



California ISO

# Market Performance and Planning Forum

August 29, 2018

ISO PUBLIC

## Objective: Enable dialogue on implementation planning and market performance issues

- Review key market performance topics
- Share updates to 2018 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 – August 29, 2018

Time:	Topic:	Presenter:
10:00 – 10:05	Introduction, Agenda	Jody Cross
10:05 – 12:00	Market Performance and Quality Update	Rahul Kalaskar Amber Motley Guillermo Bautista Alderete
12:00 – 1:00	Lunch	
1:00 – 2:00	Policy Update	Brad Cooper John Goodin
2:00 – 3:00	Release Update	Adrian Chiosea Janet Morris

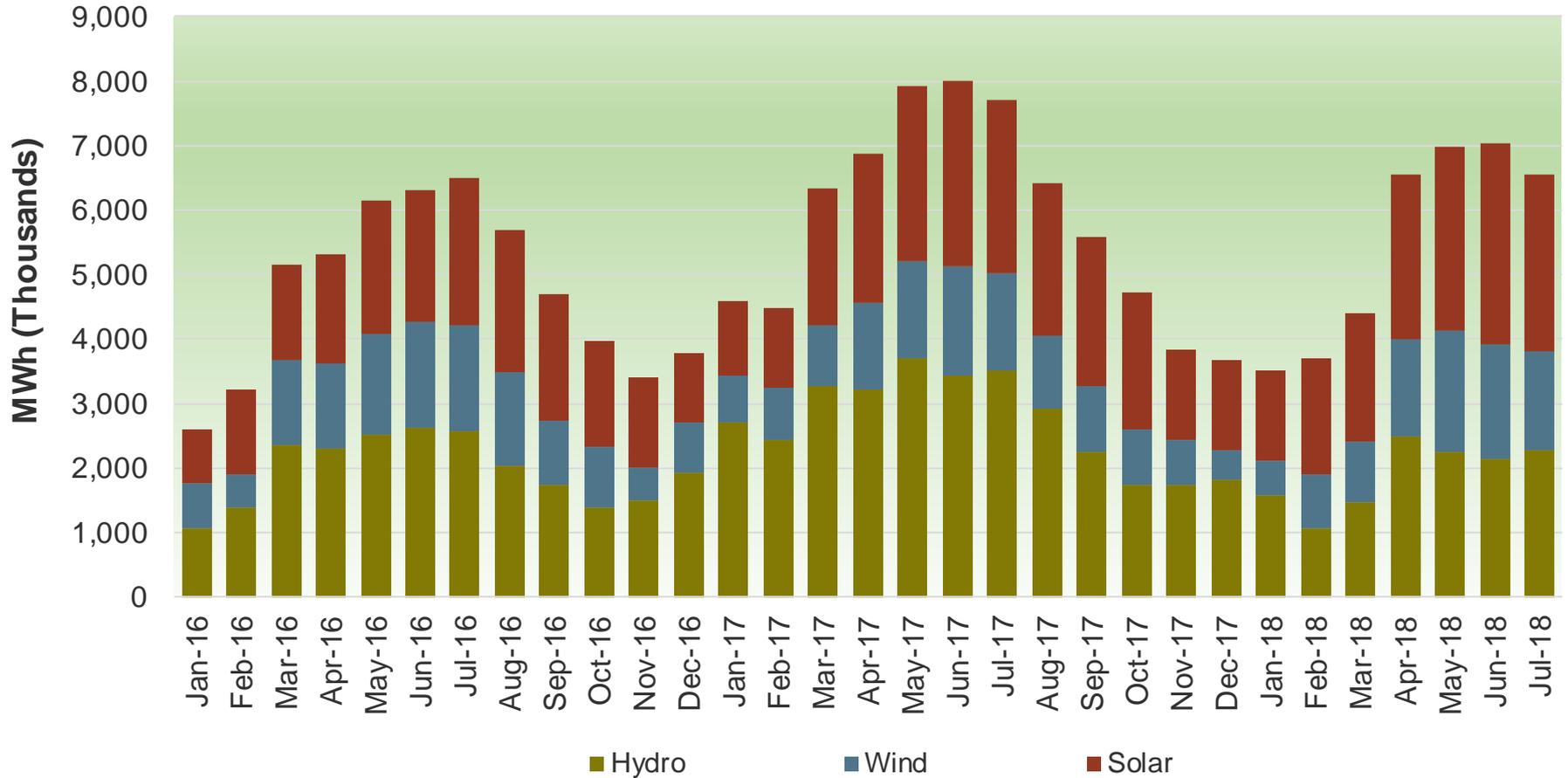
# Market Update

Rahul Kalaskar  
Manager, Market Validation Analysis

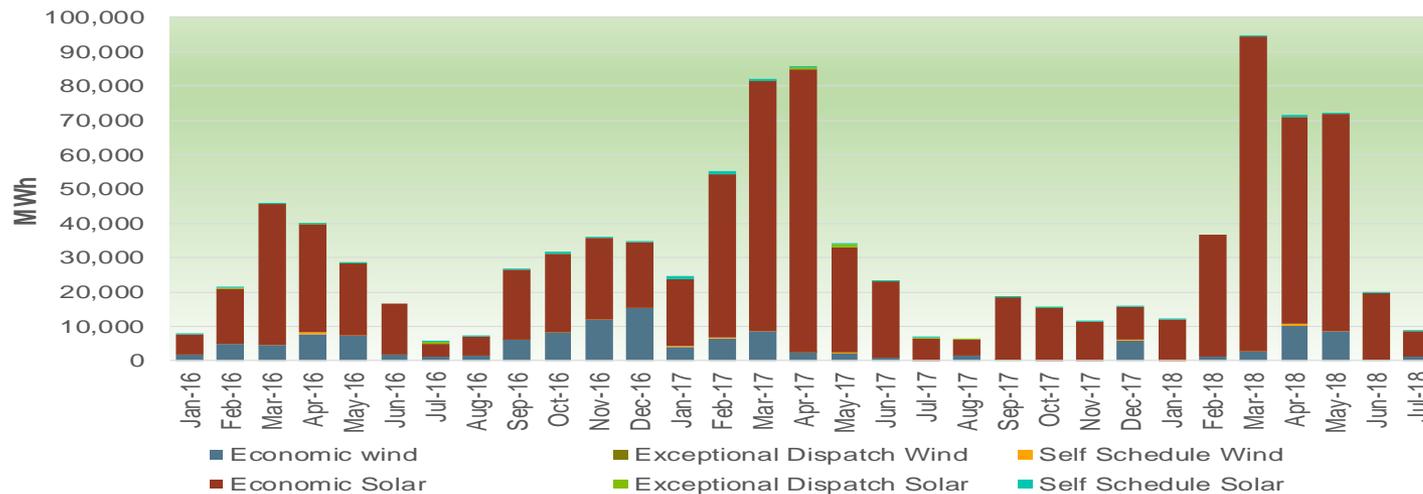
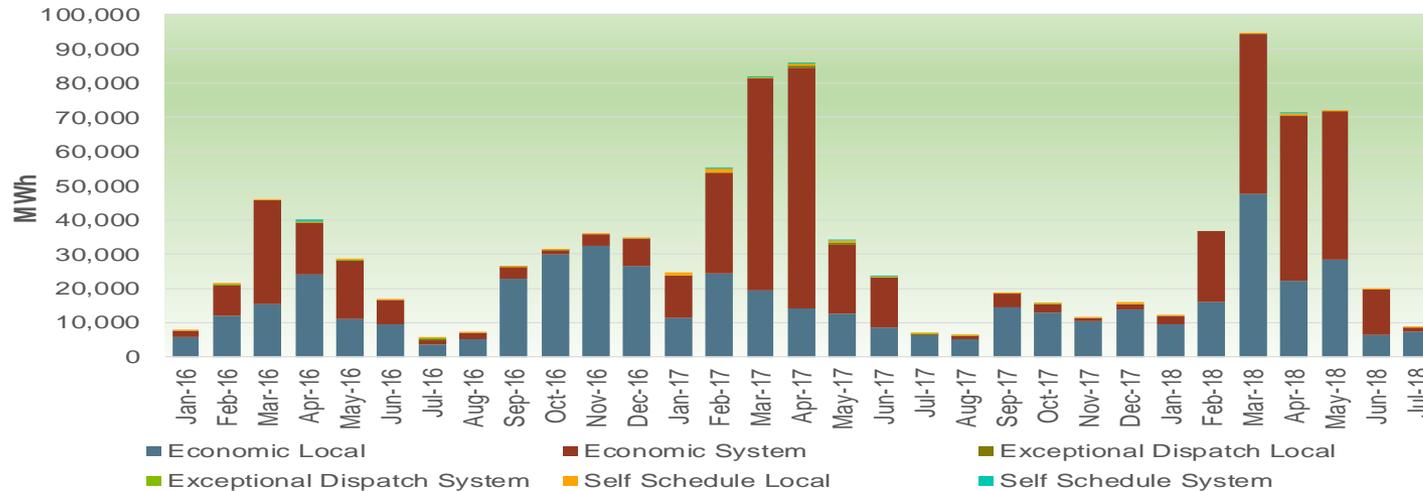
Amber Motley  
Manager, Short Term Forecasting

Guillermo Bautista Alderete, Ph.D.  
Director, Market Analysis and Forecasting

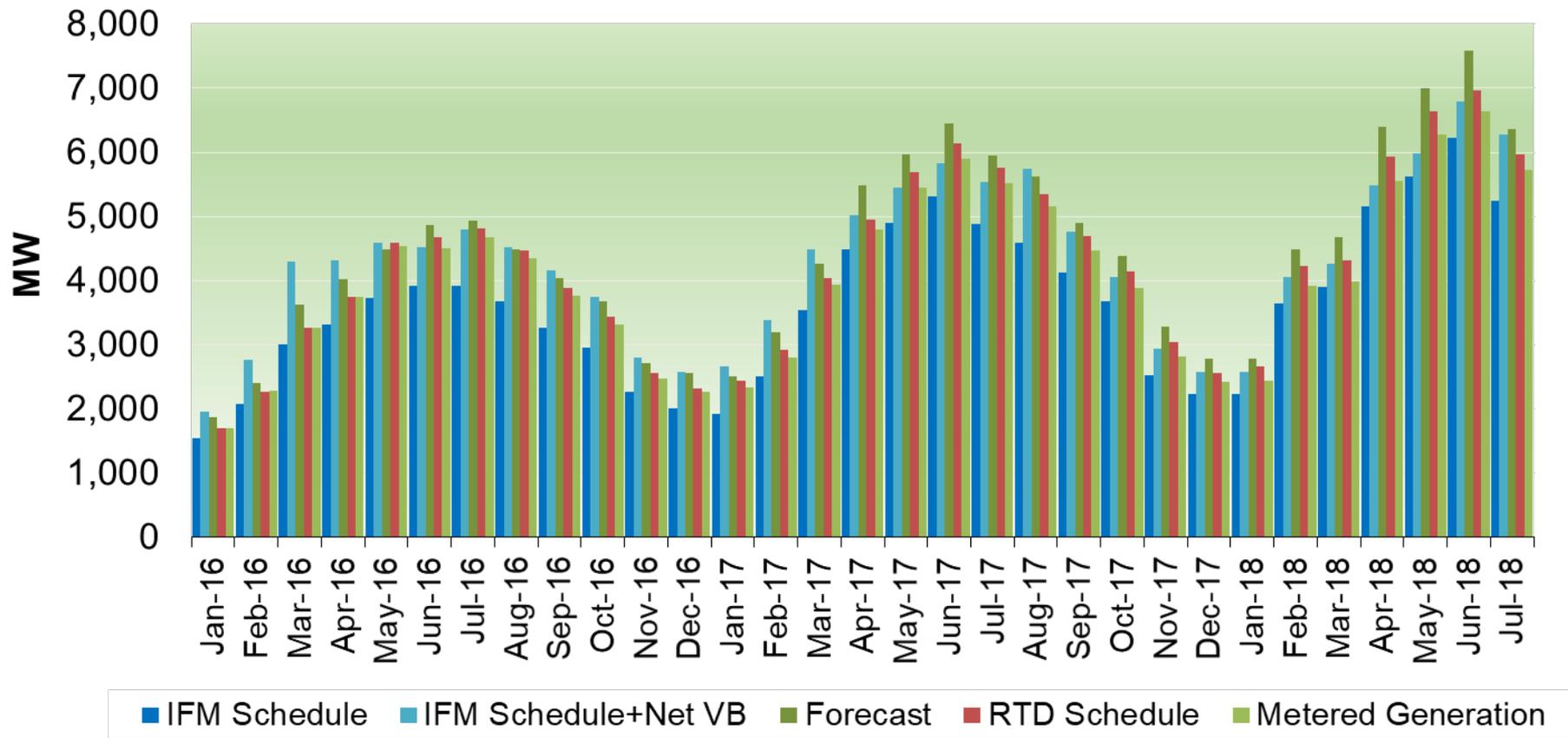
# Hydro production decreased slightly in July as the summer progresses



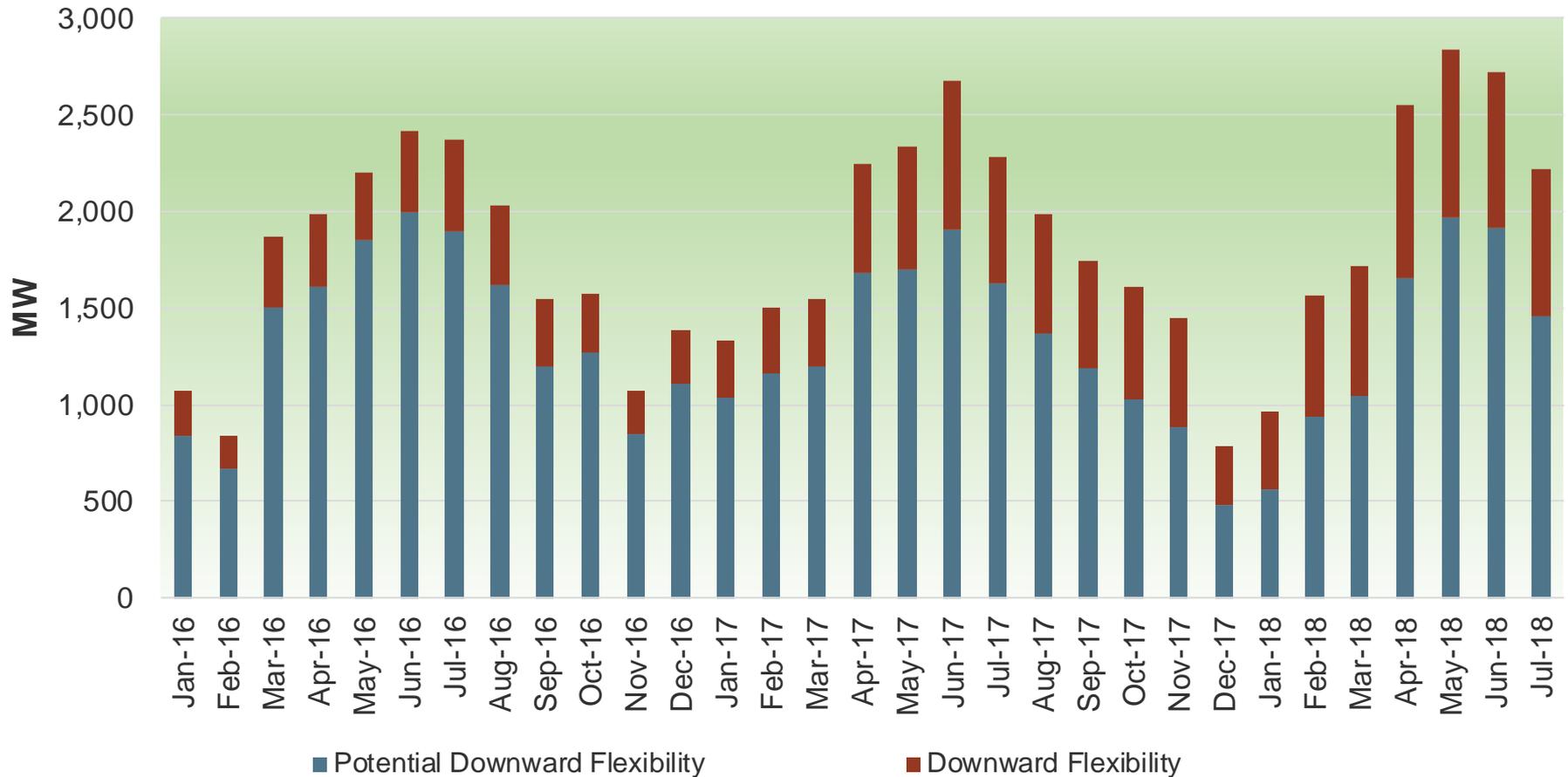
# RTD renewable (VERs) curtailment dropped in June and July due to seasonal load increasing



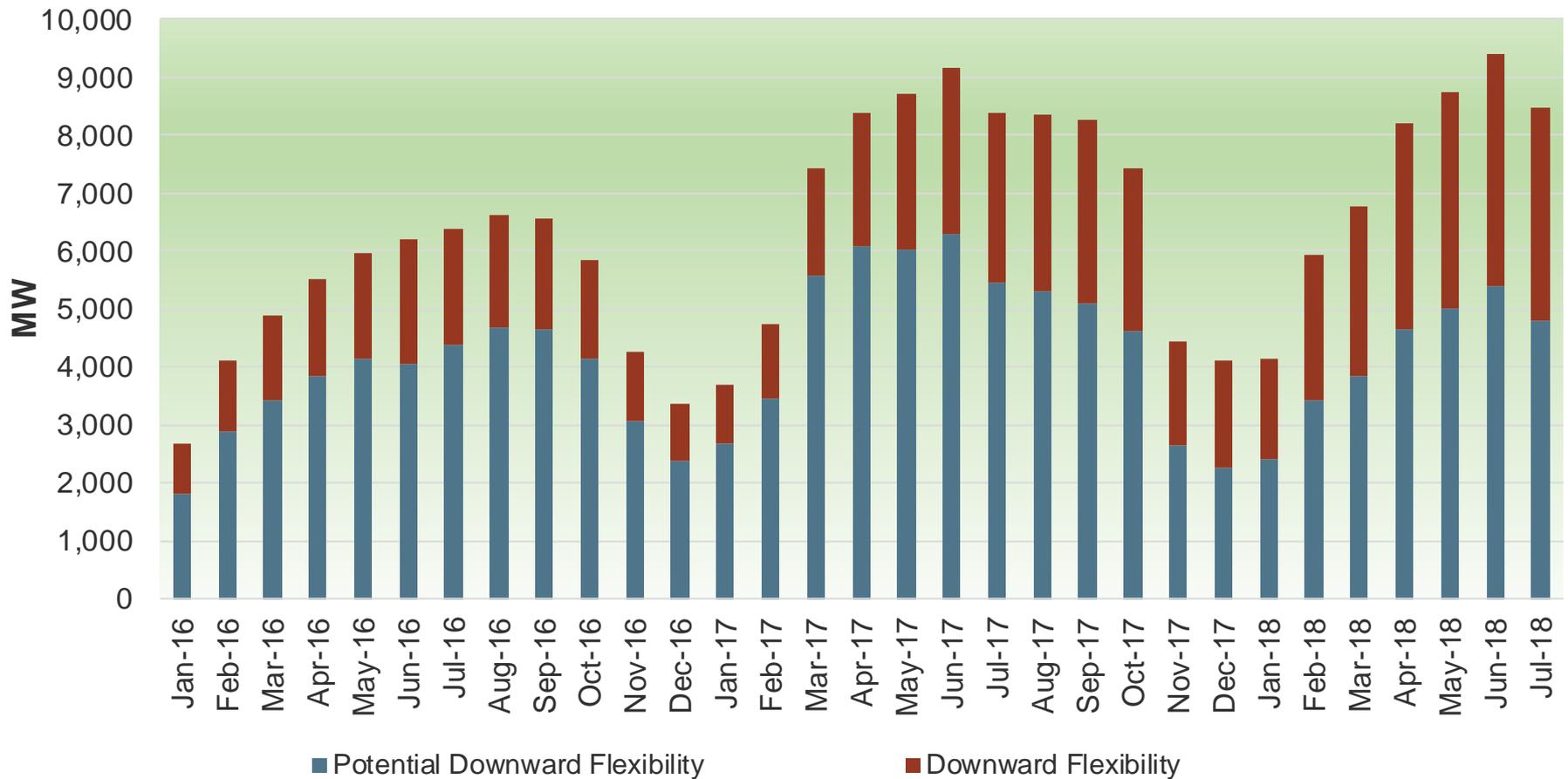
# ISO total monthly VERS schedules and forecasts compared to actuals



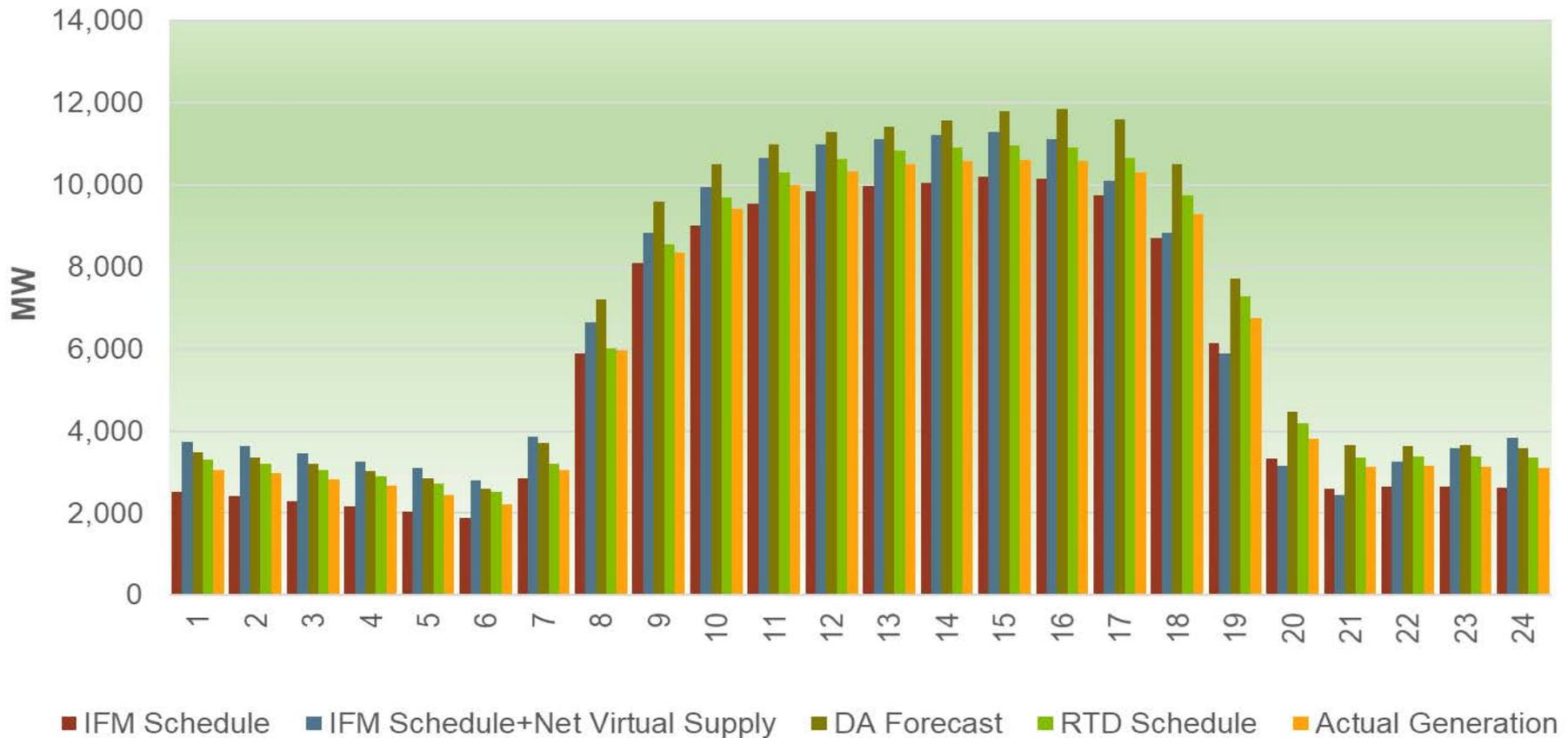
# Monthly wind (VERs) downward flexibility in FMM



