



California ISO

Market Performance and Planning Forum

March 4, 2021

ISO PUBLIC

Objective: Enable dialogue on implementation planning and market performance issues

- Review key market performance topics
- Share updates to 2021 release plans, resulting from stakeholders inputs
- Provide information on specific initiatives
 - to support Market Participants in budget and resource planning
- Focus on implementation planning; not on policy
- Clarify implementation timelines
- Discuss external impacts of implementation plans
- Launch joint implementation planning process



California ISO

Market Performance and Planning Forum

Agenda – March 4, 2021

1 p.m. – 4 p.m.

Time:	Topic:	Presenter:
1:00 – 1:05	Introduction, Agenda	Kristina Osborne
1:05 – 2:00	Market Performance Update	Guillermo Bautista Alderete Rahul Kalaskar Amber Motley
2:00 – 2:45	Policy Update	Brad Cooper John Goodin
2:45 – 3:45	Release Update	Adrian Chiosea

Market Performance Update

Guillermo Bautista Alderete
Director, Market Analysis and Forecasting

Rahul Kalaskar
Manager, Market Validation and Quality

Amber Motley
Senior Manager, Short-Term Forecasting

Agenda

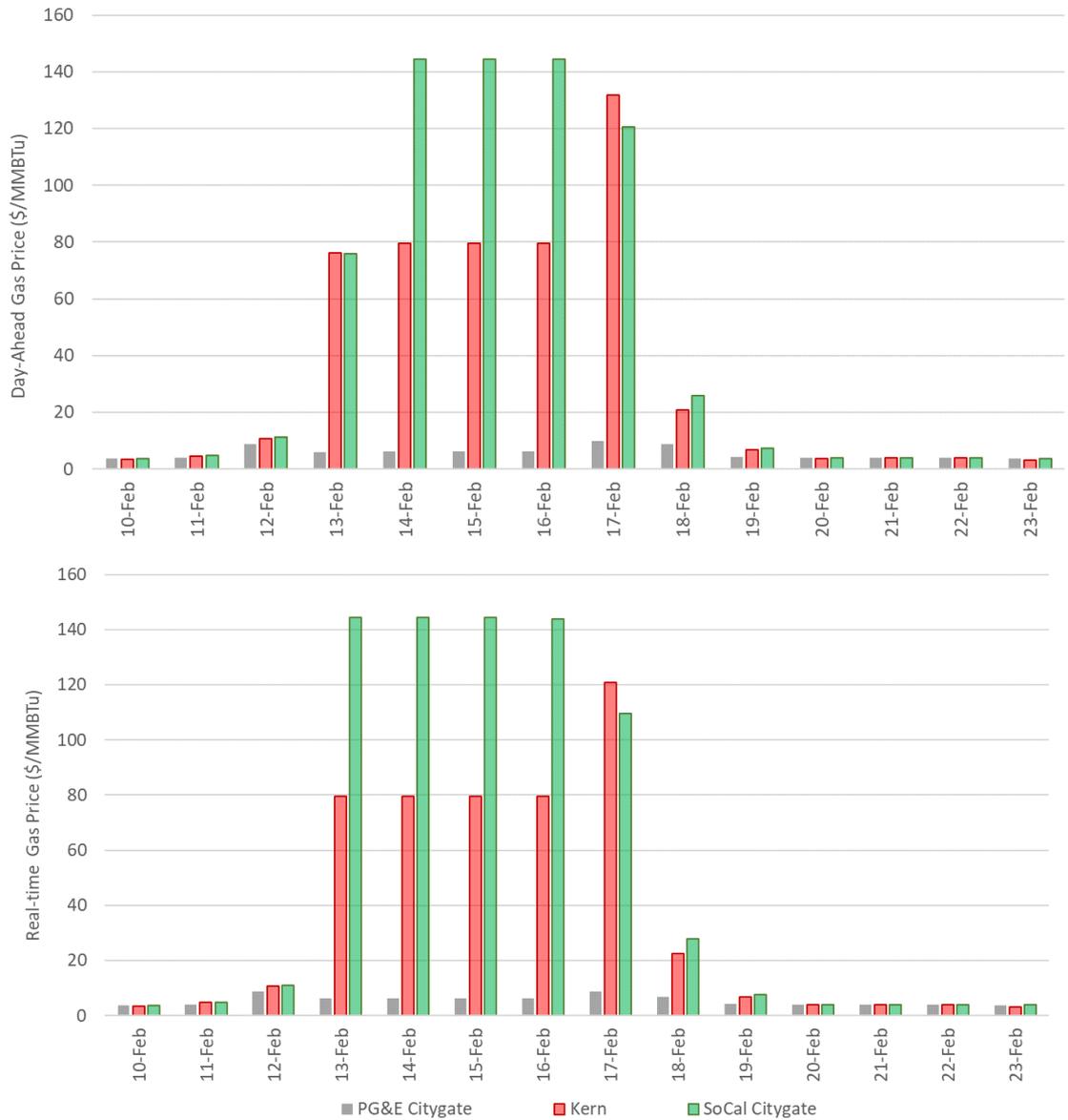
- Gas Conditions
- Congestion Revenue Rights
- 2020 CAISO's market costs
- Batteries
- Resource Sufficiency Test
- Load Conformance Limiter Enhancement
- Market Performance Metrics

Gas Conditions

Recent gas conditions precipitated deployment of new functionality in CAISOs' markets

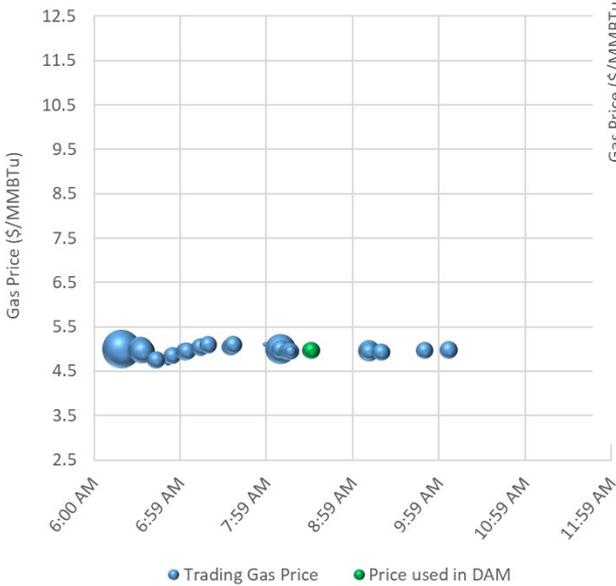
- Given high gas prices in Southern in mid February, CAISO expedited the deployment of the commitment costs and default energy bid (CCDEBE) functionality
- CCDEBE became in effect for trading date February 16
- CAISO also seek relief as of February 17 to allow for after the fact cost recovery for incremental bids above \$1000/MWh
- CAISO intends to deploy FERC831 functionality no later than March 21, 2021
- On February 22, CAISO filed Tariff language for the pricing parameters policy initiative

Gas prices in Southern gas hubs increased steeply during the cold weather days in mid February

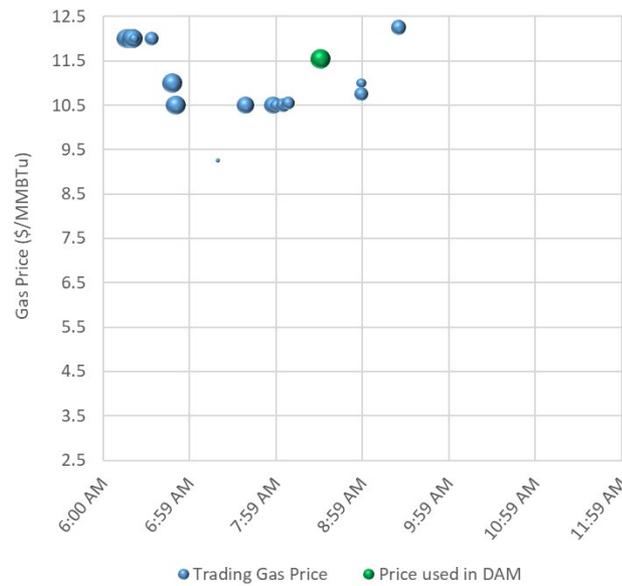


Gas prices in SoCal Citygate hub were fairly volatile for the next-day weekend package of February 13

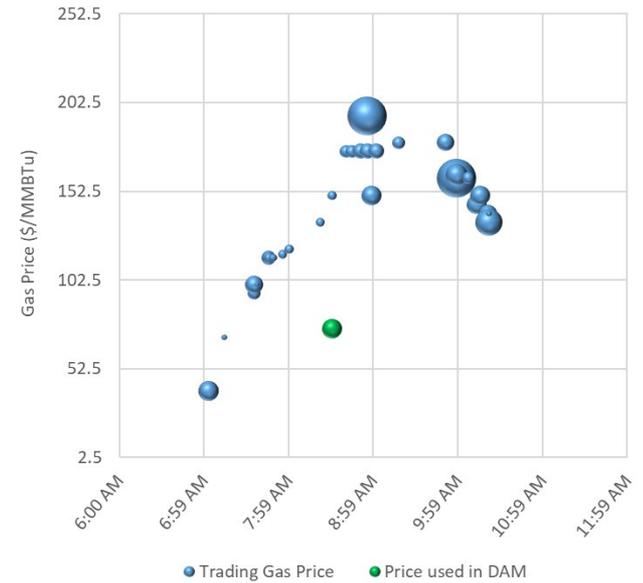
February 11



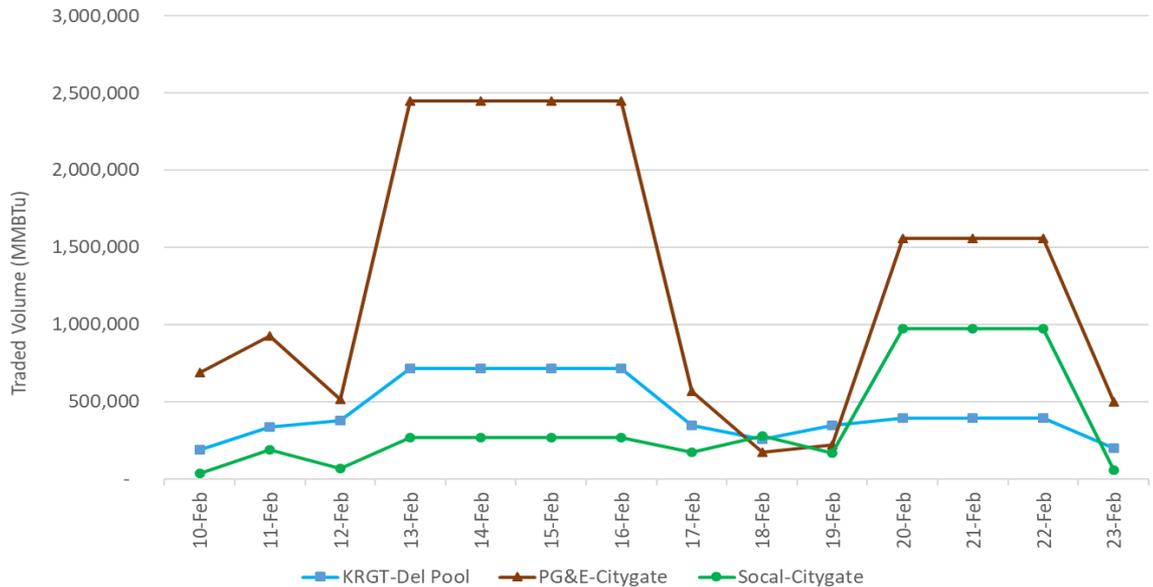
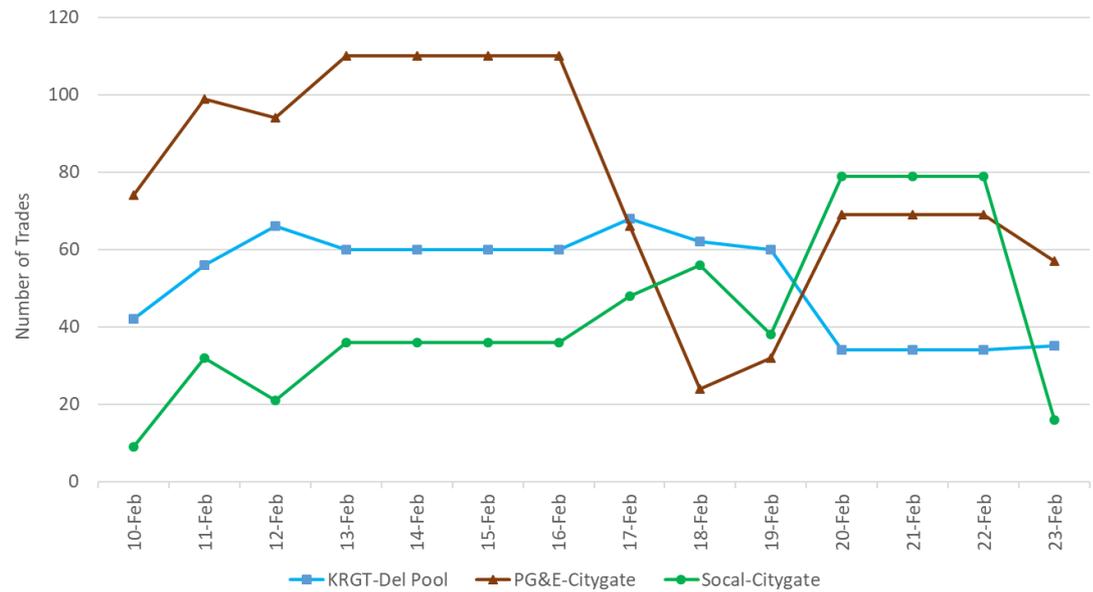
February 12



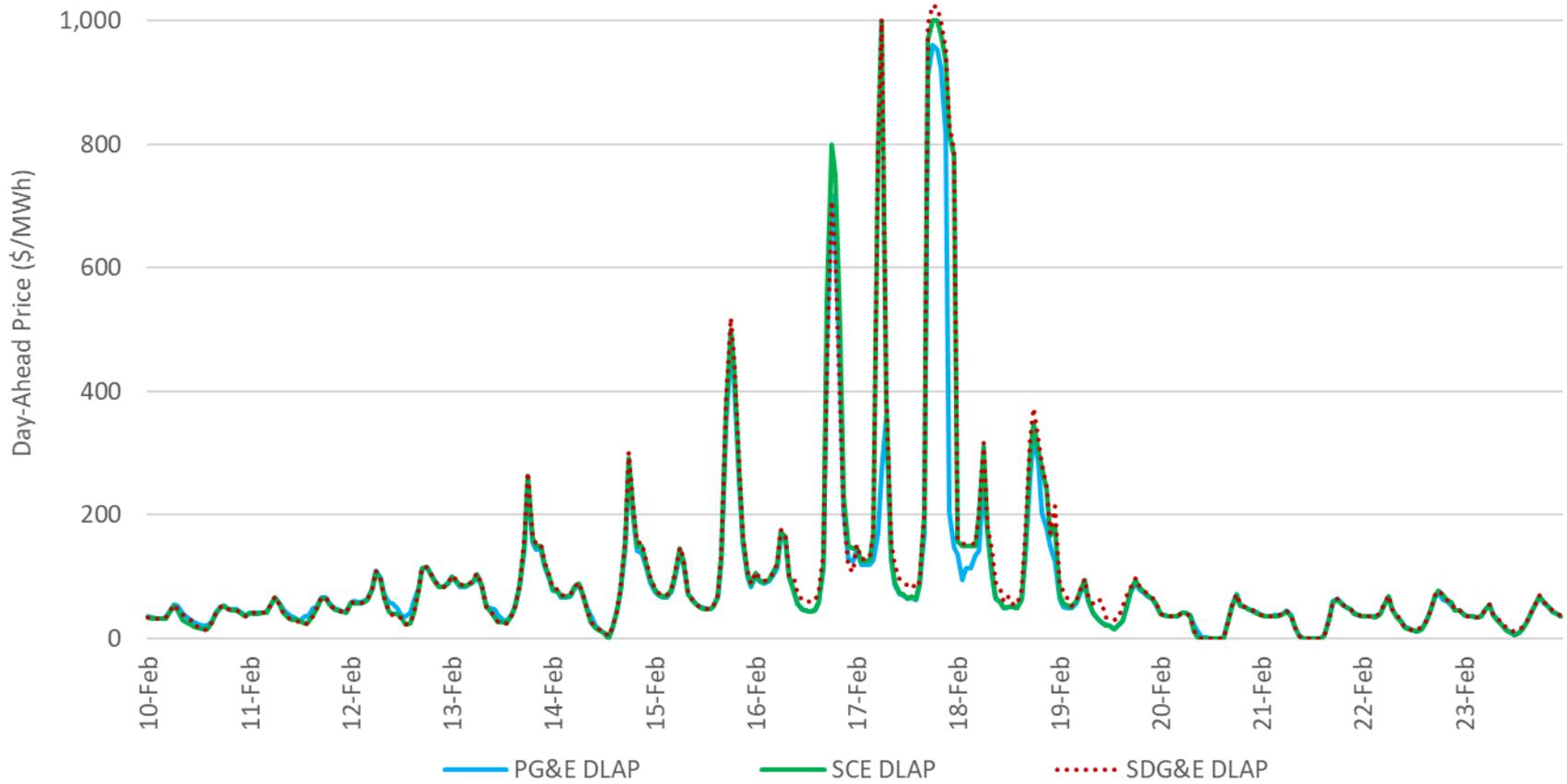
February 13-16



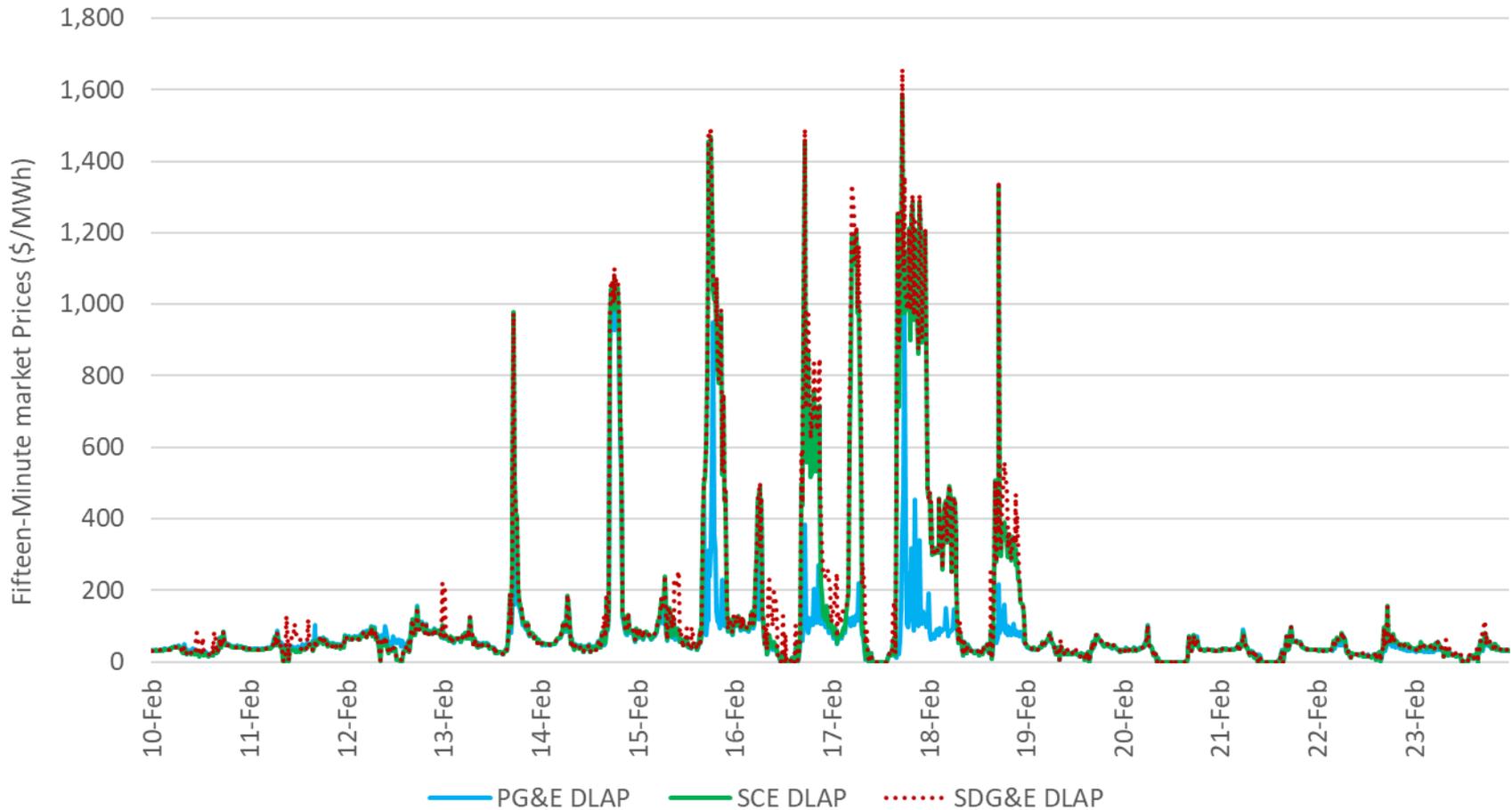
Gas trading for hubs used in CAISO markets during the cold weather period seemed to be liquid



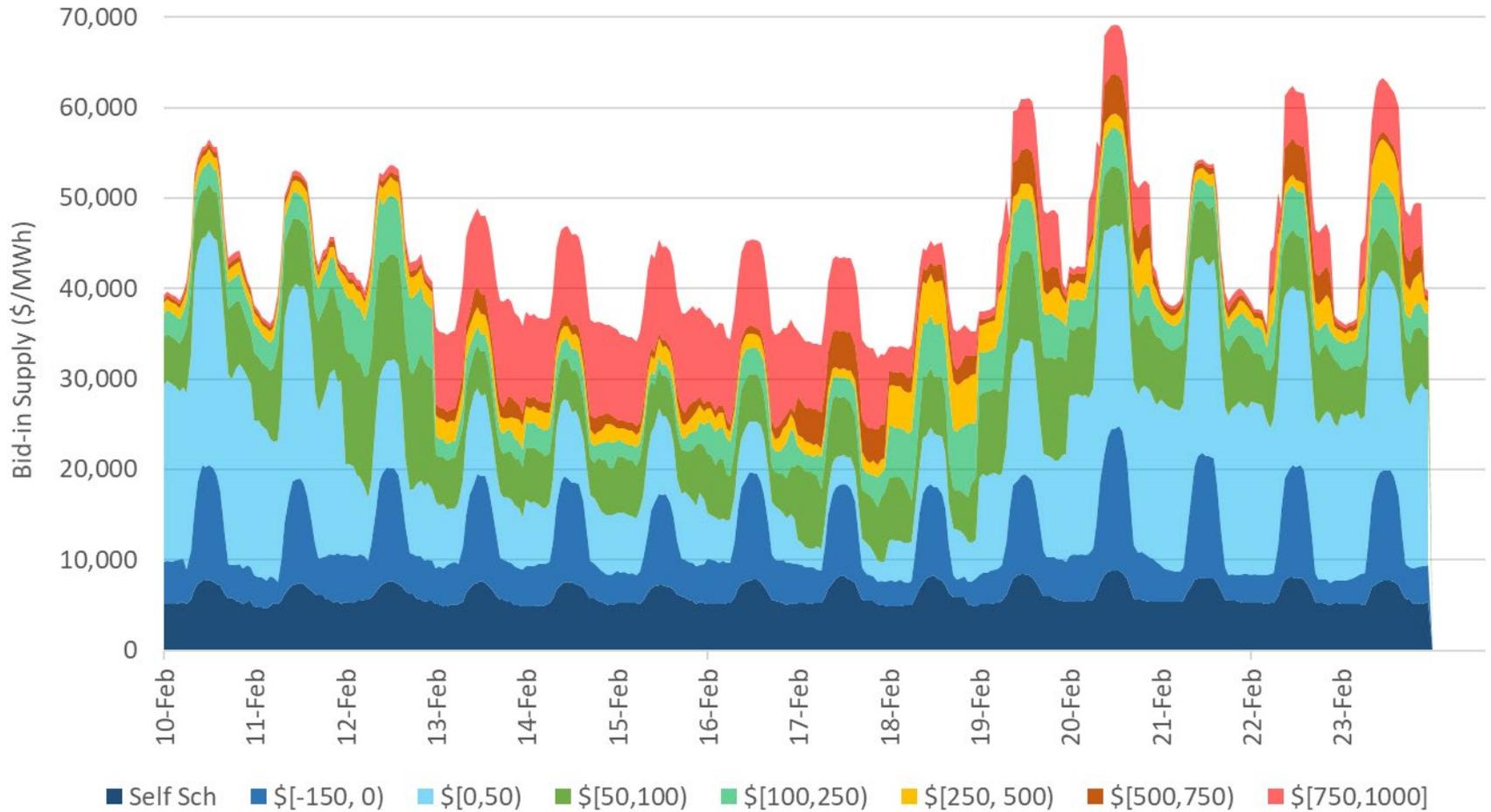
Day-Ahead prices reached the \$1000 mark on February 17 with negligible separation among system areas



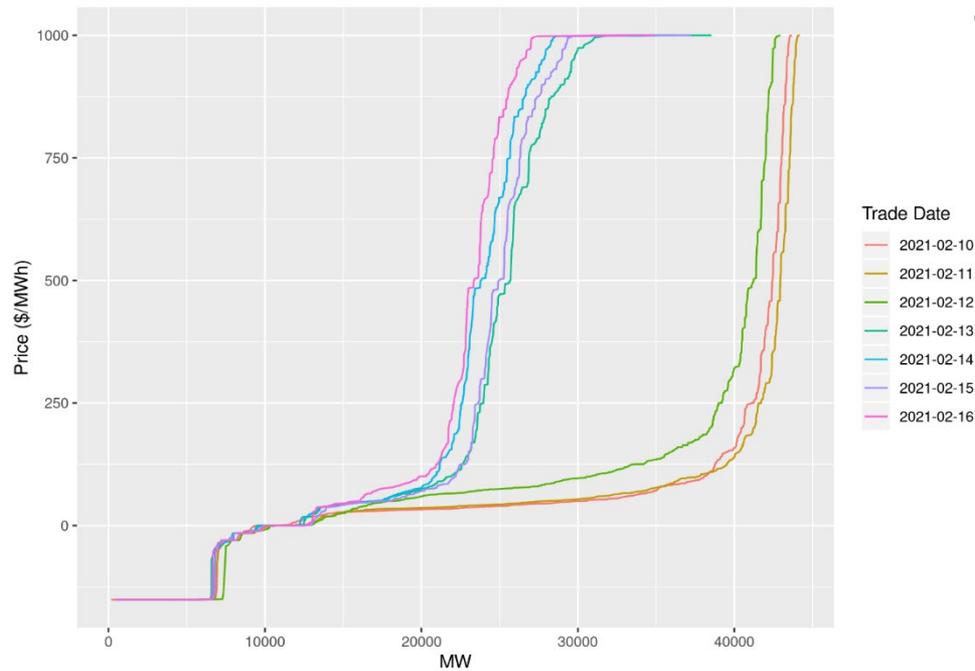
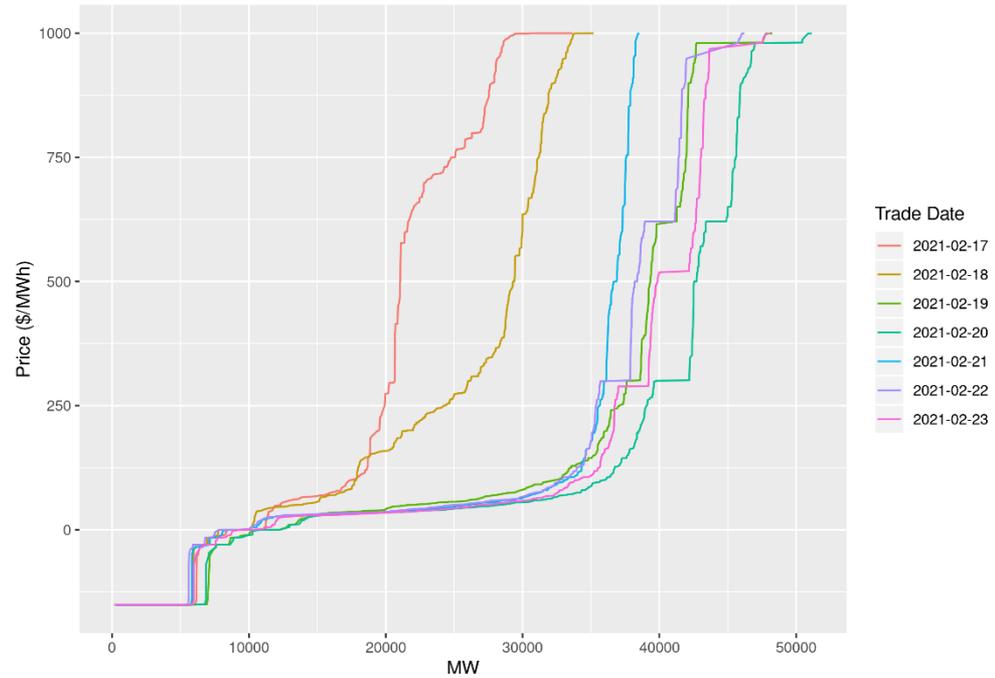
Real-time prices observed separation with higher prices in the south



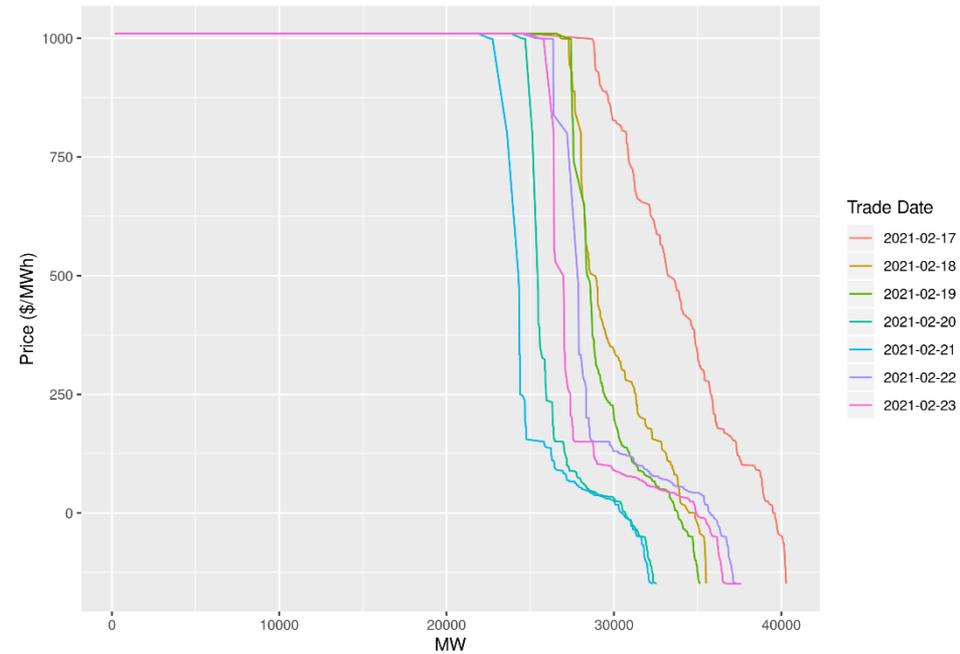
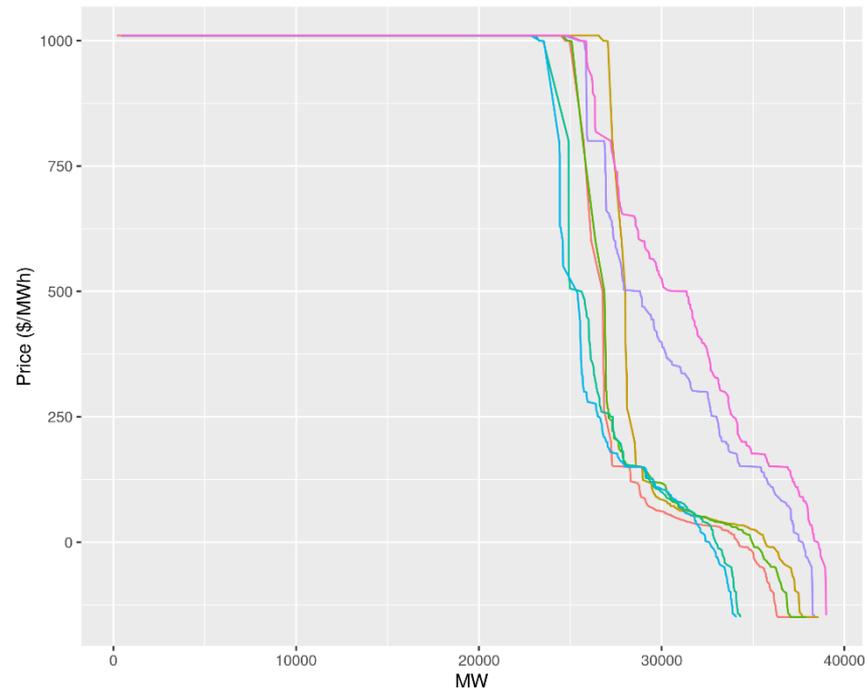
Bid-in supply shows an increase of \$1000/MWh bids during days with high gas prices



The supply stack shows the steep increase of energy bids while being capped at \$1000

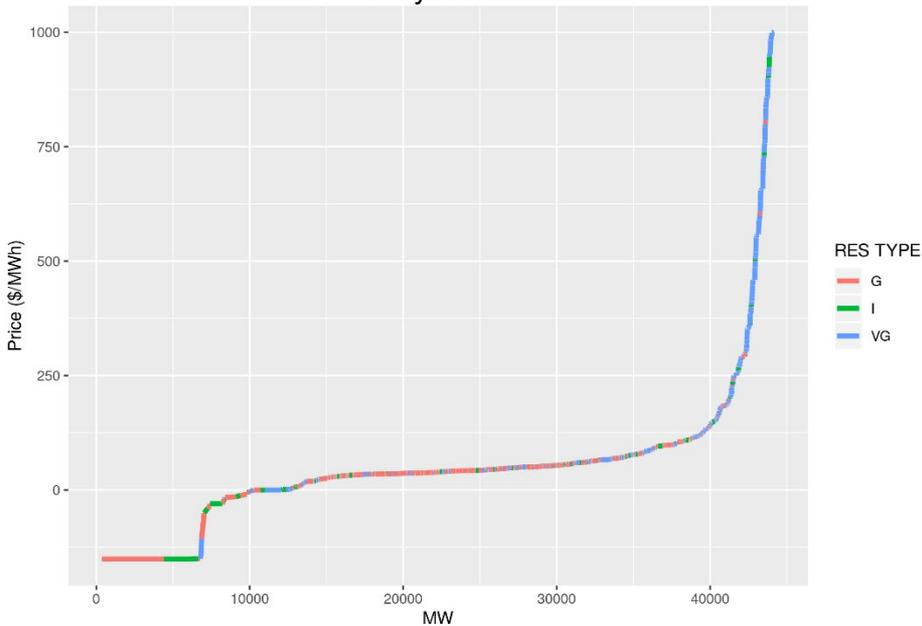


Bid-in Demand stack shows less of a change in pattern during the cold weather days

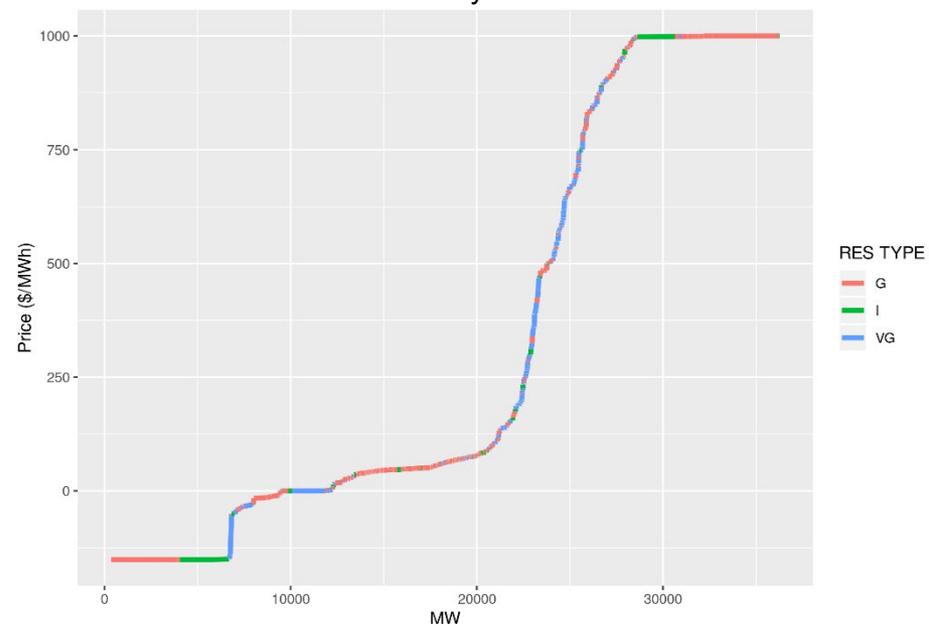


For days with high gas prices, bids at the cap were largely from internal generation and some portion of imports

