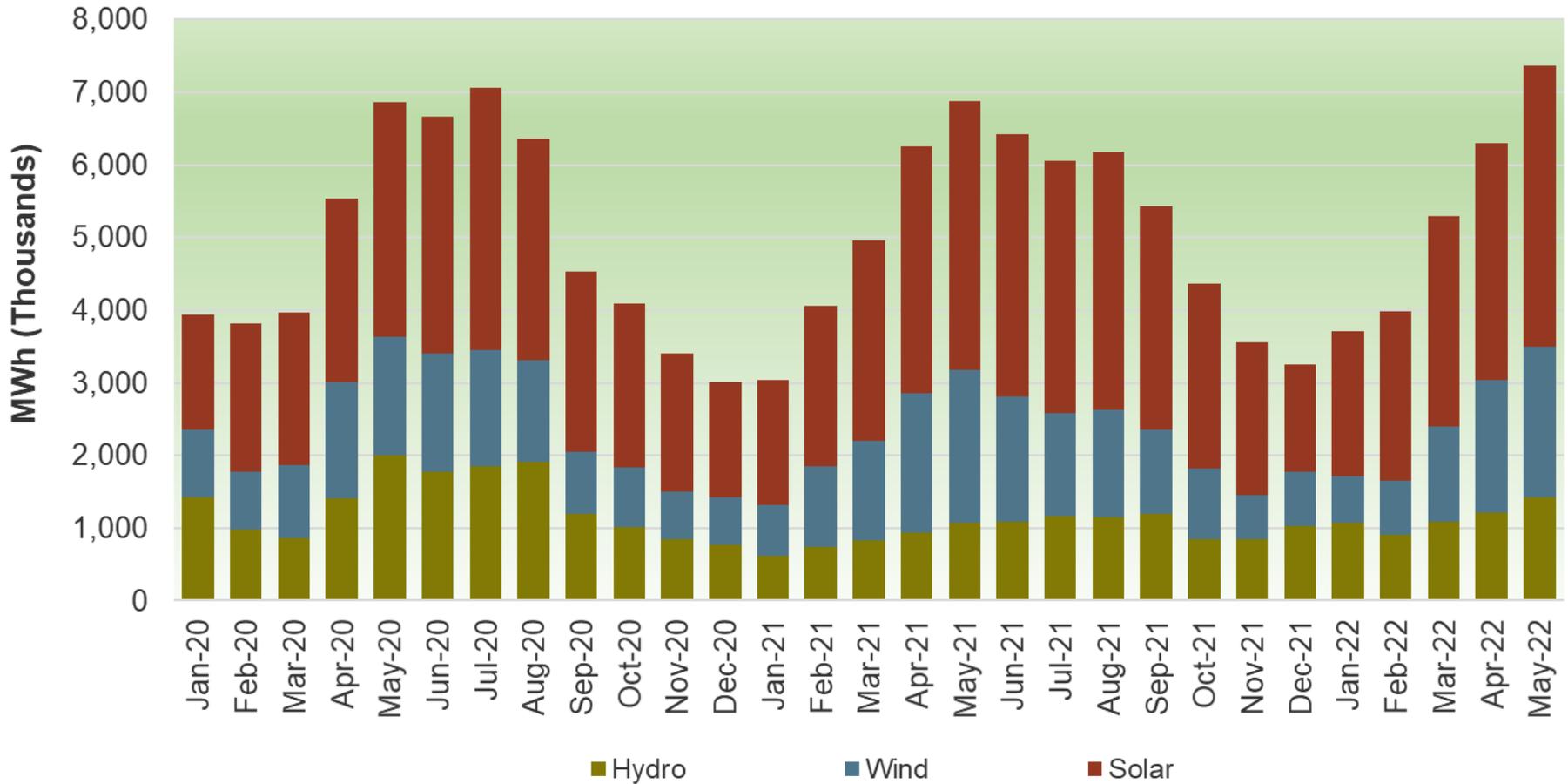
It will differentiate between storage resources and hybrid resources

Market Performance Metrics

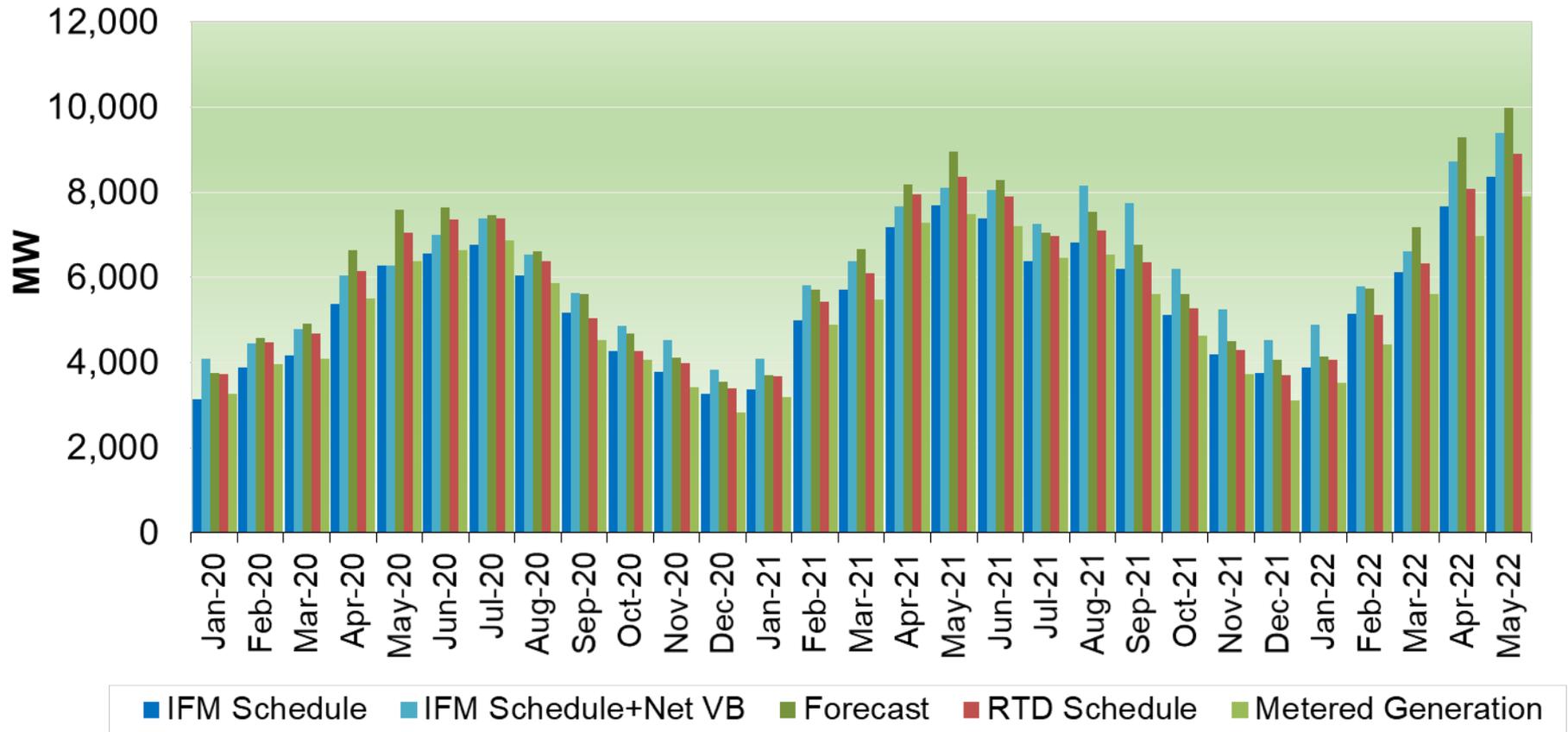
RTD renewable (VERs) curtailment fell in May



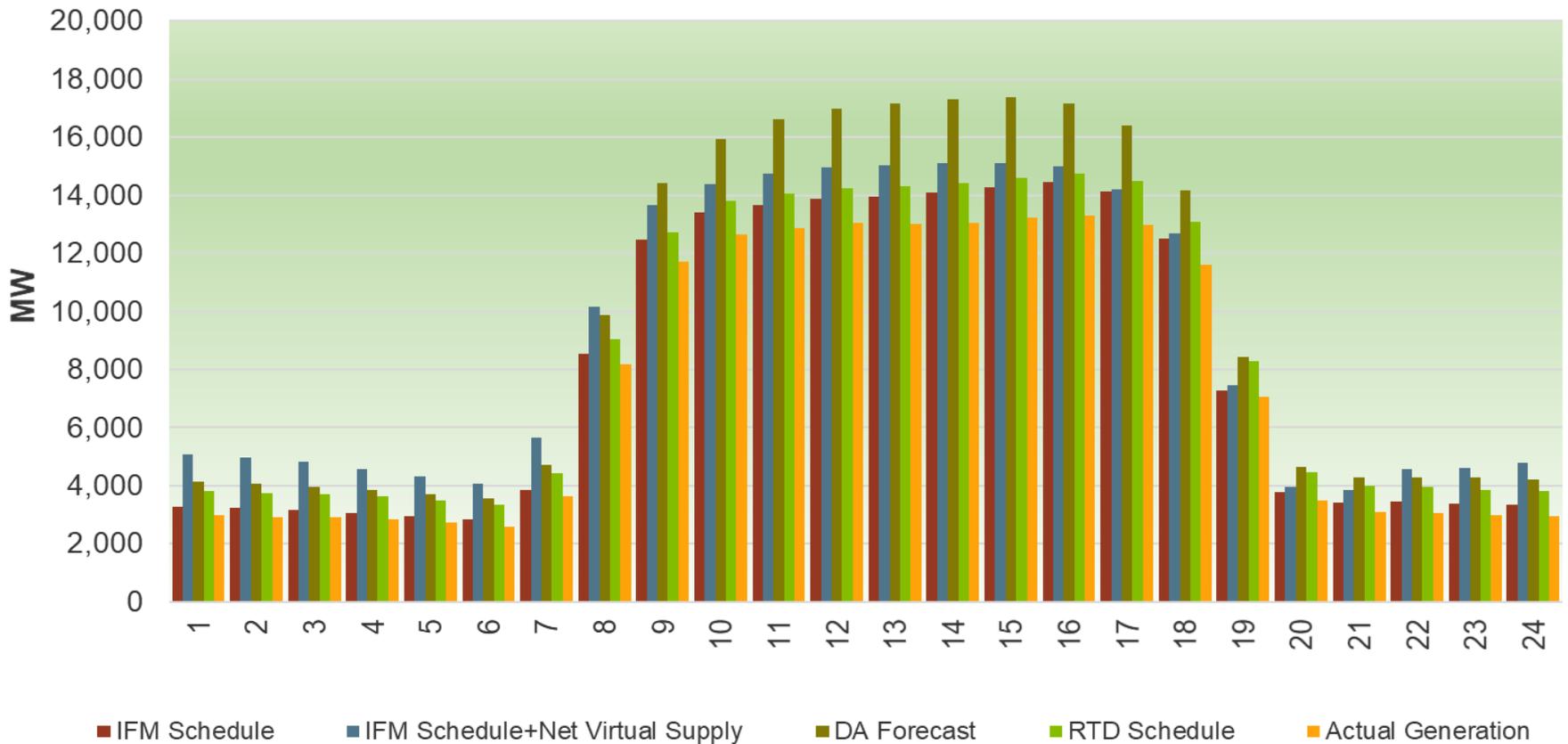
Hydro production relatively low, similar to previous year



ISO total monthly VERS schedules and forecasts compared to actuals

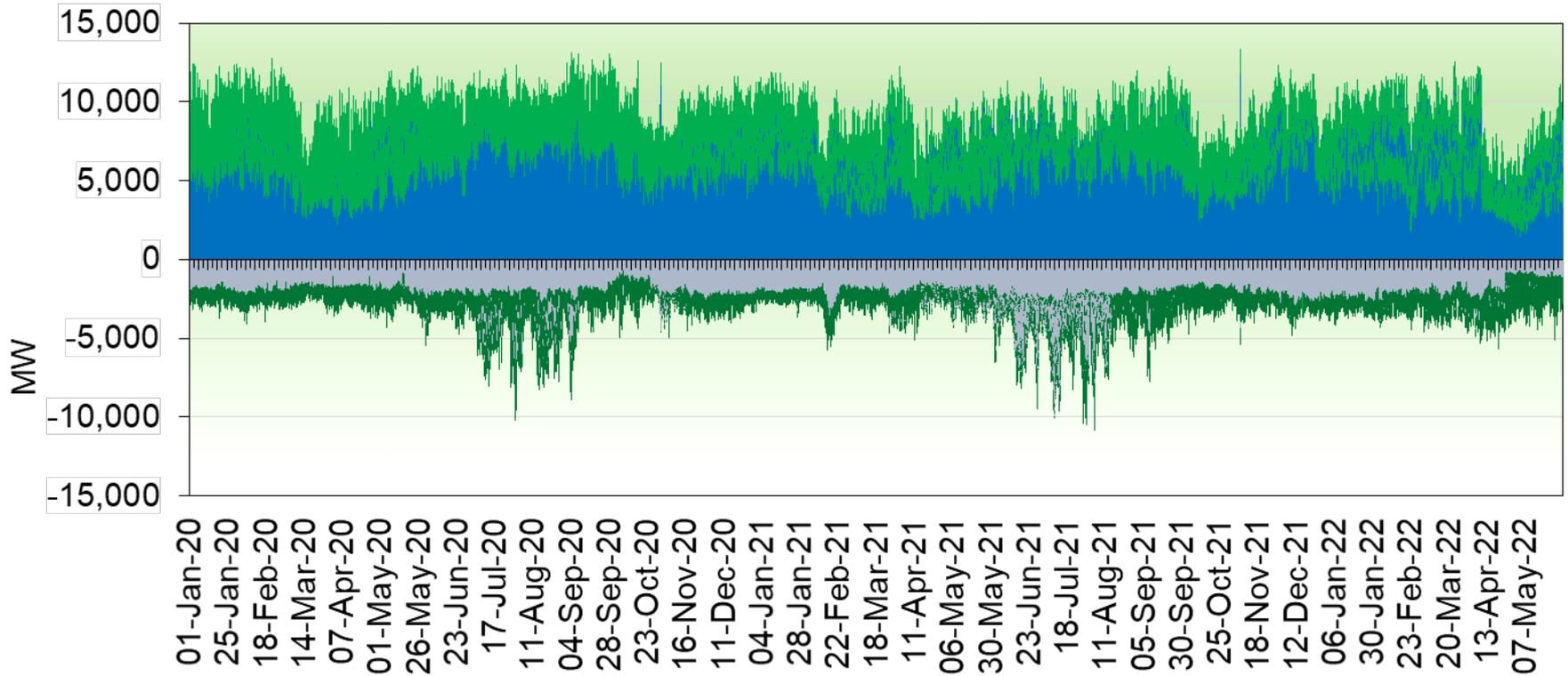


Renewable (VERS) schedules including net virtual supply aligns with VER forecast in April and May



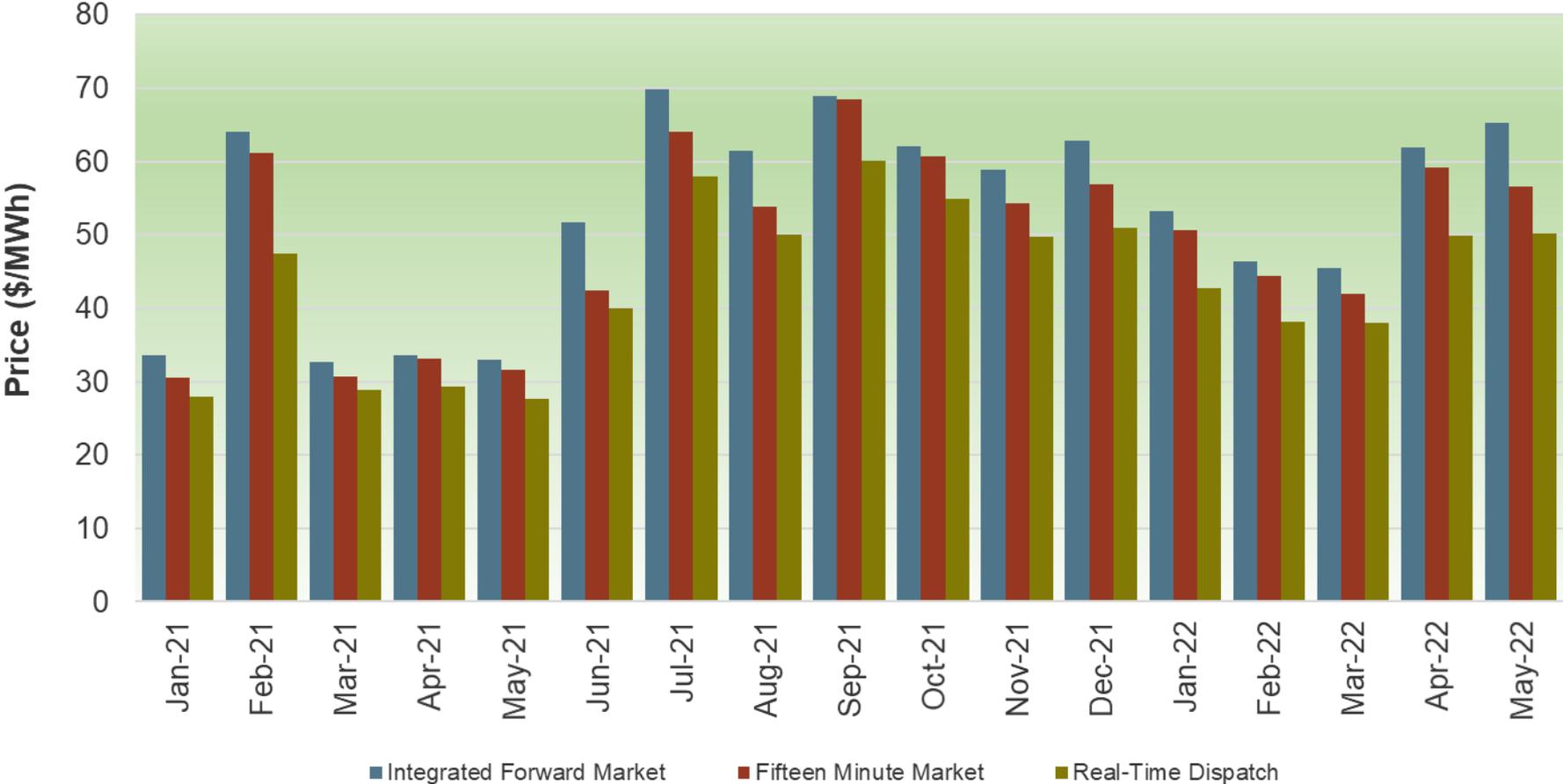
<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=EFF75C2E-F28E-4087-B88B-8DFFAED828F8>

