



California ISO

Market Performance and Planning Forum

April 18, 2019

ISO PUBLIC

Objective: Enable dialogue on implementation planning and market performance issues

- Review key market performance topics
- Share updates to 2019 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



Market Performance and Planning Forum

Agenda – April 18, 2019

Time:	Topic:	Presenter:
10:00 – 10:05	Introduction, Agenda	James Bishara
10:05 – 10:30	Generator Contingency and Remedial Action Scheme Update	Gopakumar Gopinathan Jun Zhu
10:30 – 12:00	Market Performance and Quality Update	Market Analysis and Forecasting
12:00 – 1:00	Lunch	
1:00 – 2:00	Policy Update	Jill Powers Brad Cooper
2:00 – 3:00	Release Update	Adrian Chiosea



Update on Generator Contingency and Remedial Action Scheme Modeling (GCARM)

Operations Engineering Services

4/18/2019

GCARM Summary

- This initiative enhances the ISO market's security constrained economic dispatch (SCED) models to include the potential loss of individual generators and to model **Remedial Action Schemes (RAS)**
- Serves as a preventative to post-contingency overload
- Minimize manual intervention of market
- More accurate generation dispatch by introducing Frequency Response (FR) Flag to the generators

Default Active GCARM Contingencies Involving RAS Action in Market

Planned Activation: 6/1/2019

- SC1 SERRAN-VALLEY_1 500_GC
- SC1 ELDORD-LUGO_1 500_GC
- SD1 ECONTY-MIG 500_RENEW_GC
- SD1 IVALLY-ECONT 500_RENEW_GC
- SD1 IVALLY-OCTIL 500_RENEW_GC
- SD1 OCTIL-SNCRST 500_RENEW_GC

Default Inactive GCARM Contingencies Involving RAS Action in Market

Planned Activation: 6/1/2019

- SC1 BAILEY-PASTRA_1 230_GC
- SC1 PARDEE-PASTRA_1 230_GC
- SC2 DEVERS-VALLEY1+2 500_GC
- SD1 IVALLY 500|230 BK81_GC
- SD1 IVALLY 500|230 BK82_GC
- SD1 50004-50005 500_GDROP_GC
- SD1 50005-50004 500_GDROP_GC
- SD1 ECONT-MIGUEL 500_GDROP_GC
- SD1 50001-50005 500_GDROP_GC
- SD1 IVALLY-ECONT 500_GDROP_GC
- SD1 IVALLY-OCTIL 500_GDROP_GC
- SD1 OCTIL-SNCRST 500_GDROP_GC
- SD1 50003-50004 500_GDROP_GC
- SD1 SNCRST-SXCYN_1 230_GC
- SD1 SNCRST-SXCYN_2 230_GC
- SD1 MIGUEL 500|230 BK80_GC
- SD1 MIGUEL 500|230 BK81_GC

Default Active GCARM Contingencies Not Involving RAS Action in Market

Planned Activation: 6/1/2019

- PG1 SOBRNT-GRZ-CLR 115 1_GC
- PG1 COLEMN-CTTNWD 60_GC
- PG1 PALRMO-BOGUE 115_GC
- PG1 SANLOB-TEMBLR 115_GC
- PG1 WESTPK-COLMBS 115_GC
- PG1 TAFT-MARCPA 70_GC

Other GCARM Contingencies Not involving RAS Action in Market

- PG1 GYS5X6-CLOVDL 115_GC [Activated: 3/1/2019]
- Bus contingencies activated during the other bus outage which may disconnect load/generation

Nomogram Conversion to GCARM Contingency

7320_CP7_NG

7820_IV_Bk80_BK81_NG

7820_IV_Bk80_BK82_NG

7820_TL23040_IV_SPS_NG

7820_TL54_55_SNbyp_IVMLOUT_NG

MIGUEL_BKs_MXFLW_NG

South_of_SO_IV_NGILA_IVSXOUT_NG

South_of_SO_IV_NGILA_NG

South_of_SO_IV_NGILA_TL50001_NG

OMS IV-ML OUTAGE_NG

OMS IV-SX OUTAGE NG

7510-PAR-PAS-OOS_NG

7510-PAR-PAS-WAR-OOS_NG

7510-PAS-BAI-PAR-OOS_NG

7750 CP5_NG

7750 CP6_NG

7750_D-ECASCO_OOS_CP5_NG

7750_D-ECASCO_OOS_CP6_NG

7750_D-ECASCO_OOS_N1SV500_NG

7750_D-ECASCO_OOS_N2DV500_NG

7750_D-SBLR_OOS_CP5_NG

7750_D-SBLR_OOS_CP6_NG

7750_D-SBLR_OOS_N1SV500_NG

7750_D-SBLR_OOS_N2DV500_NG

7750_DV2_N1SV500_NG

7750_DV2_N2DV500_NG

7750_D-VISTA1_OOS_CP5_NG

7750_D-VISTA1_OOS_CP6_NG

7750_D-VISTA1_OOS_N1SV500_NG

7750_D-VISTA1_OOS_N2DV500_NG

7750_D-VISTA2_OOS_CP5_NG

7750_D-VISTA2_OOS_CP6_NG

7750_D-VISTA2_OOS_N1SV500_NG

7750_D-VISTA2_OOS_N1SV500_NG_CPY

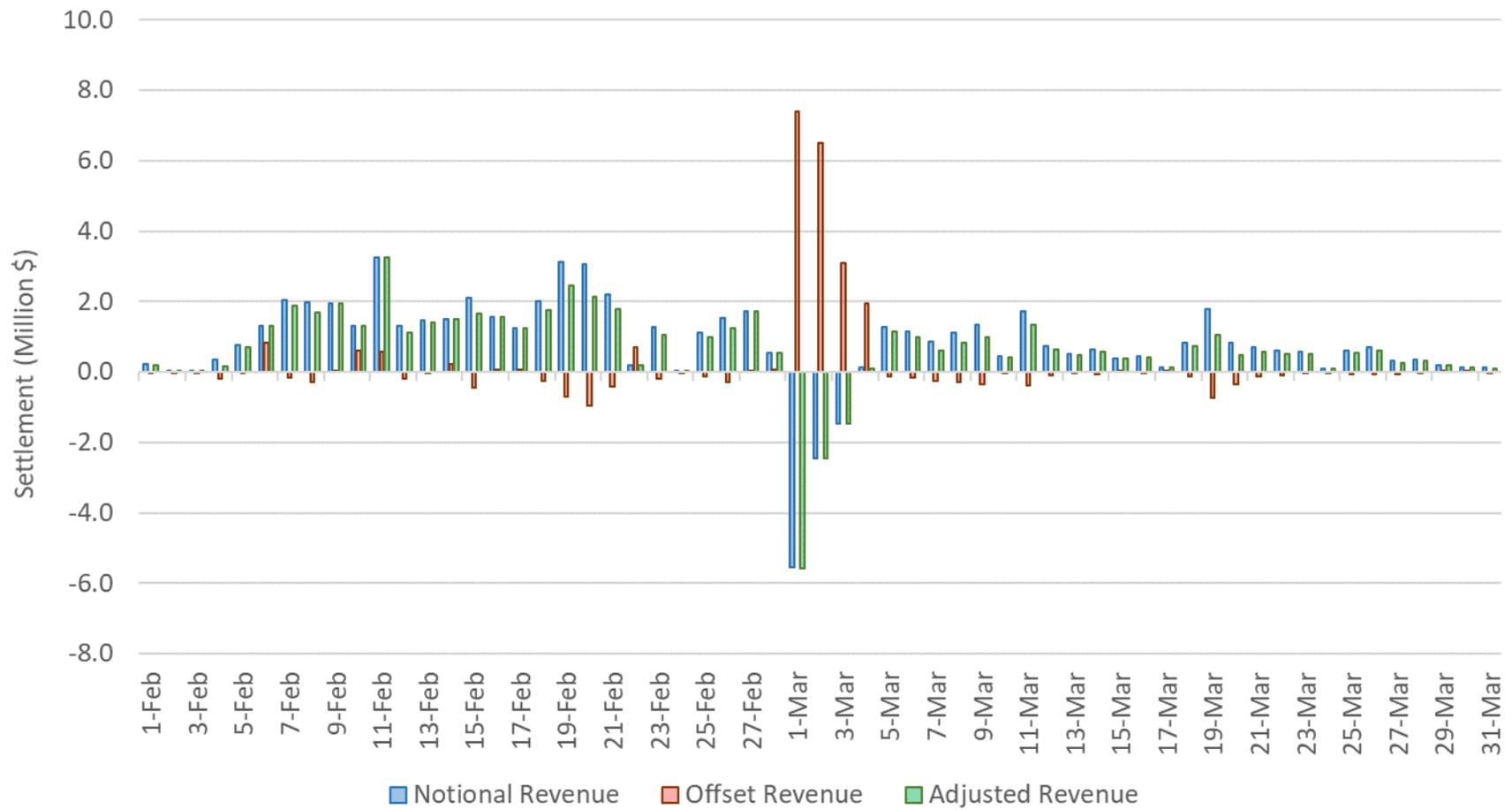
7750_D-VISTA2_OOS_N2DV500_NG

OP-6610_ELD-LUGO

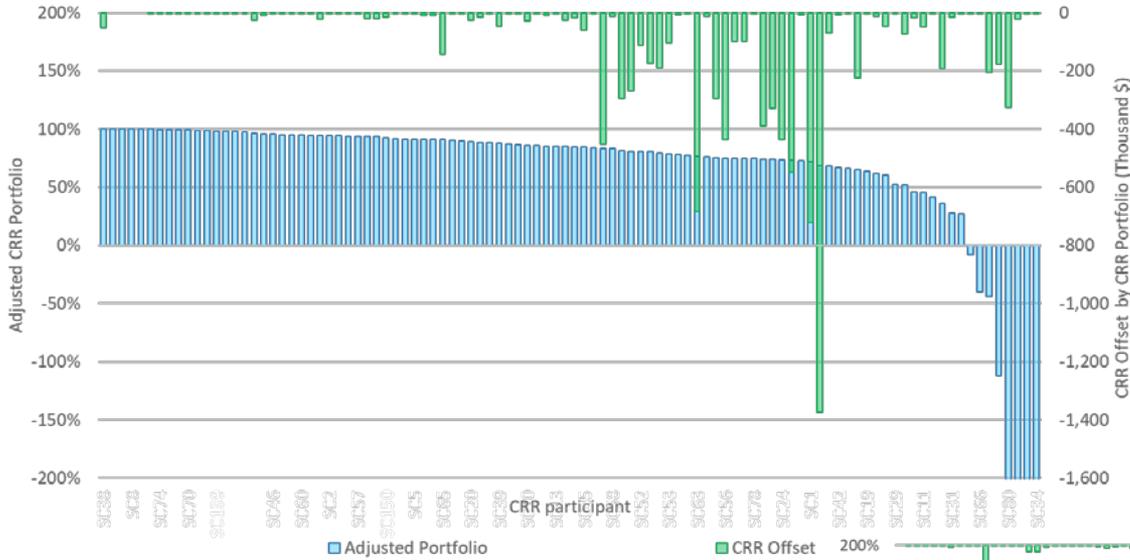
Market Performance and Quality Update

Market Analysis & Forecasting Department

Pro-rata funding logic for CRRs took effect in January 2019. First quarter of 2019 generally observed a CRR surplus



Based on its contribution to deficiency, each CRR portfolio saw accordingly a pro-rata adjustment

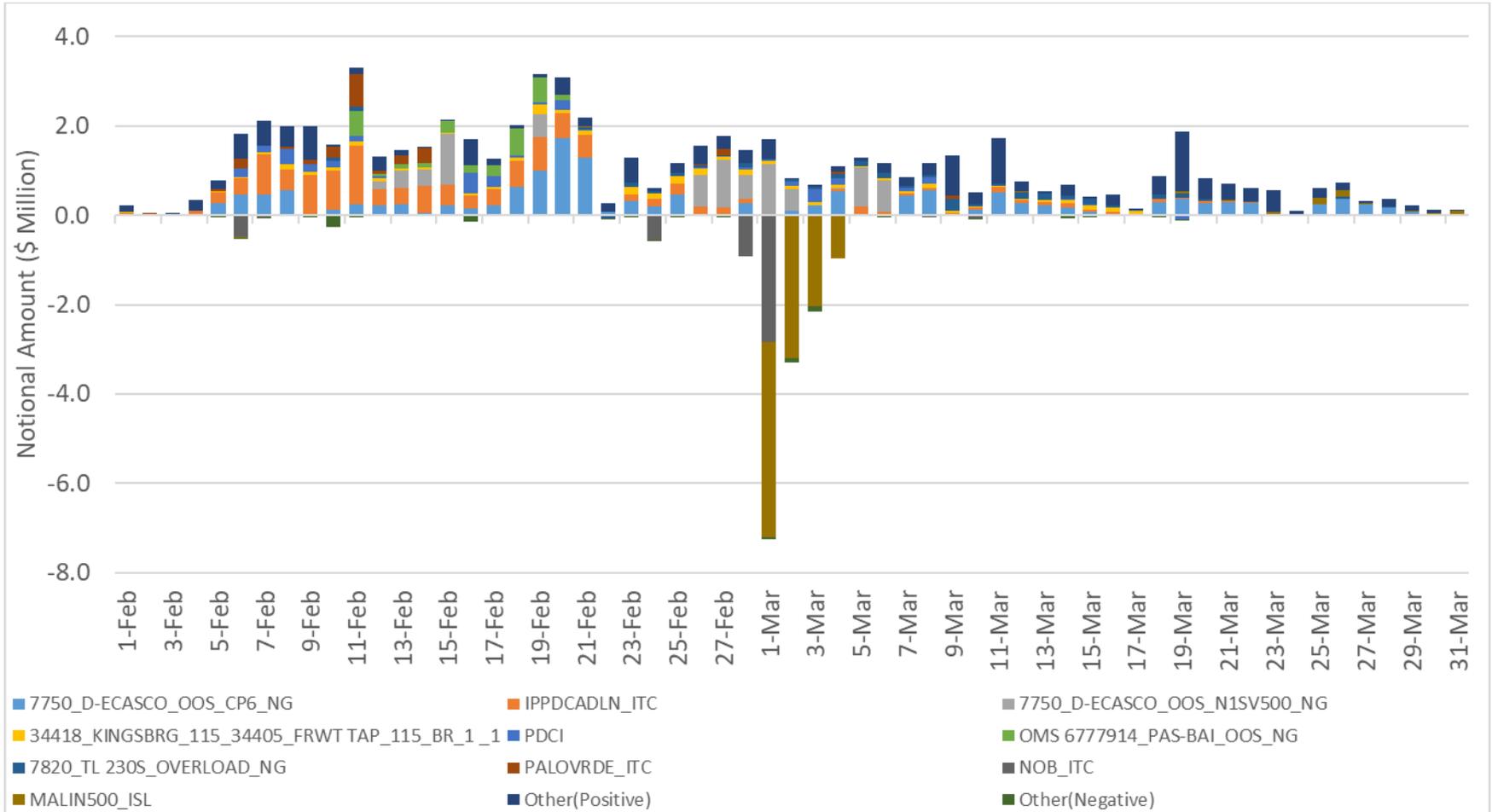


CRR portfolio adjustment for February

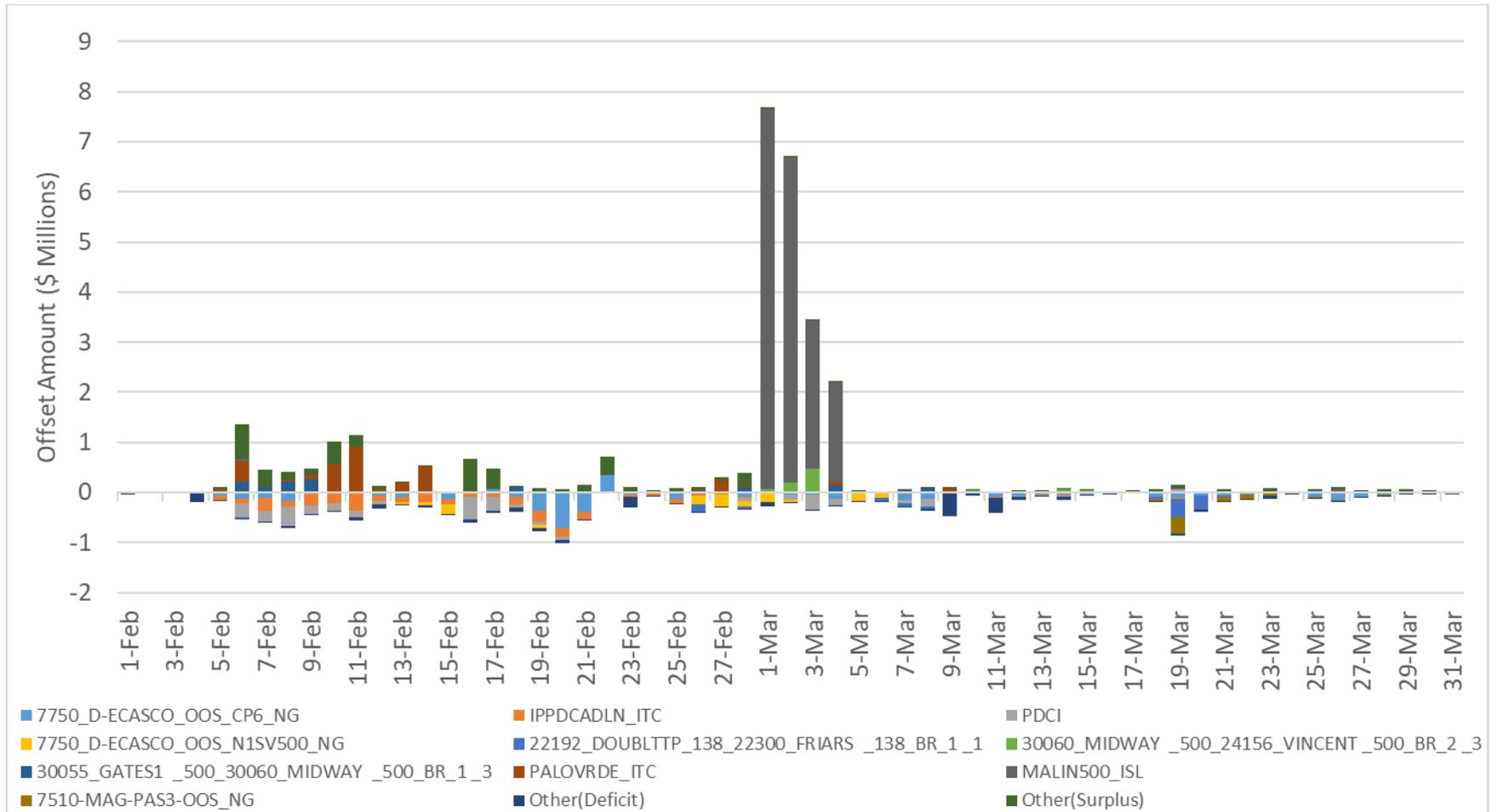
CRR portfolio adjustment for March



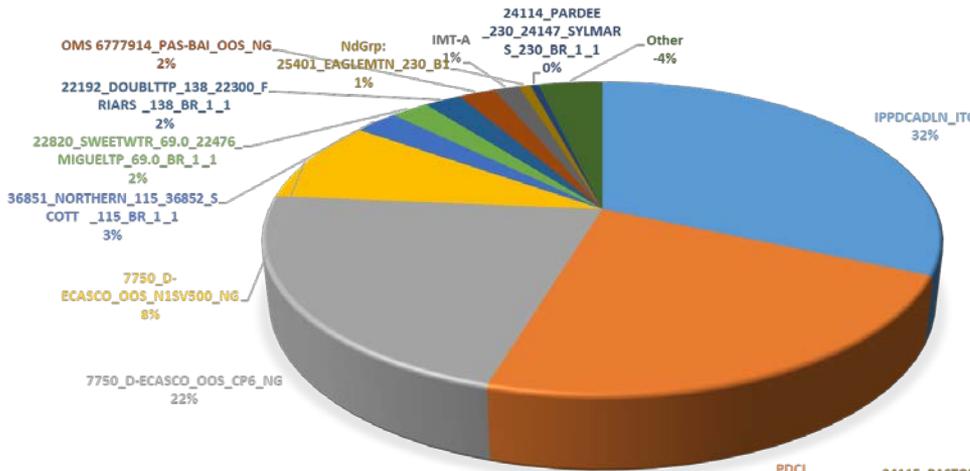
CRR notional value is now estimated for each transmission constraint



CRR deficits are tracked separately by constraint

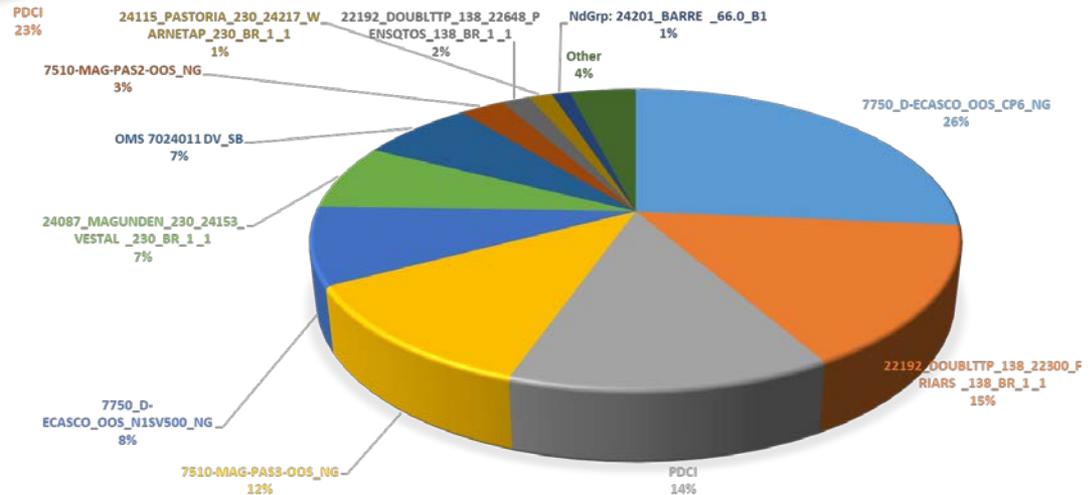


CRR deficit is pro-rata allocated by constraint to all impactful CRRs

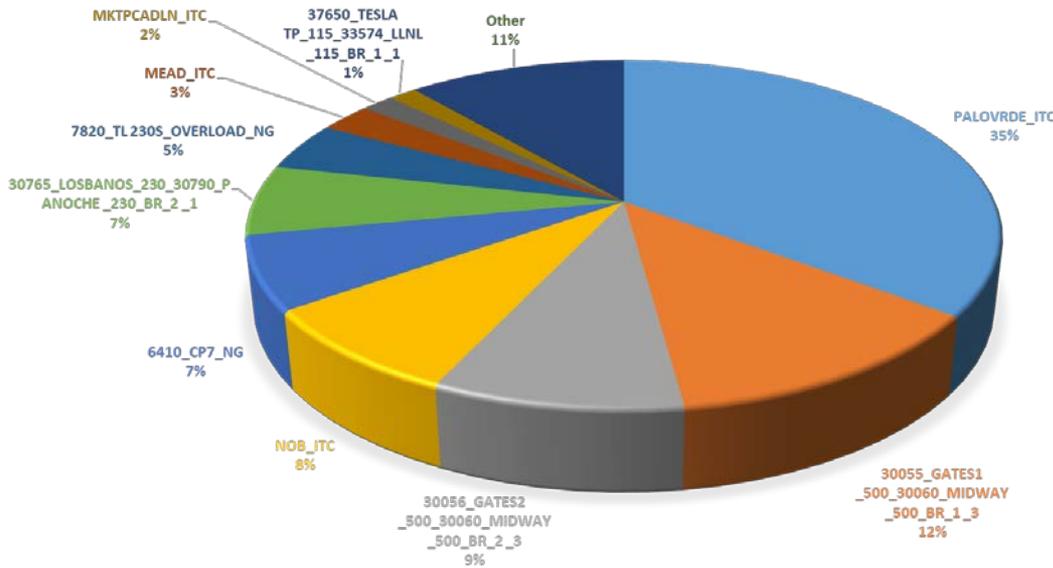


Monthly Deficit Amount for February was approximately \$10 million

Monthly Deficit Amount for March was approximately \$6 million

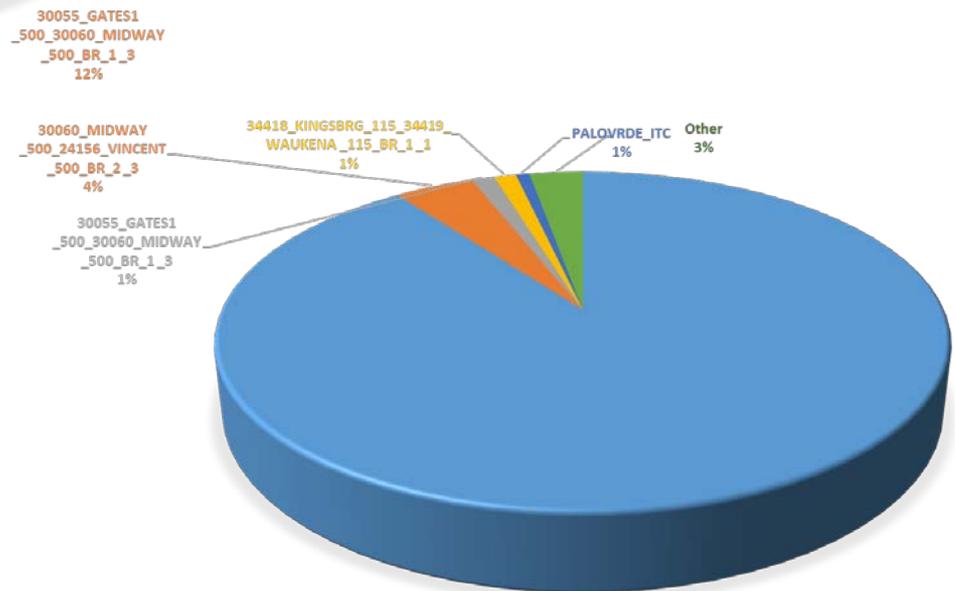


CRR surplus is allocated to measured demand

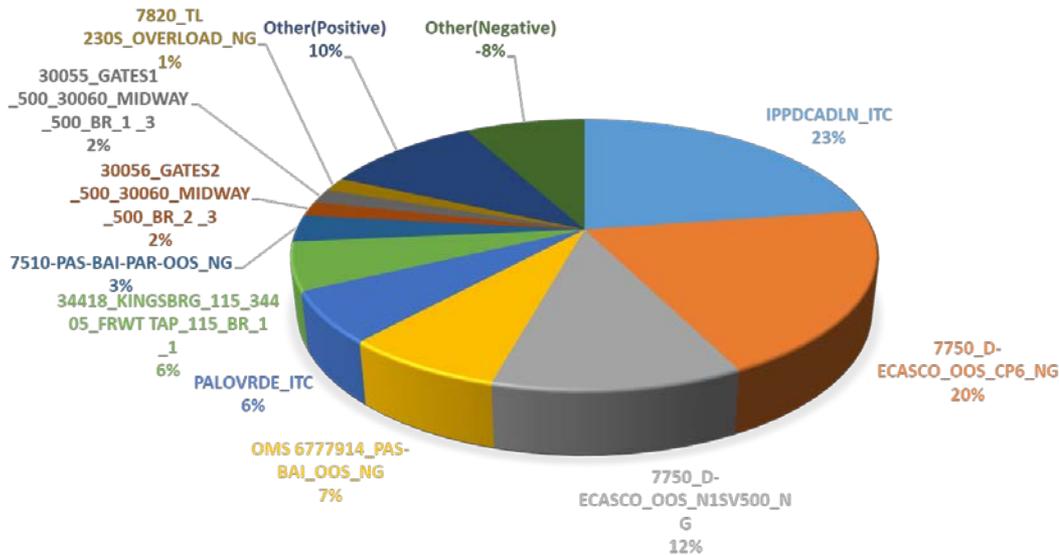


Monthly Surplus Amount for February was approximately \$8.8 million

Monthly Surplus Amount for March was approximately \$21.4 million

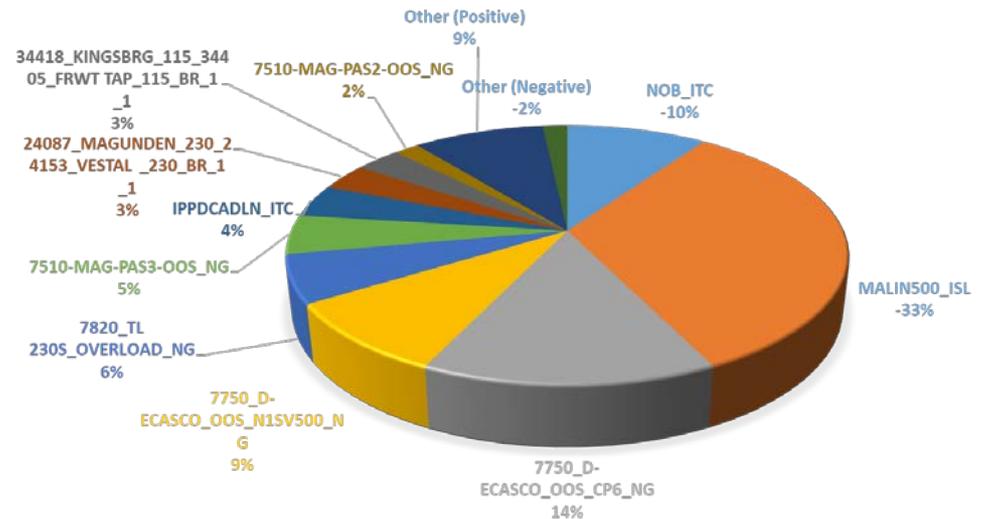


Total CRR payment after pro-rata adjustments



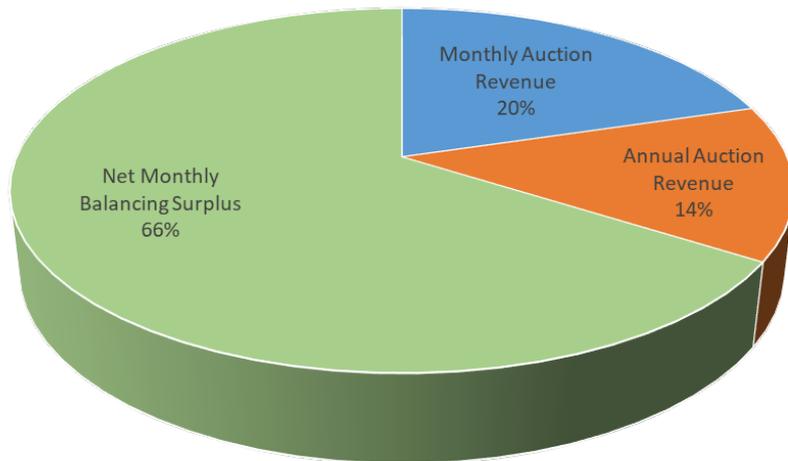
Total CRR Payment for February was approximately \$29.5 million