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

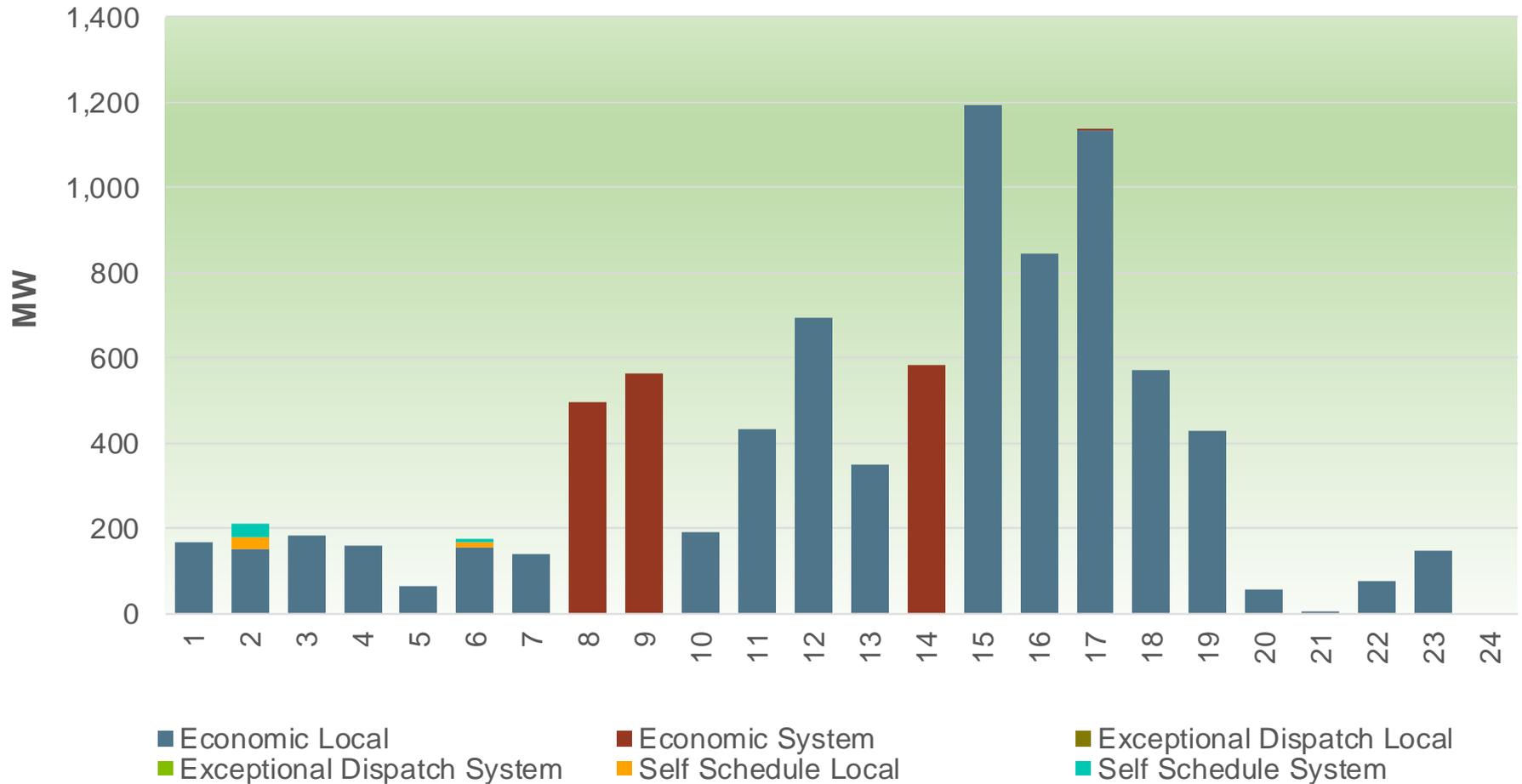


# Renewable (VERs) schedules including net virtual supply aligns with VER forecast in June and July

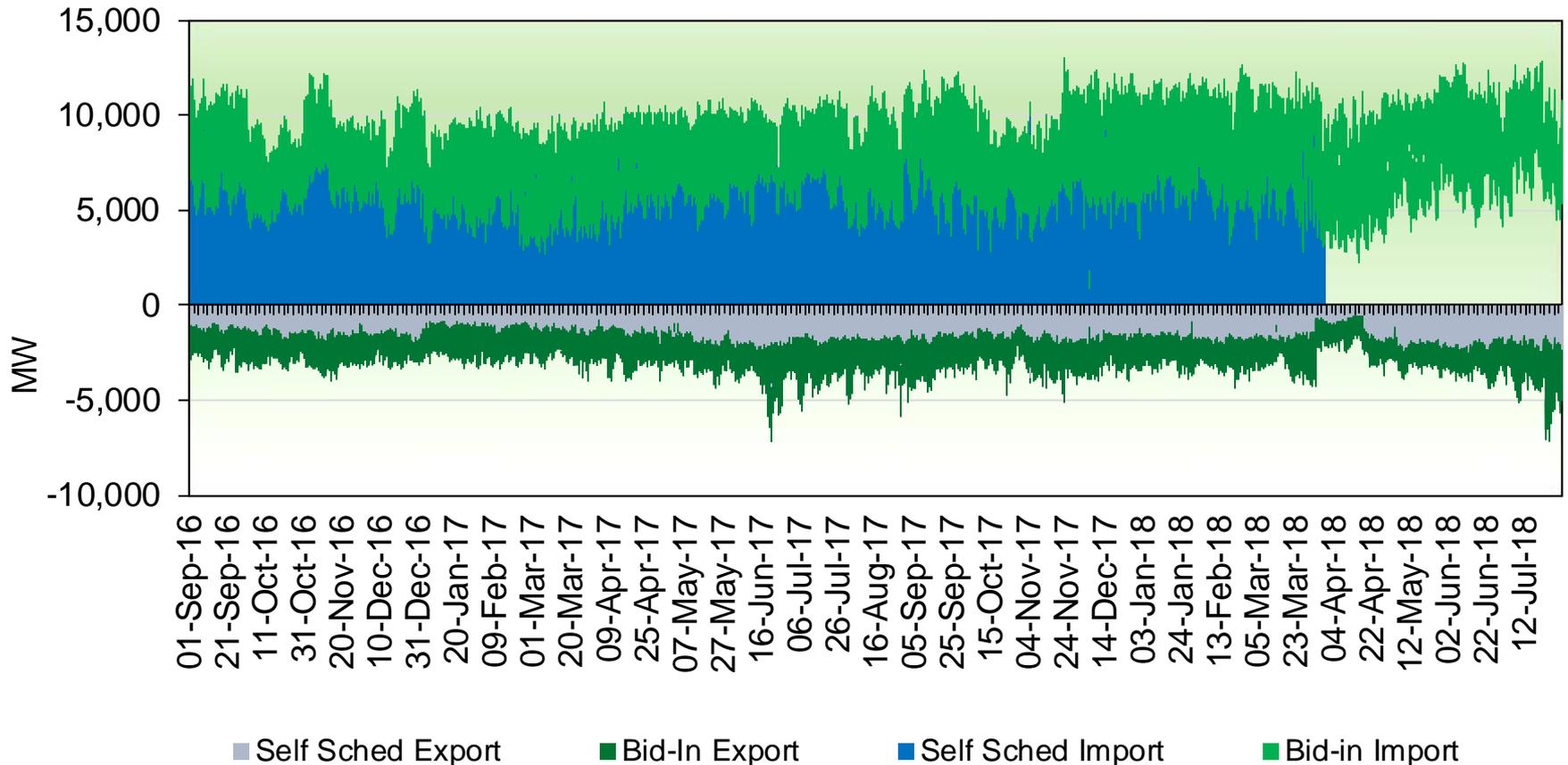


<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=EFF75C2E-F28E-4087-B88B-8DFFAED828F8>

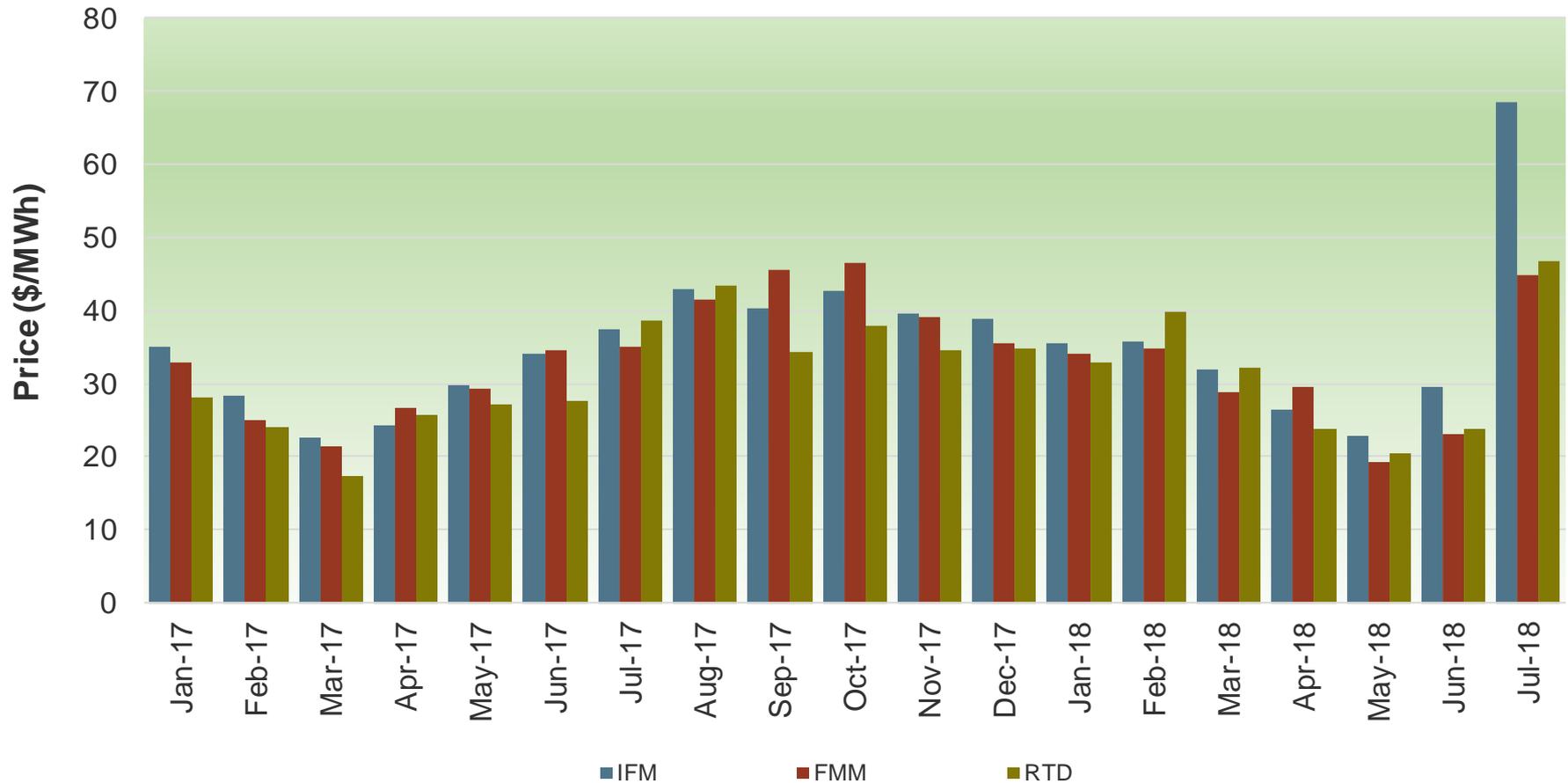
# Hourly distribution of maximum RTD renewable (VERS) curtailment in July



# Self scheduled interties in the real-time market remained high

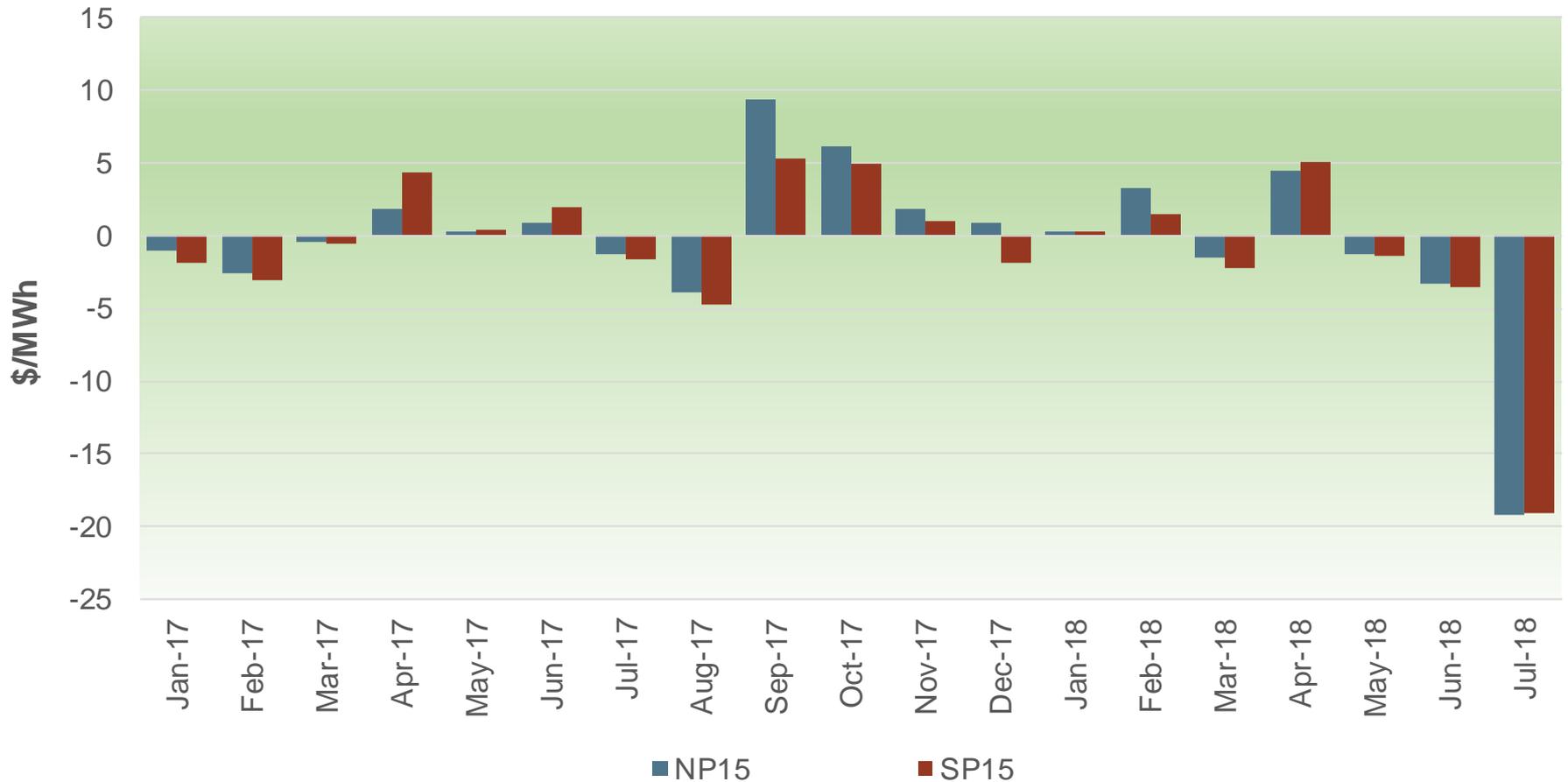


# Higher IFM price in July largely driven by the week of July 24 conditions

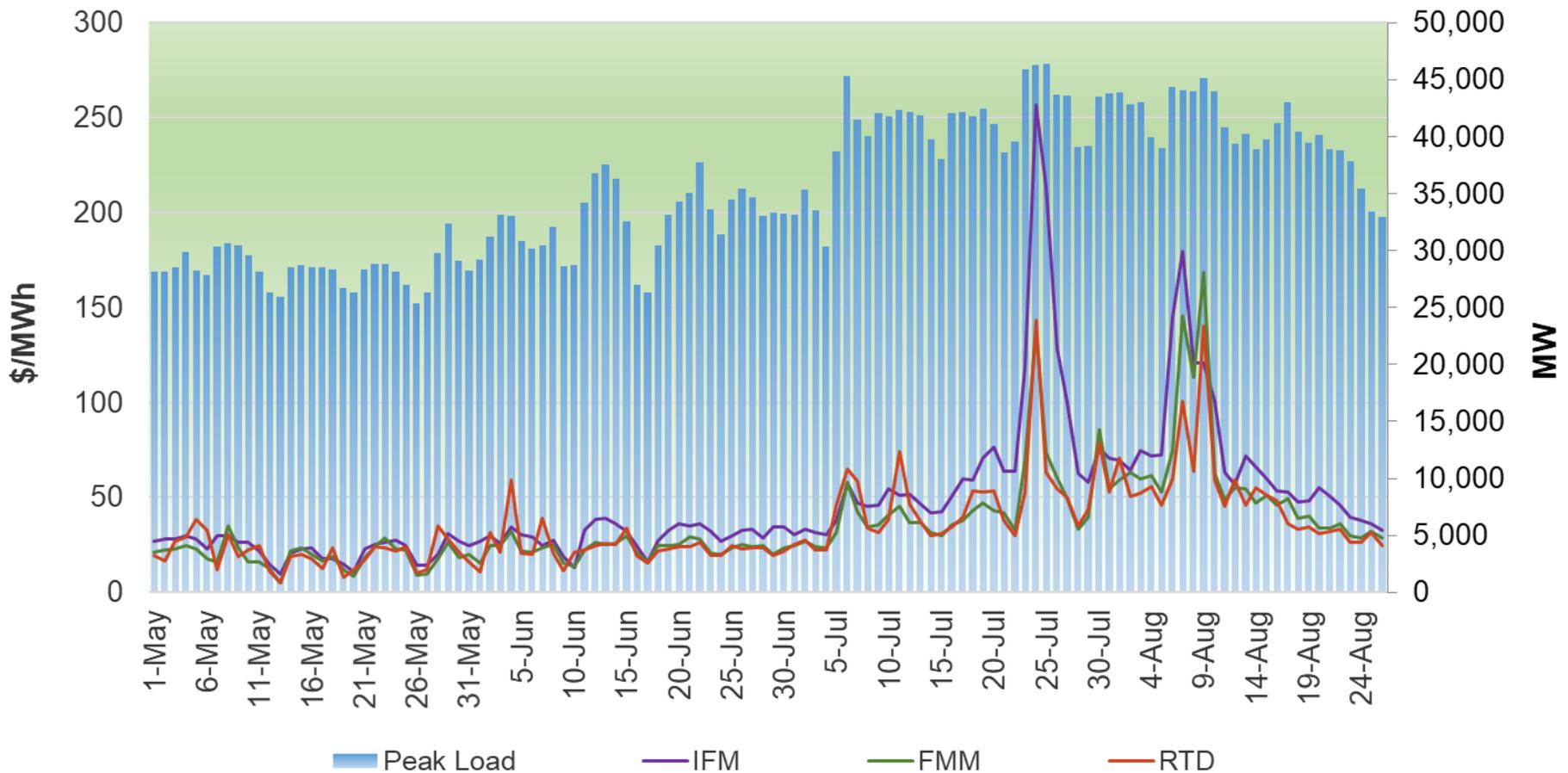


Note: Metric Based on System Marginal Energy Component (SMEC)

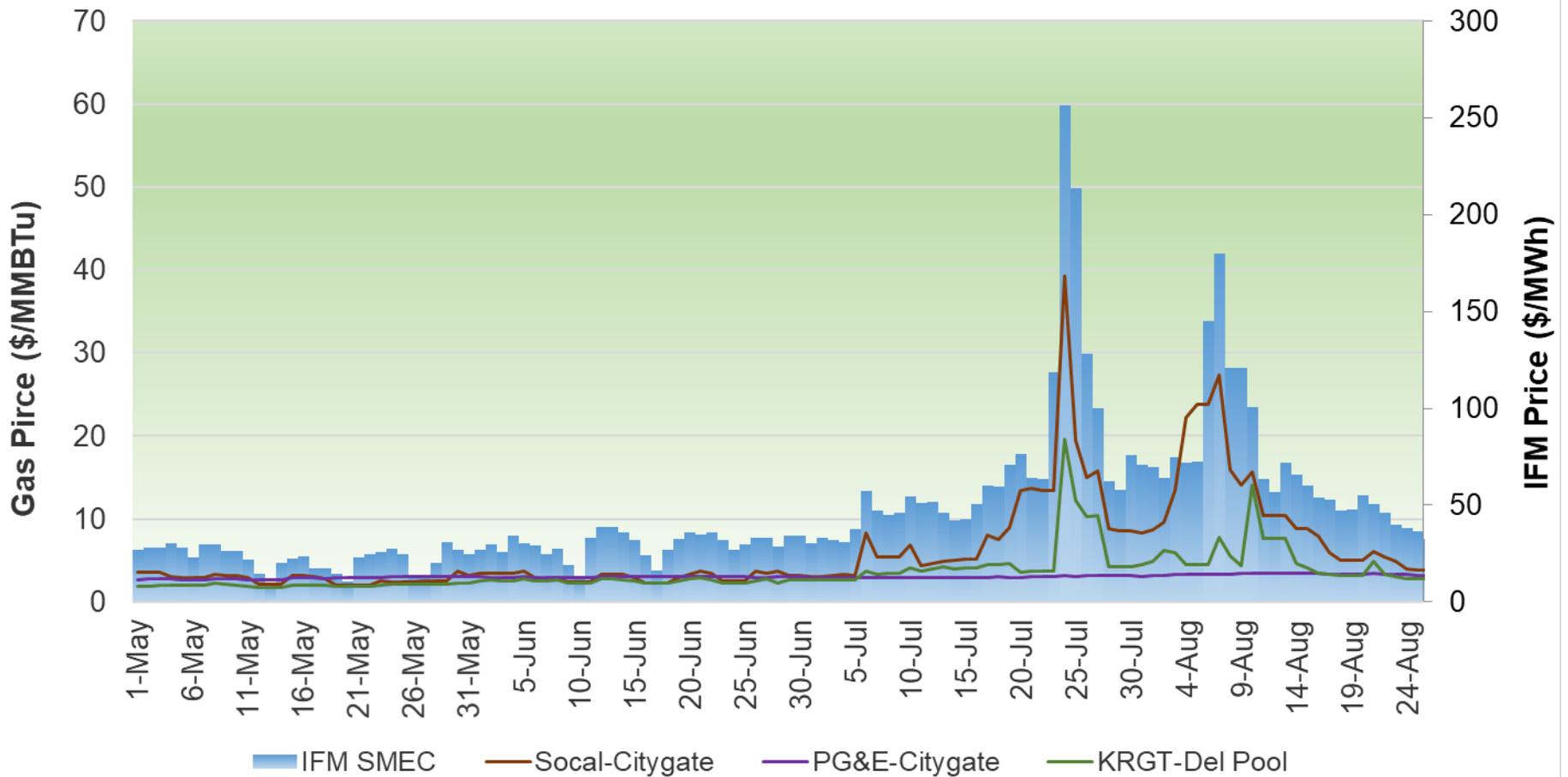
# RT prices lower than DA prices for both NP15 and SP15 in June and July