Self scheduled exports declined in April and May



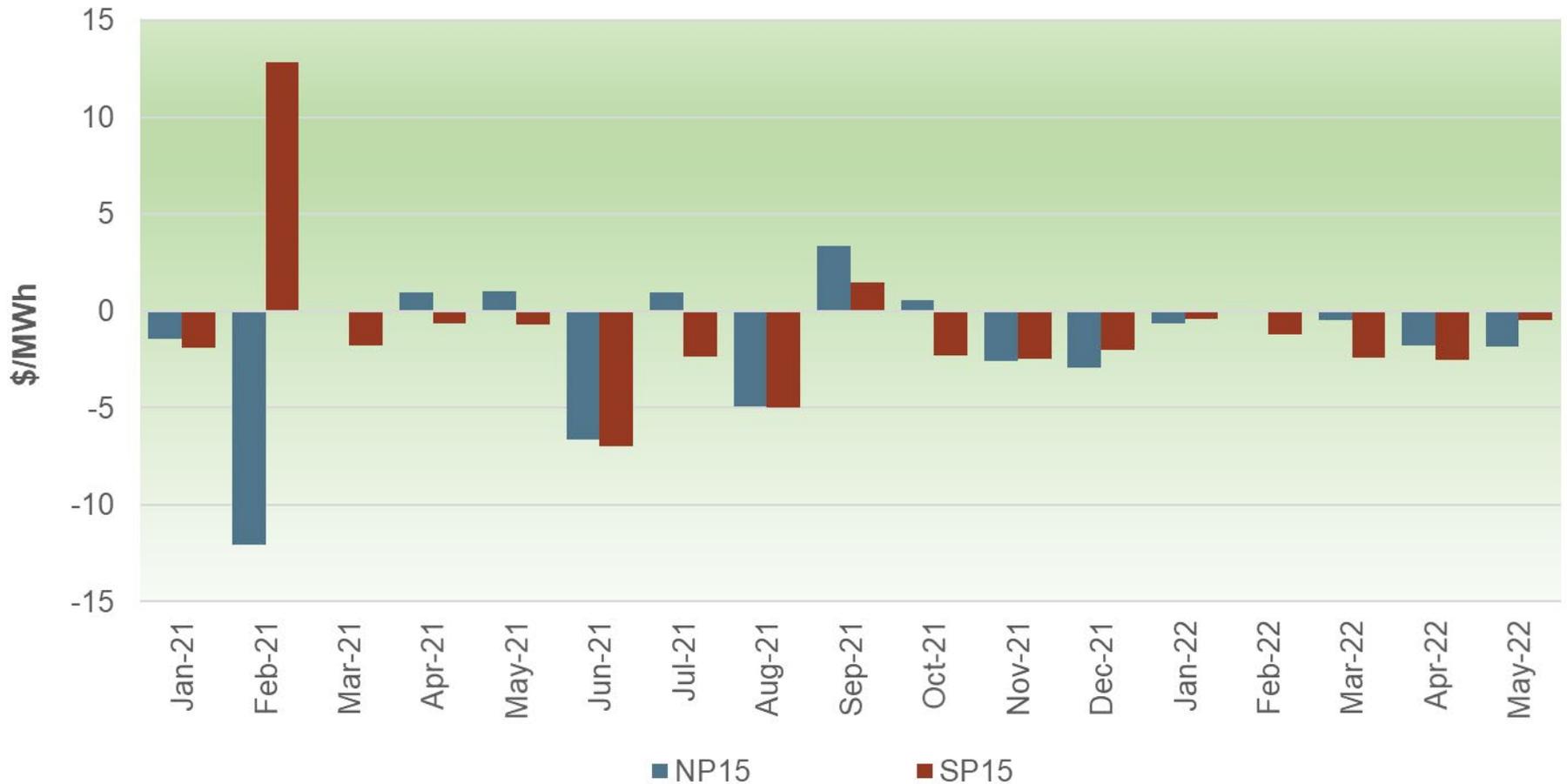
■ Self Sched Export ■ Bid-In Export ■ Self Sched Import ■ Bid-in Import

Lower average real-time prices

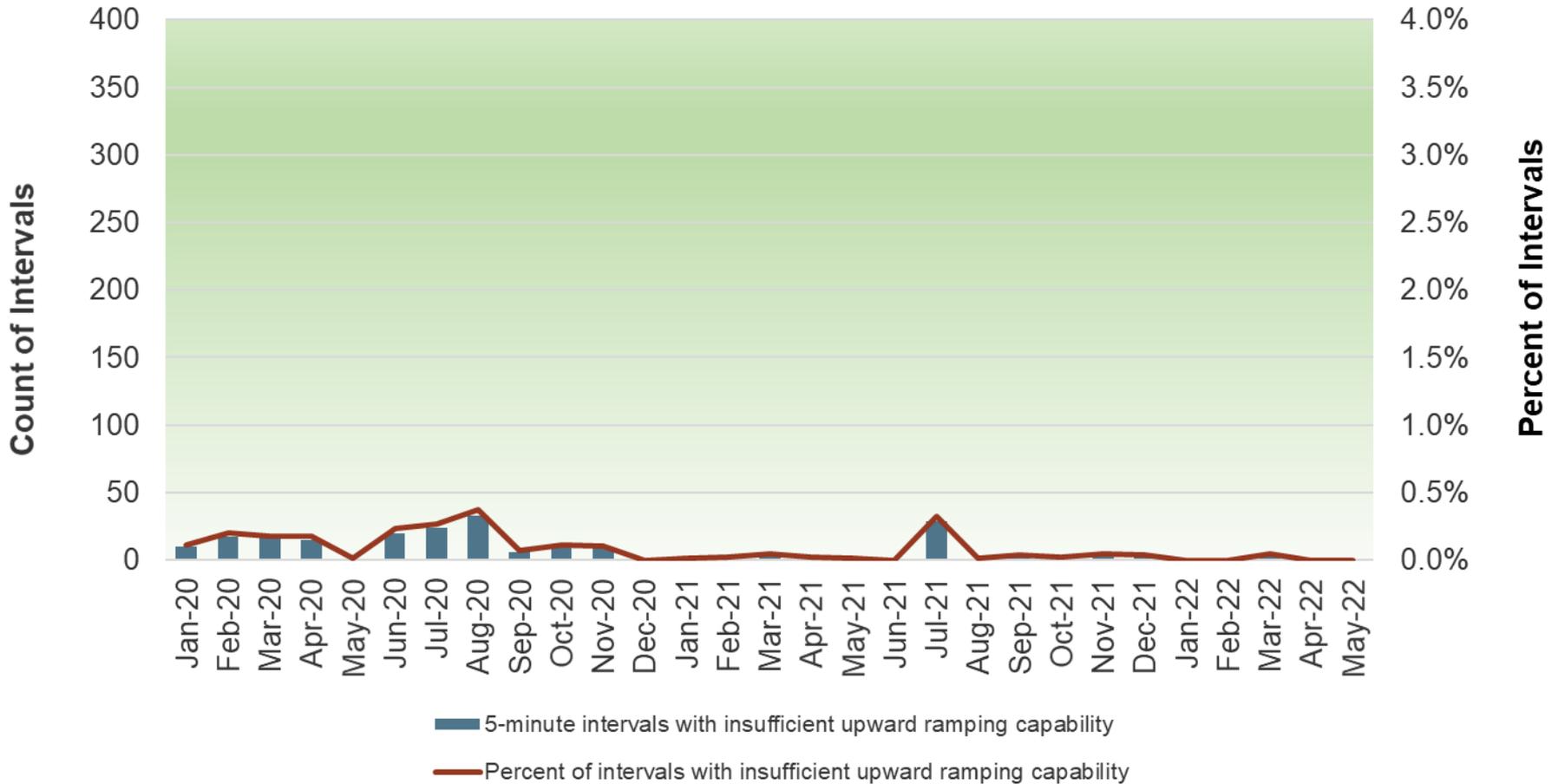


Note: Metric Based on System Marginal Energy Component (SMEC)

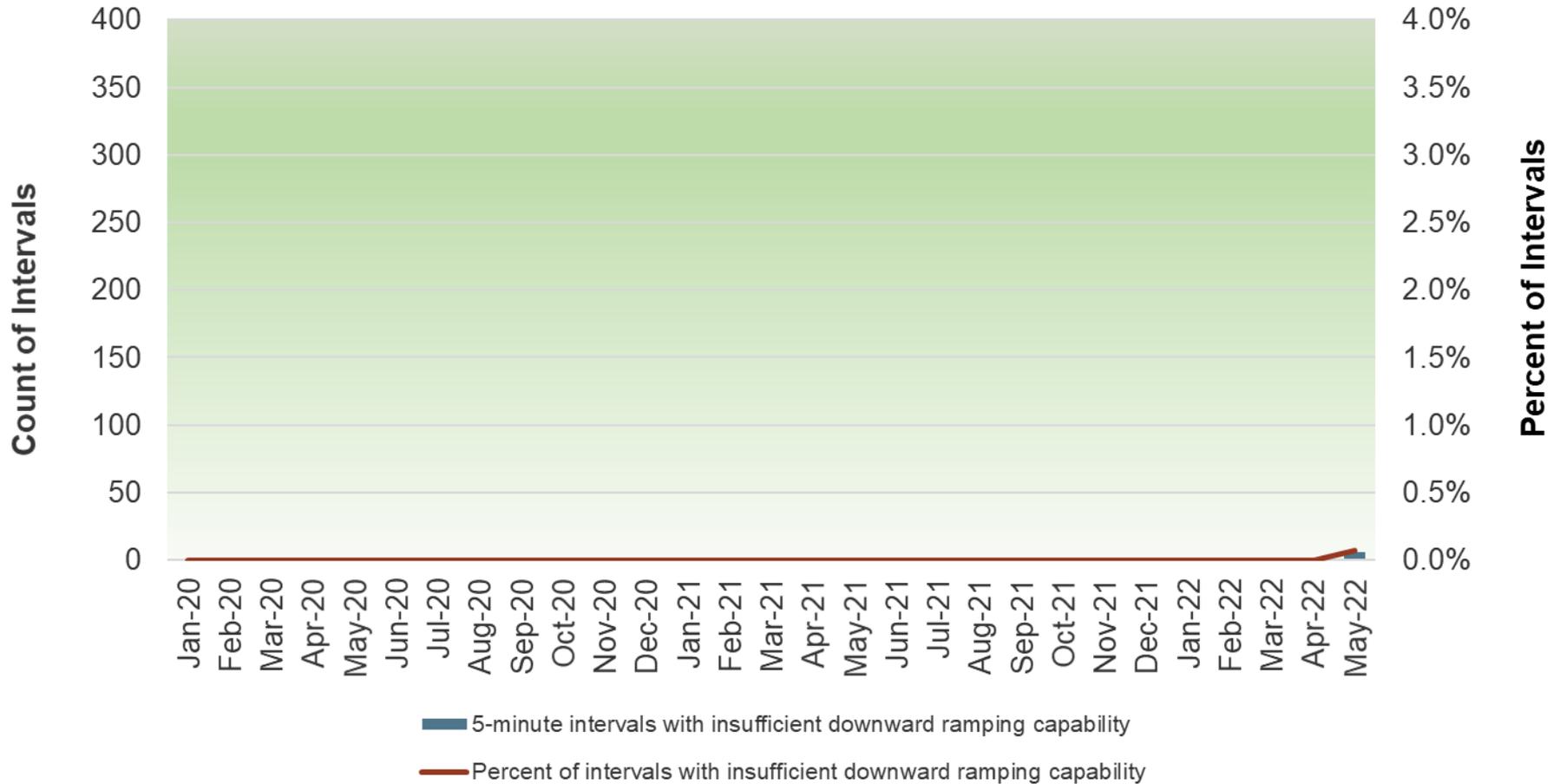
Real-time prices lower than day-ahead prices for both NP15 and SP15 since last November



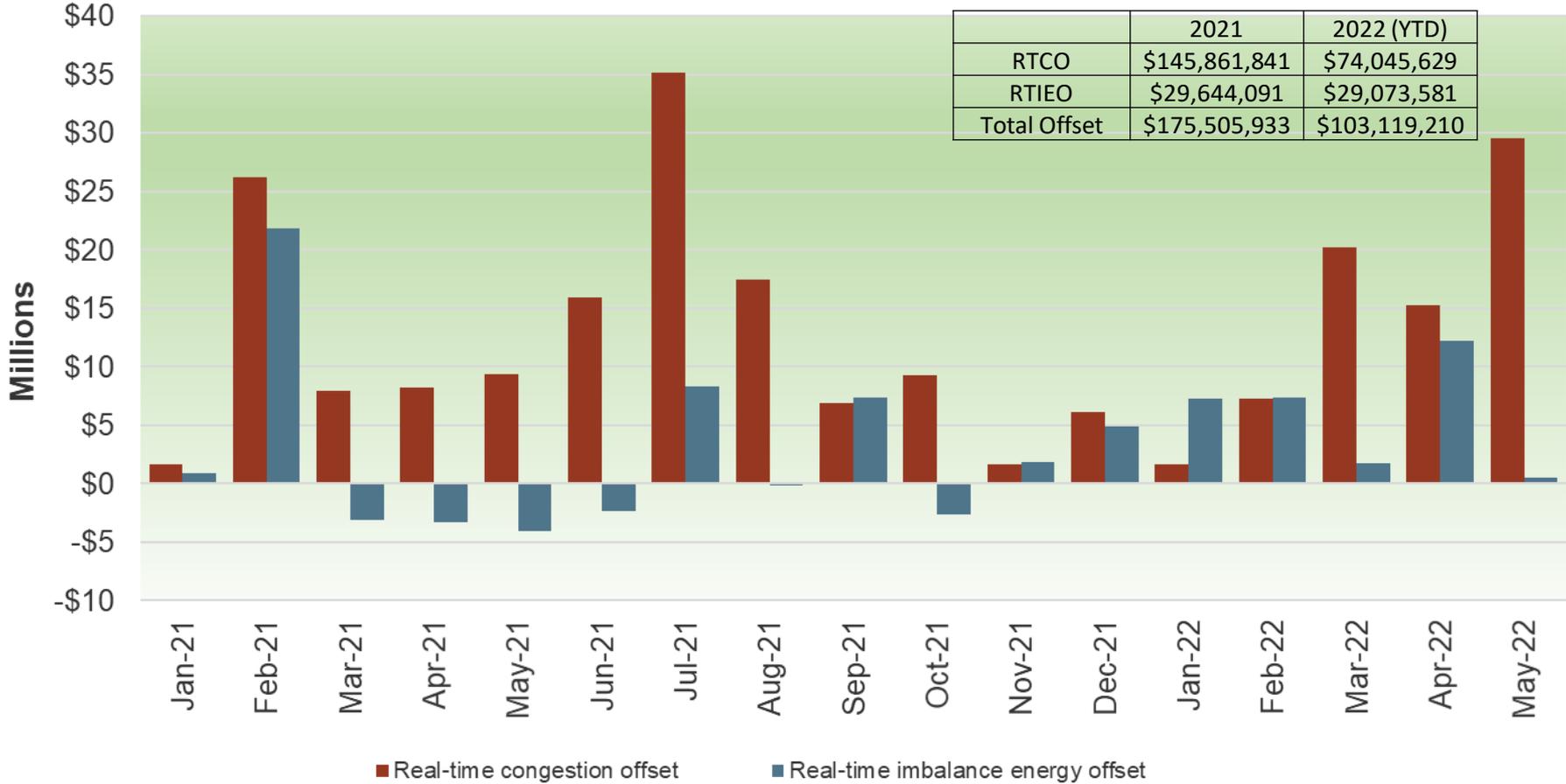
Insufficient upward ramping capacity in ISO real-time decreased since last July



Insufficient downward ramping capacity in real-time stayed low



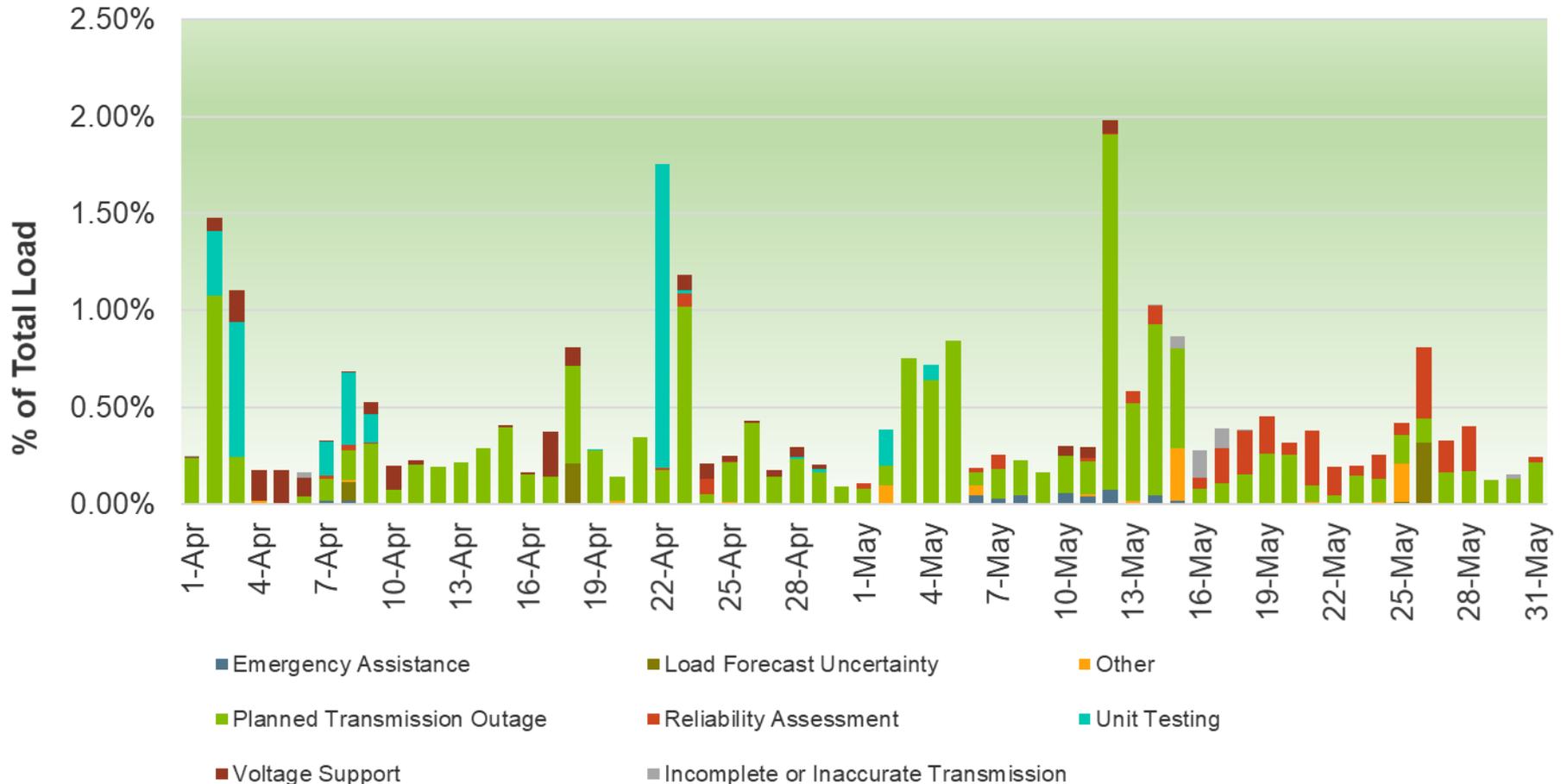
ISO area real-time imbalance congestion offset trended upward since February