Total CRR Payment for March was approximately \$3.3 million

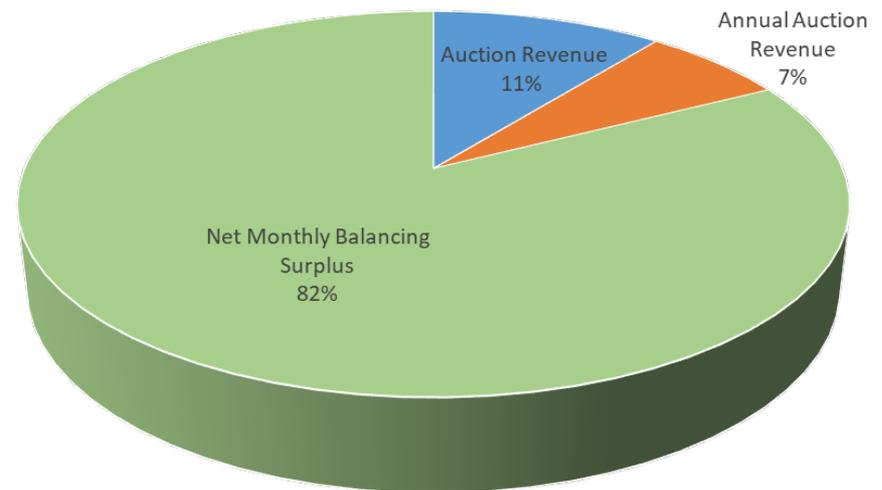


Total CRR surplus includes both auction revenues and surplus offset, and all of that is allocated to measured demand

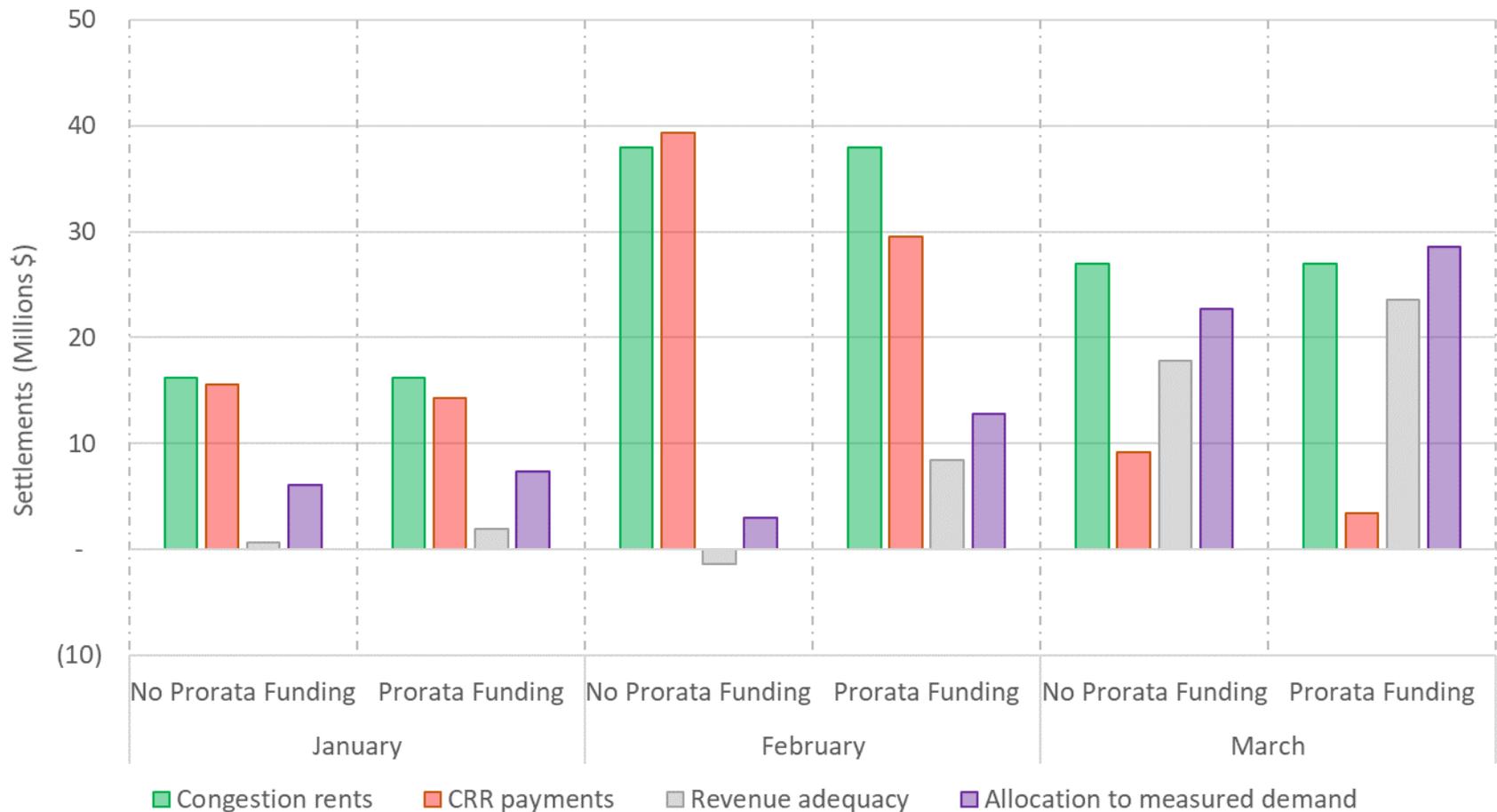
February - Total Balancing Account (~12million)



March - Total Balancing Account (~28million)



Total CRR surplus includes both auction revenues and balancing surpluses, and all of that is allocated to measured demand

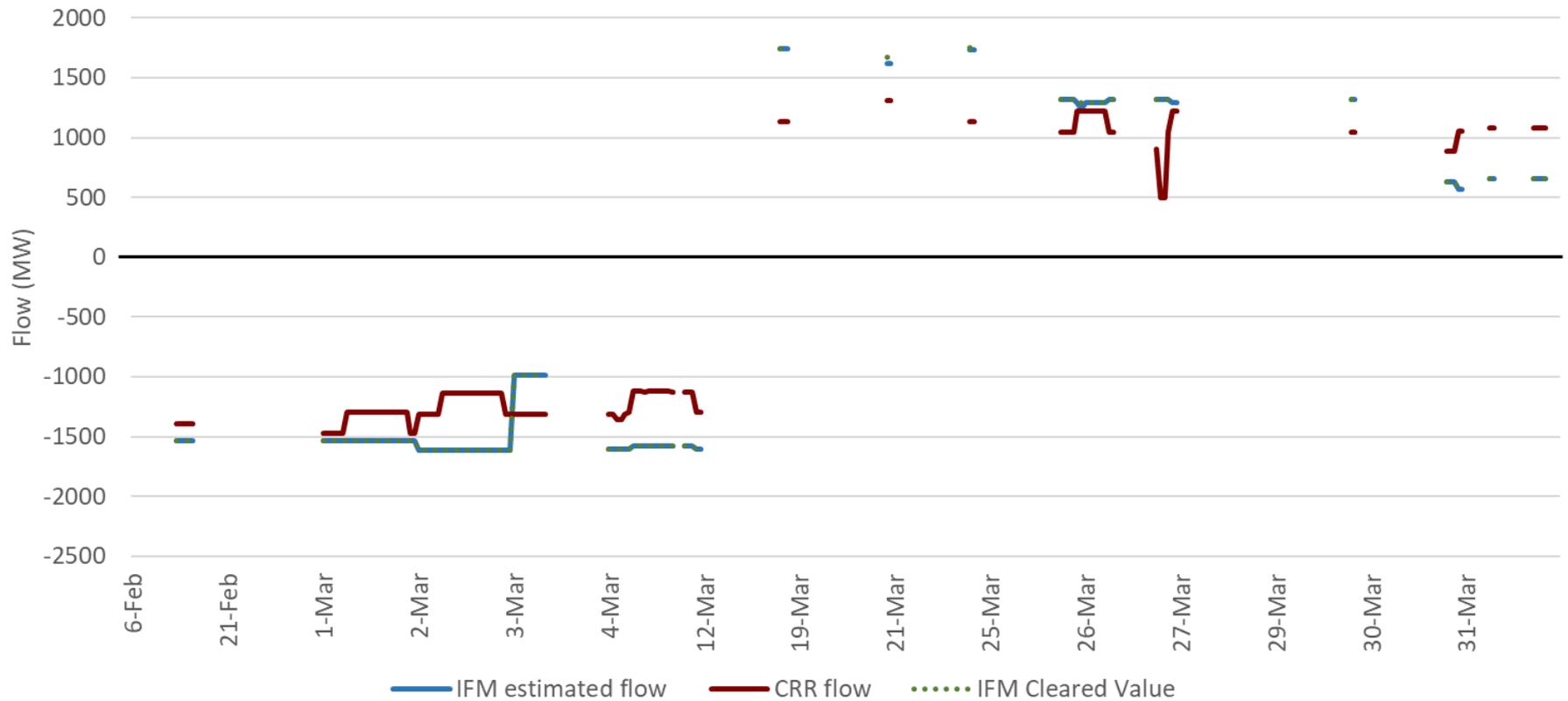


Higher surplus was observed in March as compared to January and February



MALIN500_ISL observed an export flow in early March and accrued a CRR surplus in the month

MALIN500_ISL - Compare Flows



Pro-rata funding implemented in 2019 at portfolio level shows no insights into impact on individual CRRs

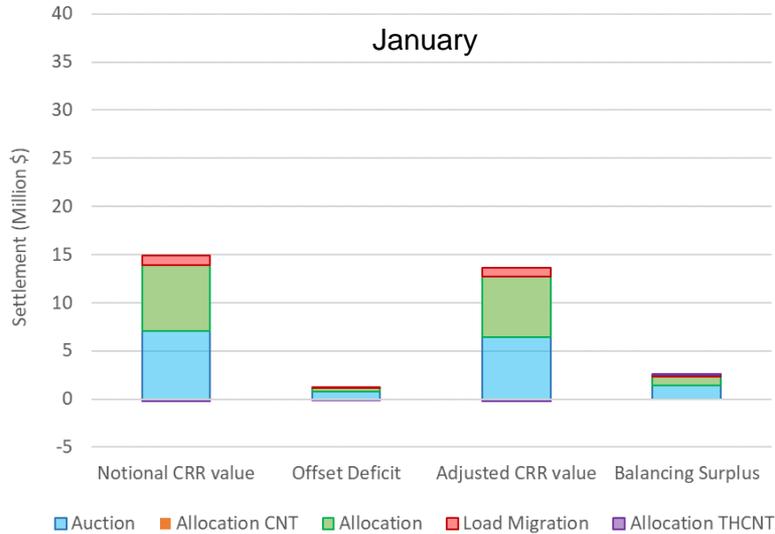
- There may be multiple ways to disaggregate the CRR deficit from the portfolio level to the individual CRR
- Depending on what logic is used, different estimates and thus conclusions can be attained regarding the effectiveness of the pro-rata funding on the auction efficiency
- The disaggregation at CRR level implemented by the CAISO only for analysis purposes follows the same principle of the pro-rata funding applied at the portfolio level
- This logic is only for purposes of analyzing performance and has no impact on the actual settlements of CRRs, which continue to be at the portfolio level

Pro-rata funding implemented in 2019 at portfolio level shows no insights into impact on individual CRRs

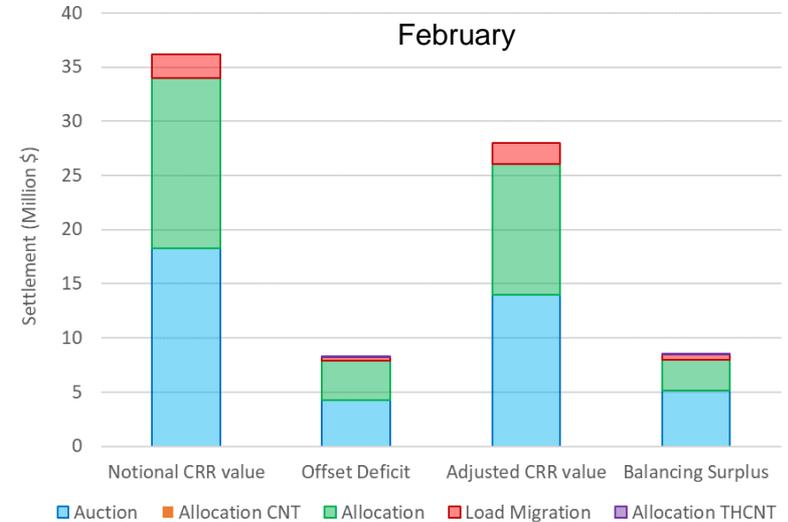
- Implementing a logic to disaggregate deficits from portfolio level to each individual CRR requires data at the granular CRR level, which is the underlying data used to settle CRRs under new policy
- CAISO's estimates provided in subsequent slides are estimates using intermediate and more granular data.
- Through this analysis CAISO has identified some data quality items at the granular level which are currently being addressed
- These estimates are not settlement-quality and will be subject to changes as more data becomes available

CRR payments have been evenly distributed between Allocation and Auction CRRs

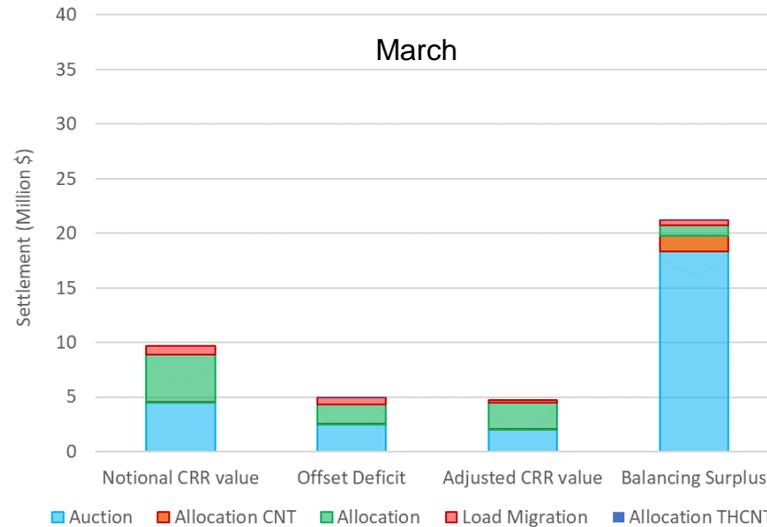
January



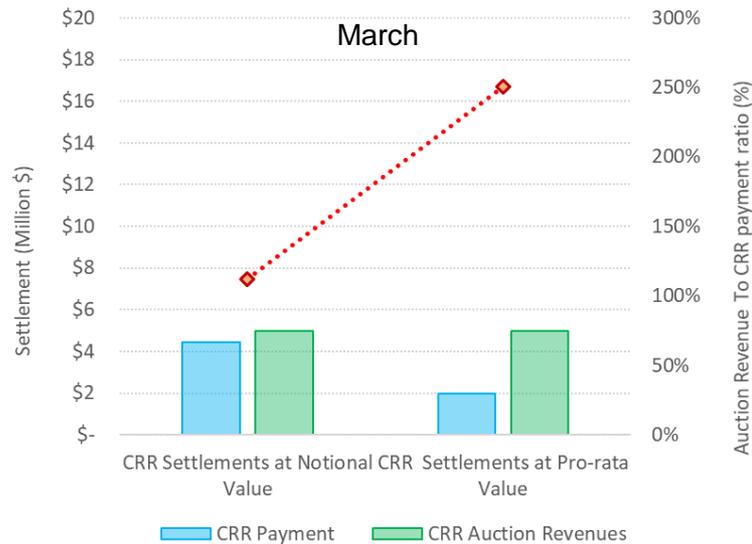
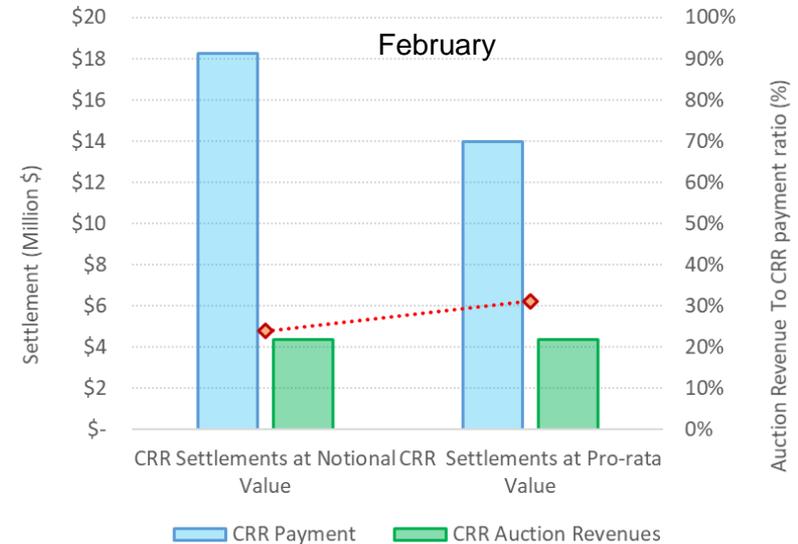
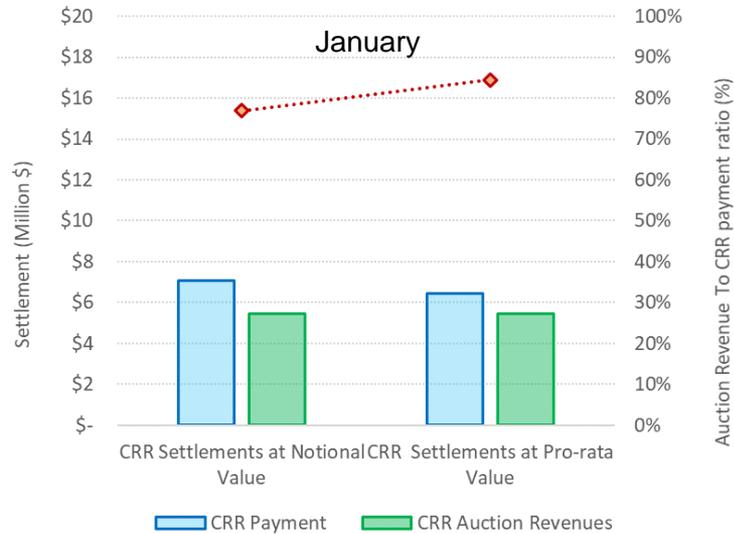
February



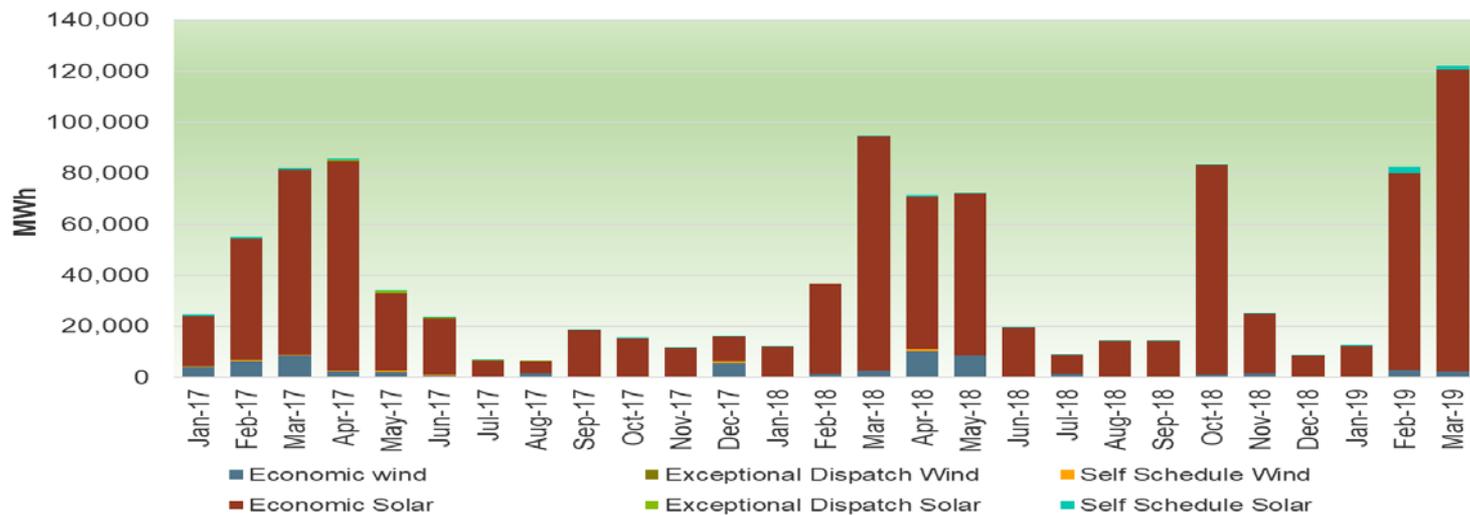
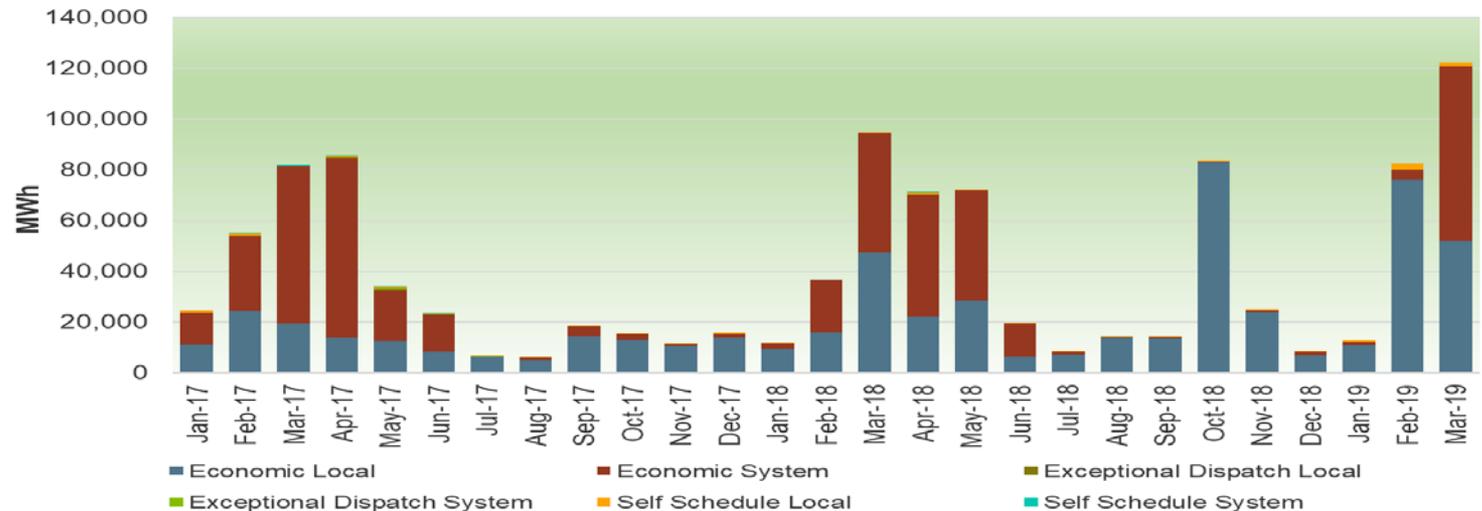
March



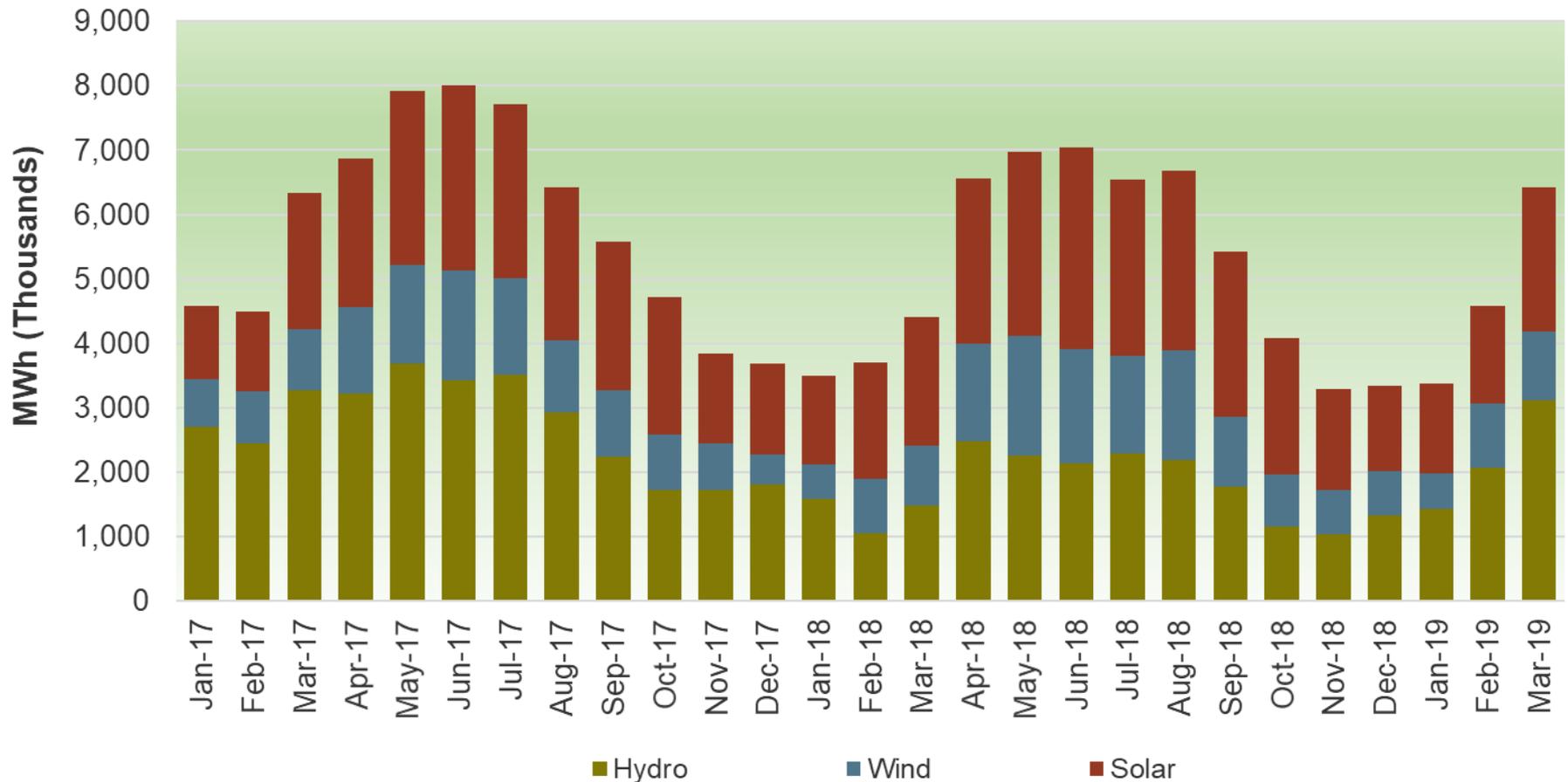
Auction Revenue shortfall decreased with the consideration of the deficit offset