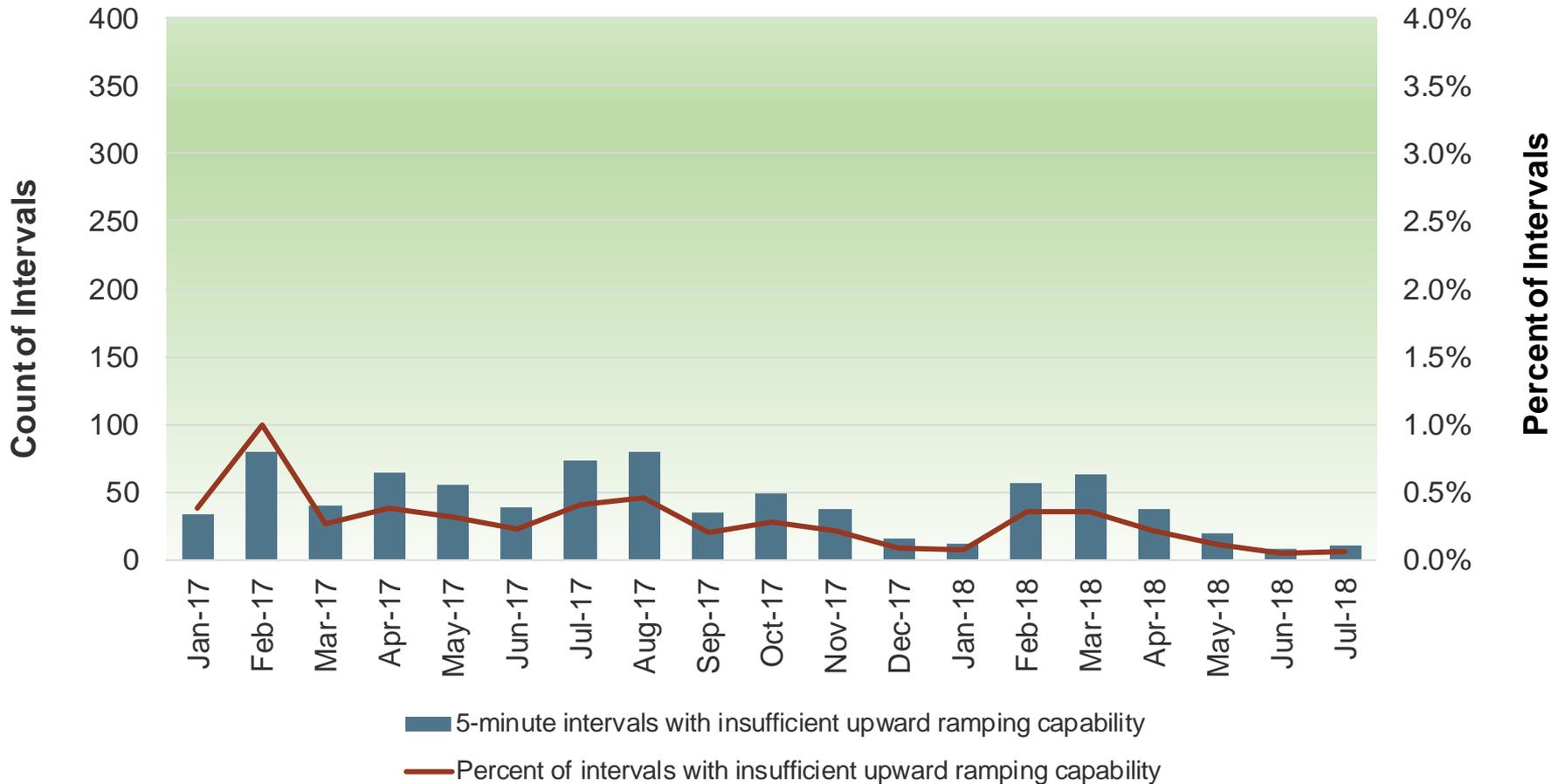
# Higher load conditions were observed in July that drove higher prices



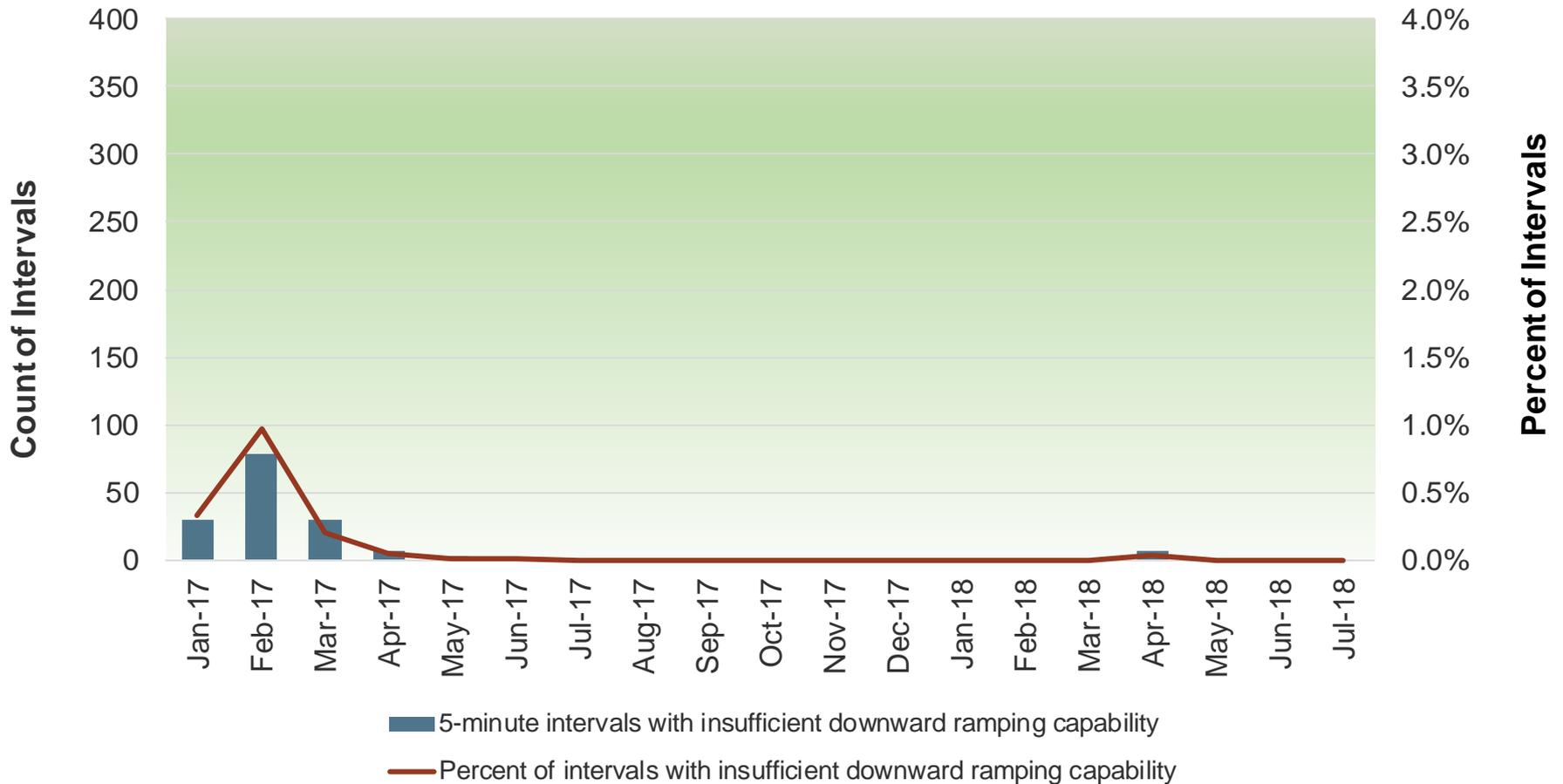
# Higher gas prices in SoCal area reflected in high IFM energy prices and exacerbated congestion patterns



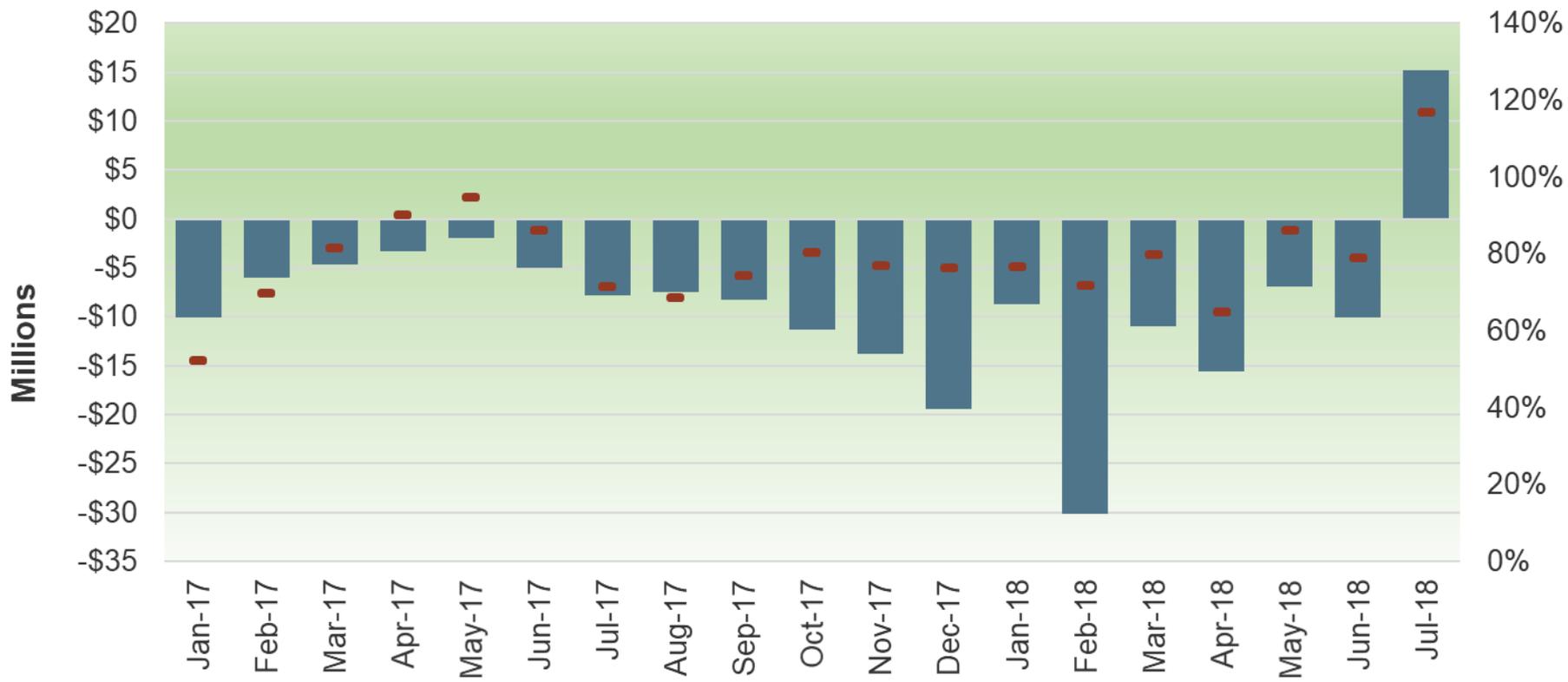
# Insufficient upward ramping capacity in ISO trended downward since February



# Insufficient downward ramping capacity remained low in June and July.



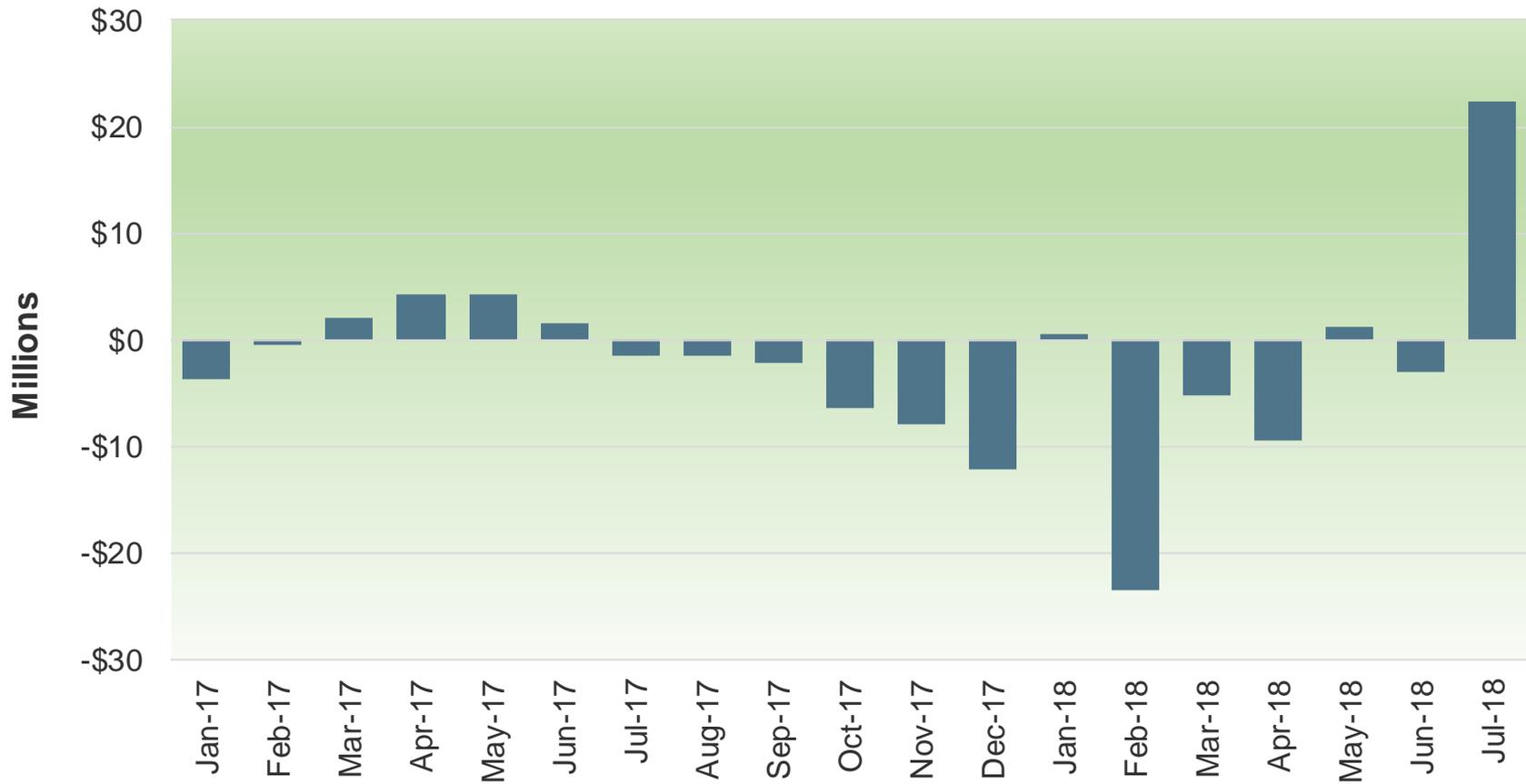
# Congestion revenue rights market revenue in surplus in July without auction revenues.



CRR revenue adequacy does not include monthly and annual auction revenues.

■ Revenue Adequacy      ● Percent of Revenue Adequacy

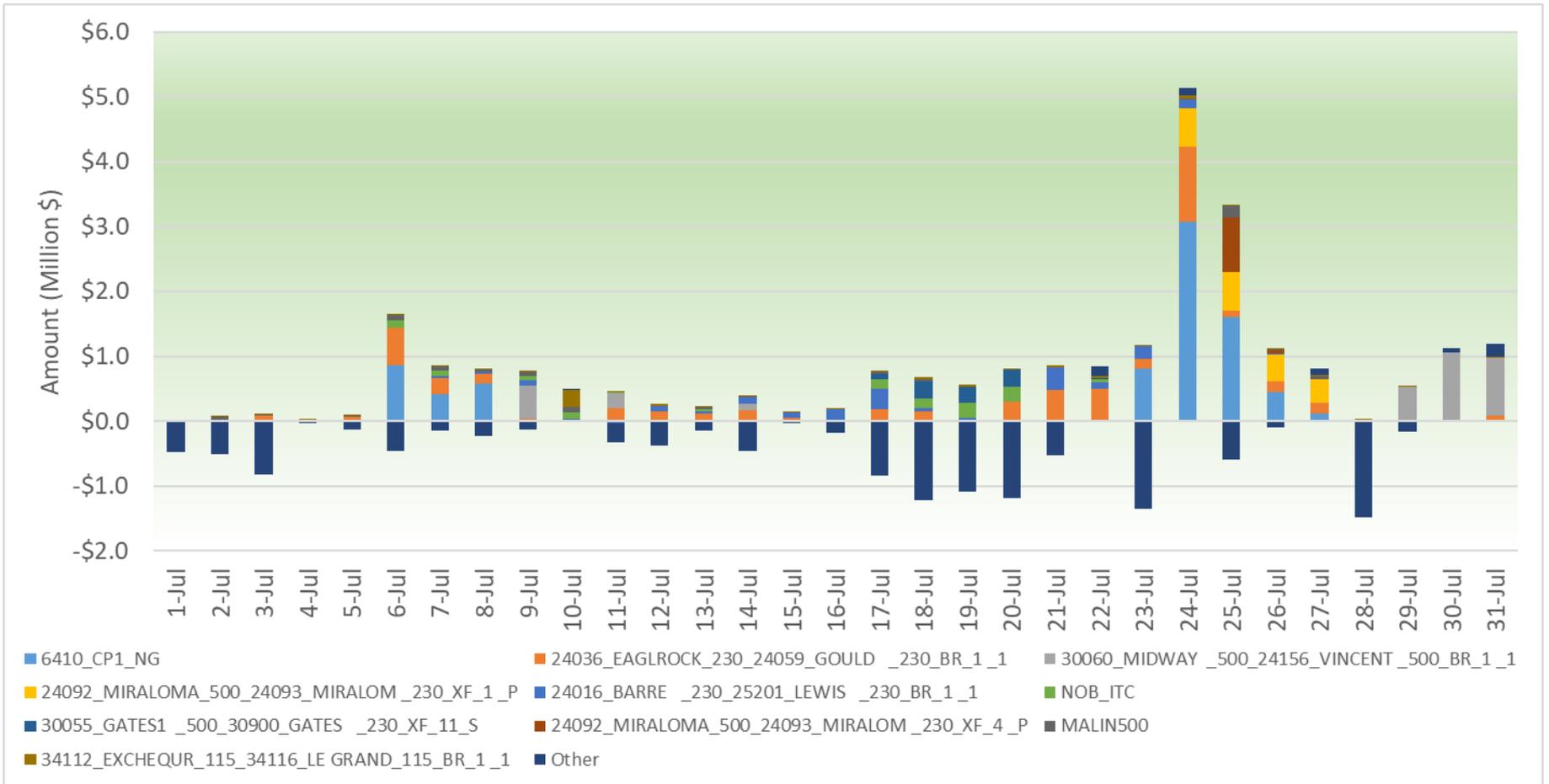
# Congestion revenue rights market revenue sufficiency including auction revenues.