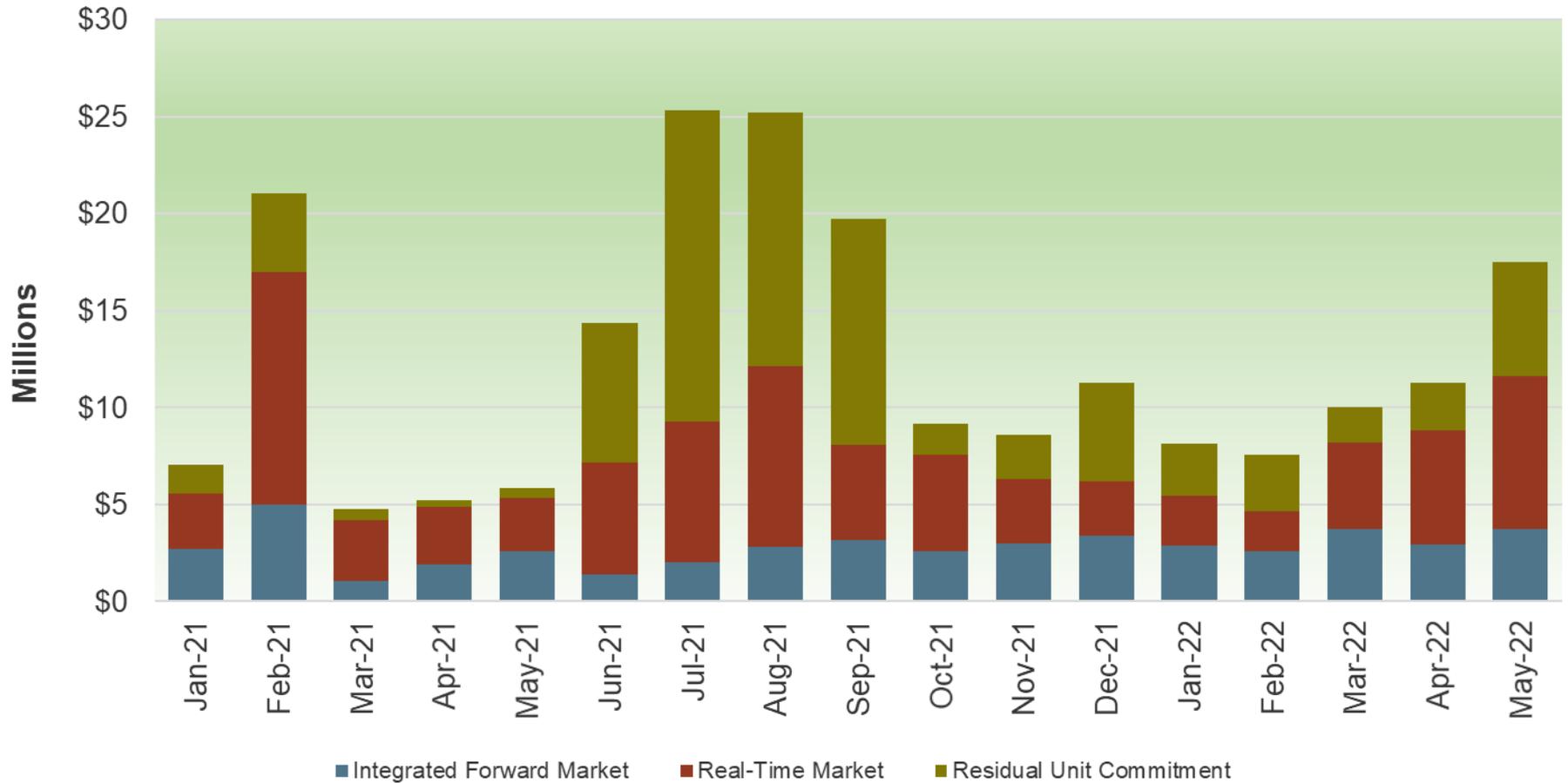
Exceptional dispatch volume in the ISO area are at low levels



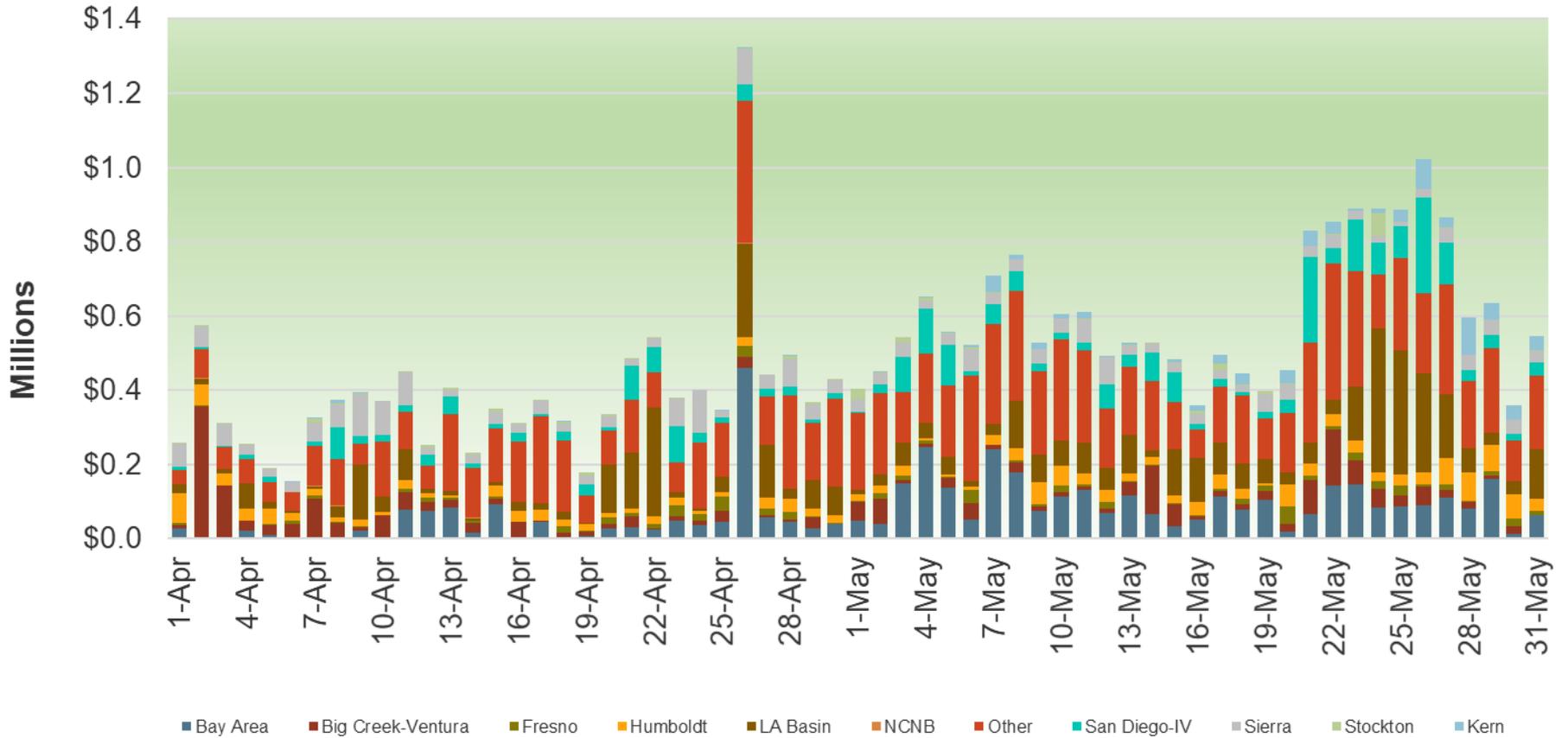
Exceptional dispatches volume driven by a variety of reasons in April and May



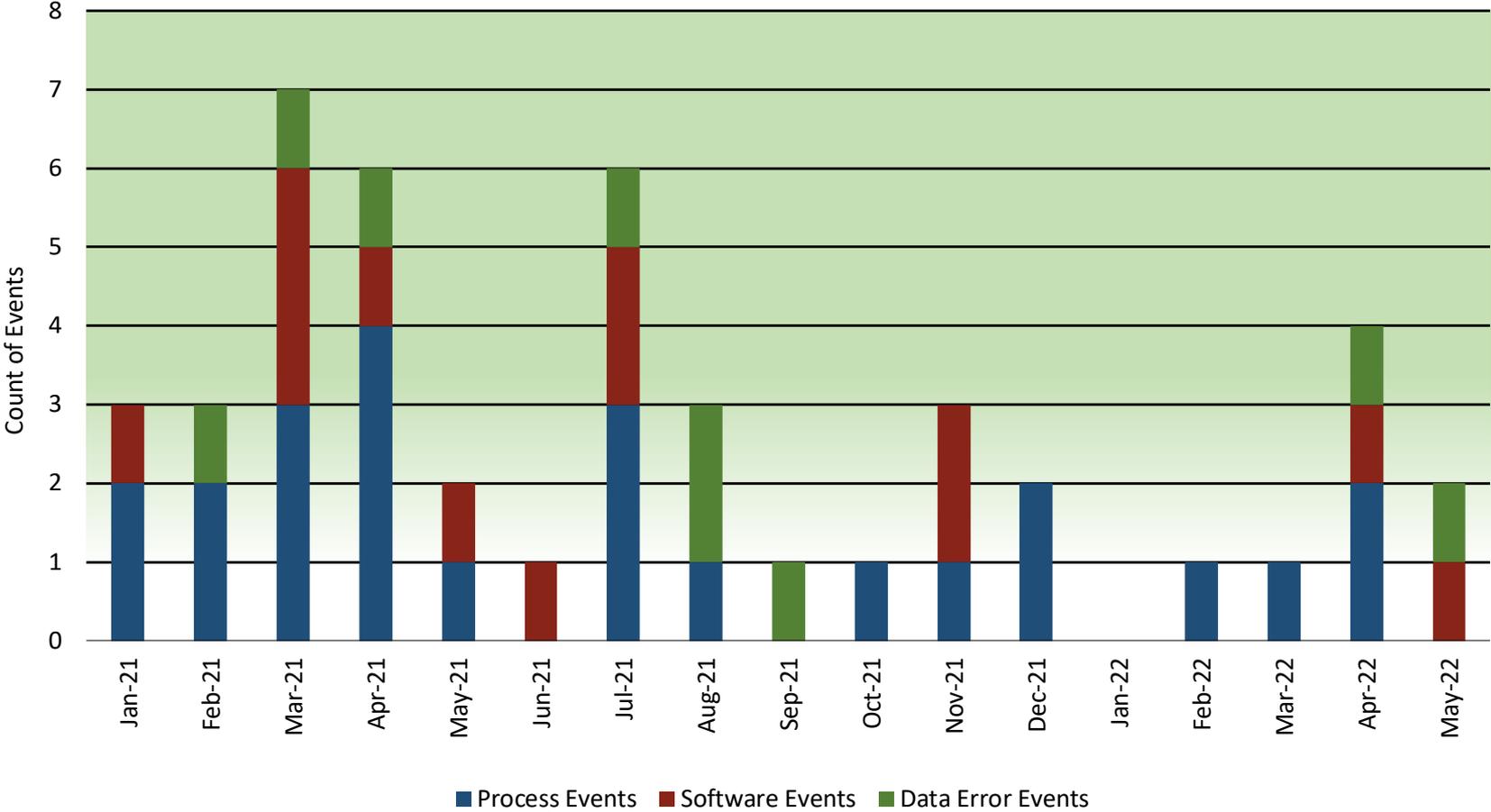
Bid cost recovery increased since February



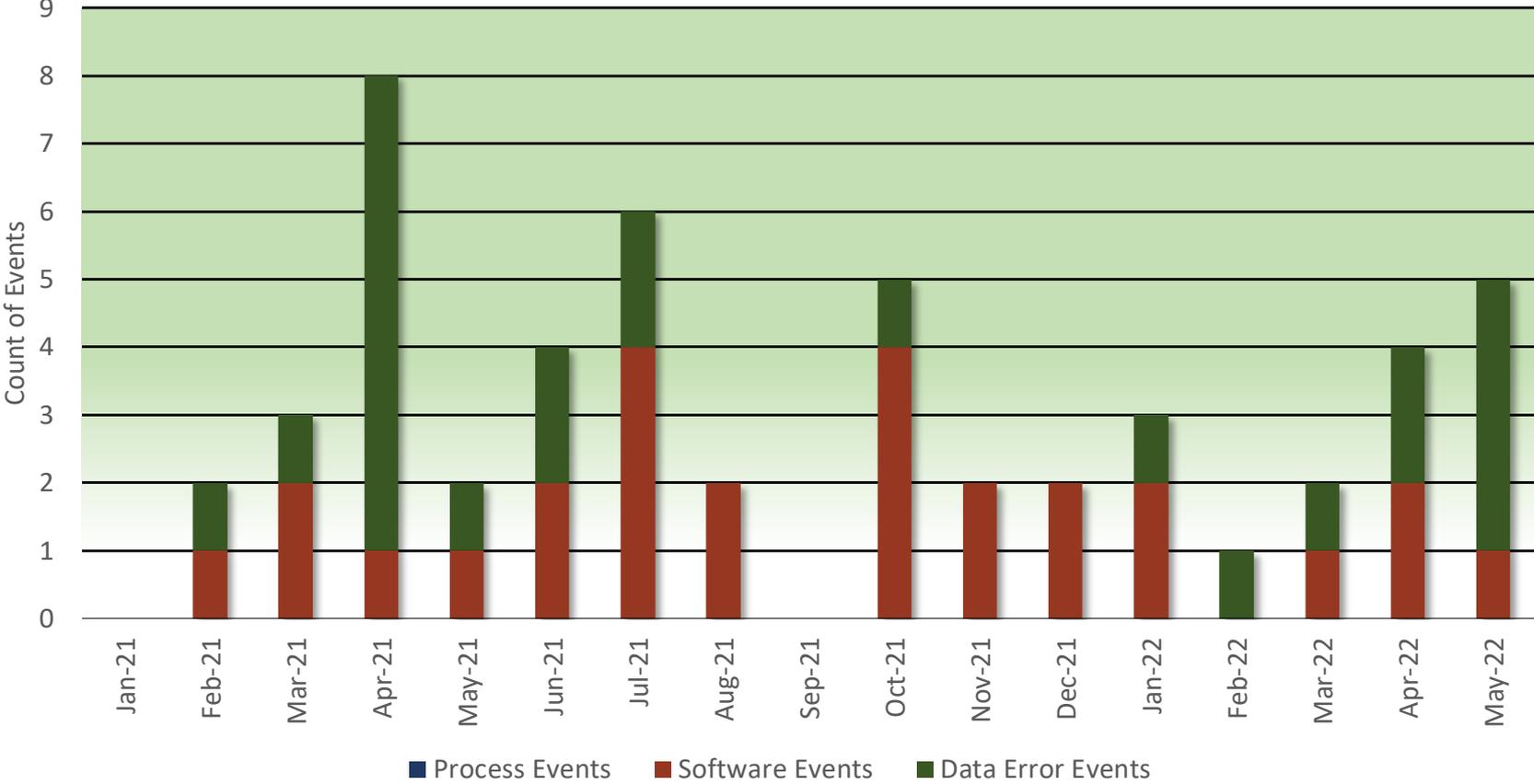
Bid cost recovery (BCR) by Local Capacity Requirement area



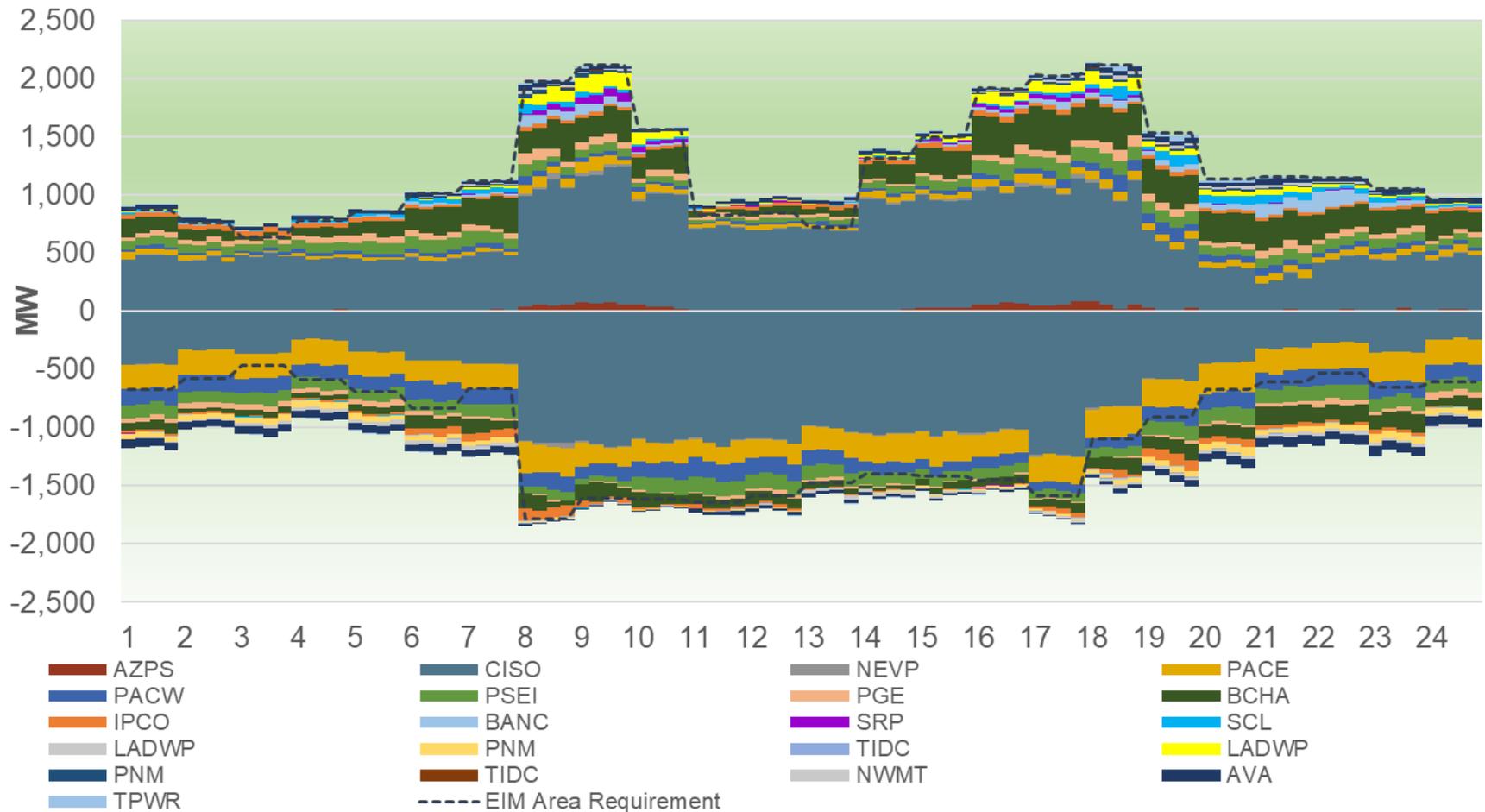
CAISO price correction events increased in April and May