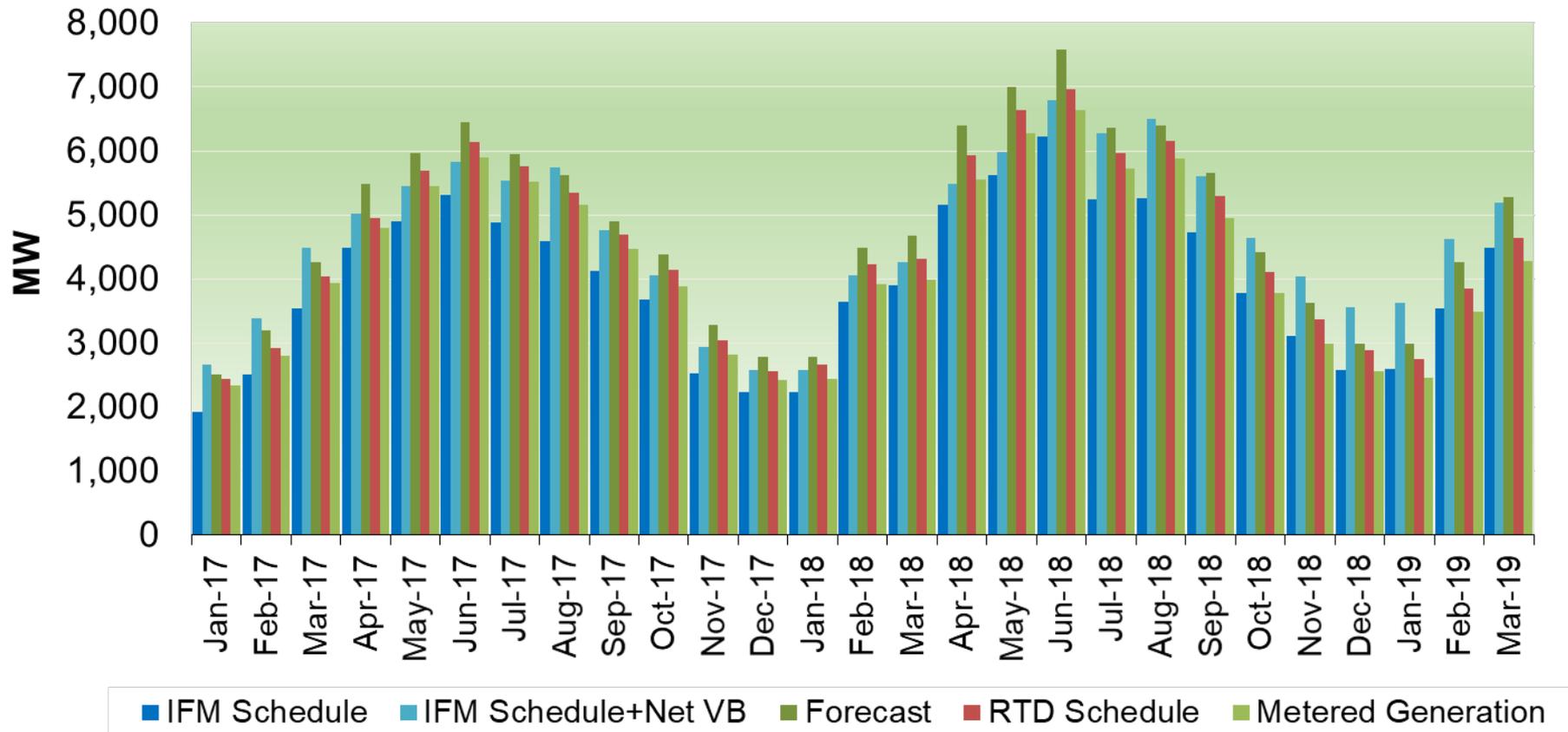
RTD renewable (VERs) curtailment increased in February and March



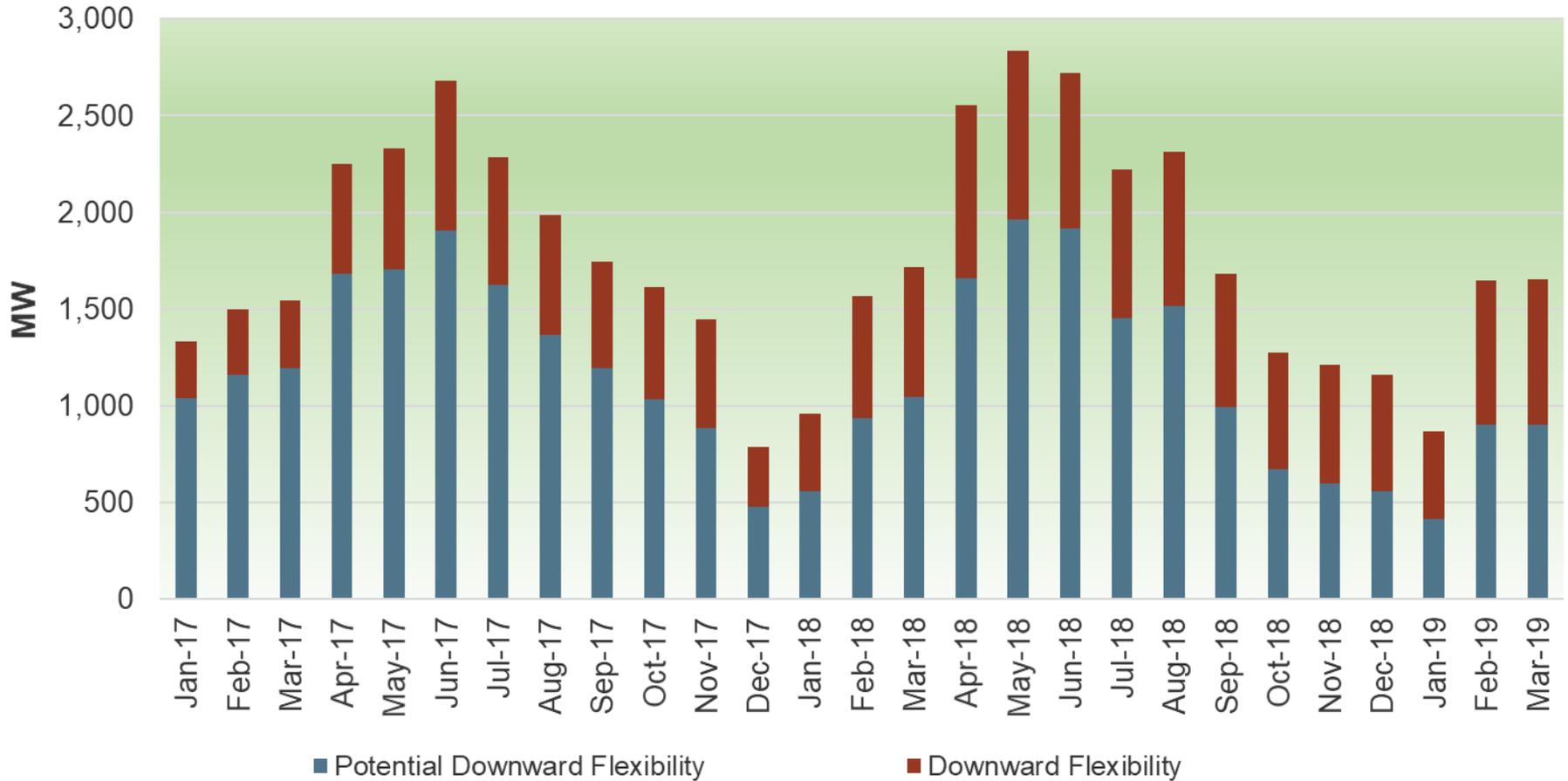
Hydro production higher than previous year in February and March



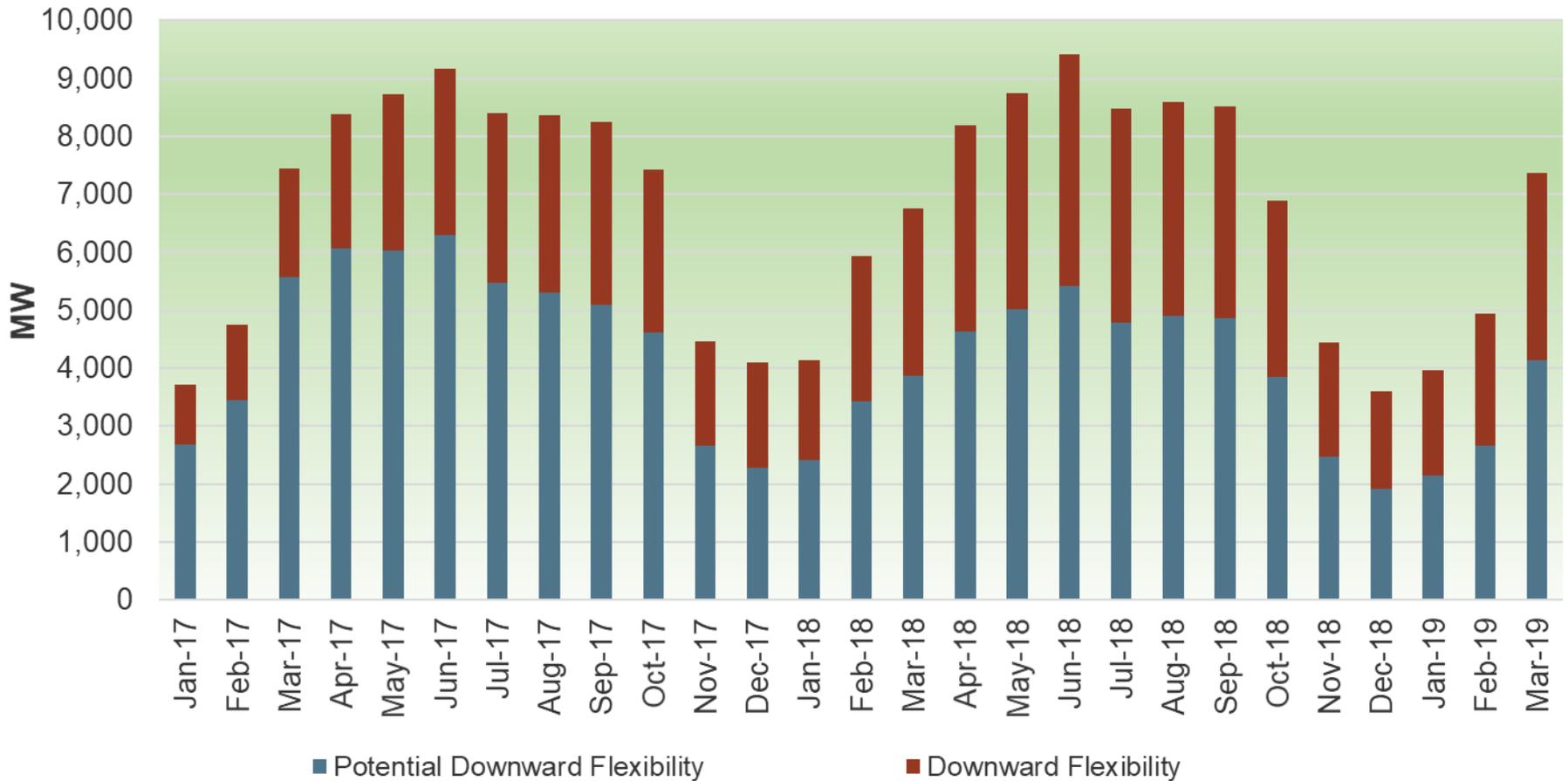
ISO total monthly VERS schedules and forecasts compared to actuals



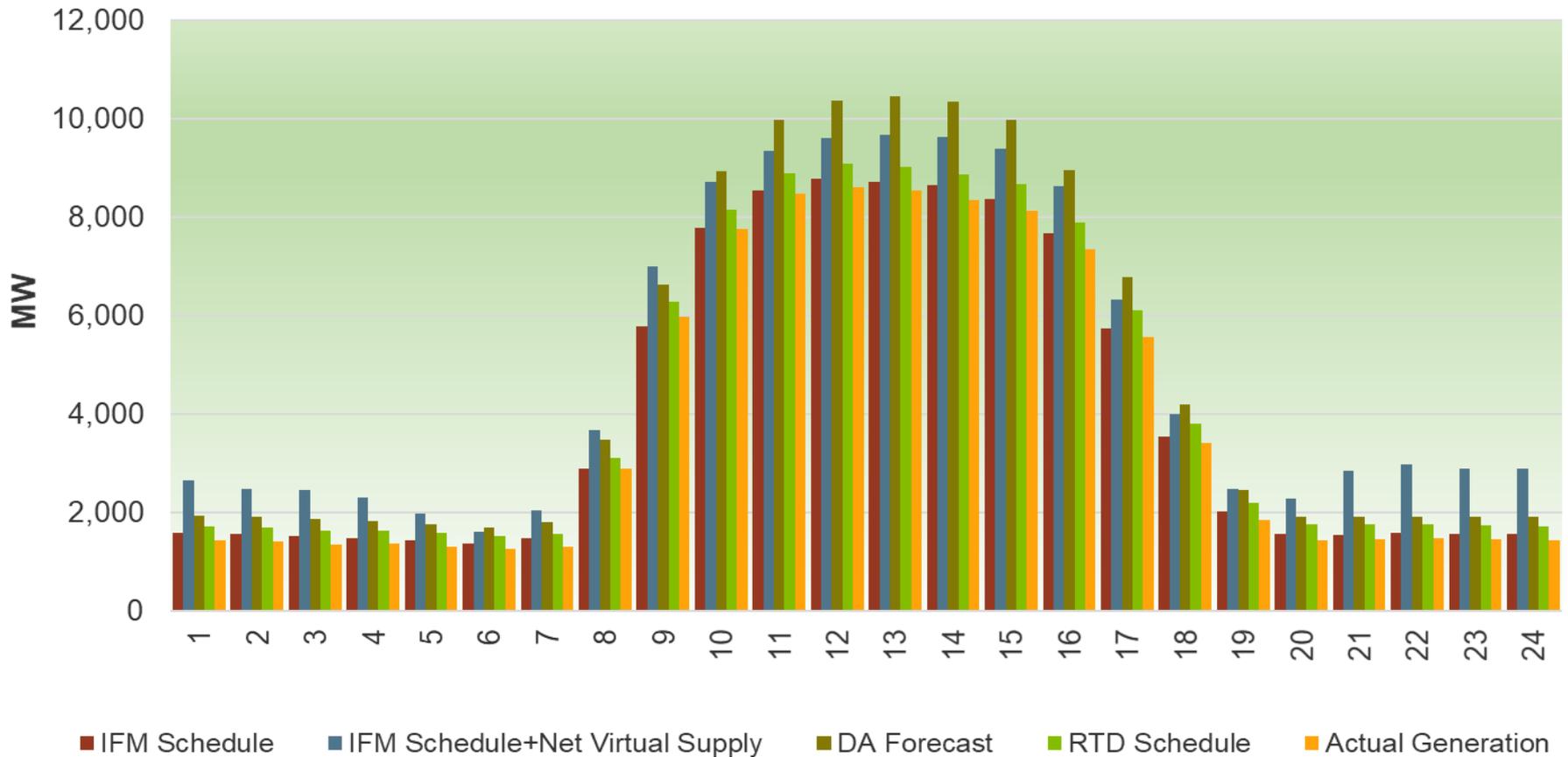
Monthly wind (VERs) downward flexibility in FMM



Monthly solar (VERs) downward flexibility in FMM from 11 AM to 5 PM

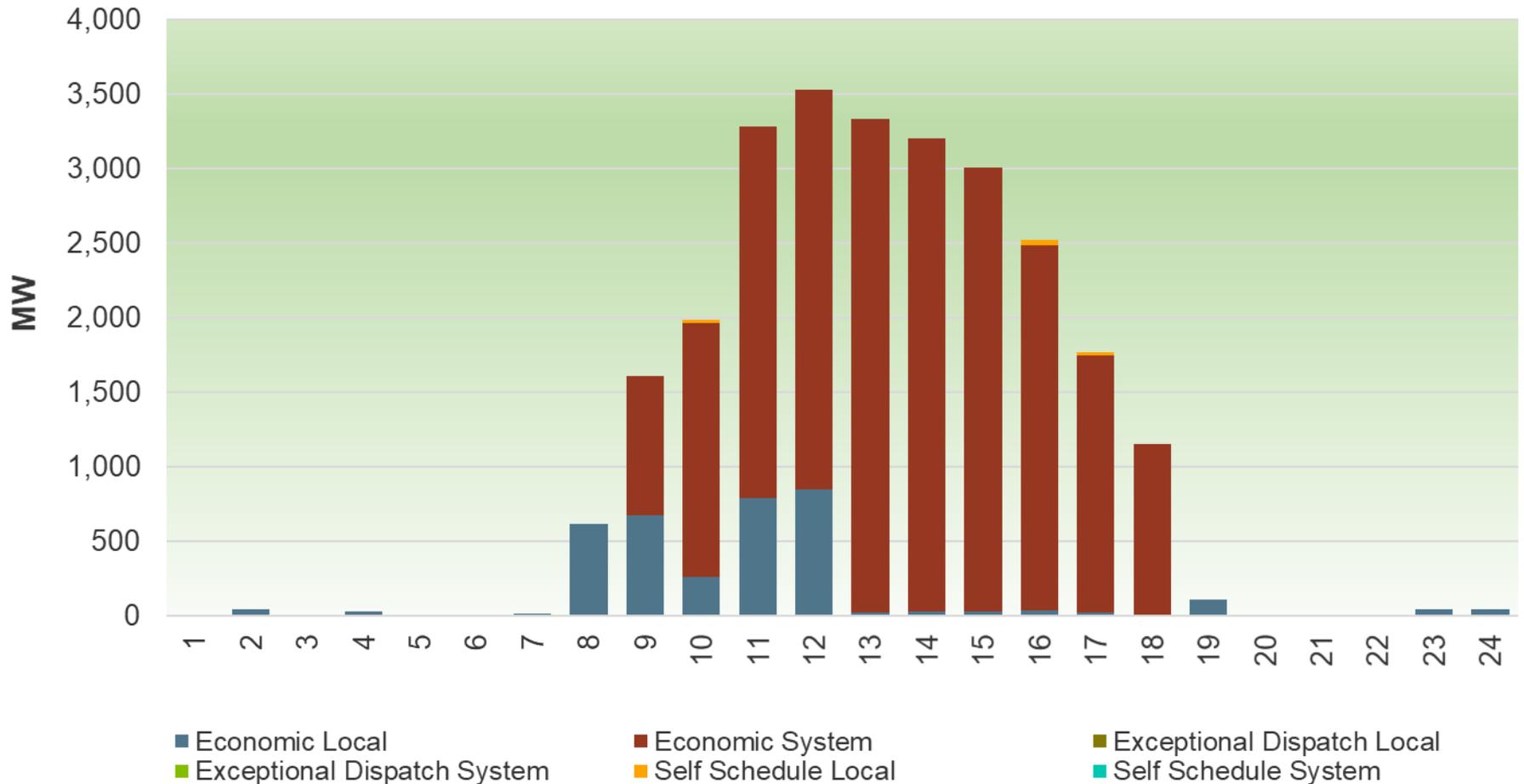


Renewable (VERS) schedules including net virtual supply aligns with VER forecast in February and March

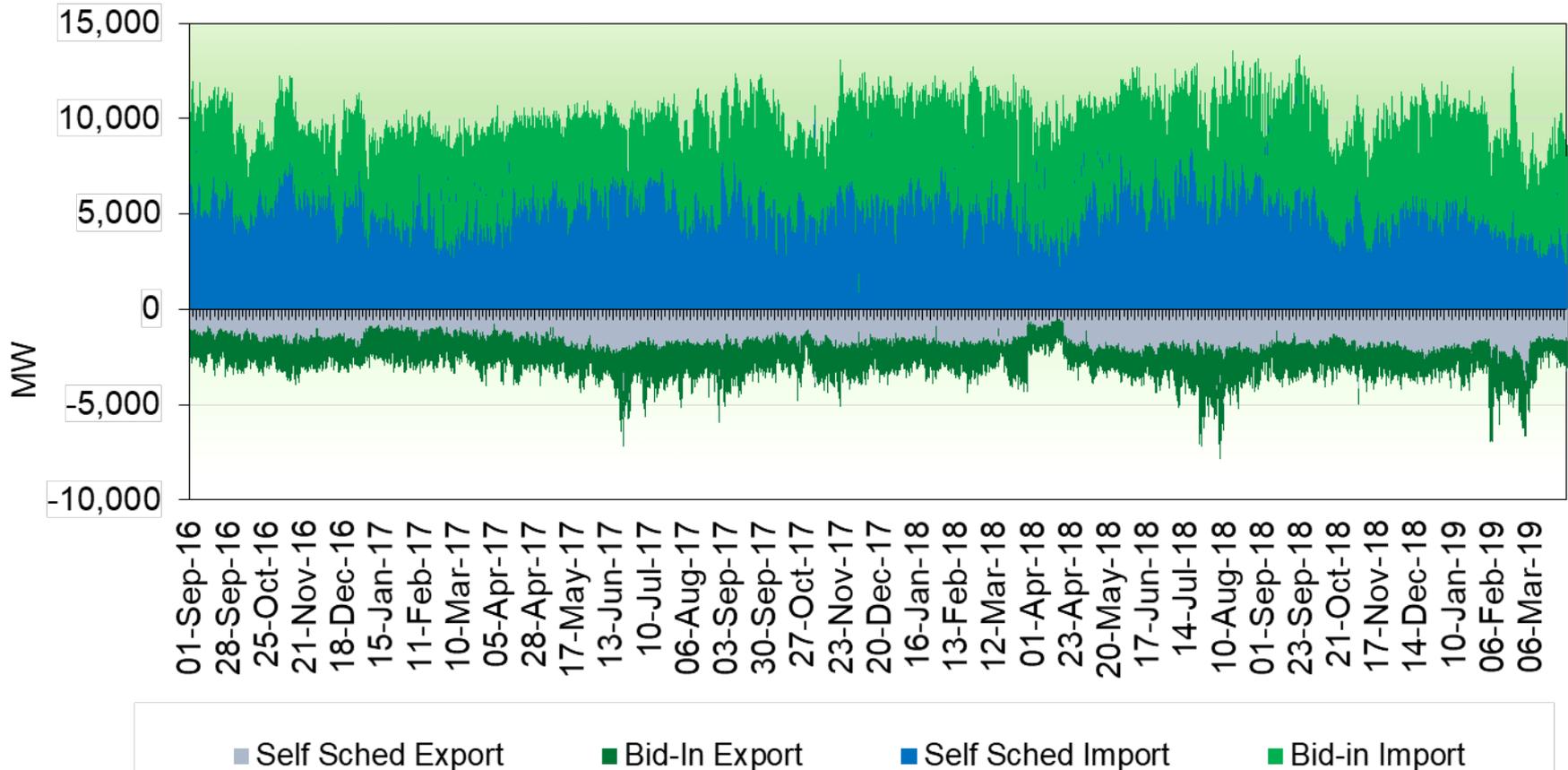


<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=EFF75C2E-F28E-4087-B88B-8DFFAED828F8>

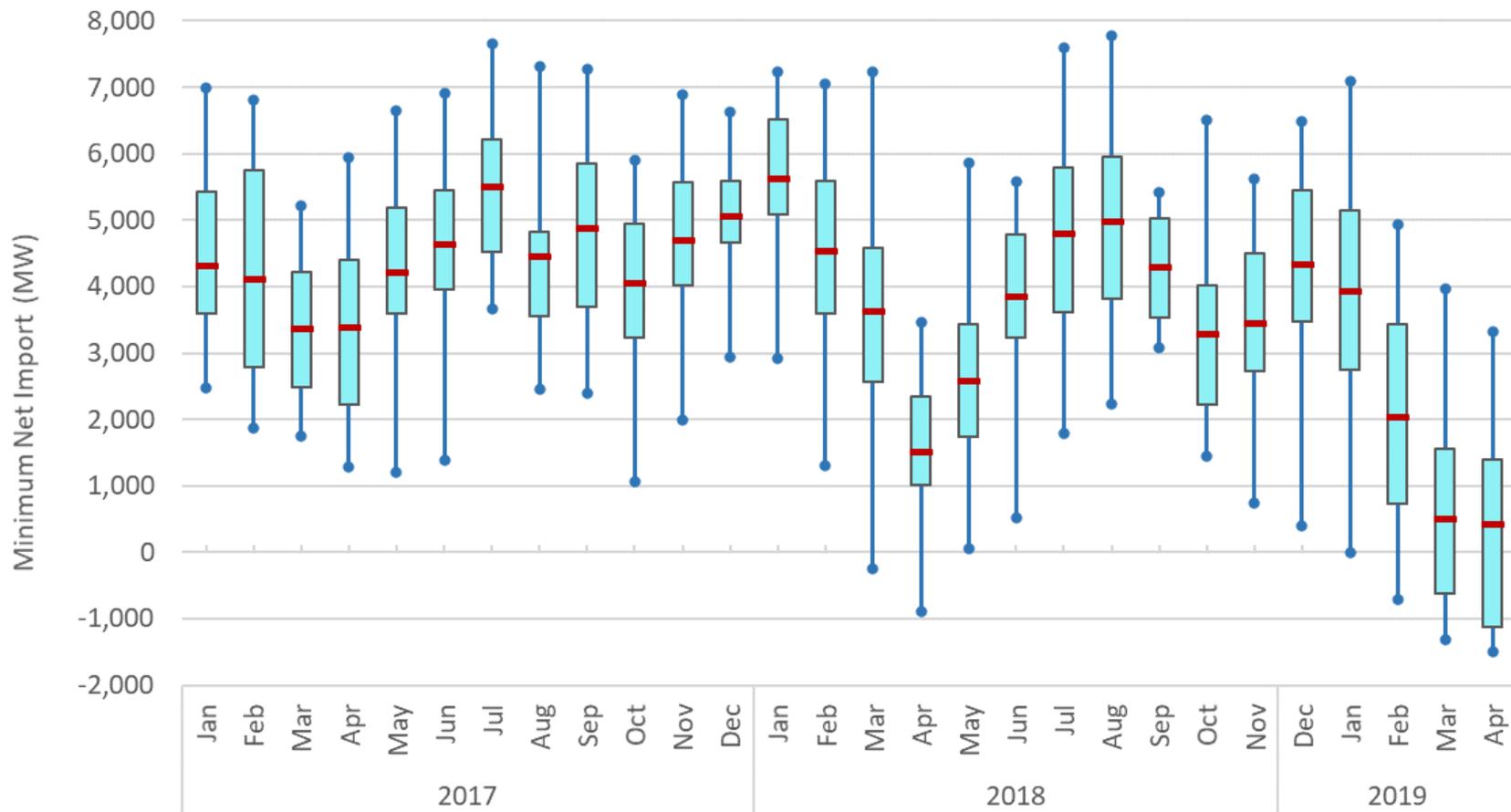
Hourly distribution of maximum RTD renewable (VERS) curtailment in March