# CRR Revenue Adequacy for the month of July

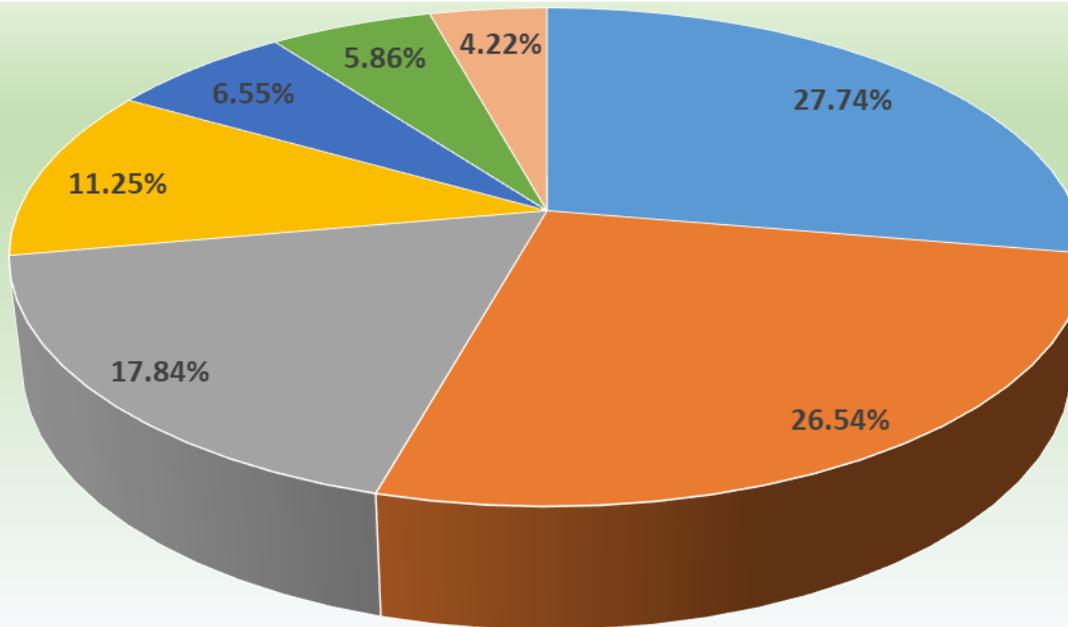
Description	Amount (\$)
Congestion Revenue	105,210,643
CRR Payment	90,058,226
Perfect Hedge	(2,575,112)
CRR Clawback	60,986
CRR Revenue Adequacy before Auction Revenue	15,152,417
Monthly Auction Revenue	4,002,822
Annual Auction Revenue	3,152,449
Balancing Account surplus allocated to Measured Demand	22,307,688

# CRR Revenue Adequacy by Transmission Element



# Top six transmission elements with revenue surplus

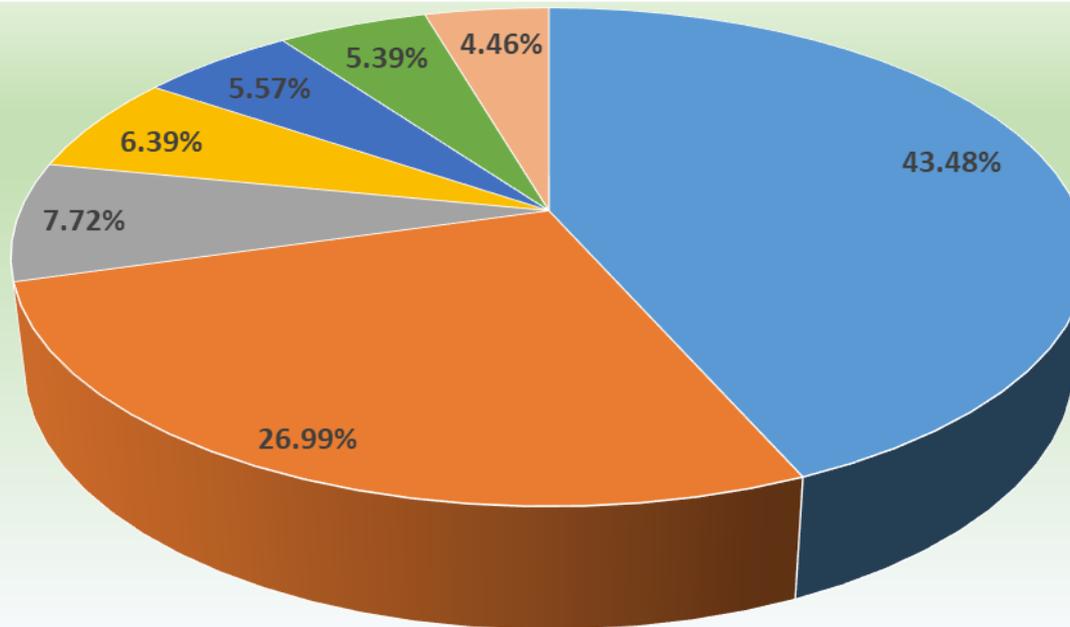
Revenue Surplus by Transmission Element (\$ 29.78 Millions)



- Other
- 24036\_EAGLROCK\_230\_24059\_GOULD\_230\_BR\_1\_1
- 24092\_MIRALOMA\_500\_24093\_MIRALOM\_230\_XF\_1\_P
- NOB\_ITC
- 6410\_CP1\_NG
- 30060\_MIDWAY\_500\_24156\_VINCENT\_500\_BR\_1\_1
- 24016\_BARRE\_230\_25201\_LEWIS\_230\_BR\_1\_1

# Top 6 transmission elements with revenue deficiency

Revenue Deficiency by Transmission Element (\$ 14.33 Millions)



- 6410\_CP5\_NG
- 7820\_TL 230S\_OVERLOAD\_NG
- 33310\_SANMATEO\_115\_33315\_RAVENSWD\_115\_BR\_1\_1
- 7820\_TL23040\_IV\_SPS\_NG
- Other
- 22500\_MISSION\_138\_22496\_MISSION\_69.0\_XF\_1
- 32970\_CLAYTN\_115\_33035\_LKWD\_JCT\_115\_BR\_1\_1

# A glance on CRRs settled in July show less CRR capacity released in CRR processes than cleared in DAM market

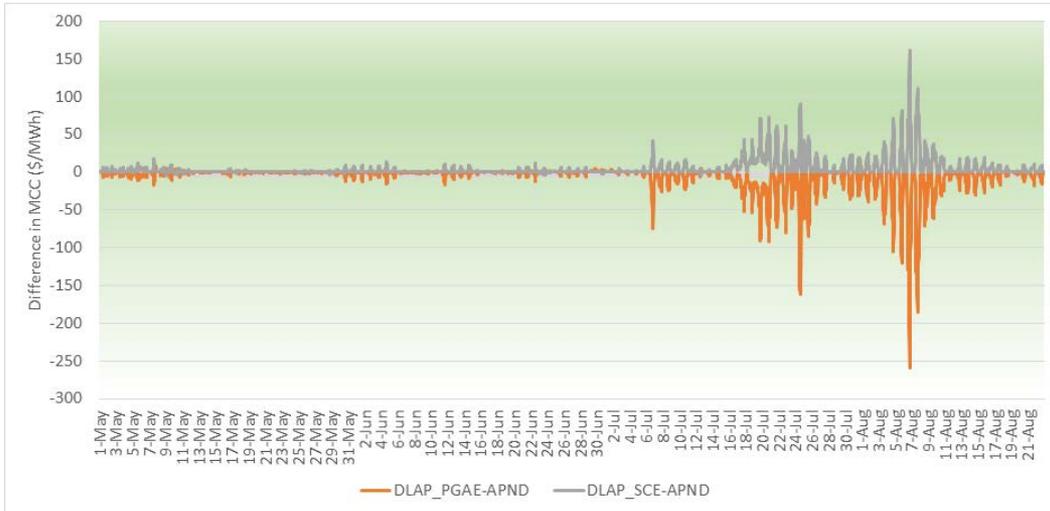
## Top CRR payments

TRADE_DATE	CRR_SOURCE	CRR_SINK
7/24/2018	SYLMARLA_2_N501	TH_SP15_GEN-APND
7/24/2018	TH_NP15_GEN-APND	TH_SP15_GEN-APND
7/24/2018	COACHELV_2_N101	MLAP_RVSD-APND
7/24/2018	MALIN_5_N101	TH_SP15_GEN-APND
7/24/2018	POD_LEBECS_2_UNITS-APND	TH_SP15_GEN-APND
7/24/2018	POD_ELKHIL_2_PL1X3-APND	TH_SP15_GEN-APND
7/24/2018	POD_SUNRIS_2_PL1X3-APND	TH_SP15_GEN-APND
7/24/2018	NAVY35R_7_B1	POD_ELKHIL_2_PL1X3-APND
7/24/2018	MIDWAY_5_B1	TH_SP15_GEN-APND
7/24/2018	TH_ZP26_GEN-APND	TH_SP15_GEN-APND

## Bottom CRR payments

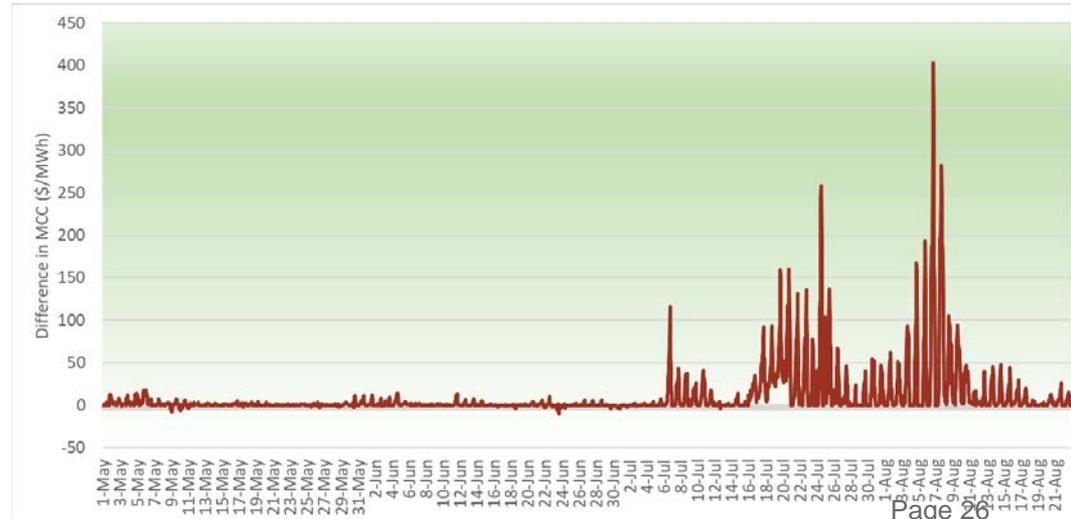
TRADE_DATE	CRR_SOURCE	CRR_SINK
7/24/2018	TH_SP15_GEN-APND	DLAP_PGAE-APND
7/24/2018	SYLMARDC_2_N501	TH_NP15_GEN-APND
7/24/2018	SLAP_SCHD-APND	MALIN_5_N101
7/24/2018	DLAP_SCE-APND	MALIN_5_N101
7/24/2018	ELCENTRO_2_N001	CALIPSF_7_N001
7/24/2018	AVSOLAR_7_N008	DLAP_PGAE-APND
7/24/2018	DLAP_SCE-APND	COACHELV_2_N101
7/24/2018	DLAP_VEA-APND	MALIN_5_N101
7/24/2018	POD_BUCKBL_2_PL1X3-APND	COACHELV_2_N101
7/24/2018	DLAP_SCE-APND	POD_INTKEP_2_UNITS-APND

# CRRs outcome in July is mainly driven by Day-Ahead price differences between North and South



Marginal Congestion Component in DLAPs

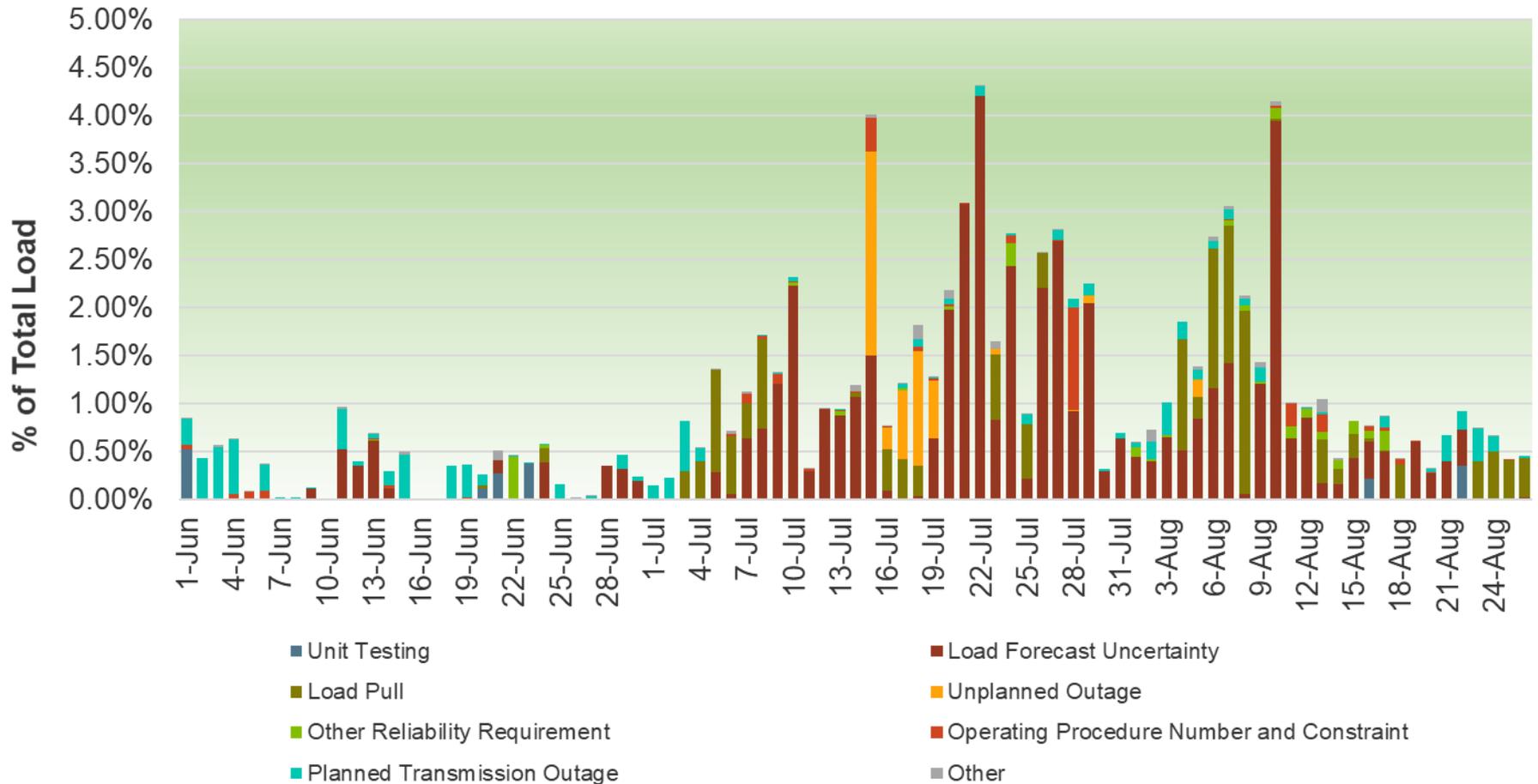
$$\text{DAM difference} = (\text{SP15} - \text{NP15})$$



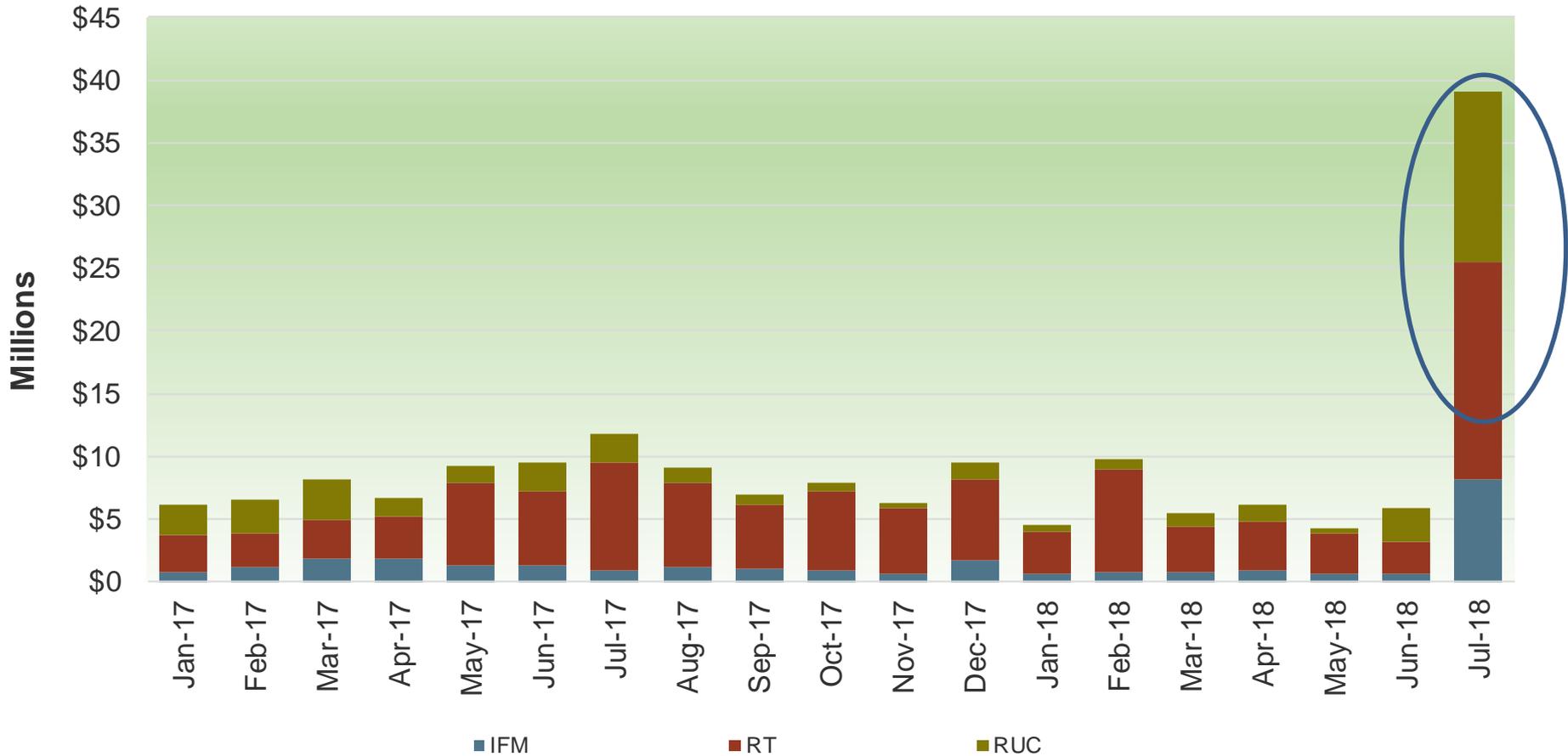
# Exceptional dispatch volume in the ISO area increased in July to be above 1% due level of load uncertainty during high load days



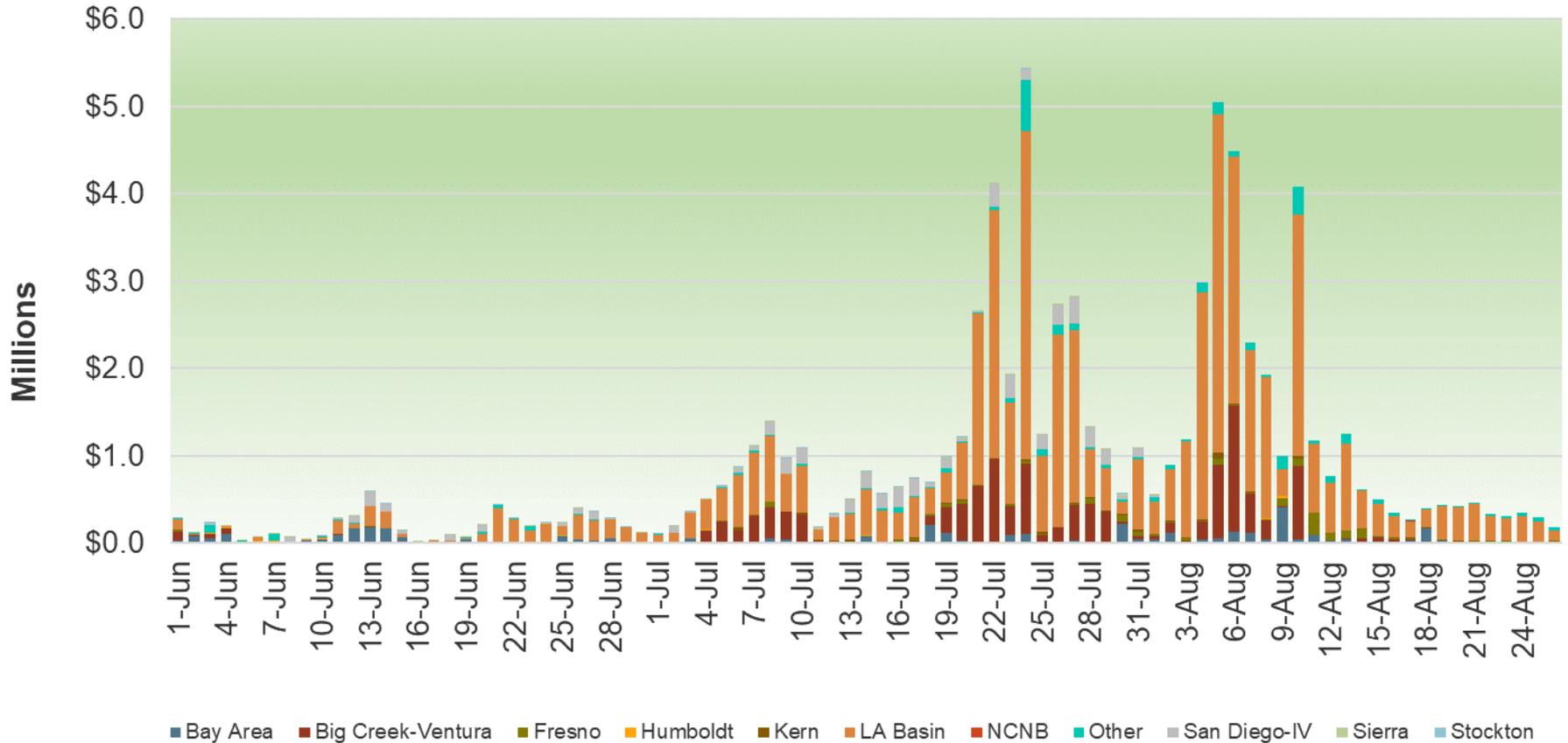
# Exceptional Dispatches increased through July as load increased



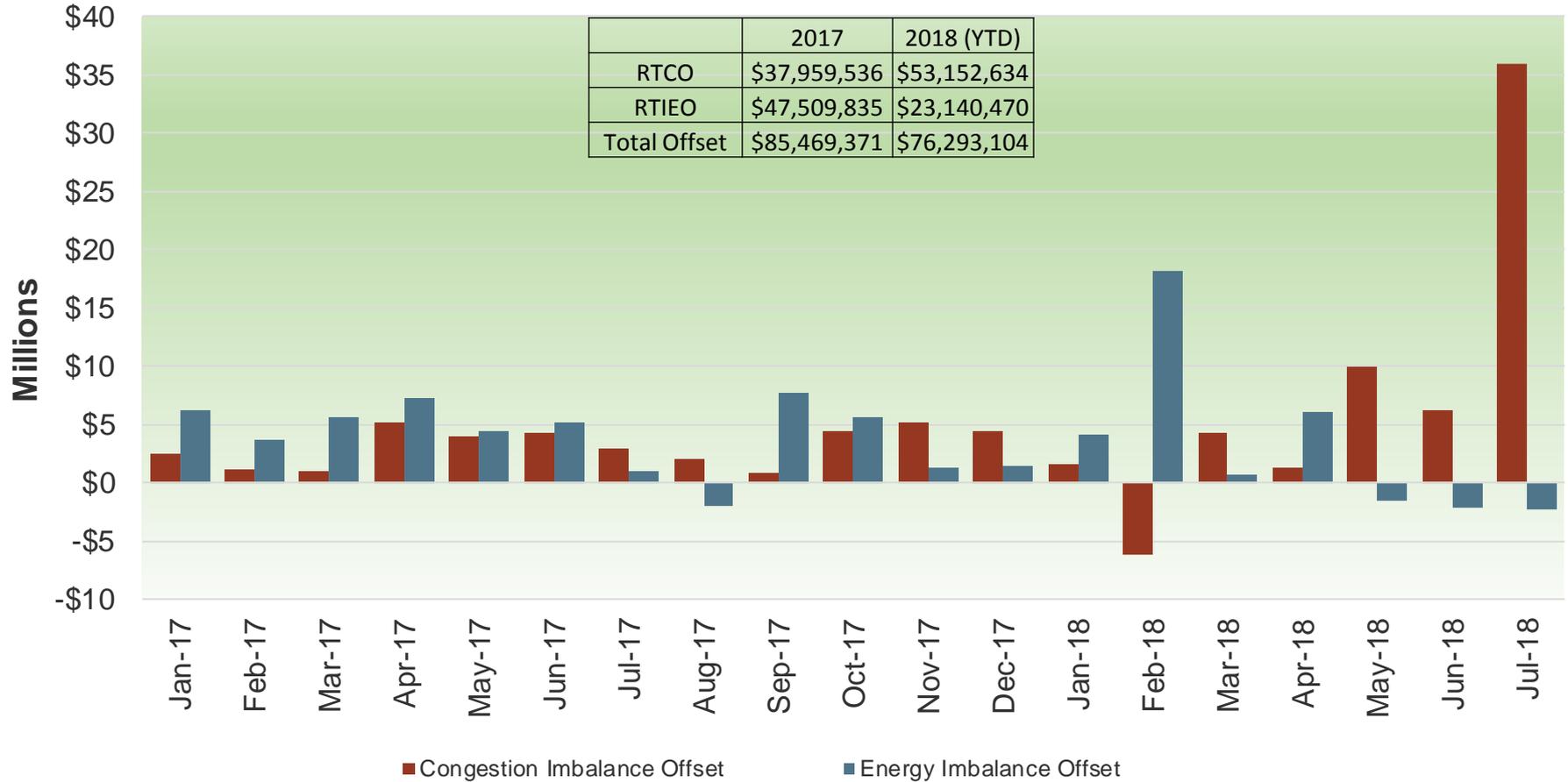
Real-time Bid cost recovery rose in July due to combination of higher load, gas prices, system and resource constraints.