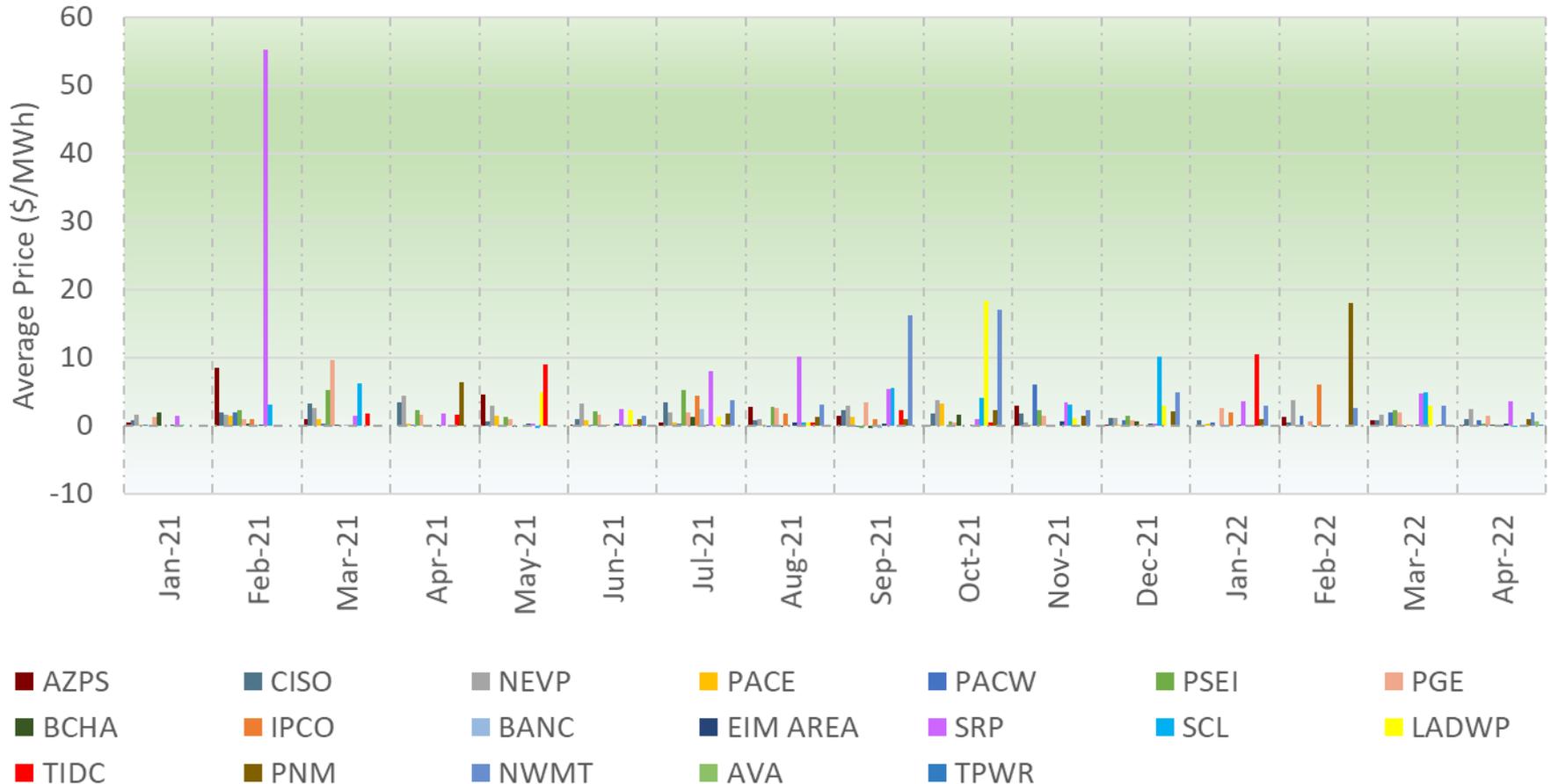
EIM-related price corrections increased in April and May



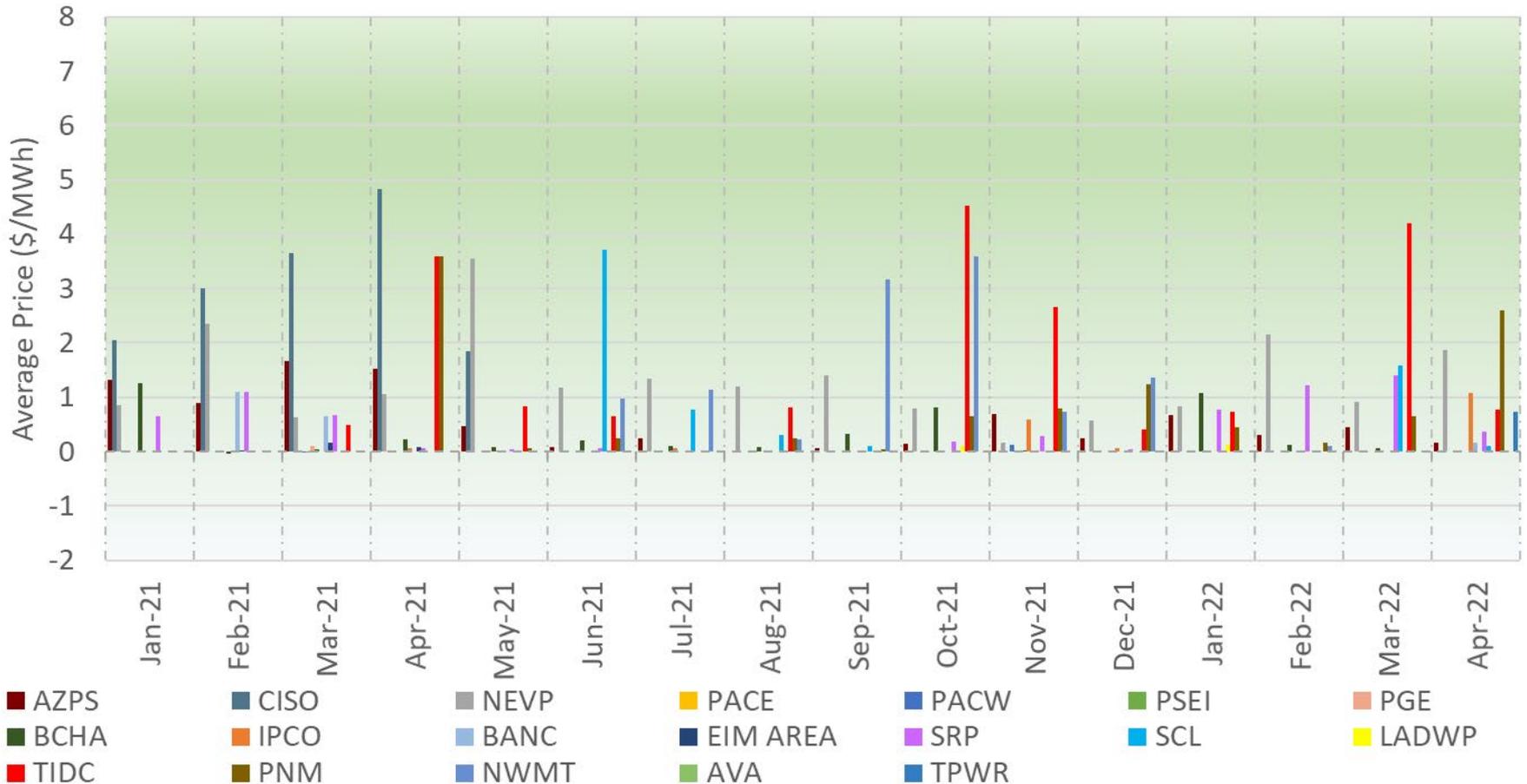
Average flexible ramp product cleared awards for each area with EIM area requirement - Mar 2022 to Apr 2022



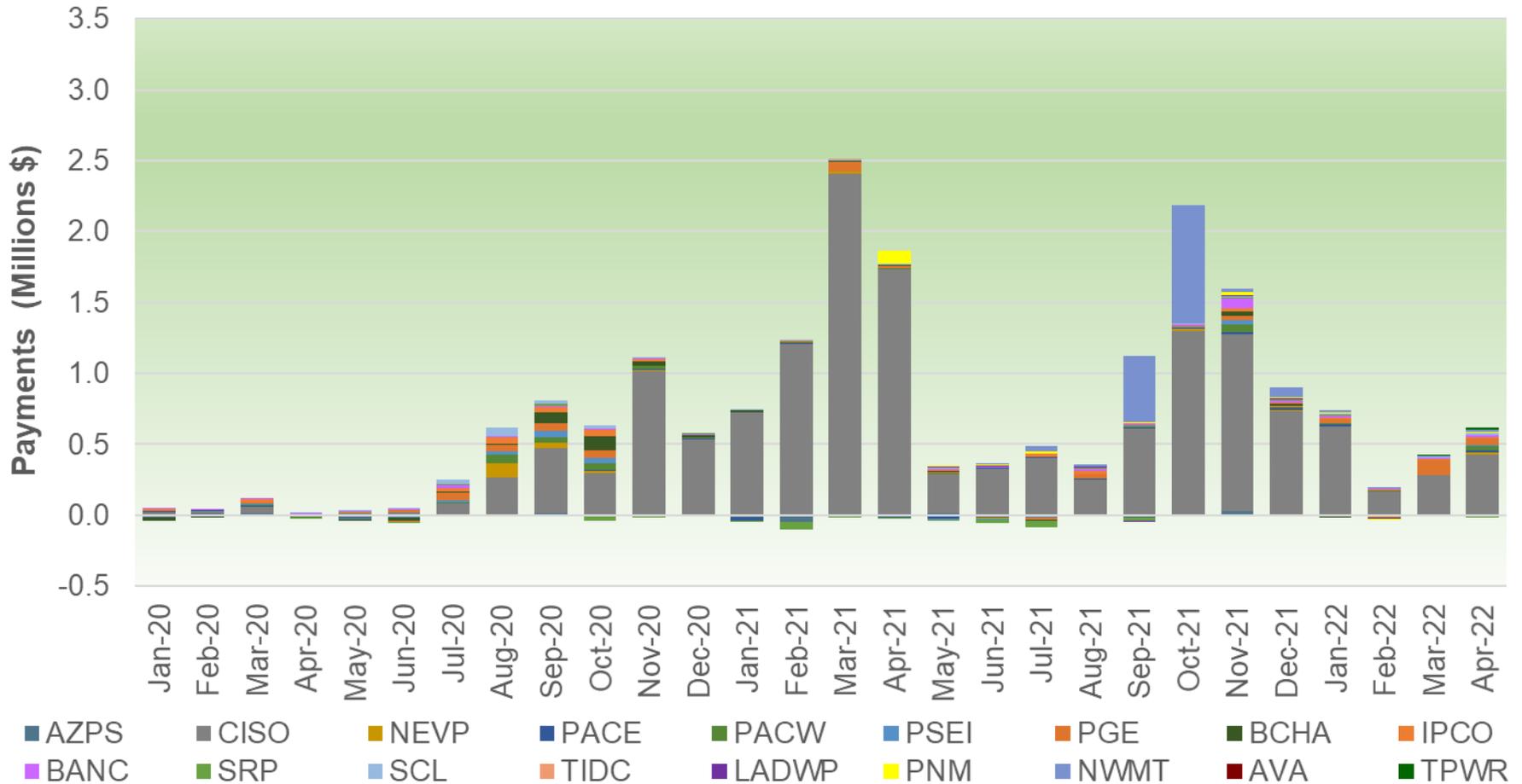
Average flexible ramp up price (\$/MWh)



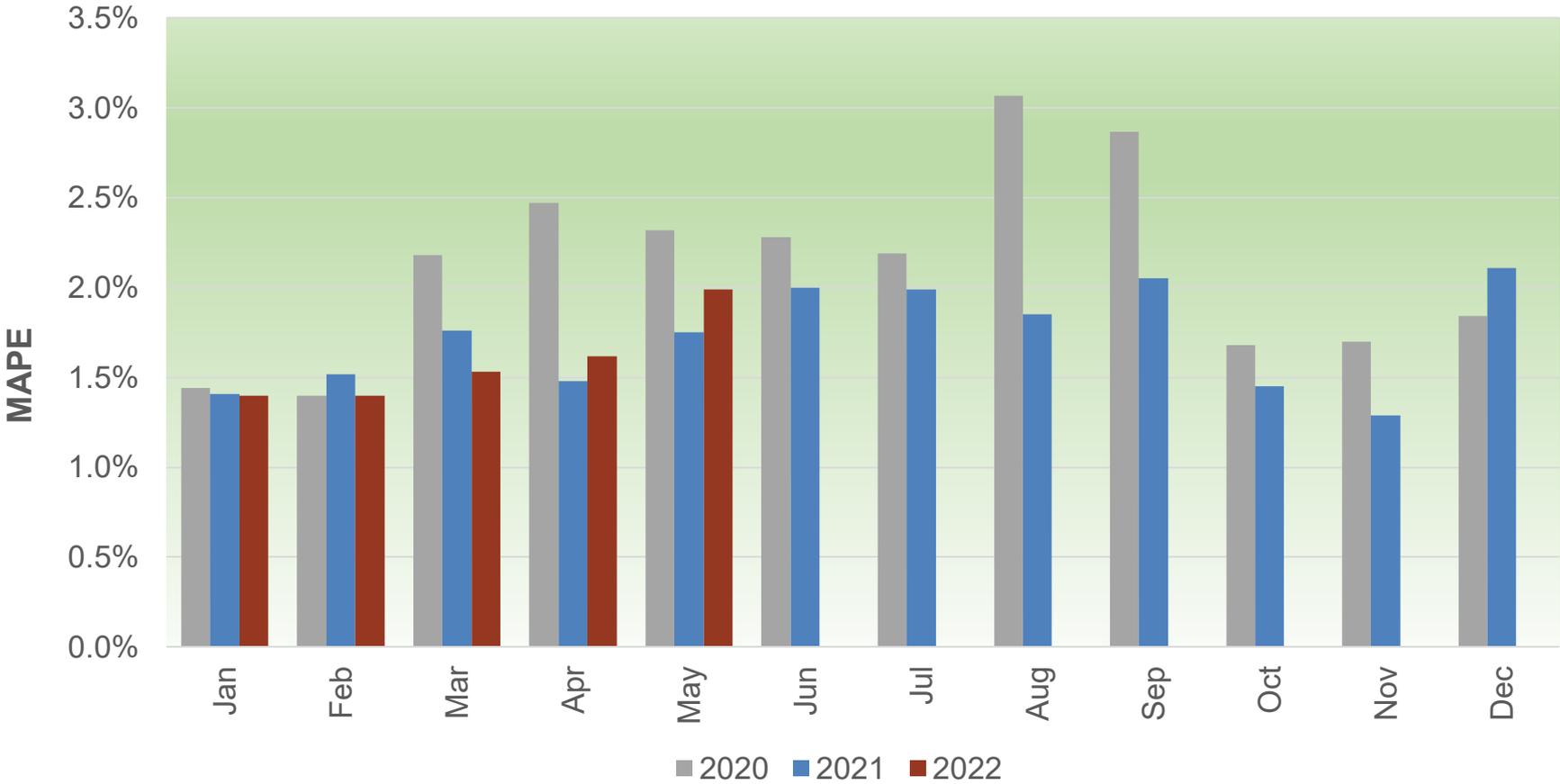
Average flexible ramp down price (\$/MWh)