February 11

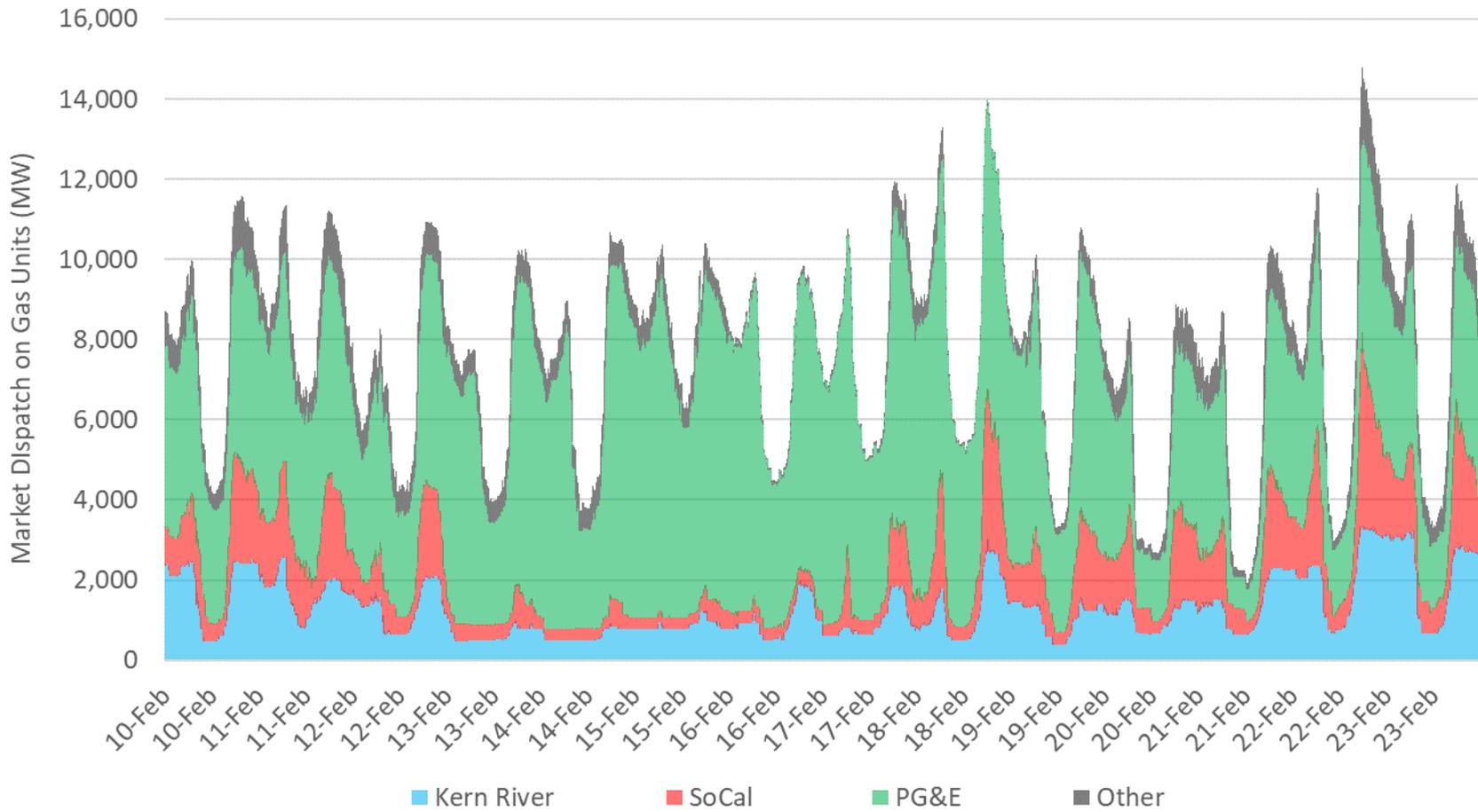


February 14

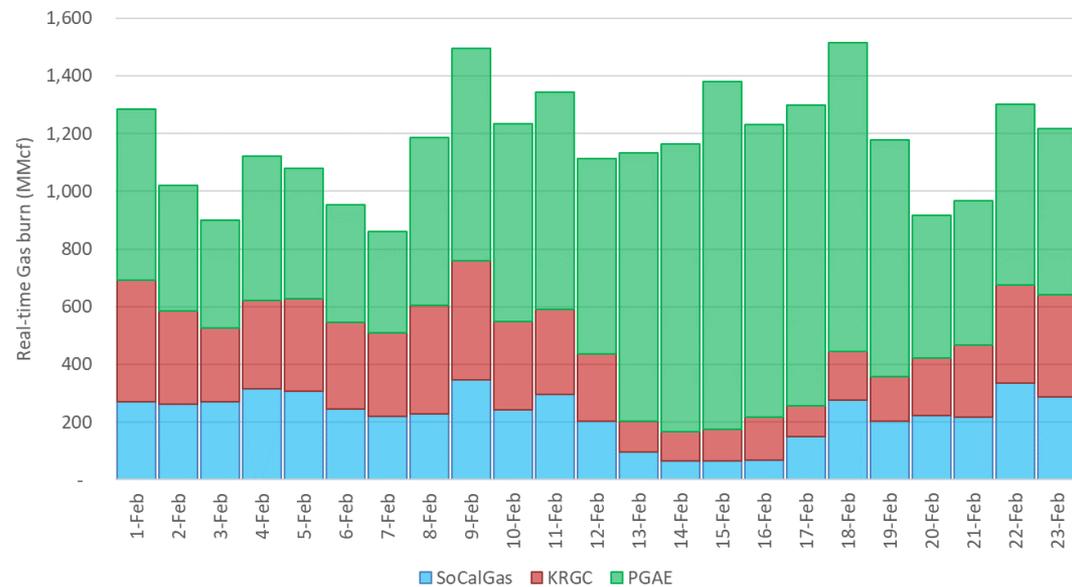
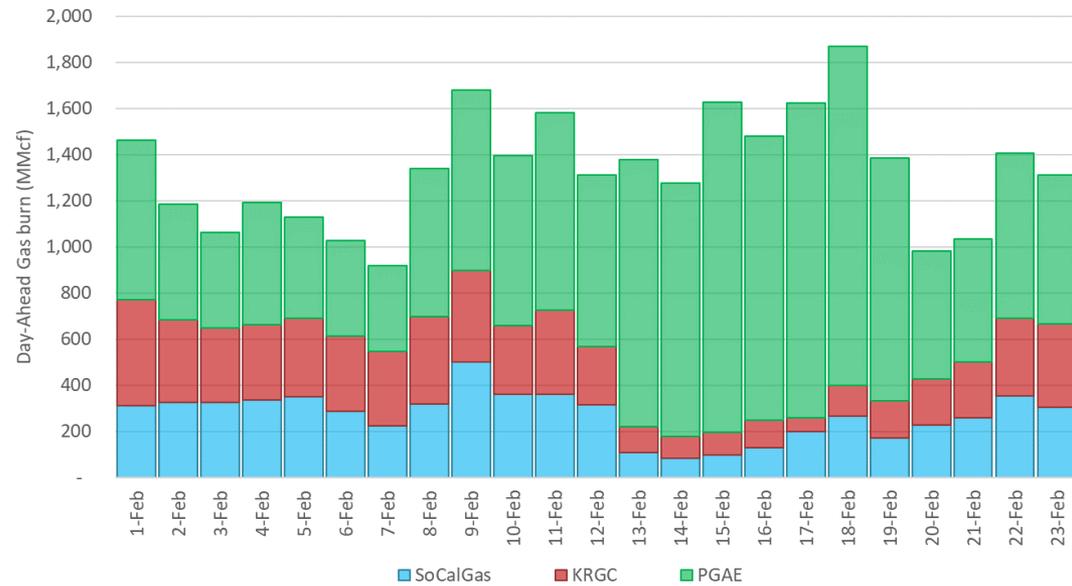


G: Internal Generation
I: Imports
VG: Convergence (supply) generation

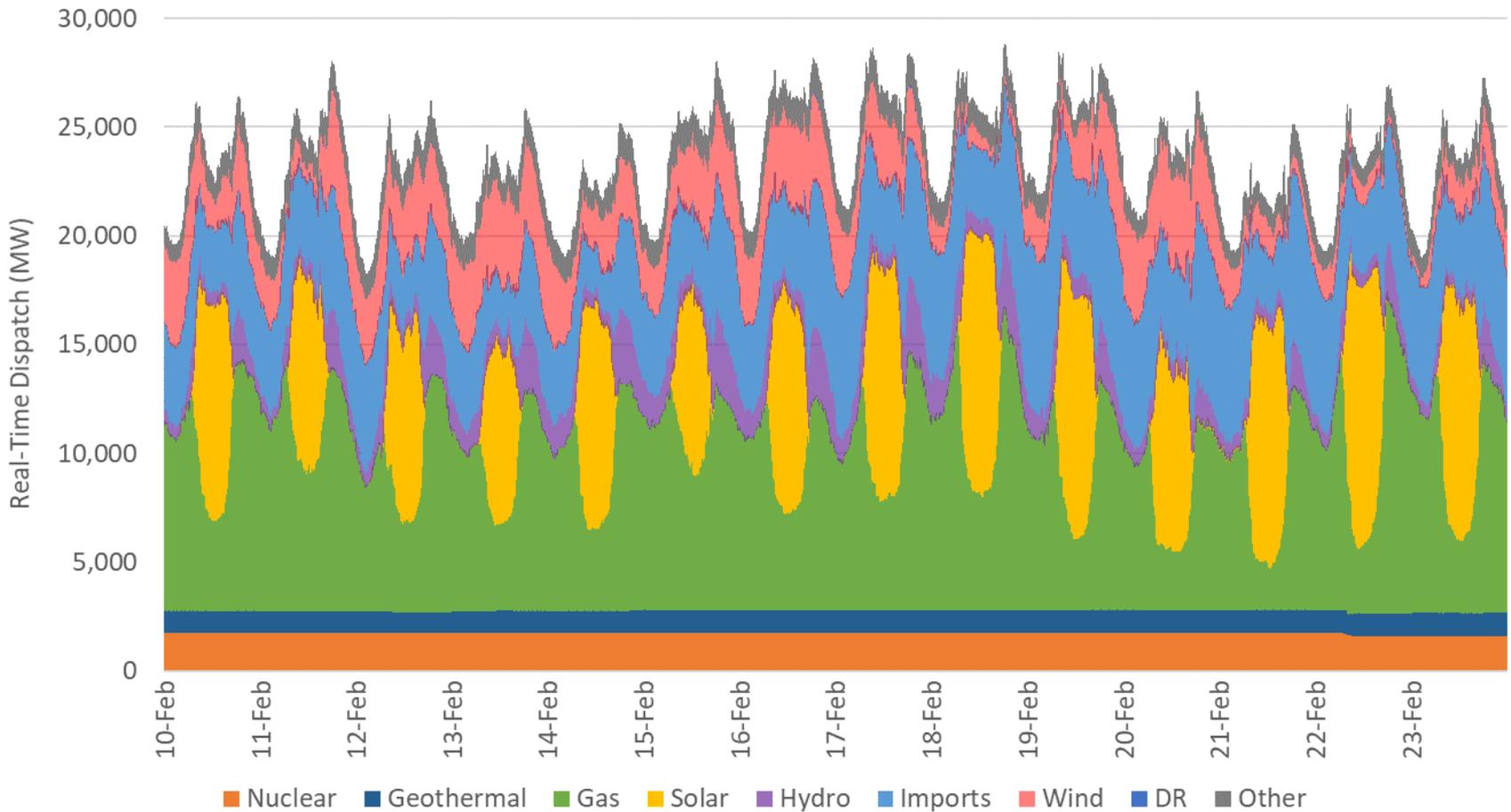
Dispatches of gas-based generation were fairly reduced for units on the SoCal and Kern River systems



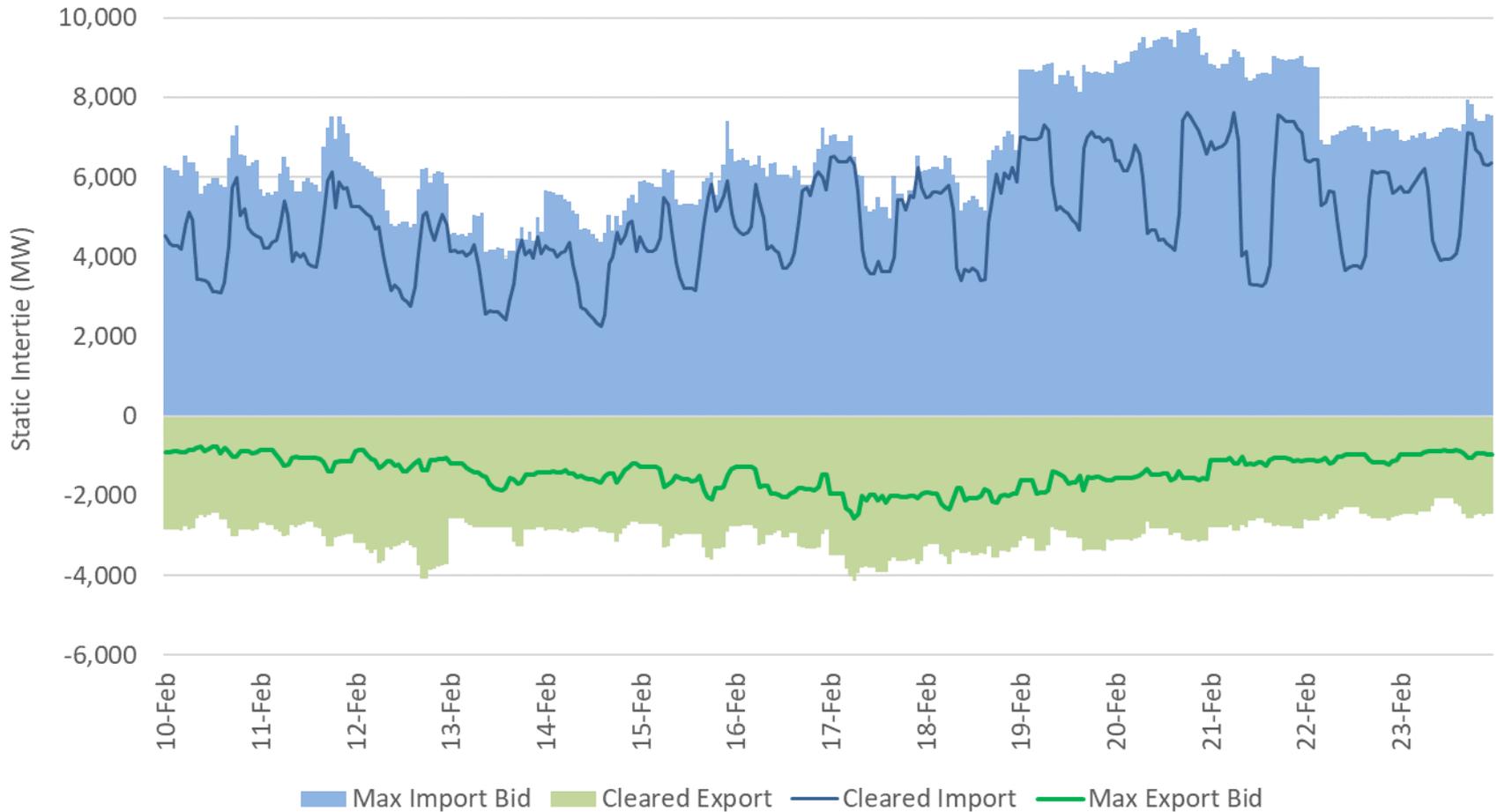
High gas prices in SoCal and Kern hubs resulted in reduced gas burn in the Southern part of the system



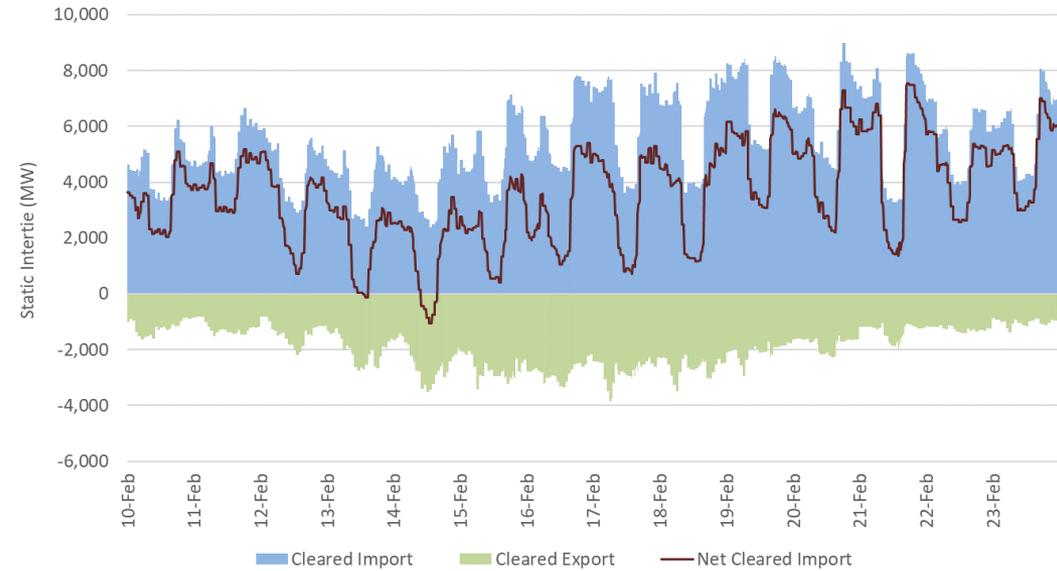
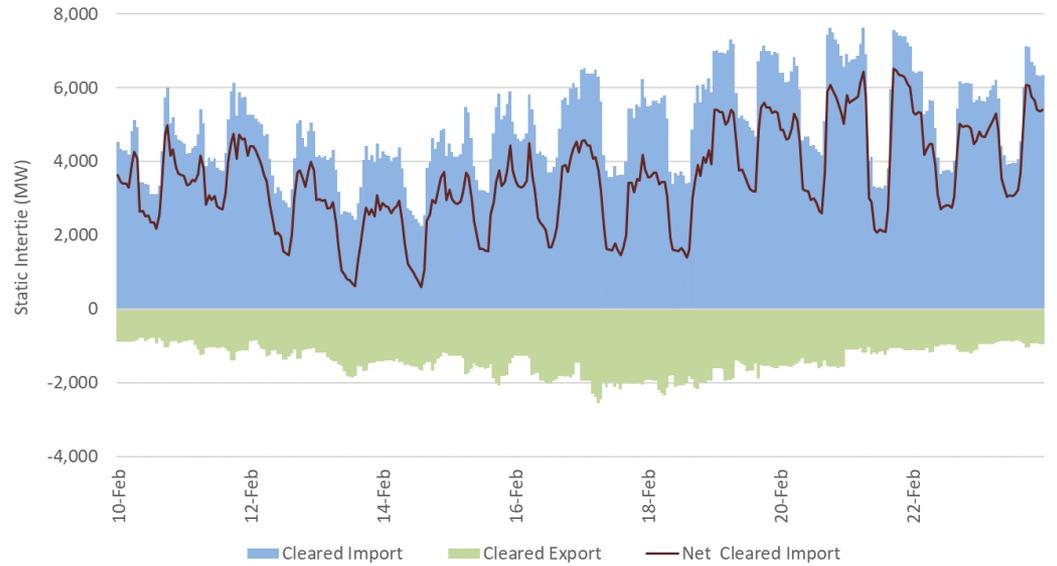
With low system loads and high gas prices in the south, other generation technologies and gas resources from the north economically displaced expensive gas-based generation in the south



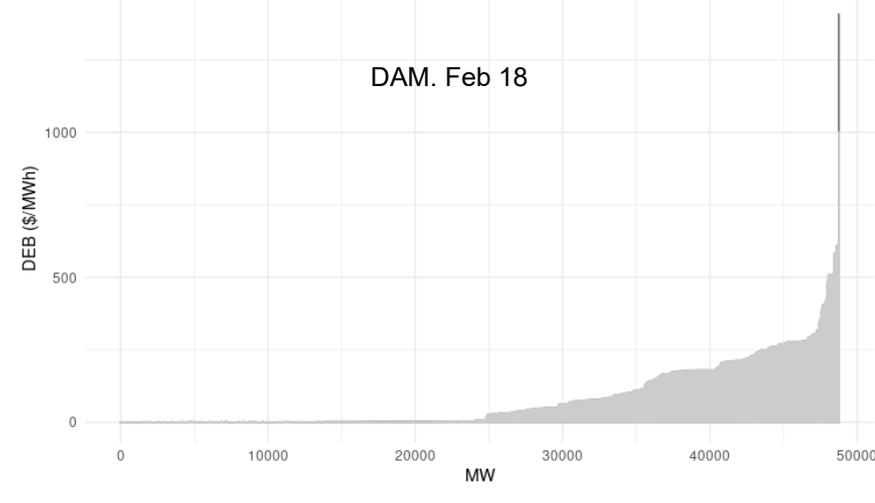
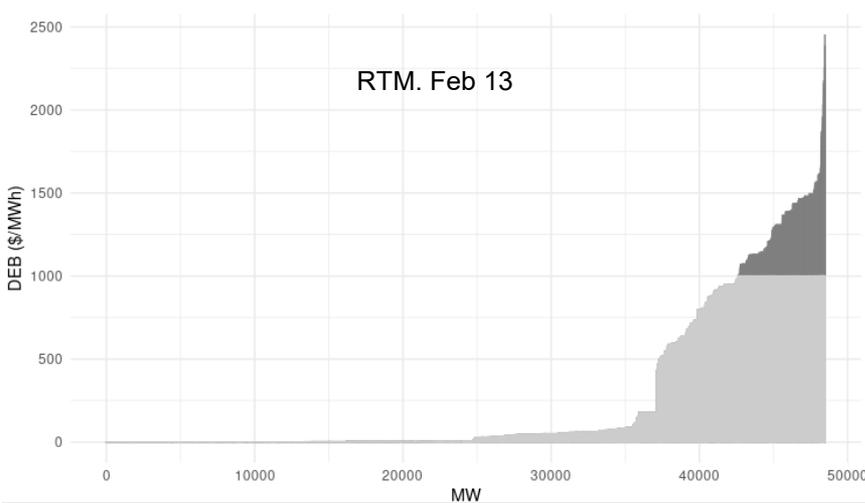
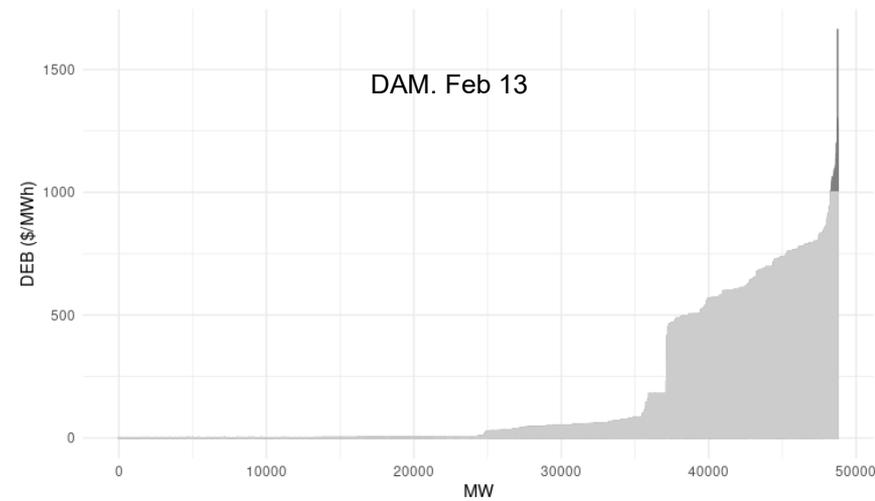
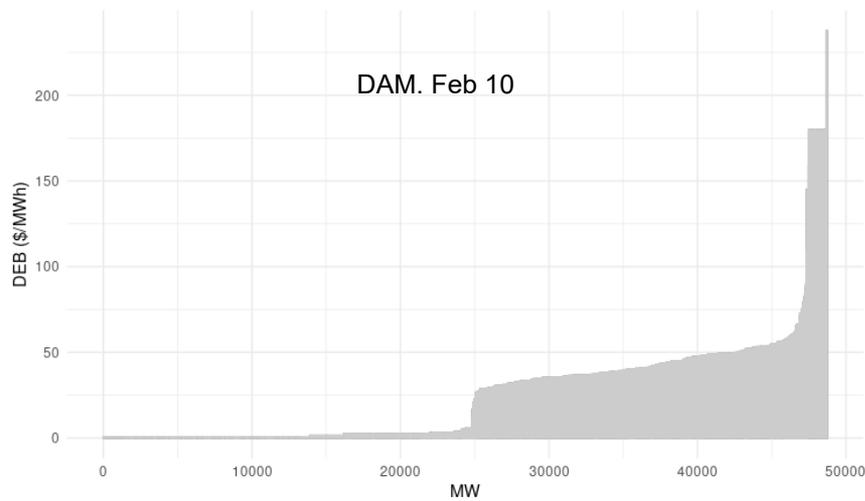
Imports decreased while export marginally increased during the cold weather conditions



Net Imports decreased fairly in the day-ahead market on the weekend of February 13 and further decreased in the real-time market



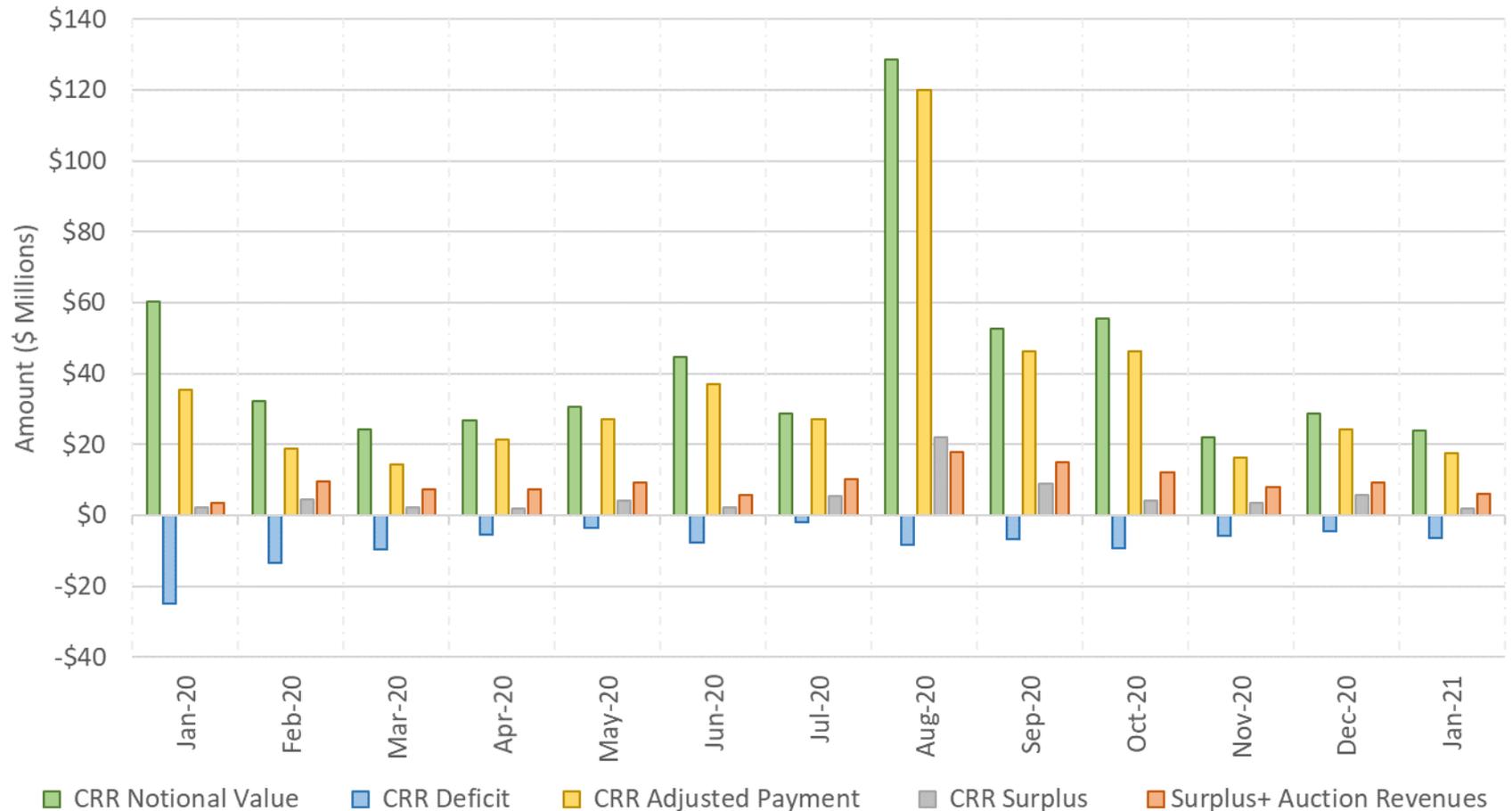
Incremental bids as estimated by Default Energy Bids exceeded the bid cap of \$1000/MWh during the cold weather days



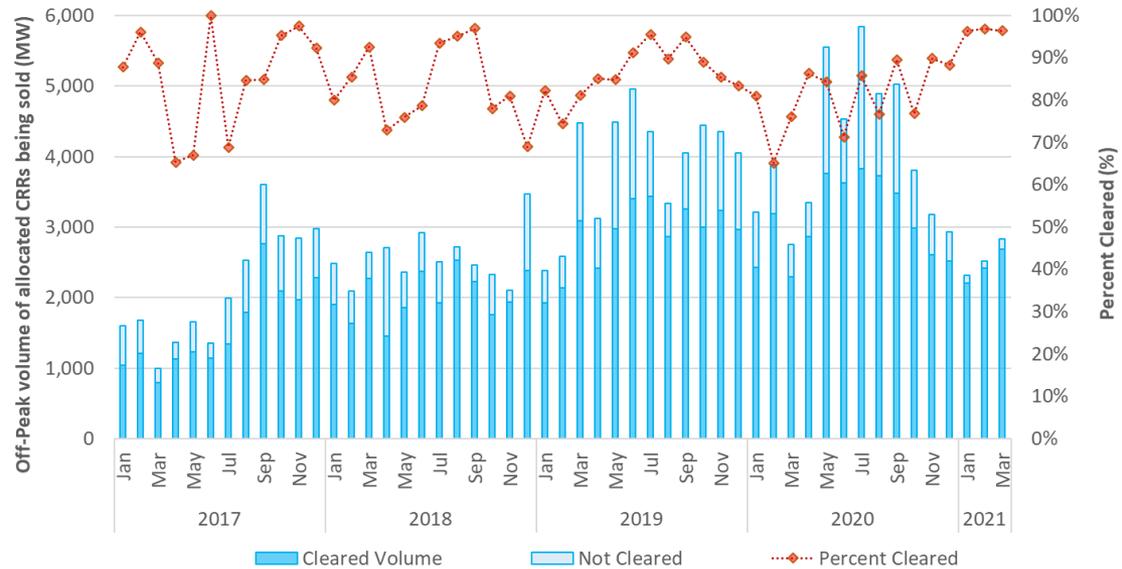
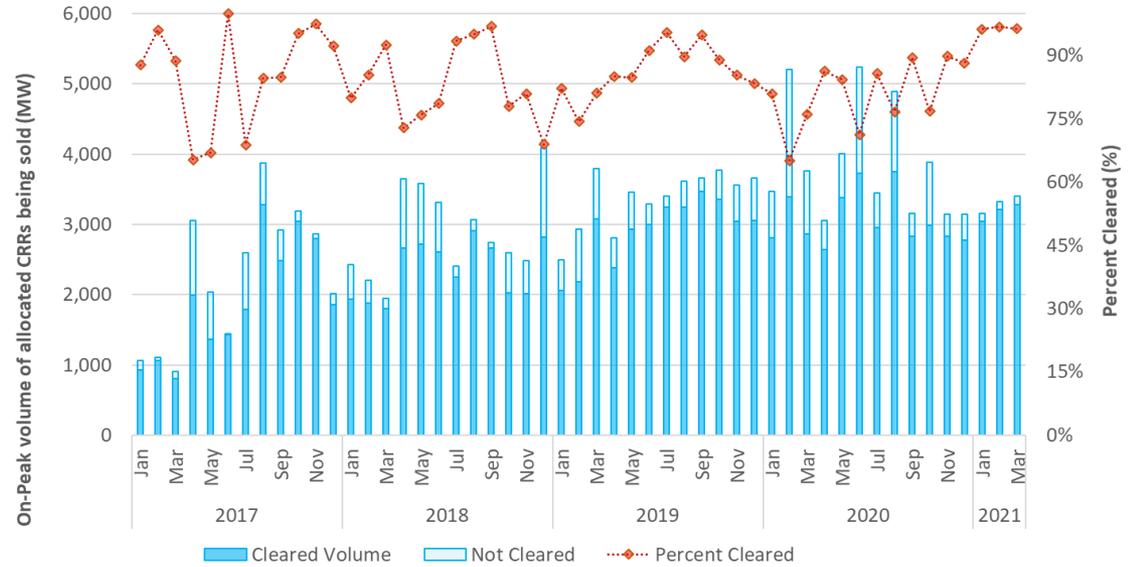
Original DEB with bid cap at \$1000 are shown with light grey. DEBs with no bid caps are shown with dark grey.

Congestion Revenue Rights

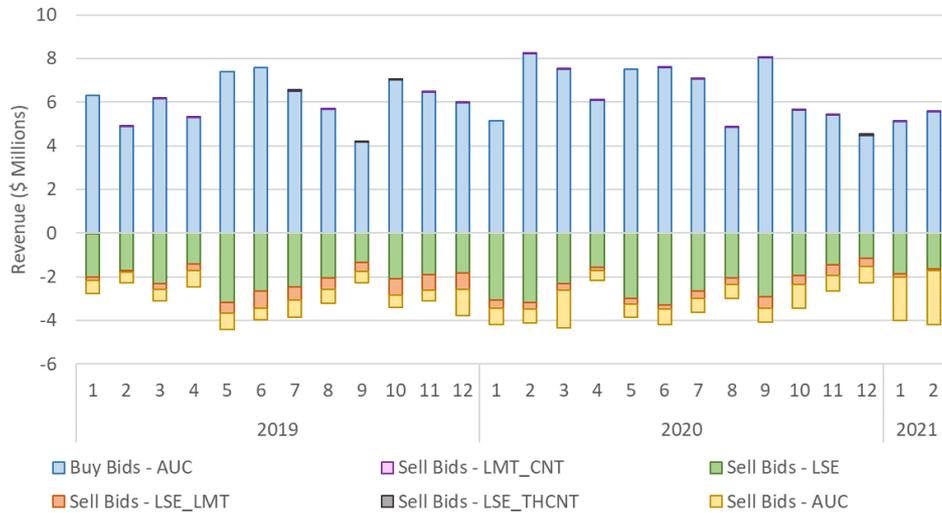
With milder conditions after the summer, the magnitude of the overall CRR settlements has decreased



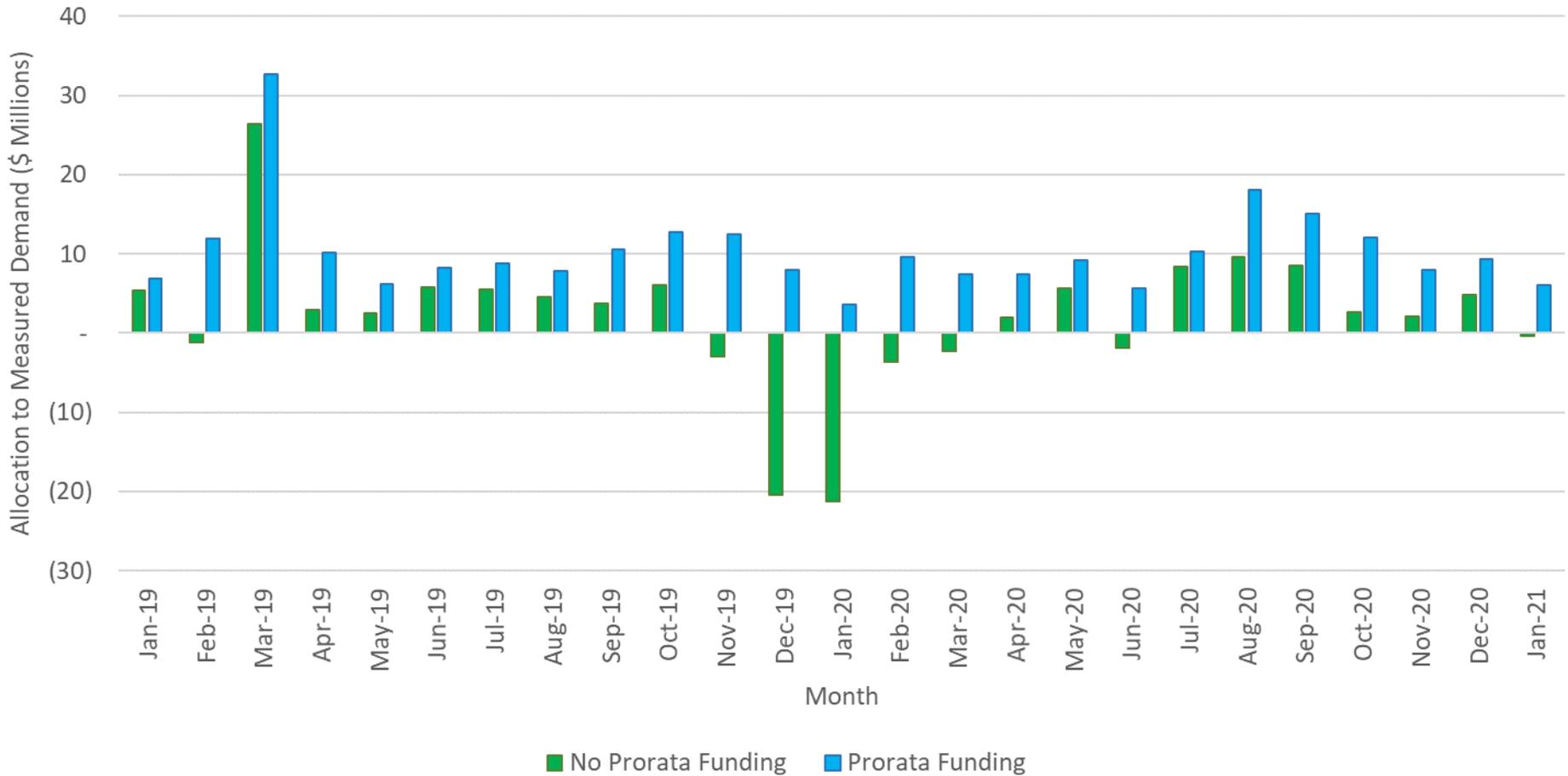
Volume of allocated CRRs being sold by LSEs in CRR auctions have dropped slightly in the last few months



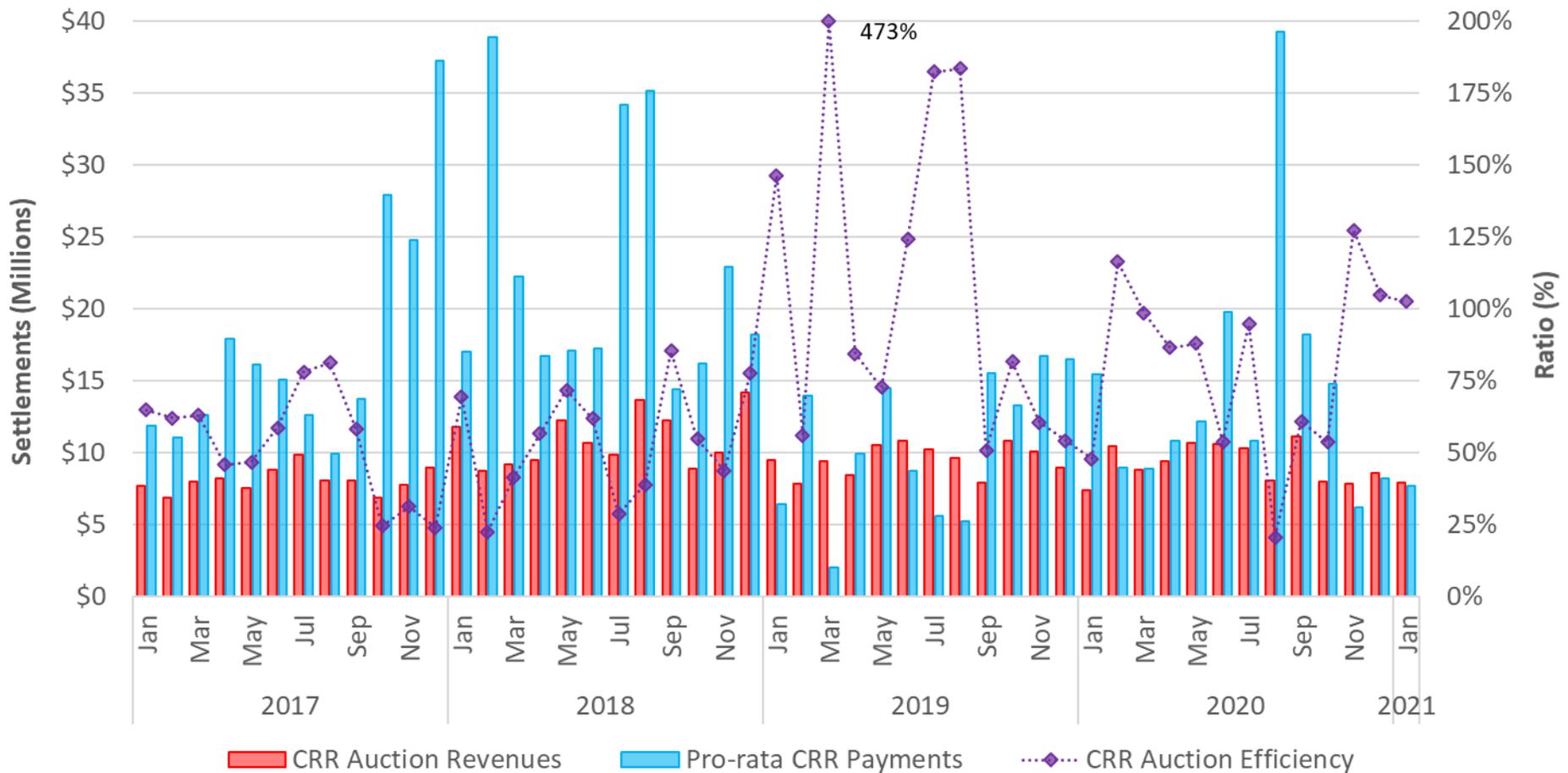
Auction Revenues remain within historical range



Implementation of pro-rata funding continues to improve revenue adequacy in 2021



Auction Efficiency has performing better after the summer months



2020 CAISO's Market Costs

Costs in CAISO markets have multiple components, with the energy cost transacted in day-ahead market accounting for over 90 percent of the overall cost

- Main cost components include:
 - Day-ahead energy costs
 - Real-time energy costs
 - Ancillary Service costs
 - Bid cost recovery
 - Reliability Must Run
 - GMC