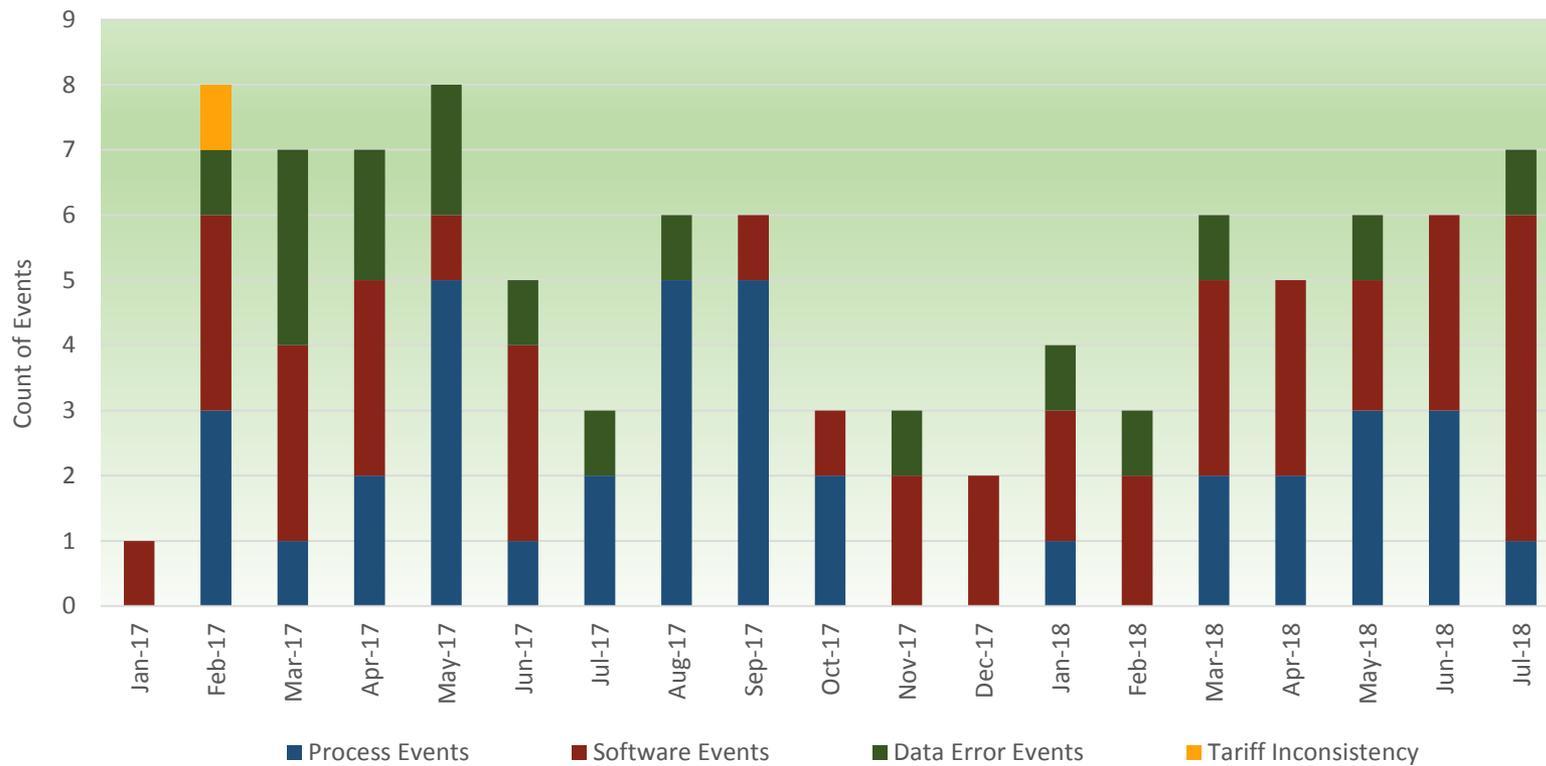
# Bid cost recovery (BCR) by Local Capacity Requirement area



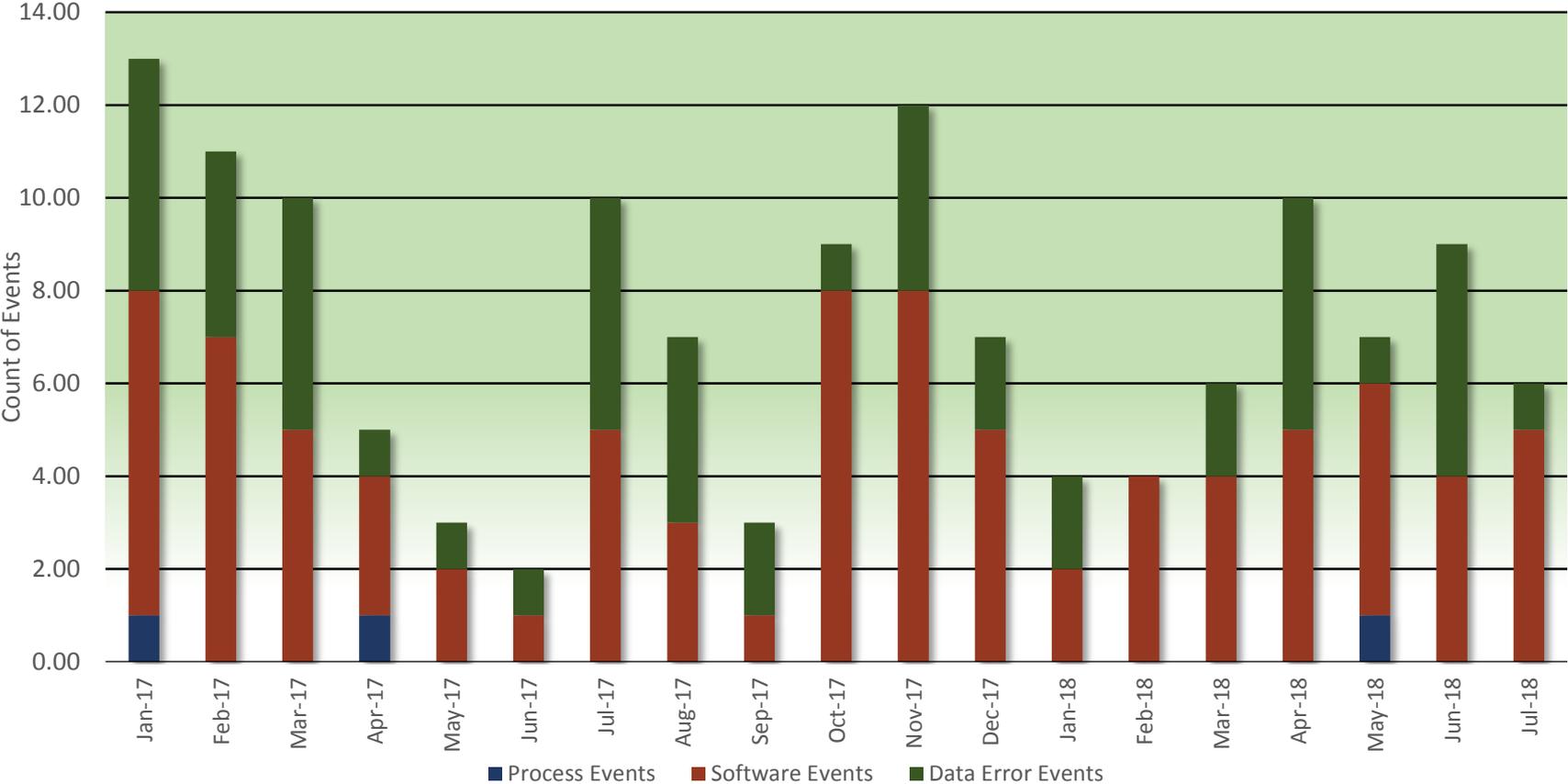
# ISO area RTCO increased in July following system conditions related to high load, gas prices, and real-time congestion patterns



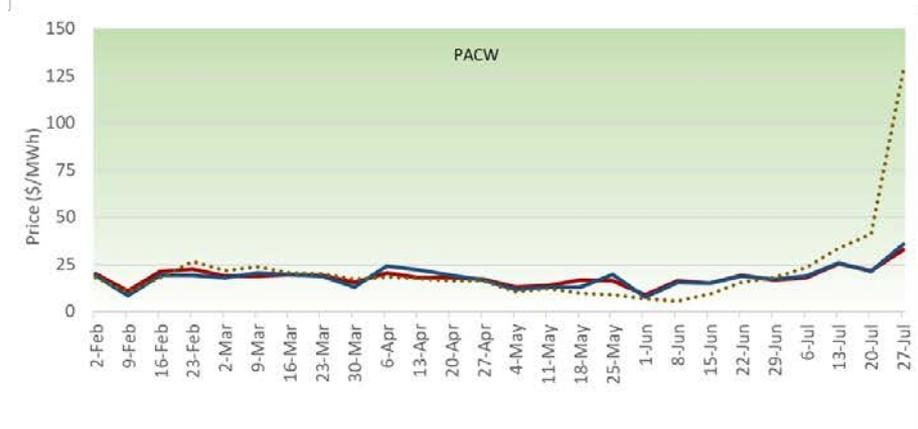
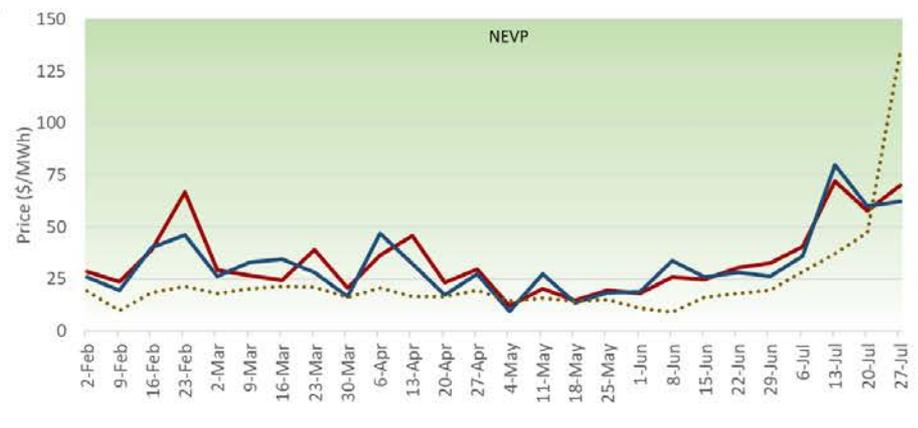
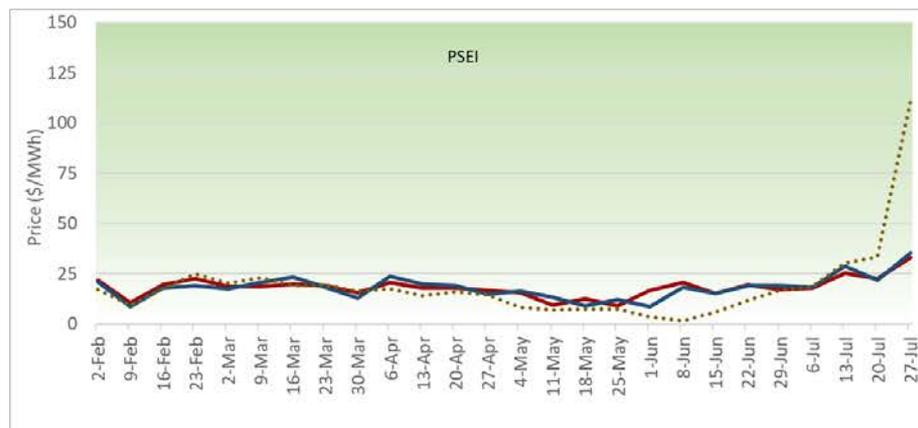
# CAISO price correction events increased in July



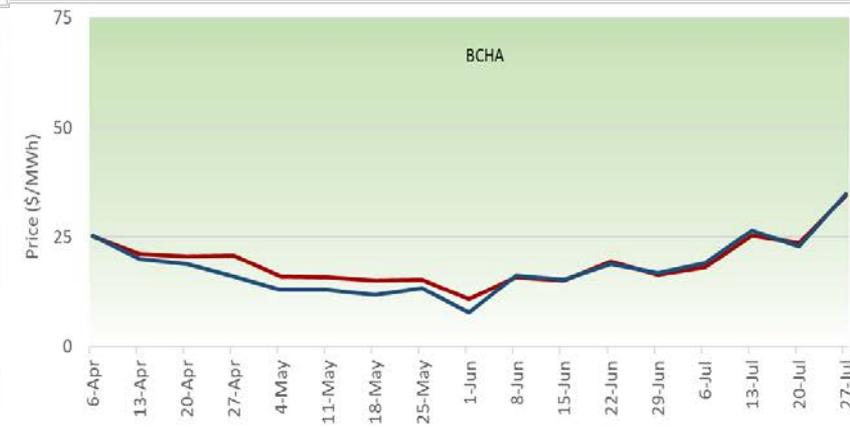
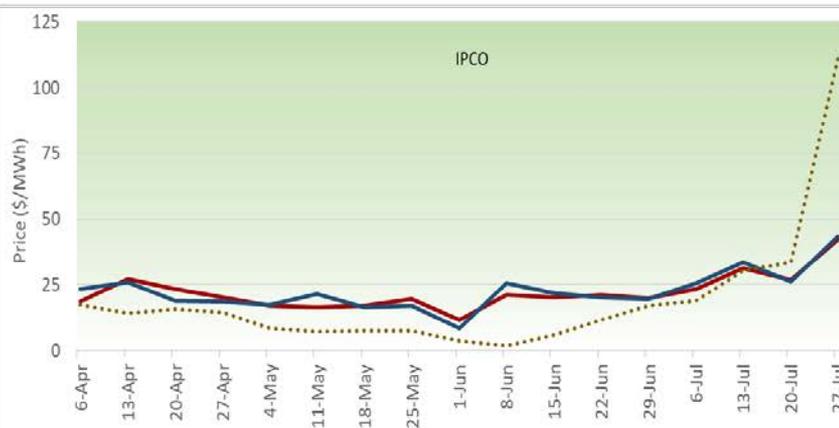
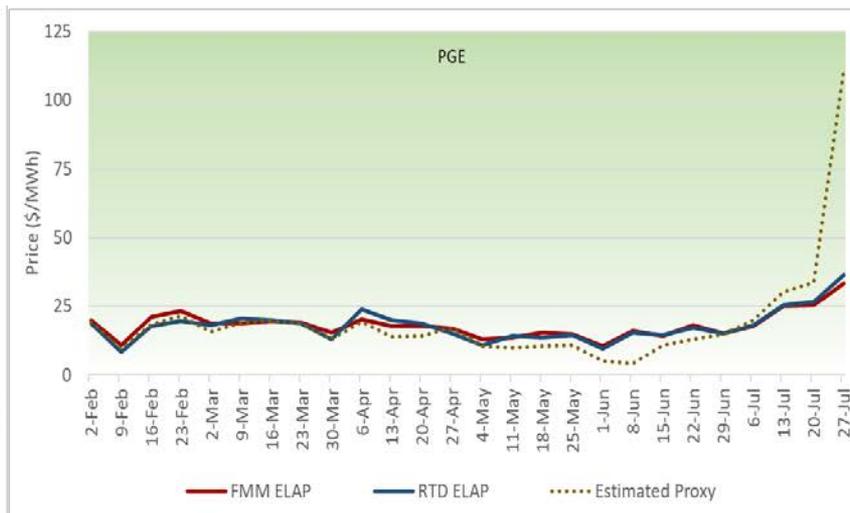
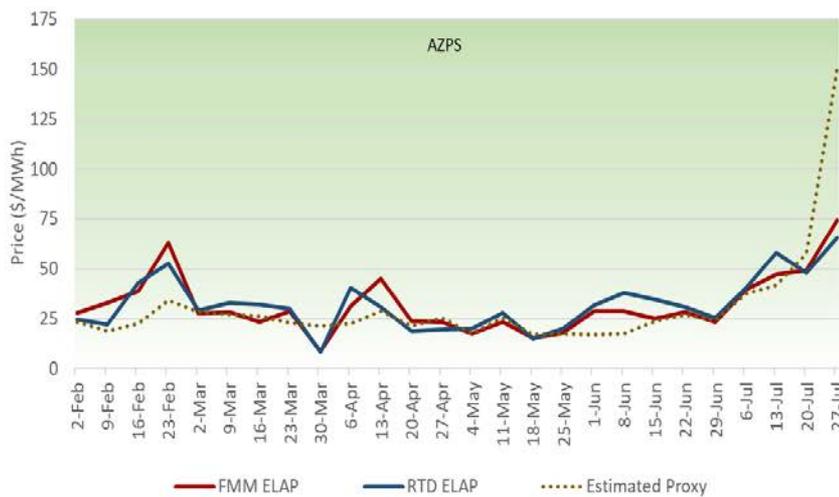
# EIM-Related price correction events decreased in July



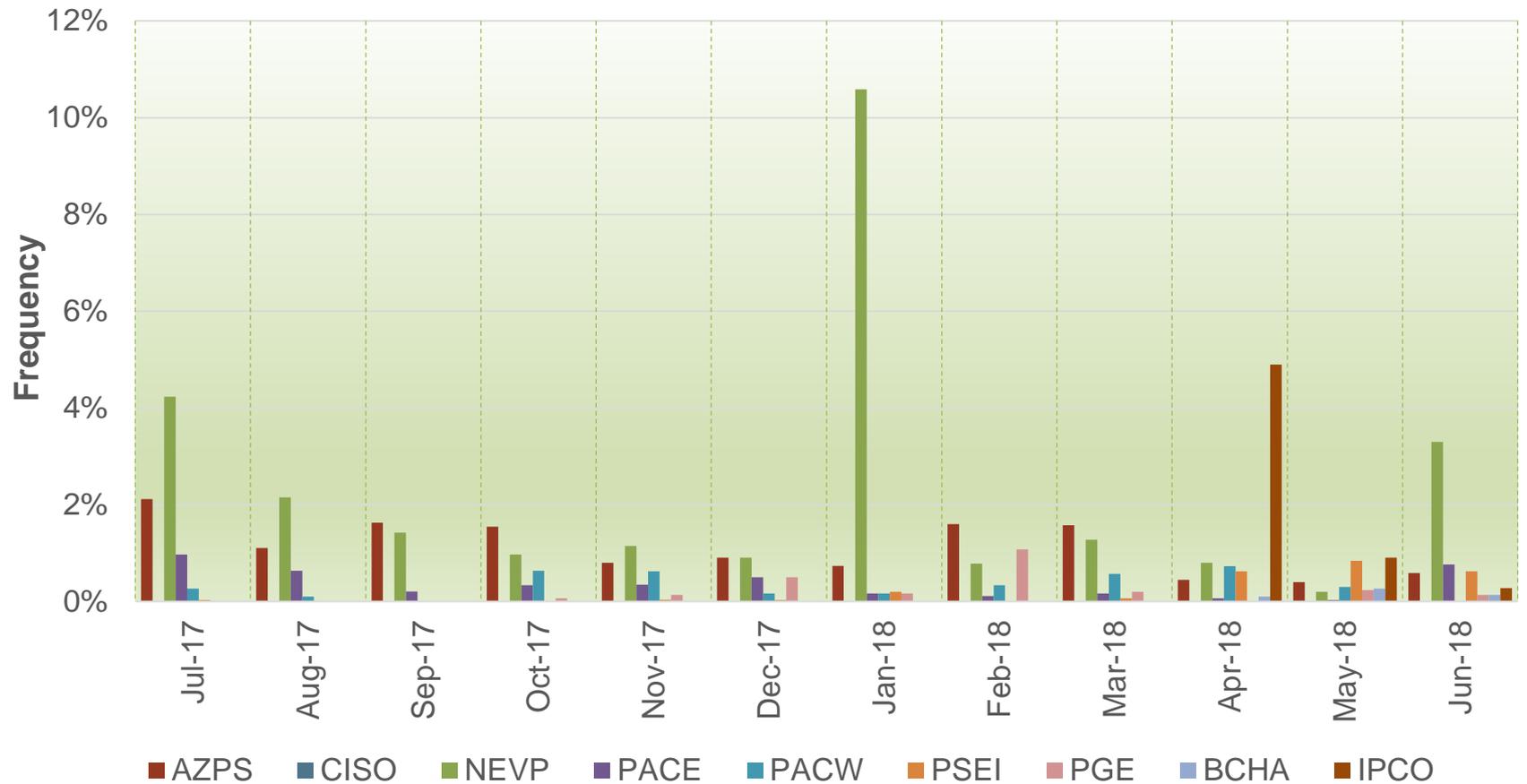
# EIM prices were generally stable and reflected tight EIM-wide supply conditions at the end of July



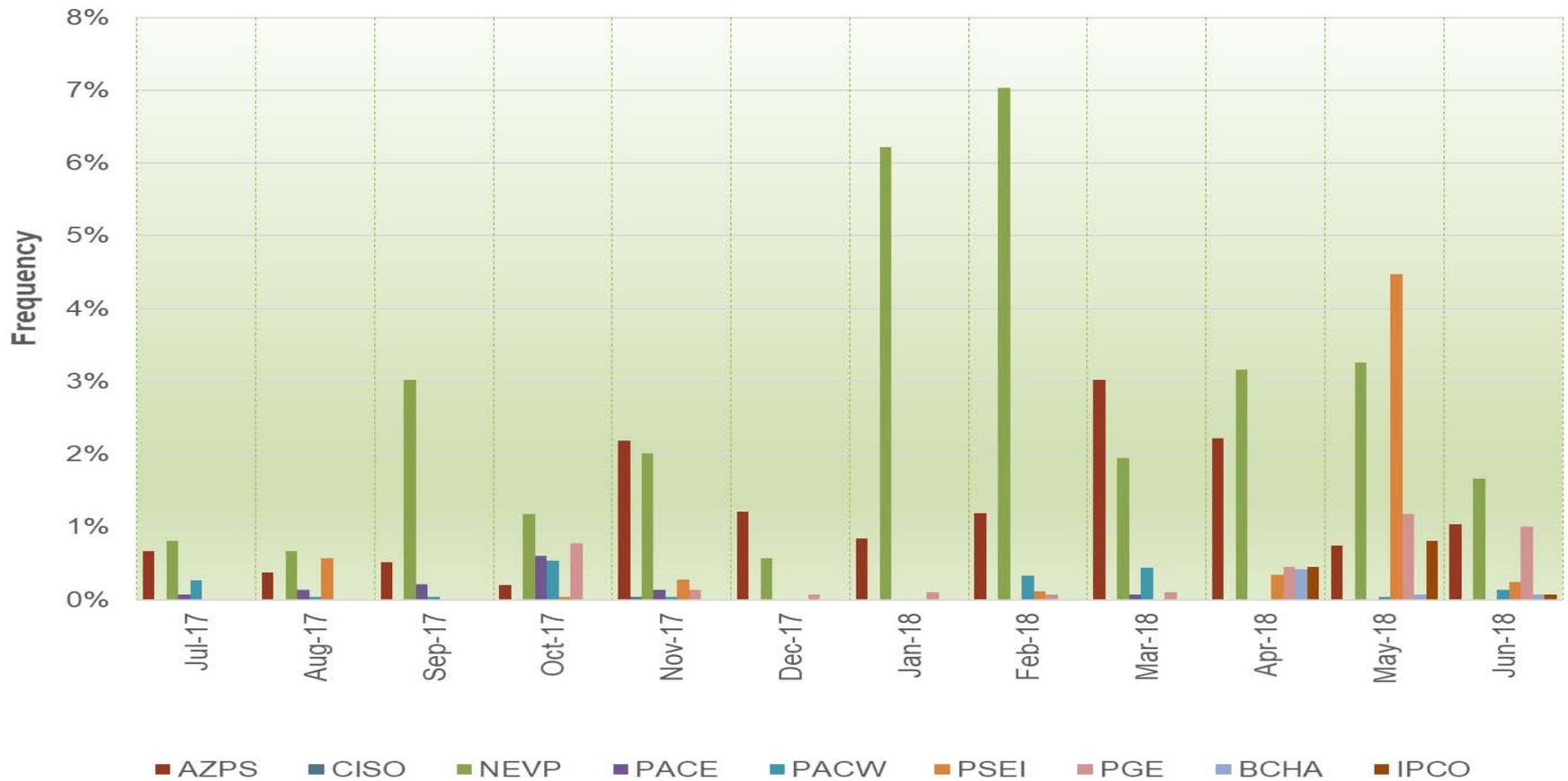
# EIM prices were generally stable and reflected tight EIM-wide supply conditions at the end of July