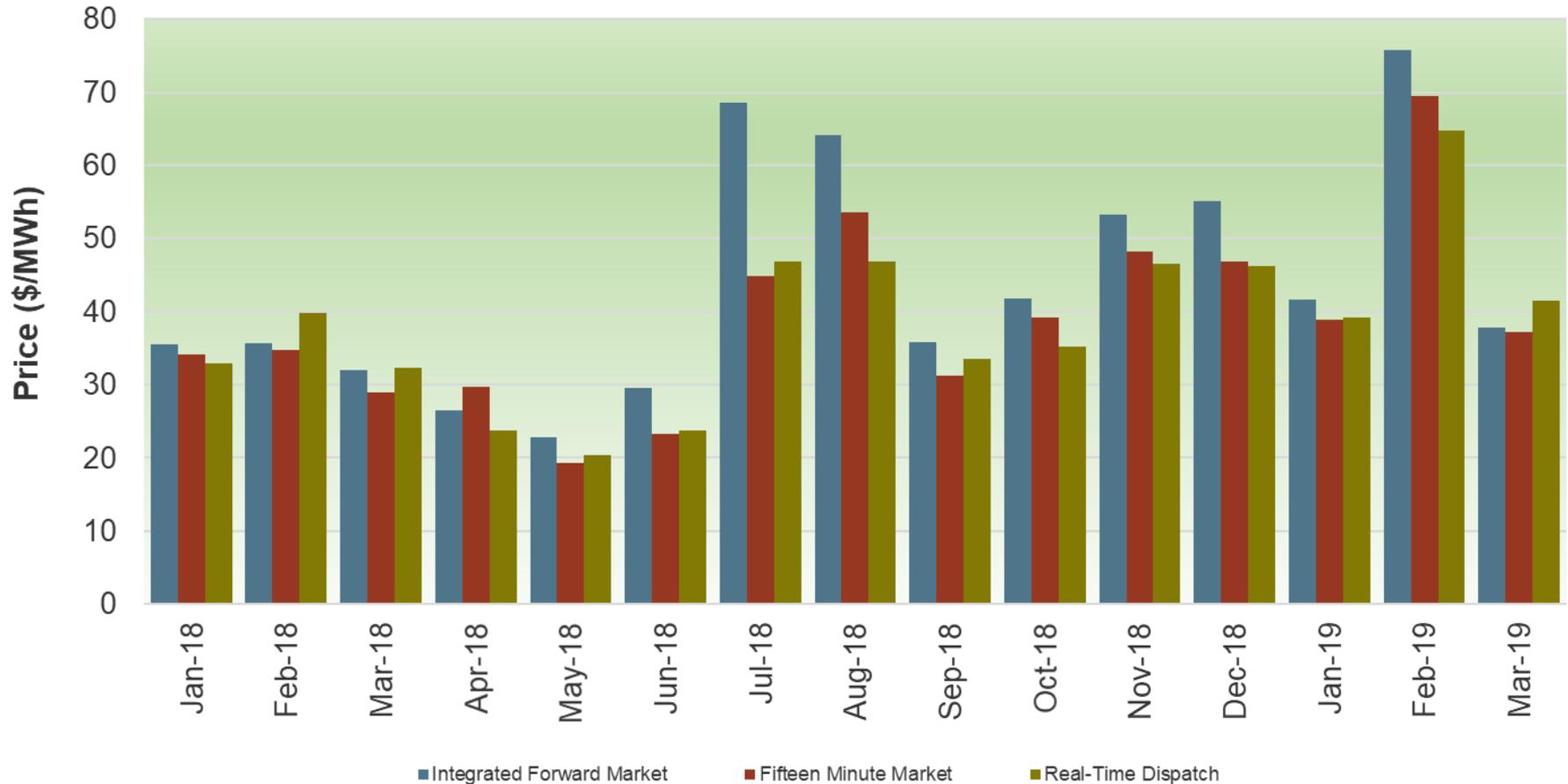
Self scheduled interties in the real-time market remained high



Minimum levels of net imports to the CAISO system are observed during spring time

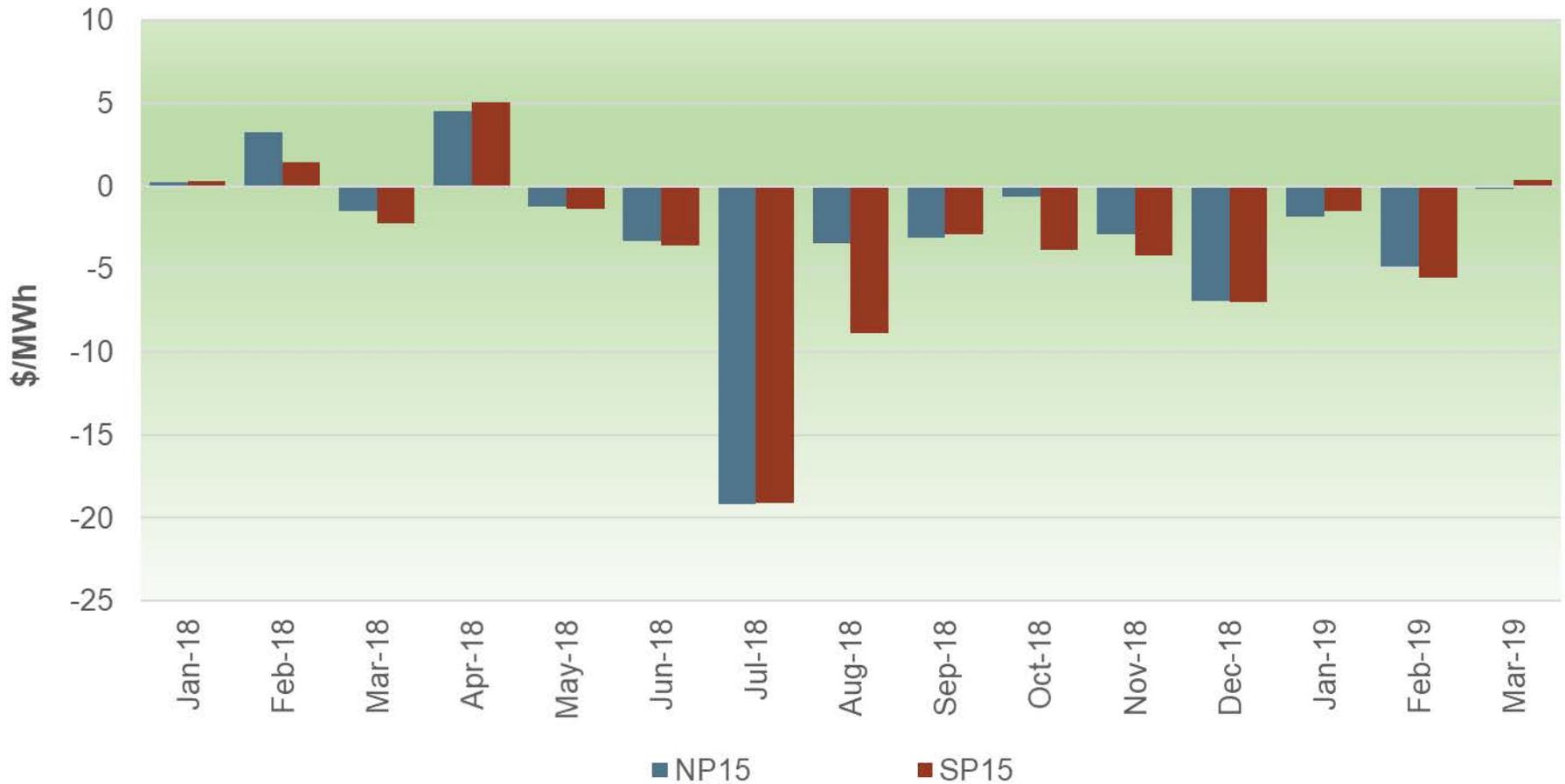


Good price convergence in March and high prices in February.

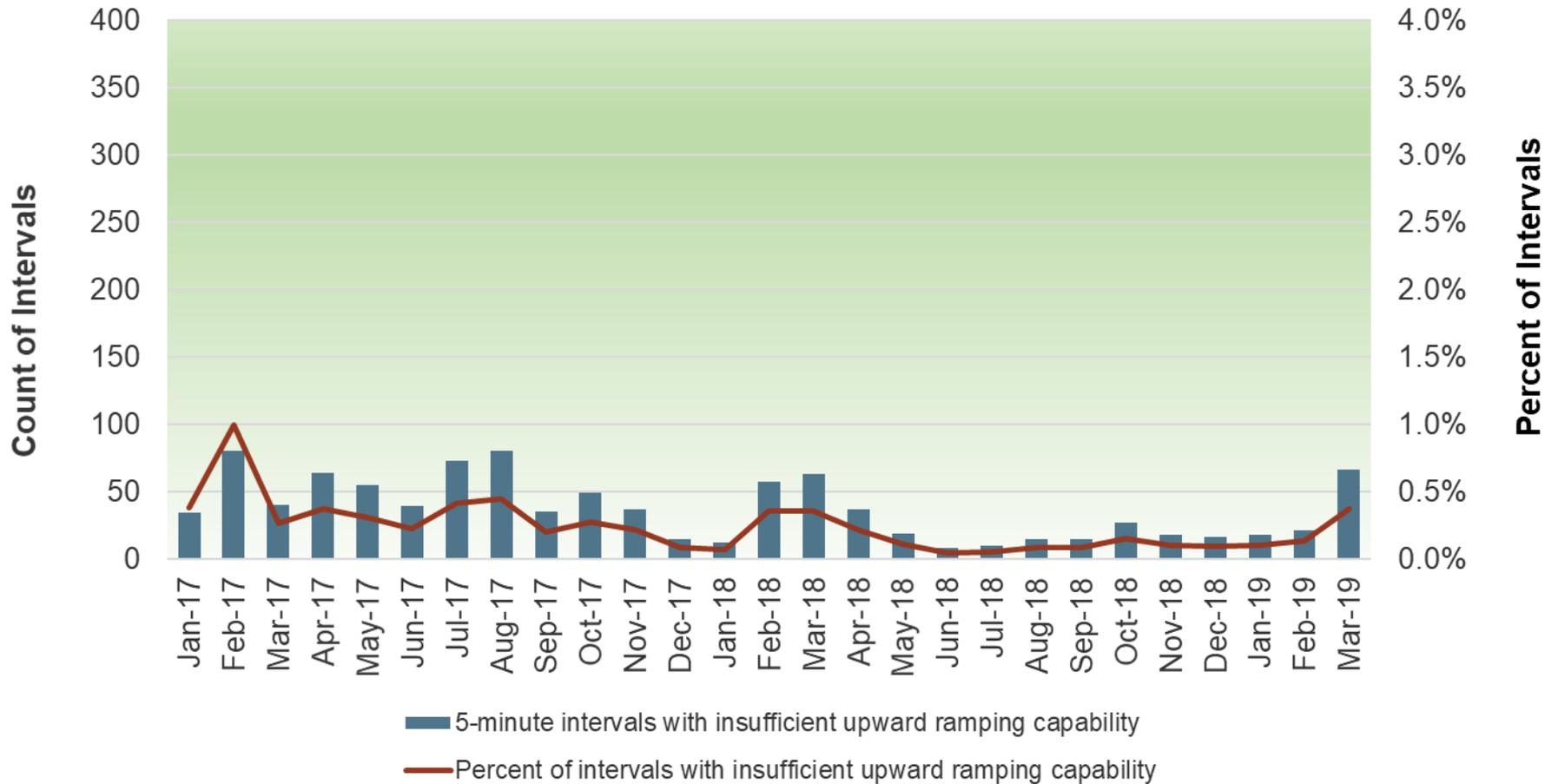


Note: Metric Based on System Marginal Energy Component (SMEC)

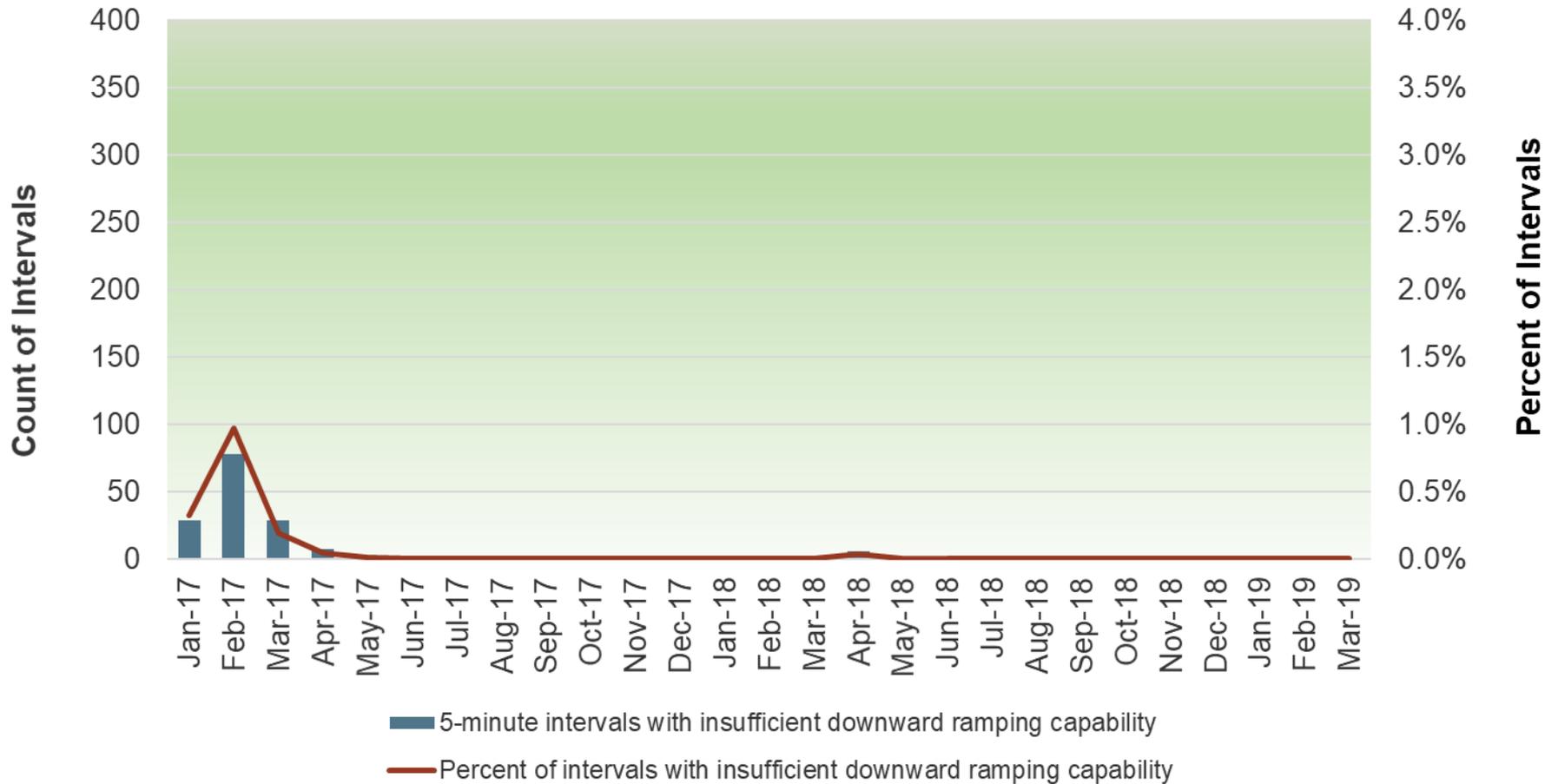
RT prices lower than DA prices for both NP15 and SP15 in February



Insufficient upward ramping capacity in ISO real-time increased in March



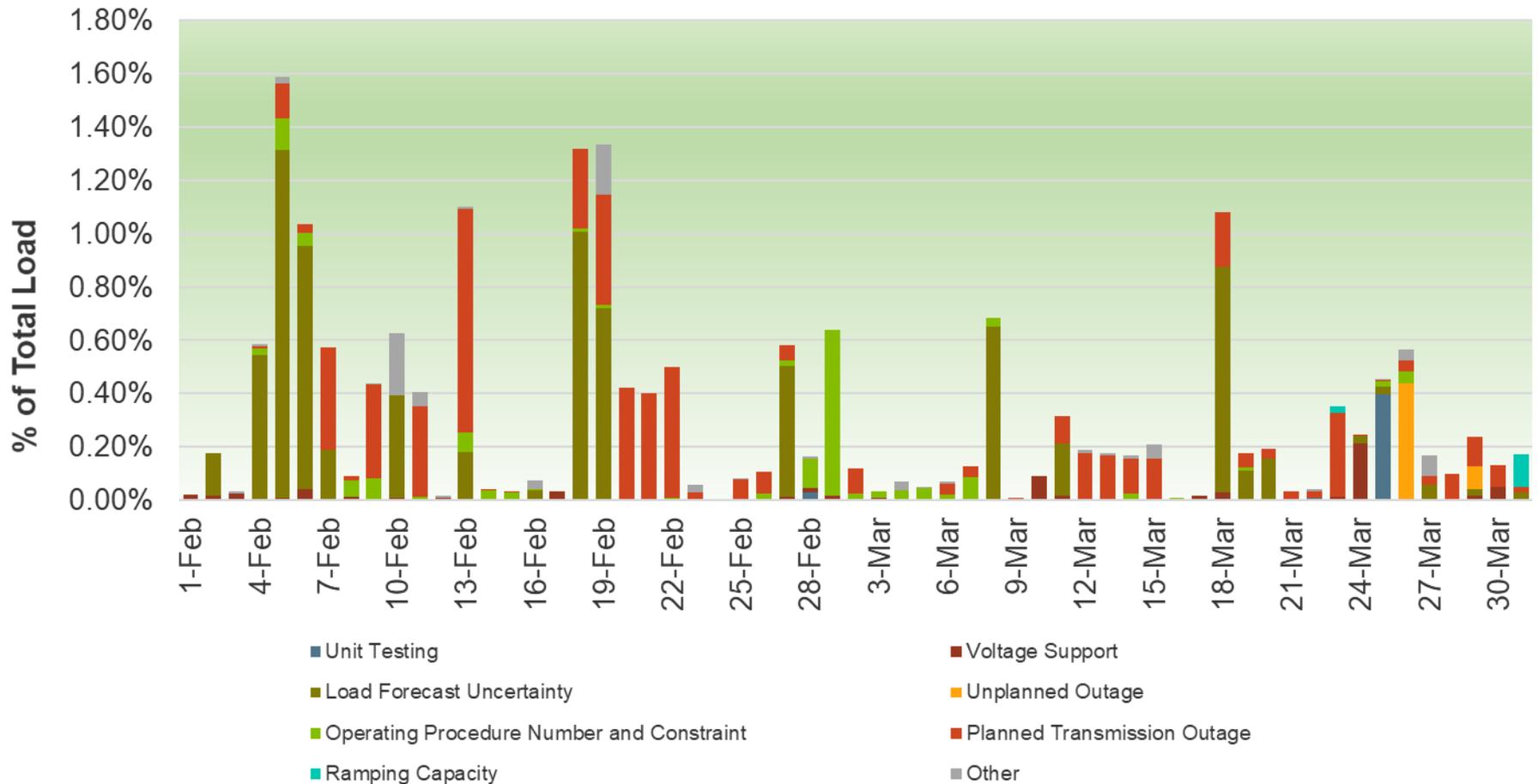
Insufficient downward ramping capacity in real-time continued to be low in February and March



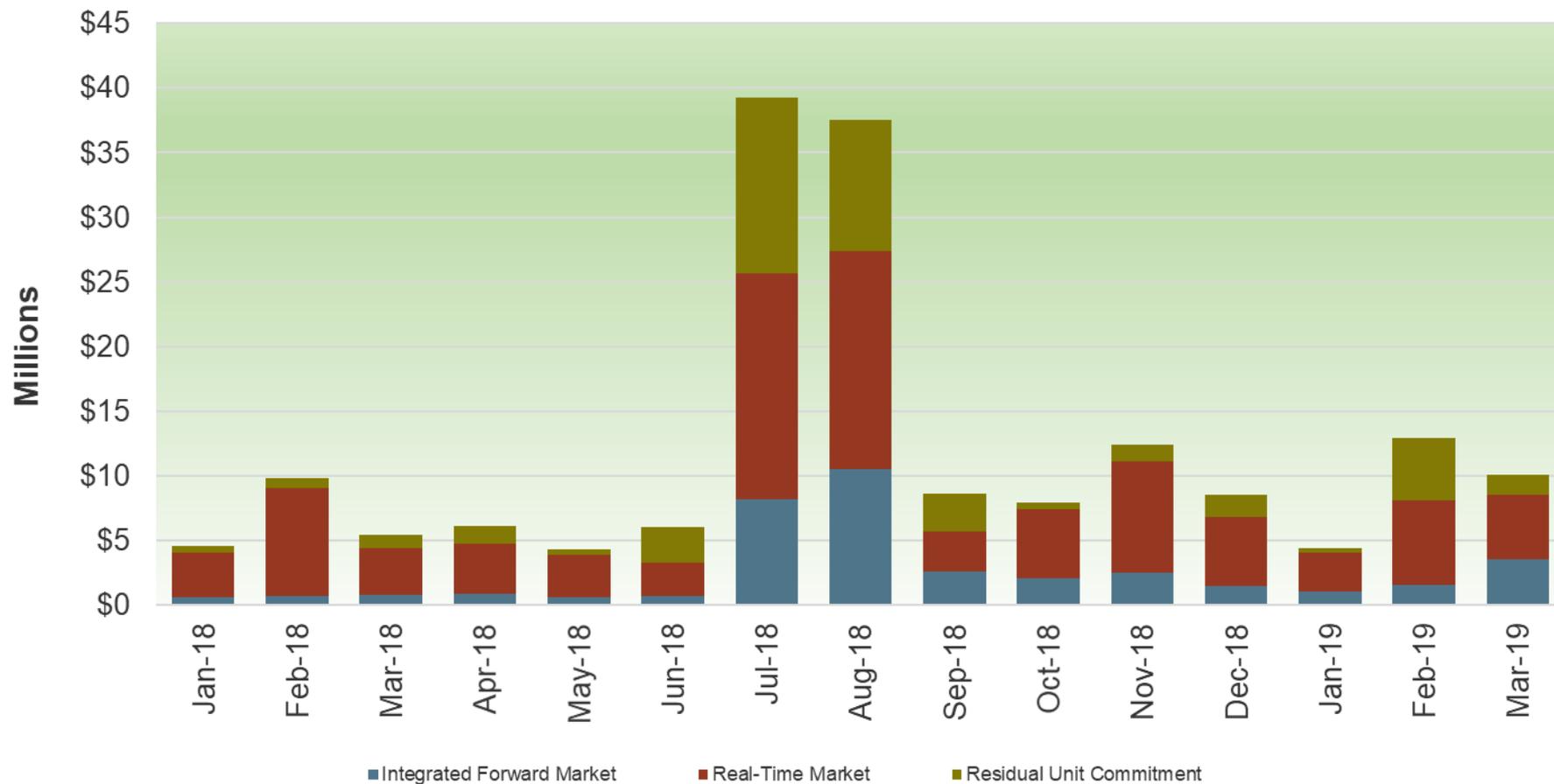
Exceptional dispatch volume in the ISO area fell compared with last year.



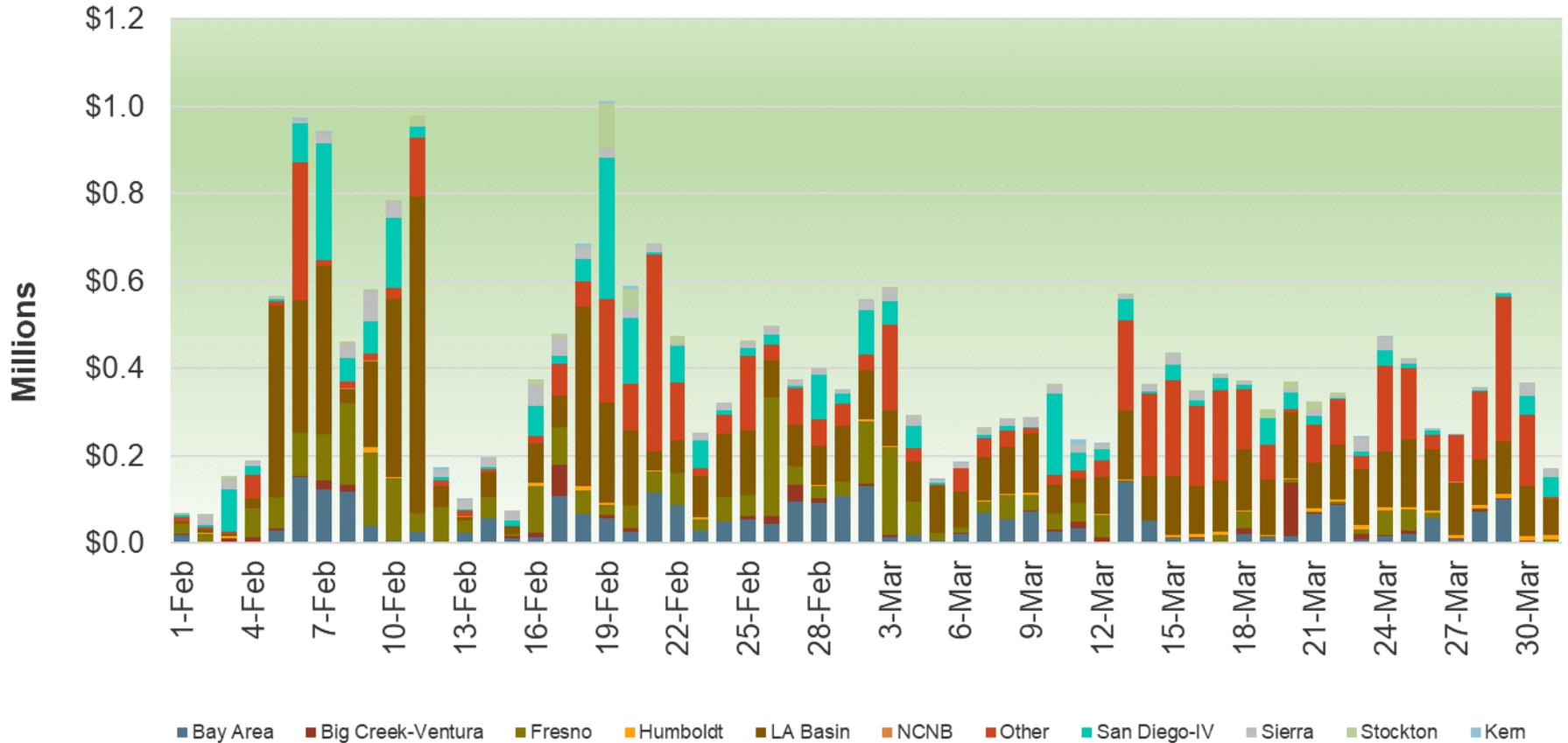
Exceptional dispatches dropped in March.