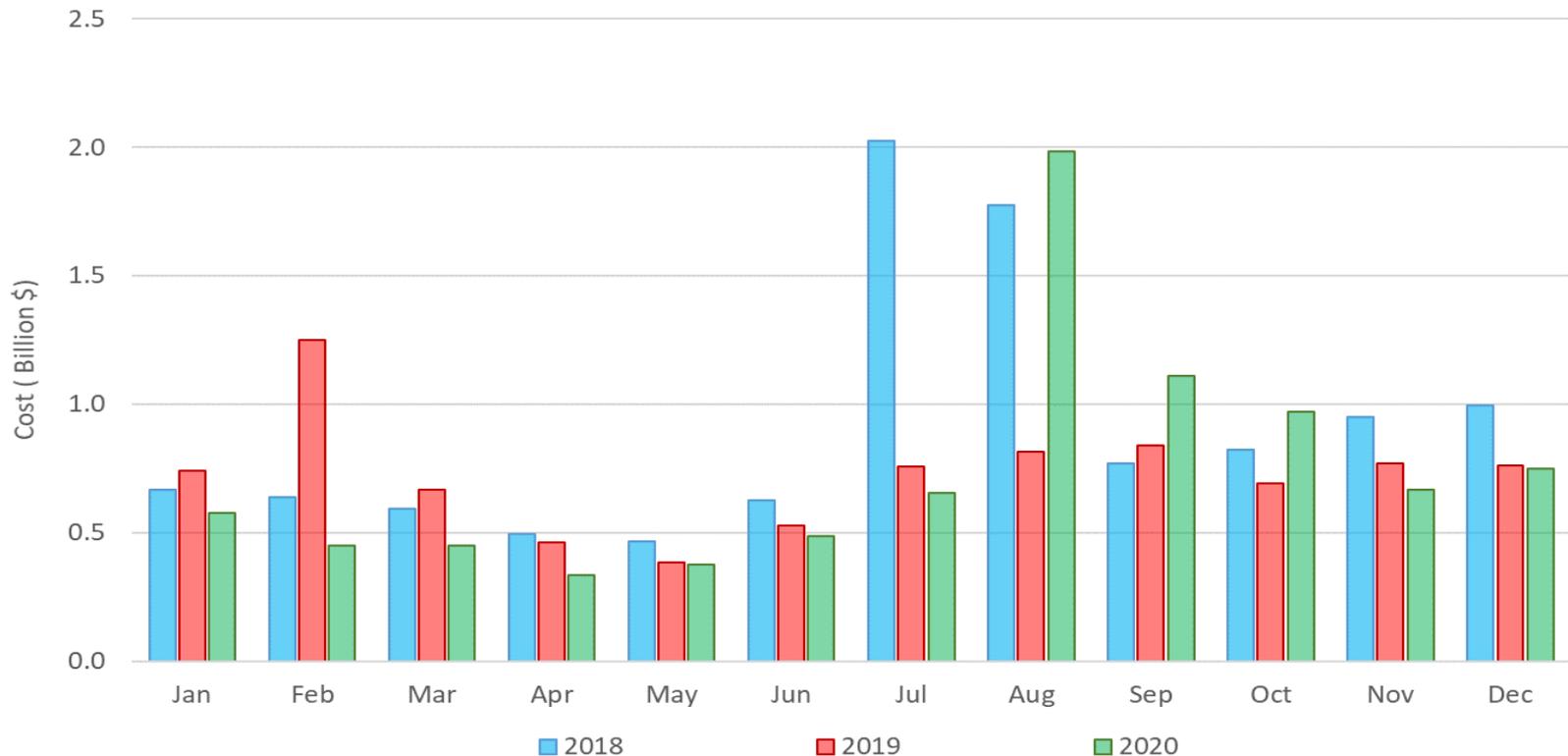
Overall costs in 2020 slightly increased to \$8.96 Billion from \$8.82 Billion 2019*



2020 summer cost increased by \$1.3 Billion with respect to 2019 while it was \$0.8 Billion lower than in 2018

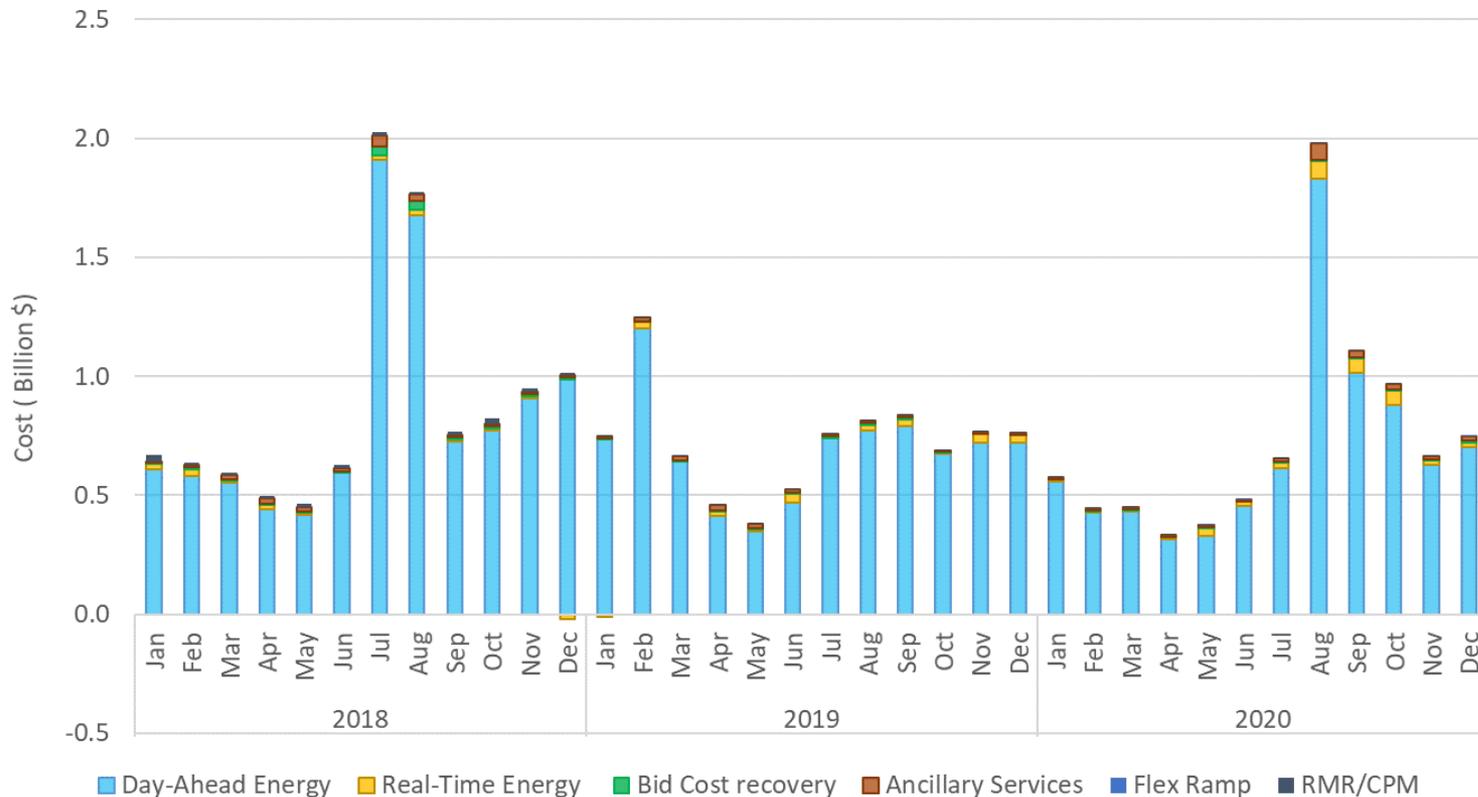
* These are estimates based on data available by the time of the calculation, which are still subject to changes

Monthly comparisons highlight the evolving conditions from year to year in a more granular basis

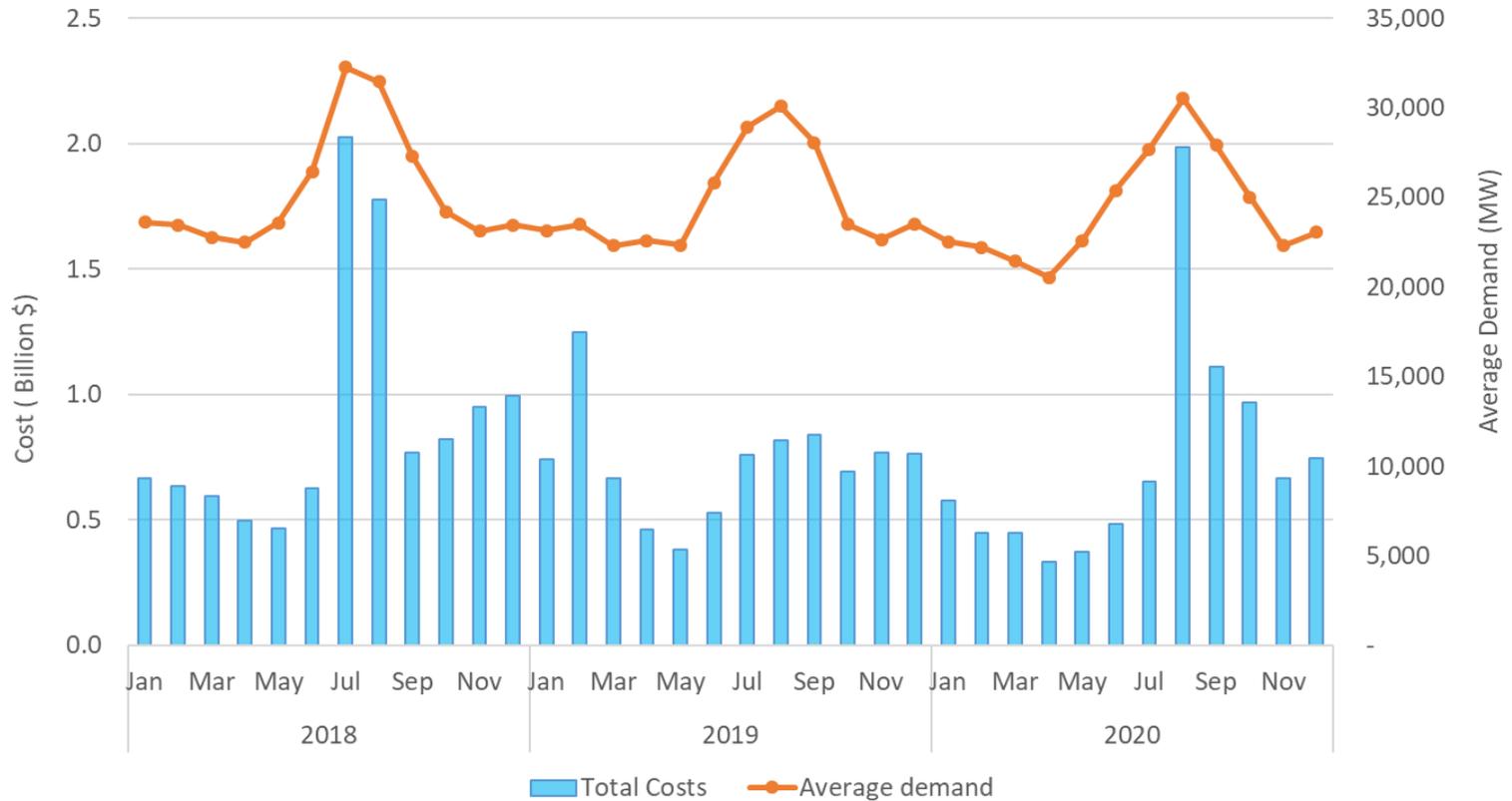


Costs for August were \$1.7B, \$0.81B and \$1,98B in 2018, 2019 and 2020, respectively.

Over 90 percent of the overall costs are accrued on the day-ahead market transactions

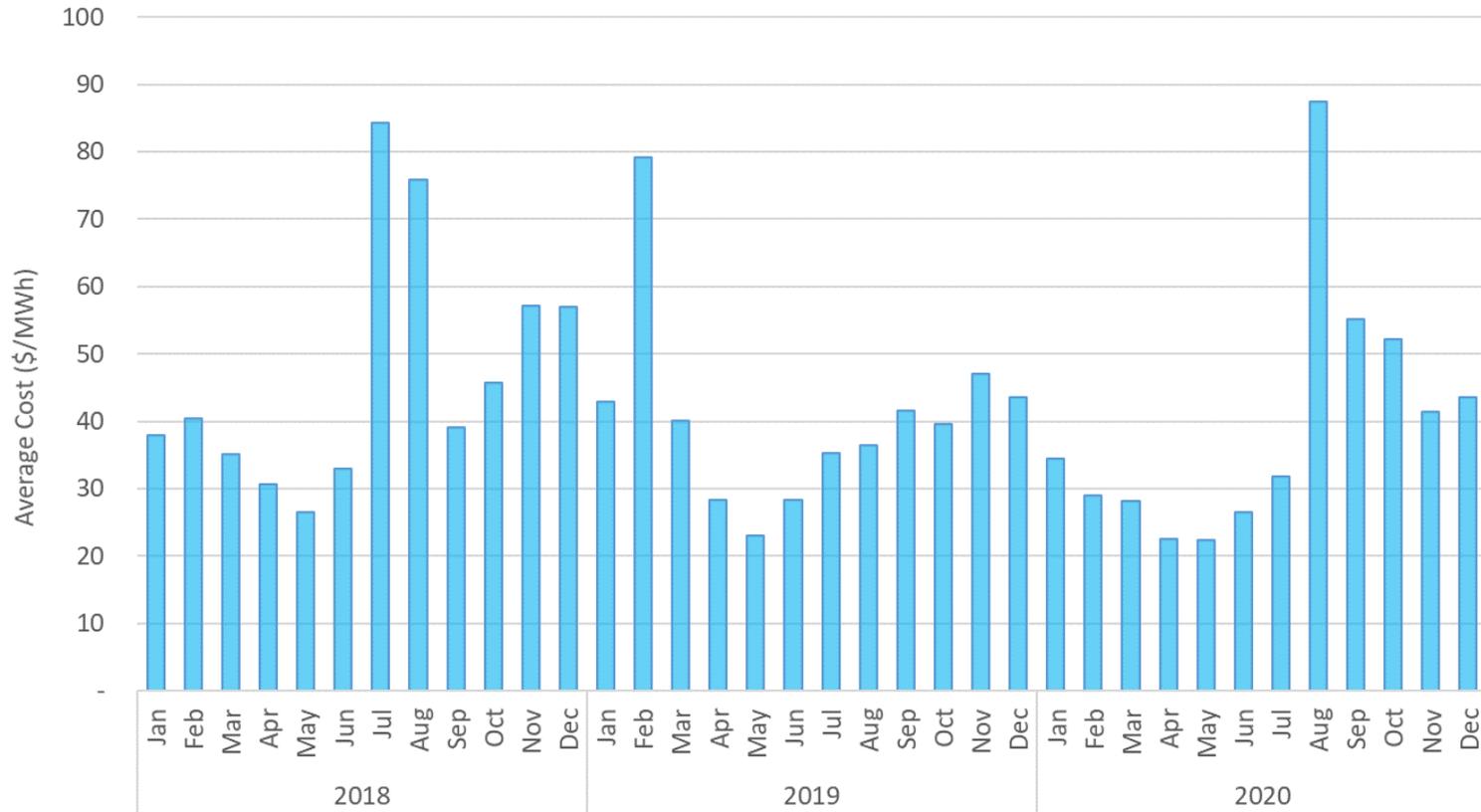


Costs depend on both market clearing prices and demand transacted

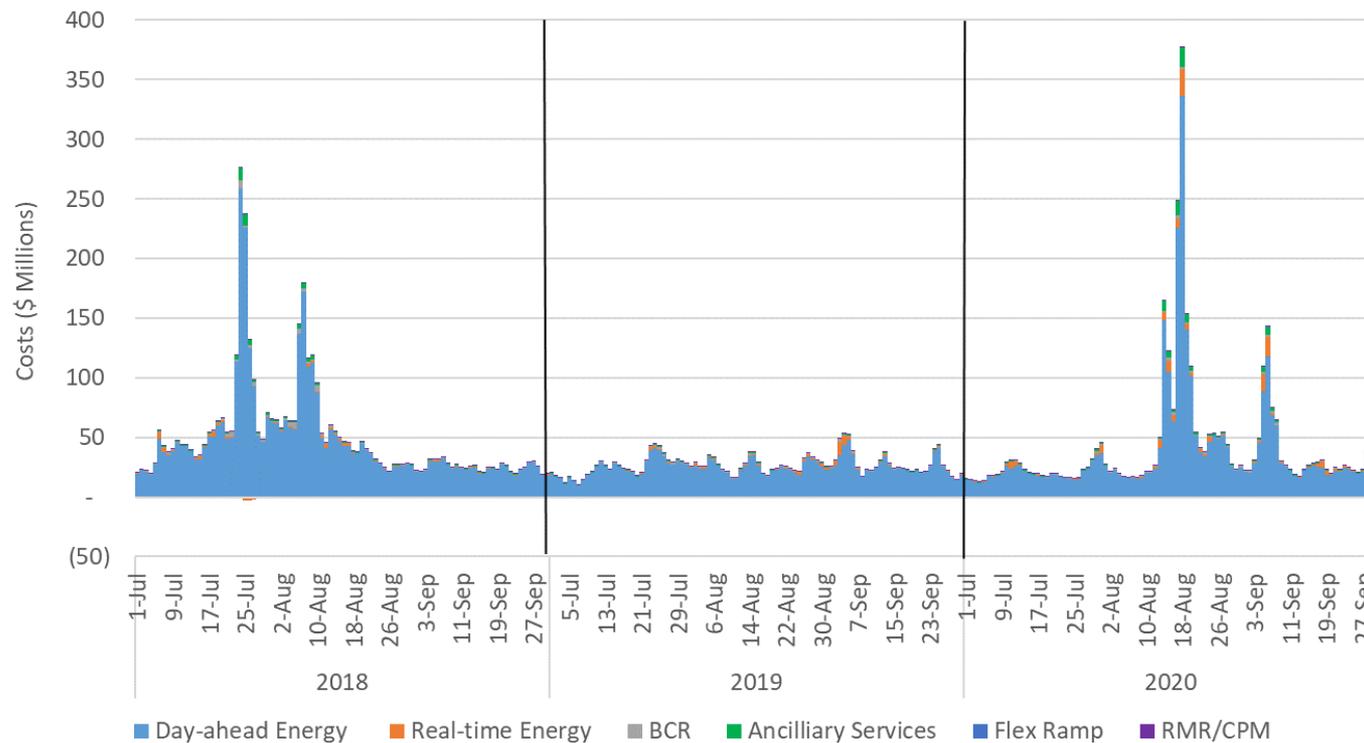


- Energy settled in the CAISO's market during summer conditions was within typical ranges in the last three years

Average cost increased to about \$87 in August 2020

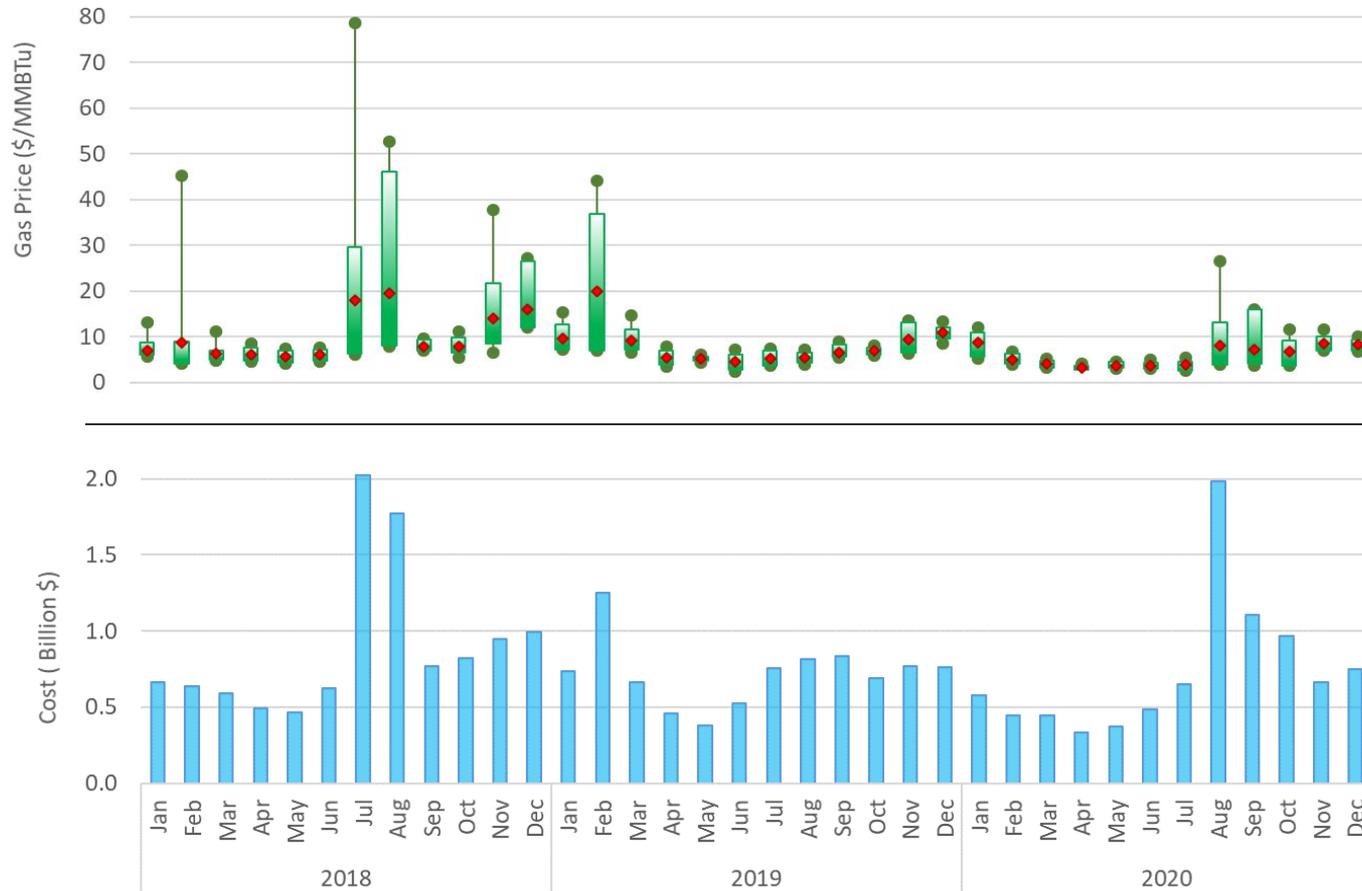


The daily costs trend shows more granular costs accrued during the summer of last three years



- Cost in summer 2020 were more concentrated in fewer days at higher value
- Highest daily cost in 2020 was as much as \$377 Million
- Highest daily costs were \$53 million on September 2019 and \$276 Million on July 2018

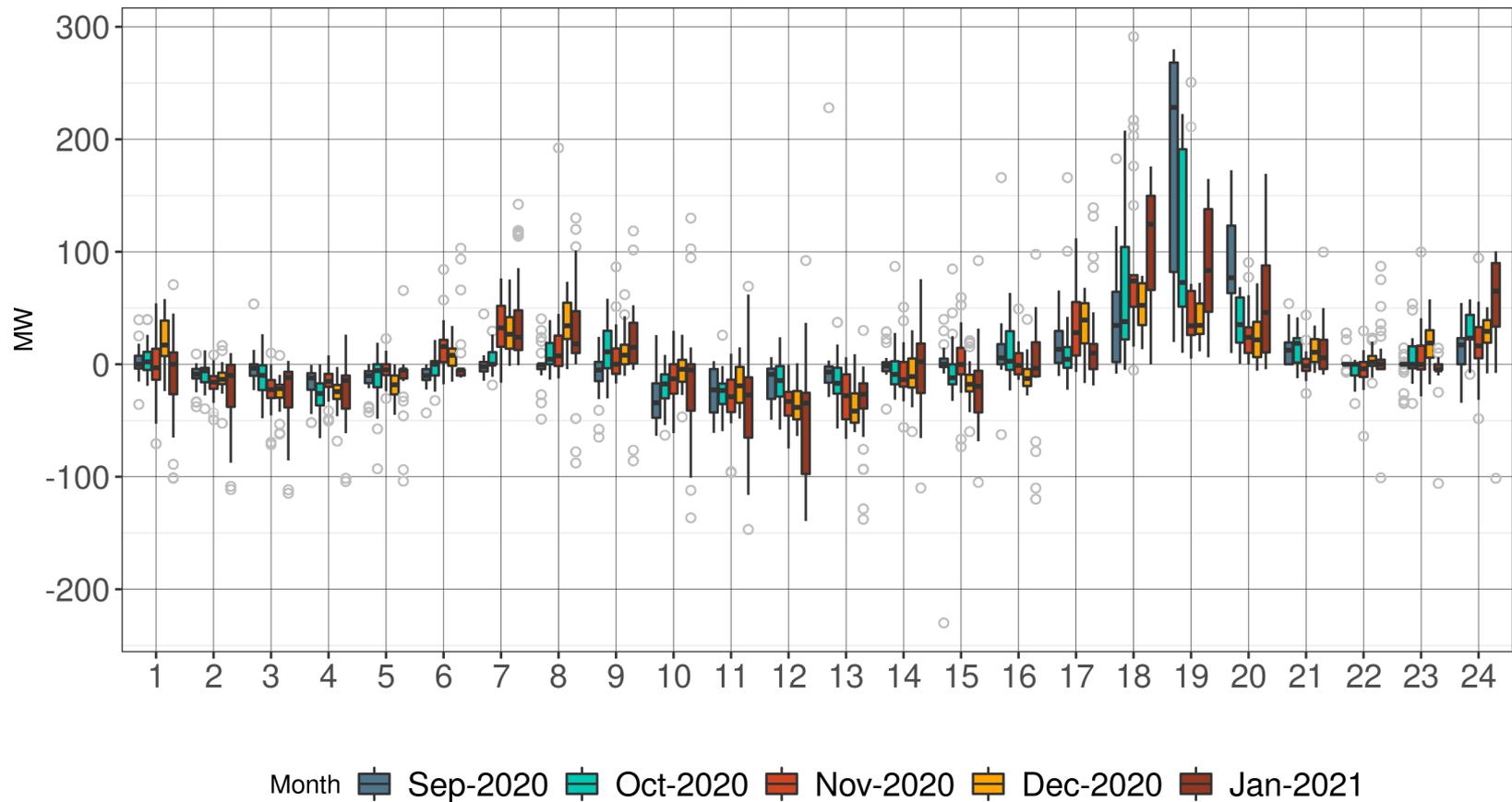
Gas prices in Southern California drove to some extent high electric prices in CAISO market



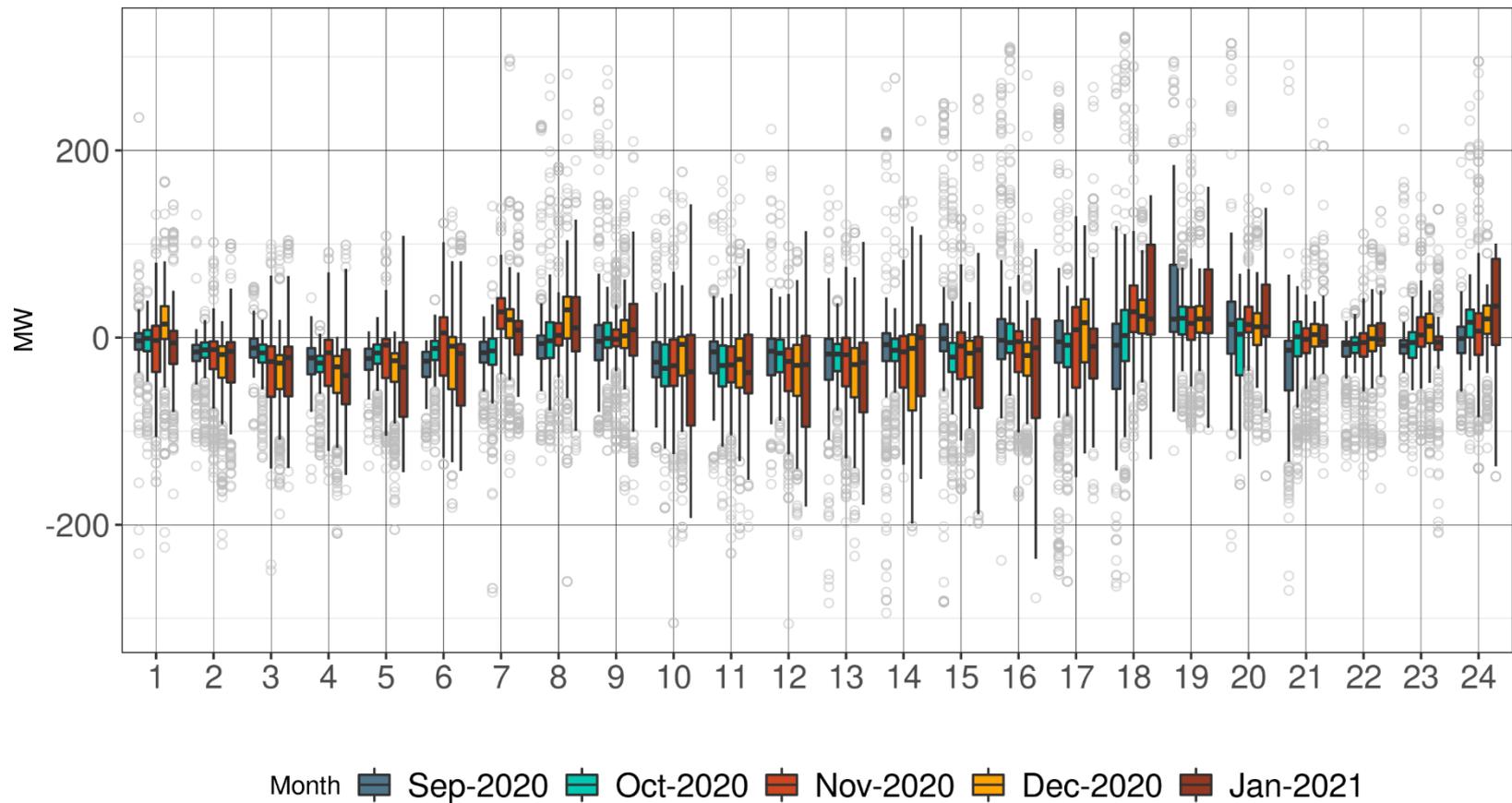
The gas chart shows the maximum and minimum gas prices with the green tails of each whisker, the red dot shows the monthly average price while the box represents the range where 80 percent of the gas prices in the month falls

Batteries

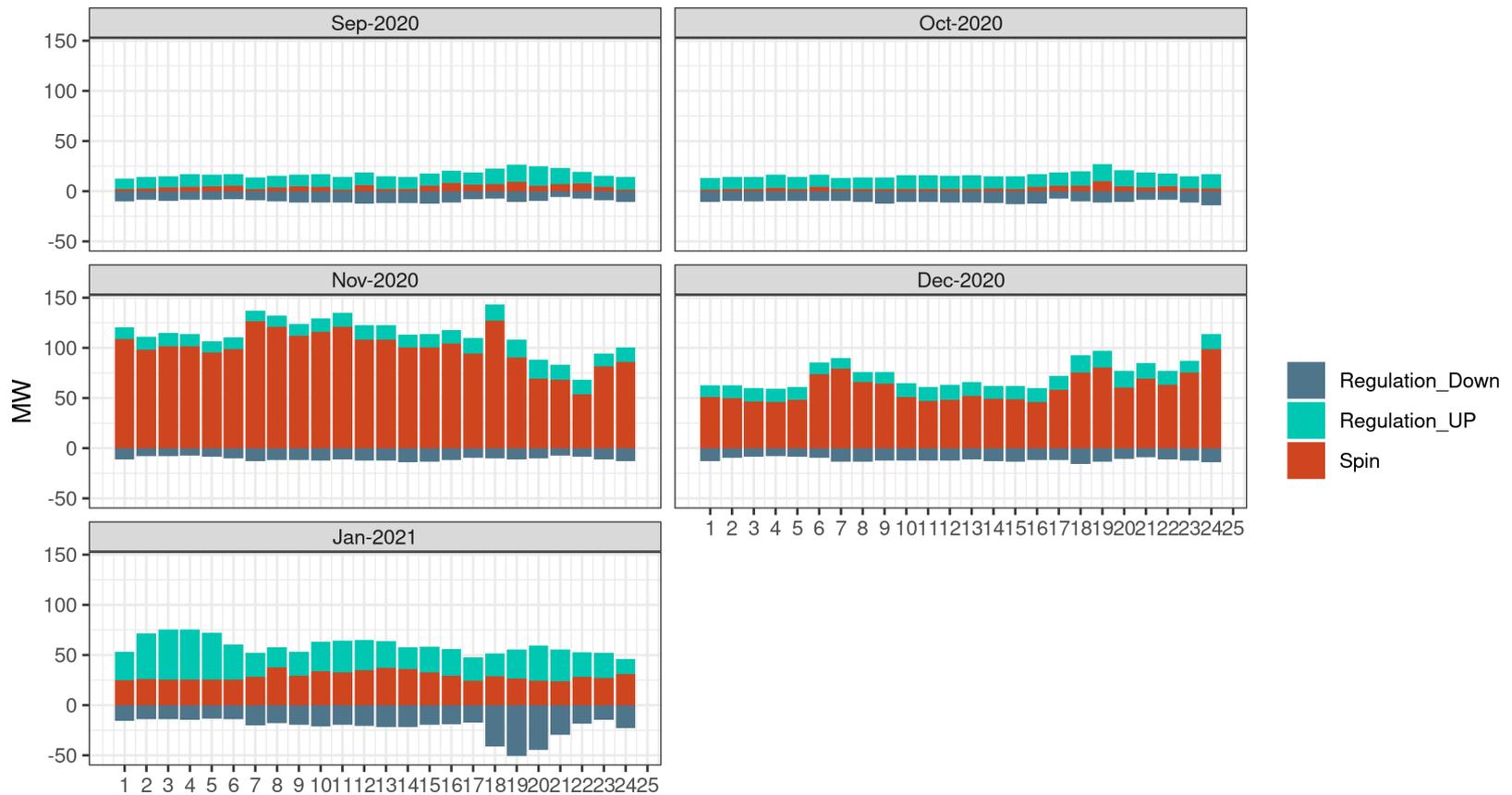
Batteries are being awarded for discharge in the day-ahead market based on prices largely at peak hours



Batteries are dispatched in real-time based on real-time economics



Batteries are providing more Regulation down in January compared to December



State of Charge Management in Real-Time

- Real-Time market reserves stage of charge (SOC) to deliver energy continuously for 5 minute for regulation award
- Operators have observed there is not enough SOC to support regulation Awards
- ISO is proposing to change SOC management to reserve SOC to deliver energy continuously for 30 minutes

Current implementation:

$$\underline{SOC}_{i,t} + (SR_{i,t} + NR_{i,t}) \frac{30}{60} + (RU_{i,t} + FRU_{i,t-1}) \frac{5}{60} \leq SOC_{i,t}$$

Proposed Change:

$$\underline{SOC}_{i,t} + (SR_{i,t} + RU_{i,t} + NR_{i,t}) \frac{30'}{60} + FRU_{i,t-1} \frac{5}{60} \leq SOC_{i,t}$$

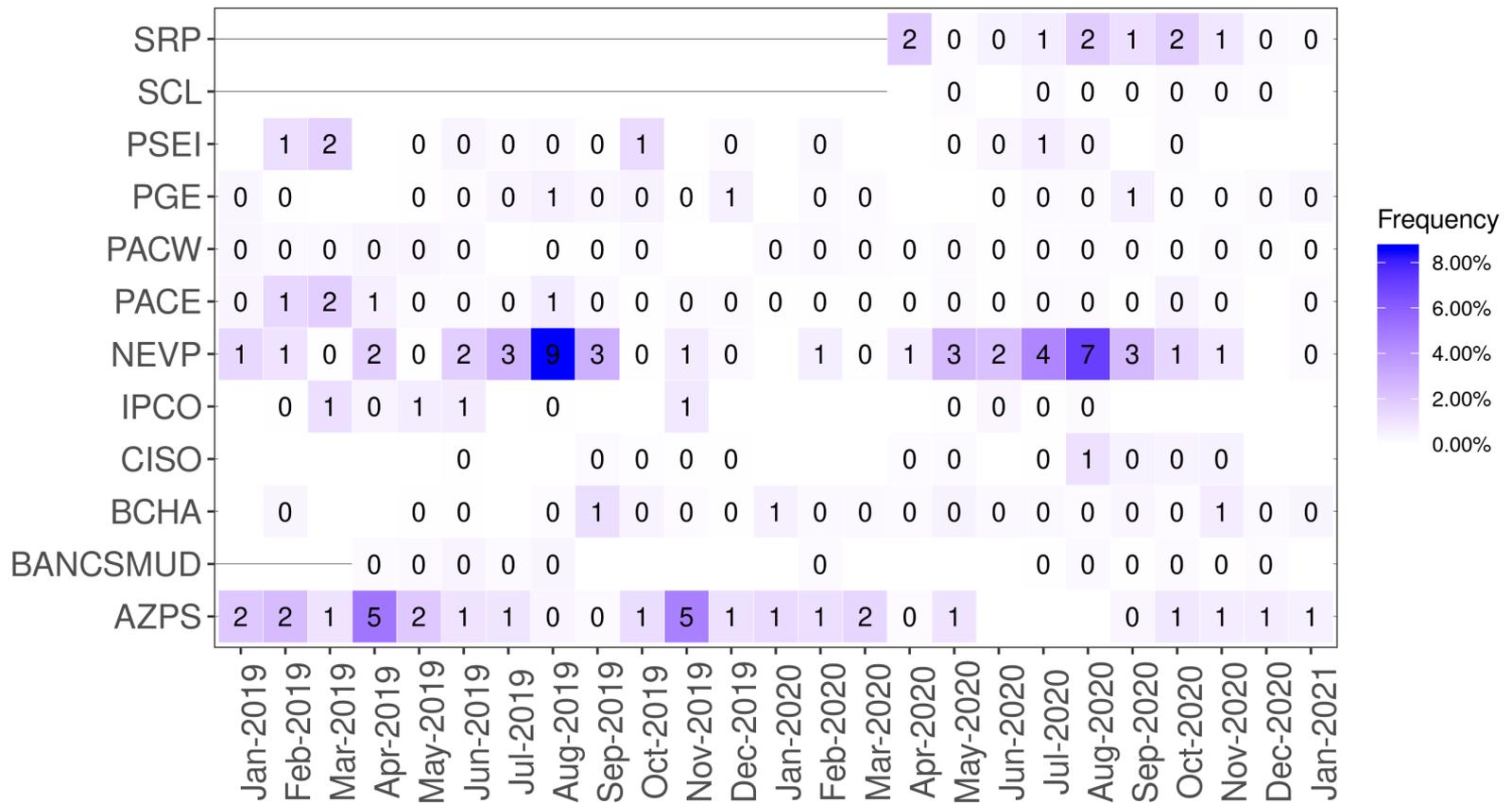
State of Charge Management in Real-Time - Example

- Consider a Storage resources with 100 MW regulation award for fifteen-minute interval
- Based on current rule, real-time market will reserve 8.33 MWh of SOC ($100 \times 5/60$)
- With the proposed change market will reserve 50 MWh of SOC ($100 \times 30/60$)

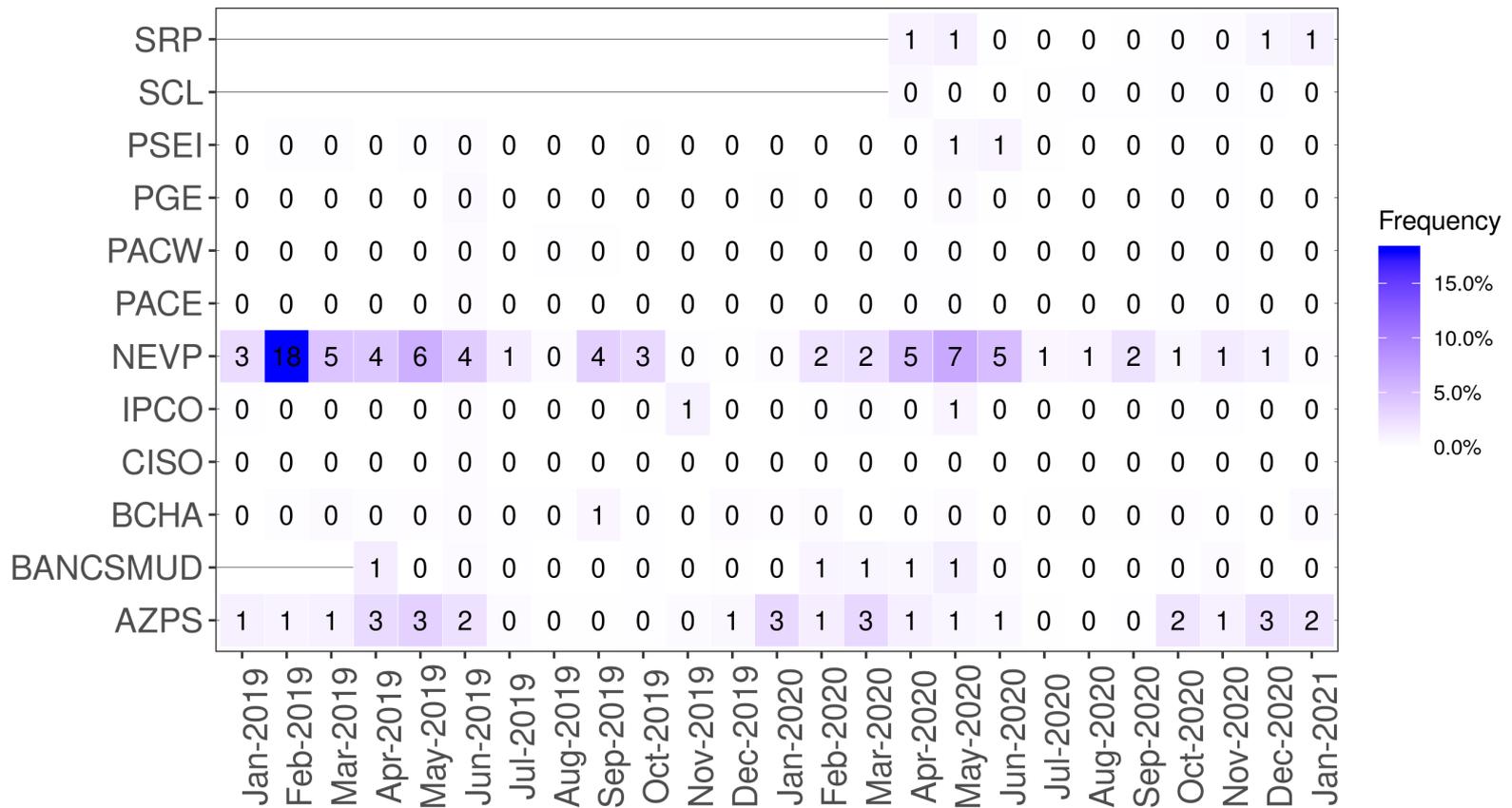
Interval	Regulation up Award (MW)	Current Minimum SOC (MWh)	Proposed Minimum SOC (MWh)
1	100	8.33	50
2	100	8.33	50
3	100	8.33	50