Uncertainty Up Settlement Amount

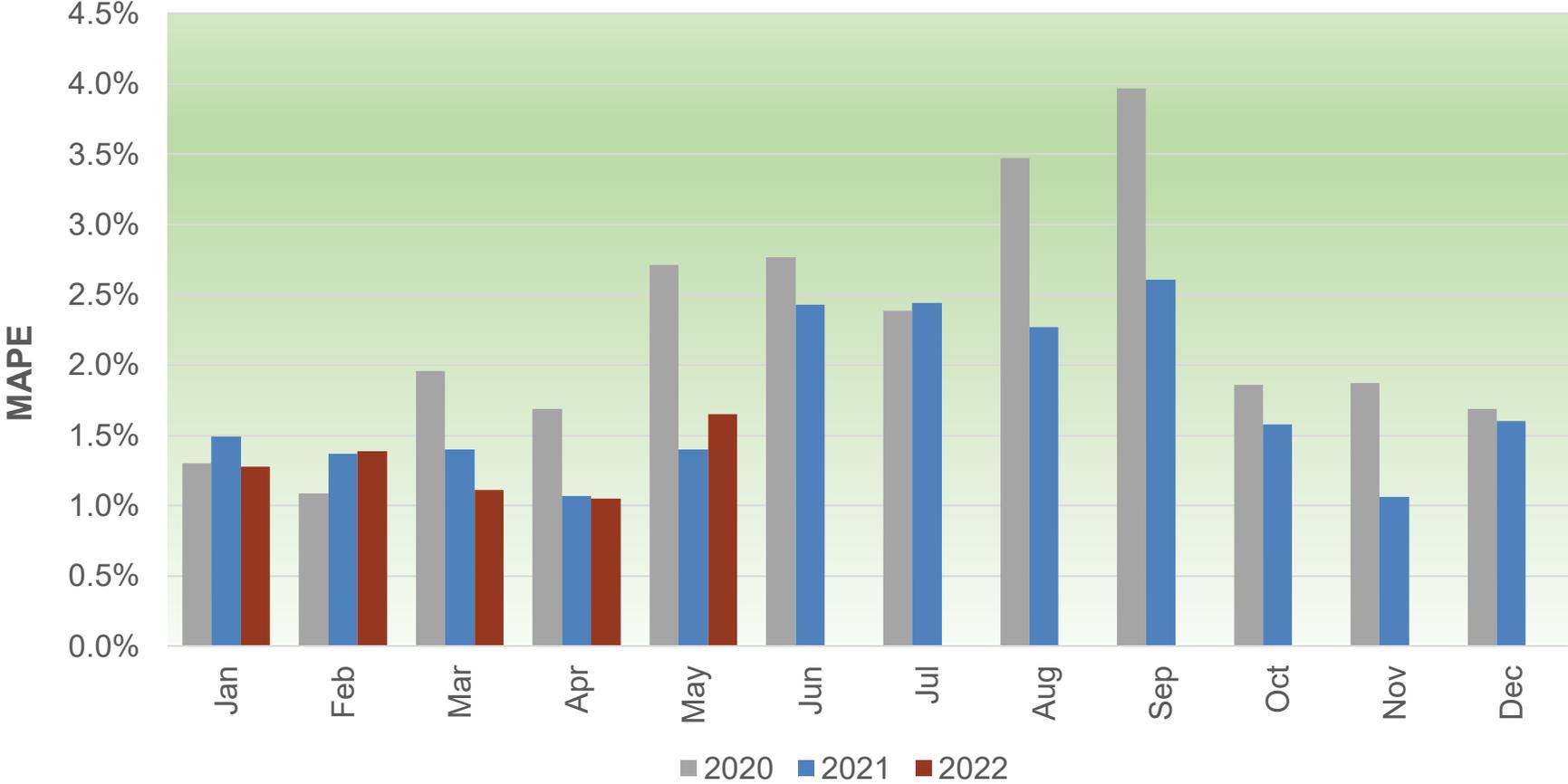


Day-ahead load forecast



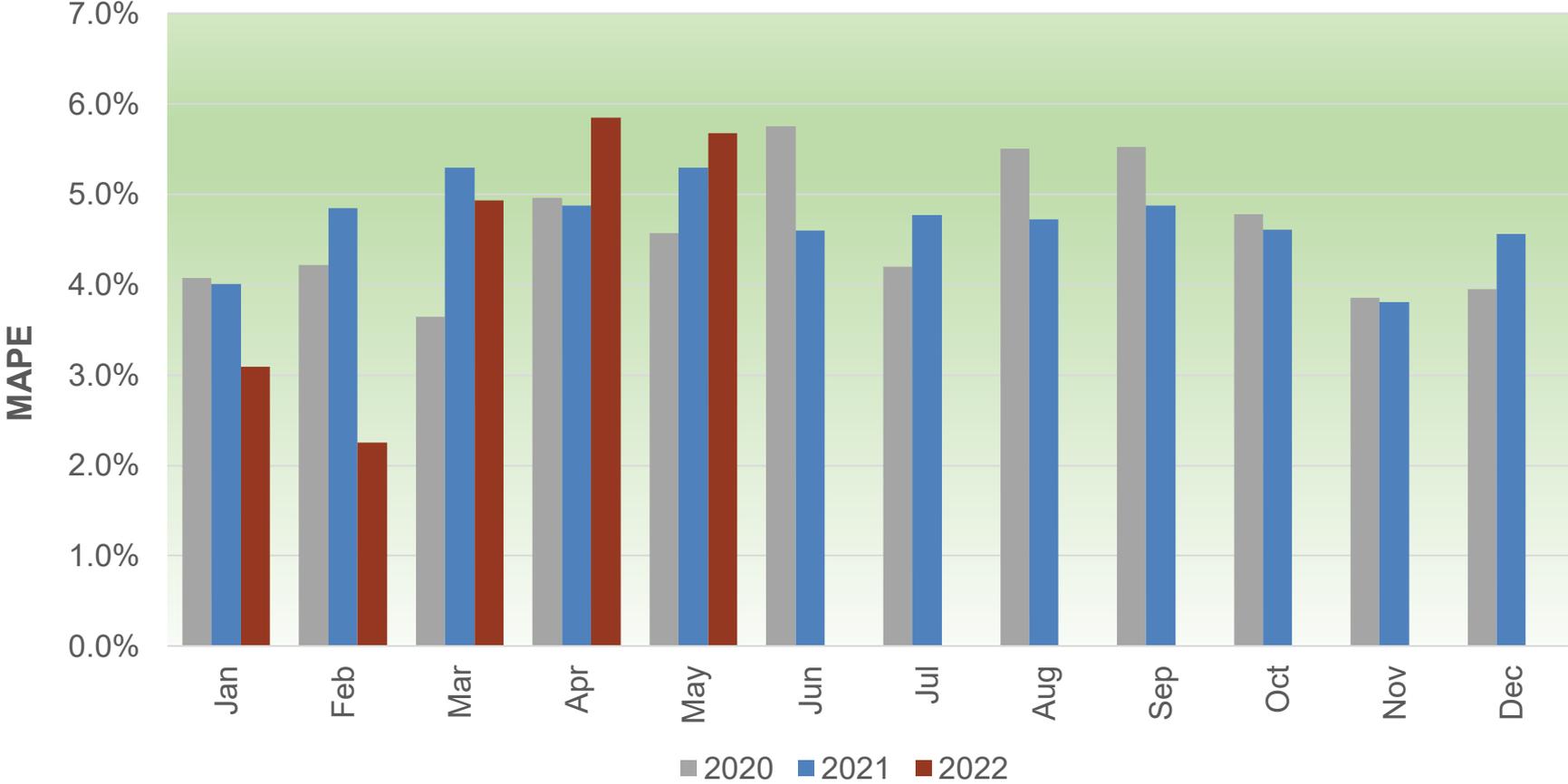
**MAPE = abs(Forecast - Actual)/Actual

Day-ahead peak forecast



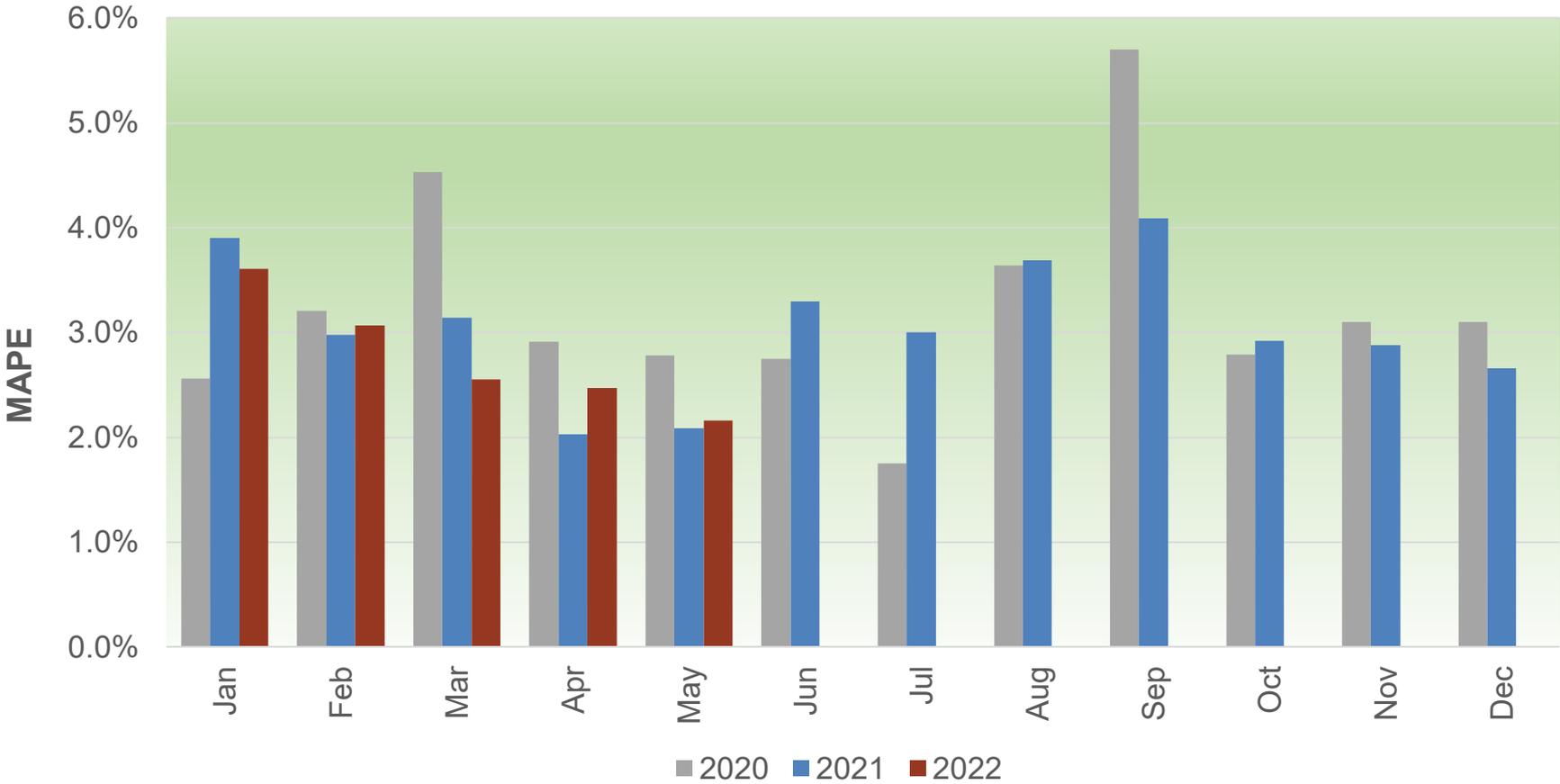
**MAPE = abs(Forecast - Actual)/Actual

Day-ahead wind forecast



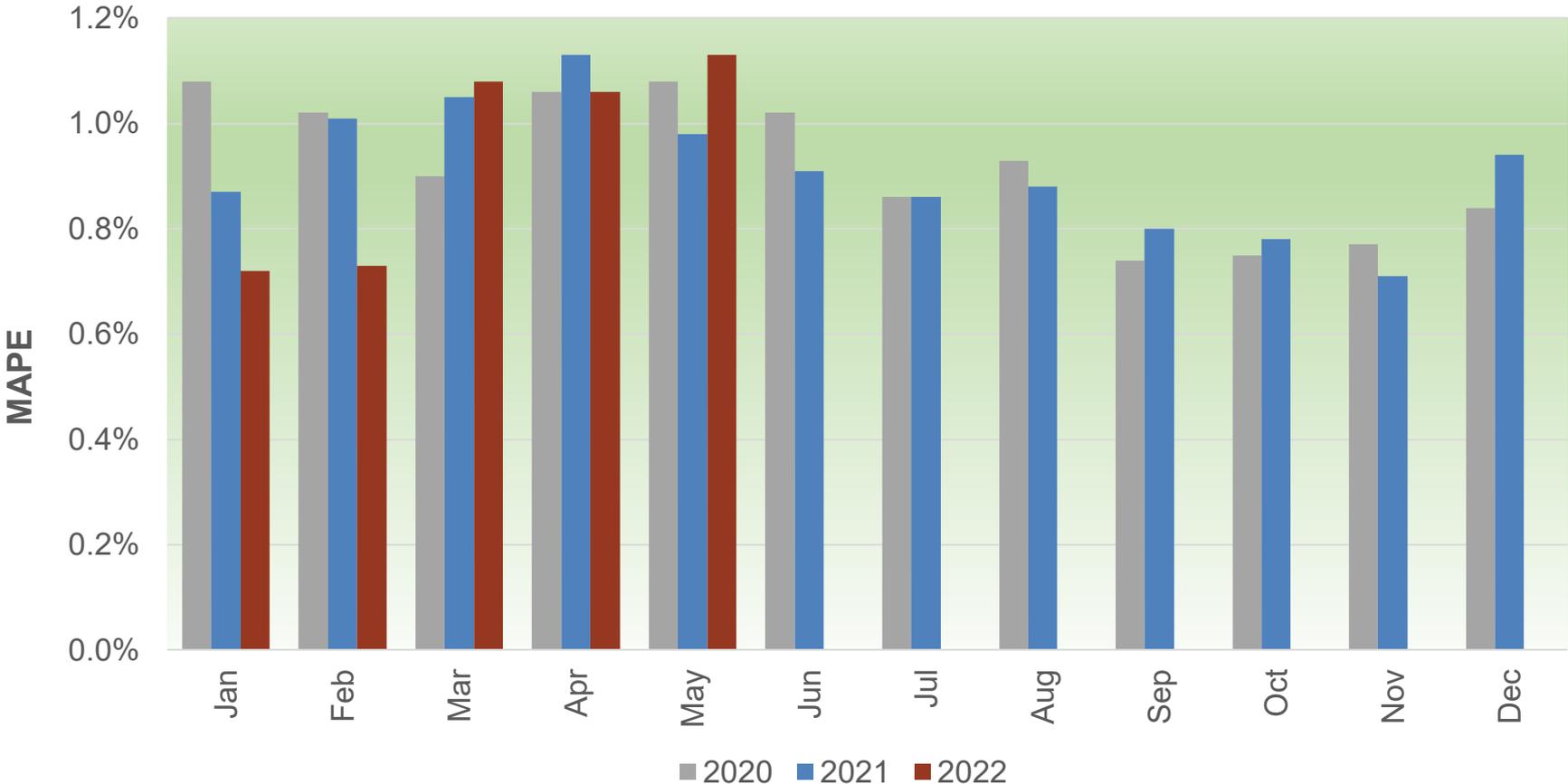
**MAPE = abs(Forecast - Actual)/Capacity

Day-ahead solar forecast



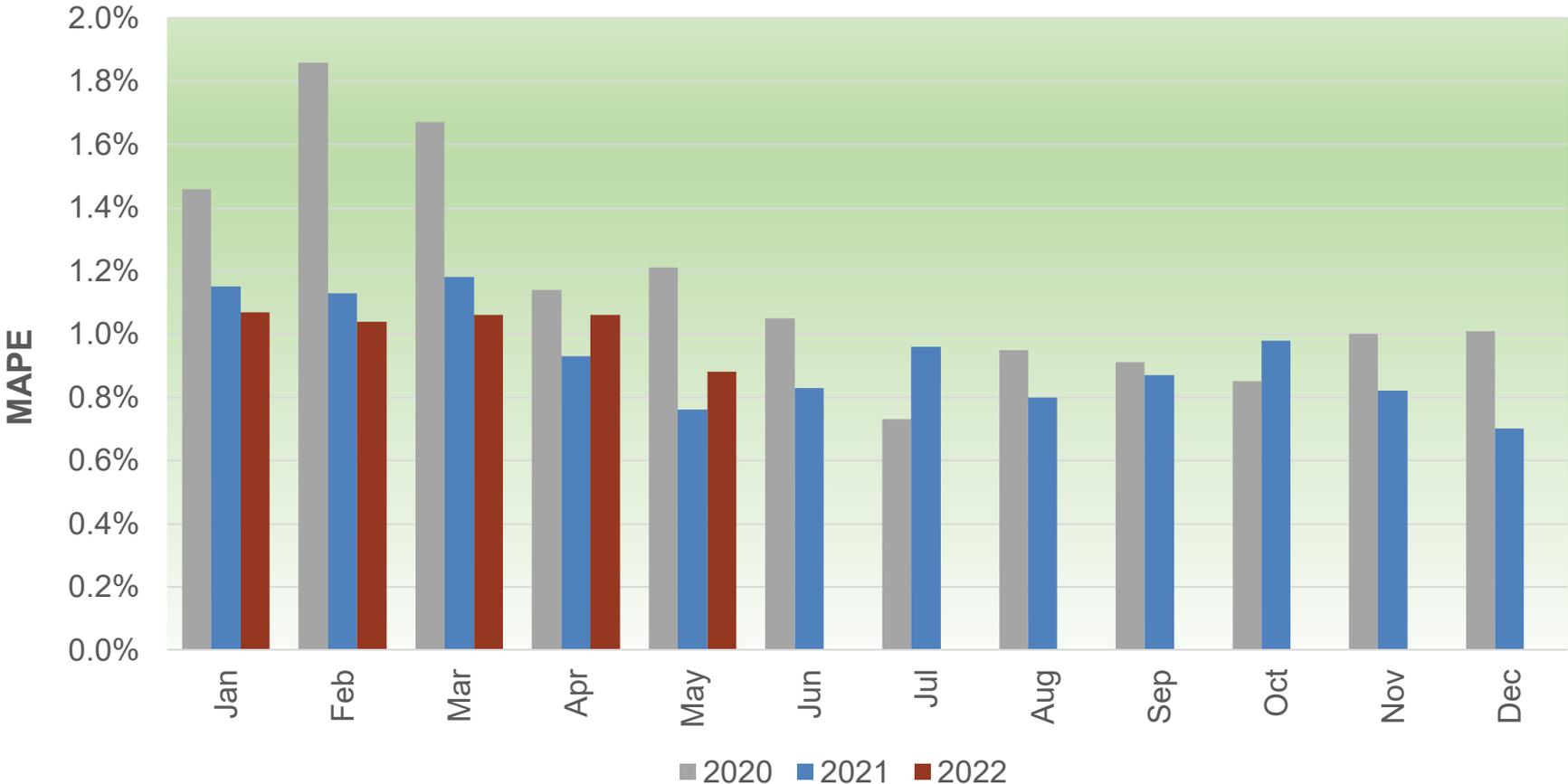
**MAPE = abs(Forecast - Actual)/Capacity

Real-time wind forecast



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

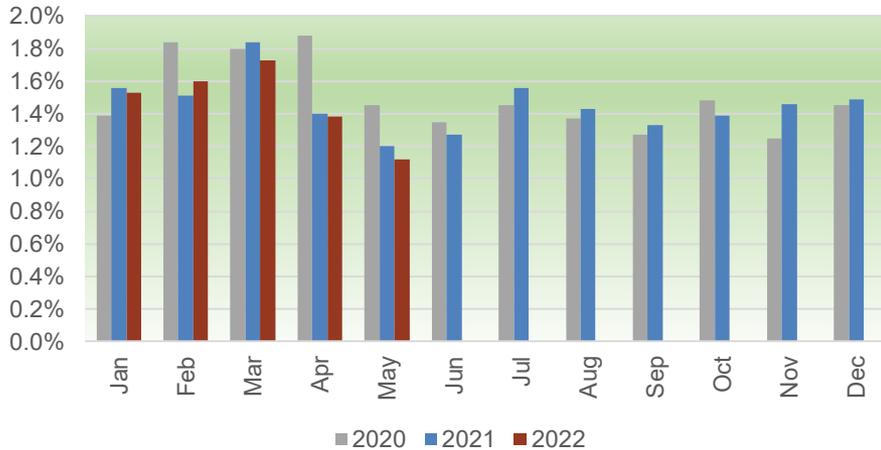
Real-time solar forecast



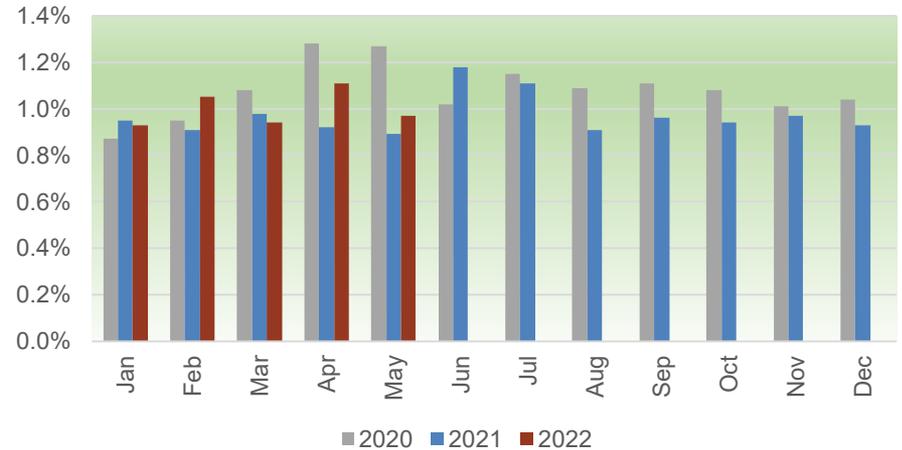
**MAPE = abs(Forecast - Actual)/Capacity