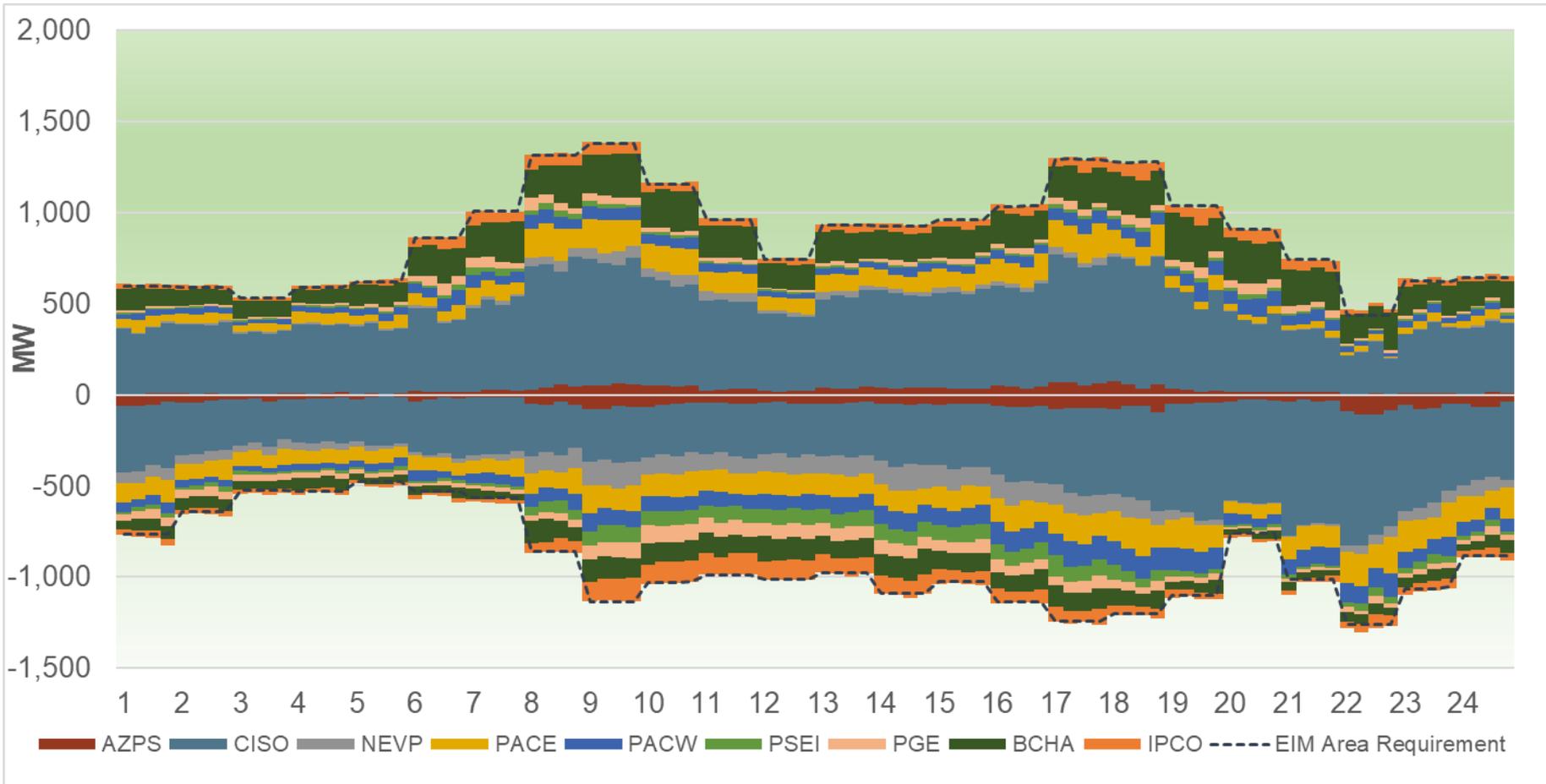
# Flexible Ramp Up Sufficiency Test Results



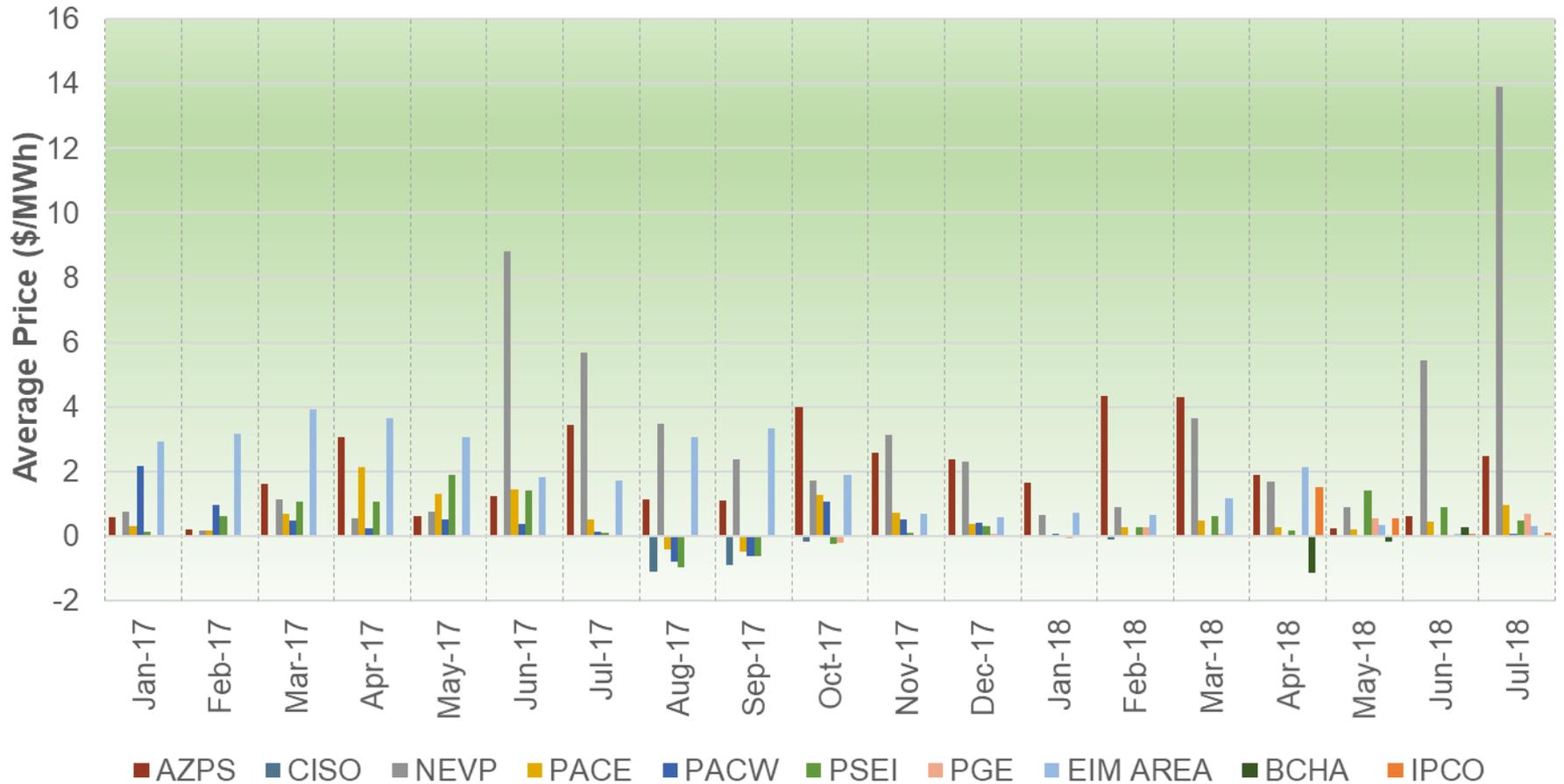
# Flexible Ramp Down Sufficiency Test Results



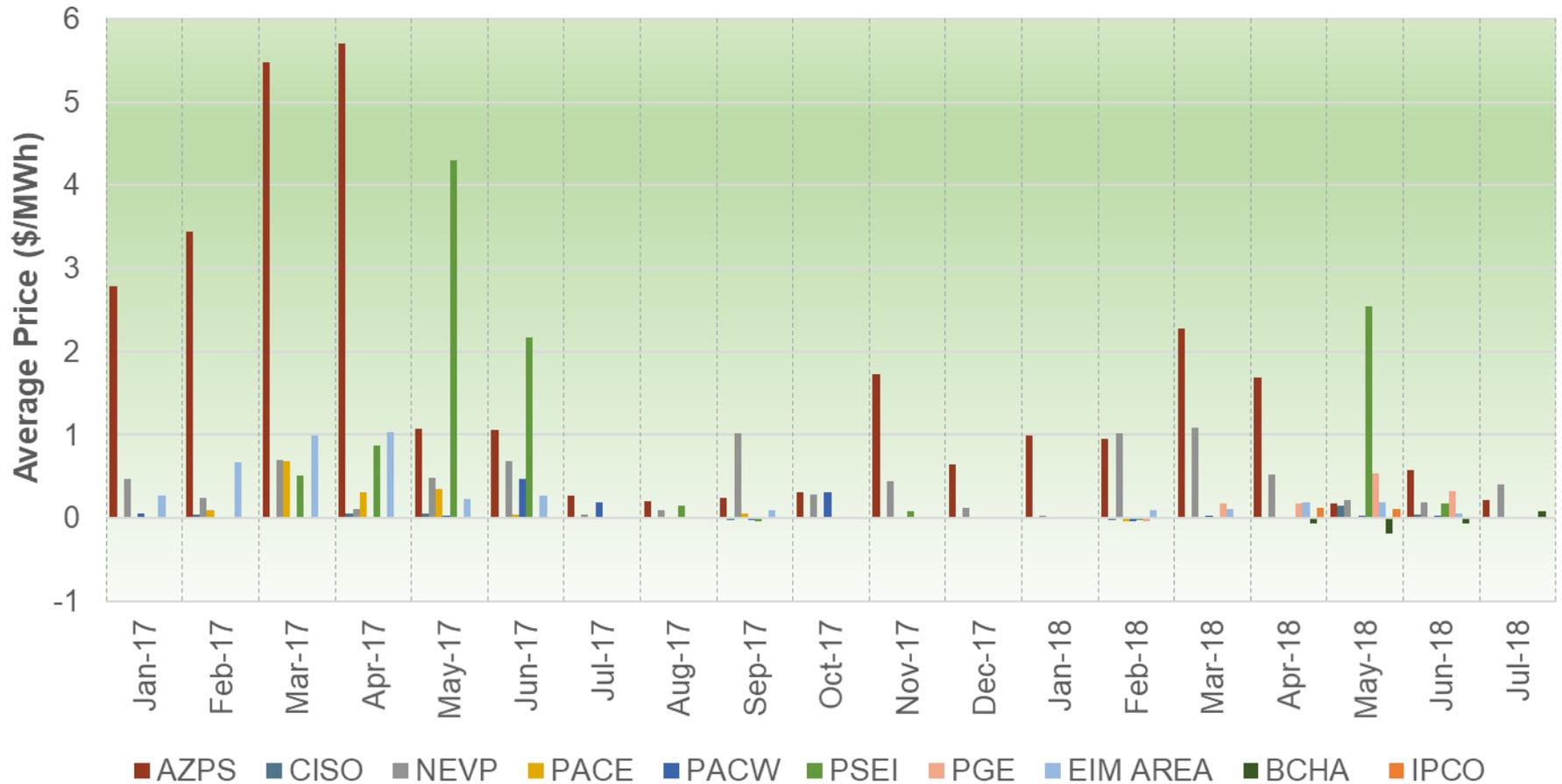
# Average Flexible Ramp Product Cleared Awards for each area with EIM Area Requirement - May – July 2018



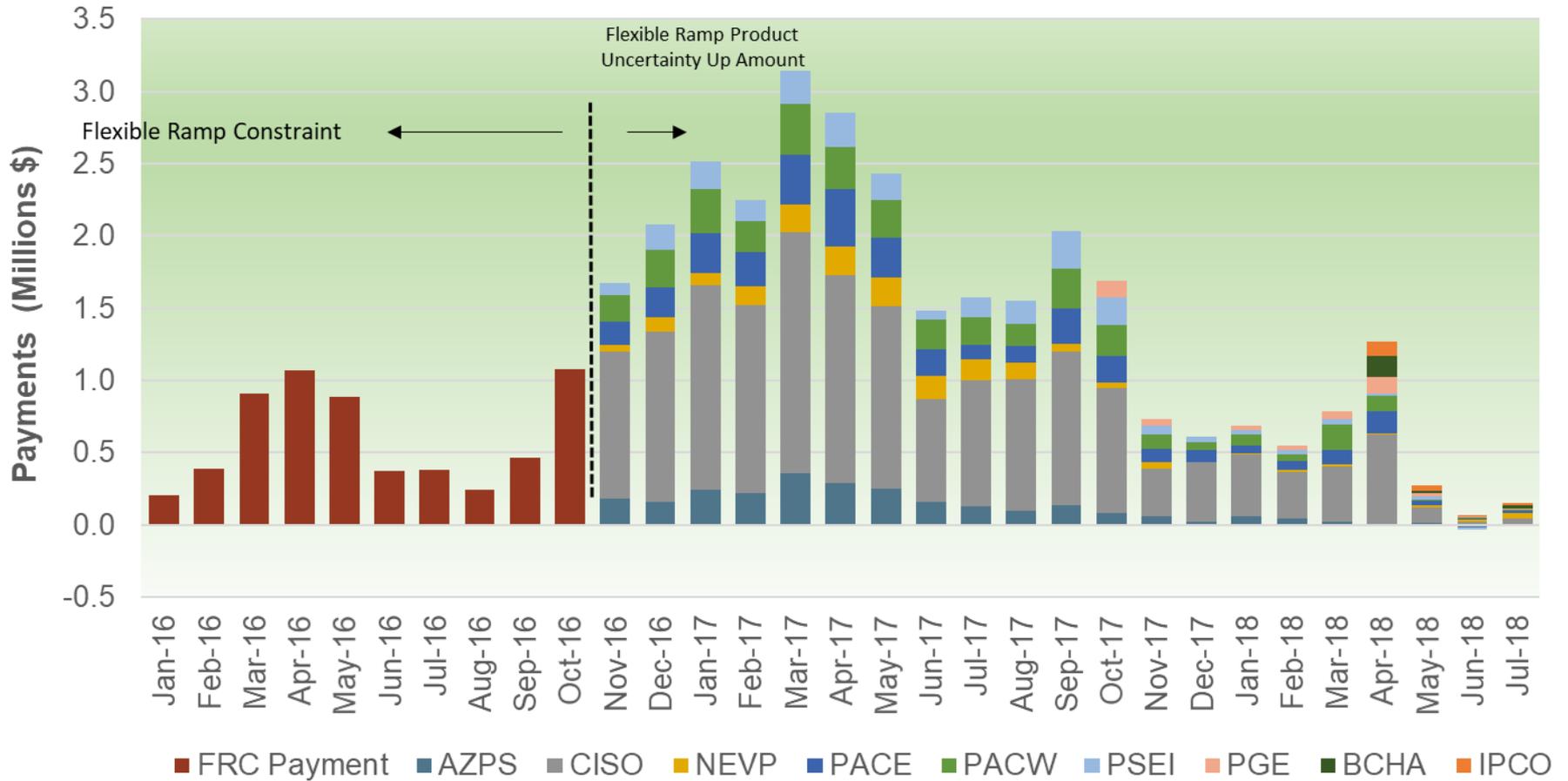
# Average Flexible Ramp Up Price (\$/MWh)



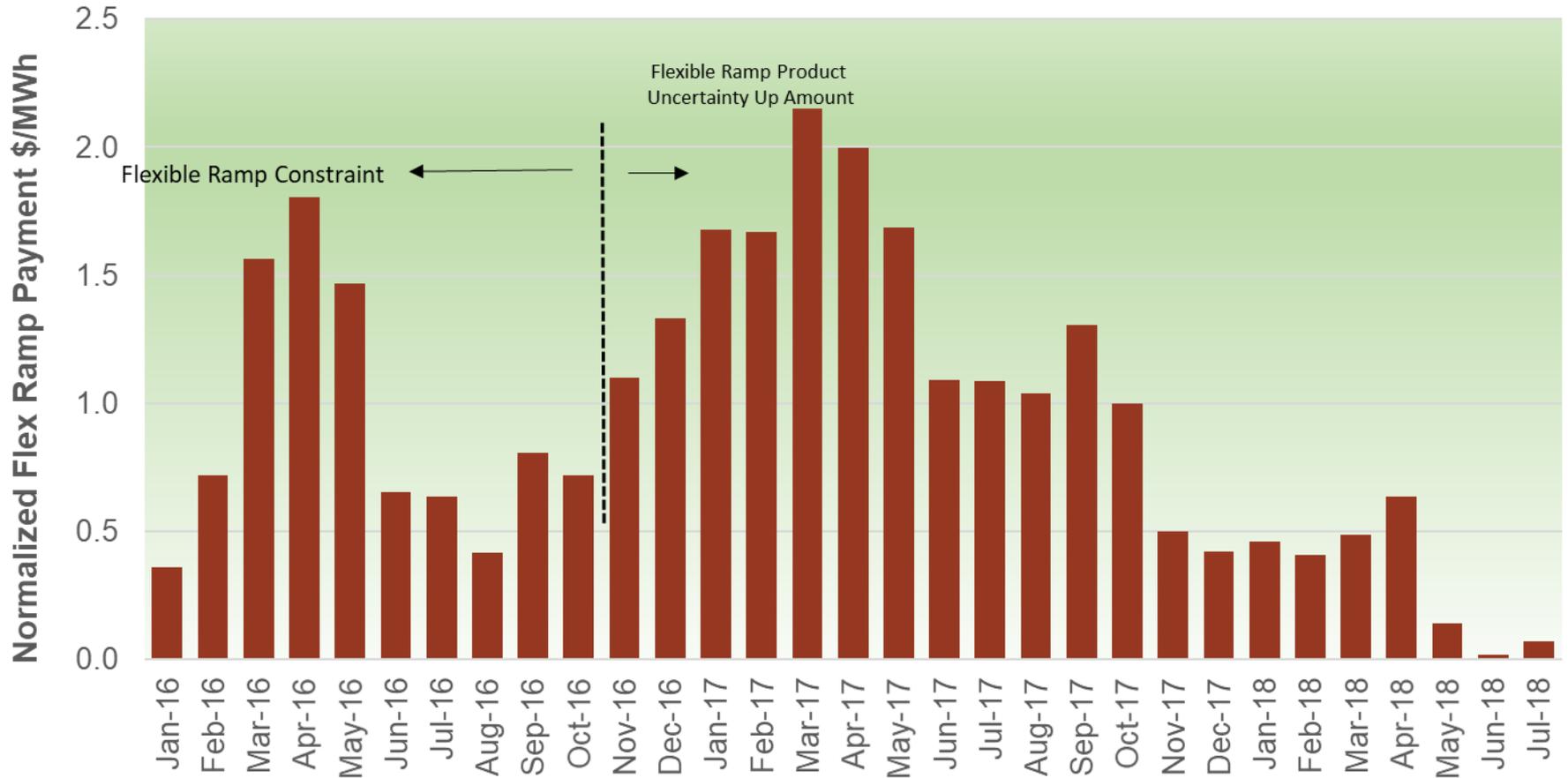
# Average Flexible Ramp Down Price (\$/MWh)