Resource Sufficiency Test

Flexible Ramp Up Sufficiency Test Results in the last three months have observed few failures



Flexible Ramp Down Sufficiency Test Results in the last three months have seen few failures

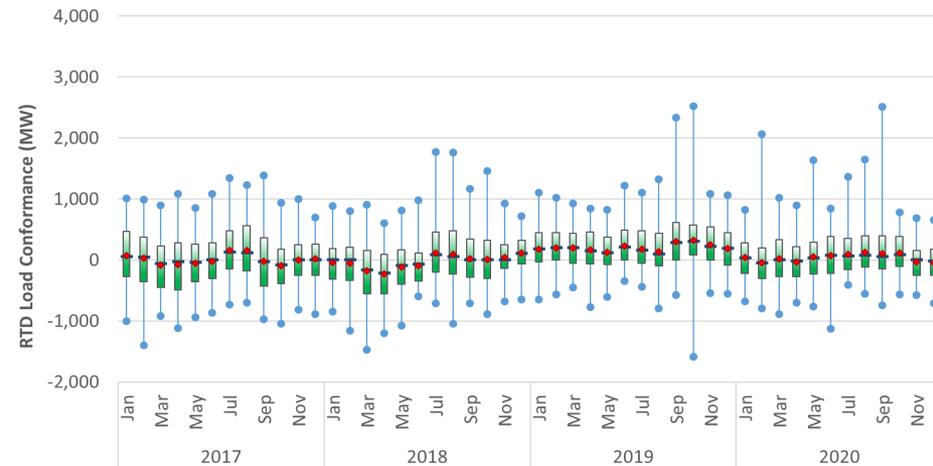
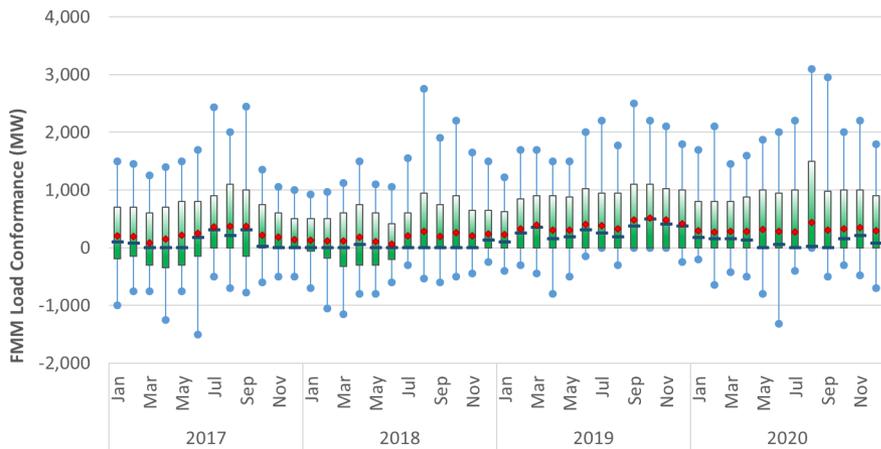
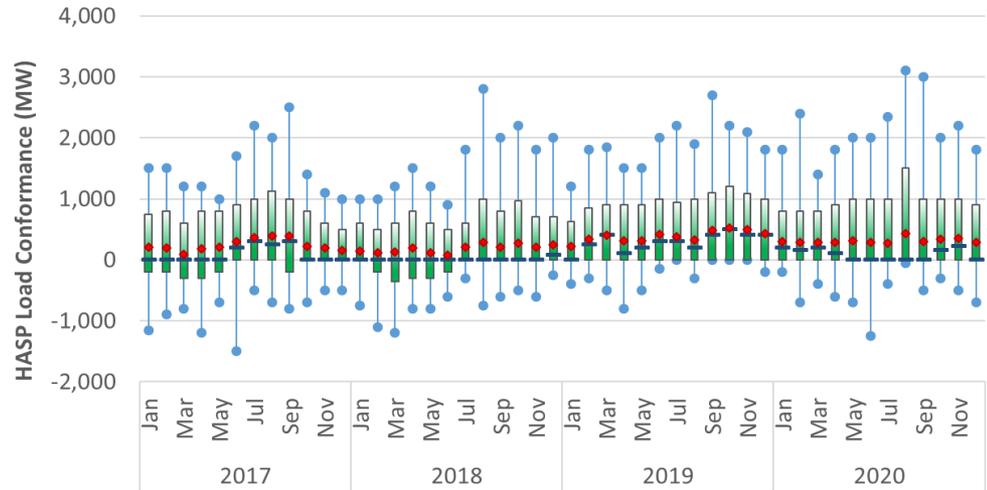


Load Conformance Limiter Enhancement

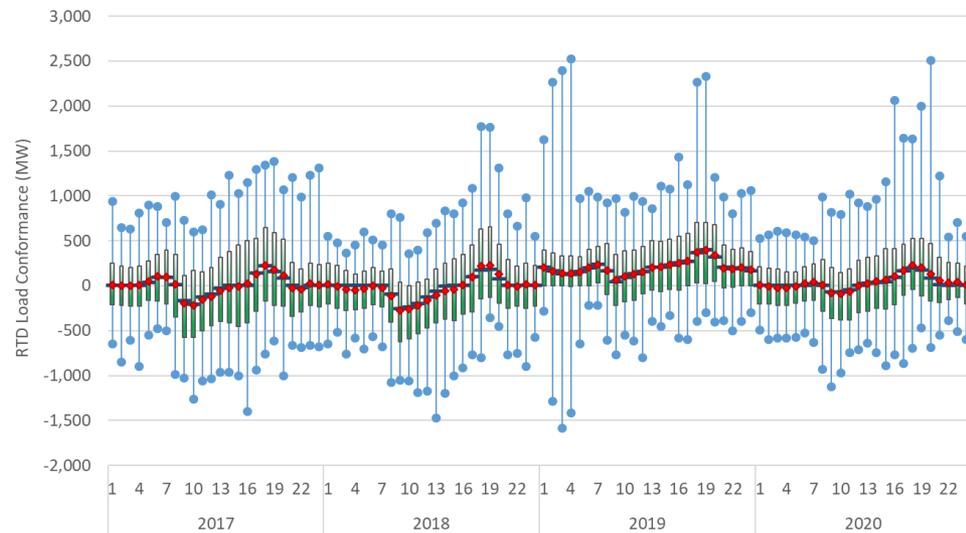
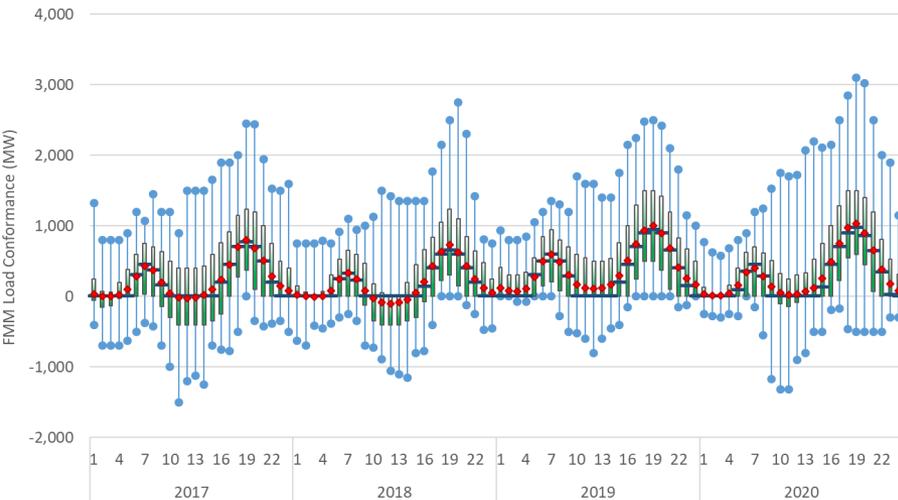
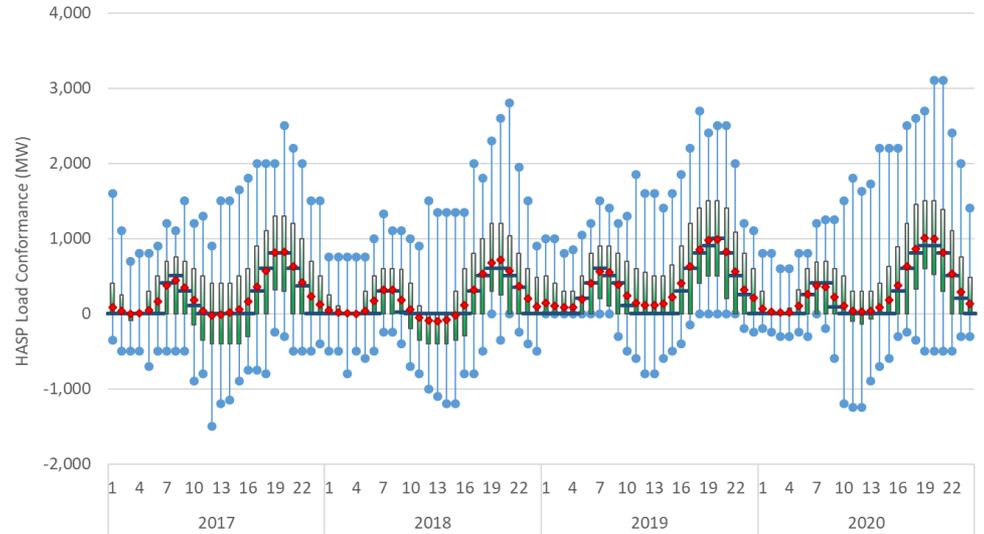
Imbalance Conformance Enhancements

- Limiter logic implemented on February 27, 2019
- CAISO committed to undertake several initiatives to reduce the need for conformances
- After two years, CAISO would assess conditions to disable the limiter after making the necessary market design and process improvements
- Given current status of improvements, CAISO is not expecting to disable the limiter at the 2-year mark

Imbalance conformance continue to show similar trend in recent years –Monthly profile



Imbalance conformance continue to show similar trend in recent years—Hourly profile

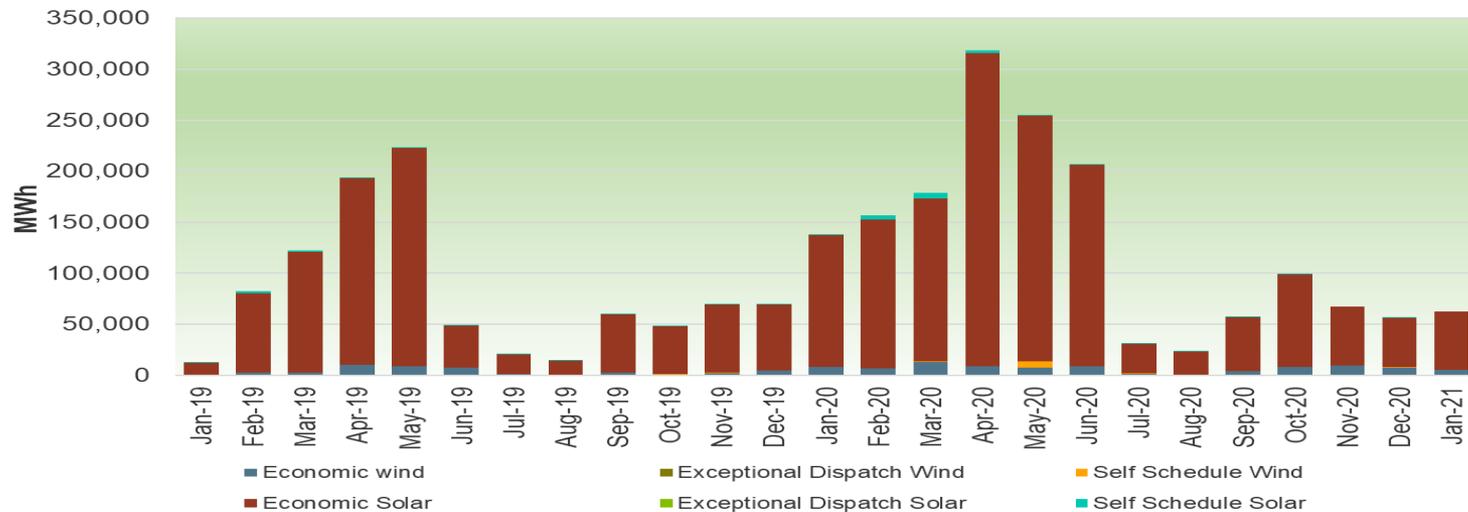
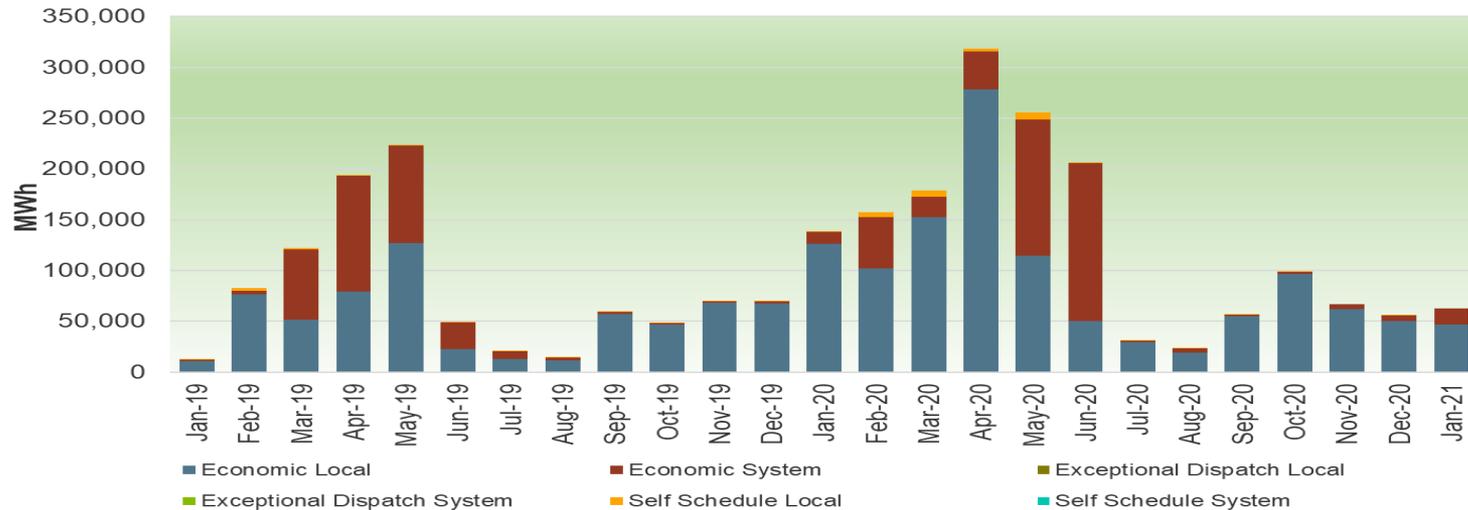


Improvements needed to disable the Limiter

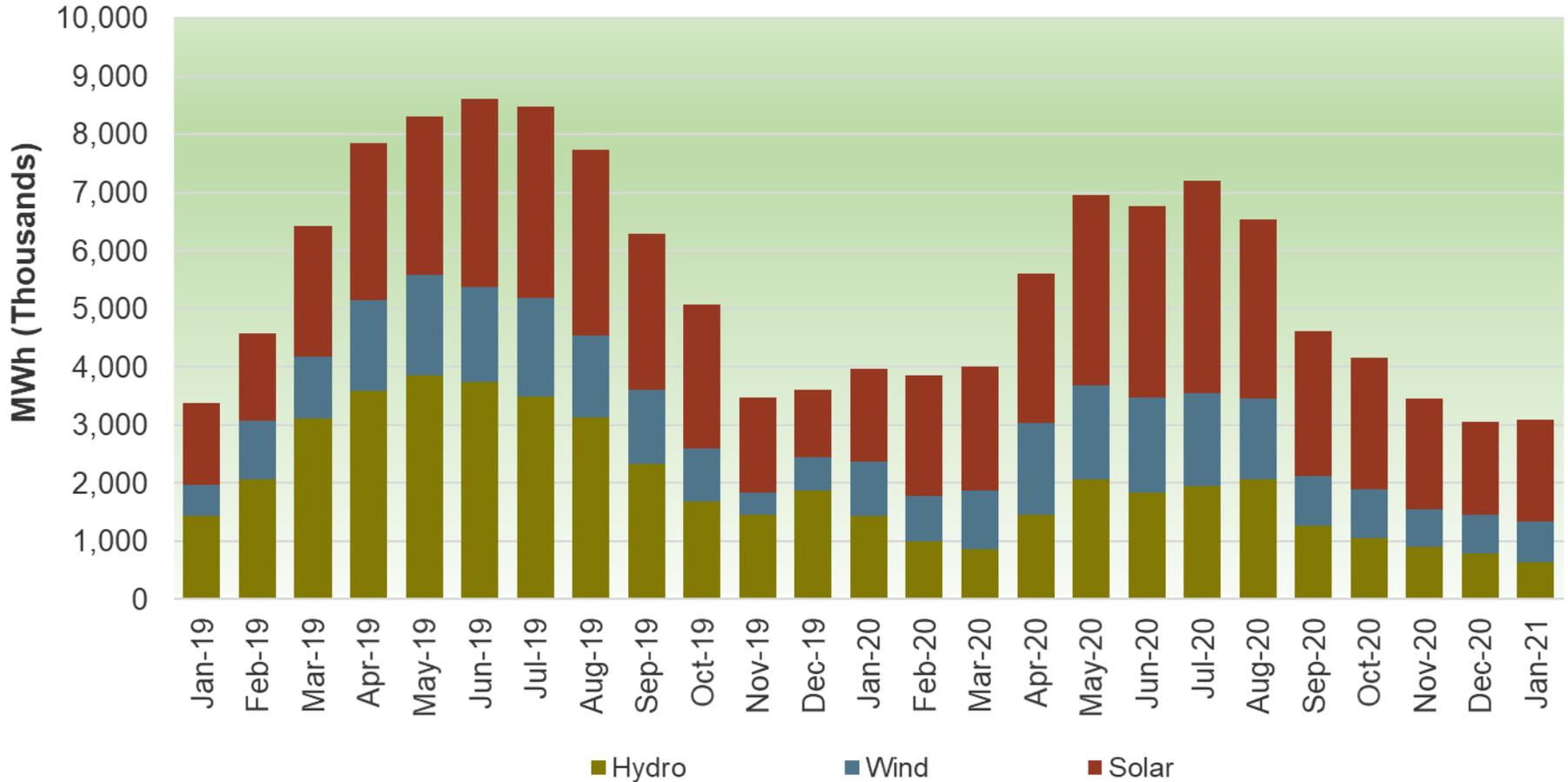
- Develop a persistency-based forecast for renewable resources.
 - Already developed in house
- Day-Ahead market enhancements
 - Policy initiative in progress
- Flexible Ramping product improvements
 - Deliverability and Requirements enhancements coming in Fall 2021
- Imbalance conformance tool
 - In progress
- Ramping capacity tool
 - In progress

Market Performance Metrics

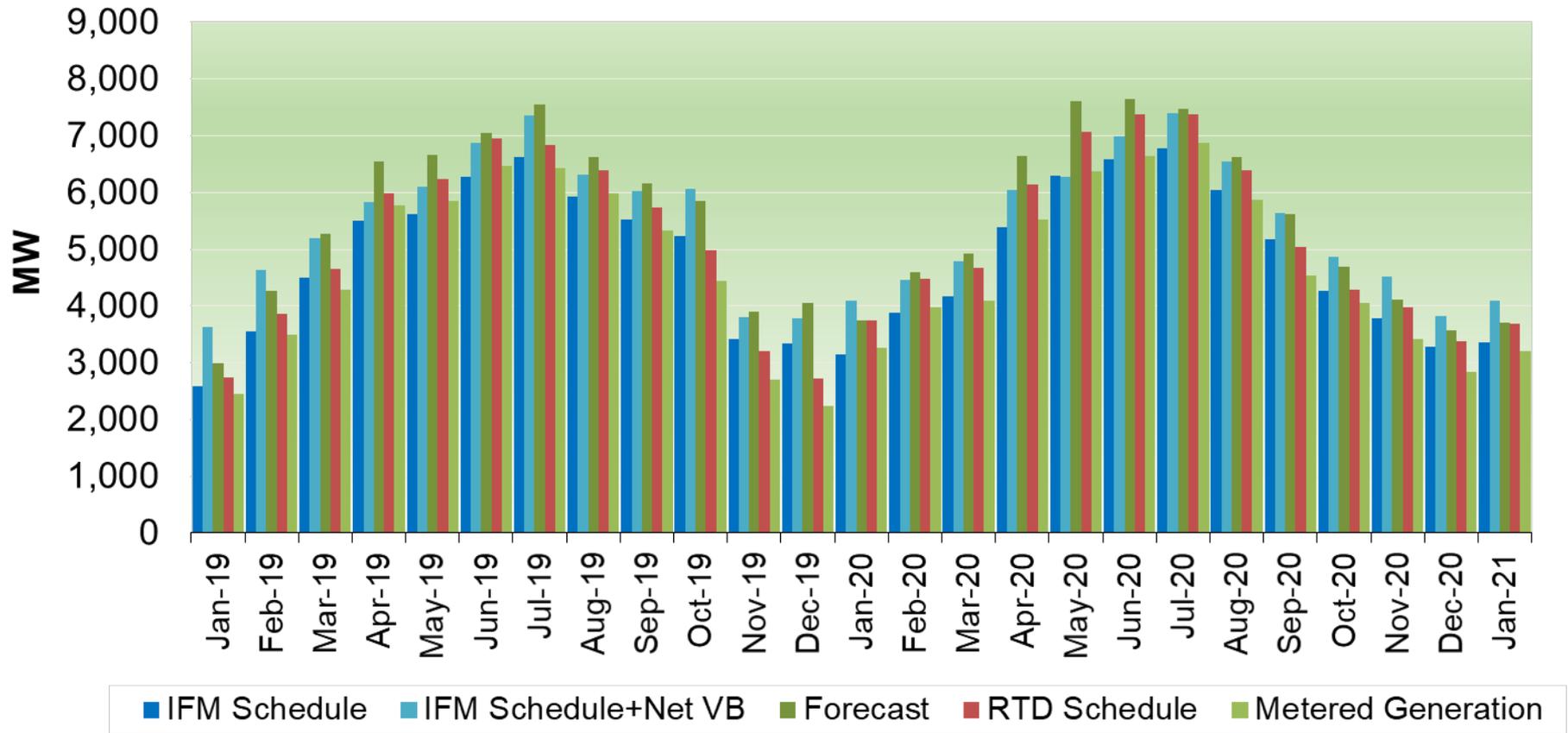
RTD renewable (VERs) curtailment fell since October



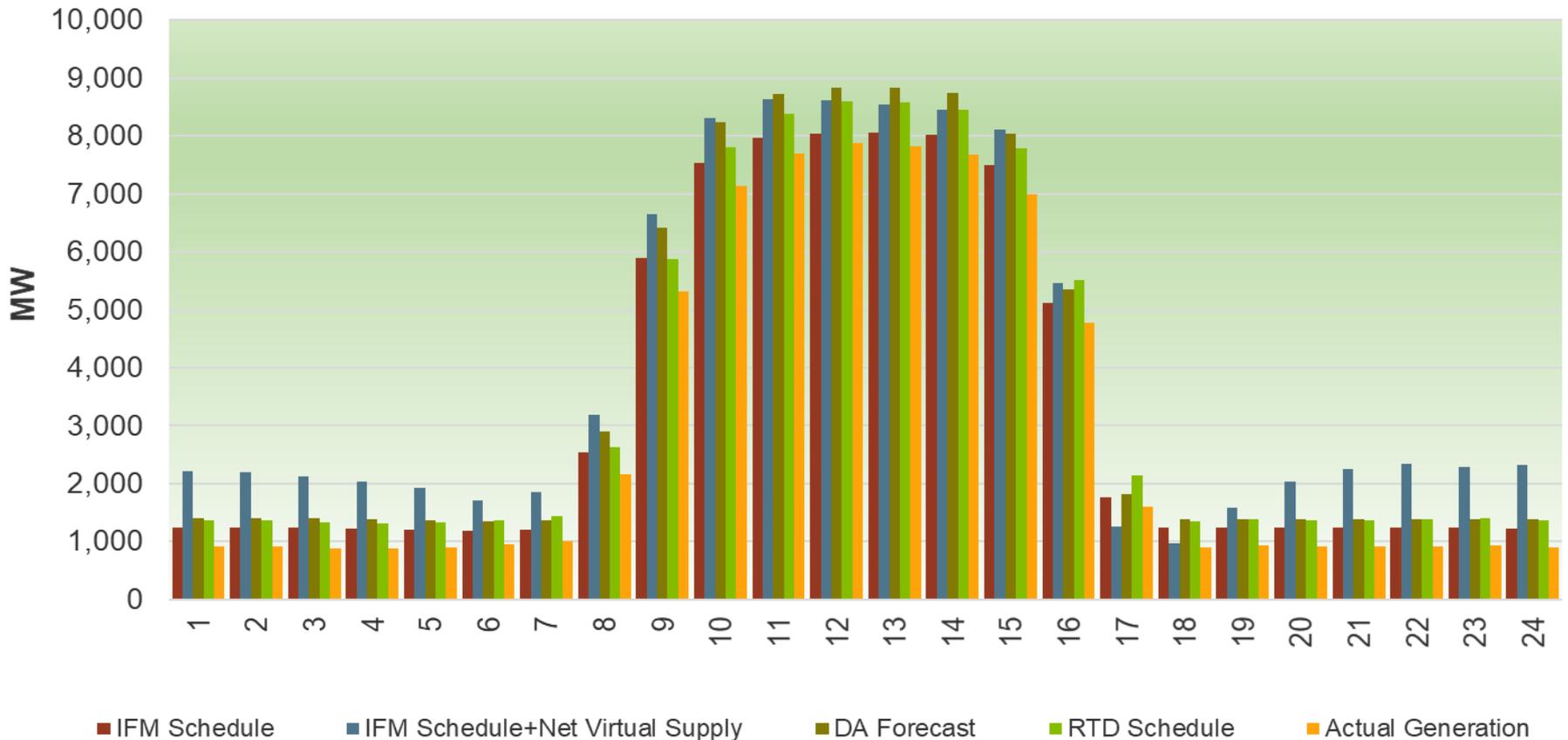
Hydro production has declined since July following a seasonal pattern



ISO total monthly VERS schedules and forecasts compared to actuals

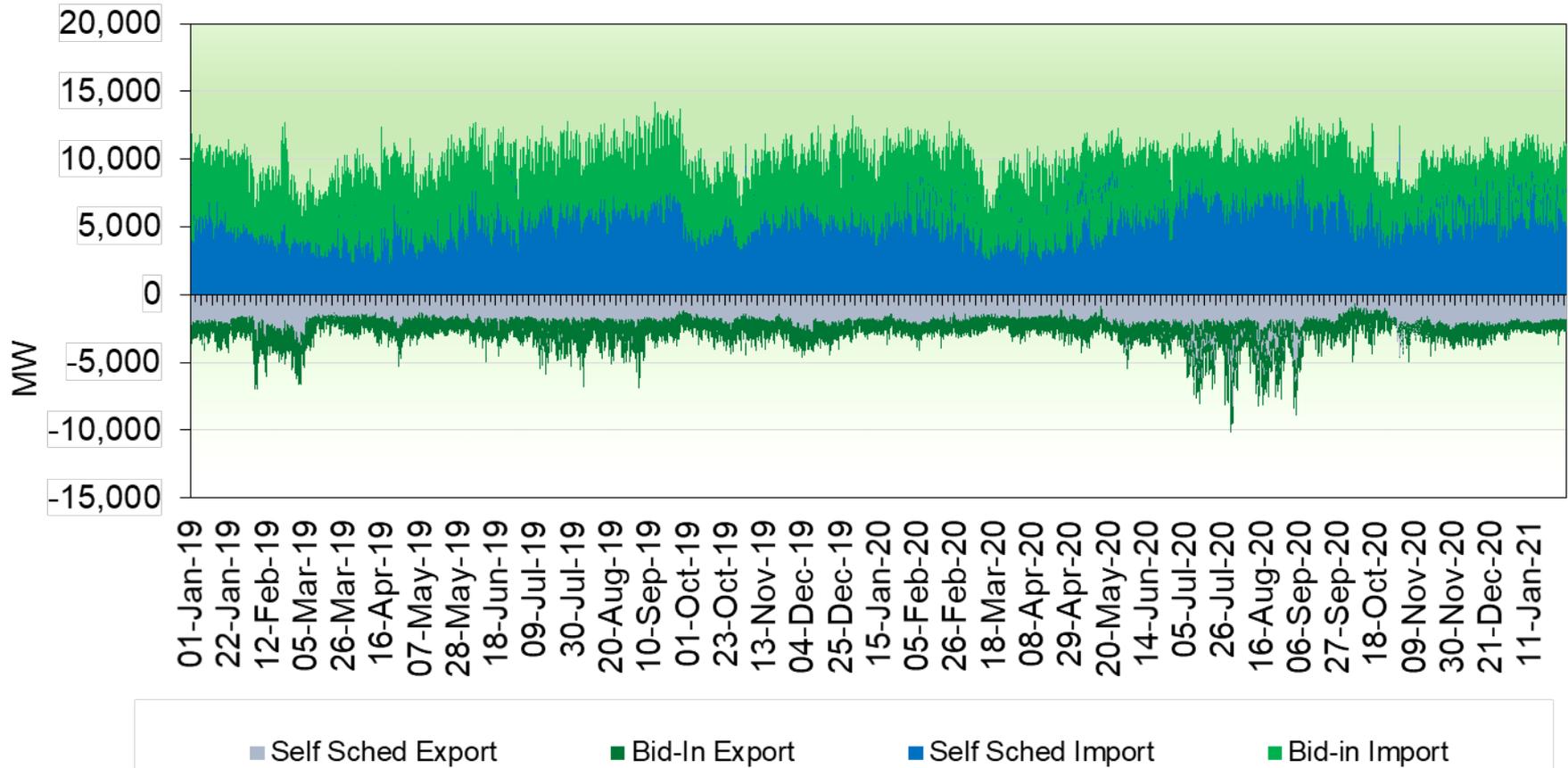


Renewable (VERS) schedules including net virtual supply aligns with VER forecast in December and January

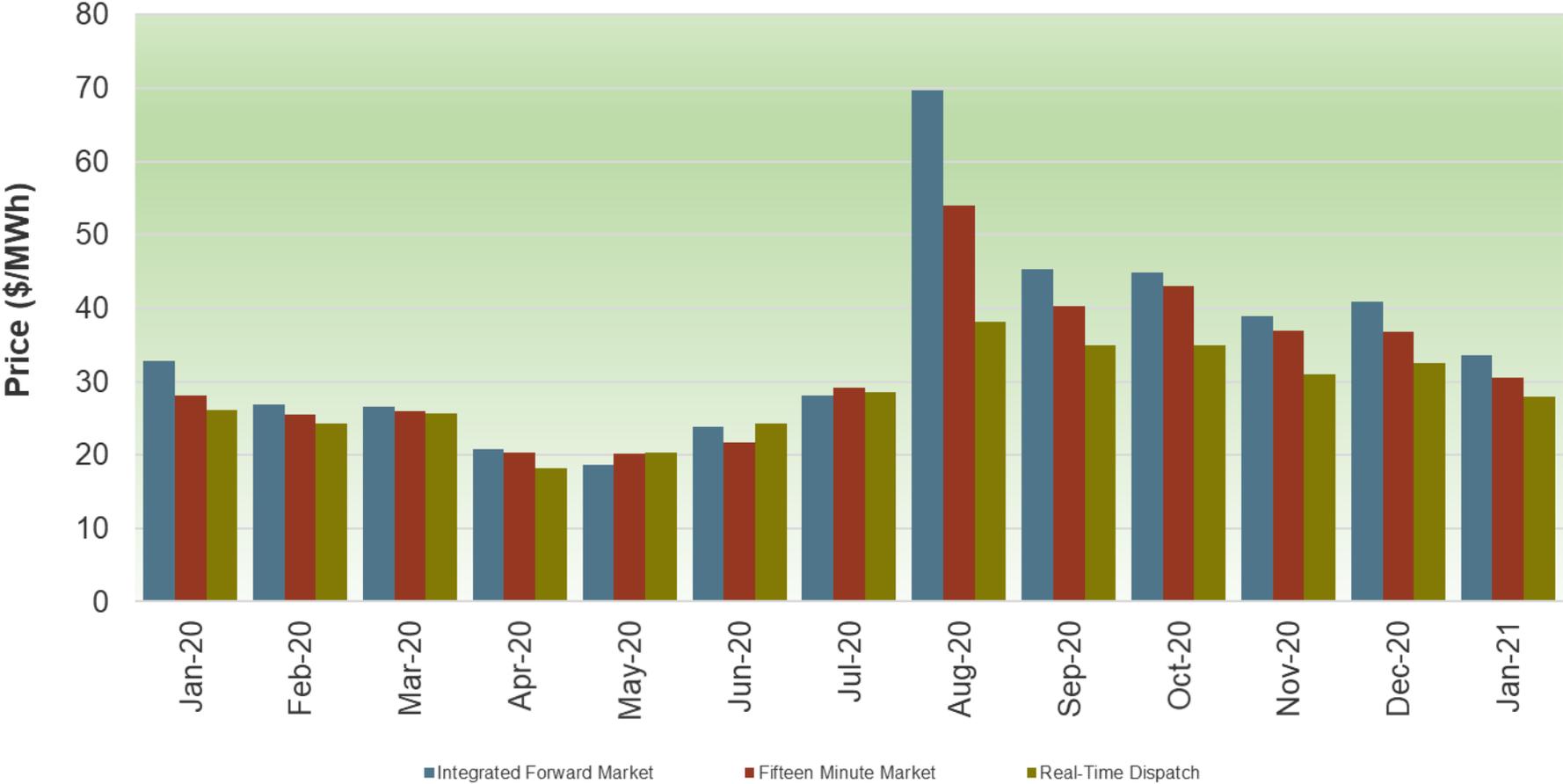


<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=EFF75C2E-F28E-4087-B88B-8DFFAED828F8>

Self scheduled interties in the real-time market are at typical historical levels after summer conditions

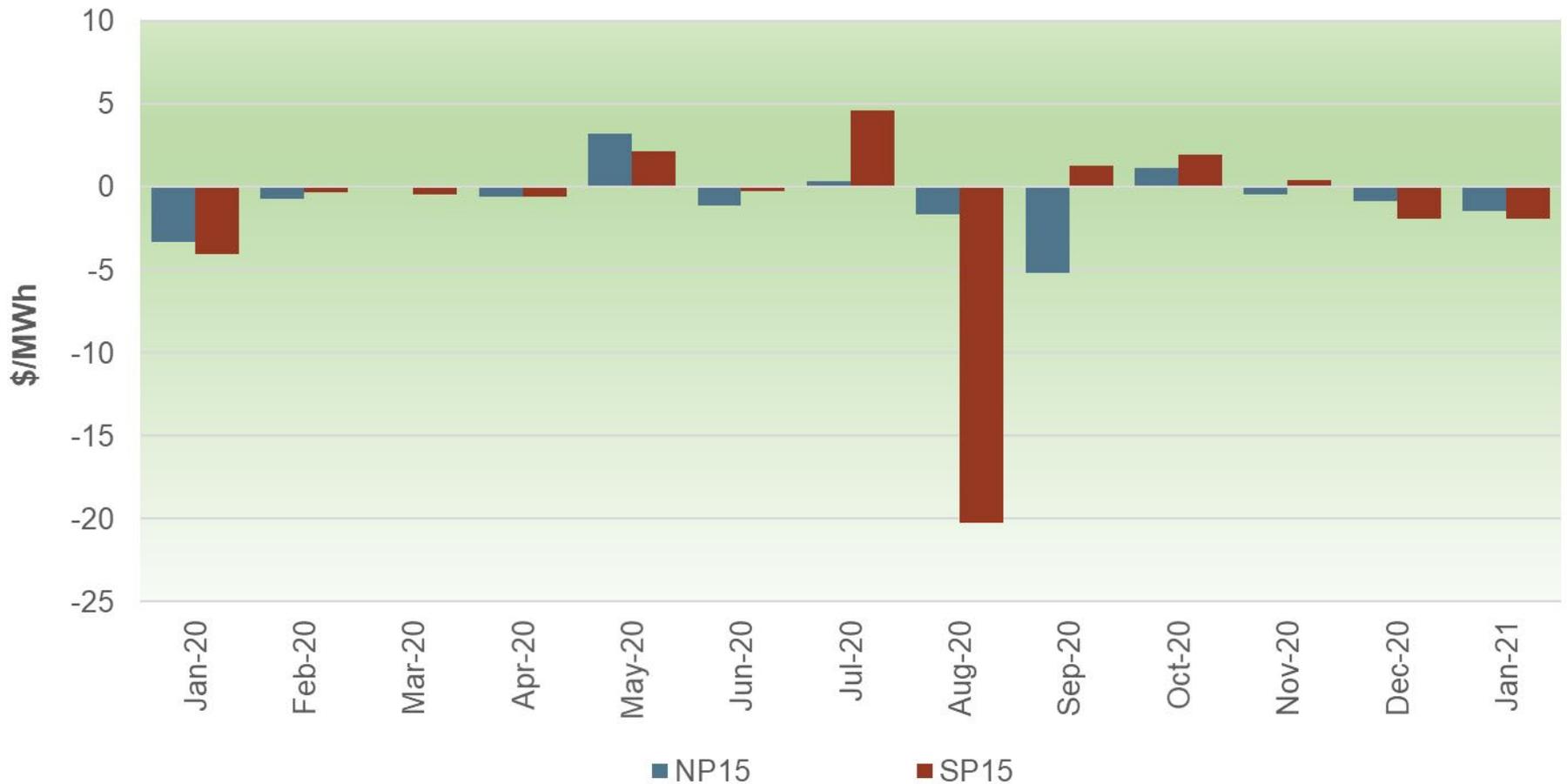


Lower average real-time prices since last August

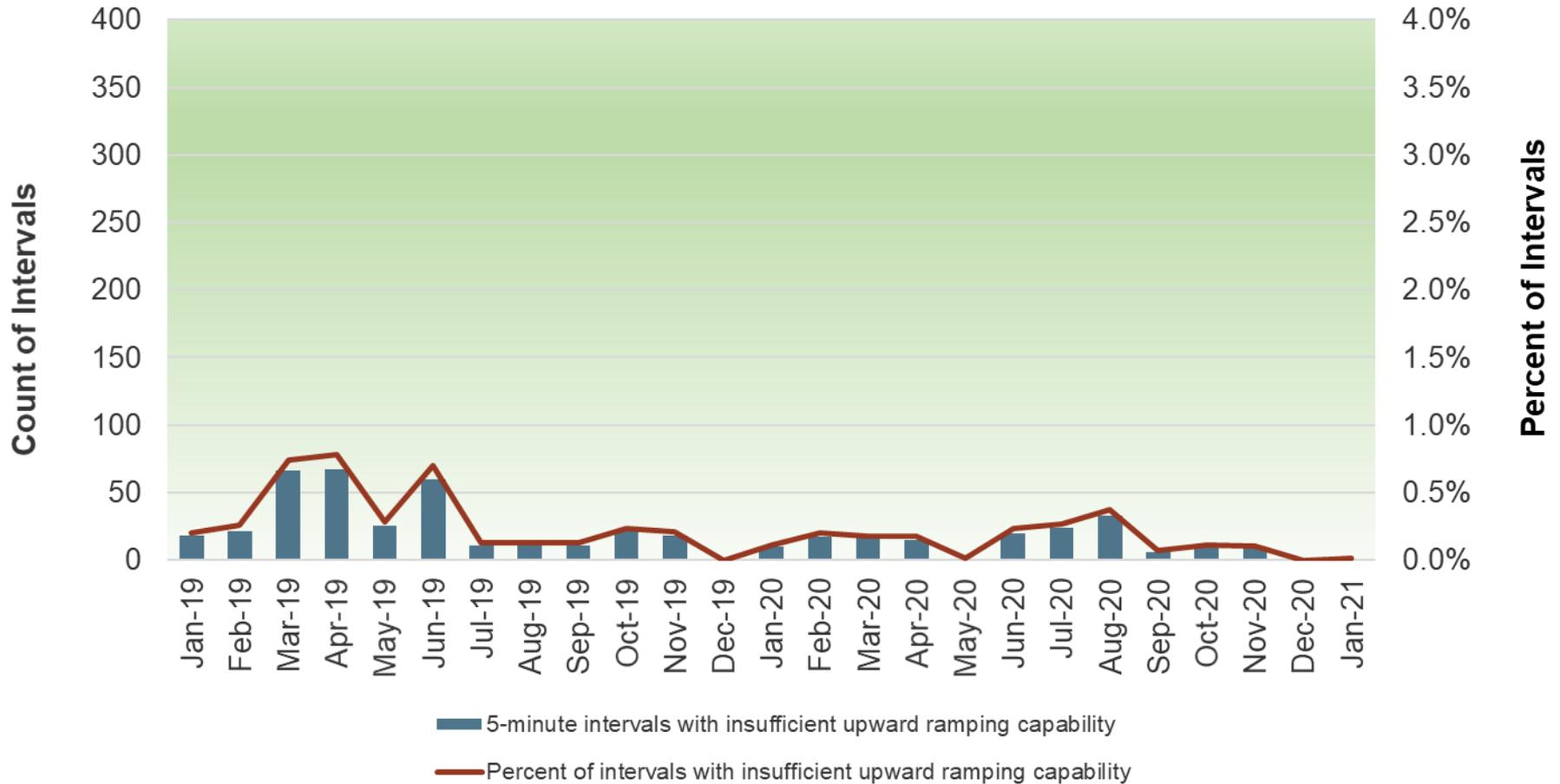


Note: Metric Based on System Marginal Energy Component (SMEC)