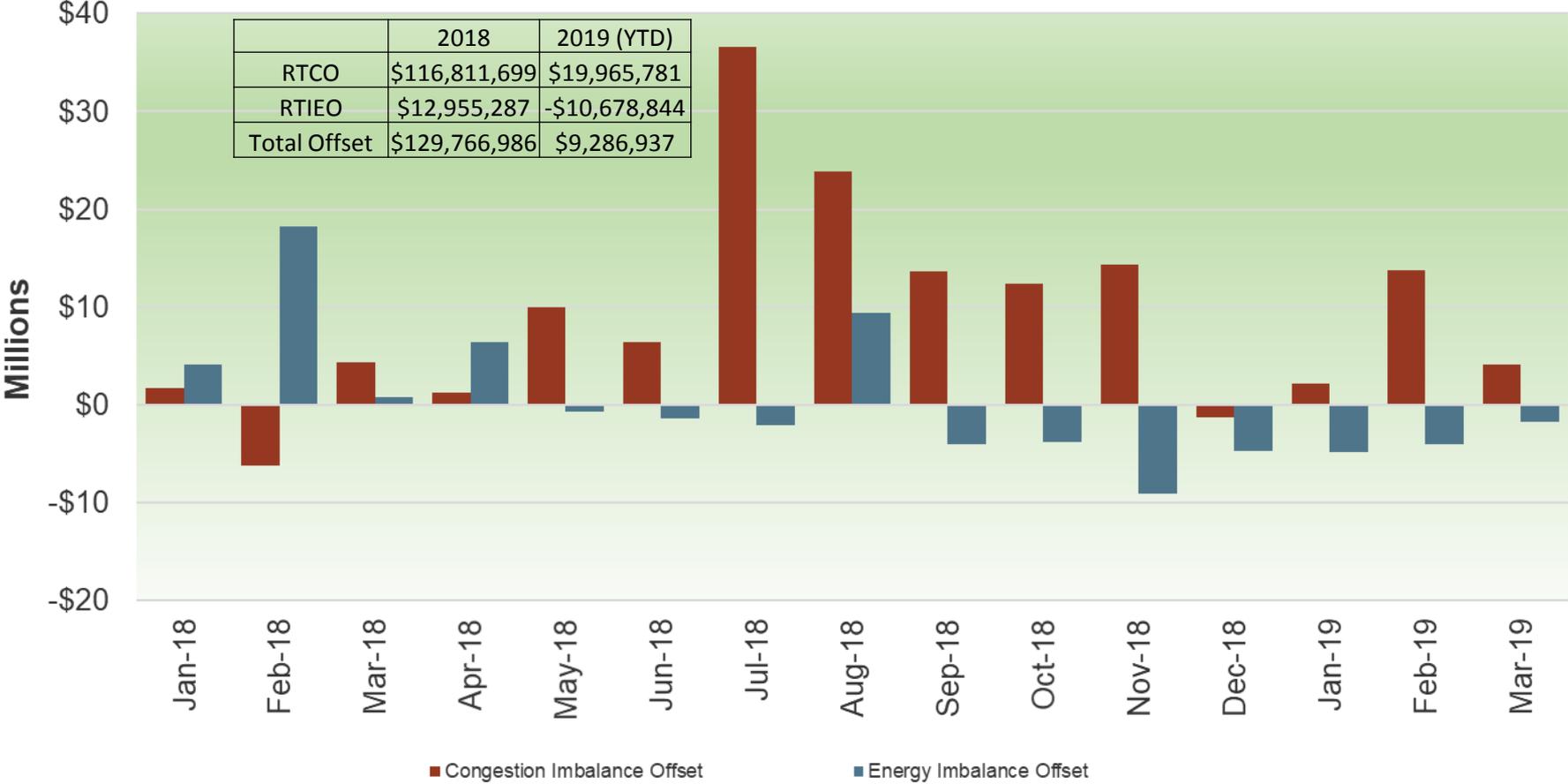
Bid cost recovery rose stay within typical ranges in February and March.



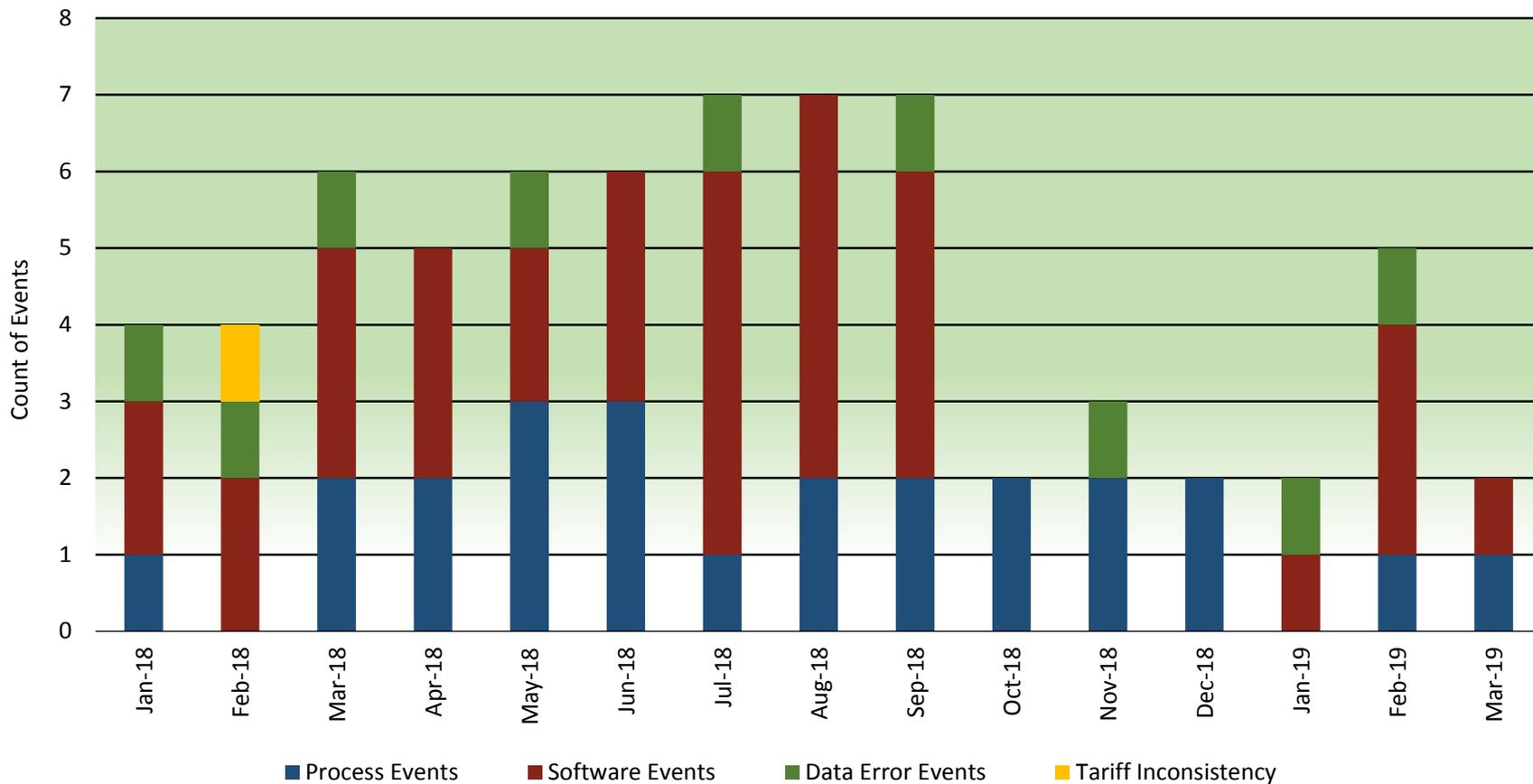
Bid cost recovery (BCR) by Local Capacity Requirement area



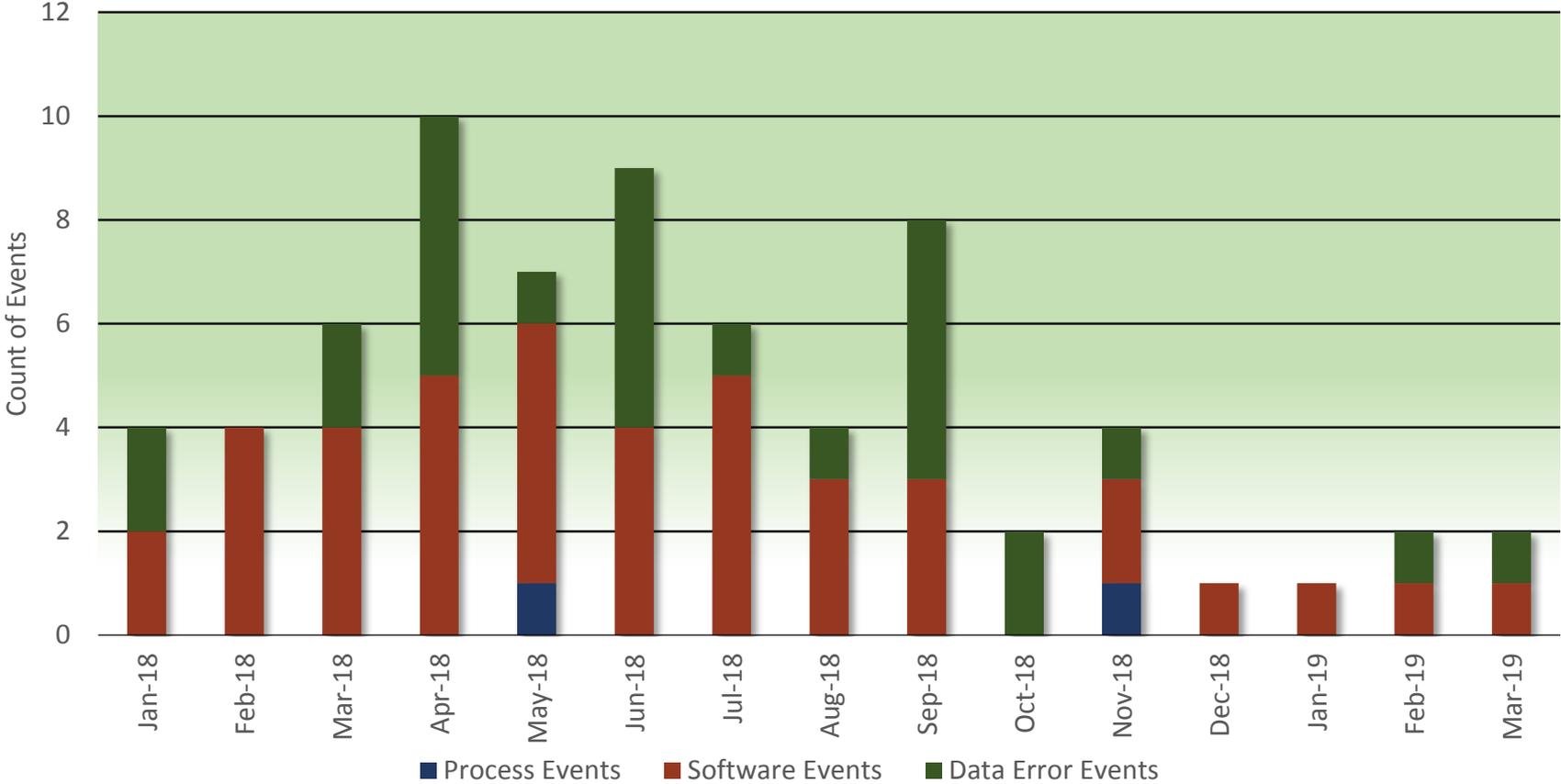
ISO area RTCO increased in February while RTIEO remained negative.



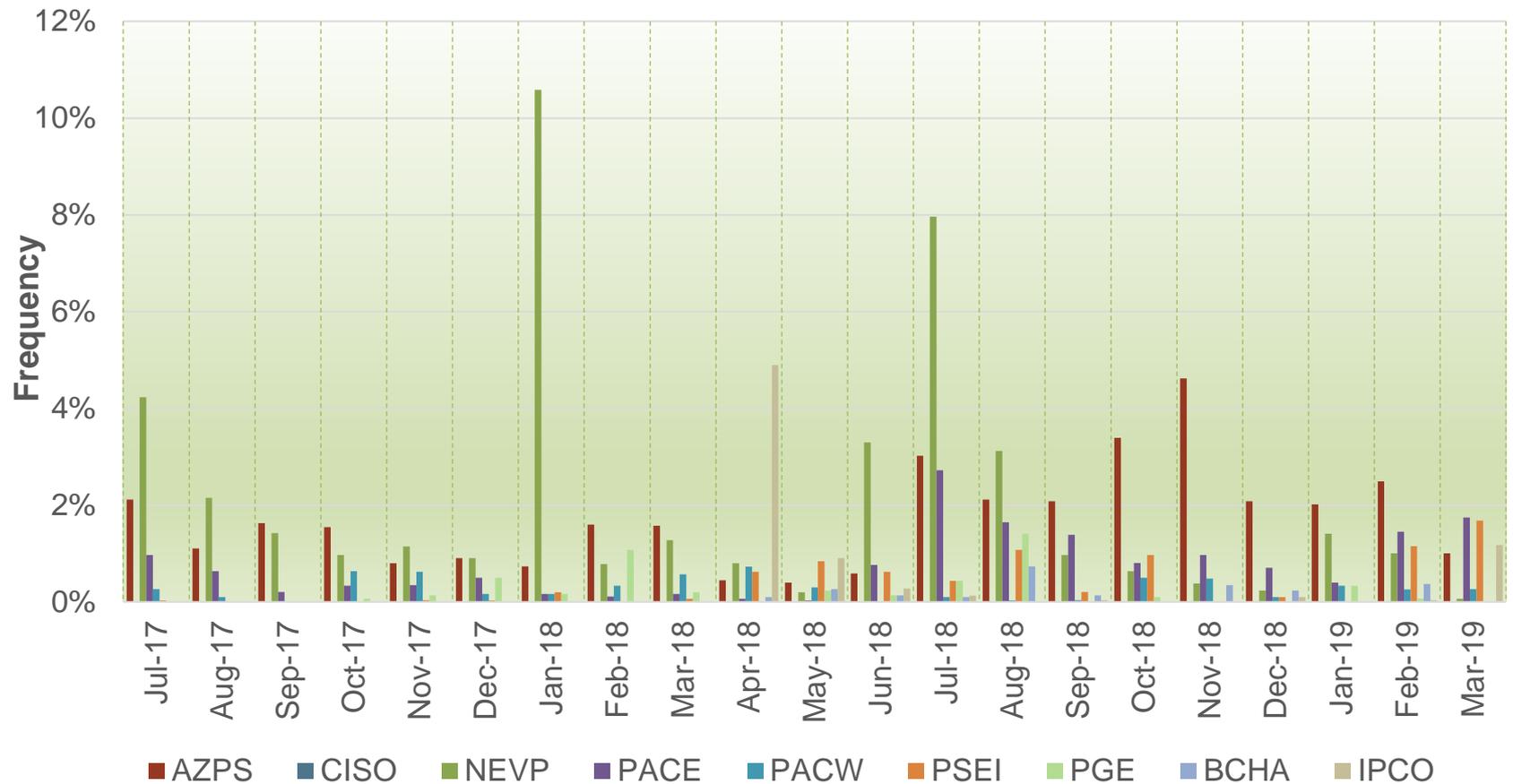
CAISO price correction events remain low in March



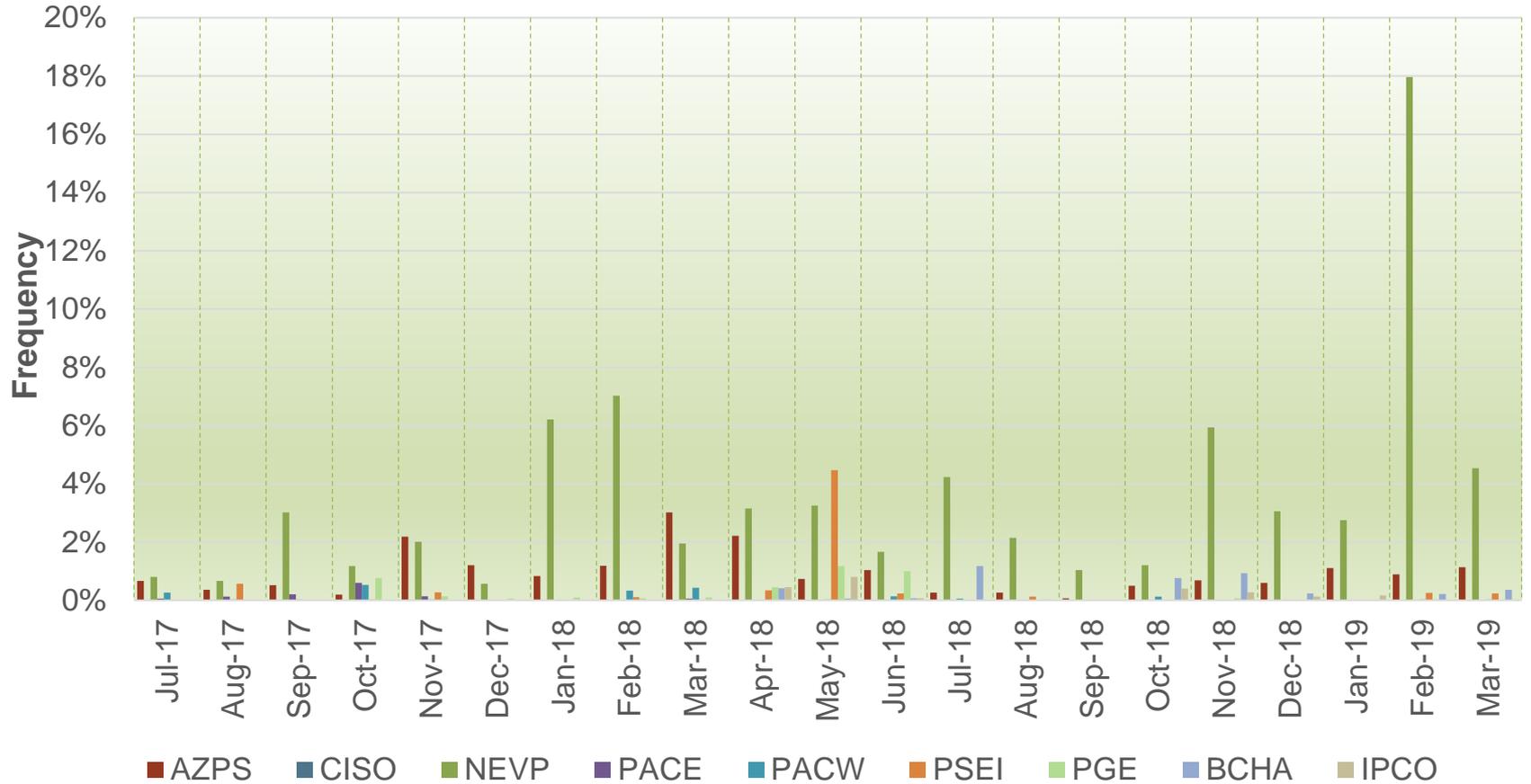
EIM-Related price correction events remain low in March



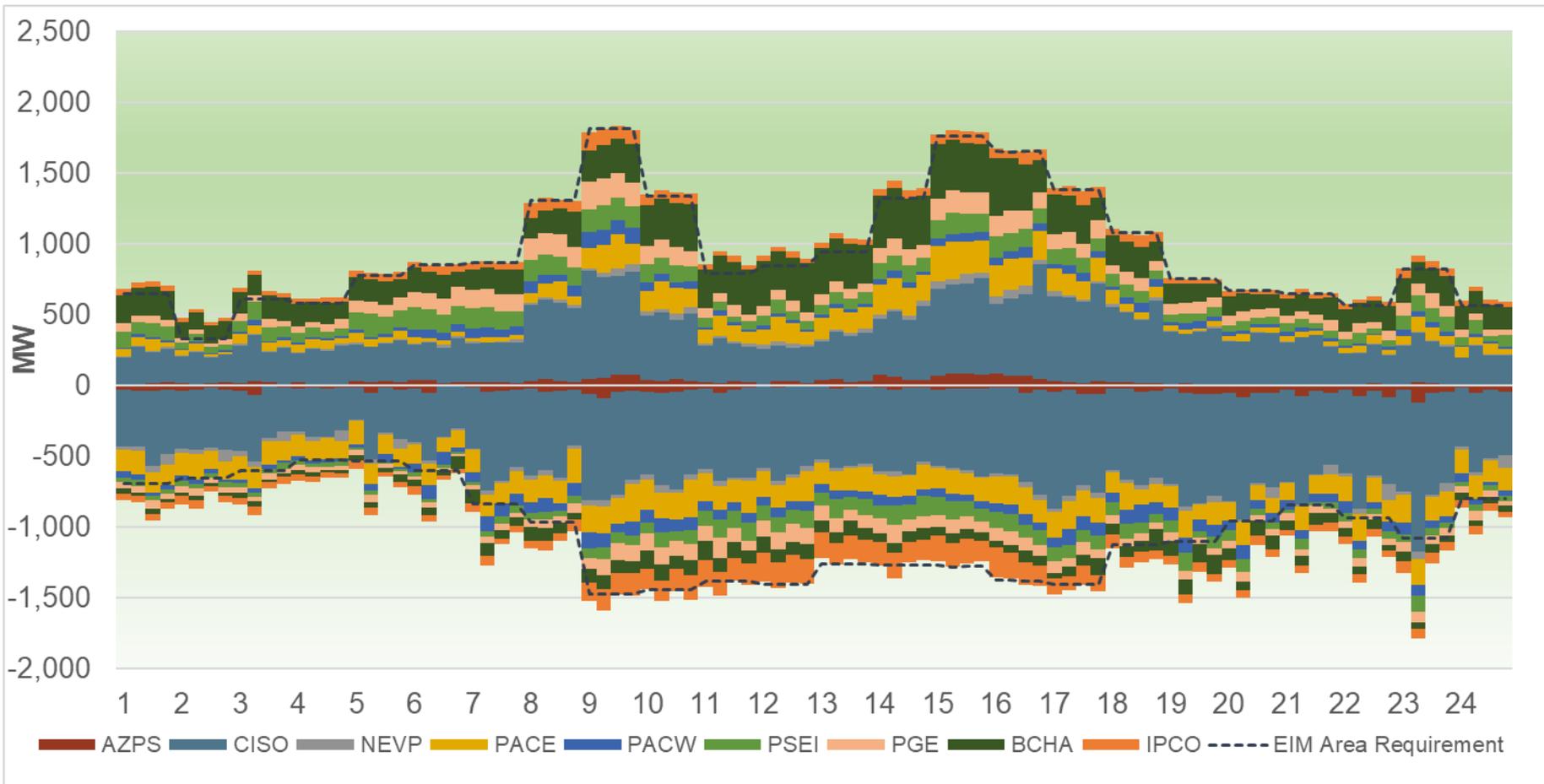
Flexible Ramp Up Sufficiency Test Results



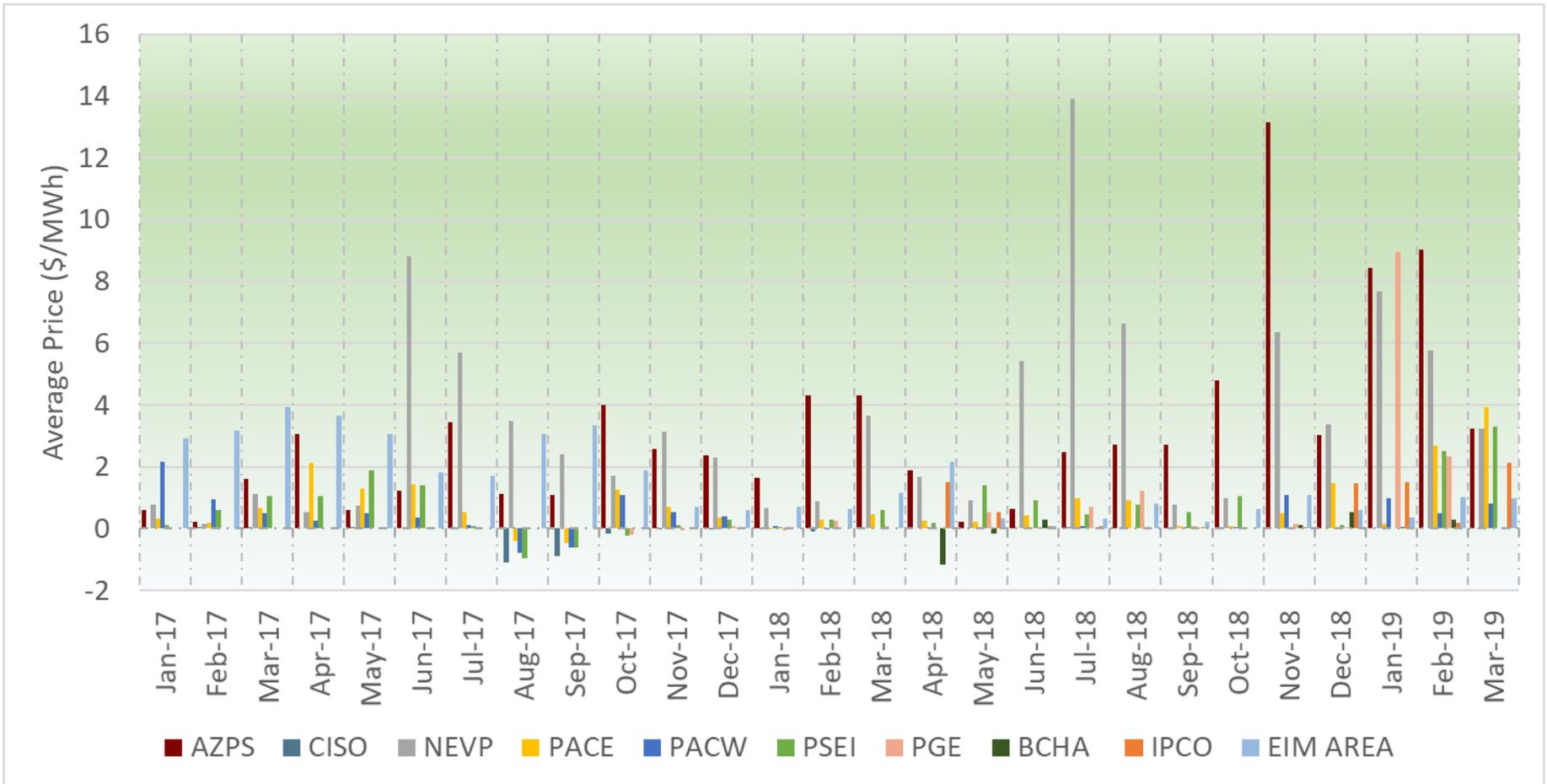
Flexible Ramp Down Sufficiency Test Results



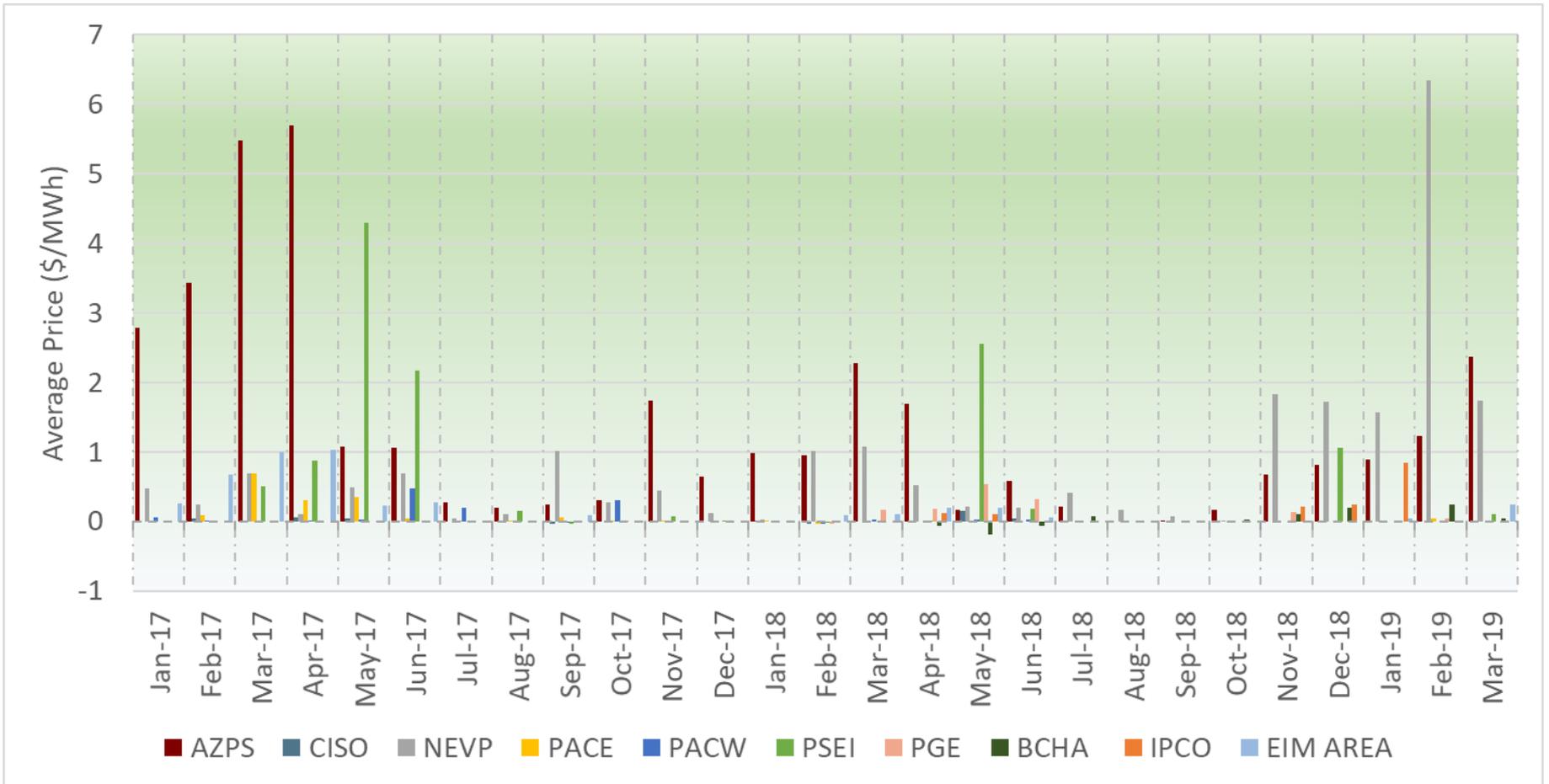
Average Flexible Ramp Product Cleared Awards for each area with EIM Area Requirement - Dec 2018 to Jan 2019