EIM T-60 forecast

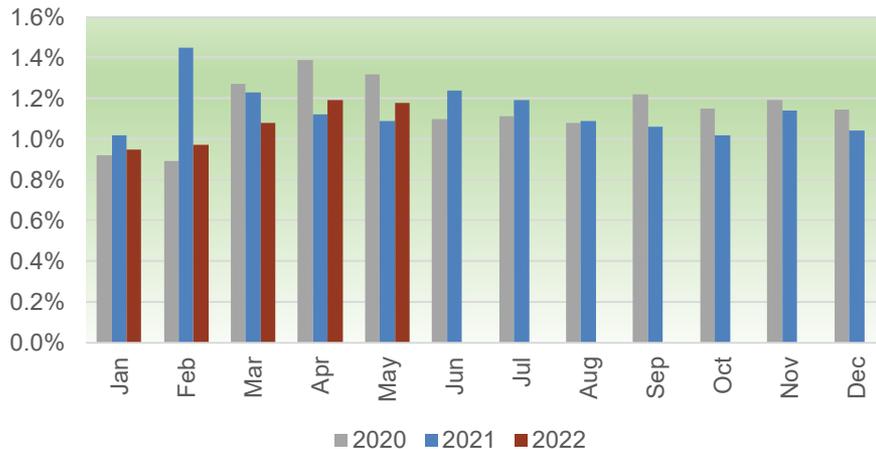
AZPS T-60 Forecast



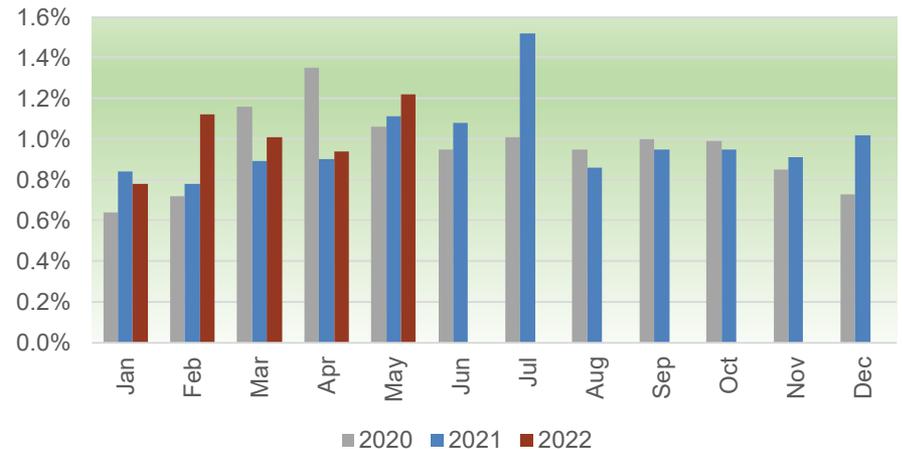
IPCO T-60 Forecast



PGE T-60 Forecast

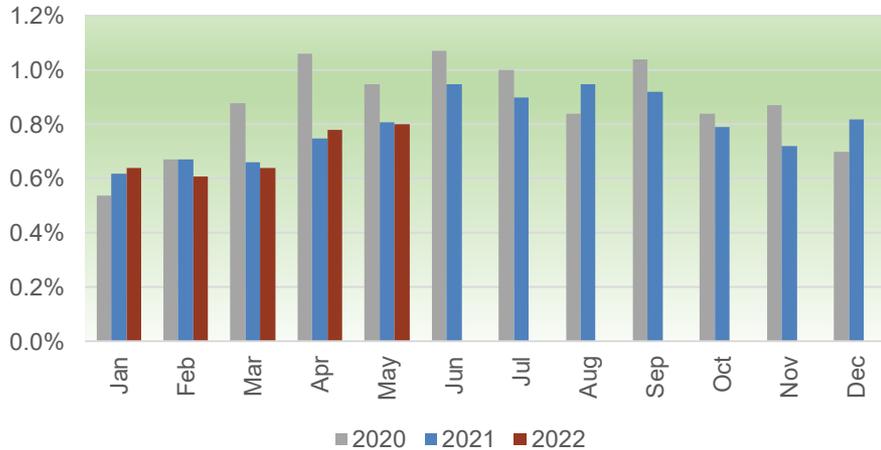


NVE T-60 Forecast

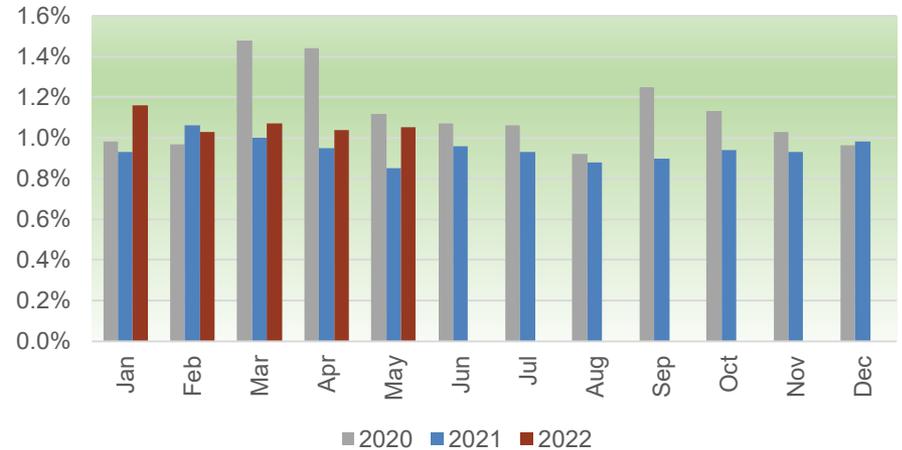


EIM T-60 forecast

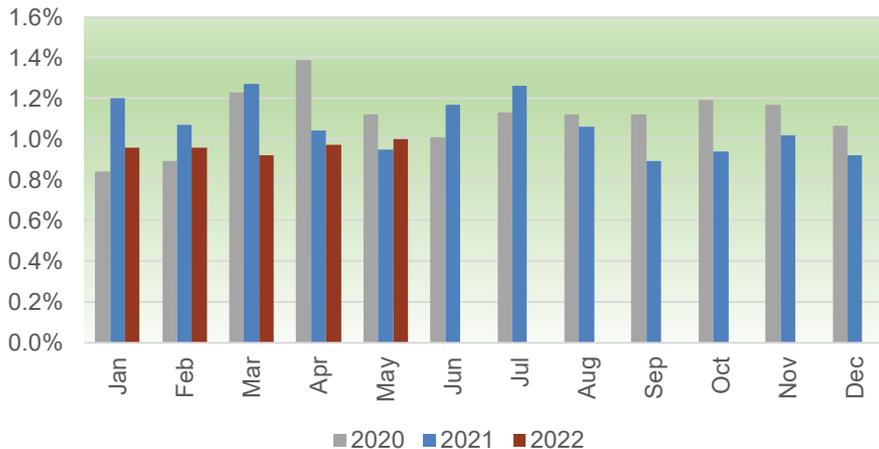
PACE T-60 Forecast



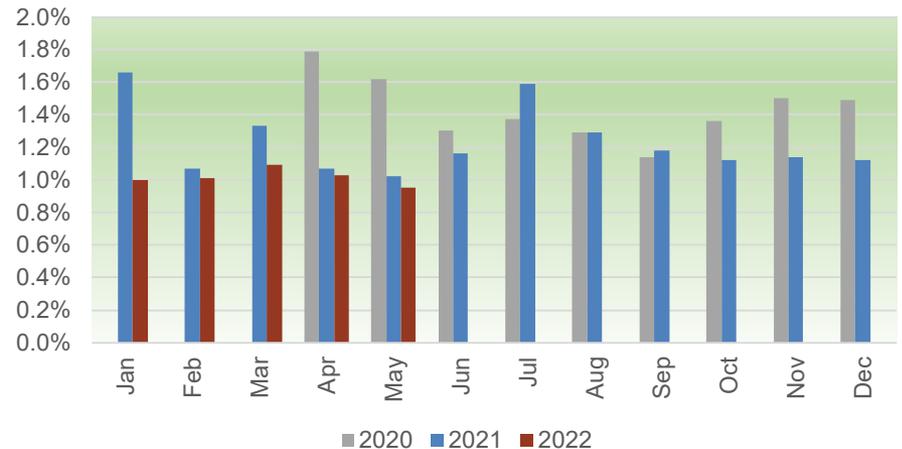
PACW T-60 Forecast



PSE T-60 Forecast

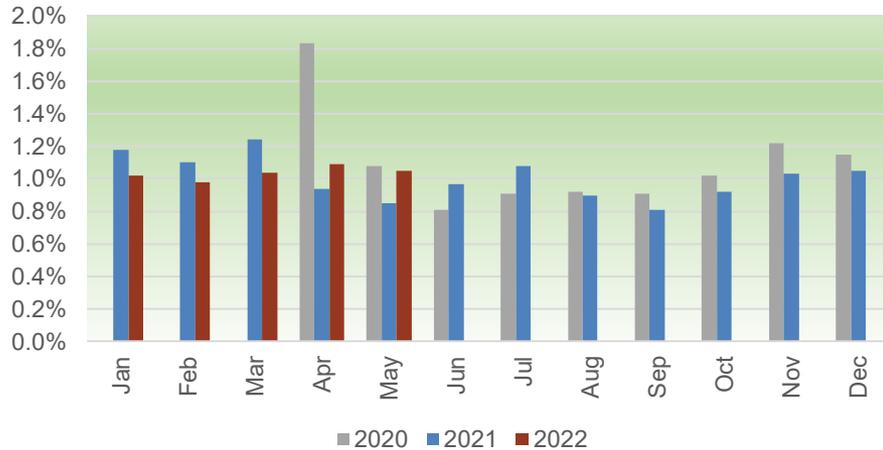


SRP T-60 Forecast



EIM T-60 forecast

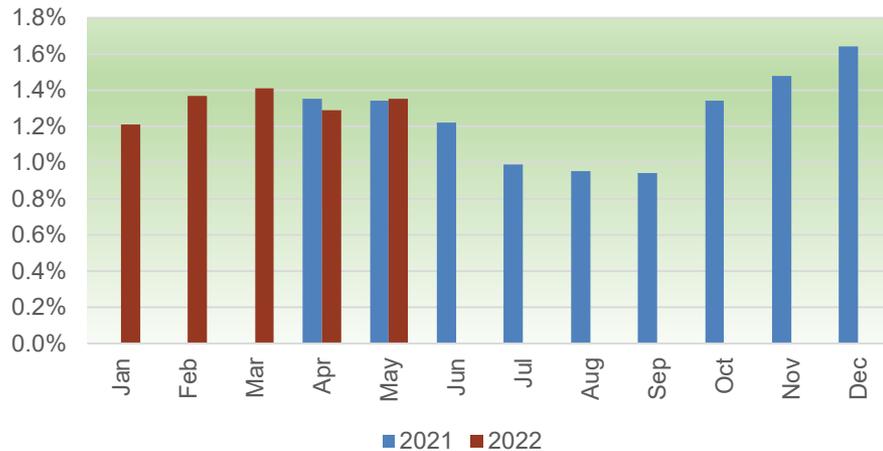
SCL T-60 Forecast



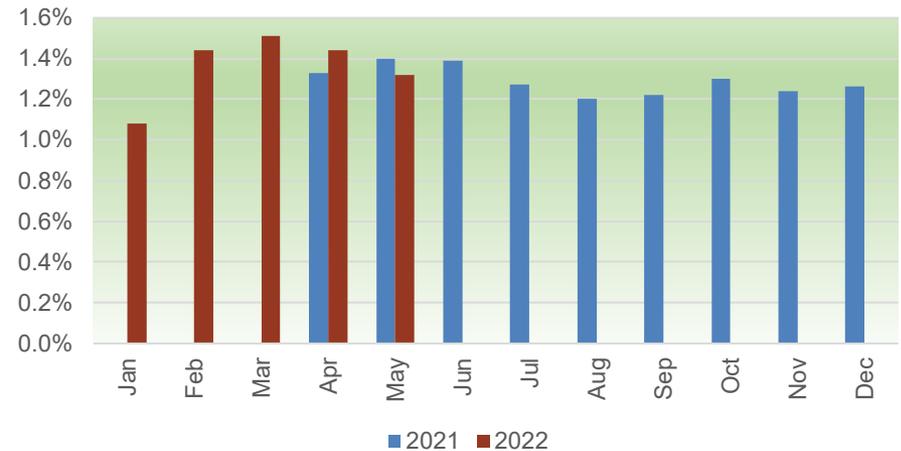
LADWP T-60 Forecast



TIDC T-60 Forecast

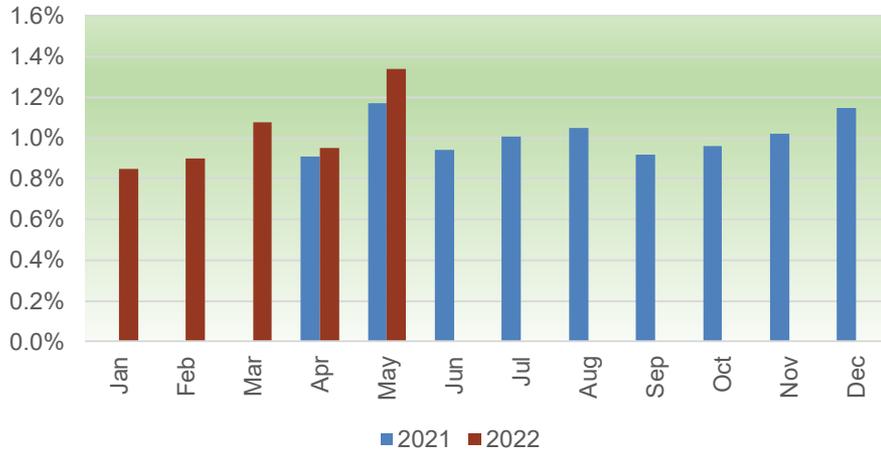


PNM T-60 Forecast

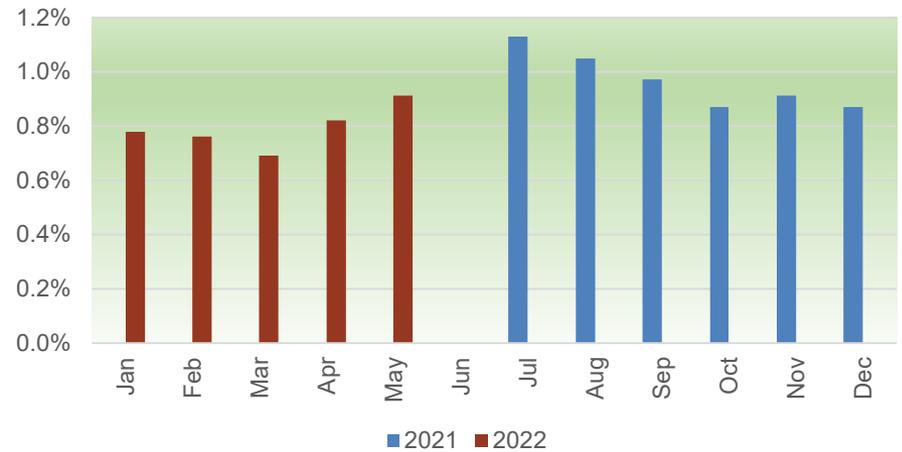


EIM T-60 forecast

BANC T-60 Forecast



NWMT T-60 Forecast



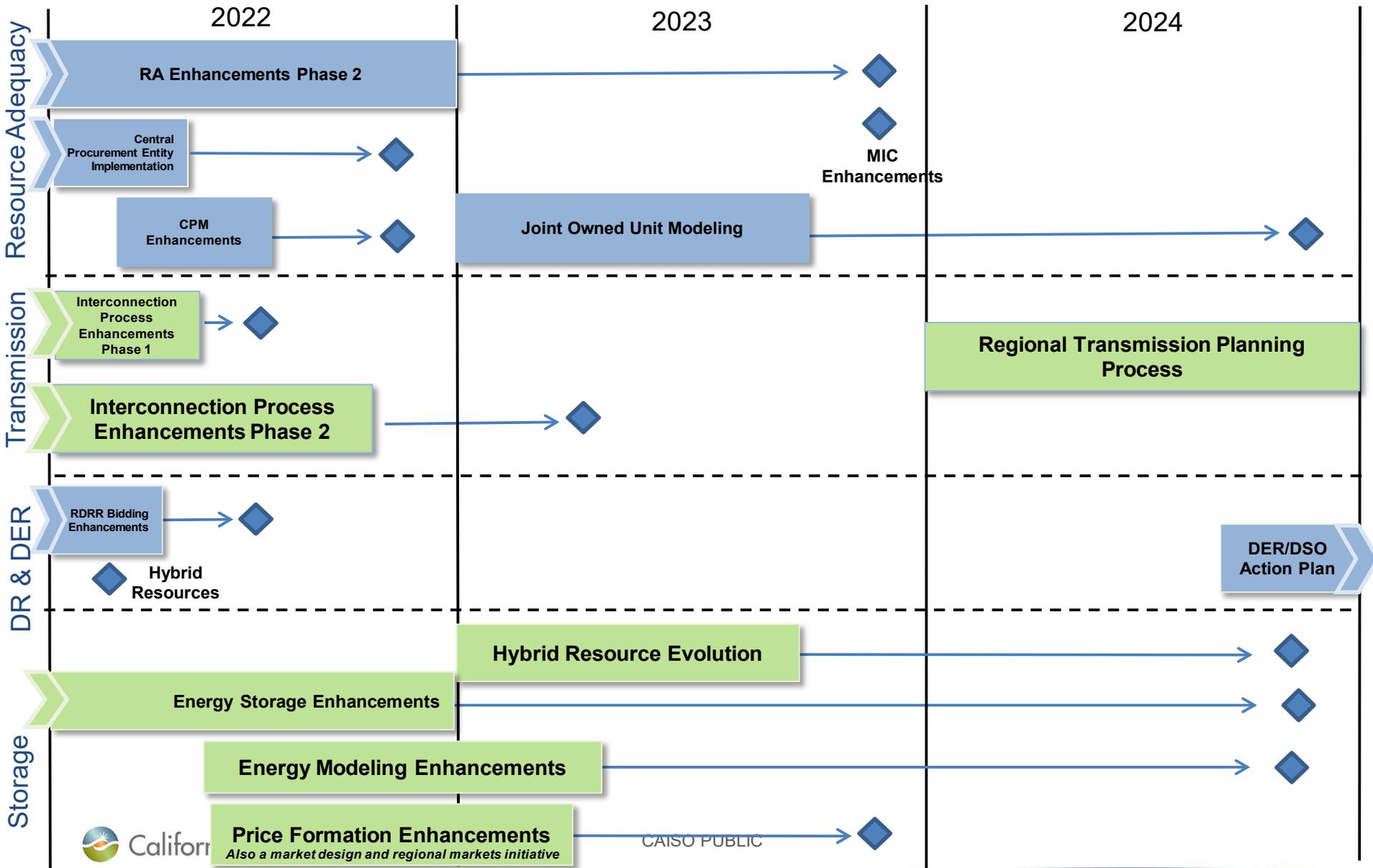
Policy Update

Brad Cooper

Senior Manager, Policy Integration and Governance

RA, Transmission, DR & DER, and Storage

◆ = Implementation



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*Timeframes are approximate and subject to change

Reliability Demand Response Resource Bidding Enhancements

- Scope: Enhancements to RDRR bidding:
 - Track 1: Aligning with FERC Order No. 831
 - Track 2:
 - Exploring minimum load costs
 - Potential change to discrete dispatch option cap
- WEIM Governing Body role: joint authority
- Status:
 - Track 1:
 - Approved at March CAISO Board and WEIM Governing Body meeting
 - Track 2:
 - Final proposal posted on April 12
 - July 2022 joint CAISO Board and WEIM Governing Body meeting