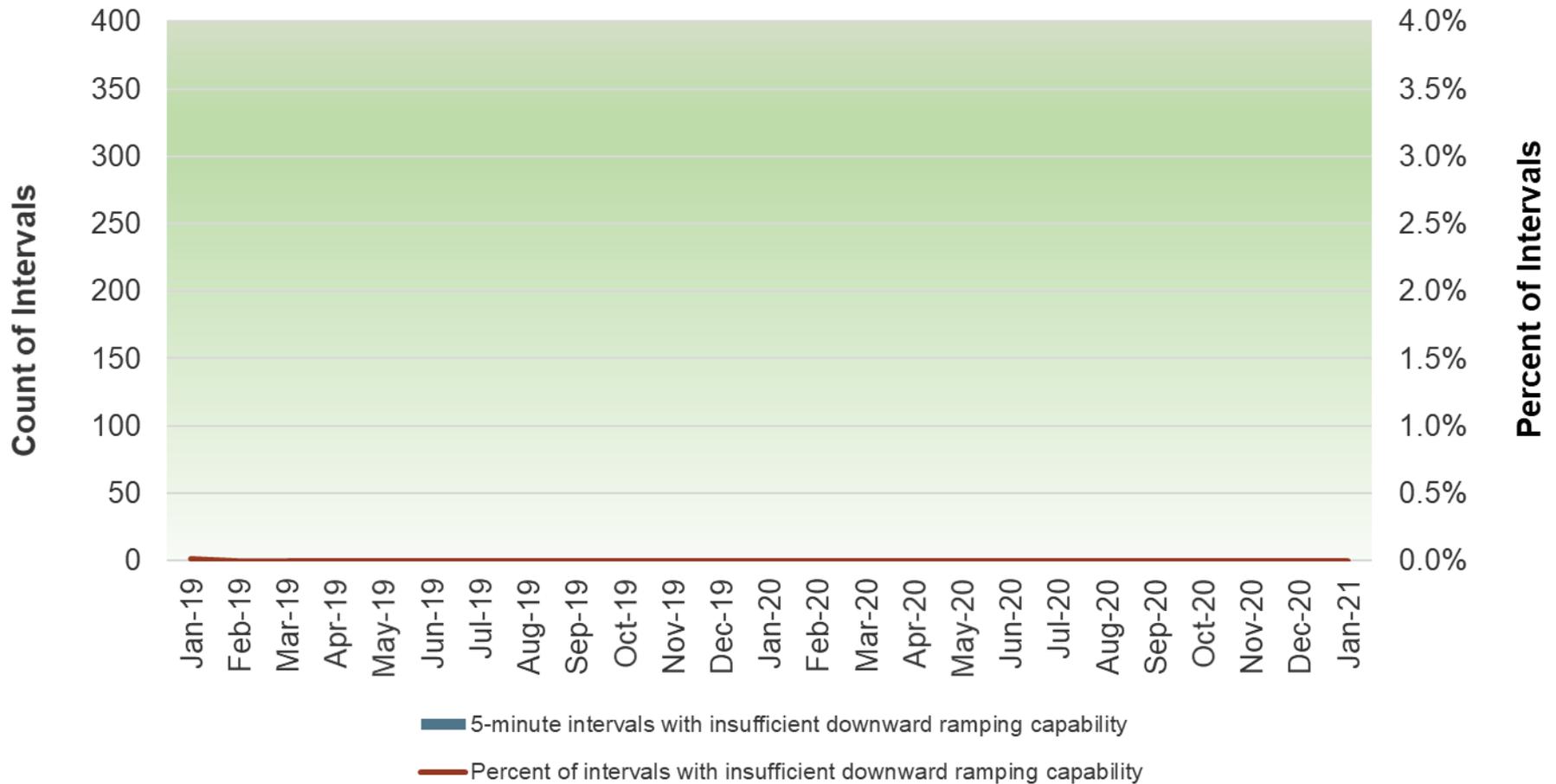
Lower real-time prices for both NP15 and SP15 in December and January



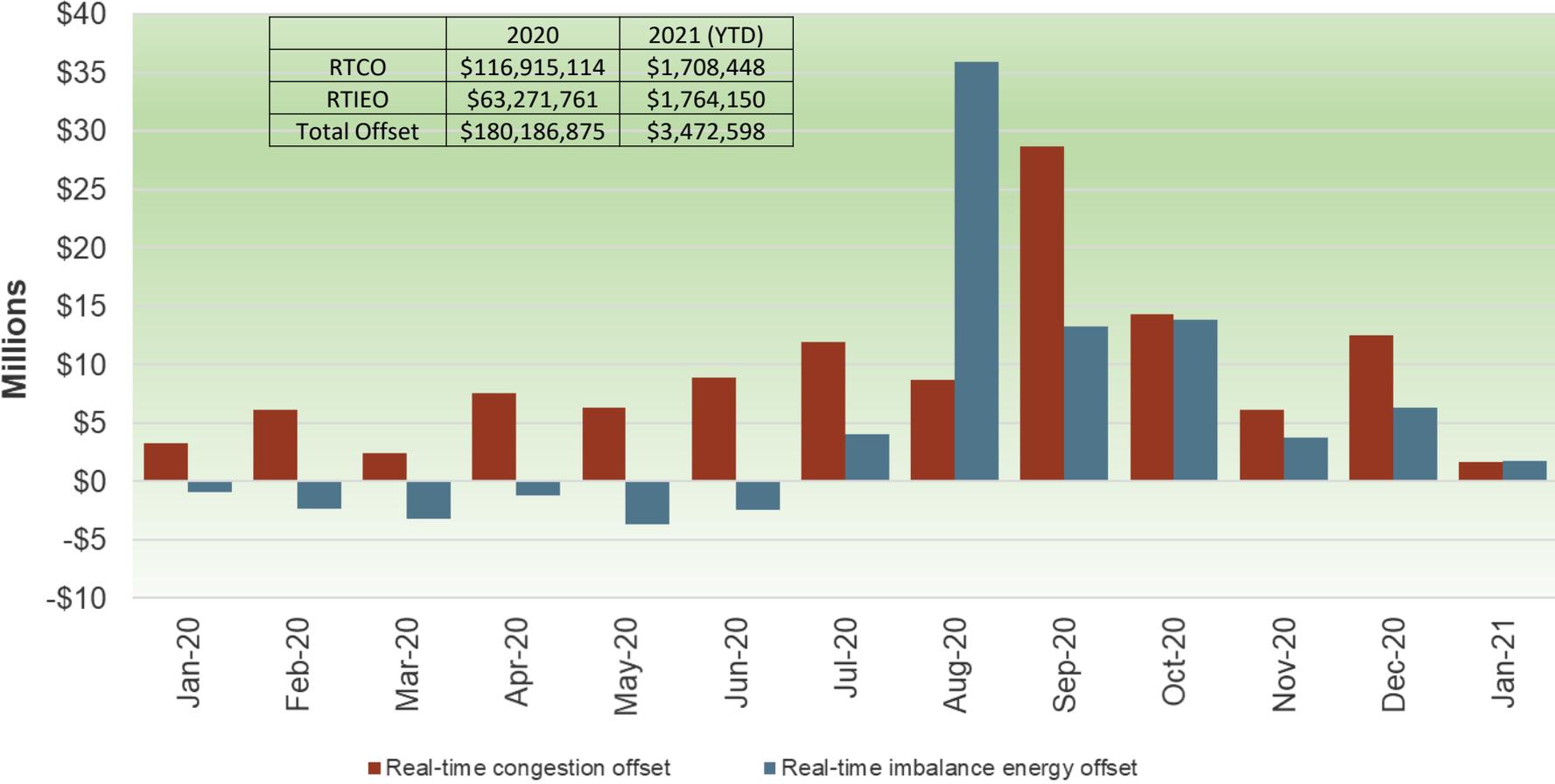
Insufficient upward ramping capacity in ISO real-time declined since November



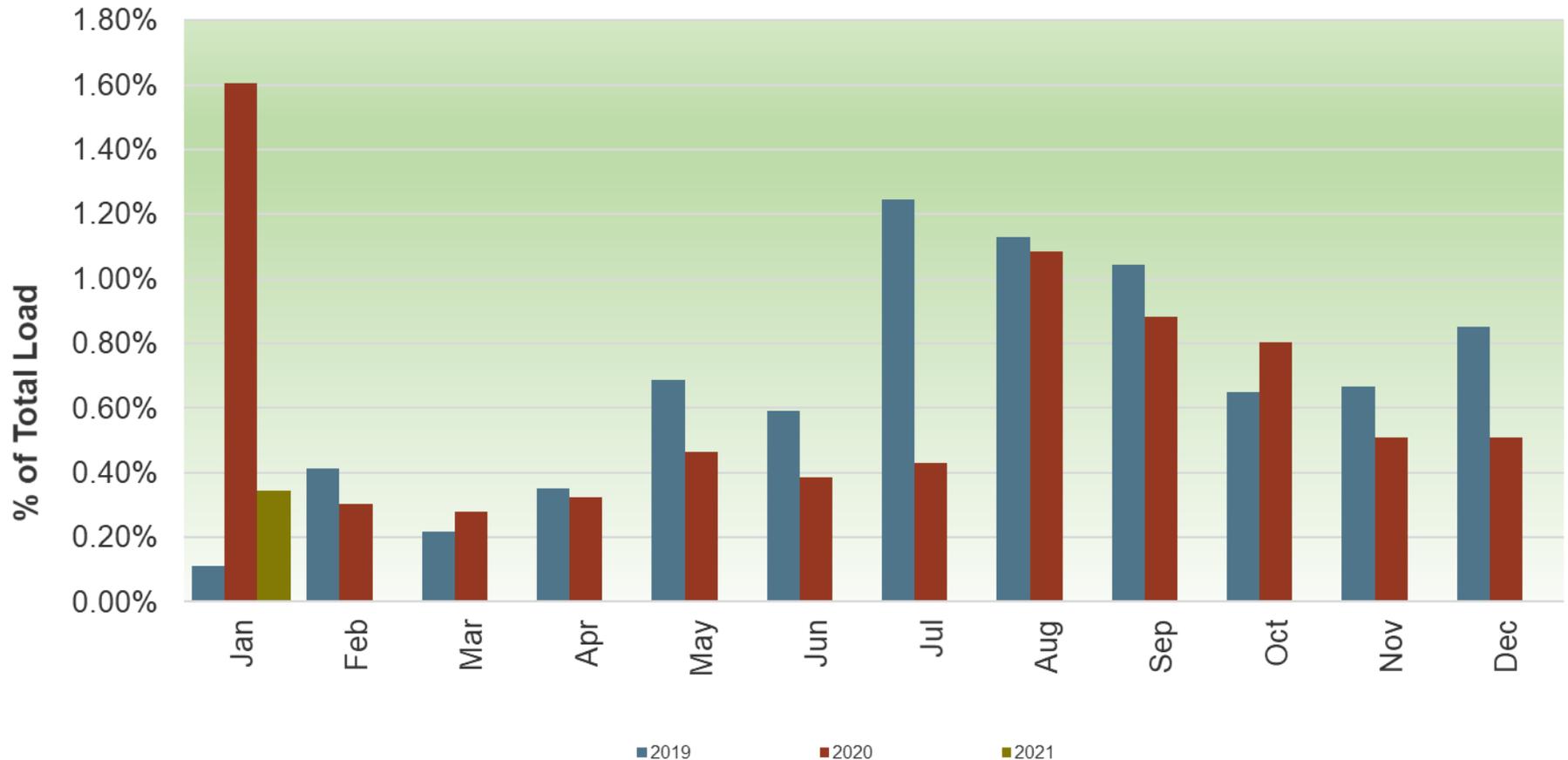
Insufficient downward ramping capacity in real-time remained low



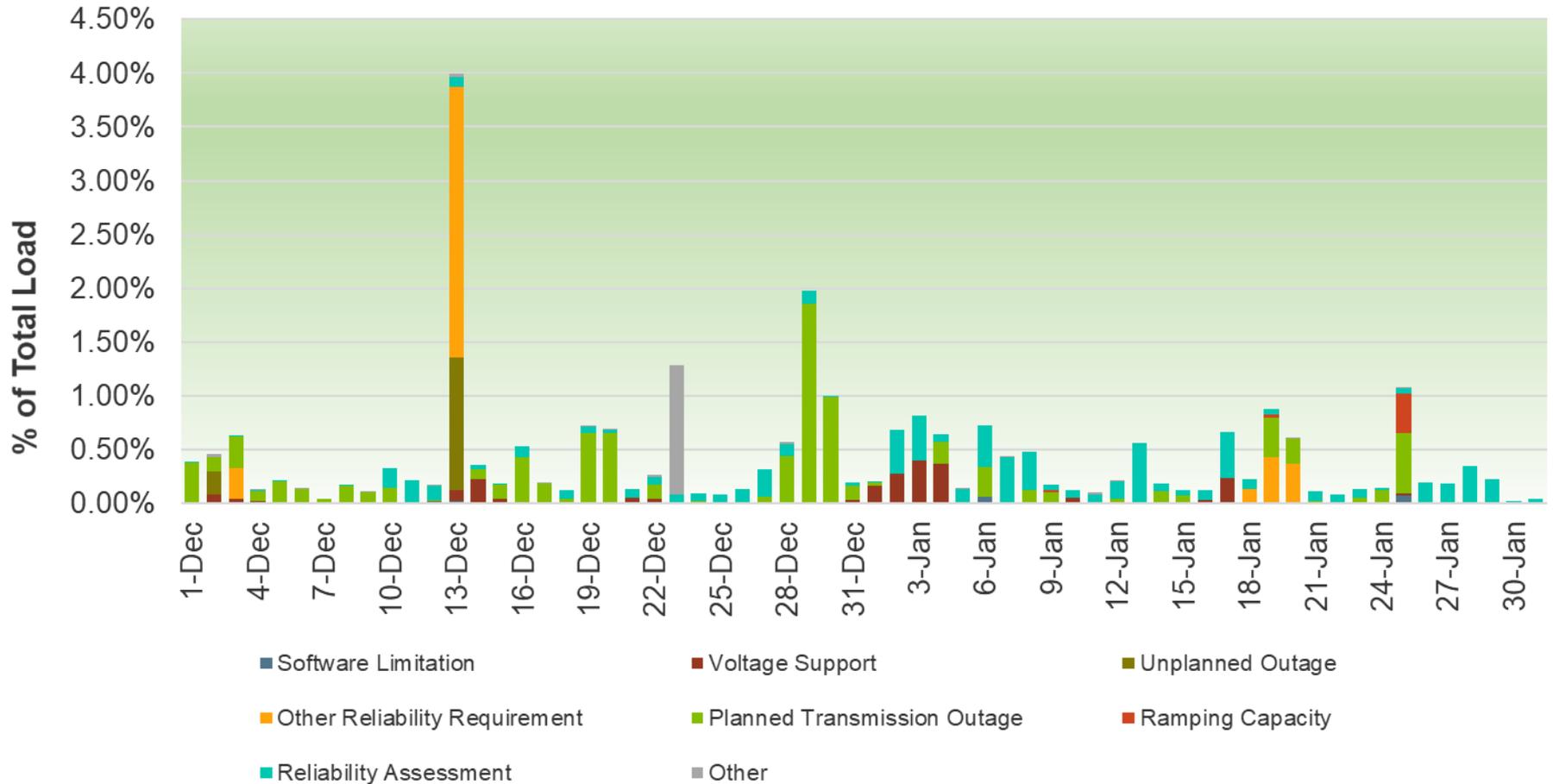
ISO area real-time imbalance energy and congestion offsets dropped in January



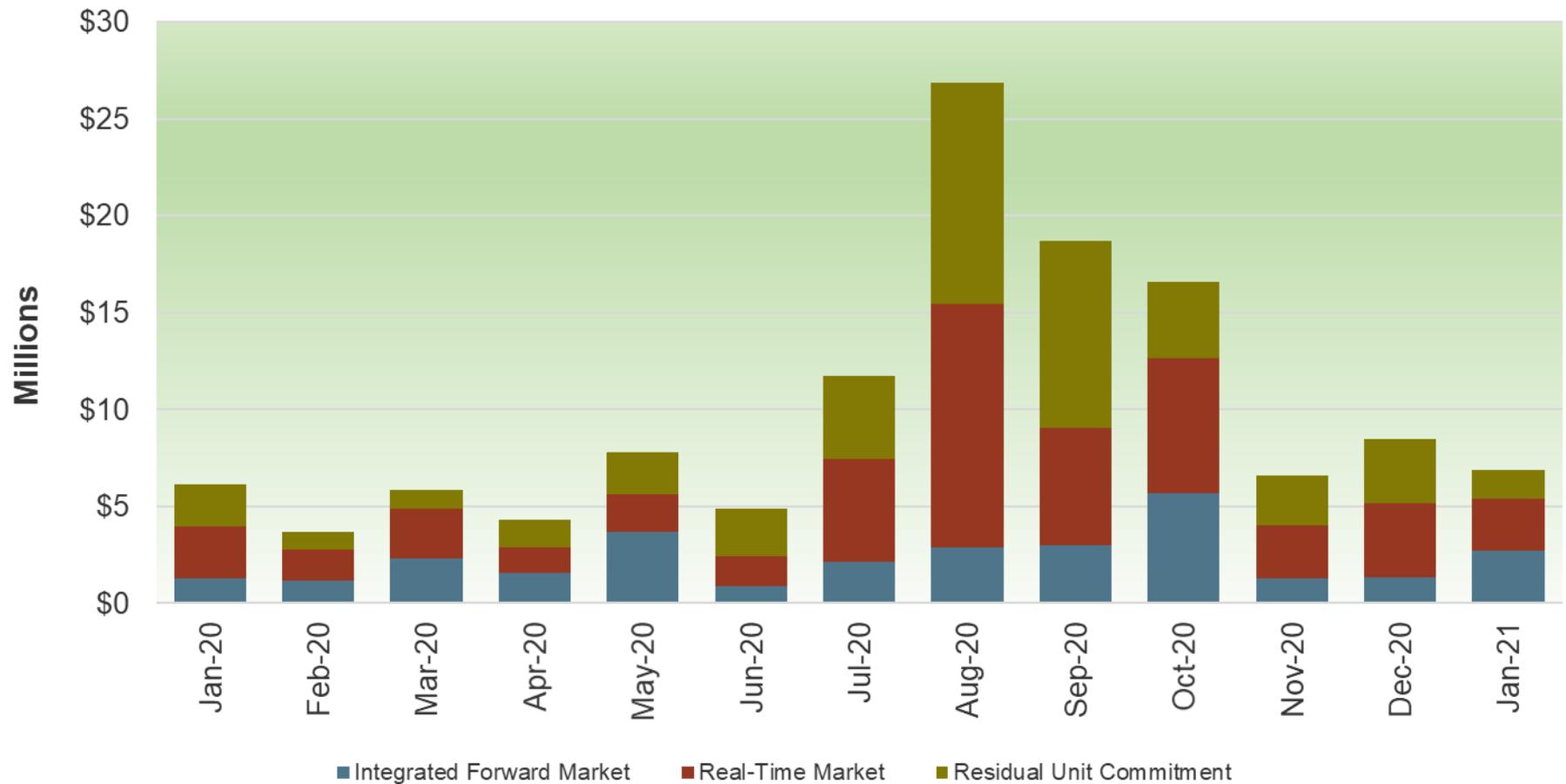
Exceptional dispatch volume in the ISO area trended downward since last August



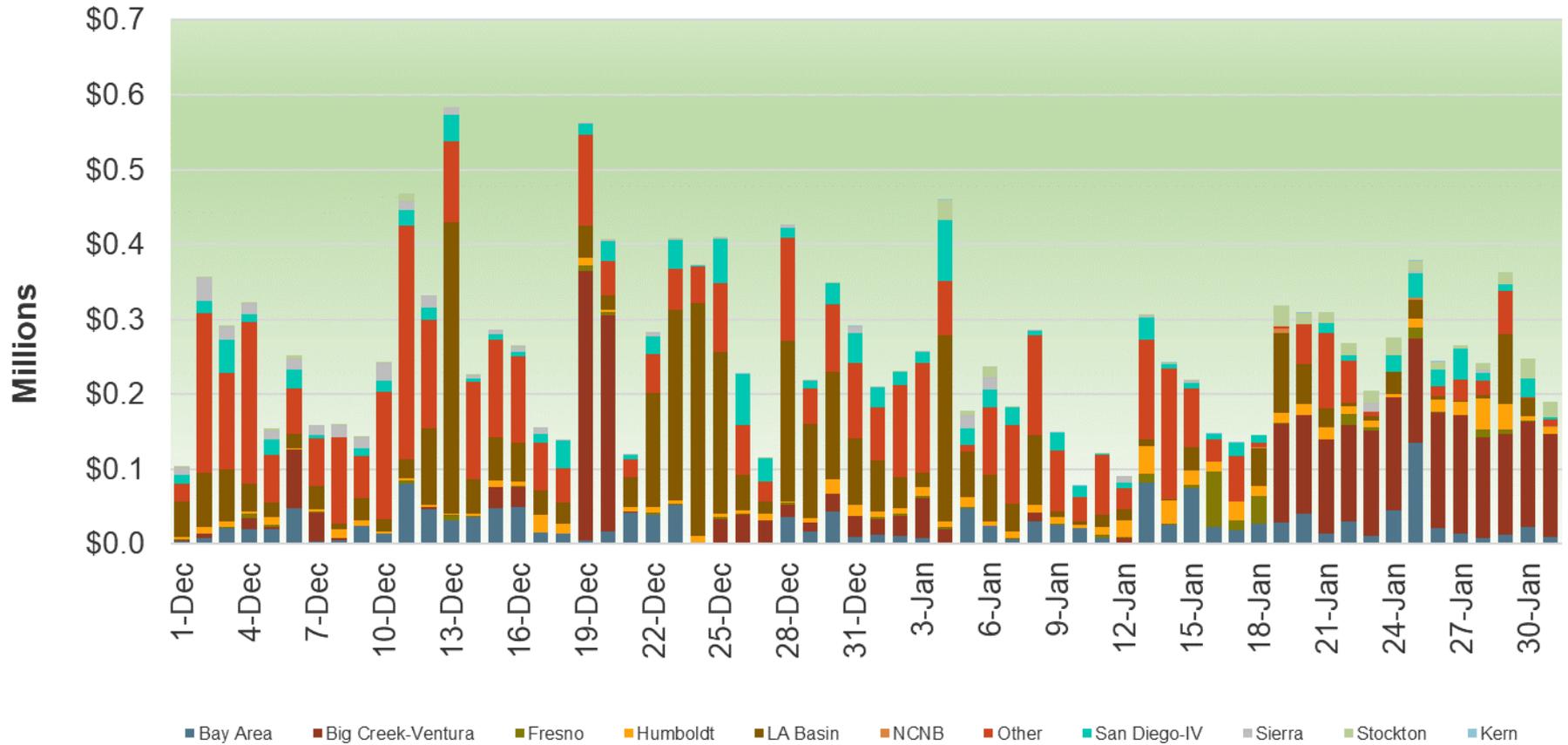
Exceptional dispatches volume driven by a variety of reasons in December and January



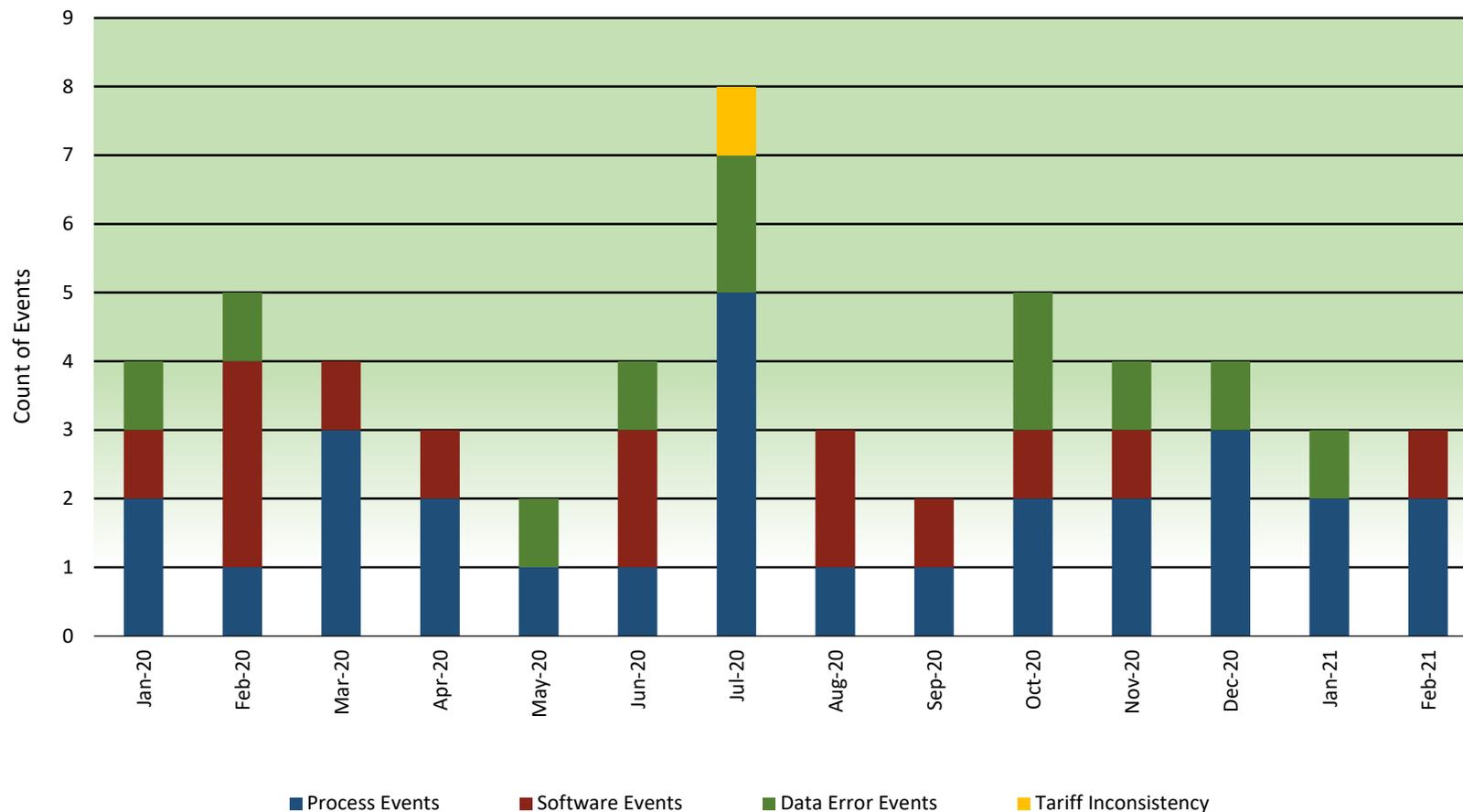
Bid cost recovery stayed at low levels in the past three months



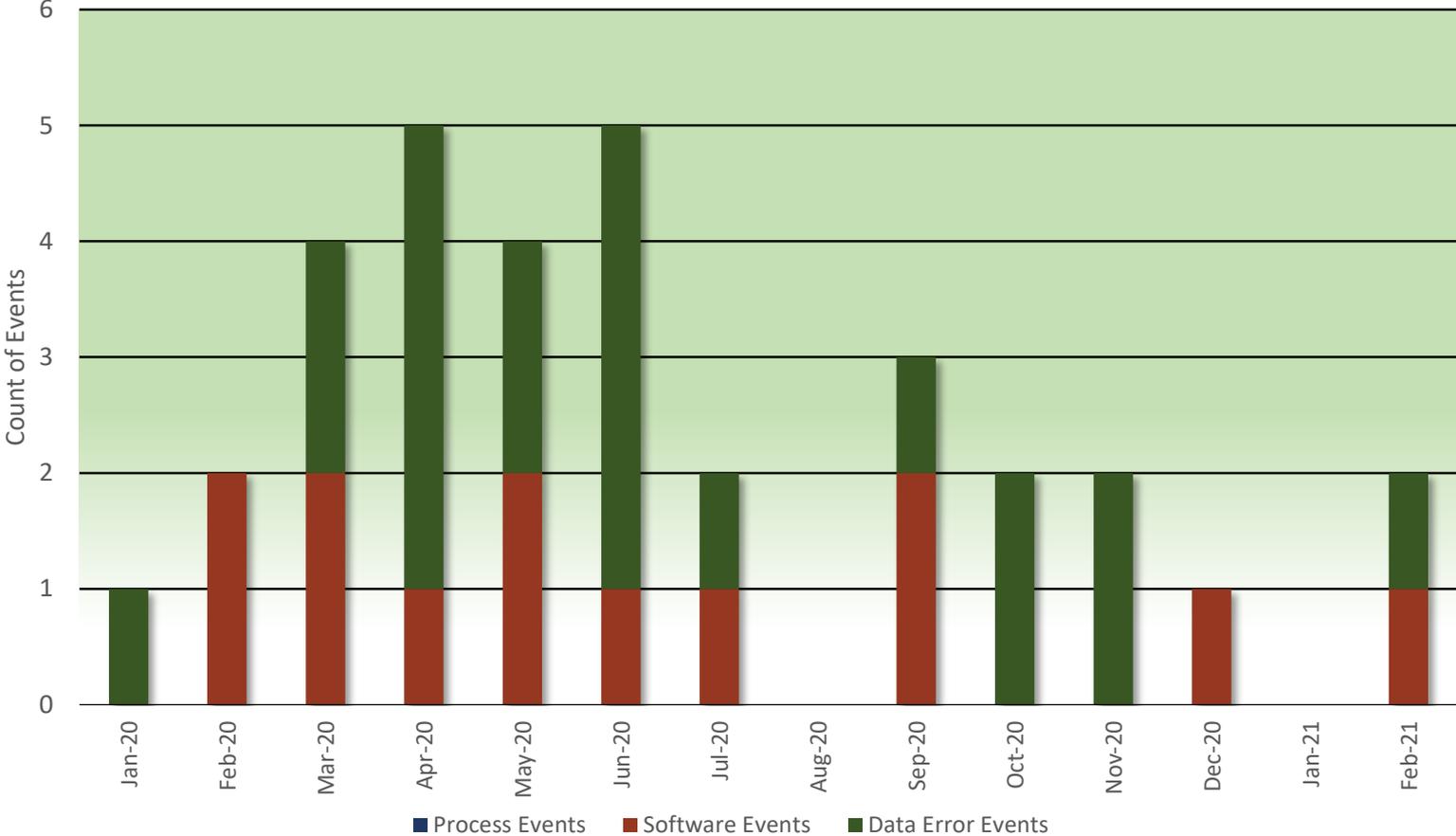
Bid cost recovery (BCR) by Local Capacity Requirement area



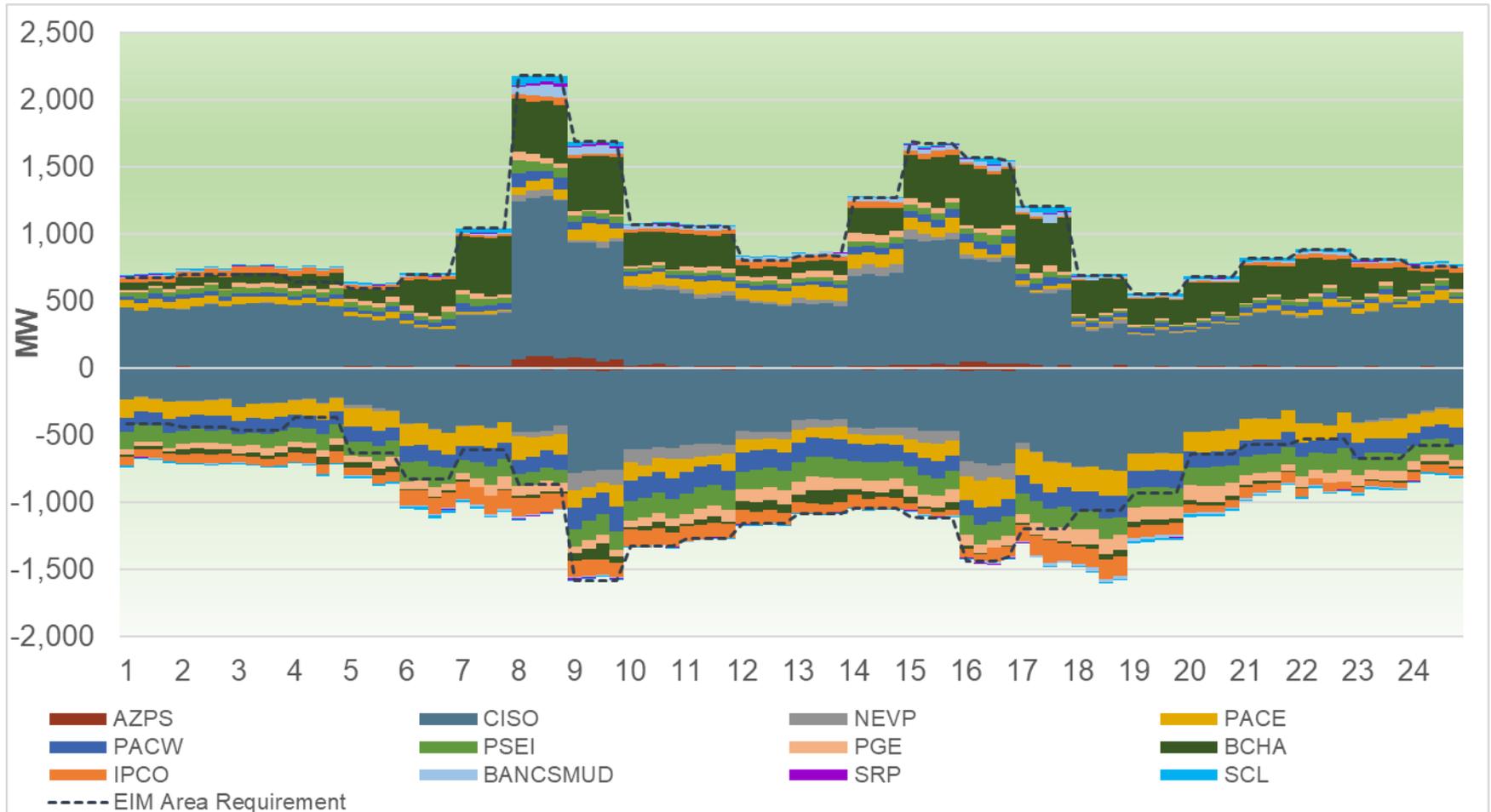
CAISO price correction events remain within historical levels



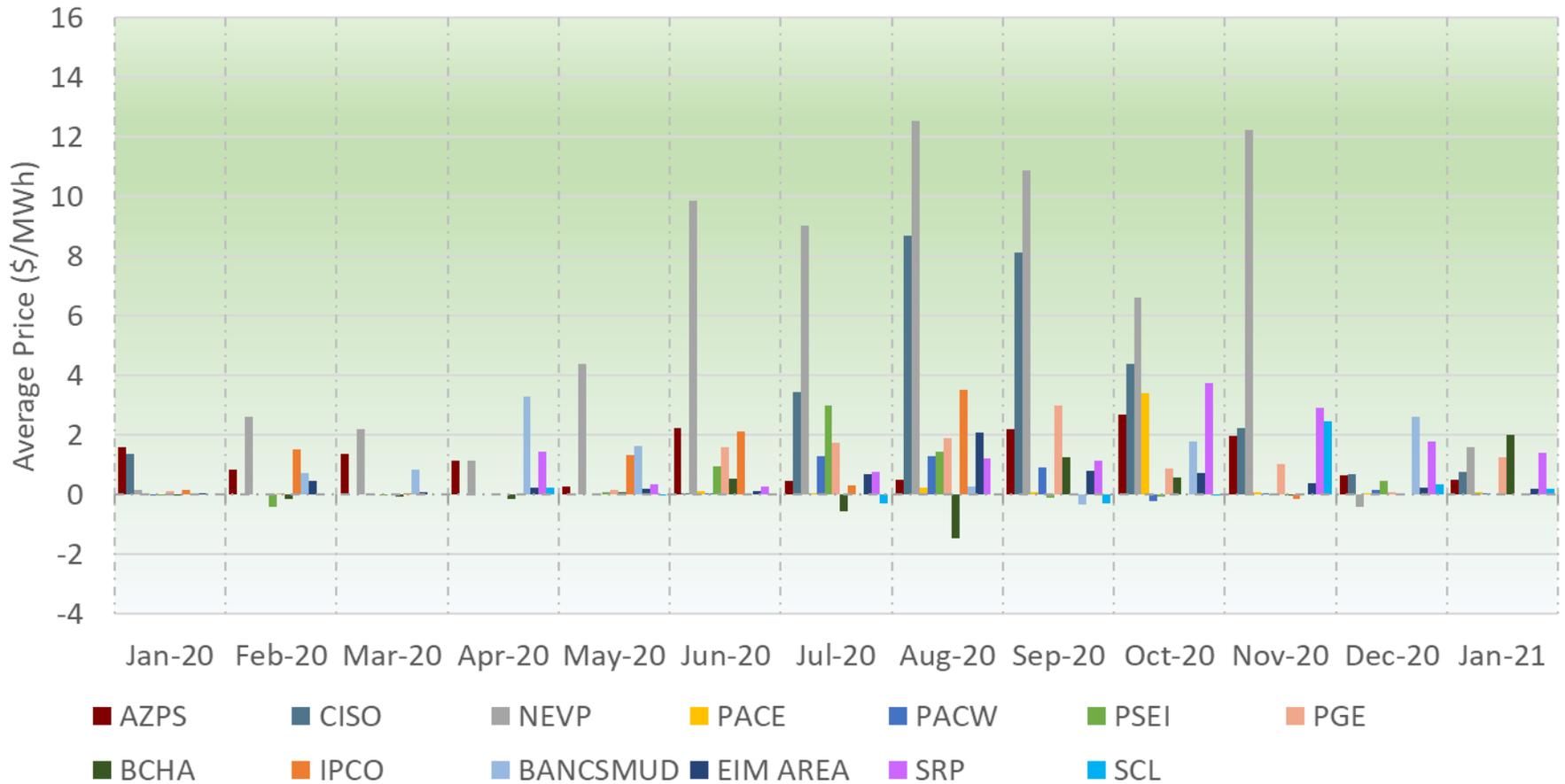
EIM-related price corrections remain within historical levels