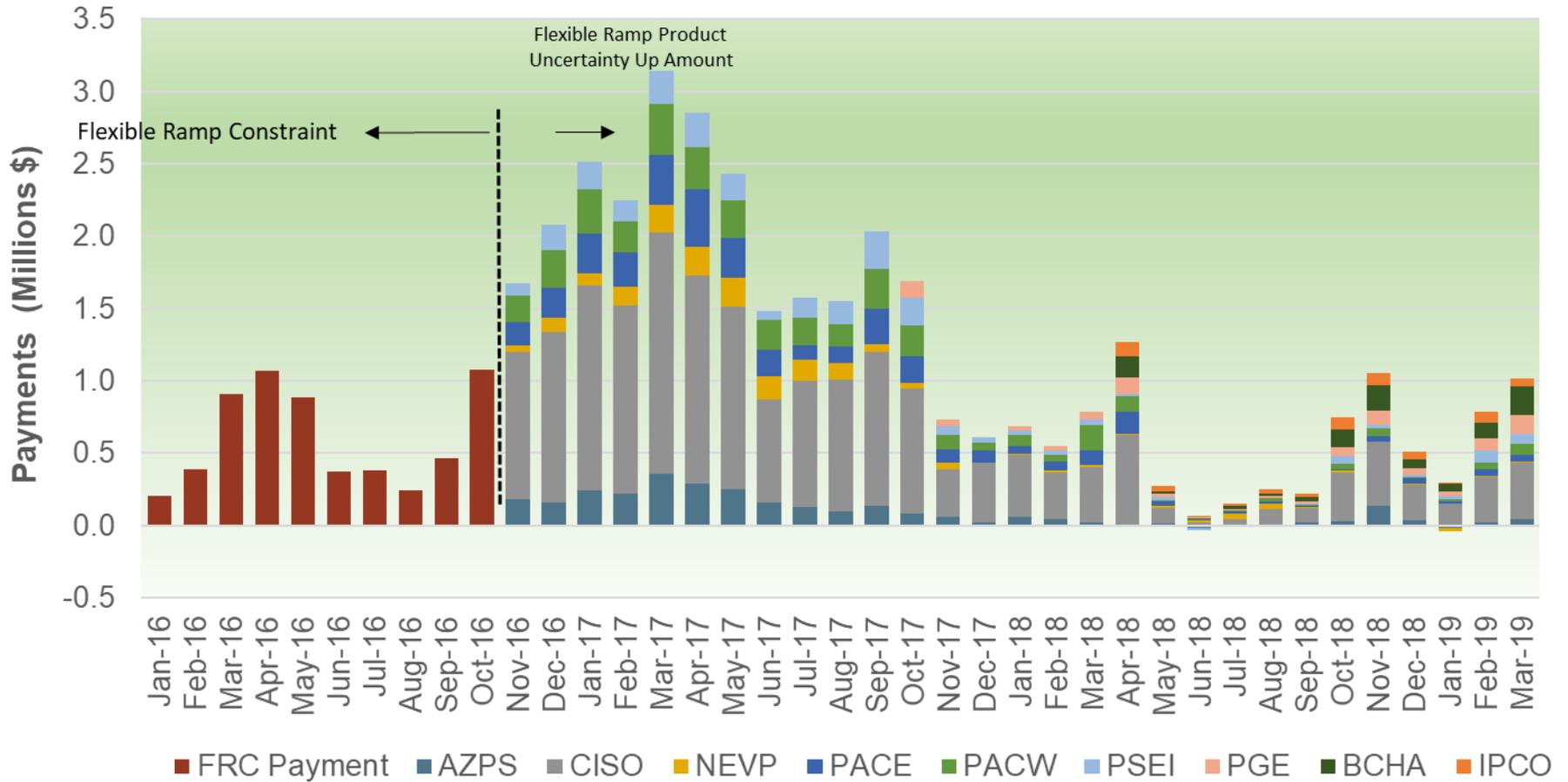
Average Flexible Ramp Up Price (\$/MWh)



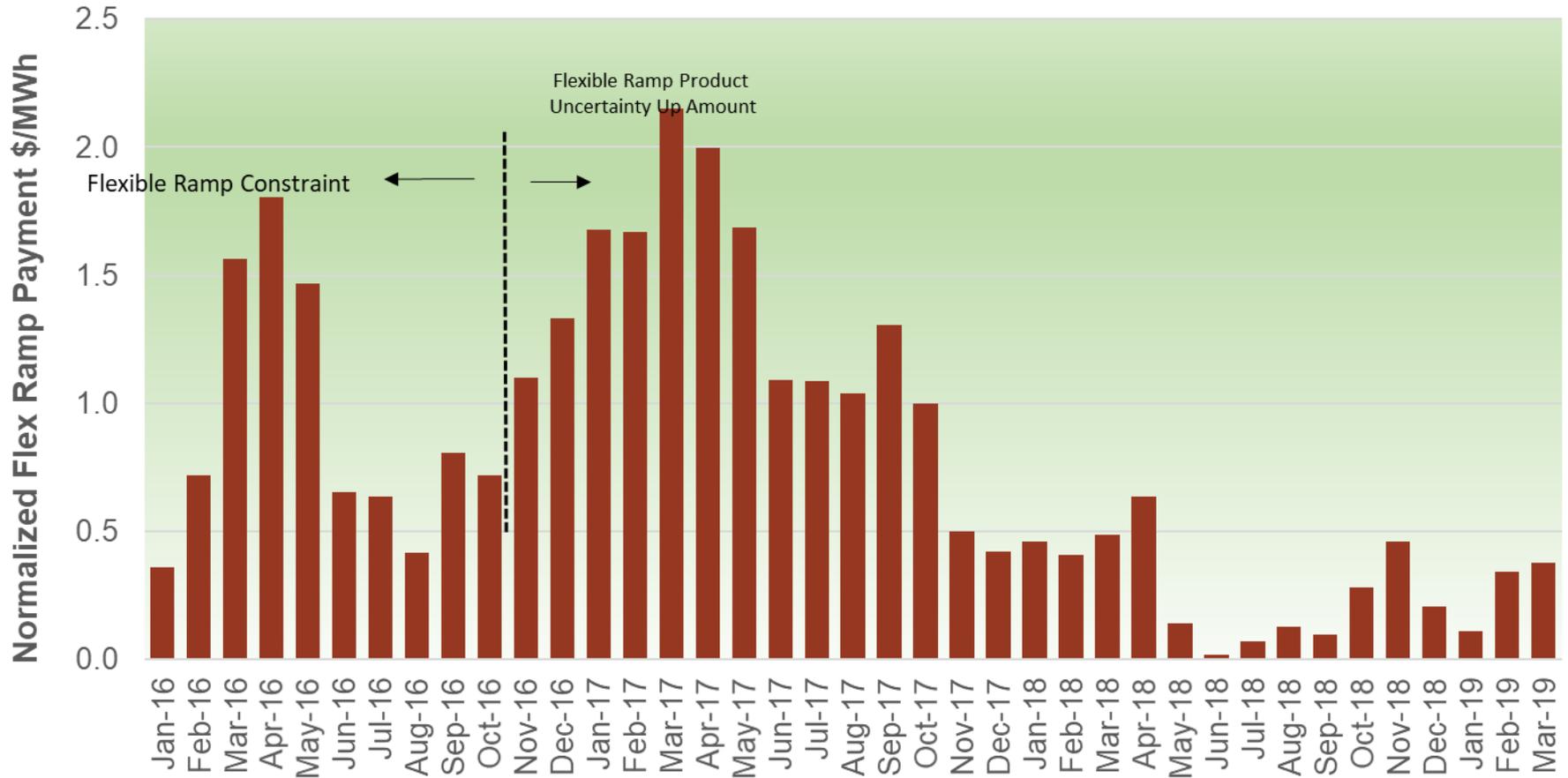
Average Flexible Ramp Down Price (\$/MWh)



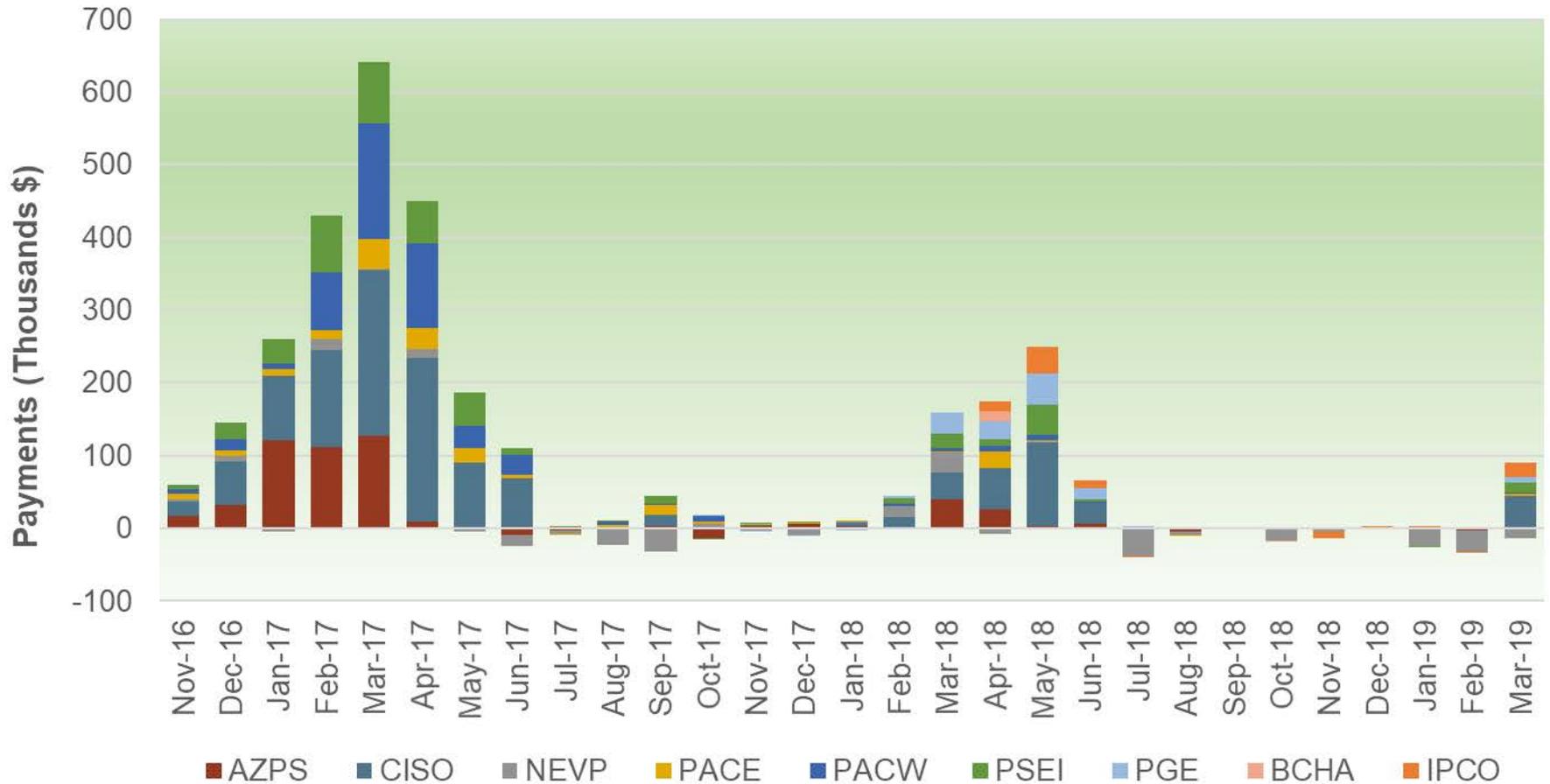
Uncertainty Up Settlement Amount



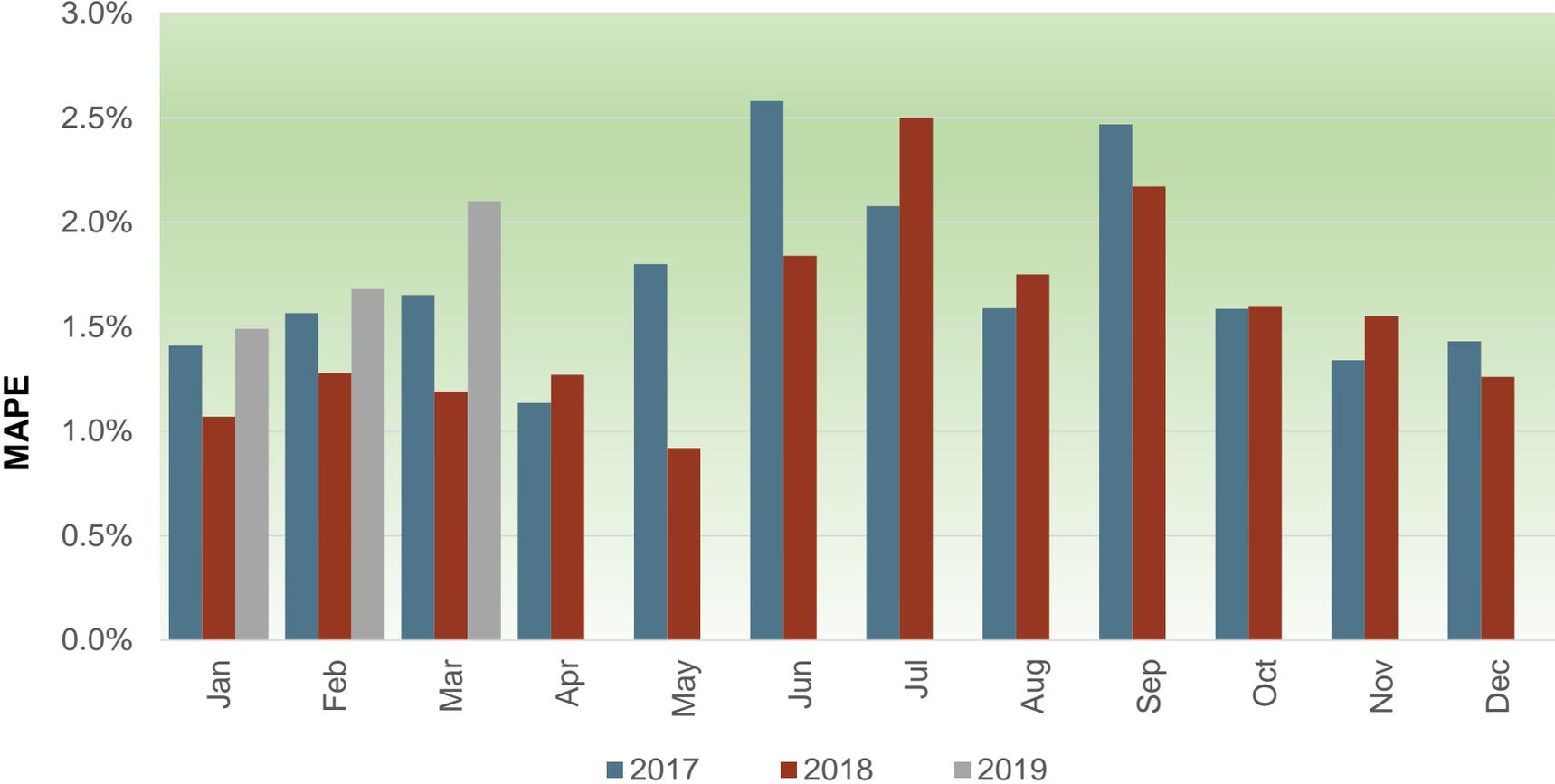
Normalized Flex Ramp Up Payment



Uncertainty Movement Down Settlement



Day-ahead load forecast



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

Day-ahead peak to peak forecast accuracy



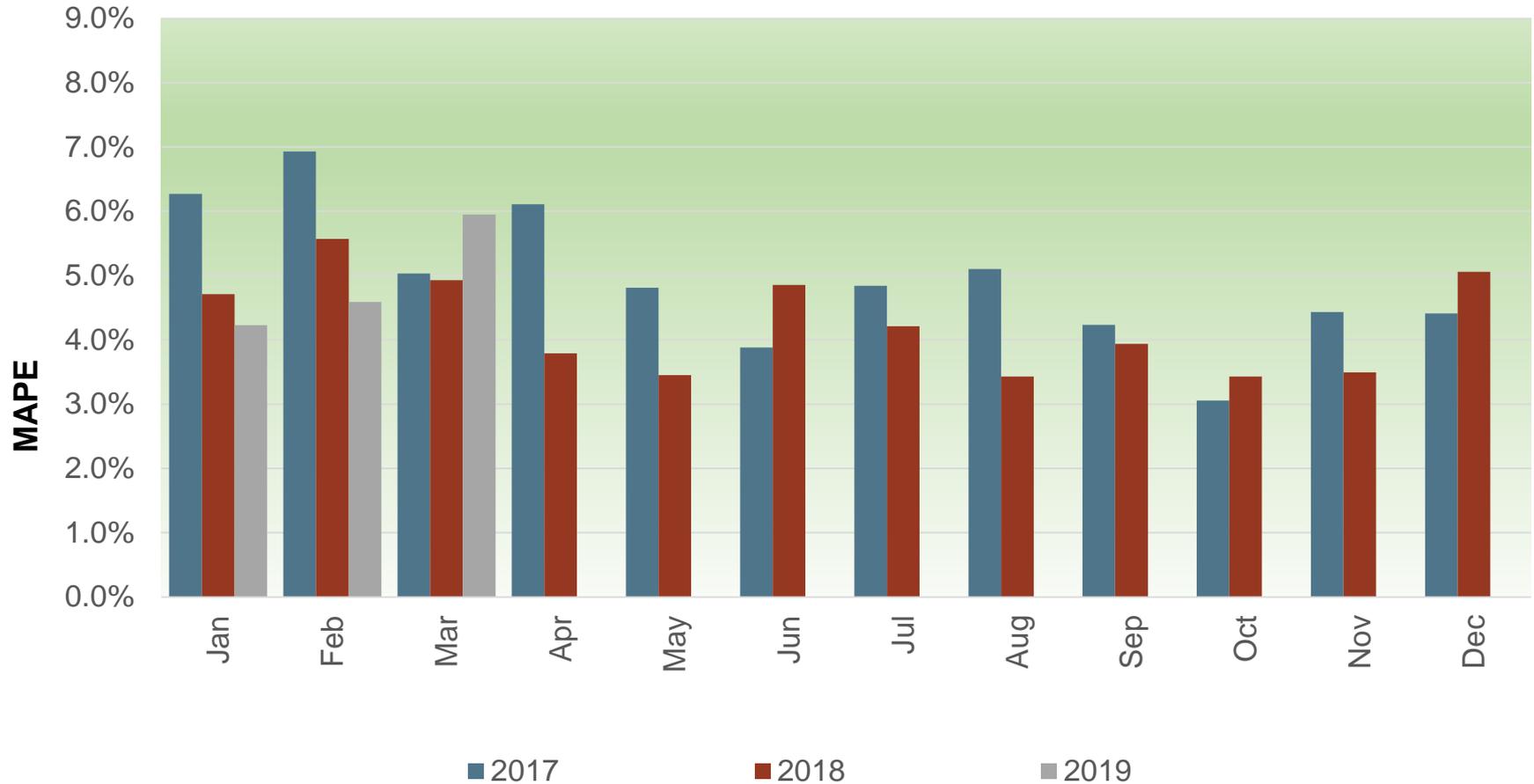
**MAPE = abs(Forecast - Actual)/Actual

Day-ahead wind forecast



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

Day-ahead solar forecast



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

Real-time wind forecast



The 2017 generation data used for accuracy calculation contains the economically dispatched MW.
 **This forecast accuracy is pulled directly from the CAISO Forecasting System.
 **MAPE = abs(Forecast - Actual)/Capacity

Real-time solar forecast



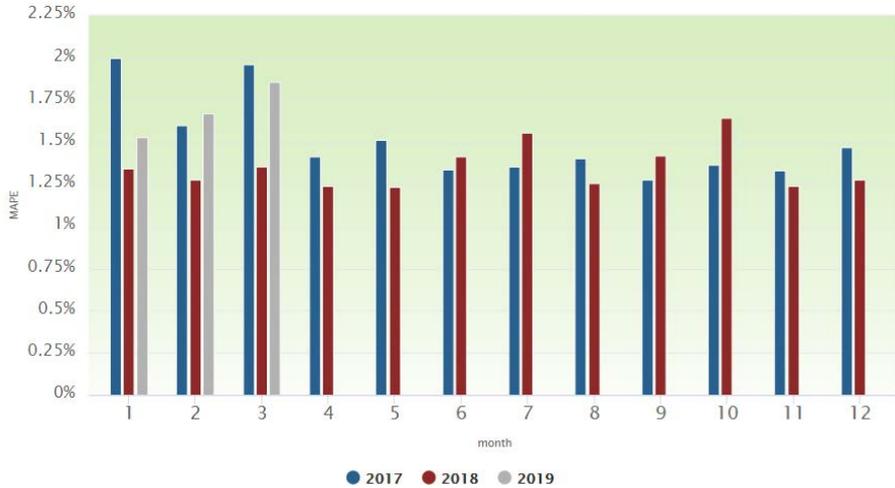
**2017 has been changed to track the RTD accuracy, i.e. the forecast made 7.5 minutes before the binding interval. The 2017 generation data used for accuracy calculation contains the economically dispatched MW.

**This forecast accuracy is pulled directly from the CAISO Forecasting System.

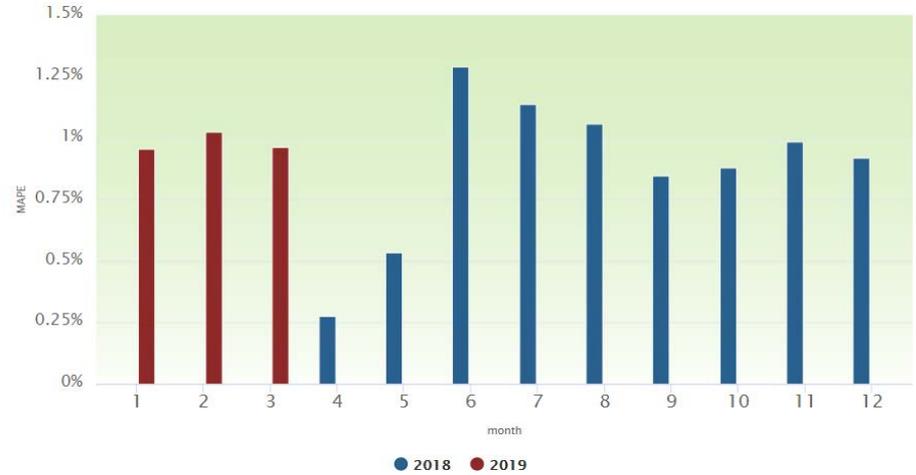
**MAPE = $\text{abs}(\text{Forecast} - \text{Actual}) / \text{Capacity}$

EIM T-60 Forecast

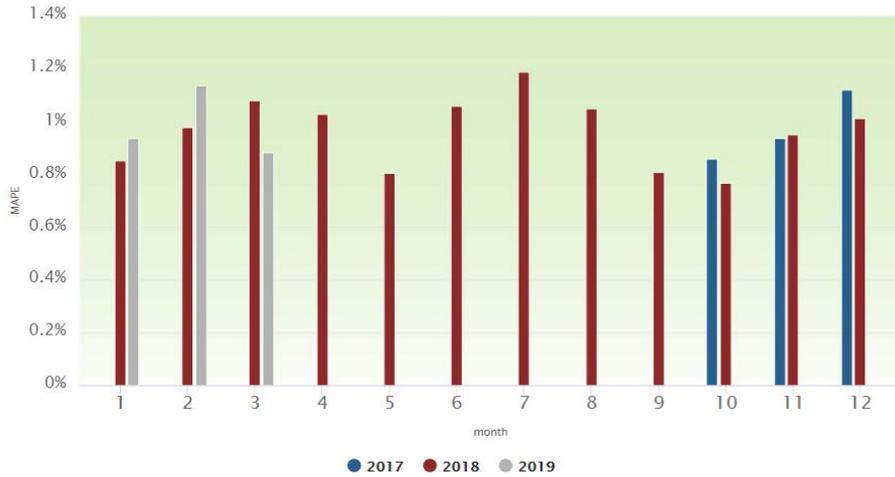
APS T-60 Minute Forecast



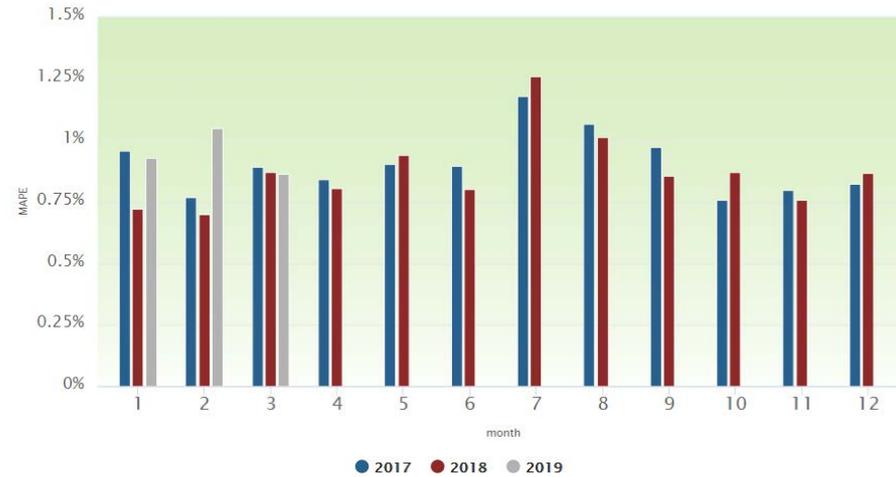
IPCO T-60 Minute Forecast



PGE T-60 Minute Forecast

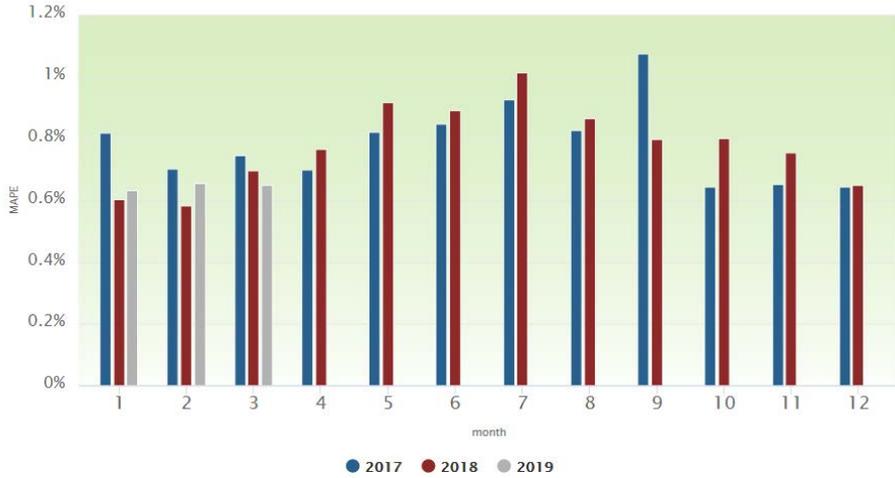


NVE T-60 Minute Forecast

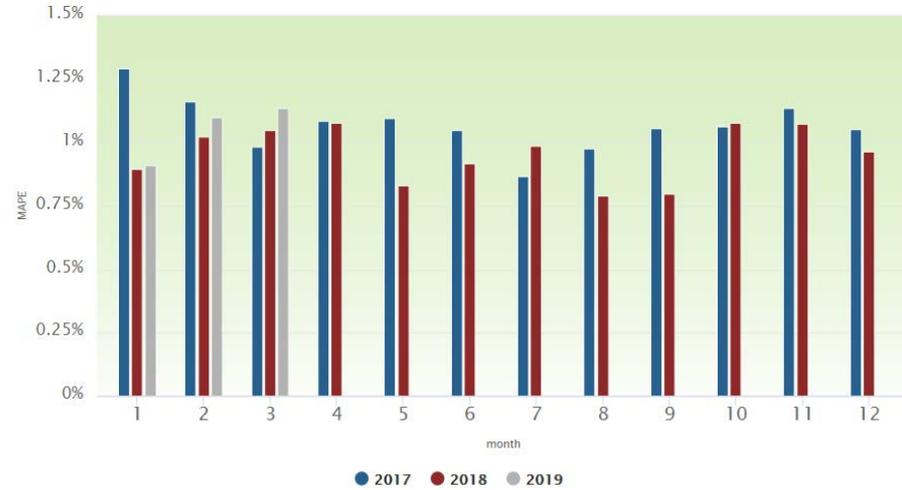


EIM T-60 Forecast

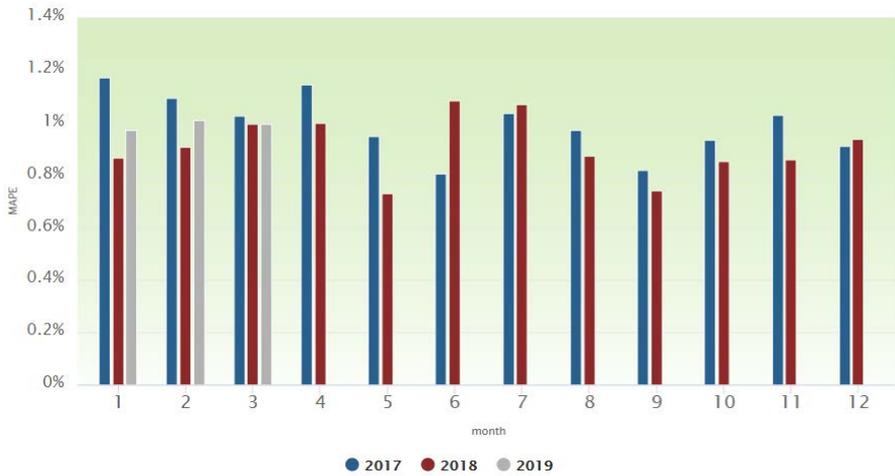
PACE T-60 Minute Forecast



PACW T-60 Minute Forecast



PSE T-60 Minute Forecast



Policy Update

Jill Powers

Infrastructure & Regulatory Policy Manager

Brad Cooper

Senior Manager, Market Design Policy

Policy stakeholder initiatives

- **Transmission Access Charge Structure Enhancements**
 - Policy development completed
 - ISO Board of Governors Meeting – TBD (previously May)
- **Resource Adequacy Enhancements**
 - Revised straw proposal – late June, SH meeting second week of July
 - ISO Board of Governors Meeting Q2
- **Excess Behind the Meter Production**
 - Draft final proposal posted on December 12
 - May 2019 ISO Board of Governors meeting