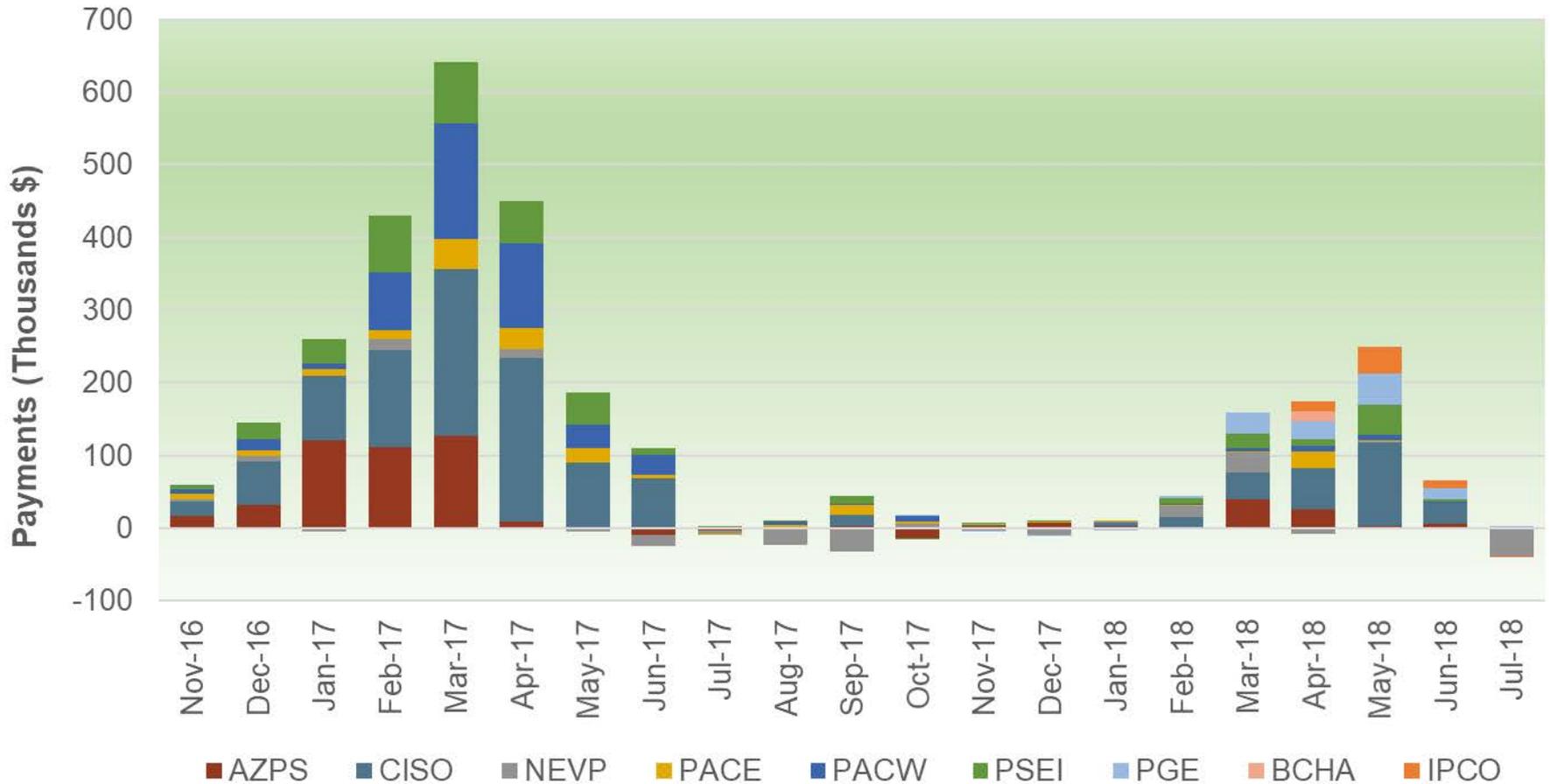
# Uncertainty Up Settlement Amount



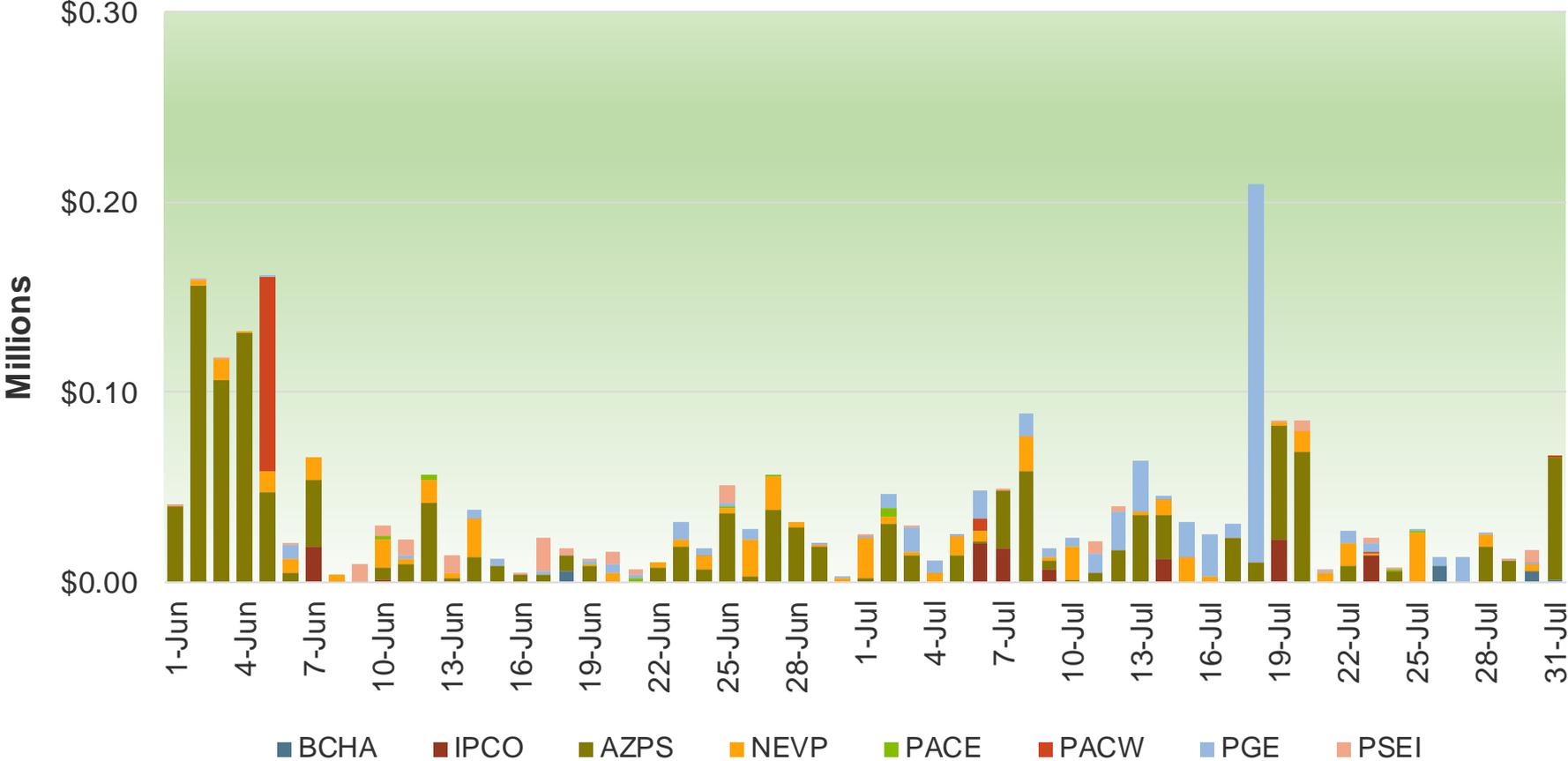
# Normalized Flex Ramp Up Payment



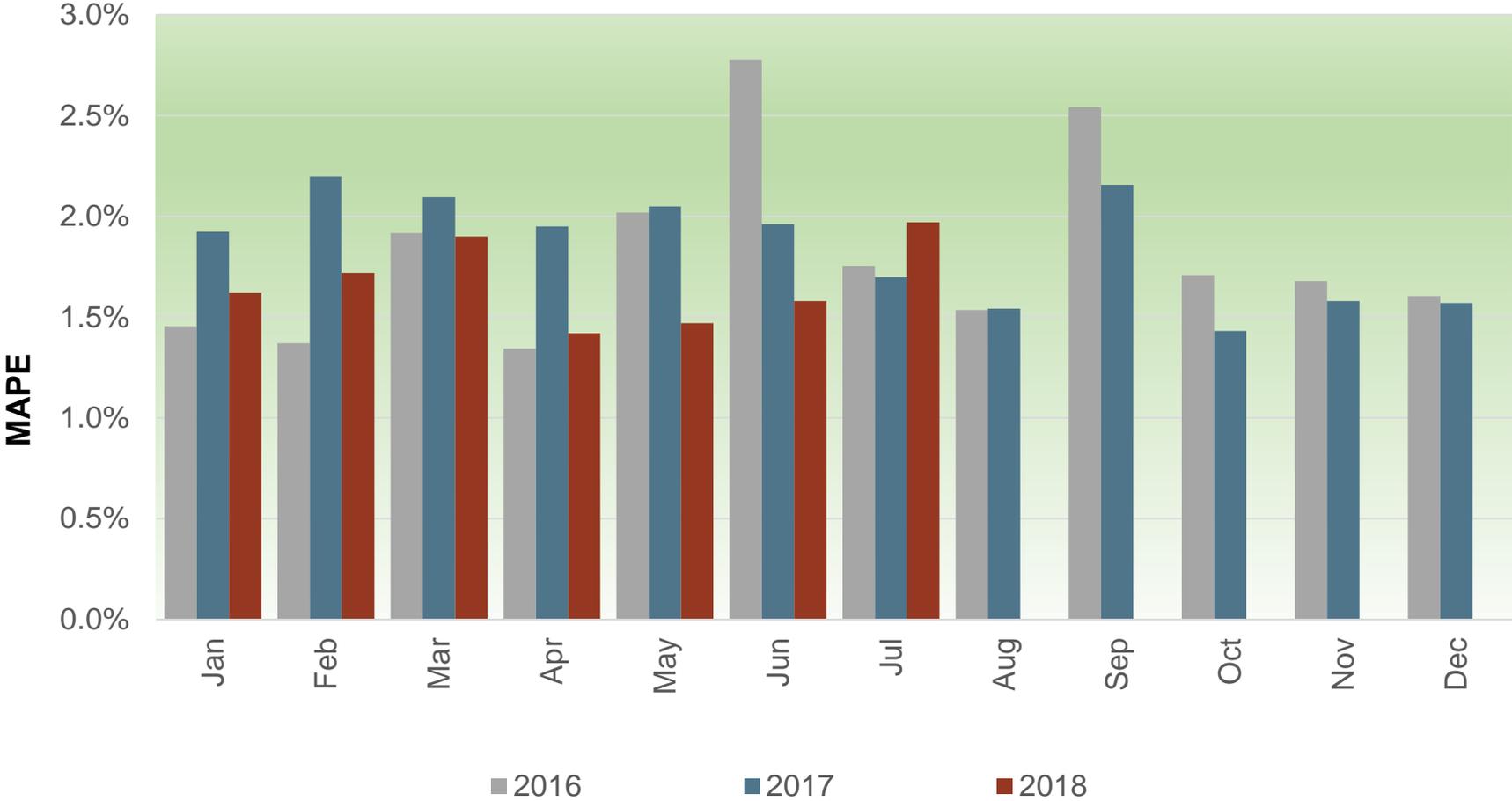
# Uncertainty Movement Down Settlement



# EIM BCR increased slightly in July compared with June



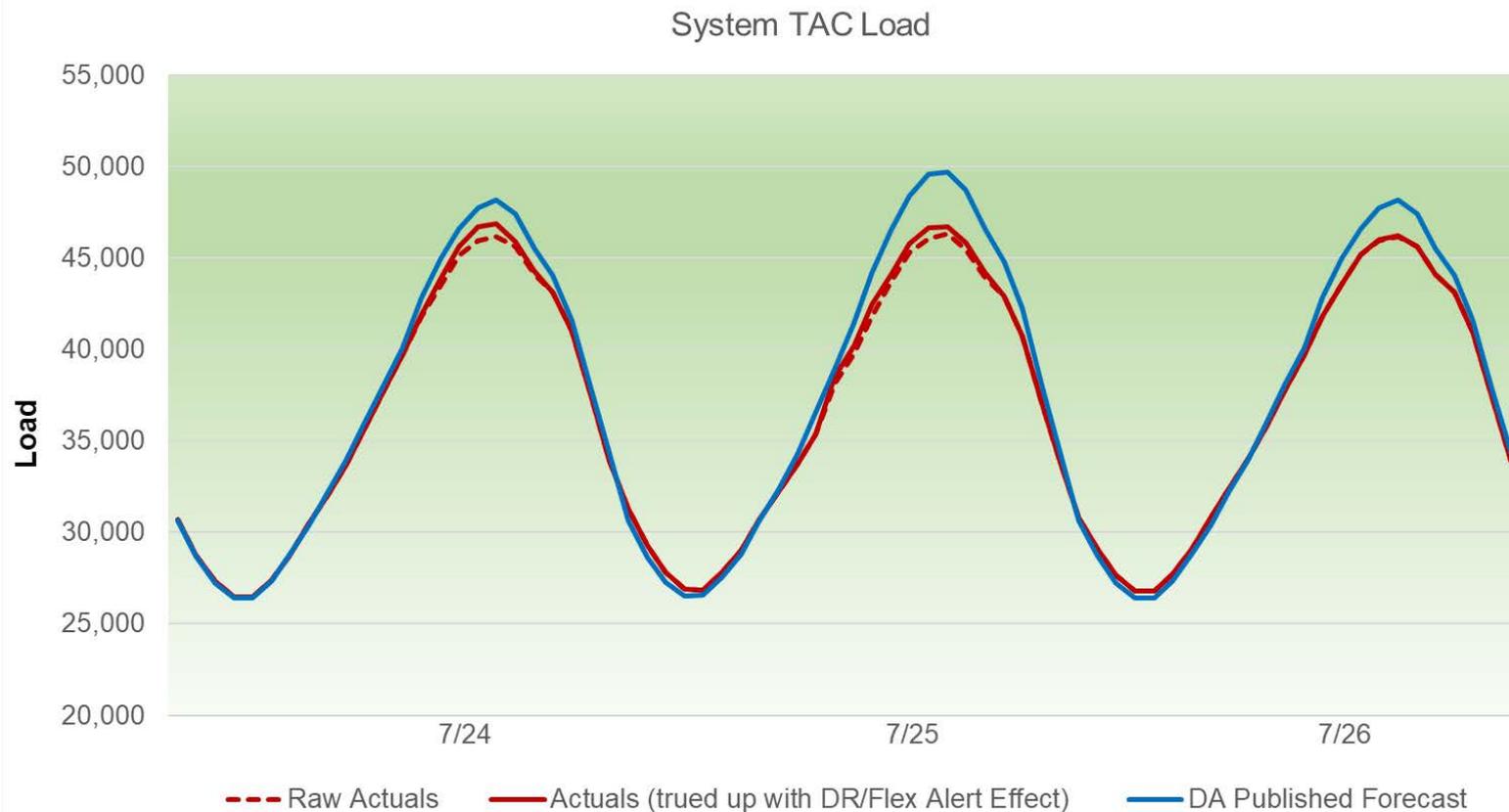
# Day-ahead load forecast



# Day-ahead peak to peak forecast accuracy



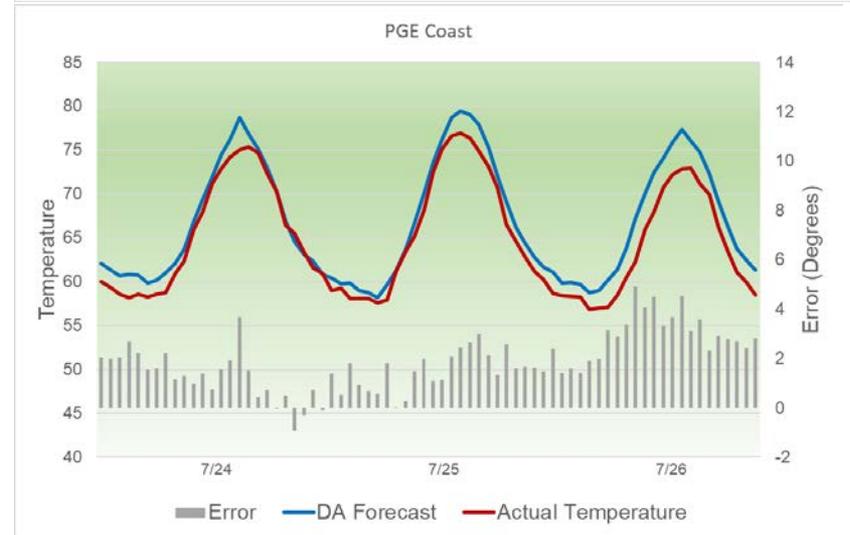
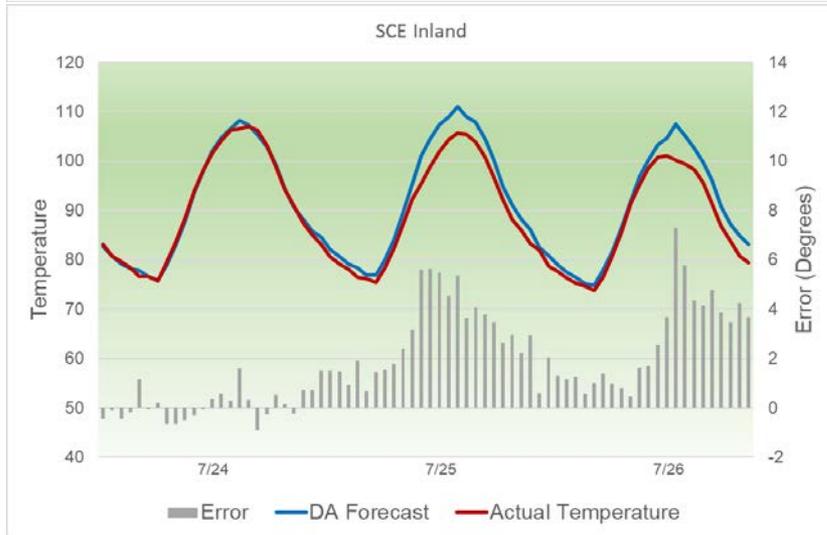
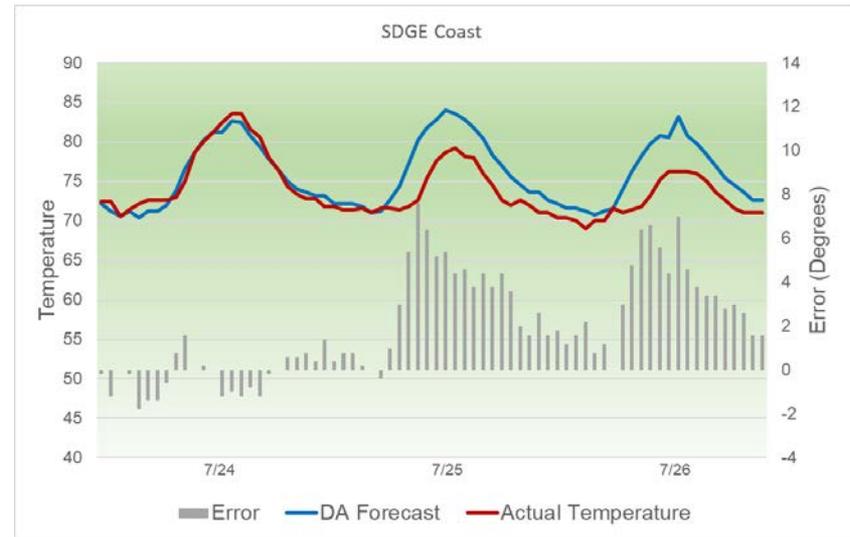
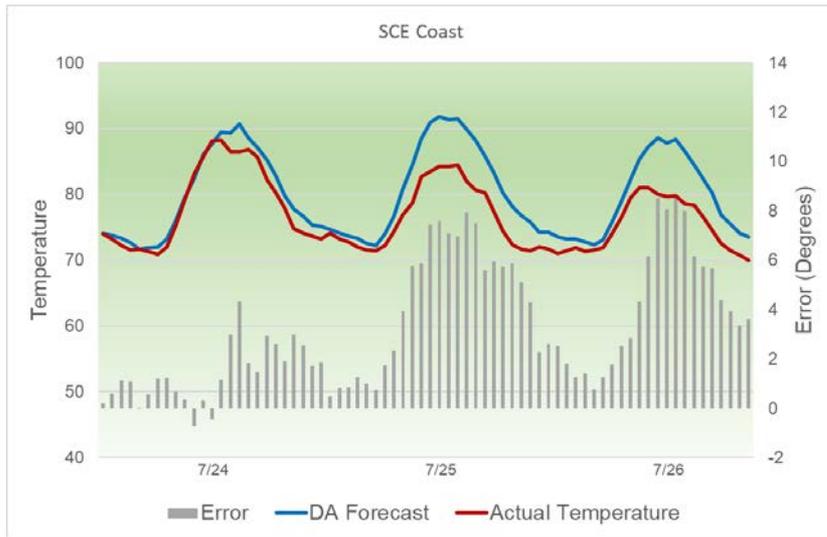
# July Forecast Error – Heat Event



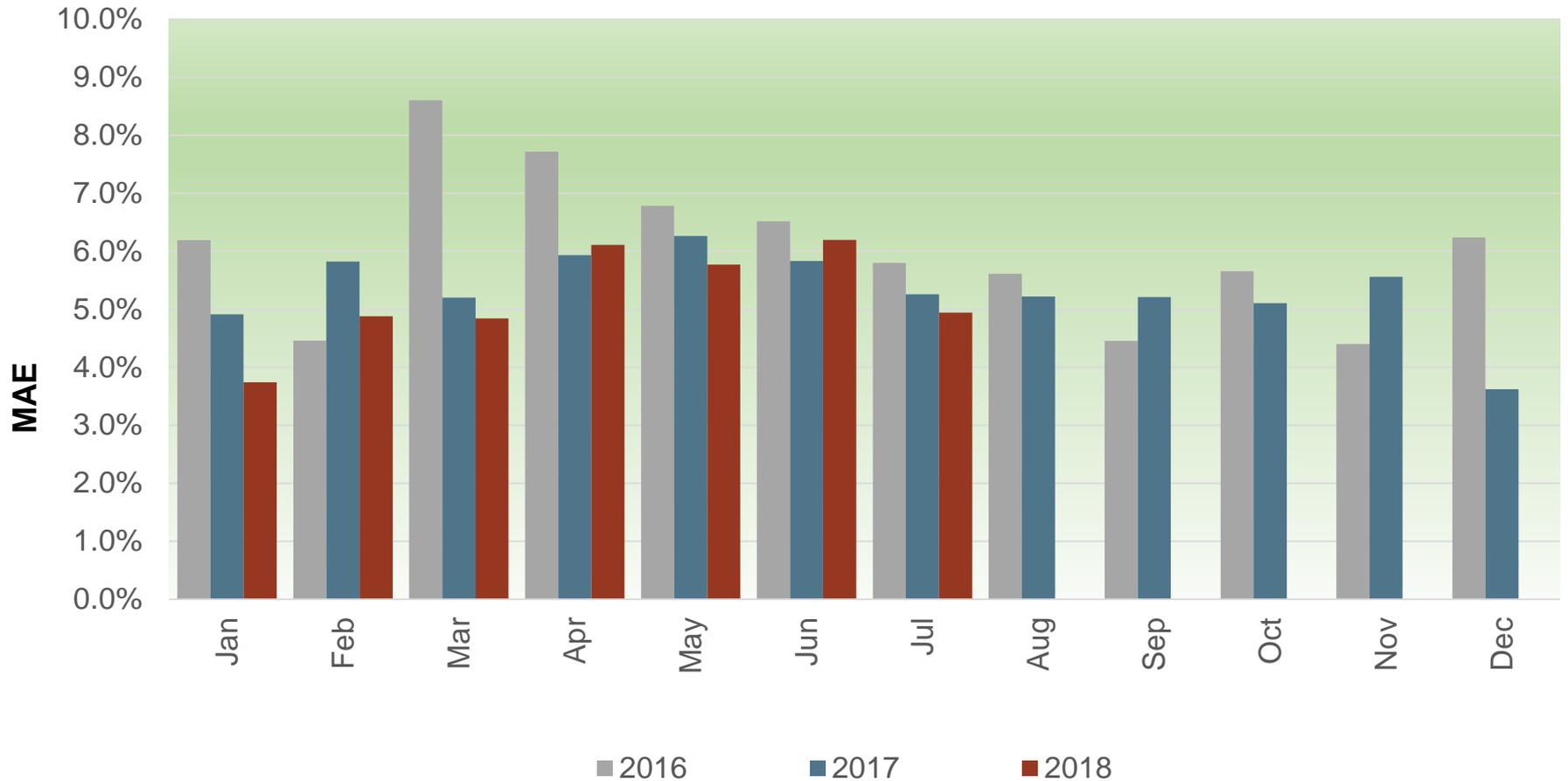
July saw multiple days of over-forecasting load, with the main driver being weather forecast error.

The National Weather Service (NWS) submitted excessive heat warnings starting 7/24, but temperatures came in 10 degrees cooler than forecasted in some regions.