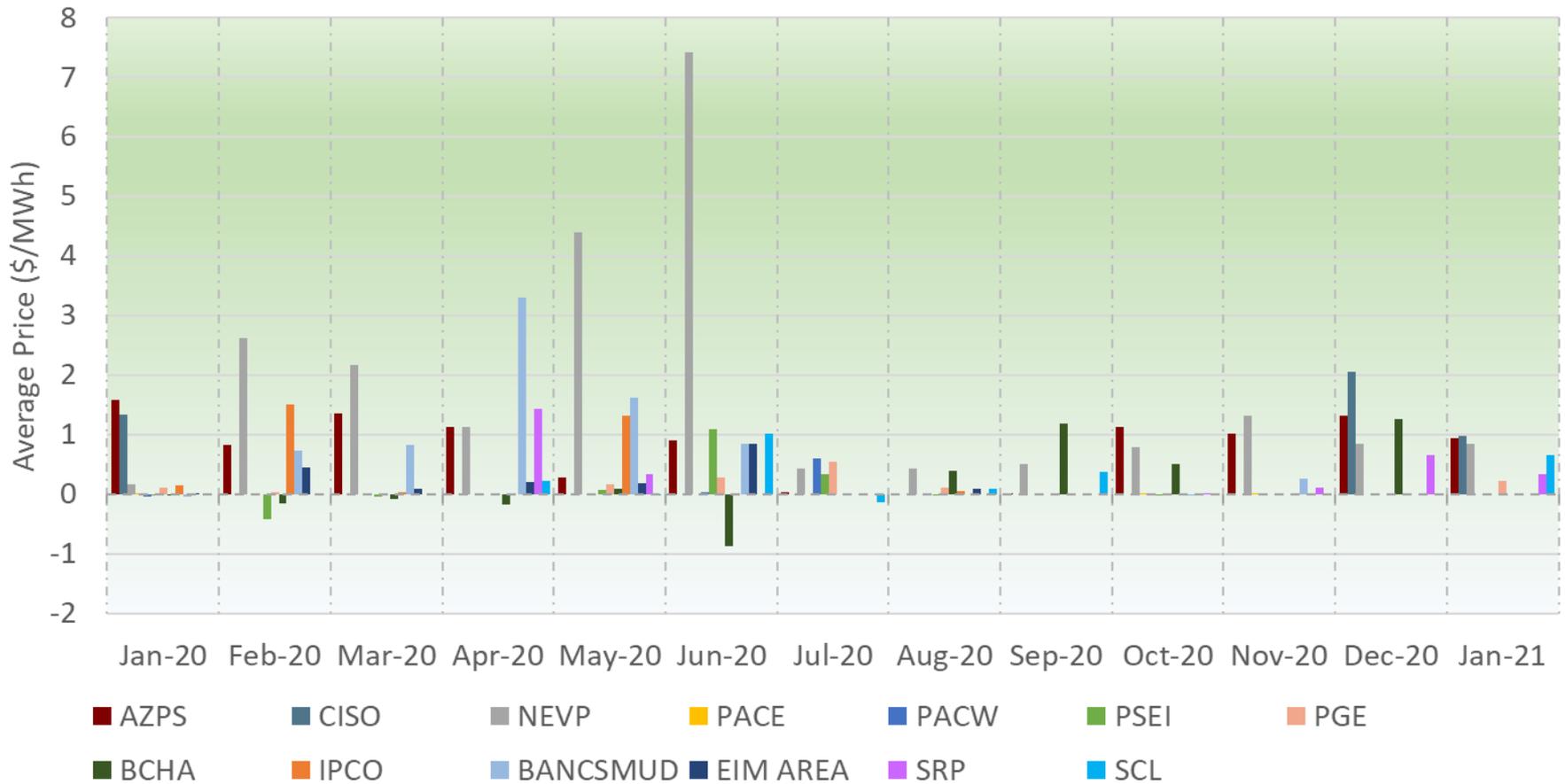
Average Flexible Ramp Product Cleared Awards for each area with EIM Area Requirement - Dec to Jan 2021



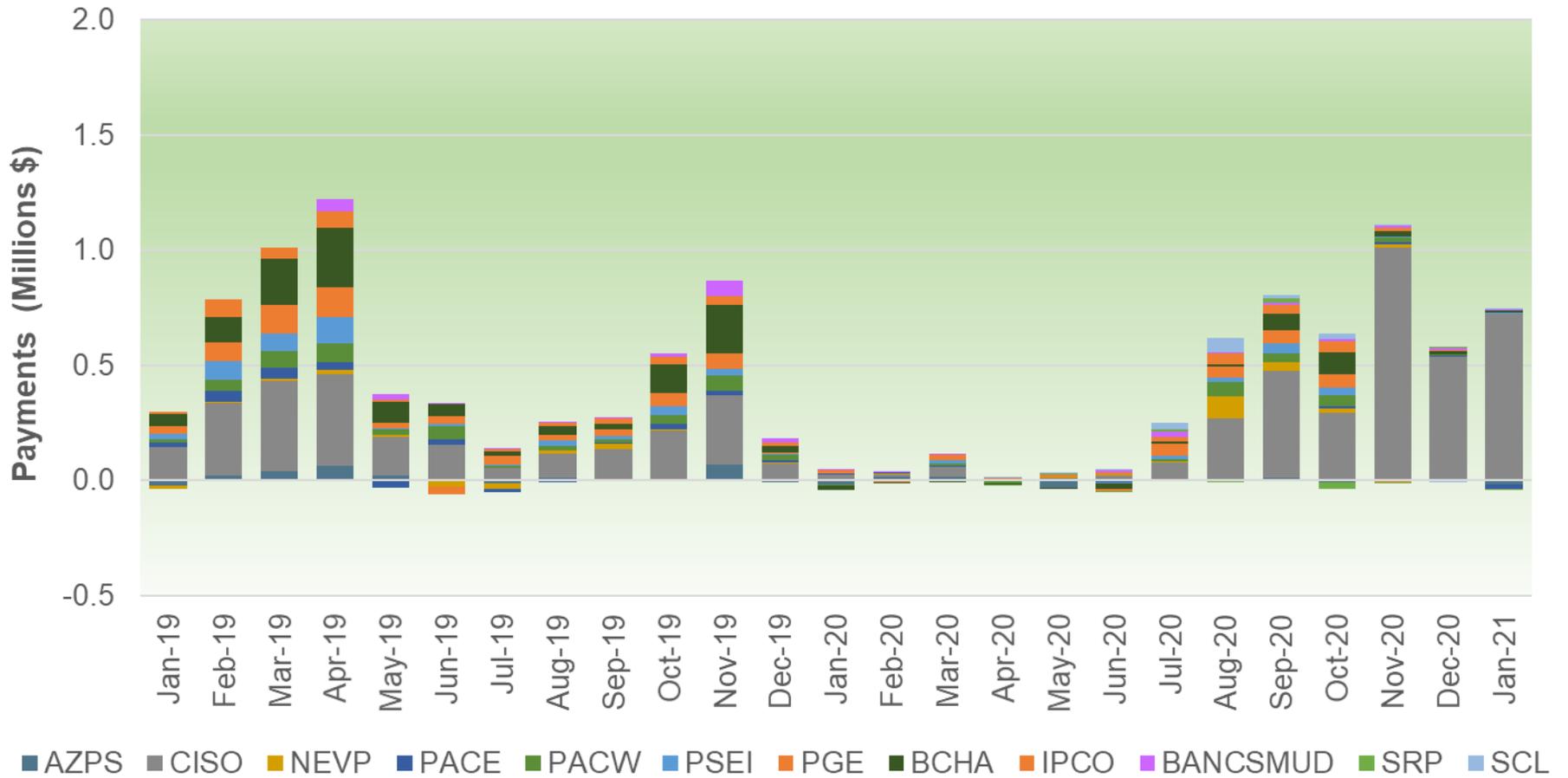
Average Flexible Ramp Up Price (\$/MWh)



Average Flexible Ramp Down Price (\$/MWh)



Uncertainty Up Settlement Amount

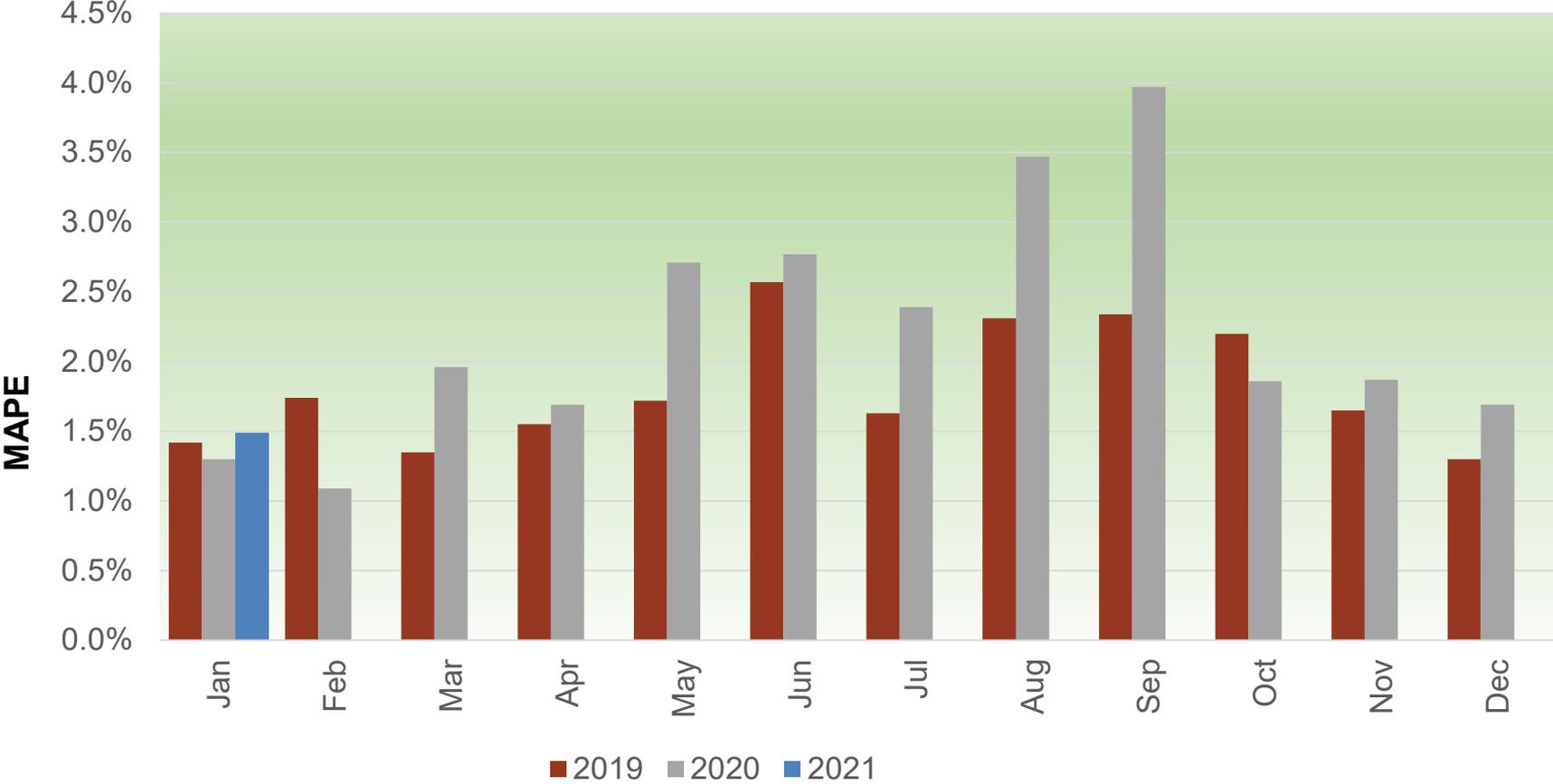


Day-ahead Load Forecast

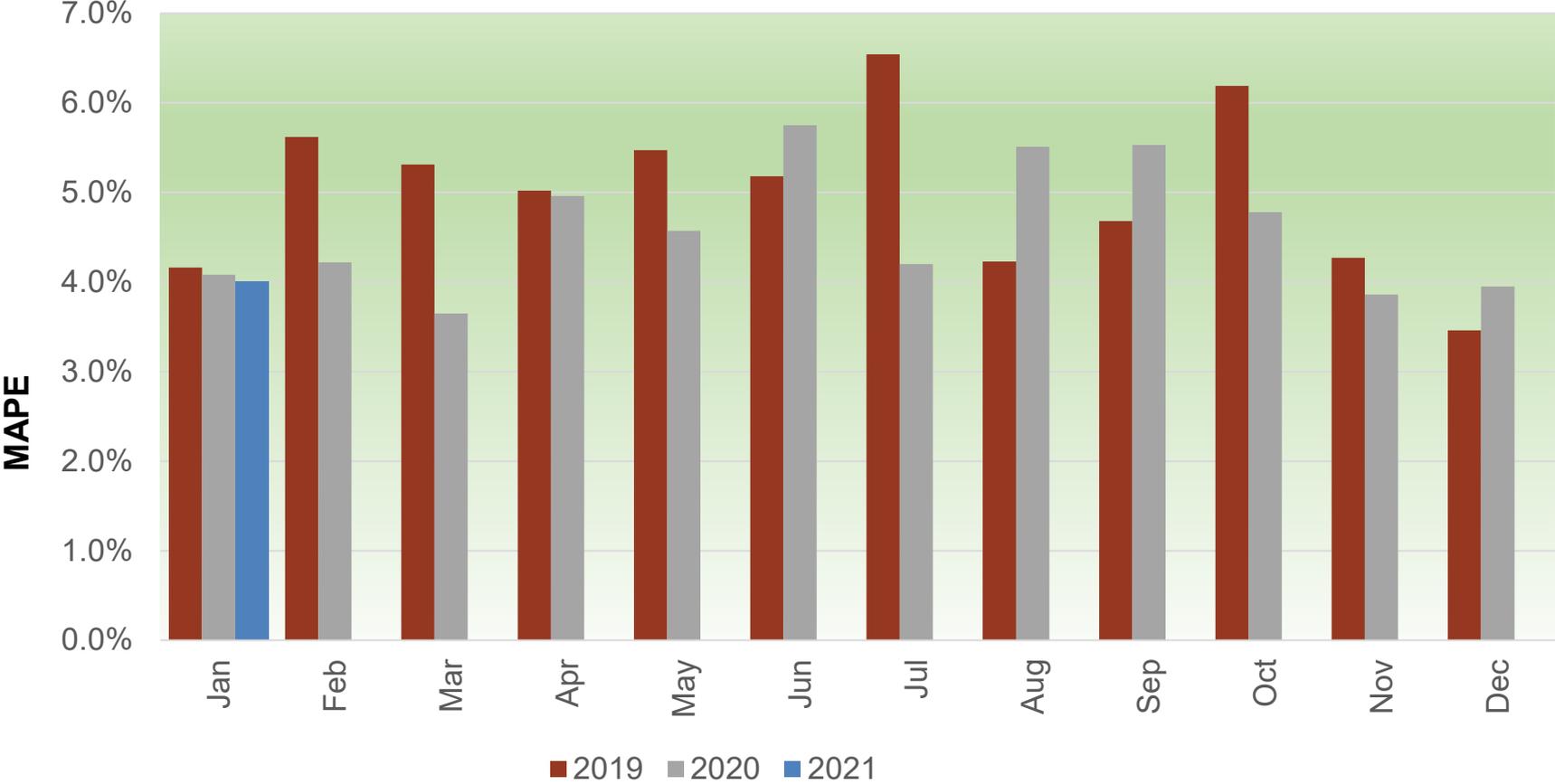


**MAPE = abs(Forecast - Actual)/Actual

Day-ahead Peak Forecast

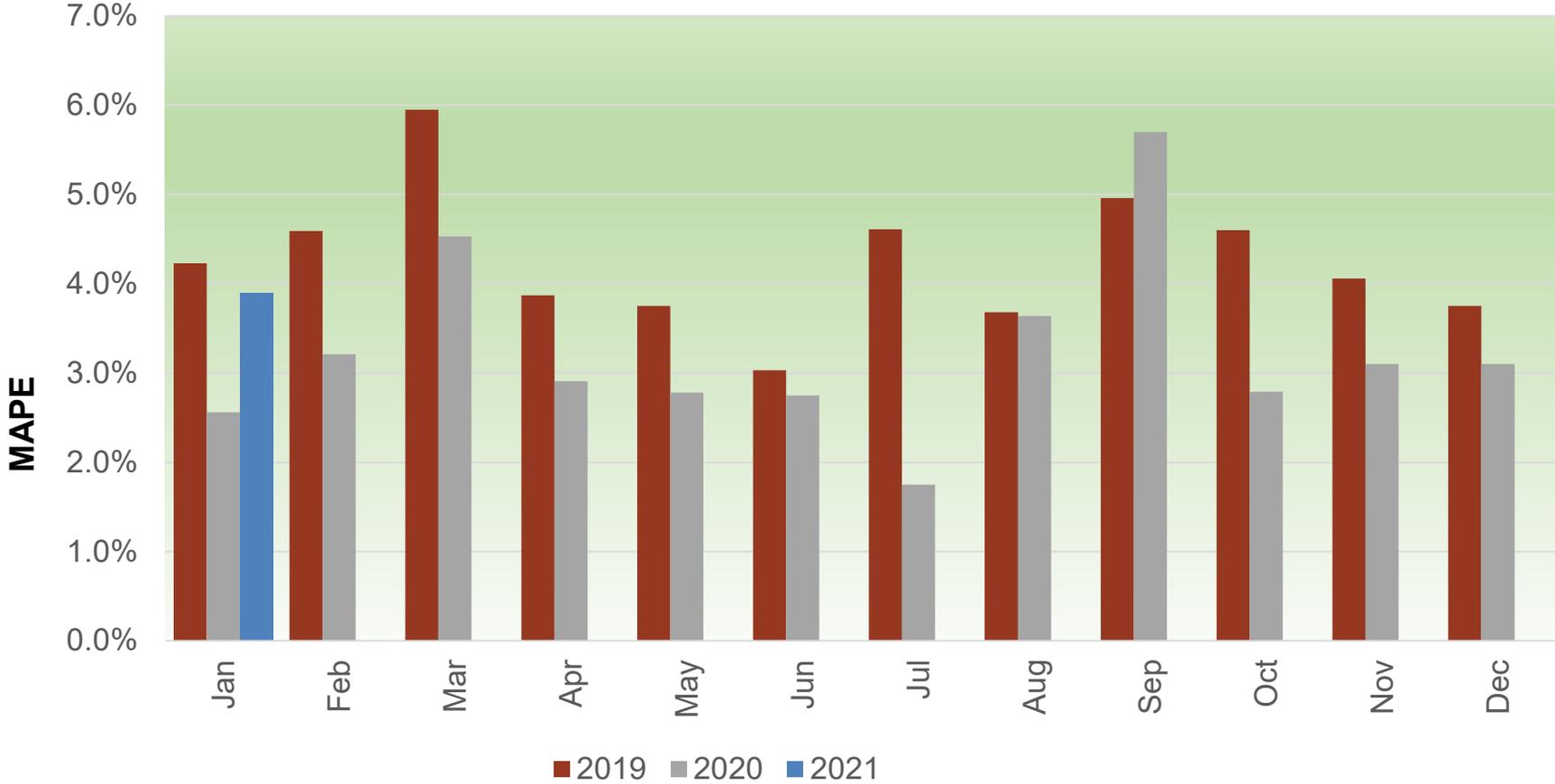


Day-ahead Wind Forecast



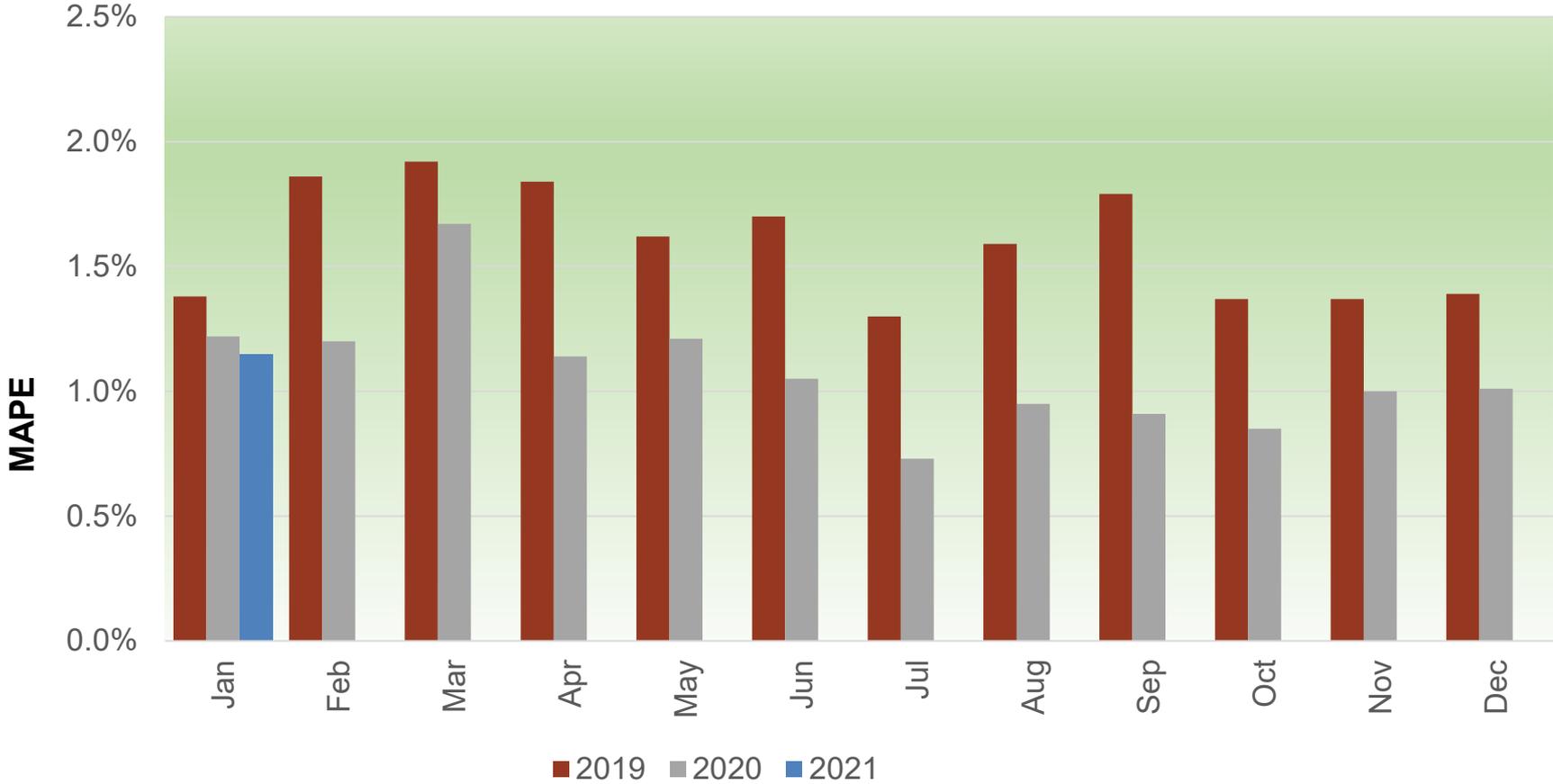
**The 2017 generation data used for accuracy calculation contains the economically dispatched MW.
 **MAPE = abs(Forecast - Actual)/Capacity

Day-ahead Solar Forecast



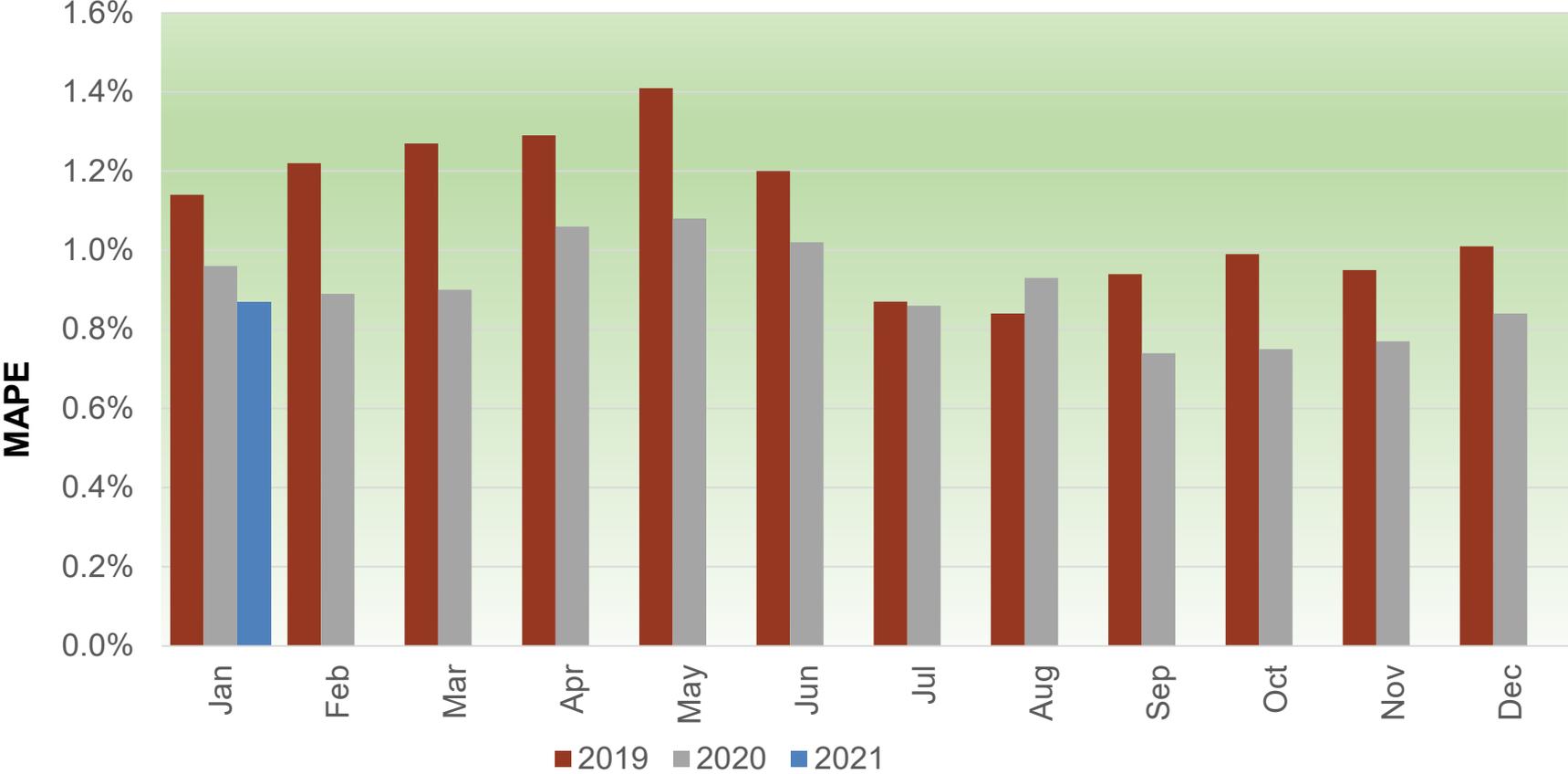
**MAPE = abs(Forecast - Actual)/Capacity

Real-time Solar Forecast



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

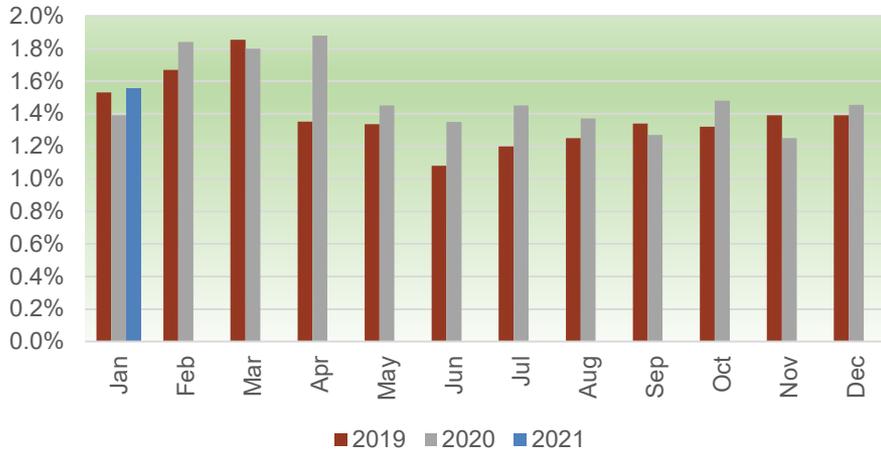
Real-time Wind Forecast



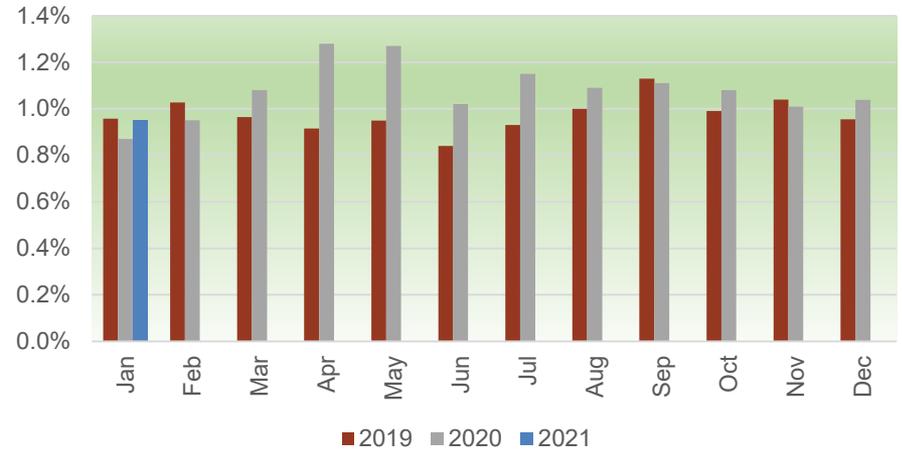
**MAPE = abs(Forecast - Actual)/Capacity

EIM T-60 Forecast

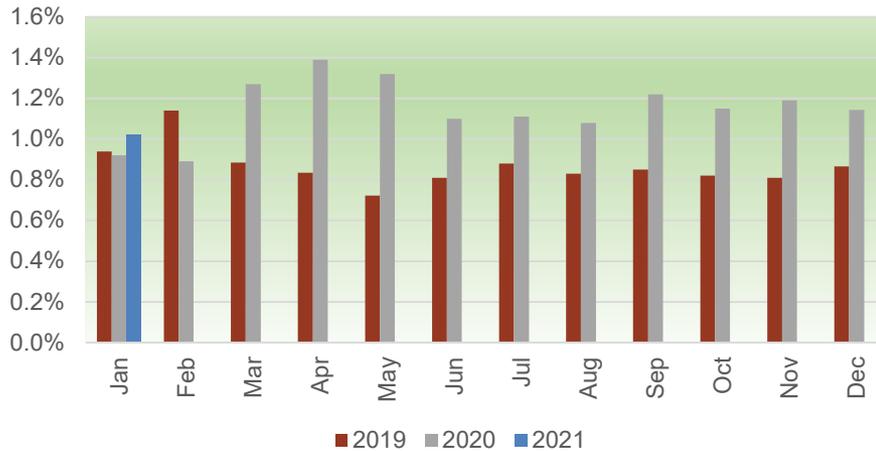
AZPS T-60 Forecast



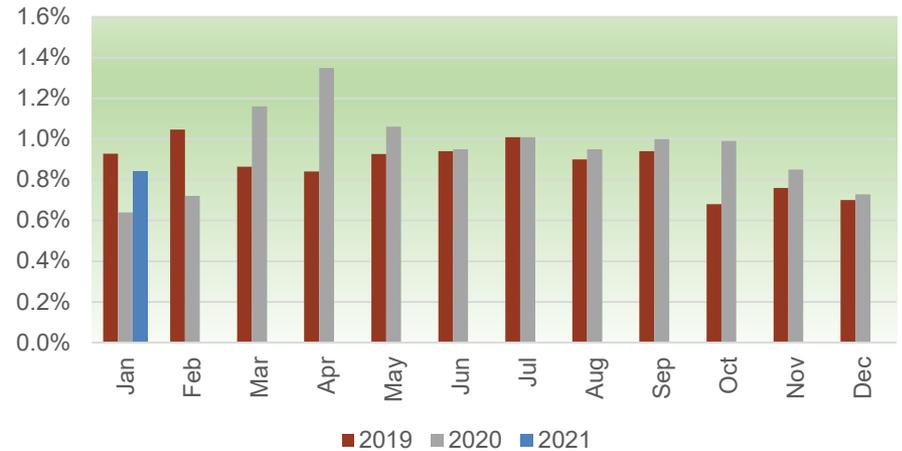
IPCO T-60 Forecast



PGE T-60 Forecast

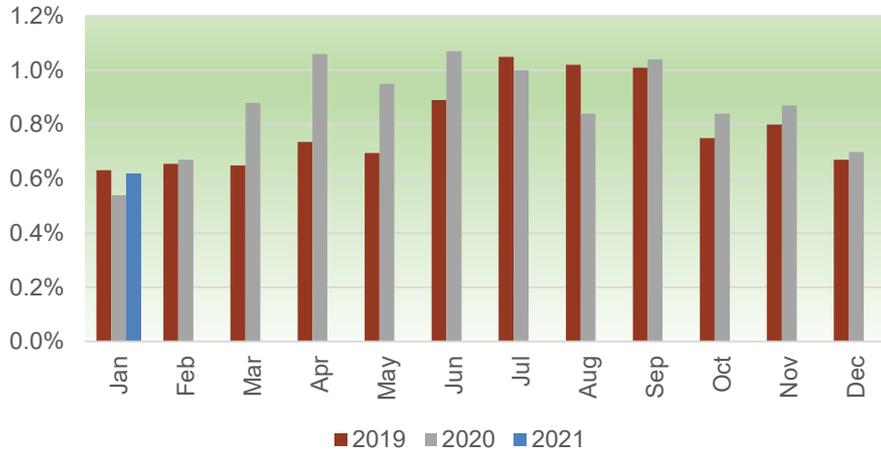


NVE T-60 Forecast

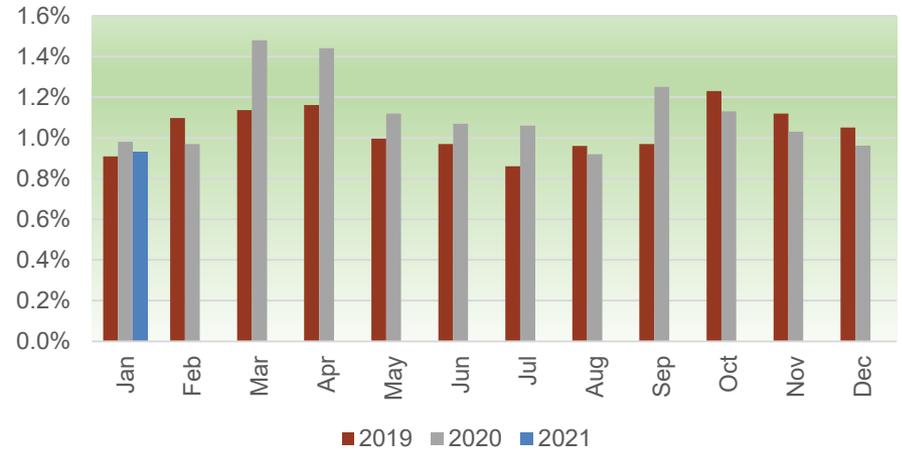


EIM T-60 Forecast

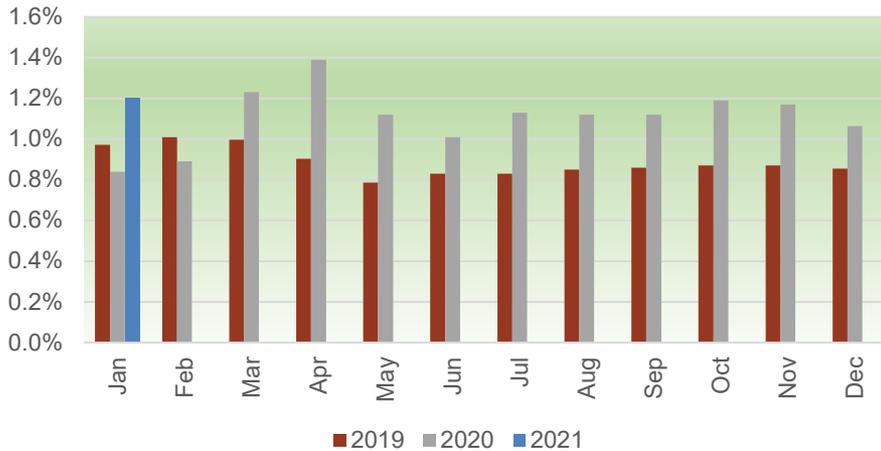
PACE T-60 Forecast



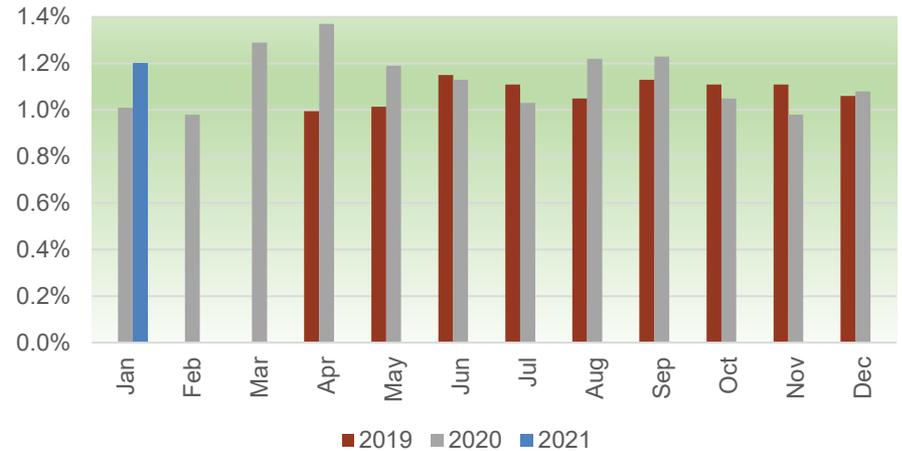
PACW T-60 Forecast



PSE T-60 Forecast



SMUD T-60 Forecast

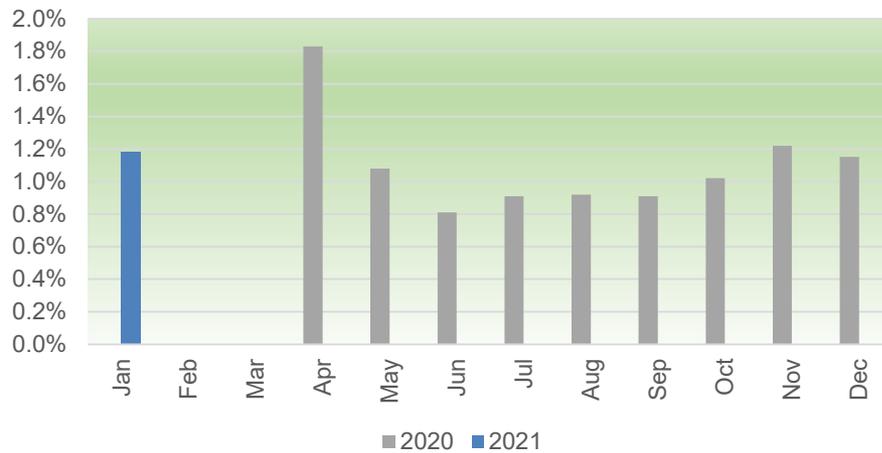


EIM T-60 Forecast

SRP T-60 Forecast



SCL T-60 Forecast



Policy Update

John Goodin

Senior Manager, Infrastructure & Regulatory Policy

Brad Cooper

Senior Manager, Market Design Policy

Fall 2021 with software release

- Hybrid Resources Initiative
 - Aggregate Capability Constraint
 - Allowance for co-located storage to deviate from dispatch under certain circumstances
 - Additional tools for hybrid resources
- Energy Storage and Distributed Energy Resources
 - Default Energy Bid for Storage
 - Optional end-of-hour state-of-charge parameter for storage
 - Maximum daily run time parameter for demand response

Resource Adequacy Enhancement Initiative

Scope: Reforms needed to the ISO's resource adequacy rules, requirements, and processes to ensure the future reliability and operability of the grid

- Phase 1 - Implementation 2021 (RA Yr. 2022)
 - Planned Outage Process Enhancements Phase 1 – Summer 2021
 - Minimum State of Charge Requirement – Summer 2021
 - Backstop Capacity Procurement for local energy insufficiency – Fall 2021
- Phase 2 - Implementation 2022 (RA Yr. 2023)
 - Portfolio Assessment
 - Unforced Capacity Counting (UCAP)
 - Minimum System RA Requirement
 - RA Import Reform
 - Planned Outage Process Enhancements Phase 2
 - Must offer obligations and bid insertion modifications
 - Flexible Resource Adequacy
 - Backstop Capacity Procurement for portfolio assessment deficiencies

Resource Adequacy Enhancements Initiative

- Status:
 - Phase 1 items:
 - Final Proposal Posted February 17, 2021
 - ISO Board decision March 2021
 - Phase 2 items:
 - Sixth revised straw proposal posted December 17, 2020
 - ISO Board decision proposed Sept 2021 and Nov 2021
 - RA imports Nov 2021; all else Sept 2021
- No EIM Governing Body role- CAISO BAA specific policy

Energy Storage Enhancement Initiative

Scope:

The purpose of this initiative is to enhance the optimization, dispatch, and settlement of energy storage resources.