Ongoing policy stakeholder initiatives (continued)

- Energy Storage and Distributed Energy Resources Phase 4
 - Issue Paper posted February 6
 - Working group meeting held on March 18
 - Received stakeholder comments on April 1
 - Straw Proposal will be posted by April 24
- Storage as a Transmission Asset
 - Policy development on hold pending completion of ESDER 4 policy development

Ongoing policy stakeholder initiatives (continued)

- Day-Ahead Market Enhancements - Phase 1
(15-minute granularity)
 - EIM Governing Body hybrid non-EIM specific approval role. Primary approval role regarding EIM 15-min base schedules
 - March 7 stakeholder meeting on 3rd revised straw proposal
 - Assessing technical feasibility and stakeholder comments
 - Remaining schedule TBD

Ongoing policy stakeholder initiatives (continued)

- Day-Ahead Market Enhancements - Phase 2
(day-ahead flexible ramping product)
 - EIM Governing Body advisory role
 - March 7 stakeholder meeting on straw proposal/issue paper
 - Revised straw proposal – June 2019
 - Governing Body and Board decision dates TBD

Upcoming policy stakeholder initiatives

- **System Market Power Mitigation**
 - Report - April 2019
- **Intertie Offer Cost Verification**
 - Issue paper/straw proposal – April 2019
- **Maximum Gas Constraint**
 - Issue Paper – April/May 2019
- **Market Settlement Timeline Enhancements**
 - Q2 2019 – Issue paper/straw proposal – May 2019
- **Extended day-ahead market (EDAM)**
 - Q2/Q3 2019 – Schedule TBD

Release Plan Update

Adrian Chiosea

Manager, Strategic Initiative Management

The ISO offers innovative training programs

Date	Training courses and workshops
April 11	Welcome to the ISO webinar
Mid-April	EIM Resource Sufficiency Enhancements CBT
April 23 -25	ISO Training Workshop (ISO Headquarters)



CustomerTraining@caiso.com

New Modules (recorded webinar and slides)

You can find new initiatives training courses on the learning center web page below.
More resources will be added throughout 2019 in accordance with project schedules.

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 Imbalance Energy Market

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>

Release Plan Summary: 2019

Spring 2019

- Commitment Cost Enhancement (CCE) Phase 3

Independent 2019

- EIM Resource Sufficiency Enhancements
- LMC Transparency Enhancement

Fall 2019

- Commitment Costs and Default Energy Bid Enhancements Phase 1
- Energy Storage and Distributed Energy Resources Phase 3A
- RMR and CPM Enhancements (March 2019 BOG)
- Local Market Power Mitigation Enhancements (Mar 2019 BOG)
- EIM 2019 Enhancements

Release Plan Summary: 2020 - 2021

Spring 2020

- Energy Imbalance Market (EIM) 2020 Salt River Project
- Energy Imbalance Market (EIM) 2020 Seattle City Light
- Energy Imbalance Market (EIM) 2020 Los Angeles Dept. of Water and Power

Independent 2020

- Automated Dispatch System (ADS) User Interface (UI) Replacement

Fall 2020

- DAME 15 Minute Granularity – Phase 1 (BOG TBD)
- Commitment Costs and Default Energy Bid Enhancements Phase 2
- Contingency Modeling Enhancements - Transmission
- Energy Storage and Distributed Energy Resources Phase 3B
- Dispatch Operating Target Tariff Clarifications
- Intertie Deviation Settlement
- Excess Behind the Meter Production (May 2019 BOG)

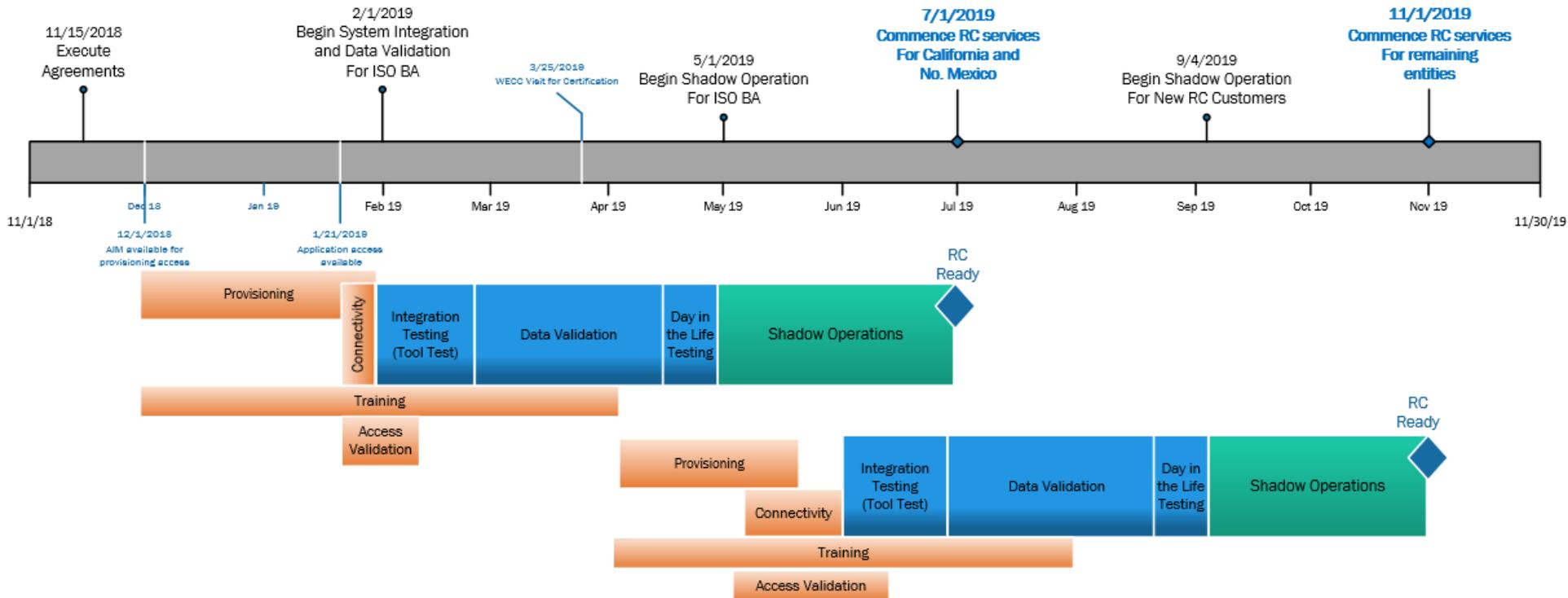
Spring 2021

- Energy Imbalance Market (EIM) 2021 Public Service Company of New Mexico
- Energy Imbalance Market (EIM) 2021 North-Western Energy

TBD – tentative, subject to impact assessment

- DAME - Flexible Ramping Product (BOG TBD)
- RA Enhancements Track 2 (Q2 BOG)
- Energy Storage and Distributed Energy Resources Phase 4
- Storage as a Transmission Facility (BOG TBD)
- TAC Structure Enhancements (BOG TBD)

RC Participant Onboarding Timeline – please attend RC Onboarding webinars for more information.



System Interface Changes: CMRI

Release	Project	Change Type	Customer Impact	Customer Action	UI Change	API Service Name & Major Version	MAP Stage	Production Activation	Technical Specifications	Artifacts
Spring 2019	CCE3	New	CAISO Market	Adopt when ready	Tab: Default Bids New Report: Actual Limitation Values	RetrieveActualLimitationValues_CMRIv1 RetrieveActualLimitationValues_CMRIv1_DocAttach	Sep 2018	April 1, 2019* *Data available April 18 for May 2018 thru April 2019	3.8.2	1.1
Spring 2019	CCE3	New	CAISO Market	Adopt when ready	Tab: Default Bids New Report: Resource Opportunity Costs	RetrieveResourceOpportunityCost_CMRIv1 RetrieveResourceOpportunityCost_CMRIv1_DocAttach	Sep 2018	April 1, 2019* *Data available April 30 for May 2019	3.8.2	1.1
2019	RCSI	New	RC	Adopt when ready	New Tab: Reliability Coordination New Report: Load Forecast	RetrieveRCLoadForecast_CMRI_v1 RetrieveRCLoadForecast_CMRI_v1_DocAttach	Feb 1, 2019	Jul 1, 2019	1.0.0	1.1.0

System Interface Changes: OMS

Release	Project	Change Type	API Service Name & Major Version	MAP Stage	Production Activation	Technical Specifications	Artifacts
2019	RCSI	Modify* <i>*While the CAISO supports two major versions of API, the CAISO strongly recommends moving to the latest one (v3)</i>	RetrieveAvailabilityResults_OMSv2 RetrieveAvailabilityResults_OMSv2_DocAttach RetrieveResourceOutage_OMSv3 RetrieveResourceOutage_OMSv3_DocAttach RetrieveResourceOutageChangeRequest_OMSv3 RetrieveResourceOutageChangeRequest_OMSv3_DocAttach RetrieveTransmissionOutage_OMSv3 RetrieveTransmissionOutage_OMSv3_DocAttach RetrieveTransmissionOutageChangeRequest_OMSv3 RetrieveTransmissionOutageChangeRequest_OMSv3_DocAttach SubmitResourceOutage_OMSv3 SubmitResourceOutage_OMSv3_DocAttach SubmitResourceOutageChangeRequest_OMSv3 SubmitResourceOutageChangeRequest_OMSv3_DocAttach SubmitTransmissionOutage_OMSv3 SubmitTransmissionOutage_OMSv3_DocAttach SubmitTransmissionOutageChangeRequest_OMSv3 SubmitTransmissionOutageChangeRequest_OMSv3_DocAttach	Feb 28, 2019	Jul 1, 2019	2.0	Artifacts

System Interface Changes: ALFS, RCBSAP, RCEIDE, STLMT

System	Release	Project	Change Type	API Service Name & Major Version	MAP Stage	Production Activation	Technical Specifications	Artifacts
ALFS	2019	RCSI	New	SubmitExternalEntity5MinLoadForecast_ALFSv1 SubmitExternalEntity5MinLoadForecast_ALFSv1_DocAttach	Feb 1, 2019	Jul 1, 2019	1.0.0	Artifacts
				SubmitExternalEntity15MinLoadForecast_ALFSv1 SubmitExternalEntity15MinLoadForecast_ALFSv1_DocAttach				
				SubmitExternalEntity60MinLoadForecast_ALFSv1 SubmitExternalEntity60MinLoadForecast_ALFSv1_DocAttach				
RCBSAP	2019	RCSI	New	RetrieveRCBaseScheduleResults_RCBSAPv1 RetrieveRCBaseScheduleResults_RCBSAPv1_DocAttach	Feb 1, 2019	Jul 1, 2019	1.1	Artifacts
				SubmitRCBaseSchedule_RCBSAPv1 SubmitRCBaseSchedule_RCBSAPv1_DocAttach				
RCEIDE	2019	RCSI	New	PutSchedule_RC	Feb 1, 2019	Jul 1, 2019	1.0	Artifacts
STLMT	2019	RCSI	New	SubmitNetEnergyData_STLMTv1 SubmitNetEnergyData_STLMTv1_DocAttach *For RC Customers outside of the CAISO BA to submit Net Energy for Load and Net Generation	TBD	TBD	1.0	1.0

References

- This document
 - <http://www.caiso.com/Documents/SystemInterfaceChangeSummary.pdf>
- Developer Site
 - <https://developer.caiso.com/>
 - Requires sign-up for access
 - Fall 2019 Release Technical Specifications will be published here
- Application Access
 - <http://www.caiso.com/participate/Pages/ApplicationAccess/Default.aspx>

Release Schedule 2019

Date of Data Refresh: 4/2/19 9:11 AM



Legend		
Market Simulation	CA ISO Holiday	
External Testing	Deployment Week	

4/1/19 - 4/7/19
4/8/19 - 4/14/19
4/15/19 - 4/21/19
4/22/19 - 4/28/19
4/29/19 - 5/5/19
5/6/19 - 5/12/19
5/27/19 - 6/2/19
7/1/19 - 7/7/19
7/8/19 - 7/14/19
7/15/19 - 7/21/19
7/22/19 - 7/28/19
7/29/19 - 8/4/19
8/5/19 - 8/11/19
8/12/19 - 8/18/19
8/19/19 - 8/25/19
8/26/19 - 9/1/19
9/2/19 - 9/8/19
9/30/19 - 10/6/19

MAP Stage Environment Window

EIM Resource Sufficiency - Capacity & Sufficiency	EIM Resource Sufficiency - Capacity & Sufficiency (04/01-05/06)
EIM Resource Sufficiency - Capacity & Sufficiency - External Testing Starts	EIM Resource Sufficiency - Capacity & Sufficiency - External Testing Starts (04/01)
CCDEBE Phase 1	CCDEBE Phase 1 (07/15-08/30)
CCDEBE Phase 1 - Market Sim	CCDEBE Phase 1 - Market Sim (07/15-08/30)
ESDER Phase 3A	ESDER Phase 3A - Bid Dispatchable Option (07/15-08/30)
ESDER Phase 3A - Market Sim	ESDER Phase 3A - Bid Dispatchable Option - Market Sim (07/15-08/30)
RMR and CPM Enhancements	RMR and CPM Enhancements (07/15-08/30)
RMR and CPM Enhancements - Market Sim	RMR and CPM Enhancements - Market Sim (07/15-08/30)
LMPM - Enhancements	LMPM - Enhancements (07/15-08/30)
LMPM - Enhancements - Market Sim	LMPM - Enhancements - Market Sim (07/15-08/30)
EIM Enhancements 2019	EIM Enhancements 2019 (07/15-08/30)
EIM Enhancements 2019 - Market Sim	EIM Enhancements 2019 - Market Sim (07/15-08/30)

Production Environment Window

Commitment Cost Enhancements Phase 3 Activation	Commitment Cost Enhancements Phase 3 Activation (04/01)
EIM - BANC-SMUD	EIM - BANC-SMUD (04/03)
LMC Transparency Enhancements	LMC Transparency Enhancements (05/01)
EIM Resource Sufficiency Capacity & Sufficiency	EIM Resource Sufficiency Capacity & Sufficiency (05/06)
CCDEBE Phase 1	CCDEBE Phase 1 (10/01)
ESDER Phase 3A	ESDER Phase 3A (10/01)
RMR and CPM Enhancements	RMR and CPM Enhancements (10/01)
LMPM - Enhancements	LMPM - Enhancements (10/01)
EIM Enhancements 2019	EIM Enhancements 2019 (10/01)

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

2019 Spring Release

Spring 2019 - Commitment Cost Enhancements Phase 3

Project Info	Details/Date
Application Software Changes	<p>Scope:</p> <ol style="list-style-type: none"> 1. Clarify use-limited registration process and documentation to determine opportunity costs 2. Clarify definition of “use-limited”; add MSG Configuration ID to ULPDT 3. Change Nature of Work attributes (Outage cards) <ul style="list-style-type: none"> • Modify use-limited reached for RAAIM Treatment • Allow PDR to submit use-limit outage card for fatigue break. 4. Market Characteristics (added to GRDT in Spring 2018) shall be Read-Only and set to Null <ul style="list-style-type: none"> • Maximum Daily Starts • Maximum MSG transitions • Ramp rates <p>Impacted Systems:</p> <ol style="list-style-type: none"> 1. Master File: Set use-limited resource types and limits 2. CIRA: RAAIM exempt rule for “use-limited reached” 3. CMRI: Publish opportunity cost 4. SIBR: Add Opportunity cost adders on bid caps 5. OMS: “Use-Limited Reached” nature of work attribute for Generation Outage Card 6. Settlements: Publish the actual start up, run hour and energy output for the use-limited resources
BPM Changes	Market Instruments, Outage Management, Reliability Requirement, Market Operations

Spring 2019 - Commitment Cost Enhancements Phase 3 (cont.)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors (BOG) Approval	Mar 25, 2016	✓
External BRS	Post Updated External BRS	Aug 21, 2017	✓
Config Guides	Config Guide	May 17, 2018	✓
Tech Spec	Publish Updated Master File Technical Specification, GRDT/IRDT Definitions	Jul 13, 2018	✓
	Publish updated CMRI Tech Spec, updated API for Use Limit Type Enumeration update	Aug 02, 2018	✓
Tariff	Draft Tariff	Jul 31, 2017	✓
	File Tariff	Mar 23, 2018	✓
BPMs	Publish Draft BPM: Market Instruments	Oct 19, 2018	✓
	Publish Draft BPM: Market Operations	Oct 19, 2018	✓
	Publish updated Draft BPMs	Dec 07, 2018	✓
	Publish updated Draft BPM: Market Operations (PRR 1147)	Mar 04, 2019	✓
External Training	Deliver External Training	Sep 10, 2018	✓
Market Simulation	Full Market Simulation Testing	Sep 05, 2018 - Oct 12, 2018	✓
Production Activation	ISO reach out to resources eligible for negotiated opportunity costs	Feb 2019	✓
	Commitment Costs Phase 3	Apr 01, 2019	✓
	OC Adders Effective	May 01, 2019	

2019 Independent

Independent 2019 – Overview

	Board Approval	External BRS	Config Guide	Tech Spec	Draft Tariff**	BPMs	External Training	Market Sim / Ext Testing Start	Production Activation
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Independent 2019 - Overview

EIM Resource Sufficiency Enhancements – Capacity & Sufficiency	N/A	02/22/19	N/A	02/20/19	N/A	02/14/19	03/25/19	04/01/19	05/06/19
LMC Transparency Enhancement	N/A	11/19/18	10/19/18	N/A	N/A	10/19/18	N/A	N/A	05/01/19

Notes:

Items in **BLUE** are complete

Items in **PURPLE** indicate a new date.

*TBD items may be inapplicable, or they may have undetermined dates

**Draft Tariff dates have been updated to show only the draft tariff posting. FERC Filing dates can be seen on individual project slides.

2019 – EIM Resource Sufficiency Enhancements

Project Info	Details/Date
Application Software Changes	<p>EIM: Perform Capacity Test and Flex Ramp Up/Down Sufficiency Test Enhancements</p> <ul style="list-style-type: none"> • Apply Tolerance Threshold to Flex Ramp Sufficiency Test of 1% or 1MW threshold, whichever greater • Both Bid Range Capacity and Flex Ramp Sufficiency Test evaluations shall independently pass/fail for each 15min interval of next trade hour at T-70, T-55, and T-40 • Apply new Bid Range Capacity Test rule where failure of one 15min interval of trade hour results in failure of same 15-minute interval for Flex Ramp Sufficiency Test <p>BAAOP: EIM Operator displays shall be modified to:</p> <ol style="list-style-type: none"> 1) Present EIM BAA Sufficiency Test status results in 15min granularity for Bid Range Capacity and Flex Ramp Up/Down Sufficiency Tests (Balancing or Feasibility Test status results remain hourly) 2) Provide Bid Range Capacity Test results with 15min granularity <p>RTM (RTPD, RTD): Apply EIM transfer limits based on 15-minute Sufficiency Test results:</p> <ul style="list-style-type: none"> • EIM Transfer for 15min interval failing FRU/FRD limited from below/above (import/export) to least restrictive of: <ul style="list-style-type: none"> ○ EIM Transfer in previous 15min interval from last successful FMM, or ○ Base EIM Transfer schedule in current 15min interval from current FMM <p><i>See Technical Specifications note below regarding CMRI and OASIS impacts to data. No changes will be made to the data structure of API technical specifications (e.g. same data schema and broadcast service), but the data context and, in the case of OASIS, enumerations will change with the transition to 15min granularity.</i></p> <p><i>Note: No settlement impact.</i></p>
BPM Changes	<ul style="list-style-type: none"> • Energy Imbalance Market • Market Instruments • Market Operations

2019 – EIM Resource Sufficiency Enhancements

Project Info	Details/Date
Technical Specifications	<p>CMRI and OASIS API technical specifications will <i>not</i> be modified, although the following changes in data context will occur:</p> <p>CMRI:</p> <ul style="list-style-type: none">• <i>Energy Imbalance Market > Bid Range Capacity Test Results</i> report shall transition from reporting hourly result in either UP or DOWN direction (one record) to reporting the most-insufficient 15-minute time interval of trade hour in both UP and DOWN direction (two records)• Bid Capacity and Flex sufficiency values (reported as negative insufficiency) will be provided for each 15min interval (instead of zero value) to clarify EIM BAA's proximity to insufficiency thresholds <p>OASIS:</p> <ul style="list-style-type: none">• <i>Energy > EIM Transfer Limits</i> report (which was previously deprecated in 2015) will be re-purposed to provide the IMPORT and EXPORT Net EIM Transfer Limits for binding 15min/5min RTM intervals impacted by Flex Ramp Up/Down Sufficiency Test failure (by EIM Balancing Authority Area)• The API name (existing) for the OASIS report is “<i>ENE_EIM_TRANSFER_LIMITS</i>”• Pre-existing report data (from 2015) reflecting “High” and “Low” Limit Types will remain; this implementation will provide “Import” and “Export” Limit Types for the report's re-purposed use <p>No formal structured scenarios will be schedule for Market Simulation, but test environment will be available to allow external participants to test impacts to their business processes.</p> <p><i>Example results will be provided in forthcoming external business requirements specification (External BRS) document.</i></p>

2019 – EIM Resource Sufficiency Enhancements – Capacity & Sufficiency

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Milestone: Post External BRS (v1.0)	Jan 16, 2019	✓
	Milestone: Post External BRS (v1.1)	Jan 25, 2019	✓
	Milestone: Post External BRS (v1.2)	Feb 22, 2019	✓
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Create ISO Interface Spec (OASIS Tech spec)	Feb 20, 2019	✓
Tariff	File Tariff	N/A	
BPMs	Post Draft Business Practice Manual changes (1% Threshold)	Jan 22, 2019	✓
	Post Draft Business Practice Manual changes (Non-Threshold)	Feb 14, 2019	✓
External Training	Deliver External Training	Mar 25, 2019	✓
	Post External CBT Online	Mid-Apr 2019	
External Testing	Capacity & Sufficiency - External Testing Starts	Apr 01, 2019	✓
Production Activation	EIM Resource Sufficiency 1% Threshold	Feb 15, 2019	✓
	EIM Resource Sufficiency Cap & Sufficiency	May 6, 2019	

2019 – LMC Transparency Enhancement

Project Info	Details/Date
Application Software Changes	<p>Logical Meter Calculation (LMC) enhancements will provide additional transparency for ISO market participant dynamic system resources (non ISO-pollled) by providing LMC Allocation Factors used to determine the 5-minute settlement interval meter value as a bill determinant. Allocation Factor bill determinants become available for settlement dates on or after May 1, 2019.</p>

Milestone Type	Milestone Name	Dates	Status
External BRS	Post External BRS	Nov 19, 2018	✓
Config Guides	Post Config Guides	Oct 19, 2018	✓
BPMs	Post Draft BPM changes – PRR 1102	Oct 19, 2018	✓
Market Simulation	Market Sim Window	N/A	
Production Activation	LMC Transparency Enhancements	May 1, 2019	

2019 Fall Release

Fall 2019 Release – Overview

	Board Approval	External BRS	Config Guide	Tech Spec***	Mkt Sim Scenarios	Draft Tariff**	BPMs	External Training	Market Sim	Production Activation
Fall 2019 Release - Overview		04/01/19	05/17/19	05/17/19	05/17/19	06/14/19	07/12/19	07/12/19	07/15/19 – 08/30/19	10/01/19
CCDEBE Phase 1	03/22/18	04/05/19	N/A	05/17/19	05/17/19	06/14/19	07/12/19	07/11/19	07/15/19 – 08/30/19	10/01/19
ESDER Phase 3A	09/05/18	03/20/19	05/17/19	05/02/19	05/17/19	05/15/19	06/20/19	07/10/19	07/15/19 – 08/30/19	10/01/19
RMR and CPM Enhancements	03/28/19	04/01/19	05/17/19	N/A	05/17/19	4/3/19	07/12/19	07/12/19	07/15/19 – 08/30/19	10/01/19
LMPM - Enhancements	03/28/19	04/01/19	N/A	05/17/19	05/17/19	06/14/19	07/12/19	07/12/19	07/15/19 – 08/30/19	10/01/19
EIM Enhancements 2019	N/A	02/05/19	05/17/19	05/17/19	05/17/19	N/A	TBD	TBD	07/15/19 – 08/30/19	10/01/19

Notes:

Items in **BLUE** are complete

Items in **PURPLE** indicate a new date.

Items in **RED** indicate a new date which is later than the target date listed on the overview line.

*TBD items may be inapplicable, or they may have undetermined dates

**Draft Tariff dates have been updated to show only the draft tariff posting. FERC Filing dates can be seen on individual project slides.