Interconnection Process Enhancements

- **Scope: Enhancing the CAISO's generator interconnection and deliverability allocation procedures**
 - Enhancements to address queue overload
 - Broader process reform considerations focusing on aligning the procurement processes
- **WEIM Governing Body Role: CAISO Board only**
- **Status:**
 - Phase 1 – Approved at May 2022 CAISO Board meeting
 - Phase 2 - Oct 2022 CAISO Board meeting

WEIM Resource Sufficiency Evaluation Enhancements

– Phase 2

- **Scope:**
 - Load conformance in the RSE
 - Measures of uncertainty (intertie and net load)
 - WEIM transfers / HASP exports
 - WEIM emergency energy assistance
 - Selective application of RSE
- **WEIM Governing Body role: joint authority**
- **Status:**
 - Held series of workshops through May
 - Straw proposal to be posted week of June 20
 - Oct 2022 joint CAISO Board and WEIM Governing Body meeting

Energy Storage Enhancements

- Scope: Market enhancements to efficiently dispatch storage resources in alignment with operational needs.
 - New features for local areas, ancillary services enhancements
 - Enhancements to the co-located resource model
- WEIM Governing Body role: Joint authority
- Status:
 - Moving new model for state of charge portion of the scope into separate initiative, *Storage Modeling Enhancements*
 - Stakeholder comments and responses regarding the energy storage model posted May 25
 - Second revised straw proposal posted week of June 20
 - Draft final proposal to be posted in July
 - Q4 2022 joint CAISO Board and WEIM Governing Body meeting

Storage Modeling Enhancements

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

Day-Ahead Market Enhancements

- Scope:
 - Co-optimizing supply based on both cleared demand and imbalance reserve product needs
 - Residual unit commitment process improvements
- WEIM Governing Body Role: partially advisory, partially joint
- Status:
 - Discussed at workshops and MSC meetings earlier this year
 - Third revised straw proposal posted on April 27
 - Planning additional workshops and straw proposal revision
 - Q4 2022 joint CAISO Board and WEIM Governing Body meeting

Resource Adequacy Enhancements – Phase 2

- Scope:
 - Day-ahead market enhancements alignment
 - Bid price and must offer obligations changes
 - Flexible resource adequacy
 - Enhance must offer obligations for storage and conditionally available resources
 - Bid insertion modifications
 - Other changes to accommodate CPUC changes
- WEIM Governing Body role – limited items potentially advisory
- Status:
 - Schedule for revised straw proposal TBD

Extended Day-Ahead Market

- **Scope: Extending day-ahead market to EIM entities. Scope includes:**
 - Supply commitment and resource sufficiency
 - Transmission commitment and congestion rent allocation
 - Greenhouse gas accounting and costs
- **WEIM Governing Body Role:**
 - Management has not yet proposed a decisional designation
- **Status:**
 - Workshops on straw proposal held on May 25, 26
 - Technical workshops to be held in July
 - Revised straw proposal to be posted early August
 - Targeting completion by end of 2022

Transmission Services and Market Scheduling Priorities

- **Scope:**
 - Process for wheeling transactions through the CAISO BAA to obtain high-priority scheduling rights
 - Enhancements to processes for exporting from non-resource adequacy resources
- **WEIM Governing Body role: advisory**
- **Status:**
 - FERC approved extension of current framework on March 18
 - Phase 2 straw proposal to be posted mid July
 - Late 2022 joint CAISO Board and WEIM Governing Body and meeting

Price Formation Enhancements

- **Scope:**
 - Scarcity pricing enhancements that better reflect tight supply
 - Consideration of fast-start pricing in the CAISO markets
 - Enhancements to how the real-time market uses advisory prices
 - Bid cost recovery changes focused on storage resource interaction with the real-time market's multi-interval optimization
 - Improvements to local power mitigation to more accurately assess transmission constraints between BAAs
 - Other price formation issues important to stakeholders
- **WEIM Governing Body role: advisory**
- **Status:**
 - Held workshop on June 10
 - Issue paper to be posted late June
 - Q1 2023 joint CAISO Board and WEIM Governing Body and

Market Parameter Changes Enhancements

- **Scope:**
 - Minimum shift factor used in the CAISO market
 - Procedure for change penalty prices used in the CAISO market
- **WEIM Governing Body role: joint authority**
- **Status:**
 - Straw proposal posted in April
 - Remaining schedule TBD

Release Plan Update

Trang Vo
Senior Project Manager,
Strategic Initiative Management

Transparency Enhancements 2022 - Summary

Area/System	Summary	Customer Value	Timeline
CAISO website; Today's Outlook	Counting methodology for battery capacity has been modified to reflect units online that have reached commercial operation date, and no longer includes those in the commissioning process	Provides clarity of what resources are actually on-line which helps in infrastructure planning purposes	Completed 3/31/22
CAISO website	Summary information gathered from various studies/reports to help interconnection customers identify locations where resources can connect without requiring costly and long lead time upgrades.	This additional data will allow for more effective and efficient queue position evaluations and data analysis. It will also provide a more realistic picture of when additional capacity is expected to come online, especially for larger projects that may be coming online in phases over several years.	In progress - separated from IPE and progressing on its own)
CAISO website	Published a draft of its first 20-Year Transmission Outlook to help enable and accelerate the integration of new renewable resources onto the grid and to expand the planning horizon and bring together a wide cross-section of stakeholders to identify and set priorities for different possible solutions.	The transparency will help developers make more informed decisions on infrastructure planning and development.	Published Feb 2022
CAISO website	Transmission project tracking information; In conjunction with the CPUC and PTOs, quarterly public stakeholder forums provide status updates on the transmission projects previously approved through the transmission planning process and network upgrades identified in the generation interconnection process	This additional transparency will help market participants make more informed decisions when going through the procurement process, likely leading to reduced number of interconnection requests.	Started Jan 2022; to be conducted quarterly
CAISO website	Interconnection Process Enhancement Data Transparency efforts; As part of the 12/6 2021 IPE Issue Paper and Straw Proposal the ISO agreed that additional data, in a usable format, may be made available to market participants as public data. The ISO requested stakeholders provide specific data items that they wanted to have as public information.	Stakeholders can independently evaluate the interconnection queue trends and be able to develop data driven opinions of the various reforms.	In progress - separated from IPE and progressing on its own)

Transparency Enhancements 2022 – Summary (cont.)

Area/System	Summary	Customer Value	Timeline
CAISO website	Posted a new document that supports the DA Summer Report by providing an explanation of information included in the report. Explanation of data included in the Day-Ahead Summer Reports , is located at the top of the reports. available on the Reports and Bulletins webpage , under the <i>Market performance reports</i> heading, <i>Day-ahead daily market watch and summer reports</i> subheading	Understanding the posted data allows for informed decision making by participants in the market.	Implemented May 9, 2022
OASIS	Publication of RUC/HASP/RTPD/RTD adjustments (load forecast adjustments/load bias)	Provides market efficiency by allowing participants to understand the risk and uncertainty around decisions when formulating energy bides, along with improving their ability to manage and plan for the use of their resources in the market.	Completed 6/8/22 Training on 4/28/22
OASIS	Publication of curtailment (schedule reduction) data (wheels, exports, load)	Same as above.	Completed 6/8/22 Training on 4/28/22
CMRI	Publish Resource-Specific RSE Capacity Test Data Publish Resource-Specific RSE Flexible Ramping Test Data	Same as above.	6/16/22 Training on 5/16/22
OASIS	Increased Resource Sufficiency Evaluation (RSE) Data on RSE Results and Additional Data Transparency and Reporting – Publish Balancing Authority Area (BAA) RSE Capacity Test Data	Same as above.	6/16/22 Training on 5/16/22
OASIS	Increased RSE Data on RSE Results and Additional Data Transparency and Reporting – Publish BAA RSE Flexible Ramping Test Data	Same as above.	6/16/22 Training on 5/16/22

Transparency Enhancements 2022

Area/System	Summary	Customer Value	Timeline
CAISO website Today's Outlook page and ISO Today mobile app	Redesign of the existing Capacity chart to better define available capacity and call out reserves portion	Provides market efficiency by allowing participants to understand the risk and uncertainty around decisions when formulating energy bides, along with improving their ability to manage and plan for the use of their resources in the market.	Completed 6/6/22 Training on 5/16/22
CAISO website Today's Outlook page and ISO Today mobile app	Highlighted line on the Demand Trend that visually indicates when Demand Response is being dispatched and its subsequent divergence from the load forecast	Same as above.	Completed 6/6/22 Included in Today's Outlook release training. Training completed.

WEIM Release Plan Summary: 2022

WEIM 2022 Independent

- WEIM Enhancements: Shared Ramping Constraint – Q3
- WEIM Enhancements: ETSR UI – Q4

Release Plan Summary: 2022

2022 Independent

- ✓ Transmission Service & Market Scheduling Priorities Ph1 (was Ext Load Forward Sched Rights Process Ph1)
- WEIM Resource Sufficiency Evaluation Enhancements – Phase 1
- ✓ Adjustment to Intertie Constraint Penalty Prices (Market Parameter Changes)
- ✓ RDRR Bidding Enhancements Phase 1
- ✓ Short-Long Start Definitions
- ✓ OMS Framework to WebVision
- Interconnection Process Enhancements Phase 1
- Operations System Improvements Enhancements
- Reliability Demand Response Resource 2

Fall 2022

- Hybrid Resources Phase 2-B
- FRP Improvements
- Central Procurement Entity Implementation

WEIM 2022 Release

WEIM Enhancements

Project Information	Details/Date
High Level Business Problem or Need	To collectively address important issues identified by WEIM market participants through Customer Inquiry, Dispute and Information system (CIDI) requests to improve the visibility, functions and features in Energy Imbalance Market (WEIM).
High Level Project Scope	<ul style="list-style-type: none"> • Scope 1: BAAOP: ETSR Locks. Only RTMO can use the new functionality of scheduling ETSR locks but all WEIMs can see the ETSR lock status. • Scope 2: BAAOP: WEIM shared ramping constraint IS NOT editable through UI. • Scope 3: BAAOP: ETSR detail screen will be available to BOTH RTMO and WEIMs. (First drop for testing will only be available to RTMO).
BPM Changes	WEIM, Market Instruments
Tariff Change	Section 29.4
System	High Level Changes
Real-Time Market (RTM)	Scope 1: <ul style="list-style-type: none"> • ETSR Locks. WEIMs can see the ETSR lock status.
Real-Time Market (RTM)	Scope 2: <ul style="list-style-type: none"> • Shared ramping capability constraint • UI for WEIM entity input parameters for ramp sharing • Use in the optimization for each resource based on BAA ramp share parameters
Real-Time Market (RTM)	Scope 3: <ul style="list-style-type: none"> • New ETSR detail screens

Independent 2022 Release

Independent 2022 Overview

	Board Approval	External BRS	Config Guide	Tech Spec	Tariff	BPMs	Training	Market Sim / Ext Testing Start	Production Activation
Independent 2022									
Resource Sufficiency Evaluation Enhancements Phase 1A	02/09/22	03/07/22 04/08/22	01/25/22	OASIS CMRI – 04/20 BAAOP	Filed 03/11/22 (ER22-1278) Accepted 5/27/22	DR, WEIM, Mkt Inst	5/16/22	5/19/22 6/3/22	06/01/22 06/17/22
Interconnection Process Improvements 2021 Phase 1	05/11/22	N/A	N/A	N/A	TBD	TBD	N/A	N/A	09/01/22

Independent 2022 – Transmission Service and Market Scheduling Priorities – Phase 1

Project Information	Details
High Level Business Problem or Need	-To development of a long-term, holistic, and durable, framework for establishing scheduling priorities in the CAISO market. Phase 1 of the initiative will be evaluating near-term enhancements that the CAISO can implement by summer 2022
High Level Project Scope	<p>Transparency enhancements</p> <ul style="list-style-type: none"> - Publication of Aggregate PT Wheel Registration Data and Aggregate RA showing Import Data Completed-data posted in CAISO website - Publication of RUC/RTPD/RTD adjustments - OASIS - Publication of curtailment (schedule reduction) data (wheels, exports, load)- OASIS <p>Market Scheduling Priorities enhancements</p> <ul style="list-style-type: none"> - Extension of wheeling through scheduling priorities for Summer 2022 to June 1, 2024 (status quo). - Provide visibility of non-RA capacity for supporting resource, and notification to PT exports and supporting resource when sum of PT export schedules exceed non-RA capacity. -SIBR
BPM Changes	<ul style="list-style-type: none"> - Market Instruments - Market Operations
Tariff Change	Extension to June 1, 2024 Sections:30.5.1, 31.4, 31.5.5,31.4.1, 34.12.1, 34.12.2, 34.12.3
Impacted systems	Details
SIBR	<p>Allow SC of supporting resource to view the available capacity in SIBR</p> <p>Notify the SC of export when sum of the export exceed supporting resource non-RA capacity from SIBR</p>
Integrated Forward Market, Real Time Market (IFM, RTM)	<p>Publish RUC adjustment</p> <p>Publish RTPD, RTD load forecast adjustment</p> <p>Publish Schedule reduction once the instruction is issued in RUC</p> <p>Publish Schedule reduction once the instruction is issued in HASP that incorporate the post-HASP pro-rate process or operator adjustment</p>
OASIS	<p>Publish RUC adjustments on OASIS</p> <p>Publish RTPD, RTD binding interval and advisory intervals load forecast adjustments on OASIS</p> <p>Publish aggregated schedule reduction after instruction issued in RUC on OASIS</p> <p>Publish aggregated schedule reduction after instruction issued (HASP),</p>

Independent 2022 – Transmission Service and Market Scheduling Priorities – Phase 1

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors	Jan 20, 2022	✓
External BRS	Post External BRS	Mar 2, 2022	✓
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec) OASIS SIBR	Mar 25, 2022, Apr 11, 2022 May 2022	✓
Tariff	File Tariff - ER22-906	Jan 27, 2022	✓
	FERC Accepted Extension of Loads, Exports, Wheeling thru Jun 1, 2024)	Mar 15, 2022	✓
BPMs	Post Draft BPM changes – Mkt Inst PRR 1439	Apr 29, 2022	✓
External Training	Deliver External Training	Apr 28, 2022	✓
Market Sim	Market Sim Window	May 5, 2022 – Jun 7, 2022	
	SIBR UI available in MAPSTAGE	May 5, 2022	✓
	SIBR API available in MAPSTAGE Scenario 1	TBD May 10, 2022	✓
	OASIS UI available in MAPSTAGE OASIS API available in MAPSTAGE Scenario 2, 3	May 24, 2022 May 24, 2022 May 26, 2022	✓ ✓ ✓
Production Activation	Production	Jun 01, 2022 - SIBR Jun 08, 2022 - OASIS	✓ ✓

Independent 2022 –WEIM Resource Sufficiency Evaluation Enhancements – Phase 1

Project Information	Details
High Level Business Problem or Need	Implement enhancements to the WEIM Resource Sufficiency Evaluation (RSE) to ensure the RSE is administered accurately and applied equitably.
High Level Project Scope	Address the following WEIM RSE Enhancements: <ul style="list-style-type: none"> - Consideration of Intertemporal Constraints in the Capacity Test - Flexible Ramping Test Modifications – Power Balance Constraint - Consider a Resource’s Transition through Forbidden Operating Region in the Flexible Ramping Sufficiency Test. - RSE Modifications – Storage Resources Treatment - Balancing Test Modifications - Demand Response Inclusion with RSE - Reliability of CAISO Interchange Schedules - Increased RSE Data on RSE Results and Additional Data Transparency and Reporting - Increased WEIM Entities Situational Awareness Regarding Test Performance - Net-Load Uncertainty Calculation Removal in Capacity Test - Intertie Uncertainty Calculation Removal in Capacity Test
BPM Changes	<ul style="list-style-type: none"> - Energy Imbalance Market (WEIM) - Market Instruments - Market Operations - Settlements and Billing
Tariff Change	29.34

Independent 2022 – WEIM Resource Sufficiency Evaluation Enhancements – Phase 1 (cont'd)

Impacted systems	Details
Master File (MF)	Implement the following RSE enhancements: <ul style="list-style-type: none"> - Demand Response Inclusion with RSE
Real-Time Base Scheduler (RTBS)	Implement the following RSE enhancements: <ul style="list-style-type: none"> - Consideration of Intertemporal Constraints in the Capacity Test - Flexible Ramping Test Modifications – Power Balance Constraint - Consider a Resource’s Transition through Forbidden Operating Region in the Flexible Ramping Sufficiency Test. - RSE Modifications – Storage Resources Treatment - Demand Response Inclusion with RSE - Reliability of CAISO Interchange Schedules - Increased WEIM Entities Situational Awareness Regarding Test Performance - Net-Load Uncertainty Calculation Removal - Intertie Uncertainty Calculation Removal
Balancing Authority Area Operations Portal (BAAOP)	Implement the following RSE enhancements: <ul style="list-style-type: none"> - Demand Response Inclusion with RSE - Increased WEIM Entities Situational Awareness Regarding Test Performance
Real Time Market (RTM)	Implement the following RSE enhancements: <ul style="list-style-type: none"> - Demand Response Inclusion with RSE
Settlements	Implement the following RSE enhancements: <ul style="list-style-type: none"> - Balancing Test Modifications - Demand Response Inclusion with RSE - Reliability of CAISO Interchange Schedules
CAISO Website, Today’s Outlook	Implement the following RSE enhancements: <ul style="list-style-type: none"> - Increased RSE Data on RSE Results and Additional Data Transparency and Reporting

Independent 2022 – WEIM Resource Sufficiency Evaluation Enhancements – Phase 1 (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors	Feb 9, 2022	✓
External BRS	Post External BRS	Mar 7, 2022	✓
Config Guides	Post Draft Config Guides	Jan 25, 2022	✓
Tech Spec	Create ISO Interface Spec (Tech spec) OASIS CMRI RTM	Mar 25, 2022, Apr 11, 2022 Apr 20, 2022	✓
Tariff	File Tariff - ER22-1278	Mar 11, 2022	✓
BPMs	Post Draft BPM changes – DR , WEIM , Mkt Inst , RC, Stlmts & Billing	Yes	
External Training	Deliver External Training	May 16, 2022	✓
Market Sim	Market Sim Window	May 19, 2022 – June 15	✓
Production Activation	Production	Jun 1, 2022 Jun 17, 2022 – OASIS UI/API, CMRI UI/API, BAAOP UI	✓

WEIM Resource Sufficiency Evaluation Enhancements

Phase 1A

RSEE ID	Description	System	Market Simulation Impact
RSEE-1010	Consideration of Supply Conditions in the Capacity Test	Market	
RSEE-1020	Flexible Ramping Test Modifications – PBC	Market	Yes
RSEE-1030	Consider a Resource's Transition through FOR in the Flexible Ramping Test.	Market	
RSEE-1040	RSE Modifications – Storage Resources Treatment	Market	
RSEE-1050	Balancing Test Modifications	Settlements	Yes
RSEE-1060	DR Inclusion with RSE	Market, BAAOP	Yes
RSEE-1070	Reliability of CAISO Interchange Schedules	Market	
RSEE-1090	Increased RSE Data on RSE Results and Additional Data Transparency and Reporting	OASIS	
RSEE-1100	Increased WEIM Entities Situational Awareness Regarding Test Performance	Market, CMRI, OASIS	
RSEE-1110	Net-Load Uncertainty Calculation Removal from Capacity Test	Market	
RSEE-1120	Intertie Uncertainty Calculation Removal from Capacity Test	Market	