- Explore the RT look out horizons
- Develop market based mechanism(s) to replace MSOC
- Update exceptional dispatch and bid-cost recovery rules
- Explore how to better model differing ramp rates based on SOC to reduce infeasible dispatches

Status:

- Engaging in internal policy and initiative coordination discussions with goal to launch this initiative in April
- Target Fall 2022 implementation

MIC Enhancements/Monthly Allocation of Available Import Capability

- **Scope:**
 - Develop enhancements to the maximum import allocation (MIC) process
 - Develop a process for entities to procure CAISO BAA import capability and transmission on a forward basis
- **EIM Governing Body role**
 - TBD
- **Status:**
 - Begin initiative in Q2

Market Enhancements for Summer 2021 Readiness

- **Scope:**
 - Develop market rule changes in response to Summer 2020 events to implement for Summer 2021
- **EIM Governing Body role**
 - RSE and interchange modeling enhancement under primary
 - Load/export/wheeling priorities and pricing enhancement advisory
- **Status:**
 - Draft final proposal and draft tariff language posted on February 18
 - Stakeholder comments on DFP submitted on February 26
 - Additional stakeholder call on revised DFP to be scheduled
 - MSC opinion call on March 8
 - Presenting RSE, interchange modeling enhancement, scarcity pricing enhancement at March 10 EIM Governing Body
 - Will present load/export/wheeling priorities at special EIM Governing Body and ISO Board meetings in April

Resource Sufficiency Evaluation Enhancements

- **Scope:**
 - Develop further enhancements to the EIM's resource sufficiency evaluation
 - Examine modifications to the consequences for resource sufficiency evaluation failure
- **EIM Governing Body role**
 - Primary
- **Status:**
 - Begin initiative in Q2

Western EIM sub-entity scheduling coordinator role

- Scope: Allow multiple scheduling coordinators in an EIM entity BAA to directly schedule and settle non-participating loads resources
- EIM Governing Body primary approval role
- Status:
 - Draft final proposal and draft tariff language to be posted March 18
 - Stakeholder call on March 25
 - Comments due on April 9
 - May 2021 EIM Governing Body and ISO Board meetings

Day-Ahead Market Enhancements

- **Scope:**
 - Co-optimizing supply based on both cleared demand and imbalance reserve product needs
- **EIM Governing Body Role:**
 - EIM Governing Body Charter specifies advisory role for components that change generally applicable real-time market rules
 - However, Management will request that the ISO Board of Governors give the EIM Governing Body an advisory role for entire initiative
- **Status:**
 - Restarting initiative in 2nd quarter of 2021

Extended Day-Ahead Market

- **Scope: Extending day-ahead market to EIM entities**
 - Bundle 1: transmission provision, resource sufficiency evaluation, distribution of congestion rents
 - Bundle 2: accounting for GHG costs, ancillary services, full network model enhancements, administrative fee
 - Bundle 3: price formation, convergence bidding, external resource participation, and other items
- **EIM Governing Body Role:**
 - Management will request that the ISO Board of Governors give the EIM Governing Body joint approval authority for entire initiative
- **Status:**
 - Restarting initiative in 4th quarter of 2021

Scarcity pricing

- Scope:
 - Improve CAISO market's scarcity pricing provisions for efficient market pricing during tight supply conditions
 - If appropriate, reconsider currently developed system market power mitigation design
- EIM Governing Body role TBD
- Status:
 - Start initiative in Q2

Dispatch enhancements

- Scope:
 - Various enhancements to improve renewable resource management
- EIM Governing Body role TBD
- Status:
 - Start initiative 4th quarter of 2021

Release Plan Update

Adrian Chiosea

Senior Manager, Strategic Initiative Management

The ISO offers innovative training programs

Date	Training courses and workshops
June 8 - 9, 2021 (9am – 12pm)	Intro to ISO Markets (<i>Virtual Workshop</i>)
June 15 - 16, 2021 (9am – 12pm)	Market Transactions (<i>Virtual Workshop</i>)
June 22 - 23, 2021 (9am – 12pm)	ISO Settlements (<i>Virtual Workshop</i>)
	Email us at CustomerReadiness@caiso.com for any training or readiness related questions



CustomerReadiness@caiso.com

Computer Based Training

There are more than 20 computer based training modules on the ISO website covering: Markets and Operations, Settlements and Metering, Reference Materials, Western Energy Imbalance Market and more!

Visit our **Learning Center** web page to access our training calendar, register for courses and find other informational resources:
<http://www.caiso.com/participate/Pages/LearningCenter/default.aspx>

New Modules (recorded webinar and slides)	
You can now find the following new initiatives training courses on the learning center web page:	
• ADS Training Part 1 & 2	• RC Settlements
• DOT Tariff Clarification	• FERC 841
• Excess Behind the Meter Production	• Market Settlements Timeline Transformation
• Flexible Ramping Product Refinements	• Intertie Deviation Settlement

Release Plan Summary: 2021

Spring 2021

- Energy Imbalance Market 2021 - BANC Ph 2/WAPA, TID, PNM, LADWP
- EIM Enhancements 2021 Phase 1
- Base Schedule Submission Deadline Phase 1
- Real-Time Settlement Review Phase 1
- FERC Order 831 - Compliance: Raise the Bid Cap to \$2000/MWh

Summer 2021 - tentative, subject to change

- Summer 2021 Readiness
- RA Enhancements
- FERC Order 831 - Pricing Parameters, Import Bid Screening, and Validation

Independent 2021

- CIRA Enhancements
- Energy Imbalance Market (EIM) Enhancements 2020 - Inter-tie Multi-Stage Generator
- Aliso Canyon Phase 5
- Variable Operations and Maintenance Cost Review

Release Plan Summary: 2021 - 2022

Fall 2021

- Energy Storage and Distributed Energy Resources Phase 4
- Flexible Ramping Product Refinements
- Hybrid Resources Phase 2
- Western EIM Sub-Entity Scheduling Coordinator Role
- EIM Enhancements 2021 Phase 2
- EIM Base Schedule Submission Deadline Phase 2
- Real-Time Settlement Review Phase 2
- Intertie Shadow Pricing Resolution

Spring 2022

- Energy Imbalance Market (EIM) 2022 - Avista
- Energy Imbalance Market (EIM) 2022 – Bonneville Power Administration
- Energy Imbalance Market (EIM) 2022 – Tacoma Power
- Energy Imbalance Market (EIM) 2022 – Xcel Energy - Colorado
- Energy Imbalance Market (EIM) 2022 - Tucson Electric Power

Release Schedule 2021

Date of Data Refresh: 2/19/2021



Legend	
Market Simulation	CA ISO Holiday
External Testing	Deployment Week

2/22/21 - 2/28/21	3/1/21 - 3/7/21	3/8/21 - 3/14/21	3/15/21 - 3/21/21	3/22/21 - 3/28/21	3/29/21 - 4/4/21	4/5/21 - 4/11/21	4/12/21 - 4/18/21	4/19/21 - 4/25/21	4/26/21 - 5/2/21	5/3/21 - 5/9/21	5/10/21 - 5/16/21	5/17/21 - 5/23/21	5/24/21 - 5/30/21	5/31/21 - 6/6/21	6/7/21 - 6/13/21	6/14/21 - 6/20/21	6/21/21 - 6/27/21	6/28/21 - 7/4/21	7/5/21 - 7/11/21	7/12/21 - 7/18/21	7/19/21 - 7/25/21	7/26/21 - 8/1/21	8/2/21 - 8/8/21	8/9/21 - 8/15/21	8/16/21 - 8/22/21	8/23/21 - 8/29/21	8/30/21 - 9/5/21	9/6/21 - 9/12/21	9/13/21 - 9/19/21	9/20/21 - 9/26/21	9/27/21 - 10/3/21	10/4/21 - 10/10/21	10/11/21 - 10/17/21	10/18/21 - 10/24/21	10/25/21 - 10/31/21	11/1/21 - 11/7/21	11/8/21 - 11/14/21	11/15/21 - 11/21/21	11/22/21 - 11/28/21	11/29/21 - 12/5/21	12/6/21 - 12/12/21	12/13/21 - 12/19/21	12/20/21 - 12/26/21	12/27/21 - 1/2/22
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MAP Stage Environment Window

CIRA Enhancements - Market Sim
EIM Enhancements 2021 Phase 1 - Market Sim
EIM Base Schedule Submission Deadline Phase 1 - Market Sim
Real-Time Settlement Review Phase 1 - Market Sim
Summer 2021 Readiness - Market Sim
Resource Adequacy (RA) Enhancements - Market Sim
Energy Storage and Distributed Energy Resources Phase 4 - Market Sim
Flexible Ramping Product Refinements - Market Sim
Hybrid Resources Phase 2 - Market Sim
Western EIM Sub-Entity Scheduling Coordinator Role - Market Sim
EIM Enhancements 2021 Phase 2 - Market Sim
EIM Base Schedule Submission Deadline Phase 2 - Market Sim
Real-Time Settlement Review Phase 2 - Market Sim
Variable Operations and Maintenance Cost Review - Market Sim
Intertie Shadow Pricing Resolution - Market Sim
EIM - Avista - Market Sim
EIM - Bonneville Power Administration - Market Sim
EIM - Tacoma Power - Market Sim
EIM - Xcel Energy - Colorado - Market Sim
EIM - Tucson Electric Power - Market Sim

CIRA Enhancements - Market Sim (TBD)
EIM Enhancements 2021 Phase 1 - Market Sim (03/18-03/31)
EIM Base Schedule Submission Deadline Phase 1 - Market Sim (03/18-03/31)
Real-Time Settlement Review Phase 1 - Market Sim (03/01-03/31)
Summer 2021 Readiness - Market Sim (04/26-05/21)
Resource Adequacy (RA) Enhancements - Market Sim (04/26-05/21)
Energy Storage and Distributed Energy Resources Phase 4 - Market Sim (07/26-09/03)
Flexible Ramping Product Refinements - Market Sim (07/26-09/03)
Hybrid Resources Phase 2 - Market Sim (07/26-09/03)
Western EIM Sub-Entity Scheduling Coordinator Role - Market Sim (07/26-09/03)
EIM Enhancements 2021 Phase 2 - Market Sim (07/26-09/03)
EIM Base Schedule Submission Deadline Phase 2 - Market Sim (07/26-09/03)
Real-Time Settlement Review Phase 2 - Market Sim (07/26-09/03)
Variable Operations and Maintenance Cost Review - Market Sim (07/26-09/03)
Intertie Shadow Pricing Resolution - Market Sim (07/26-09/03)
EIM - Avista - Market Sim (10/01-11/30)
EIM - Bonneville Power Administration - Market Sim (10/01-11/30)
EIM - Tacoma Power - Market Sim (10/04-02/03)
EIM - Xcel Energy - Colorado - Market Sim (12/01-01/26)
EIM - Tucson Electric Power - Market Sim (12/01-01/31)

Production Environment Window

EIM Enhancements 2020 - Inter-tie Multi-Stage Generator
CIRA Enhancements
FERC Order 831 - Compliance: Raise the Bid Cap to \$2000/MWh
EIM Enhancements 2021 Phase 1
EIM Base Schedule Submission Deadline Phase 1
Real-Time Settlement Review Phase 1
EIM - BANC Phase 2 / WAPA
EIM - Turlock Irrigation District
EIM - Public Service Company of New Mexico
EIM - Los Angeles Dept. of Water & Power
EIM - North-Western Energy
Aliso Canyon Phase 5
Summer 2021 Readiness
Resource Adequacy (RA) Enhancements
FERC Order 831 - Pricing Parameters, Import Bid Screening, and Validation
Energy Storage and Distributed Energy Resources Phase 4
Flexible Ramping Product Refinements
Hybrid Resources Phase 2
Western EIM Sub-Entity Scheduling Coordinator Role
EIM Enhancements 2021 Phase 2
EIM Base Schedule Submission Deadline Phase 2
Real-Time Settlement Review Phase 2
Variable Operations and Maintenance Cost Review
Intertie Shadow Pricing Resolution

EIM Enhancements 2020 - Inter-tie Multi-Stage Generator (03/01)
CIRA Enhancements (03/03)
FERC Order 831 - Compliance: Raise the Bid Cap to \$2000/MWh (NLT 03/21)
EIM Enhancements 2021 Phase 1 (03/31)
EIM Base Schedule Submission Deadline Phase 1 (03/31)
Real-Time Settlement Review Phase 1 (04/01)
EIM - BANC Phase 2 / WAPA (03/25)
EIM - Turlock Irrigation District (03/25)
EIM - Public Service Company of New Mexico (04/01)
EIM - Los Angeles Dept. of Water & Power (04/01)
EIM - North-Western Energy (04/01)
Aliso Canyon Phase 5 (April)
Market Enhancements for Summer 2021 Readiness (06/01)
Resource Adequacy (RA) Enhancements (06/01)
FERC Order 831 - Pricing Parameters, Import Bid Screening, and Validation (June)
Energy Storage and Distributed Energy Resources Phase 4 (10/01)
Flexible Ramping Product Refinements (10/01)
Hybrid Resources Phase 2 (10/01)
Western EIM Sub-Entity Scheduling Coordinator Role (10/01)
EIM Enhancements 2021 Phase 2 (10/01)
EIM Base Schedule Submission Deadline Phase 2 (10/01)
Real-Time Settlement Review Phase 2 (10/01)
Variable Operations and Maintenance Cost Review (10/01)
Intertie Shadow Pricing Resolution (10/01)

<http://www.caiso.com/Documents/ReleaseSchedule.pdf>



ISO PUBLIC

2021 Spring Release

Spring 2021 – EIM integrations for BANC Phase 2, TID, PNM, LADWP

Project Info	Details/Date
Application Software Changes	Implementation of BANC Phase 2, TID, PNM, LADWP, and NWE as EIM Entities
BPM Changes	EIM BPM will be updated if needed to reflect new modeling scenarios identified during implementation and feedback from BANC Phase 2, TID, PNM, LADWP, and NWE.
Market Simulation	December 2020 – January 2021
Parallel Operations	February 2021 – March 2021

Milestone Type	Milestone Name	Dates					Status
		BANC Phase 2	TID	PNM	LADWP		
Market Sim	Market Sim Window	11/3/20 - 1/31/21	11/3/20 - 1/31/21	11/3/20 - 1/31/21	11/3/20 - 1/31/21		✓
Parallel Operations	Parallel Operations	1/27/21 – 3/25/21	1/27/21 – 3/25/21	1/30/20 – 4/1/21	1/30/20 – 4/1/21		
Tariff	File Readiness Certification	Mar 2021					✓
Production	Activation	3/25/21	3/25/21	4/1/21	4/1/21		

Spring 2021 – EIM Enhancements 2021 Phase 1

Project Information	Details/Date
High Level Business Problem or Need	To collectively address important issues identified by EIM market participants through Customer Inquiry, Dispute and Information system (CIDI) requests to improve the visibility, functions, and features in Energy Imbalance Market (EIM)
High Level Project Scope	<ul style="list-style-type: none">• Two EIM enhancement CIDI requests for Phase 1 in Spring 2021<ul style="list-style-type: none">• BAAOP: ITC and ETSR data sharing among the related EIM Entities• CMRI: ITC Limits report and sharing among the related EIM Entities
BPM Changes	EIM, Market Instruments
Tariff Change	Section 29.4
Impacted Systems	RTM/BAAOP, RTM/Integration, CMRI

Spring 2021 – EIM Enhancements 2021 Phase 1 (cont'd)

System	High Level Changes
Master File (MF) For CIDI: 226744 (226917) 226745 (226918)	Define ITC, ETSR association with EIM entities SC <ul style="list-style-type: none"> For the EIM entities that share the same path, associate the EIM entity SC with ETSR resources. For the EIM entities that share the same path, associate the EIM entity SC with ITC
Real-Time Market (RTM) /Balancing Authority Area Operations Portal (BAAOP) For CIDI: 226744 (226917) 226745 (226918)	<ul style="list-style-type: none"> Receive association ETSR/ITC with EIM entities Allow the associated EIM entities to view the ITC and associated ETSR Add New UI ITC detail display in BAAOP, a table of all internal BAA ITCs and shared/global ITC's which should include the ITC name, import limit, export limit, net flow (cleared value). Each ITC should have a sub-table displaying each resource included in the ITC with a calculation row with the sum of each data column for the market horizon for RTPD and RTD Ensure No impact on existing function and UI
CAISO Market Results Interface (CMRI) For CIDI: 226744 (226917) 226745 (226918)	<ul style="list-style-type: none"> Receive association ITC with EIM entities Allow the associated EIM entities to view the ITC limits report through ACL Receive the ITC/TCOR/PTST limits from market Create ITC/TCOR limit reports, UI/API
Real-Time Market (RTM) /Integration For CIDI: 226744 (226917) 226745 (226918)	<ul style="list-style-type: none"> Publish ITC/TCOR limits

Spring 2021 – EIM Enhancements 2021 Phase 1 (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Milestone: Post External BRS	Feb 17, 2021	✓
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec)	Feb 24, 2021	✓
Tariff	File Tariff	N/A	
BPMs	Draft BPM changes	N/A	
External Training	Deliver External Training	Mar 08, 2021	
Production Activation	EIM 2021 Phase 1 NWMT CIDI	Mar 31, 2021	

Spring 2021 – Base Schedule Submission Deadline Phase 1

Project Information	Details/Date
High Level Business Problem or Need	<ul style="list-style-type: none"> • Provide EIM Scheduling Coordinators with additional flexibility to submit more accurate base schedules closer to the operating hour. • Update tariff rules and market systems to allow EIM Entities to submit base schedules with energy below a resource’s minimum load. • Allow CAISO and EIM Entities to more accurately capture the startup energy of large conventional resources within their Resource Sufficiency Evaluations (RSE), thus increasing their ability to pass the RSE while lowering their exposure to uninstructed imbalance energy settlement. <p>*across Phase 1 & 2</p>
High Level Project Scope	<p>Phase 1: Inclusion of startup energy below a resource’s minimum load:</p> <ul style="list-style-type: none"> • Include startup energy in an EIM base schedule <ul style="list-style-type: none"> ○ Include startup energy in the resource sufficiency evaluation (RSE) ○ Reduction of imbalance energy settlement <p>Phase 2, Fall 2021: Updates to the base schedule submission timeline</p> <ul style="list-style-type: none"> • Move market closing for the final binding EIM base schedule submissions from T-40 to T-30 - <ul style="list-style-type: none"> ○ Adding additional RSE at T-40
BPM Changes	<p>EIM Market Instruments Market Operations Settlements</p> <p>*across Phase 1 & 2</p>
Tariff Change	<p>11.8.6.3 BCR Settlement 29.11 Startup Energy Settlement 29.34 Base Schedules below Pmin and Submission Timeline Adjustment</p> <p>*across Phase 1 & 2</p>
Impacted Systems	<p>Phase 1: RTM, Settlements, BSAP, RCBSAP, CMRI</p> <p>Phase 2, Fall 2021: RTM, BSAP, ITS, CMRI</p>

Spring 2021 – Base Schedule Submission Deadline Phase 1 (cont'd)

System	High Level Changes
RTM	<p>Phase 1:</p> <ul style="list-style-type: none"> • Include startup energy in balancing test only for EIM entities • EIM RSE to include energy below minimum load (startup energy) would only be on the balancing test • Startup energy will not be included as part of CAISO's RSE <p>Phase 2, Fall 2021:</p> <ul style="list-style-type: none"> • Shorten the run time of the current T-37.5 RTPD interval • Move start time to after T-30 • Result publication remains at T-22.5 • Final RSE will begin following T-30 deadline • Add additional RSE test
Settlements	<p>Phase 1:</p> <ul style="list-style-type: none"> • Settlements will treat startup energy as part of a EIM base schedule (not paid/charged for energy) • Deviations from the base schedule to be settled as uninstructed imbalance energy (UIE) • The intervals where BASE Schedules reflect Start Up Energy, should be considered self-committed startups • Startup energy will not be included as part of CAISO's RSE • Update calculation for Bid Cost Recovery (BCR) transfer amounts (if this initiative precedes Real-Time Settlements initiative then requirements will be taken from Real-Time Settlement initiative for the BCR calculation)
BSAP	<p>Phase 1:</p> <ul style="list-style-type: none"> • Modify the logic of the BSAP to allow for startup energy to be submitted as part of an EIM entity's base schedule • EIM base schedules to include a resources entire energy output, including portions below minimum load <p>Phase 2, Fall 2021:</p> <ul style="list-style-type: none"> • Send base schedule to market at T-30
RCBSAP	<p>Phase 1:</p> <p>Modify the logic of the RCBSAP to allow for startup energy to be submitted as part of an EIM entity's base schedule</p>
ITS	<p>Phase 2, Fall 2021:</p> <ul style="list-style-type: none"> • ITS will need to adjust the timing of RTPD publication checks and adjustments to account for the RTPD change from T-37.5 RTPD to T-30 • RTPD 5 run will be decreased to around five and a half minutes • RTPD 5 run will be considered late at T-22.5 • RTPD 4 should start at T-21.5 • Payload times need to be adjusted
CMRI	<p>Phase 1:</p> <ul style="list-style-type: none"> • Leverage existing EIM Base Schedule report in CMRI <p>Base schedule energy below Pmin reflected</p> <p>Phase 2, Fall 2021:</p> <ul style="list-style-type: none"> • Additional payload consumed at T-30 for test results • Receive results from RTPD 5 run by T-22.5

Spring 2021 – Base Schedule Submission Deadline Phase 1 (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Dec 17, 2020	✓
External BRS	Milestone: Post External BRS	Jan 15, 2021	✓
Config Guides	Post Draft Config Guides	Jan 19, 2021	✓
Tech Spec	Create ISO Interface Spec (Tech spec)	N/A	
Tariff	File Tariff	Jan 27, 2021	✓
BPMs	Draft BPM changes	N/A	
External Training	Deliver External Training	Mar 08, 2021	
Production Activation	EIM BSSD Phase 1_Start-up Energy	Mar 31, 2021	

Spring 2021 – Real-Time Settlement Review Phase 1

Project Information	Details/Date
High Level Business Problem or Need	<p>The scope of this initiative is to identify and address any inappropriate cost shifting that may be occurring in ISO's real-time market between the Western Energy Imbalance Market (EIM) balancing authority areas.</p> <p>*across Phase 1 & 2</p>
High Level Project Scope	<p>Phase 1:</p> <ul style="list-style-type: none"> Eliminate the option for EIM entities to settle their base ETSR schedule deviations bilaterally. Deviations will be settled through the CAISO market at scheduling point intertie prices at a unique pricing location (LMP) Calculation changes for real-time bid cost recovery (BCR) uplift costs for EIM transfers. Allocate real-time BCR uplift costs to load and exports. <p>Phase 2, Fall 2021:</p> <ul style="list-style-type: none"> Allow EIM entities using a load derivation approach the option to not settle unaccounted for energy (UFE).
Impacted Systems	<p>Master File, BSAP, Settlements</p> <p>*across Phase 1 & 2</p>
System	High Level Changes
Master File	<p>*across Phase 1 & 2</p> <ul style="list-style-type: none"> Establish base energy transfer system resources (ETSR) at a transfer location between EIM BAAs and default the Settlement Flag = Y
Base Schedule Aggregation Portal (BSAP)	<ul style="list-style-type: none"> Set transmission loss percentage to zero for calculating the hourly load base schedule for EIM entities the elect not to settle UFE.
Settlements	<ul style="list-style-type: none"> Configuration changes for unaccounted for energy (UFE) – CAISO to exclude EIM entities that elect to not settle UFE from calculation of UFE amount. Configuration changes for Bid Cost Recovery (BCR) – CAISO to update EIM RT BCR Uplift formula to remove uninstructed imbalance energy (UIE) and unaccounted for energy (UFE) and replace with Load and Exports.

Spring 2021 – Real-Time Settlement Review Phase 1 (cont'd)

Milestone Type	Milestone Name	Dates	Status
External BRS	Milestone: Post External BRS	Jan 21, 2021	✓
Config Guides	Post Draft Configuration Guides	Jan 19, 2021	✓
External Training	Deliver External Training	Mar 04, 2021	
Production Activation	Real-Time Settlement Review Phase 1	Apr 01, 2021	

Spring 2021 - FERC Order 831 - Compliance: Raise the Bid Cap to \$2000/MWh

Project Information	Details/Date
High Level Business Problem or Need	<ul style="list-style-type: none"> The CAISO submitted its proposed tariff changes to comply with FERC Order No. 831 in September 2019. In its proposed tariff changes, the CAISO did not submit a separate filing requesting authority to cost-verify or price screen import bids above \$1,000/MWh. However, the CAISO decided to further address this topic in this initiative because of the CAISO balancing authority area's increasing dependence on imports. In addition, a number of stakeholders objected to the CAISO's proposal in the compliance filing to continue to set the power balance constraint penalty price at the hard energy bid cap, which under Order No. 831 increases from \$1,000/MWh to \$2,000/MWh. This would result in market prices being set to \$2,000/MWh if the market has to relax the power balance constraint. Consequently, this initiative also addresses this topic.
High Level Project Scope	<ul style="list-style-type: none"> The FERC 831 Import Bidding and Market Parameters project focuses on process and system modifications related to CAISO's Federal Energy Regulatory Commission (FERC) Order No. 831 compliance filing. In its compliance filing, CAISO revised the tariff to raise the energy bid cap from \$1,000/MWh to \$2,000/MWh. CAISO also revised the tariff to require suppliers within the CAISO balancing authority area (BAA), that submit energy bids above \$1,000/MWh, to base bids on verifiable actual or expected costs. The CAISO's associated policy initiative objective is to ensure all supply bids priced above \$1,000/MWh represent verified costs, when supply is needed to meet the ISO's load responsibility. The FERC 831 project addresses two topics related to the changes CAISO proposed: <ul style="list-style-type: none"> A price-screening methodology for import bids greater than \$1,000/MWh. The "penalty prices" at which CAISO markets will relax market constraints under the increased energy bid cap. <ul style="list-style-type: none"> A methodology to establish market constraint relaxation penalty prices under a \$2,000/MWh hard energy bid cap.
Tariff Change	<p>Previously we filed for a Petition for Waiver to Extend Date of FERC Order No. 831 Compliance Filing</p> <p>On Feb 18 CAISO filed a Notice of Withdrawal – Petition of Limited Tariff Waiver – FERC Order No. 831</p> <p>On Feb 22 CAISO filed the tariff changes for import bidding rules and market pricing parameters to complement the Order No. 831 compliance</p>
Impacted Systems	<p>SIBR</p> <ul style="list-style-type: none"> Hard cap \$2000 (parameter change) The following is being delivered with CCDEBE functionality: <ul style="list-style-type: none"> Soft cap \$1000 Generators can bid up to their DEB if they bid above \$1000. Interties, Virtuals, and Load can all bid to \$2000 without any restrictions. <p>IFM/RTN</p> <ul style="list-style-type: none"> DA and RT market applications scale scheduling and pricing run constraint penalty prices to be consistent with a \$2000 hard energy bid cap.

Spring 2021 - FERC Order 831 - Compliance: Raise the Bid Cap to \$2000/MWh (cont'd)

Milestone Type	Milestone Name	Dates	Status
External BRS	Milestone: Post External BRS	Dec 21, 2020	✓
	Revised BRS to synch with tariff filing and differentiate compliance scope from enhancements scope	Feb 8, 2021	✓
Tariff Filing	Petition to FERC for extension and requesting a decision by March 11	Jan 26, 2021	✓
	Notice of Withdrawal – Petition of Limited Tariff Waiver – FERC Order No. 831	Feb 18, 2021	✓
	Tariff changes for import bidding rules and market pricing parameters to complement the Order No. 831 compliance	Feb 22, 2021	✓
Production Activation	FERC Order 831 - Compliance: Raise the Bid Cap to \$2000/MWh	Tentative March 18, 2021	

2021 Summer Release

Summer 2021 – Summer 2021 Readiness

Initiative definition in the policy process at

[caiso.com > Stay Informed > Stakeholder Initiatives Market enhancements for summer 2021 readiness](https://www.aiso.com/Stay-Informed/Stakeholder-Initiatives/Market-enhancements-for-summer-2021-readiness)

Project Information	Details/Date
High Level Business Problem or Need	A historic heat storm impacted the western US for several consecutive days in mid-August 2020, causing energy supply shortages that led to two rotating power outages in the ISO footprint on August 14 and 15. ISO commits to the development of actions to prevent supply gaps in advance of summer 2021. This initiative focuses on near-term efforts on market rules, procedural changes, and resource adequacy necessary to manage heat events next summer.
High Level Project Scope	<p>Scope described below is preliminary and may evolve as we move into the final phase of policy development</p> <ul style="list-style-type: none"> • Export and load scheduling priorities • Including reliability demand response resources in real-time pre-dispatch • Management of storage resources during tight conditions • Import and export market incentives during tight system conditions • EIM coordination and resource sufficiency test review • New OASIS report showing gross exports and imports by intertie • Resource adequacy capacity validation for load at 8 PM • CIRA Notifications • Addressing 15% PRM
BPM Changes	Energy Imbalance Market (EIM), Market Instruments, Market Operations, Reliability Requirements, Settlements and Billing,
Tariff Change	Tariff sections: 4.13.3, 11.6.4, 29.7, 29.34, 30.6, 31.4, 34.4, 34.8, 34.12, 34.22, 40.4, 40.6, Sections L.1.6 of Appendix L, Section 4 of Appendix DD
Impacted Systems	<p>ALFS, SIBR, CIRA, IFM/RTN, Master File, OASIS, OMS, RTM, Settlements.</p> <p>* Note on MF – this year CAISO will issue two versions of the GRDT (Generator Resource Data Template) – one required in the Summer Release and one in the Fall Release – details to follow</p>

Summer 2021 – Summer 2021 Readiness

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Mar 25, 2021	
External BRS	Post Draft External BRS	Feb 26, 2021	✓
	Post External BRS v1.0	Mar 15, 2021	
Config Guides	Post Draft Config Guides	Apr 05, 2021	
Tech Spec	Publish Technical Specifications	Apr 05, 2021	
Tariff	FERC Filing	Apr 01, 2021	
BPMs	Post Draft BPM changes	Apr 20, 2021	
External Training	Deliver External Training	Apr 21, 2021	
Market Sim	Market Sim Window	Apr 26, 2021 - May 21, 2021	
Production Activation	Summer 2021 Readiness Initiative	Jun 01, 2021	

Summer 2021– Resource Adequacy (RA) Enhancements

Project Information	Details/Date
High Level Project Scope	<ul style="list-style-type: none"> • Capacity Procurement Mechanism (CPM - for local availability limitations) • RA Import rules • Operationalizing Storage • Portfolio Assessment – Phase 1 <ul style="list-style-type: none"> • CIRA payload modifications • Update tool for new analysis • Incorporate planned outage process into portfolio analysis • Unforced Capacity (UCAP) – Phase 1 <ul style="list-style-type: none"> • Set up systems to track resources' forced outage rates, supply cushion hours • Modifications to how OMS data is tracked and stored, alignment with RC definitions if not already aligned.
BPM Changes	Market Instruments, Reliability Requirements, Outage Management
Tariff Change	Yes
Impacted Systems	CIRA, OMS, SIBR, Master File, RTM/IFM

Summer 2021– Resource Adequacy (RA) Enhancements (cont'd)

System	High Level Changes
Customer Interface for Resource Adequacy (CIRA)	<p>Unforced Capacity Evaluations (System RA) UCAP Phase 1:</p> <ul style="list-style-type: none"> • Ability for Demand runs to calculate UCAP availability values • Outage data must be made readily available for end users • Calculate Supply cushion hours • Access to the daily RA data for calculation of the Supply Cushion hours excluding the Wind and Solar RA capacity. • Calculate the weighted average of the yearly historical Seasonal Average Availability Factor (SAAF) for the UCAP per resource (must maintain 5 years worth of historical data) • Calculate the class average rate for new resources that will be coming online • There will be a unique UCAP calculation methodology for the following resource types: Hybrid, DR, QF, Hydro, imports & storage resources (unique fuel types) • UCAP calculations for Hybrid resources will require the Dynamic Limit functionality from the Real Time Market. • UCAP calculations for Hydro resources will require 10 years worth of bidding data (currently there are 3 years). Will leverage UCAP tool (using template) to obtain 10 years of bidding data from LSEs. • UCAP calculations for DR & QF resources will require a metric to measure performance against dispatch instructions. • The system must calculate DR performance with respect to dispatch response (for the last 3 years). • UCAP calculations for imports will need an additional input if their transmission product is firm or non-firm (from source to sync) and if there was curtailment on the e-tag. Reason for needing if transmission product is firm or non-firm from source to sync will determine if curtailment derates the UCAP values. • For non dispatchable resources will have a different calculation methodology for UCAP (UCAP = NQC). Non dispatchable resources could be included in the future for the standard UCAP calculation. • Regarding Wind & Solar resources, UCAP values = NQC. • For calculating Supply cushion hours, hourly net load is needed for UCAP calculation & Contingency reserves. <p>RA Import Rules:</p> <ul style="list-style-type: none"> • Need to obtain transmission profile to showcase firm or non-firm transmission. • Allow Market participants to attest possible UI change. Need to determine how the attestation is viewed by Market Participants.
Outage Management System (OMS)	<p>Unforced Capacity Evaluations (System RA) UCAP Phase 1:</p> <ul style="list-style-type: none"> • In order to calculate supply cushion hours, system must provide hourly outage impact per resource (This is currently performed at daily level). <p>Planned Outage Provisions:</p> <ul style="list-style-type: none"> • Addition of validation rules to automatically deny planned outages without substitution.
Integrated Forward Market (IFM)/ Real Time Markets (RTM)	<p>Operationalizing Storage:</p> <ul style="list-style-type: none"> • Creation of a new energy constraint that at the end of the time horizon has a state of charge. • DA schedule for next several hours should have guaranteed delivery. • If the resource has a DA discharge schedule and shown for resource adequacy then its requirement is set.

Summer 2021 – Resource Adequacy (RA) Enhancements (cont'd)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Mar 24, 2021	
External BRS	Post External BRS v1.0 - Planned Outage Substitution	Feb 26, 2021	✓
	Post External BRS v2.0 - Operationalizing Storage	Mar 15, 2021	
Config Guides	Post Draft Config Guides	Apr 21, 2021	
Tech Spec	Publish Technical Specifications	Mar 30, 2021	
Tariff	File Tariff	Apr 01, 2021	
BPMs	Post Draft BPM changes	Apr 20, 2021	
External Training	External Training	Apr 22, 2021	
Market Sim	Market Sim Window	Apr 26, 2021 - May 21, 2021	
Production Activation	Resource Adequacy Enhancements Track 1	Jun 01, 2021	

Summer 2021 - FERC Order 831 - Pricing Parameters, Import Bid Screening, and Validation

Project Information	Details/Date
High Level Business Problem or Need	<ul style="list-style-type: none"> The CAISO submitted its proposed tariff changes to comply with FERC Order No. 831 in September 2019. In its proposed tariff changes, the CAISO did not submit a separate filing requesting authority to cost-verify or price screen import bids above \$1,000/MWh. However, the CAISO decided to further address this topic in this initiative because of the CAISO balancing authority area's increasing dependence on imports. In addition, a number of stakeholders objected to the CAISO's proposal in the compliance filing to continue to set the power balance constraint penalty price at the hard energy bid cap, which under Order No. 831 increases from \$1,000/MWh to \$2,000/MWh. This would result in market prices being set to \$2,000/MWh if the market has to relax the power balance constraint. Consequently, this initiative also addresses this topic
High Level Project Scope	<ul style="list-style-type: none"> The FERC 831 Import Bidding and Market Parameters project focuses on process and system modifications related to CAISO's Federal Energy Regulatory Commission (FERC) Order No. 831 compliance filing. In its compliance filing, CAISO revised the tariff to raise the energy bid cap from \$1,000/MWh to \$2,000/MWh. CAISO also revised the tariff to require suppliers within the CAISO balancing authority area (BAA), that submit energy bids above \$1,000/MWh, to base bids on verifiable actual or expected costs. The CAISO's associated policy initiative objective is to ensure all supply bids priced above \$1,000/MWh represent verified costs, when supply is needed to meet the ISO's load responsibility. The FERC 831 project addresses two topics related to the changes CAISO proposed: <ul style="list-style-type: none"> A price-screening methodology for import bids greater than \$1,000/MWh. The "penalty prices" at which CAISO markets will relax market constraints under the increased energy bid cap. <ul style="list-style-type: none"> A methodology to establish market constraint relaxation penalty prices under a \$2,000/MWh hard energy bid cap.
BPM Changes	Market Instruments, Market Operations, Definitions & Acronyms
Tariff Change	<p>Previously we filed for a Petition for Waiver to Extend Date of FERC Order No. 831 Compliance Filing</p> <p>On Feb 18 CAISO filed a Notice of Withdrawal – Petition of Limited Tariff Waiver – FERC Order No. 831</p> <p>On Feb 22 CAISO filed the tariff changes for import bidding rules and market pricing parameters to complement the Order No. 831 compliance</p>
Impacted Systems SIBR	<ul style="list-style-type: none"> Hard cap \$2000 (parameter change) The following is being delivered with CCDEBE functionality: <ul style="list-style-type: none"> Soft cap \$1000 Generators can bid up to their DEB if they bid above \$1000. Interties, Virtuals, and Load can all bid to \$2000 without any restrictions. Rule change: For an import bid of non-resource specific RA resource, the System shall limit the resource to the higher of the soft bid cap or the max import bid price. Rule change: When the maximum import bid price is greater than \$1000/MWh, or a cost verified resource bid is greater than \$1000/MWh, the System shall allow a non-resource specific non-RA import and virtual bids to bid up to the hard energy bid cap price.

Summer 2021 - FERC Order 831 - Pricing Parameters, Import Bid Screening, and Validation (cont'd)

System	High Level Changes
Impacted Systems IFM / RTM	<ul style="list-style-type: none"> DA and RT market applications receive maximum import bid prices calculated from ECIC. RT market applications receive EIM BAA-specific constraint relaxation thresholds from the master file. DA and RT markets define the high bid cap condition for a given hour as: maximum import bid price or cost-verified resource bid is greater than \$1000. DA market scales scheduling and pricing run constraint penalty prices to be consistent with a \$2000 bid cap when the high bid cap condition holds during any hour in time horizon. Otherwise, current scaling is used. RT market scales scheduling and pricing run constraint penalty prices to be consistent with a \$2000 bid cap when the high bid cap condition holds during any hour in the time horizon or held for the DA market. Otherwise, current scaling is used. When RT market uses constraint penalty prices scaled to be consistent with the \$2000 bid cap, and an EIM BAA has a power balance infeasibility less than or equal to its constraint relaxation threshold, the pricing run energy prices in that EIM BAA are set based on the highest-priced economic bid cleared in the scheduling run, but no lower than \$1000 when the infeasibility is positive.
Impacted Systems OASIS	<ul style="list-style-type: none"> Publish the Hourly Energy Price Shaping Factor for day-ahead and real-time markets. Publish the static constraint relaxation threshold value(s) for the CAISO BAA and each EIM BAA annually.