***Fall 2019 Release Technical Specifications will be published at <https://developer.aiso.com>; **this site requires sign-up for access**

Fall 2019 Release – System Interface Changes

(Preliminary)

System	Project	Change Type	Description	MAP Stage	Production Activation	Technical Specifications	Artifacts
CMRI	CCDEBE1	New	participant to retrieve final default commitment cost	Jul 15, 2019	Oct 1, 2019	May 17, 2019 https://developer.caiso.com/	
CMRI	CCDEBE1	Modify	participant to retrieve default bid curve at hourly level and include DEB source (cost type/ exante process)				
CMRI	LMPME	Modify	DefaultBidCurves_v1 XSD change to remove enumeration from XSD				
CMRI	EIM 2019	Modify	include base schedule deviation in the balancing test results XSD				
DRRS	ESDER3A	New	DRRegistrationData				
MF	ESDER3A	Modify	GeneratorRDT_v4 XSD for additional bid dispatchable option for PDR				
MF	LMPME	Modify	GeneratorRDT_v4 XSD change to add default/alternate bilateral hub, max horizon cap value, and new DEB type				
SIBR	CCDEBE1	New	participant to submit exante bid and commitment				
SIBR	CCDEBE1	New	participant to retrieve submitted exante bid and commitment				
SIBR	CCDEBE1	New	participant to retrieve final exante bid and commitment				

Fall 2019 – Commitment Cost and Default Energy Bid Enhancements Ph1

Project Info	Details/Date
Application Software Changes	<p><u>Scope:</u> Enhances the ability to submit market-based commitment cost bids in order to reflect unique costs and volatility:</p> <ul style="list-style-type: none"> • Support integration of renewable resources through incentivizing flexible resources participation during tight fuel supply • Account for costs of flexible resources (gas and non-gas) to reduce risk of insufficient cost recovery • Encourage participation of non-RA and voluntary EIM resources; compliance with FERC Order 831 • Raises energy bid cap from \$1,000/MWh to \$2,000/MWh: • Requires supporting verified costs of energy bids above \$1,000/MWh <p><u>Impacted Systems:</u></p> <ul style="list-style-type: none"> • SIBR: Allow the submittal of Ex Ante cost adjustments. Increase energy bid caps, incorporate soft energy bid cap. • IFM/RTM: Recalibrate the penalty price parameters in response to raising energy bid cap to \$2,000/MWh. • CMRI: Provide additional source information for default bids. • CIDI: Submit requests for manual consultation and ex-post default bid adjustments.
BPM Changes	<ul style="list-style-type: none"> • Market Instruments • Market Operations
Business Process Changes	<ul style="list-style-type: none"> • Maintain Major Maintenance Adders (MMG LIII) • Maintain Negotiated Default Energy Bids (MMG LIII) • Maintain Negotiated O_Ms (MMG LIII) • Manage Day Ahead Market (MMG LII) • Manage Market Billing Settlements (MOS LII) • Manage Real Time Hourly Market (RTPD) (MMG LII) • Manage Real Time Operations – Maintain Balance Area (MMG LII)

Fall 2019 – Commitment Cost and Default Energy Bid Enhancements Ph1

Milestone Type	Milestone Name	Dates	Status
Draft Policy	Publish Draft Business Rules externally	Jan 31, 2018	✓
Board Approval	Obtain Board of Governors Approval	Mar 22, 2018	✓
External BRS	Publish revised external BRS	Jan 22, 2019	✓
	Update External BRS: Reference Level Adjustments	Apr 05, 2019	✓
	Update External BRS: Phase 1/Phase 2, clarifications	Mar 28, 2019	✓
Config Guides	Config Guide	N/A	
Tech Spec	Publish Technical Specifications	May 17, 2019	
Tariff	File Tariff (possibly multiple filings)	Jun 14, 2019	
BPMs	Post Draft BPM changes	Jul 12, 2019	
External Training	Deliver external training	Jul 11, 2019	
Market Sim	Market Sim Window	Jul 15, 2019 - Aug 30, 2019	
Production Activation	CCDEBE	Oct 01, 2019	

Fall 2019 – ESDER Phase 3a – Bid Dispatchable Option

Project Info	Details/Date
Application Software Changes	<p><u>Scope:</u> The ESDER 3a scope of the larger ESDER3 initiative will include two (2) demand response enhancements:</p> <ul style="list-style-type: none">• New bid dispatchable options for demand response resources• Removal of single LSE requirement for PDR registrations & removal of default load adjustment (DLA) <p>Additionally, for ESDER2 Tariff Compliance, following is being implemented as part of this project</p> <ul style="list-style-type: none">• Customer Load Baseline Submittal <p><u>Impacted Systems (Overview):</u></p> <p>Master File:</p> <ul style="list-style-type: none">• RDTs for PDR registrations in MF will require selection of an effective Bid Dispatchable Option to be used for market optimization and dispatch <p>DRRS:</p> <ul style="list-style-type: none">• PDR registrations will not require all service accounts to have the same LSE <p>SIBR:</p> <ul style="list-style-type: none">• Will apply Net Benefit Test price criteria for PDR bids and reject those not meeting the applicable criteria• Will not allow Bid Dispatchable Options to be changed in SIBR <p>HASP/RTM:</p> <ul style="list-style-type: none">• Will use effective Bid Dispatchable Option registered in MF (e.g., 5-min, 15-min or Hourly) for market optimization and dispatch instructions• Will broadcast new PDR energy schedules/awards and instructions to downstream applications

Fall 2019 – ESDER Phase 3a – Bid Dispatchable Option (cont.)

Project Info	Details/Date
Application Software Changes (continued)	<p>Settlements:</p> <ul style="list-style-type: none"> Will remove the default load adjustment (DLA) application Will provide Bid Cost Recovery for PDRs with 15-Minute Bids but not Hourly Bids <p>CMRI:</p> <ul style="list-style-type: none"> Will include energy schedules and awards for PDRs with new Bid Dispatchable Options (Existing) <p>MRI-Settlements (ESDER2 Tariff Compliance):</p> <ul style="list-style-type: none"> New BASE measurement type for monitoring calculated baseline data
BPM Changes	Market Operations, Market Instruments, Outage Management, Settlements and Billing
Tariff Change	4.13 and 11.6

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Sep 05, 2018	✓
External BRS	Post External BRS	Feb 11, 2019	✓
	Post Revised External BRS	Feb 25, 2019	✓
	Post Revised External BRS as per scope change for Fall 2019	Mar 20, 2019	✓
Config Guides	Post Draft Config Guides	May 17, 2019	
Tech Spec	Publish Technical Specifications	May 02, 2019	
Tariff	Post Draft Tariff	May 15, 2019	
	File Tariff	Jul 01, 2019	
BPMs	Post Draft BPM changes	Jun 20, 2019	
External Training	External Training	Jul 10, 2019	
Market Sim	MARKET SIMULATION	Jul 15, 2019 - Aug 30, 2019	
Production Activation	ESDER 3a - DRRS	Sep 18, 2019	
	ESDER Phase 3a - Bid Dispatchable Option	Oct 01, 2019	

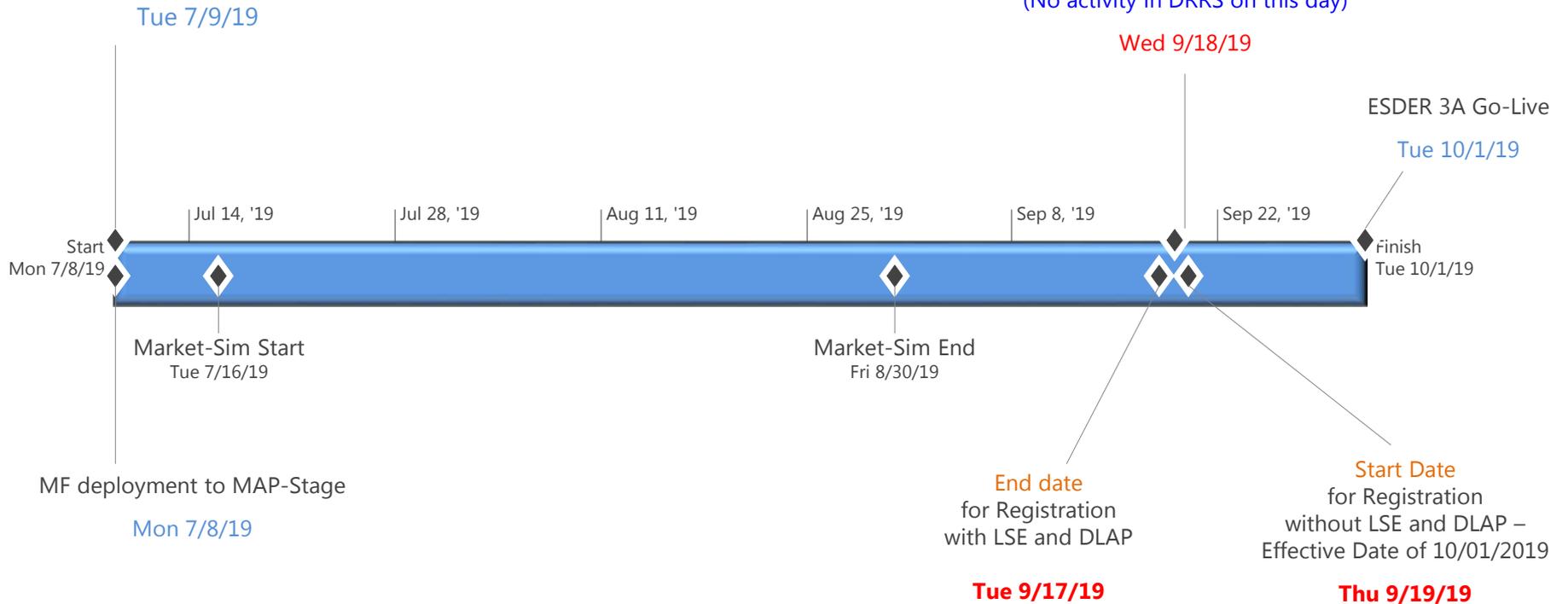
Fall 2019 – ESDER Phase 3a – Bid Dispatchable Option (cont.)

Proposed DRRS Transition Timeline

MPs can change their resource to be hourly or 15 min via MF for Market-Sim

DRRS Production Deployment

(No activity in DRRS on this day)



Fall 2019 – RMR and CPM Enhancements

Project Info	Details/Date
<p>Application Software Changes</p>	<p><u>Scope:</u></p> <p>RMR and CPM Enhancements will address the following policy and tariff amendment scope:</p> <ul style="list-style-type: none"> • Risk-of-Retirement will transition from CPM to RMR Tariff section • RMR units with new contracts shall: <ul style="list-style-type: none"> Have reliability capacity allocated by TAC Area (for PTOs, not LSEs), Flex RA credit shall be applied Receive Must-Offer Obligation (MOO) Subject to RAAIM Streamline RMR invoicing, settlement process through inclusion in ISO Settlement process <p>CPM units shall have pricing formulation for resources offering CPM above soft-offer cap</p> <p><u>Impacted Systems (Overview):</u></p> <p>Master File:</p> <ul style="list-style-type: none"> • New resource RMR contract type flag to distinguish RMR units with contracts signed prior to (“pre-existing”) vs. after (“new”) the Interim RMR Agreement Tariff Amendment was enacted. <p>CIRA:</p> <ul style="list-style-type: none"> • New features to both qualify (e.g. confirm EFC is defined) and allocate System/Local/Flex reliability capacity by TAC Area (for PTOs) for RMR units with new contract type: <ul style="list-style-type: none"> • Apply Flex RA credit by TAC Area (for PTOs) • Perform RMR Substitution • Support RMR Risk-of-Retirement • Like RA resources, new contract type RMR units will receive RAAIM status determination <p>SIBR</p> <ul style="list-style-type: none"> • Like RA resources, automatically generates cost-based energy bids for new contract type RMR units for un-submitted bid range below RMR contract capacity <ul style="list-style-type: none"> • Bids will reflect applicable GHG Compliance costs, SC charges, Major Maintenance Adder (MMA), or Opportunity Costs (OC); Note: MMA and OC will only be applied for Unit Commitment/Economic Dispatch decisions in market (will not be recovered in settlement) • Removes self-schedule requirement for new contract type RMR units scheduled/dispatched in Day-Ahead Market

Fall 2019 – RMR and CPM Enhancements (cont.)

Project Info	Details/Date
Application Software Changes	<p><u>Impacted Systems (Continued):</u></p> <p>IFM/RTM:</p> <ul style="list-style-type: none"> • Unit Commitment, Economic Dispatch decisions will include applicable MMA and OC • Like RA resources, new contract type RMR units will have automatic RA Obligation (\$0/MWh bids in RUC) <p>Settlements:</p> <ul style="list-style-type: none"> • RMR units under new contract type will receive: <ul style="list-style-type: none"> • Replacement of existing RMR invoice and settlement with standard ISO settlement process • Monthly RMR capacity payment (by resource) and cost allocation (by PTO) • RAAIM settlement/allocation • Bid Cost Recovery (does not include MMA or OC) • True-ups for RMR Condition 2 overpayment (does not include MMA or OC) • CPM units with offers above soft-offer cap may receive true-up based on CPM pricing formulation (formulation TBD)
BPM Changes	Reliability Requirements, Market Operations, Market Instruments, Settlements and Billing
Tariff Change	11.13, 31.2.2, 34.1, 40.9, 41, 43, 43A, Appendix G

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors Approval	Mar 28, 2019	✓
External BRS	Post External BRS	Apr 01, 2019	✓
Config Guides	Publish Config Guide	May 17, 2019	
Tech Spec	Publish Technical Specifications	N/A	
Tariff	Post draft tariff (third revision)	Apr 3, 2019	✓
	File Tariff w/ FERC	Apr 19, 2019	
BPMs	Post Draft BPM changes	Jul 12, 2019	
External Training	Deliver External Training	Jul 12, 2019	
Market Sim	Market Sim Window	Jul 15, 2019 - Aug 30, 2019	
Production Activation	RMR and CPM Enhancements	Oct 01, 2019	

Fall 2019 – Local Market Power Mitigation Enhancements

Project Info	Details/Date
Application Software Changes	<p>Scope: Prevent Flow reversal, Limits transfer, DEB for Hydro, Reference level adjustment process, Gas price Indices</p> <p>Impacted Systems:</p> <p>RTM: Prevent flow reversal Eliminate rule mitigate in FMM carry to RTD Eliminate rule mitigate for balance of hour for FMM, balance 15 minute for RTD Use current market competitive LMP for mitigation Add a nominal parameter to mitigated bids Mitigated bid = MAX (DEB, Competitive LMP + \$0.xx parameter)</p> <p>RTM: Limit transfers to limit Economic Displacement Optional rule for EIM BAA Limit transfers to the greater of exports in MPM and flexible ramping requirements Export Limit = MAX [ExportsBase, ExportsMPM, $\Sigma FRUMPMAward$] The exporting BAA will receive congestion rents created by this proposed rule</p> <p>OASIS: Publish EIM transfer limit</p> <p>CMRI: Display new Hydro DEB type</p> <p>Master File: Option to limit transfer per a defined rule Manage Hydro DEB eligibility at resource level New field to select and rank hydro DEB option Store resource's maximum storage horizon Identify default trading hubs for hydro resources, requests changes to additional hubs Ability to view parameters and ranking of approved hydro DEBs</p>
BPM Changes	Market Operations, Market Instruments
Tariff Change	Section 29.39, 31.2.1, 39.7

Fall 2019 – Local Market Power Mitigation Enhancements (cont.)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors Approval	Mar 28, 2019	✓
External BRS	Post External BRS	Apr 01, 2019	✓
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Publish Technical Specifications	May 17, 2019	
Tariff	File Tariff	Jun 14, 2019	
BPMs	Post Draft BPM changes	Jul 12, 2019	
External Training	Deliver external training	Jul 12, 2019	
Market Sim	Market Sim Window	Jul 15, 2019 - Aug 30, 2019	
Production Activation	LMPM - Enhancements	Oct 01, 2019	

Fall 2019 – Energy Imbalance Market Enhancements 2019

Project Info	Details/Date
Application Software Changes	<p>Scope: Implement 21 EIM enhancements requested by EIM entities through Customer Inquiry, Dispute and Information system (CIDI)</p> <p>Impacted Systems: BAAOP: Add displays for BAA overview, Unit deviations, Load Bias, transfer limits, contingency flag, timestamps, and other identified items. Enhance sorting and layouts ability. Enhance alarm ability for market thresholds. BSAP: Enhance capability for Base schedule modification, Add aggregated BS deviation in API. OASIS or CMRI: Display ROC limits Display 5-min market transmission Loss RTM: prevent ETSR swing using explicit triggers. ADS: Publish current DOP in the MSG transition period. Settlement: Publish data for UFE shadow calculation; Settle EIM Resource Deviation within Regulation/ABC range as instructed regulation energy. CMRI: Publish resource limit values</p>
BPM Changes	Market Instruments, Energy Imbalance Market

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Milestone: Post External BRS	Feb 05, 2019	✓
Config Guides	Publish Config. Guides	May 17, 2019	
Tech Spec	Create ISO Interface Spec (Tech spec)	May 17, 2019	
Tariff	File Tariff	N/A	
BPMs	Post Draft BPM changes	TBD	
External Training	External Training	TBD	
Market Sim	Market Sim Window	Jul 15, 2019 - Aug 30, 2019	
Production Activation	EIM Enhancements 2019	Oct 01, 2019	

2020 Spring Release

Spring 2020 – EIM integrations for SCL, LADWP, and SRP

Project Info	Details/Date
Application Software Changes	Implementation of SCL, LADWP, and SRP as EIM Entities
BPM Changes	EIM BPM will be updated if needed to reflect new modeling scenarios identified during implementation and feedback from SCL, LADWP, and SRP.
Market Simulation	December 2019 – January 2020
Parallel Operations	February 2020 – March 2020

Milestone Type	Milestone Name	Dates	Status
Tariff	File Readiness Certification	March 2020	
Market Sim	Market Sim Window	December 2019 – January 2020	
Parallel Operations	Parallel Operations	February 2020 – March 2020	
Production Activation	EIM – SCL, LADWP, SRP	April 2020	

2020 Independent

2020 – ADS Replacement

Project Info	Details/Date
Application Software Changes	<ul style="list-style-type: none"> • Transition to web-based user interface to eliminate the need to install thick client • Transition ADS provisioning to the Access and Identity Management (AIM) application including Resource Level Access Controls (RACL) access • The query tool will provide 30 days of historical data • Various user interface enhancements adding content per Operation's request • ADS B2B services changes - TBD.
BPM Changes	<ul style="list-style-type: none"> • Market Instruments • Market Operations

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	N/A	
External BRS	Post External BRS	Aug 06, 2018	✓
ADS Update	ADS Update Meeting	Aug 15, 2018	✓
Config Guides	Design review - BPM and Tariff SMEs	N/A	
Tech Spec	Publish Technical Specifications	TBD	
Tariff	File Tariff	TBD	
BPMs	Post Draft BPM changes	TBD	
External Training	Conduct External Training	TBD	
Market Sim	Market Sim Window	Q2 2020	
Production Activation	ADS Replacement	Q2 2020	
Production	ADS Parallel Operations	Q2 2020	
Decommission	Old ADS Decommission	TBD	

2020 Fall Release

Fall 2020 – Commitment Cost and Default Energy Bid Enhancements Ph2

Project Info	Details/Date
Application Software Changes	<p><u>Scope:</u> Enhances the ability to submit market-based commitment cost bids in order to reflect unique costs and volatility:</p> <ul style="list-style-type: none"> • Introduces market power mitigation (MPM) measures for commitment costs. <p><u>Impacted Systems:</u></p> <ul style="list-style-type: none"> • SIBR: Incorporate negotiated default commitment bids. Increase commitment cost caps. Allow for hourly submittal of minimum load bids into day-ahead market. • IFM/RTM: Add MPM tests for commitment costs. Mitigate commitment costs where tests indicate market power. Incorporate MPM (both energy and commitment) in short term unit commitment process. • CMRI: Provide resource-specific reporting on mitigation results for commitment costs. • MQS/PCA: Incorporate mitigation of commitment costs for specific exceptional dispatch (ED) types. Incorporate bid locking of commitment costs for ED instructions and for certain cases where resources are uneconomic to operating. • Master File: Allow submittal of resource-specific minimum load costs for costs that are independent of the Pmin level. Add the ability to indicate preference for new negotiated cost basis type. Provide a view of resource-specific scalars used for validating Ex-Ante cost adjustments. • CIDI: Incorporate templates for submitting requests for manual consultation and ex-post default bid adjustments.

Fall 2020 – Commitment Cost and Default Energy Bid Enhancements Ph2

Project Info	Details/Date
BPM Changes	<ul style="list-style-type: none"> Market Instruments Market Operations
Business Process Changes	<ul style="list-style-type: none"> Maintain Major Maintenance Adders (MMG LIII) Maintain Negotiated Default Energy Bids (MMG LIII) Maintain Negotiated O_Ms (MMG LIII) Manage Day Ahead Market (MMG LII) Manage Market Billing Settlements (MOS LII) Manage Real Time Hourly Market (RTPD) (MMG LII) Manage Real Time Operations – Maintain Balance Area (MMG LII)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Mar 22, 2018	✓
External BRS	Publish external Business Requirements Specification (BRS)	Apr 5, 2019	✓
Config Guides	Publish Configuration Guide	N/A	
Tech Spec	Publish Technical Specifications	TBD	
Tariff	File Tariff (if needed)	TBD	
BPMs	Post Draft BPM changes	TBD	
External Training	Deliver external training	TBD	
Market Sim	Market Sim Window	TBD	
Production Activation	CCDEBE	Oct 01, 2020	

Fall 2020 – Day-Ahead Market Enhancements Phase 1

Project Info	Details/Date
Application Software Changes	<p>Scope: Phase 1: 15-minute Granularity DAM</p> <ul style="list-style-type: none"> • 15 minute bids in DAM and RTM • 15 minute scheduling and settlement in DAM • 15 minute Base schedule in RTM <p>Impacted Systems: ALFS: 15 minute Load and VER forecasts SIBR: SC submit bids for energy, AS in 15 min interval in DAM and RTM, InterSC Trade is in 15 minute MPM: Market Power Mitigation in 15 minute in DAM ETCC: <i>Transmission Contract limits in 15 minute interval for DAM</i> IFM/RUC:</p> <ul style="list-style-type: none"> • Calculate AS (RegU, RegD, Spin, NSP) requirements in 15 minute interval • Co-optimize Energy, AS, TD: 15 minute interval • TD+X: hourly intervals, need normalize the cost for mixed intervals • Hourly Block energy scheduling constraint for eligible resources elect the block option, intertie, RDRR and PDR. • AS on interties can only be procured from 15-minute dispatch-able resources <p>BSAP: <i>Submit Base Schedules in 15 minute interval, energy and AS</i> BASI: <i>Balance test, capacity test, and sufficiency test are in 15 minutes in RTM</i> RTM: Receive DAM 15 minute award Energy, AS; Receive EIM BAA submit 15 minute base Schedule. CMRI: report 15 minute IFM awards, include Energy and AS. Base schedule test results by 15 minute interval OASIS: Display IFM Energy and AS requirements and results in 15 minute intervals; 15-Minute RTM LAP Price report Settlement:</p> <ul style="list-style-type: none"> • All energy, include physical energy supply, virtual supply/demand, load from all resources are settled at the LMP: $\lambda + MCC + MLC$ in 15 minute interval • AS is settled in 15 minute interval • CRR Settled at DAM congestion cost component in 15-minute interval • GMC \$1 divided by 4 for IST • GMC market service portion will apply to AS bids • Administrative price use relevant DAM 15 minute price. • Make whole payment for price correction made to load and block export. • 15 minute bidding exports get BCR <p>EMS: receive DAM schedule in 15 minute interval</p>
BPM Changes	Market Instruments, Market Operations, Energy Imbalance Market (EIM), Settlements & Billing
Tariff Change	Yes

Fall 2020 – Dispatch Operating Target Tariff Clarification

Project Info	Details/Date
Application Software Changes	<p>Scope: Allow Energy Intermittent Resources (EIRs) to automate their response to operational instructions that require the resource not to exceed their `</p> <p>Impacted Systems: RTM: Operator can select EIR resources, system to send Operating instruction Flag to ADS ADS: Receive Operating instruction flag for EIRs. Broadcast message to EIRs operator.</p>
BPM Changes	Market Instruments Market Operations
Tariff Change	Changes tariff language from “Operating Order” to “Operating Instruction” in multiple sections.

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Jul 26, 2018	✓
External BRS	Milestone: Post External BRS	Dec 26, 2018	✓
Config Guides	Design review - BPM and Tariff SMEs	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec)	TBD	
Tariff	Draft Tariff	TBD	
	File Tariff	TBD	
BPMs	Post Draft BPM changes	TBD	
External Training	Deliver External Training	TBD	
Market Sim	Market Sim Window	TBD	
Production Activation	Dispatch Operating Target Tariff Clarification	Oct 01, 2020	

Fall 2020 – Intertie Deviation Settlement

Project Info	Details/Date
Application Software Changes	<p>Scope: Implement a new Under/Over Delivery Charge for intertie deviations from Market Schedule and After-The-Fact (ATF) E-Tag, to replace Decline charge</p> <p>Impacted Systems: Settlements</p> <ul style="list-style-type: none"> • Calculate FMM binding intertie award, exclude Curtailment, calculate under/over delivery quantity as deviation of schedule and ATF E-Tag, Charge under/over delivery Charge at 50% of RTD LMP. • Remove the decline charge calculation and Decline Threshold • Allocate Over/Under delivery charge to measured demand
BPM Changes	Settlements and Billing
Tariff Change	Section 11.31

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors Approval	Feb 07, 2019	✓
External BRS	Post External BRS	TBD	
Config Guides	Post Draft Config Guide	TBD	
Tech Spec	Publish Technical Specifications	TBD	
Tariff	File Tariff	TBD	
BPMs	Post Draft BPM changes	TBD	
External Training	Deliver External Training	TBD	
Market Sim	Market Sim Window	TBD	
Production Activation	Intertie Deviation Settlement	Oct 01, 2020	

Fall 2020 – ESDER Phase 3b – Load Shift Product

Project Info	Details/Date
Application Software Changes	<p><u>Scope:</u></p> <p>The ESDER 3b initiative will include two (2) demand response enhancements:</p> <ul style="list-style-type: none">• Addition of a Load Shift Product wherein demand response resources with behind the meter (BTM) storage devices can participate in both load consumption and load curtailment.• Enable sub-metered electric vehicles supply equipment (EVSE) to participate in load curtailment <p><u>Impacted Systems (Overview):</u></p> <p>Master File:</p> <ul style="list-style-type: none">• Registration of new PDR Resource Types and business rules for PDRs with BTM storage devices and wanting to participate in both Load Curtailment and Consumption• Two (2) Resource IDs will be assigned to the same Resource to allow Consumption versus Curtailment participation (PDR-LSR) <p>DRRS:</p> <ul style="list-style-type: none">• Allow two resource IDs to be selected for registrations with LSR baseline methods• New baseline methods for PDR-LSRs and EVSEs• New attribute for locations to indicate BTM device <p>CIRA:</p> <ul style="list-style-type: none">• Will prevent the request of NQC for PDR-LSR Consumption resources

Fall 2020 – ESDER Phase 3b – Load Shift Product

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Sep 05, 2018	✓
External BRS	Post External BRS	TBD	
	Post Revised External BRS	TBD	
	Post Revised External BRS as per scope change for Fall 2019	TBD	
Config Guides	Post Draft Config Guides	TBD	
Tech Spec	Publish Technical Specifications	TBD	
Tariff	Post Draft Tariff	TBD	
	File Tariff	TBD	
BPMs	Post Draft BPM changes	TBD	
External Training	External Training	TBD	
Market Sim	Market Sim Window	TBD	
Production Activation	ESDER Phase 3b - Load Shift Product	Oct 01, 2020	

2021 Spring Release

Spring 2021 – EIM integrations for PSC-NM and NWE

Project Info	Details/Date
Application Software Changes	Implementation of PSC-NM 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 PSC-NM and NWE.
Market Simulation	December 2020 – January 2021
Parallel Operations	February 2021 – March 2021

Milestone Type	Milestone Name	Dates	Status
Tariff	File Readiness Certification	March 2021	
Market Sim	Market Sim Window	December 2020 – January 2021	
Parallel Operations	Parallel Operations	February 2021 – March 2021	
Production Activation	EIM – PNM and NWE	April 2021	

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 sim calls for major releases will be market noticed
 - Market Performance and Planning Forum
 - Bi-monthly review of market performance issues
 - High level discussion of release planning, implementation and new market enhancements

What to look for on the calendar...

Calendar of Meetings, Training and Events

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

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

Market Sim



Market Sim



Release Users Group (RUG)



2019 Meeting Schedule

- April 18 – In person/webinar
- June 20 – Webinar only
- August 20 – In person/webinar
- October 23 – Webinar only
- December 11 – In person/webinar

Reference ISO public calendar for participation details.

Agenda topic suggestions:

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