Group	System / Interface	MAP-Stage	Production
1	Settlements	Effective as of TD 3/31/22	TD 6/1/22
1	Market	5/19/22	6/1/22
1	BAAOP UI	5/19/22	6/17/22
2	OASIS UI	6/3/22	6/17/22
2	OASIS API	6/3/22	6/17/22
2	CMRI UI	6/3/22	6/17/22
2	CMRI API	6/3/22	6/17/22
3	BAAOP API	TBD	TBD

Independent 2022 – Interconnection Process Enhancements (IPE) 2021 – Phase 1

Project Information	Details
High Level Business Problem or Need	The proposal is focused on four main areas including how to manage the “currently overheated” interconnection queue and encourage resource developer discipline to submit only viable projects; removing barriers for timely development of needed resources; better alignment of resource procurement by LSEs with the ISO process and state policy direction; and addressing residual issues that have emerged since the process was last reviewed in 2018. Those residual issues include how to allocate costs for generator driven network upgrades, and reimbursement for reliability network upgrades for generators outside the ISO system.
High Level Project Scope	The project will focus on the following: <ul style="list-style-type: none">•Continuous improvement of the generator interconnection process•Provide greater visibility and transparency to the stakeholders•Eliminate manual workarounds•Provide single source of data
System Changes	N/A

Independent 2022 – Interconnection Process Enhancements (IPE) 2021 – Phase 1 (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors	May 11, 2022	✓
External BRS	Post External BRS	N/A	
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec)	N/A	
Tariff	File Tariff	TBD	
BPMs	Post Draft BPM changes	TBD	
External Training	Deliver External Training	N/A	
Market Sim	Market Sim Window	N/A	
Production Activation	Production	Sep 1, 2022	

Operations Systems Improvements 2021/2022 Enhancements

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

Operations Systems Improvements Projects

List of Proposed Improvements*

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

2021

System	Summary Description	
ADS	Add advance filter, additional color scheme, change grid color	<p>Training – August. 2022</p> <p>Unstructured Mkt Sim- Sept. 2022</p> <p>PROD – Sept. 2022</p>

2022

System	Summary Description	
ADS	System must have the capability to "update existing configuration" across profiles & "have shared displays synchronized."	<p>Training – August 2022</p> <p>Unstructured Mkt Sim- Sept. 2022</p> <p>PROD – Sept. 2022</p>
Market	Modify Unit Details UI	<p>Outreach/Release Note – Sept. 2022</p> <p>PROD - October 2022</p>

2022 Fall Release

Fall 2022 Release Overview

	BRS	Config Guide	Tech Spec	Draft Tariff*	BPMs	External Training	Market Sim	Production Activation
Fall 2022 Release	04/01/22	07/5/22	06/30/22	07/21/22	08/15/22	08/15/22 – 08/19/22	08/22/22 – 09/30/22	11/1/22
<u>Hybrid Resources Phase 2-B</u>	8/3/21 1/12/22	01/25/22	09/10/21	09/17/21	02/14/22	TBD	08/22/22 – 09/30/22	11/01/22
<u>FRP Improvements - Deliverability</u>	<u>V1.0: 01/28/21</u> Reqmts Enh V1.0: 3/11/22	07/05/22	06/30/22	08/31/20	TBD	TBD	08/22/22 – 09/30/22	11/01/22
<u>Central Procurement Entity Implementation</u>	3/10/22 4/7/22	05/31/22	TBD	TBD	TBD	TBD	08/22/22 – 09/30/22	11/01/22

Fall 2022 – Hybrid Resources Phases 2-B - Overview

Project Information	Details/Date
High Level Business Problem or Need	<p>The ISO launched this stakeholder initiative to identify new or enhanced market rules and business processes needed to accommodate hybrid resources, resources that consist of two sets of market rule changes that will facilitate mixed-fuel type project participation (hybrid and co-located resources) in the ISO markets.</p>
High Level Project Scope	<p>Phase 2 focuses on modifications that will explore how hybrid generation resources can be registered and configured to operate within the ISO market. The initiative will further develop solutions allowing developers to maximize the benefits of their resource's configuration. Additionally, hybrid resource configurations also raise new operational and forecasting challenges that the ISO plans to address during this initiative.</p> <p>The Phase 2 project has been split into two separate implementations, phases 2-A and 2-B, to support strategic delivery timing. Phase 2-B information is available under the Spring 2022 release section.</p> <p>Phase 2-A was implemented on December 15, 2021. This phase focuses on implementing Ancillary Services (AS) and High Sustainable Limit (HSL) functionality with a focus on the EMS and IFM/RTM systems.</p> <p>Phase 2-B is scheduled to implement Fall 2022. This project phase focuses on implementing the Hybrid Dynamic Limit functionality, Multiple ACC, along with all remaining project scope to include changes to systems RIMS, Master File, EMS, SIBR, IFM/RTM, OASIS, ALFS, Settlements, MRI-S Metering, CMRI, MPP, Today's Outlook, ISO Today Mobile Application, Monthly Renewables Performance Report, Wind and Solar Real-Time Dispatch Curtailment Report', and the Over Supply Page.</p> <p>External BRS Posting: An updated External BRS v1.2 has been posted. V1.3 expected by 3/13.</p>
BPM Changes	<p>Direct Telemetry, Market Instruments, Market Operations, Metering, Settlements and Billing</p>
Tariff Changes	<p>Proposed sections 4.18, 34.1.6.3, 30.5.6.1 Sections 27.13, 8.4.1.1(g), 8.4.3, Appendix K, Parts A, B and C, 8.2.3, 8.4.5, 34.7, 11.6.6, 4.8.2, 40.9.2 (b) (D)</p>
Impacted Systems	<p>ALFS, CMRI, Reporting, IFM/RTM, Master File, OASIS, RIMS, Settlements, MRI-S Metering, SIBR, MPP, Today's Outlook, ISO Today Mobile Application, Monthly Renewables Performance Report, Wind and Solar Real-Time Dispatch Curtailment Report, Over Supply Page.</p>

Fall 2022 – Hybrid Resources Phase 2-B (Cont'd)

System	High Level Changes
Automated Load Forecast System (ALFS)	<ul style="list-style-type: none"> • Identification of variable energy resources (VER) • New forecast type for hybrid resources • Forecast for hybrid resources that elect for ISO forecast
CAISO Market Results Interface (CMRI)	<ul style="list-style-type: none"> • Updates to include resource specific forecast data for hybrid resources (VER components).
Reporting	<ul style="list-style-type: none"> • Update report(s) for resource tagging changes: Solar Total tag, Wind Total Tag, Battery Total Tag (Renewable watch, Curtailment Report, ISO Today), and new Hybrid Total Tag
Integrated Forward Market (IFM)/Real-Time Market (RTM)	<ul style="list-style-type: none"> • When any resource behind an ACC constraint has an AS award, all resources behind that ACC constraint must follow their DOT and receive the must follow flag • Create a new user interface to display the hybrid summary (dynamic limits) • Modify 'Must Follow DOT' flag for AS cleared or AS dispatched award <ul style="list-style-type: none"> ◦ Must Follow DOT Flag must turn to 'Y' for Ancillary Service Cleared by resource ID • Software that takes the submitted limit and haircuts the energy bid used in each interval of the market time horizon • Limit the economic dispatch of a hybrid resource in the real-time market based on dynamic limits submitted to SIBR • For resources and hybrids, add new user interfaces • Dynamic Limit functionality: • Display a hybrid resources upper limit and lower limit
OMS	<ul style="list-style-type: none"> • System shall consume the new "HYBD" fuel type value and display the value for hybrid resource outages

Fall 2022 – Hybrid Resources Phase 2-B (Cont'd)

System	High Level Changes
Master File (MF)	<ul style="list-style-type: none"> • Enhance MF to identify Hybrid resources • Create a new categorization in MF to identify hybrid resources to handle dynamic limits • Add the ability to store the state-or-charge minimum and maximum limit • Identification of variable energy resources (VER) • Enhance MF to map hybrid resource to individual VER component(s) • Note: Renewable registration for VER components is currently mapped to Resource ID; will need further automation to map to individual VER component • New unit type to identify a hybrid resource under the existing NGR model • New identification of individual renewable components that make up a hybrid resource • Ability to elect for ISO forecast or SC submitted forecast to be at the renewable component level • Make the new categorization of hybrid resources along with associated attributes available for downstream applications • Add a MF rule to make sure the 'MOO Qualified Flag' is set to "N" for hybrid resources • Modifications to support the need for a few MF resource attributes (for example, fuel type, technology type, QF Flag, VER NGR flag, etc.) that need to be associated to the VER components that make up the hybrid resources • Map PI Tags (VER actual and meteorological tags) to each Resource ID or VER component. Note: System to be determined per Architecture Definition
Open Access Same Time Information (OASIS)	<ul style="list-style-type: none"> • Updates to create a new category for hybrid resources to be included in the forecast data reports.
Settlements	<ul style="list-style-type: none"> • Consume new VER Component ID for forecasting fee • Updates to forecast fee calculation based on meter data submitted for the VER components that elect ISO forecast
Metering (MRI-S)	<ul style="list-style-type: none"> • Ability to receive meter data at the VER Component ID level for hybrid resources • Updates for Western Renewable Energy Generation Information System (WREGIS) reporting of meter data on the Hybrid components
Scheduling Infrastructure and Business Rules (SIBR)	<ul style="list-style-type: none"> • Treat all hybrid resources as non REM NGRs • Flagging must be configured to ensure bid insertion does not occur • SIBR rules and new rule flow needs to be created to receive and validate the dynamic operating limits • Allows market participant to submit their dynamic limit • Allow submission of upper and lower economic limits for each 5-minute interval in a three hour window for hybrid resources • Validation of upper and lower economic limits • Validate the dynamic operating limits

Fall 2022 – Hybrid Resources Phase 2-B

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Nov 18, 2020	✓
External BRS	Post External BRS (Includes Phase 2-A and 2-B)	Aug 3, 2021	✓
	Post External BRS revisions - Elaboration on BRQs and clarifications	Jan 12, 2022	✓
Config Guides	Post Draft Config Guides	Jan 25, 2022	✓
Tech Spec	Create ISO Interface Spec (Tech spec)	Sep 10, 2021	✓
Tariff	File Tariff	Sep 17, 2021	✓
Market Sim Scenarios	Post proposed scenarios (Unstructured)	Feb 8, 2022	✓
BPMs	Publish Final Business Practice Manuals for mkt sim	Feb 14, 2022	✓
External Training	Deliver External Training	By 8/22	
Market Sim	Market Sim Window	Aug 22, 2022 – Sep 30, 2022	
Production Activation	Hybrid Resources Phase 2-B	Nov 1, 2022	

Fall 2022 – Flexible Ramping Product Improvements Deliverability

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

Fall 2022 – Flexible Ramping Product Improvements Deliverability

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Sept 30, 2020	✓
External BRS	Flexible Ramp Product: Deliverability	Jan 28, 2021	✓
	Flexible Ramp Product: Requirements Enhancements	Mar 11, 2022	✓
Tariff	File Tariff	June 15, 2022	
BPMs	Publish Draft BPM updates	July 15, 2022	
Config Guides	Post Draft Config Guides	July 05, 2022	
Tech Spec	Publish Technical Specification - OASIS	June 30, 2022	
External Training	Deliver External Training	By 8/22	
Market Sim	Market Sim Window	Aug 22, 2022 – Sep 30, 2022	
Production Activation	FRP Deliverability	Nov 1, 2022	

Fall 2022 – Central Procurement Entity Implementation

Project Information	Details
High Level Project Scope	<p>In June 2020, the CPUC ordered the creation of a Central Procurement Entity (CPE) to lead procurement of Local Resource Adequacy (RA) Resources for CPUC jurisdictional LSEs in the SCE and PG&E TAC areas. Under this order, CPUC would now assign the local RA obligation to the CPE to procure local resources on behalf of all CPUC jurisdictional LSEs within the CPE's respective TAC area. The system and flexible RA attributes of these local resources would also be allocated to all LSEs through CAM credits to reduce their own system and flexible requirements. The CPUC adopted what it referred to as a hybrid procurement model, in which LSEs could procure local resources voluntarily to meet their system and flexible RA requirements, in which case the local resource also would count towards the collective local RA requirements of the CPE. The CPE would also be subject to CAISO's CPM mechanism for any identified local deficiencies.</p> <p>The CAISO tariff currently allows LSEs to aggregate responsibilities to procure Local Capacity Area Resources. However, given the unique nature of the CPE as outlined in CPUC D. 20-06-002, relying solely on this existing tariff provision is not sufficient to facilitate implementation of the CPE construct. The CAISO has identified additional needed tariff, software, and business process enhancements. Although the CPUC's CPE order is the impetus for this stakeholder initiative, the CAISO does not propose to limit a CPE to CPUC-jurisdiction LSEs. The CAISO instead proposes to allow all Local Regulatory Authorities (LRAs) to designate a CPE to procure local resources on behalf of its LSEs and that LRAs may designate the same CPE to procure local resources on behalf of the LSEs under the jurisdiction of those multiple LRAs.</p> <p>Scope:</p> <ol style="list-style-type: none"> 1. Recognizing a Central Procurement Entity (CPE) 2. System and Local Obligation for CPE and LSEs with Load in Multiple Transmission Access Charge (TAC) Areas 3. Allocation of System and Flexible Attributes of Local Resource Adequacy (RA) Resources 4. Clarification of Capacity Procurement Mechanism (CPM) Process and Cost Allocations in regards to CPE changes
BPM Changes	<ul style="list-style-type: none"> - Reliability Requirements - Settlements and Billing
Tariff Change	Yes
Impacted Systems	CIRA, Settlements

2023 CRR System Upgrade

2023 – Congestion Revenue Rights (CRR) Upgrade

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

2023 – Congestion Revenue Rights (CRR) Upgrade

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

2023 – Congestion Revenue Rights (CRR) Upgrade

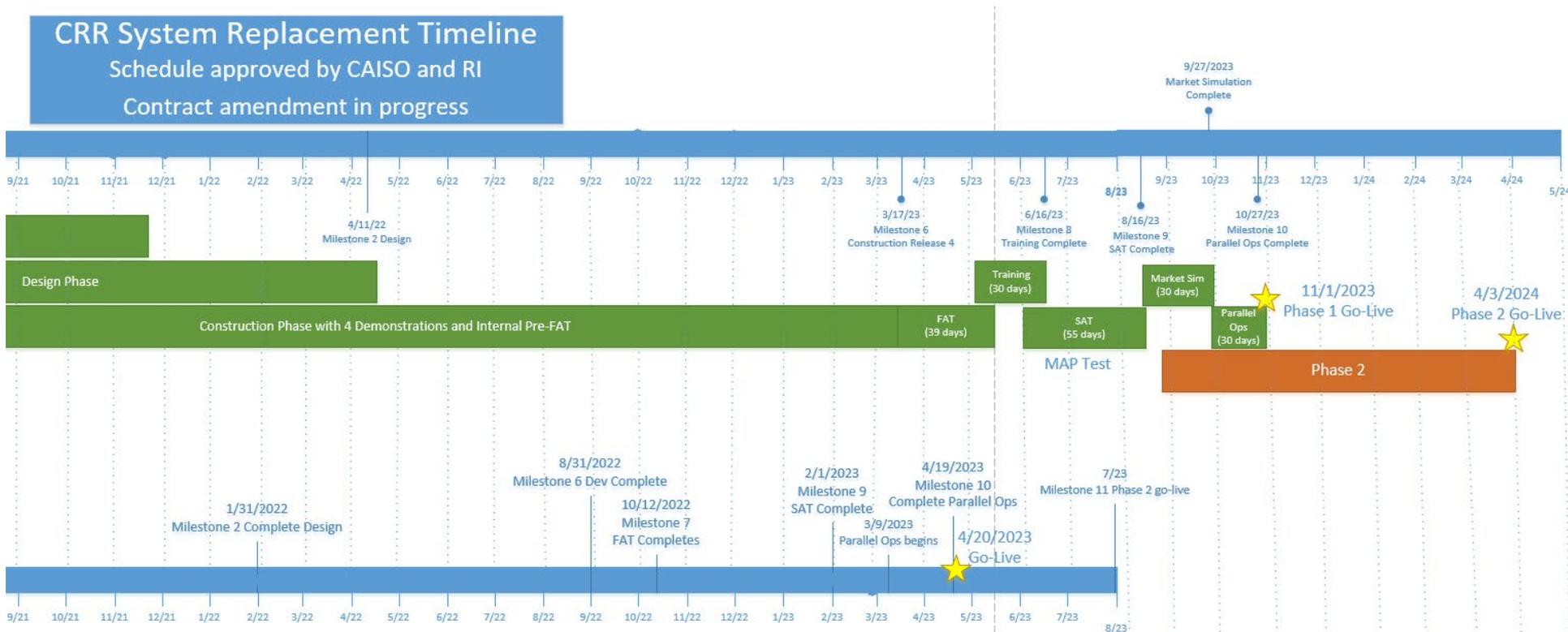
Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Publish External BRS	N/A	
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Publish Technical Specification	Draft 11/5/21	✓
Tariff	File Tariff	N/A	
BPMs	Publish Draft BPM updates	Mar 1, 2023	
External Training	Deliver External Training	May 8, 2023 – Jun 16, 2023	
Market Sim	Market Sim Window	Aug 17, 23 - Sep 27, 2023	
Production Activation	CRR Upgrade	Nov 1, 2023	
Effective Date	First Trade Date for Monthly Auction results on new system	Jan 1, 2024	
Phase 2 Production Activation	Phase 2 Go-Live	Apr 3, 2024	

2023 CRR System Upgrade – Milestone Schedule

CRR System Replacement Timeline

Schedule approved by CAISO and RI

Contract amendment in progress



2023 CRR System Upgrade – Get Connected

- CRR External meetings:
 - **Bi-weekly Technical User Group (TUG)** Tue 10 AM, alternates with RUG.
 - Meetings available on the CAISO calendar on www.caiso.com
 - Meeting details and presentation materials are available on the CAISO Developer site at www.developer.caiso.com , which requires an account to be setup for access
 - **B2B Improvements – Webinar Series** (invitation only)
 - Technical details with respect to the new integration pattern
 - Interested folks should send email to inambiar@caiso.com
 - Review CRR new API specifications.
 - **CRR Customer Partnership Group**
 - Introduction and Overview scheduled for Wed 5/18/22 @ 10 AM

2024 Settlement Upgrade

2024 - Settlement Upgrade - Overview

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

Benefits for our customers include:

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

2024 - Settlement Upgrade – Get Connected

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

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

2024 - Settlement Upgrade – Targeted Goals

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

2024 - Settlement Upgrade – Targeted Goals Cont.

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

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

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

Stay Informed

Ways to participate in releases

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

What to look for on the calendar...

Calendar of Meetings, Training and Events

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

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

Market Sim



Market Sim



Release Users Group (RUG)



Upcoming meetings

The next MPPF is scheduled for September 27, 2022.

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

Agenda topic suggestions:

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