Milestone Type	Milestone Name	Dates	Status
External BRS	Milestone: Post External BRS	Dec 21, 2020	✓
	Revised BRS to synch with tariff filing and differentiate compliance scope from enhancements scope	Feb 8, 2021	✓
Tariff Filing	Petition to FERC for extension and requesting a decision by March 11	Jan 26, 2021	✓
	Notice of Withdrawal – Petition of Limited Tariff Waiver – FERC Order No. 831	Feb 18, 2021	✓
	Tariff changes for import bidding rules and market pricing parameters to complement the Order No. 831 compliance	Feb 22, 2021	✓
Production Activation	FERC Order 831 - Pricing Parameters, Import Bid Screening, and Validation	Jun 15, 2021	

2021 Independent

2021 - CIRA Enhancements

	CIRA Enhancements	MAP-Stage	Production
1	LSE IDs from Master File	Feb 24, 2021 ✓	Mar 4, 2021
2	CIRA Flex RA-Upload Screen & Flex Capacity Survey layer changes		
3	CIRA Acquired Resource (Phase 1)		
4	CIRA – Add SC Contact Info		
5	Publish NQC data to OASIS - this report will move from public website to a new report in OASIS (upcoming OASIS tech spec)		
6	Publish CPM to OASIS - this report will move from public website to a new report in OASIS (upcoming OASIS tech spec)		

- OASIS tech spec published **January 14** with TUG review **January 19**
- Training re: provisioning changes for the new CIRA LSE IDs were discussed during the AIM Enhancements training for UAAs **January 21**
- Customer training for these enhancements occurred **February 18**
- The enhancements will be available in MAP-Stage prior to Production
- For item 1, CIRA will cease to use the LSEID list in CIRA and will use the list in Masterfile and **this will require provisioning changes to prevent loss of access to CIRA**
 - ISO will contact impacted organization’s UAAs to reprovision to the new IDs to retain access to CIRA
 - ISO will validate that the organizations have been reprovisioned prior to go-live to prevent loss of access to CIRA
 - Please work with your UAA to Provision your LSEID for following roles:
 - EXTERNAL RA READ-ONLY
 - EXTERNAL RA READ-WRITE
 - The re-provisioning of the LSEID access to these roles are needed to retain access to see the data in several CIRA reports such as
 - RA Plan Upload/download
 - Generic Obligation Report
 - Flex Obligation Report

2021 - EIM Enhancements 2020: Inter-tie Multi-Stage

Project Info	Details/Date
Application Software Changes	<p>Scope: Support for modeling an Intertie Generating (TG) resource as an Intertie Multi-Stage Generator (TMSG) shall be added to allow for optimal coordination of the MSG schedule with its inter-temporal constraints between MSG configuration states that may have non-overlapping capacity ranges.</p> <p>IFM/RTN: support inter-tie Multi-Stage Generator (TMSG) resource model under the rules defined in MF.</p> <p>MF: support the modeling of the intertie generating resource as a multi-stage generator (TMSG)</p>
BPM Changes	<ul style="list-style-type: none"> Energy Imbalance Market
Tariff Changes	<ul style="list-style-type: none"> N/A

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Milestone: Post External BRS	Jun 19, 2020	✓
Tech Spec		N/A	
Tariff	File Tariff	N/A	
BPMs	Draft BPM changes - Market Instruments – PRR 1281	Aug 31, 2020	✓
External Training	Deliver External Training – coordinate via customer readiness EIM operations meeting		
Market Sim	Market Sim Window – unstructured	Feb 4 – Feb 18, 2021	✓
Production Activation	EIM Enhancements 2020 Phase 3	Mar 8, 2021	

2021 – Aliso Canyon Ph5

Project Info	Details/Date
Application Software Changes	<p>Scope: This project will consider enhancements to the existing Dynamic Competitive Path Assessment (DCPA) and Gas Nomogram capabilities currently in production.</p> <p>This enhancement includes the effect of gas nomogram that limit the supply counter flow in the calculation of the Residual Supply Index (RSI) within the existing DCPA methodology.</p> <p>IFM/RTN: Formulate and solve the linear programming problem for maximizing the Residual Supplier Index (RSI) for each binding constraint that DCPA is applied.</p> <p>SMDM: Enhance the User Interface to include “All Markets” when the user is defining “Market” within the Curtailment to Process section.</p> <p>SMDM: Creation of error message if the RT curtail type “incremental” or “absolute” are used and total curtailment is left null.</p>
BPM Changes	<ul style="list-style-type: none"> Managing Full Network Model Market Operations
Tariff Changes	<ul style="list-style-type: none"> N/A

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval - NO BOG Needed	N/A	
External BRS	Post External BRS	May 05, 2020	✓
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Publish Technical Specifications	N/A	
Tariff	File Tariff	N/A	
BPMs	Post Draft BPM changes	Jul 17, 2020	✓
External Training	Deliver External Training	N/A	
Market Sim	Market Sim Window	N/A	
Production Activation	Aliso Canyon Phase 5	April 2021	

Fall 2021 – Variable Operations & Maintenance Cost Review

Project Information	Details/Date
High Level Business Problem or Need	This project proposes to change the structure of how operations and maintenance (O&M) costs are estimated for use in the CAISO markets. This project is composed of three scope items
High Level Project Scope	<p>Scope 1: Defining the O&M cost components, including how to differentiate between fixed and variable O&M costs</p> <p>Scope 2: Redefining the VOM adder as only a variable operations (VO) adder</p> <p>Scope 3: Allow market participants to bid in <i>all</i> of their variable maintenance costs through a new default maintenance adder in lieu of the current MMA.</p>
BPM Changes	Market Instruments
Tariff Change	39.7.1.1.2
Impacted Systems	SIBR, Master File, Settlements

Fall 2021 – Variable Operations & Maintenance Cost Review (cont'd)

System	High Level Changes
Settlements	<u>Scope 1:</u> Potential charge code impacts due to RMR contracts. Policy is in the process of accessing these impacts and will have an update by the time of the Draft Final Proposal publication.
Scheduling Infrastructure Business Rules (SIBR)	<u>Scope 3:</u> SIBR will receive the Maintenance Adder (MA) from Master File. System must be enhanced to perform an automated calculation for a resource specific maintenance adder ($RSMA = \text{Default MA} * \text{Resource's Pmax}$), if the resource has elected for the default MA. If the resource has elected for a negotiated MA, the value can be used directly without the need to multiply with the Pmax. Potential performance impact due to the number of resources applying for default maintenance adder (10x as many hydro resources as today and 2x as many gas resources as today). SIBR rules will need to be updated to reflect the latest terminology: Major Maintenance Adder to new term "Default Maintenance Adder".
Master File	<p><u>Scope 2:</u> Default Variable Operations (VO) Adder and Maintenance Adder (MA) will be stored against the technology type. Two new data sets must be stored:</p> <ul style="list-style-type: none"> -Default VO Adder to Technology Type Mapping – new - Default MA to Technology type mapping – new <p>Two new flags will need to be added at the resource/configuration level:</p> <ul style="list-style-type: none"> ○ Default or Negotiated VO Adder (naming change: VO adder replaces the O&M adder) ○ Default or Negotiated Maintenance adder (new) <p>Two new columns to store the VO adder and MA adder at the resource/configuration level. Depending on whether the resource/configuration has selected default or negotiated, one of these values will be displaced in these new columns for both adders.</p> <p>The two new flags and the two new adder values must be visible within the Resource Data Template (RDT).</p> <p>The current database table that is based on technology type needs to be updated with the latest values outlined within the Revised Straw Proposal policy paper. Additional technology types may need to be added.</p> <p><u>Scope 3:</u> Only the final calculated default Maintenance Adder (MA) will be stored against the technology type (can either be in \$/run-hour or \$/start-up).</p>

2021 Fall Release

Fall 2021 Release - Overview

	BOG	BRS	Config Guide	Tech Spec	Mkt Sim Scenarios	Draft Tariff	Draft BPMs	Training	Market Sim	Production Activation
Fall 2021 Release		04/01/21	05/28/21	05/28/21	05/25/21	06/26/21	07/19/21	07/19/21	Jul 26, 2021 - Sep 3, 2021	10/01/21
ESDER Phase 4	9/30/20	02/03/21							Jul 26, 2021 - Sep 3, 2021	10/01/21
Flexible Ramping Product Refinements	9/30/20	01/28/21		N/A					Jul 26, 2021 - Sep 3, 2021	10/01/21
Hybrid Resources Phase 2	11/18/20	03/17/21		N/A					Jul 26, 2021 - Sep 3, 2021	10/01/21
Western EIM Sub-Entity Scheduling Coordinator Role	5/20/21								Jul 26, 2021 - Sep 3, 2021	10/01/21
EIM Enhancements 2021 – Phase 2	N/A	03/17/21		N/A					Jul 26, 2021 - Sep 3, 2021	10/01/21
EIM Base Schedule Submission Deadline - Phase 2	12/17/20	01/15/21							Jul 26, 2021 - Sep 3, 2021	10/01/21
Real-Time Settlement Review Phase 2	12/17/20	01/21/21		N/A					Jul 26, 2021 - Sep 3, 2021	10/01/21
Intertie Shadow Pricing Resolution		01/25/21							Jul 26, 2021 - Sep 3, 2021	10/01/21

Fall 2021 – Energy Storage and Distributed Energy Resources Phase 4

Project Information	Details/Date
<p>High Level Business Problem or Need</p>	<ul style="list-style-type: none"> Number and diversity of NGR energy storage resources continue to grow and represent an important part of the future grid. This initiative focuses on lowering barriers and enhancing the ability of these resources to participate in the CAISO's market.
<p>High Level Project Scope</p>	<p>For non-REM LESRs:</p> <ul style="list-style-type: none"> Allowing End-Of-Hour (EOH) State-of-charge (SOC) biddable parameter in RTM. Modification of Settlements RTM Bid Cost Recovery (BCR) to account for: <ul style="list-style-type: none"> EOH SOC Self-scheduling Enhanced Default Energy Bids (DEB) calculations for storage resources for DAM and RTM that take into account: <ul style="list-style-type: none"> Energy Costs Storage-Based Variable Costs (including Cell Degradation Cost [also called Cycling Cost]) Price-Based Opportunity Costs (applicable to RTM DEB but not DA DEB) Applying Market Power Mitigation (MPM). Note: Sufficiently small “Safe Harbor” resources that do not have market power will be exempted from bid mitigation in DAM and RTM. <p>For PDR, PDR-LSR curtailment and RDRR resources:</p> <ul style="list-style-type: none"> Considering Maximum Daily Run Time (MDRT) parameter.
<p>BPM Changes</p>	<p>Demand Response, Energy Imbalance Market, Market Instruments, Market Operations, Settlements and Billing</p>
<p>Tariff Change</p>	<p>Section 4, 11, 30, 31, 34, 39, Appendix A, Appendix B</p>
<p>Impacted Systems</p>	<p>ALFS, CMRI, IFM, MF, OASIS, RTM, Settlements, SIBR</p>

Fall 2021 – Energy Storage and Distributed Energy Resources Phase 4 (cont'd)

System	High Level Changes
<p>Integrated Forward Market (IFM)</p>	<ul style="list-style-type: none"> • Calculate DEB for all storage resources to account for: 1. Energy cost, 2. Variable cost, and 3. Opportunity cost • Energy cost (including accounting for round-trip efficiency) <ul style="list-style-type: none"> ○ Assume one cycle of charge/discharge per day. ○ Assume charging during least expensive continuous LMP prices. ○ Assume discharging during most expensive continuous LMP prices. ○ Account for round-trip efficiency. ○ For DA DEB: <ul style="list-style-type: none"> ➢ Use DA LMP from IFM-MPM pass. ○ For RTM DEB: <ul style="list-style-type: none"> ➢ Use actual binding DA LMP from same trade day IFM runs. • Applies to NGR LESR non-REM resources only. • For NGR LESR non-REM resources: <ul style="list-style-type: none"> ○ EOH SOC does not apply to DAM. ○ Apply MPM for the entire operating range (discharging and charging). ○ Note: Per MSC recommendations, a “Safe Harbor” designation for some NGR storage resources that are sufficiently small according to a TBD criteria, will be needed so that these resources can be exempted from bid mitigation. • For PDR, PDR-LSR curtailment and RDRR resources: <ul style="list-style-type: none"> ○ Add Max Daily Run Time (MDRT) as constraint in the optimization. Null shall be considered as no constraint. • Variable cost (including Cell degradation cost [also called Cycling Cost]) <ul style="list-style-type: none"> ○ Submitted by Resource SC via MF • Opportunity cost <ul style="list-style-type: none"> ○ For DA DEB: <ul style="list-style-type: none"> ➢ Calculated as the fourth highest hourly DA LMP price of the previous trade day IFM, scaled by the DA Bilateral hub index prices (DAB) between the two days. ➢ Note: This component may be removed in revised policy proposal per MSC recommendations. ○ For RTM DEB: <ul style="list-style-type: none"> ➢ Calculated as the fourth highest hourly DA LMP price of the same trade day IFM. • Calculated DEB will be daily value for each storage resource (one value DAM and another for RTM). • If Negotiated Rate Option is chosen, the NDEB shall follow existing process same as non-storage resources. • Note: Per MSC recommendations, a “Safe Harbor” designation for some NGR storage resources that are sufficiently small according to a TBD criteria, will be needed so that these resources can be exempted from bid mitigation, and consequently, no need to calculate DEB for them. • Applies to NGR LESR non-REM resources only.
<p>Automated Load Forecast System (ALFS)</p>	<ul style="list-style-type: none"> • Forecasting tools need to be tuned to reflect changes of the way NGR storage get dispatched.

Fall 2021 – Energy Storage and Distributed Energy Resources Phase 4 (cont'd)

System	High Level Changes
CAISO Market Results Interface (CMRI)	<ul style="list-style-type: none"> • Update Default Energy Bid Curve report to add new Default Bid Type for storage resources. • Applies to NGR LESR non-REM resources only.
Master File (MF)	<ul style="list-style-type: none"> • Define the following parameters for each NGR energy storage resource (LESR non-REM only) with an effective date: <ul style="list-style-type: none"> ○ Variable Cost (including Cycling Cost [also called Cell Degradation Cost]) ○ Mapping between NGR energy storage resources and bilateral hub index (ICE hub) Note: This functionality may be removed in revised policy proposal per MSC recommendations. ○ SC for each NGR storage resource may rank its resource DEB option as: <ul style="list-style-type: none"> ➢ Storage Resource option ➢ Variable Cost Option ➢ LMP Option ➢ Negotiated Rate Option ○ SC of NGR storage resource shall rank Storage Resource DEB option as first option in order to activate it. ○ If no rank is specified for a NGR storage resource, then the default rank will be <ol style="list-style-type: none"> 1) Variable Cost Option 2) Negotiated Rate Option 3) LMP Option ○ Note: Per MSC recommendations, a “Safe Harbor” designation for some NGR storage resources that are sufficiently small according to a TBD criteria, will be needed so that these resources can be exempted from bid mitigation, and consequently, no need to calculate DEB for them. • Define the following parameter for PDR, PDR-LSR curtailment and RDRR resources with an effective date: <ul style="list-style-type: none"> ○ Max Daily Run Time (MDRT) <ul style="list-style-type: none"> ➢ Valid data are integers from 1 to 23 hours. ➢ Represents maximum daily number of hours the resource can be committed and/or dispatched. ➢ Optional parameter (shall be NULL, if not entered). ➢ Applies to PDR, PDR-LSR curtailment, and RDRR resources only. ➢ Applies only to resources with minimum of 1 MW curtailment capability and with registered Pmax >= 1 MW. ➢ Follow similar submission/update process as Maximum Daily Energy parameter.

Fall 2021 – Energy Storage and Distributed Energy Resources Phase 4 (cont'd)

System	High Level Changes
Open Access Same Time Information System (OASIS)	<ul style="list-style-type: none"> • Publish masked hourly EOH SOC public bids for NGR energy storage resources on T+90 (90 days after the trade date). • Applies to NGR LESR non-REM resources only.
Real-Time Market (RTM)	<ul style="list-style-type: none"> • For NGR LESR non-REM resources: <ul style="list-style-type: none"> ○ Add hourly EOH SOC Min and Max as constraints in the optimization. ○ RTM shall dispatch resources economically or uneconomically to satisfy most restrictive constraints among EOH SOC constraints and registered and bid-in energy storage limits. ○ EOH SOC constraints shall take precedence over economic outcome of the optimization, including but not limited to energy bid curve and ancillary services bid. ○ Respecting ancillary services awards, schedules, and obligations take precedence over satisfying EOH SOC constraints. This also applies to awarded AS in lower markets. ○ EOH constraint shall apply to the last market interval of the hour (e.g. last 15-min for FMM [00:45-01:00] and last 5-min for RTD [00:55-01:00]). ○ When the RTD end of horizon is earlier than the last interval of the hour where EOH SOC exist: <ul style="list-style-type: none"> ➢ Align EOH SOC constraints between FMM and RTD, by adding implied End of Horizon SOC in RTD, using EOH SOC and the schedule MW from FMM. ○ ED or MD shall have higher priority than meeting EOH SOC constraints. ○ Apply LMPM to NGR energy storage resources for the entire operating range (discharging and charging). ○ Note: Per MSC recommendations, a “Safe Harbor” designation for some NGR storage resources that are sufficiently small according to a TBD criteria, will be needed so that these resources can be exempted from bid mitigation. • For PDR, PDR-LSR curtailment and RDRR resources: <ul style="list-style-type: none"> ○ Add Max Daily Run Time (MDRT) for DR resources as constraint in the optimization. Null shall be considered as no constraint.

Fall 2021 – Energy Storage and Distributed Energy Resources Phase 4 (cont'd)

System	High Level Changes
<p>Settlements</p>	<ul style="list-style-type: none"> • For accepted RTM EOH SOC bids in an hour: <ul style="list-style-type: none"> ◦ Disqualify the resource from receiving RTM Bid Cost shortfall for that hour and the previous hour (flagged hours). • For RTM self-schedules in an hour: <ul style="list-style-type: none"> ◦ Disqualify the resource from receiving RTM Bid Cost shortfall for the previous hour (flagged hour). • The RTM bid cost/revenue shortfall assessment shall be evaluated at each 5-minute interval of the flagged hours. <ul style="list-style-type: none"> ◦ If energy bid cost is > than revenue (shortfall), <ul style="list-style-type: none"> ➢ this interval will be set to 0 in the daily BCR settlements; ◦ If energy bid cost is <= revenue (surplus), <ul style="list-style-type: none"> ➢ there will be no change in this interval. • Existence of ED/MD instruction shall nullify the new BCR rules similar to how ED/MD instruction nullify existing RTM BCR rules for self-schedules resources. • RTM BCR rules applies to charging and discharging. • Business will verify that no rule changes to Metering Energy Adjustment Factors (MEAF). • There is no change to the AS award components of the RTM BCR settlement due EOH constraint or self-schedules. • There is no change to the DAM BCR settlement due EOH constraint or self-schedules. • No impact for: Exemption of variable output DRs that bids their <u>true</u> availability from RAAIM, similar to wind and solar is also be tied to ELCC approach adoption by the CPUC and implementation of DAME and RAE initiatives. • Applies to NGR LESR non-REM resources only.
<p>Scheduling Infrastructure and Business Rules (SIBR)</p>	<ul style="list-style-type: none"> • Add optional Min and Max End-Of-Hour (EOH) State Of Charge (SOC) as hourly biddable real-time parameters (in MWh) for NGRs. Note: Does not apply to DA bids. • Add validation for Min EOH SOC <= Max EOH SOC • Add validation for Min and Max EOH SOC to be within most restrictive of biddable Energy Storage Limits and MF registered Energy Storage Limits. • EOH SOC biddable parameters shall apply to NGR energy storage resources that have SOC management. • Do not send EOH SOC parameters to STUC in advisory payloads. • Applies to NGR LESR non-REM resources only. • Note: NGR energy storage resources shall not submit EOH SOC below Must Offer Obligation (MOO) or use it to withhold additional RA capacity that is not scheduled in IFM or RUC. <ul style="list-style-type: none"> ◦ This is market monitoring task rather than a SIBR enforced rule. Need to align with RA Enhancements initiative project.

Fall 2021 – Flexible Ramping Product Refinements

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)
Tariff Change	Yes
Impacted Systems	<p>Real Time Markets (RTM)</p> <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. <p>Settlements</p> <ul style="list-style-type: none"> • Prices are nodal therefore mechanics for cost allocation pricing to be changed • Nodal FRP prices <p>CAISO Market Results Interface (CMRI)/ Open Access Same time Information (OASIS)</p> <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 2021 – Hybrid Resources Phase 2

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 project participation (hybrid and co-located resources) in the ISO markets.
High Level Project Scope	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.
BPM Changes	Direct Telemetry, Market Instruments, Market Operations, Metering, Settlements and Billing
Tariff Change	Section 39, Appendix Q
Impacted Systems	ALFS, CMRI, Reporting, IFM/RTM, MF, OASIS, RIMS, Settlements, MRI-S Metering, SIBR

Fall 2021 – Hybrid Resources Phase 2 (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"> • Potential: 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 • Include dispatchable generation calculation in RTD and RTPD for co-located resources • 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 • HSL needs to be integrated with the persistent methodology for co-located resources: Validation rules must be developed for the HSL • Validate the dynamic operating limits • 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 data submitted to SIBR • For co-located resources and hybrids, add new user interfaces • Dynamic Limit functionality: <ul style="list-style-type: none"> • Display a hybrid resources upper limit and lower limit • Display VER availability • Display ambient derates • Provide the capability to submit energy-not-available thru the functionality

Fall 2021 – Hybrid Resources Phase 2 (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 Software that 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 2021 – Hybrid Resources Phase 2 (cont'd)

System	High Level Changes
Resource Interconnection Management System (RIMS)	<ul style="list-style-type: none"> • Enhance to identify Hybrid resources • RIMS will need to add a new Milestone type under App & Study > Project Summary > Status Report and Milestones: add Milestone Type "Co-located / Hybrid" • Under MPAl > General Info, below the drop box for additional fuel type, add "Co-located/Hybrid:" and add a drop down box with three choices – blank, "Co-located" and "Hybrid." App & Study will provide this information to MPAl when the project is pulled from App & Study. • Collect topographical map and Site Information for hybrid resources • Reference Tariff Appendix Q: Automation of existing manual processes for all renewable resources (resources ID or VER component) - Site Sheets and Topo Maps <ul style="list-style-type: none"> Impacts and Design Suggestions: <ul style="list-style-type: none"> ○ Automate the Site Sheets to automatically validate and review for accuracy by creating validation checks for the submitter. <ul style="list-style-type: none"> ➤ Allow the submitter to enter all of their information in a web form (one form for solar resources and one for wind resources). ➤ Incorporate validation check on information submitted to ensure all fields are entered correctly and match Appendix Q formatting (e.g., WGS84 coordinates, resource type filled out, address provided is a legitimate address). ➤ Add a web form check option to determine if primary met station equipment is LiDAR or not. ➤ Information entered into the system can be compiled into a site sheet (XLSX or PDF format), but the information can also be stored in a database for retrieval and query. ○ Automate Topo Maps validation checks. <ul style="list-style-type: none"> ➤ Require submitter to enter a list of coordinates for necessary elements on the topo map (project corners, met station location, and/or turbine locations) via a web form. The web form could then cross reference coordinates with the site sheet to confirm all information has been entered accurately and correctly. ➤ Require submitter to upload a digital copy (PDF) of their topo map. ➤ Require submitter to upload a picture of the physical site.

Fall 2021 – Western EIM Sub-Entity Scheduling Coordinator Role

Project Information	Details/Date
<p>High Level Project Scope</p>	<ul style="list-style-type: none"> • CAISO will send load settlements to each of its utility members instead of by EIM entity. New roles need to be created for non-participating load SC. • New role for EIM-only BAA. <ul style="list-style-type: none"> ➤ Network Model <ul style="list-style-type: none"> ❑ FNM expansion to include for PSCO EIM participating and non-participating resources. ❑ Included into market network model. ➤ Delineation of LSEs <ul style="list-style-type: none"> ❑ Consumption of market input data that are provided by each utility member. ❑ Provision of detailed market results to EIM entity. ➤ Load Forecast <ul style="list-style-type: none"> ❑ Creation of multiple LAPs for EIM entity. ❑ Consumption of Demand Forecast that are provided by each utility member for each LAP area that is not using CAISO demand forecast. ❑ Expansion of CAISO Demand Forecast to include utility member LAPs that are using CAISO demand forecast. ➤ Scheduling <ul style="list-style-type: none"> ❑ Each utility member will be represented by its own participating resources' SC. ❑ Consumption of Base Schedule from each participating resources' SC into BSAP. ❑ Consumption of Base Schedule from non-participating resources via EIM Entity SC into BSAP. ❑ Consumption of bids from each participating resource SC into SIBR. ➤ Balancing and Resource Sufficiency Tests <ul style="list-style-type: none"> ❑ Performing aggregated demand forecast. ❑ Balancing at EIM Entity BAA level. ❑ Conducting Resource Sufficiency Test at EIM Entity BAA level. ➤ Metering <ul style="list-style-type: none"> ❑ Consumption of meter data from participating resource SCs as well as SCs for non-participating loads. ➤ System Interface <ul style="list-style-type: none"> ❑ EIM Entity SC is responsible for all system interfaces. ➤ Settlements <ul style="list-style-type: none"> ❑ Generation of Settlements statements and invoices to participating resources SCs. ❑ Provision of other settlements data that are attributable by sub-area (offsets, UFE, BCR) and assign them to EIM entity for sub-allocation to individual sub-BAAs based on Open Access Transmission Tariff (OATT). The latter will be performed by the PSCO EIM Entity. ❑ Generation of statements and invoices (e.g. uplift charges) to EIM Entity SCs and non-participating load SCs. ❑ Access to Load settlement statements/invoices information shall be granted to parent EIM Entity SC.

Fall 2021 – Western EIM Sub-Entity Scheduling Coordinator Role

Project Information	Details/Date
BPM Changes	Energy Imbalance Market (EIM), Market Instruments, Outage Management
Tariff Change	No
Impacted Systems	ALFS, CMRI, Master File, RC-BSAP, RIMS, WebOMS

Fall 2021 – Western EIM Sub-Entity Scheduling Coordinator Role (cont'd)

System	High Level Changes
Automated Load Forecast System (ALFS)	<ul style="list-style-type: none"> • Provide forecast for 4 load forecast zones: • Sum the total load. • Consumption of Demand Forecast that are provided by each utility member for each LAP area that is not using CAISO demand forecast. • Expansion of CAISO Demand Forecast to include utility member LAPs that are using CAISO demand forecast. • Stop consumption of hourly load forecasts for each load forecast area for D+1 and further out from SPP RC. • Consumption of hourly load forecasts for each load forecast area for D+1, D+2, D+3, D+4 from EIM entity. • Stop consumption of hourly load forecasts for each load forecast area for real-time from SPP RC. • Consumption of hourly load forecasts for each load forecast area for real-time from EIM entity. • Publish the submitted DA forecast in DayAheadLoadforecast for DACA. (existing functionality). • data available for the ALFS forecast engine: <ul style="list-style-type: none"> • Historical meter data. • Weather zone and weather station data. • EIM provides historic load for each of the 4 load forecast areas. • CAISO ALFS will train the forecast each of the 4 load forecast areas. • Model market implementation of as its own EIM BAA, ELAP, and include CLAPs for LSEs. • Include load in EIM system load. • Publish CAISO total and 4 individual load forecasts to downstream systems. (existing functionality) • Evaluate performance and data storage.
CAISO Market Results Interface (CMRI)	<p>Potential System Impact:</p> <ul style="list-style-type: none"> • EIM to Load Base Schedule report (accessed by EIM Entity SC, and Non- Participating Resource SC): <ul style="list-style-type: none"> • Will show multiple registered loads for EIM BAA, showing multiple loads per BAA. • Applies to non-participating load SCs for their specific load resources.
Master File (MF)	<ul style="list-style-type: none"> • System Impact: <ul style="list-style-type: none"> • Define 4 non-participating load SCs to represent each utility member. • Define mapping between EIM Entity SC and the non-participating load SCs.
Reliability Coordinator Base Schedule Aggregation Portal (RC-BSAP)	<ul style="list-style-type: none"> • System Impact: • Stop consumption of base schedules for D+1 and further from SPP RC. • Stop consumption of base schedules for real-time and further from SPP RC.

Fall 2021 – Western EIM Sub-Entity Scheduling Coordinator Role (cont'd)

System	High Level Changes
Resource Interconnection Management System (RIMS)	<ul style="list-style-type: none"> • Impact regarding network model data submission. • EIM Entity submit model for all its members. • Current RIMS access is only available to PTO and RC participants and related entities (EIM only category) do not fit either of those categories. Accommodations shall be provided. • Share network model with SPP RC. • Same impact applies to TEP too.
Web Outage Management System (WebOMS)	<p>Potential System Impact:</p> <ul style="list-style-type: none"> • Stop consumption of EIM Entity SC resource outages from SPP RC. • EIM Entity (non-RC West entity) submits resource outages, broken down by ACL • Stop consumption of TOP transmission outages from SPP RC. • Each TOP (non-RC West entity) submits their transmission outages.

Fall 2021 – EIM Enhancements 2021 Phase 2

Project Information	Details/Date
High Level Business Problem or Need	To collectively address important issues identified by EIM market participants through Customer Inquiry, Dispute and Information system (CIDI) requests to improve the visibility, functions and features in Energy Imbalance Market (EIM).
High Level Project Scope	<ul style="list-style-type: none"> • Fix/Improve SVG One Lines operator display • Allow EIM resources to cycle its unit commitment when base schedules are submitted with three-part economic bids (with specific exceptions detailed) • BAAOP: Specify parameters for Shared ramping capability constraint. • CMRI: report T-7.5 initial schedule for Resource sufficiency test • BAAOP: Separate ETSR Base from ETSR detail display
BPM Changes	EIM, Market Instruments
Tariff Change	Section 29.4
Impacted Systems	RTM/BAAOP, RTM/Integration, CMRI, RTM/BAAOP

Fall 2021 – EIM Enhancements 2021 Phase 2 (cont'd)

System	High Level Changes
Master File (MF) CIDI: 226744 226745	<ul style="list-style-type: none"> • Define ITC, ETSR association with EIM entities SC • For the EIM entities that share the same path, if ETSR primary EIM entity SC authorize, <ul style="list-style-type: none"> ○ Associate the other EIM entity SC with ETSR resources. TBD: ETSR and mirror, static intertie resources • For the EIM entities that share the same path, if ITC owner primary EIM entity SC authorize <ul style="list-style-type: none"> ○ Associate the other EIM entity SC with ITC • TBD: define total ITC for the all ITCs associate of the path of EIM entities for total, instead of market sum up <ul style="list-style-type: none"> ○ Associate every ETSRs that use this path with total ITC ○ Associate Path operator EIM entity and other EIM entities with total ITC
Real-Time Market (RTM) /Balancing Authority Area Operations Portal (BAAOP) CIDI: 226744 226693	<ul style="list-style-type: none"> • Receive association ETSR/ITC with EIM entities • Allow the associated EIM entities to view the ITC and associated ETSR • Add New UI (TBD)ITC detail display in BAAOP, a table of all internal BAA ITCs and shared/global ITC's which should include the ITC name, import limit, export limit, net flow (cleared value). • Each ITC should have a sub-table displaying each resource included in the ITC with a calculation row with the sum of each data column for the market horizon for RTPD and RTD • TBD: monitor ATC Total ITC and associated ETSR • Ensure No impact on existing function • Remove ETSR BASE from ETSR details table • Build a new UI for ETSR base
Real-Time Market (RTM) /Balancing Authority Area Operations Portal (BAAOP) CIDI: 215444	<ul style="list-style-type: none"> • Within system data persistent during market run in all market display: displays Continue to show data on display until replaced with new data

Fall 2021 – EIM Enhancements 2021 Phase 2 (cont'd)

System	High Level Changes
Real-Time Market (RTM) /Real-Time Base Schedule (RTBS)	<ul style="list-style-type: none"> • Offline units with Base schedule • centralized activation/de-activation means of this functionality • System shall consider offline resources that are cycling as available for the balancing, bid range capacity, and flexible ramp sufficiency tests if capable for startup within the next hour. Same for shutdown
Real-Time Market (RTM)	<ul style="list-style-type: none"> • Shared ramping capability constraint • UI for EIM entity input parameters for ramp sharing • Use in the optimization for each resource based on BAA ramp share parameters
CAISO Market Results Interface (CMRI) CIDI: 226745	<ul style="list-style-type: none"> • Create ITC limit report • Receive association ITC with EIM entities • Allow the associated EIM entities to view the ITC limits report through ACL • Receive the ITC/TCOR/PTST limits from market • Create ITC limit report UI/API • Create TCOR limit report UI/API • TBD: Create PTST limit report UI/API
CAISO Market Results Interface (CMRI) For CIDI: 225772 226693	<p>Create reports on for each BS test at T-75, T-55, T-40, T-30</p> <ul style="list-style-type: none"> • Resource T-7.5 initial schedule for BS resource sufficiency (RS) test UI/API • Load forecast T-7.5 for RS test UI/API
Real-Time Market (RTM)/Real-Time Unit Commitment (RTUC) [(HASP, STUC, FMM)]	<ul style="list-style-type: none"> • Cycling resource with base schedule in Market • centralized activation/de-activation means of this functionality <ul style="list-style-type: none"> ○ Real-Time Markets shall have the capability to automatically start-up an offline resource that is cycling if it is economic to run. ○ Similarly, Real-Time Markets shall have the capability to automatically shut down an online resource that is cycling if is not economic to run. ○ Consider EIM resources with positive base schedules above minimum load and with three-part bids as cycling during the relevant trade hour (i.e. optimize its unit commitment on the basis of its bids), with the following exceptions: <ul style="list-style-type: none"> ○ Self-schedule exists ○ Ancillary service base schedule exists (except when non-spin for an offline resource capable of startup within 10-minutes) ○ Flexible ramp award exists (except when flex ramp up award for an offline resource capable of startup within 5-minutes) ○ Inter-temporal constraint (startup time, minimum up time, minimum down time, maximum daily starts) prevents cycling • Real-time market horizon has limitation, where resource startup time plus minimum up time exceeds 240 minutes • Cycling shall include both startup and shutdown unit commitment decisions on basis of three-part bids (economic energy bid, startup, minimum load) and applicable temporal constraints. • A positive base schedule from a resource without an energy bid shall still be treated as a self-schedule.

Fall 2021 – EIM Base Schedule Submission Deadline Phase 2

Project Information	Details/Date
High Level Business Problem or Need	Provide EIM Scheduling Coordinators with additional flexibility to submit more accurate base schedules closer to the operating hour. Allow CAISO and EIM Entities to more accurately capture the startup energy of large conventional resources within their Resource Sufficiency Evaluations (RSE), thus increasing their ability to pass the RSE while lowering their exposure to uninstructed imbalance energy settlement.
High Level Project Scope	Updates to the base schedule submission timeline <ul style="list-style-type: none"> • Move market closing for the final binding EIM base schedule submissions from T-40 to T-30, and add additional RSE at T-40 • Note: Base Schedule Validation outlined in the Policy paper will be covered in existing Market Validation processes so no additional manual or automated business process requirements are needed for Tariff compliance.
BPM Changes	EIM, MI, MO, Settlements
Tariff Change	No
Impacted Systems	RTM, Settlements, BSAP, RCBSAP, ITS, ADS, CMRI/OASIS

Fall 2021 – EIM Base Schedule Submission Deadline Phase 2 (cont'd)

System	High Level Changes
Real-Time Market (RTM)	<p>Phase 2:</p> <ul style="list-style-type: none"> • Shorten the run time of the current T-37.5 RTPD interval • Move start time to after T-30 • Result publication remains at T-22.5 • Final RSE will begin following T-30 deadline • Add additional RSE test
Base Schedule Aggregation Portal (BSAP)	<p>Phase 2:</p> <ul style="list-style-type: none"> • Send base schedule to market at T-30
Interchange Transaction Scheduler (ITS)	<p>Phase 2:</p> <ul style="list-style-type: none"> • ITS will need to adjust the timing of RTPD publication checks and adjustments to account for the RTPD change from T-37.5 RTPD to T-30 • RTPD 5 run will be decreased to around five and a half minutes • RTPD 5 run will be considered late at T-22.5 • RTPD 4 should start at T-21.5 • Payload times need to be adjusted
CAISO Market Results Interface (CMRI)	<p>Phase 2:</p> <ul style="list-style-type: none"> • Additional payload consumed at T-30 for test results • Receive results from RTPD 5 run by T-22.5

Fall 2021 – Real Time Settlements Review Phase 2

Project Information	Details/Date
High Level Project Scope	Clarify Tariff language that involves a market rule change that will allow an EIM entity not to settle Unaccounted for Energy (UFE) for each EIM entity.
BPM Changes	Settlements & Billing
Tariff Change	29.11 (q), (r), (c) (2), 11.8.6.3
Impacted Systems	Settlements, Master File, RTBS

System	High Level Changes
Settlements	<ul style="list-style-type: none"> Configuration settlement changes for UFE charge codes
Master File (MF)	<ul style="list-style-type: none"> Need to establish a base transfer system resources at a transfer location between EIM BAAs and the default the Settlement Flag = Y
Real Time Base Schedule (RTBS)	<ul style="list-style-type: none"> System shall receive the transmission loss percentage from Master File. <p>Note: This requirement moves the maintenance of this data set to Master File.</p>

Fall 2021 – Intertie Shadow Pricing Resolution

Project Information	Details/Date
High Level Business Opportunity	<p>What: Fix AS shadow price ambiguity in OASIS.</p> <p>When: It occurs at the Malin500 intertie 4-5 days per year.</p> <p>Why do we have this opportunity: The shadow price is appearing in OASIS, however it is not labelled as being for AS, and thus participants incorrectly assume it is for EA. This causes confusion when it does not match expected shadow prices.</p>
High Level Project Scope	<p>Add a feature to OASIS to indicate whether shadow prices are from ancillary services alone (AS) or Energy + Ancillary Services (EA)</p> <p>Use AS shadow price in calculating AS resource price</p>
BPM Changes	Market Instruments
Tariff Change	11.10.1.1.1, 11.10.1.2.1

System	High Level Changes
OASIS	<p>Existing OASIS shadow-price related reports to indicate whether the Intertie Transmission Constraint (ITC) or Intertie Scheduling Limit (ISL) Shadow Price was congested due to either (1) Energy and Ancillary Service [EA] or (2) Ancillary Service [AS] only for each market interval (suggested identifier attribute “Limit Type”).</p> <ul style="list-style-type: none"> • Market runs DA, RTPD, RTD = report: Intertie Constraint Shadow Prices • Market run real-time Contingency Dispatch = report: Contingency Dispatch Intertie Constraint Shadow Prices • Market runs DA, RTPD, RTD MPM process = report: MPM Intertie Constraint Shadow Prices <p>The report must publish the market output “Limit Type” result per interval, as well any post-market corrections.</p>
Settlements	<p>Settlements shall map to TIE CONGESTION component to define AS Imports Congestion Shadow Price in the import & export direction.</p> <ul style="list-style-type: none"> • For Regulation Up, Non-Spinning Reserve, and Spinning Reserve, the tie congestion component will reflect the shadow prices of EA and AS type in the import direction. • The direction drives the value that goes into the Upward AS • For Regulation Down, the tie congestion component will reflect the shadow prices of EA and AS types in the export direction. • The direction drives the value that goes into the Downward AS

2022 Spring Release

Spring 2022 – EIM integrations for Avista, BPA, Tacoma Power, Xcel Energy - Colorado, Tucson Electric Power

Project Info	Details/Date
Application Software Changes	Implementation of Avista, BPA, Tacoma Power, Xcel Energy - Colorado, and Tucson Electric Power as EIM Entities
BPM Changes	EIM BPM will be updated if needed to reflect new modeling scenarios identified during implementation and feedback from BANC Phase 2, TID, PNM, LADWP, and NWE.
Market Simulation	October 1, 2021 - February 3, 2022
Parallel Operations	February 2022 thru March 2022

Milestone Type	Milestone Name	Dates					Status
		Avista	BPA	Tacoma Power	Xcel Energy - Colorado	Tucson Electric Power	
Market Sim	Market Sim Window	10/1/21 - 11/30/21	10/1/21 - 11/30/21	10/4/21 - 12/3/21	12/1/21 - 1/26/21	12/1/20 - 1/31/21	
Parallel Operations	Parallel Operations	Feb 2020 thru Mar 2022					
Tariff	File Readiness Certification	Mar 2022					
Production	Activation	3/2/22	3/2/22	3/2/22	4/1/22	4/1/22	

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 independent 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
 - 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

February 2018						
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



WebCONF: Market Simulation
2:00pm - 3:00pm

Market Sim



WebCONF: Market Simulation
2:00pm - 3:00pm

Release Users Group (RUG)



WebCONF: Release User Group
10:00am - 11:00am

Upcoming meetings

The next MPPF is scheduled for June 2, 2021.

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.