# July Forecast Error – Heat Event



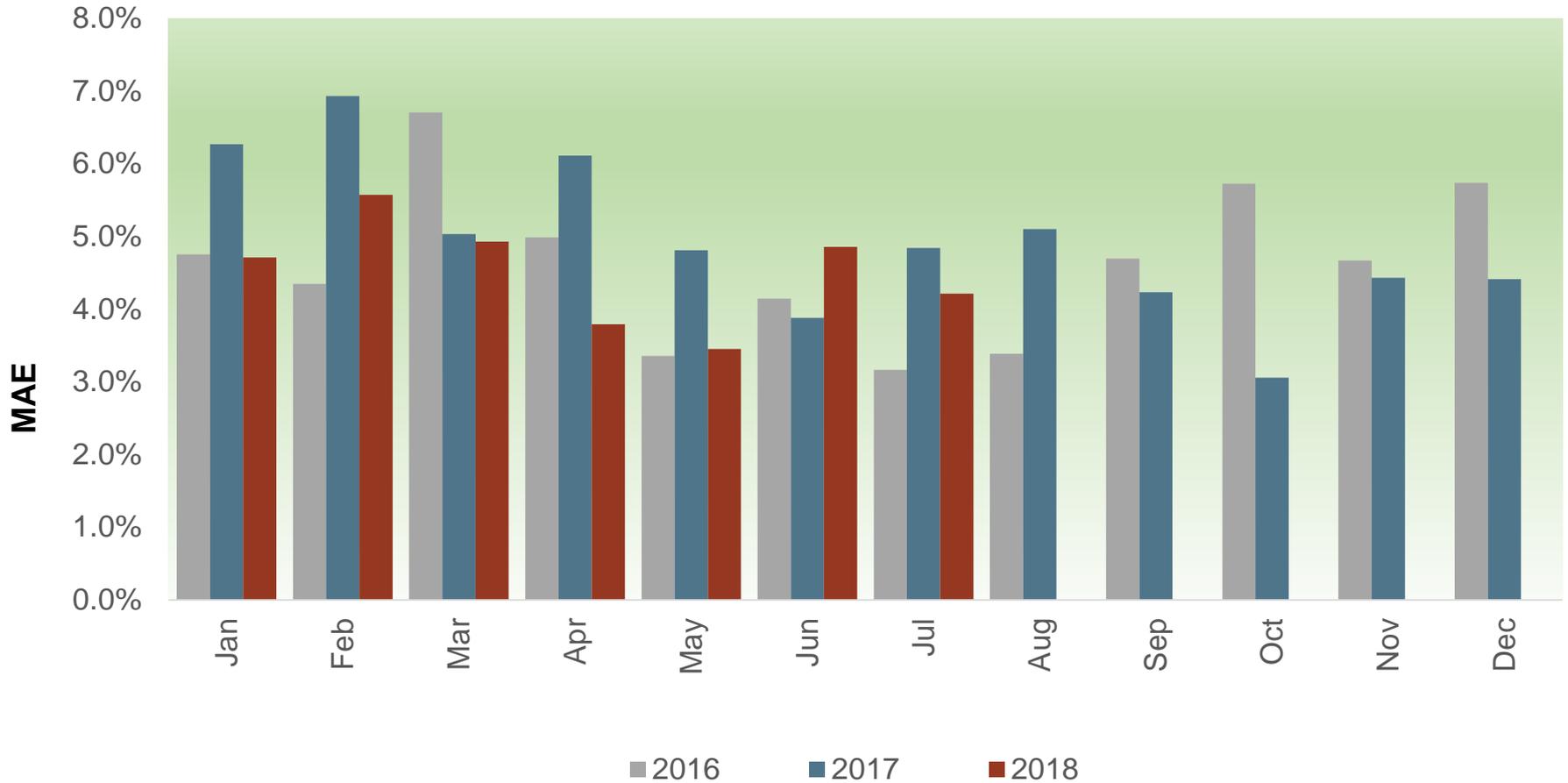
# Day-ahead wind forecast



\*\*In 2015-2016, Economic dispatches are not added back in to the generation data.

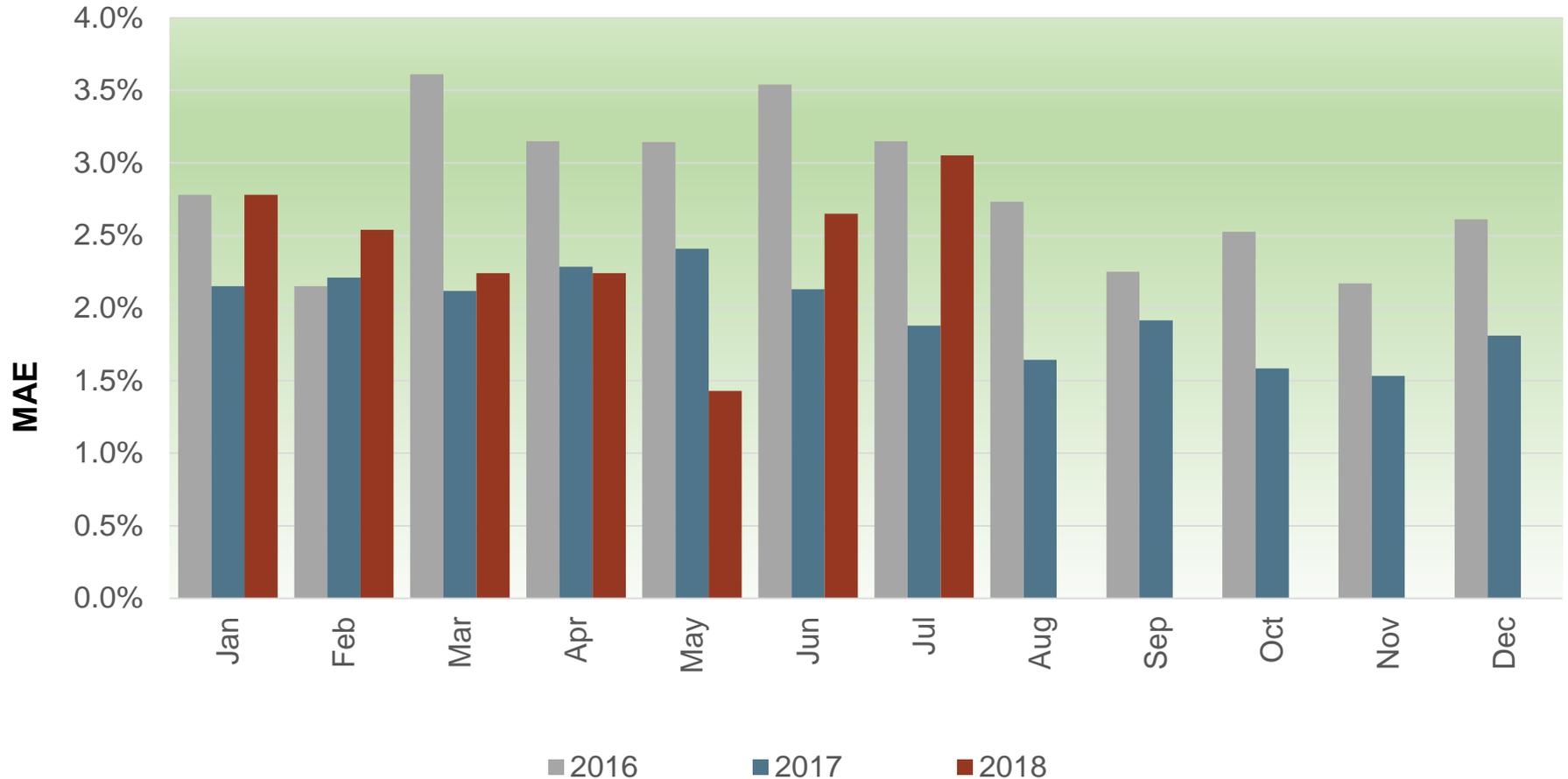
\*\*The 2017 generation data used for accuracy calculation contains the economically dispatched MW.

# Day-ahead solar forecast



\*\*In 2015-2016, Economic dispatches are not added back in to the generation data.  
 \*\*The 2017 generation data used for accuracy calculation contains the economically dispatched MW.

# Real-time wind forecast



\*\*2015-2016 represent the accuracy of the forecast made each hour at xx:55 for the following hour, i.e. the 5-65 minute ahead forecast. Economic dispatches are not added back in to the generation data.

\*\*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.

# Real-time solar forecast



\*\*2015-2016 represent the accuracy of the forecast made each hour at xx:55 for the following hour, i.e. the 5-65 minute ahead forecast. Economic dispatches are not added back in to the generation data.

\*\*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.



## Policy Update

Brad Cooper

Manager, Market Design Policy

John Goodin

Manager, Infrastructure & Regulatory Policy

# Ongoing policy stakeholder initiatives

- Day ahead market enhancements: 15 minute granularity
  - EIM Governing Body hybrid non-EIM specific approval role
  - Posted second revised straw proposal on August 27
  - Post draft final proposal on September 27
  - October EIM Governing Body meeting, November CAISO Board Meeting
- 2019 Policy Roadmap
  - EIM Governing Body briefing only
  - Post final catalog on August 30
  - Post draft roadmap and annual plan in September

## Ongoing policy stakeholder initiatives (continued)

- EIM Identified Market Power Mitigation Enhancements
  - EIM Governing Body hybrid EIM driven
  - Straw proposal posted on September 12
  - Second revised proposal or draft final proposal in October 2018
  - March 2019 EIM Governing Body meeting, March 2019 CAISO Board meeting

# Ongoing policy stakeholder initiatives (continued)

- Intertie Deviation Settlement
  - EIM Governing Body advisory role
  - Issue paper posted on August 15
  - Straw proposal posted on October 8
  - Draft final proposal in January 2019
  - March 2019 EIM Governing Body, March 2019 CAISO Board Meeting

## Ongoing policy stakeholder initiatives (continued)

- Transmission Access Charge (TAC) Enhancements
  - EIM Governing Body non-EIM item
  - Post draft final proposal on September 12
  - Stakeholder meeting on September 19
  - CAISO Board Meeting February 2019
- Flexible Resource Adequacy Criteria and Must-Offer Obligation (Phase 2)
  - EIM Governing Body non-EIM item
  - Reassessment of timeline Q1 2019 based on CPUC Track 2 decision and status of Day-Ahead Market Enhancements

# Ongoing policy stakeholder initiatives (continued)

- **RA Enhancements Initiative**
  - Multi-year RA and backstop procurement
  - Multi-year needs assessments and load forecasting
  - Review Maximum Import Capability
  - RA validation to assess showing against ISO operational needs
  - Slow response resources counting as local RA
  - Clarify RA MOO obligations for system, local and flexible capacity from all resource types
  - Issue paper Q4 2018

## Ongoing policy stakeholder initiatives (continued)

- Energy Storage and Distributed Energy Resources (ESDER) (Phase 3)
  - EIM Governing Body advisory role
  - August EIM Governing Body Meeting briefing, September CAISO Board Meeting for approval

# Ongoing policy stakeholder initiatives (continued)

- RMR and CPM Enhancements
  - EIM Governing Body non-EIM item
  - Straw proposal posted on June 26<sup>th</sup>
  - Stakeholder meeting held on July 11<sup>th</sup>
  - Market Surveillance Committee Meeting on August 3<sup>rd</sup>
  - Working Group on August 27<sup>th</sup>
  - Post revised straw proposal on September 19<sup>th</sup>

## Ongoing policy stakeholder initiatives (continued)

- **Storage as a Transmission Facility (SATA)**
  - EIM Governing Body non-EIM item
  - Revised straw proposal on August 15<sup>th</sup>
  - Stakeholder meeting on August 21<sup>st</sup>
  - Stakeholder comments due on September 4
  - Draft final proposal to be posted on September 24
  - CAISO Board Meeting in November 2018

# Ongoing policy stakeholder initiatives (continued)

- **Excess Behind the Meter Production**
  - EIM Governing Body non-EIM item
  - Post straw proposal on August 29
  - Post revised straw proposal in December
  - CAISO Board Meeting February 2019

# Release Plan Update

**Adrian Chiosea**

**Manager, Strategic Initiative Management**

**Janet Morris**

**Director, Program Office**

# The ISO offers innovative training programs

Date	Training All classes are offered at our Folsom, CA campus unless noted otherwise
August 16	EIM Enhancements 2018 webinar
August 16	Greenhouse Gas (GHG) Enhancements for EIM webinar
August 21	Commitment Cost Enhancements Phase 3 (CCE3) webinar
September 13	Congestion Revenue Rights (CRR) 1A webinar
September 13	Settlements 101 instructor led course
September 14	Settlements 201 instructor led course



## New Release Training materials currently posted

- July 2018 Welcome to the ISO recorded webinar with slides and toolkit
- ISO Orientation, Day-Ahead Overview and Real-Time Overview computer based training courses
- Energy Storage / Distributed Energy Resources Phase 2 recorded webinar and slides
- Eligible Intermittent Resource Dispatch Operating Target - EIR DOT recorded webinar and slides (coming soon)

The ISO's External Training & Readiness team provides quality training and readiness programs that successfully prepare Stakeholders to effectively engage with the ISO

Visit our **Learning Center** web page to access our training calendar, register for courses and find other useful resources, including computer based training courses, recorded webinars and new release training materials at:

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Contact us: [CustomerTraining@caiso.com](mailto:CustomerTraining@caiso.com)

# Release Plan Summary: 2018 – Independent 2019

## Independent 2018

- Congestion Revenue Rights Market User Interface (MUI) Update
- Imbalance Conformance Enhancements (ICE)
- Congestion Revenue Right Auction Efficiency 1B

## Fall 2018

- Energy Storage and Distributed Energy Resources (ESDER) Phase 2
- Settlements Performance Improvements
- Green House Gas (GHG) Enhancements for EIM
- Congestion Revenue Right (CRR) Auction Efficiency 1A
- EIM 2018 Enhancements

## Independent 2019

- **Generator Contingency and Remedial Action Scheme (RAS) Modeling**
- Automated Dispatch System (ADS) User Interface (UI) Replacement
- Black Start and System Restoration Phase 2

## Spring 2019

- **Commitment Cost Enhancement (CCE) Phase 3**
- Energy Imbalance Market (EIM) 2019 Balancing Authority of Northern California (BANC) / Sacramento Municipal Utility District (SMUD)

# Release Plan Summary: Fall 2019 – Spring 2020

## Fall 2019 – tentative, subject to impact assessment

- Commitment Costs and Default Energy Bid Enhancements
- Dispatch Operating Target Tariff Clarifications (July 2018 BOG briefing)
- Energy Storage and Distributed Energy Resources Phase 3 (Sept 2018 BOG)

## 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

## Fall 2020

- Contingency Modeling Enhancements - Transmissions
- DAME 15 Minute Granularity

## TBD – tentative, subject to impact assessment

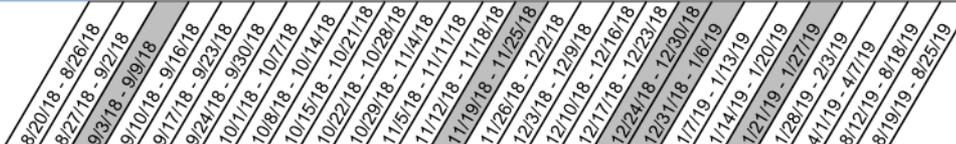
- EIM Offer Rules (TBD BOG)
- Excess Behind the Meter Production (TBD BOG)
- Extend Day-Ahead Market Enhancements to EIM Entities (TBD BOG)
- Flexible Resource Adequacy Criteria and Must-offer Obligation Phase 2 (Nov 2018 BOG)
- Intertie Deviation Settlement (March 2019 BOG)
- RA Enhancements (Track 1 and Track 2) (TBD BOG)
- RMR and CPM (March 2019 BOG) Enhancements
- Transmission Access Charge (Feb 2019 BOG) Enhancements
- Storage as a Transmission Facility (Nov 2018 BOG)

# Release Schedule 2018 – Spring 2019

Date of Data Refresh: 8/24/18 8:56 AM



Legend	
<span style="background-color: #e6f2ff; border: 1px solid #000; display: inline-block; width: 10px; height: 10px;"></span>	Market Simulation
<span style="background-color: #e6ffe6; border: 1px solid #000; display: inline-block; width: 10px; height: 10px;"></span>	CA ISO Holiday
<span style="background-color: #e6e6e6; border: 1px solid #000; display: inline-block; width: 10px; height: 10px;"></span>	Deployment Week



## Map Stage Environment Window

EIM - BANC-SMUD	EIM - BANC-SMUD (08/15-01/31)
CCE3 September Full Market Testing	CCE3 September Full Market Testing (08/06-11/01)
CCE 3 Full Market Simulation Testing - Market Sim	CCE 3 Full Market Simulation Testing - Market Sim (08/20-10/05)
ESDER Phase 2	ESDER Phase 2 (08/06-10/01)
ESDER Phase 2 - Market Sim - Market Sim	ESDER Phase 2 - Market Sim - Market Sim (08/20-09/28)
Settlements Performance Improvements	Settlements Performance Improvements (08/20-09/28)
Settlements Performance Improvements - Market Sim	Settlements Performance Improvements - Market Sim (08/20-09/28)
FNM Promotion 2018Q3	FNM Promotion 2018Q3 (08/27-08/27)
CRR Auction Efficiency 1A	CRR Auction Efficiency 1A (09/10-10/31)
EIM Enhancements 2018	EIM Enhancements 2018 (09/13-10/17)
Generator Contingency and RAS Modeling	Generator Contingency and RAS Modeling (09/10-02/01)
Green House Gas Enhancements for EIM	Green House Gas Enhancements for EIM (09/10-11/01)
CRR Auction Efficiency 1A - Market Sim	CRR Auction Efficiency 1A - Market Sim (09/17-10/12)
EIM Enhancements 2018 - Market Sim	EIM Enhancements 2018 - Market Sim (09/17-10/12)
Green House Gas Enhancements for EIM - Market Sim	Green House Gas Enhancements for EIM - Market Sim (09/17-10/12)
Generator Contingency and RAS Modeling - Market Sim	Generator Contingency and RAS Modeling - Market Sim (09/17-10/12)
CRR Auction Efficiency 1B	CRR Auction Efficiency 1B (11/02-12/21)
CRR Auction Efficiency 1B - Market Sim	CRR Auction Efficiency 1B - Market Sim (11/05-11/28)
EIM - BANC-SMUD - Market Sim	EIM - BANC-SMUD - Market Sim (12/03-01/31)
FNM Promotion 2018Q4	FNM Promotion 2018Q4 (12/11-12/12)
EIM - Seattle City Light	EIM - Seattle City Light (08/15-01/31)
EIM - Los Angeles Dept of Water and Power	EIM - Los Angeles Dept of Water and Power (08/15-01/31)

## PROD Environment Window

65% Transmission Capacity for CRR Allocation & Auction	65% Transmission Capacity for CRR Allocation & Auction (09/24-09/24)
ESDER Phase 2 - DRRS Production Deployment	ESDER Phase 2 - DRRS Production Deployment (10/01-10/01)
Settlements Performance Improvements	Settlements Performance Improvements (11/01-11/01)
EIM Enhancements 2018	EIM Enhancements 2018 (11/01-11/01)
ESDER Phase 2 Production Deployment	ESDER Phase 2 Production Deployment (11/01-11/01)
CRR Auction Efficiency 1A	CRR Auction Efficiency 1A (11/01-11/01)
Green House Gas Enhancements for EIM	Green House Gas Enhancements for EIM (11/01-11/01)
Imbalance Conformance Enhancements	Imbalance Conformance Enhancements (11/20-11/20)
FNM Promotion 2018Q4	FNM Promotion 2018Q4 (11/27-11/29)
Settlement Provisions	Settlement Provisions (12/28-12/28)
Generator Contingency and RAS Modeling	Generator Contingency and RAS Modeling (02/01-02/01)
CCE3 Activation in Production: Full Scope	CCE3 Activation in Production: Full Scope (04/01-04/01)
EIM - BANC-SMUD	EIM - BANC-SMUD (04/03-04/03)

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



ISO PUBLIC

# 2018 Independent Projects

# 2018 – Congestion Revenue Rights MUI Update

With the update to the Congestion Revenue Rights (CRR) Market User Interface (MUI) users will no longer be required to have Java installed. The CRR MUI will be updated as follows:

	AS-IS	TO-BE
UI Change	Current Market User Interface (MUI) requires IE9 and Java 1.6 update 43.	Updated MUI will not require Java Runtime Environment. All Java applets are removed
UI Change	Current MUI uses older format	New version will have a slightly different look but the same functionality plus some additional user features
No Change to XML format	Allows upload of allocation and auction portfolios via XML	There will be no changes to the existing XML format

# 2018 – Congestion Revenue Rights MUI Update

Project Info	Details/Date
Application Software Changes	Update to CRR MUI to remove all applets from the MUI
BPM Changes	No BPM changes are required
WebEx Overview Training	July 26, 2018 - Presentation available on CRR MUI
CRR MUI Manual	August 24, 2018 - Will be available on CRR MUI
MAP Stage	August 13, 2018
Production Implementation	Tentatively set for <b>September 17, 2018</b>
Questions	crrdata@caiso.com

Milestone Type	Milestone Name	Dates	Status
WebEx Overview Training	Training on updates to CRR MUI	July 26, 2018	✓
CRR MUI Manual	CRR MUI Manual Available on CRR MUI	August 24, 2018	✓
MAP Stage	System Available in MAP-Stage	August 13, 2018	✓
Production Activation	Activate new CRR MUI	<b>September 17, 2018</b>	

# 2018 – Imbalance Conformance Enhancements

Project Info	Details/Date
Application Software Changes	Improve RTPD, RTD limiter algorithm to better adjust for factors before and after conformance (Inc. VER deviations; other patterns observed from conformance studies; and after conformance value entered - ramping across multiple intervals rather than today's one interval). In scope for delivery 2018.
BPM Changes	Definitions & Acronyms BPM. The ISO is replacing the term 'load biasing' with 'imbalance conformance'

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	May 16, 2018	✓
External BRS	Post External BRS	Jul 10, 2018	✓
Config Guides	Post Config Guides	N/A	
Tech Spec	Publish Technical Specifications	N/A	
Tariff	File Tariff	Sep 04, 2018	
BPMs	Post Draft BPM changes	TBD	
	Publish Final Business Practice Manuals	TBD	
External Training	External Training Complete	N/A	
Market Simulation	Market Sim Window	N/A	
Production Activation	Imbalance Conformance Enhancements	Nov 20, 2018	

# 2018 - CRR Auction Efficiency – 1B

Project Info	Details/Date
Application Software Changes	<p>Targeted reduction of congestion revenue rights payouts on a constraint by constraint basis</p> <p><b>CRR:</b> provide CRR ownership and MWs</p> <p><b>CRRS/MQS:</b> Calculate offset MW for each CRR per contingency case per monitored element per hour:</p> <ul style="list-style-type: none"> <li>• Calculate CRR q proportion of prevailing flow on constraint</li> <li>• Calculate IFM constraint flow difference (CFD)</li> <li>• Calculate CRR q Offset MW = a*b</li> <li>• Calculate offset revenue and target CRR revenue</li> </ul> <p><b>Settlement: new Charge Codes</b></p> <p>Daily Settlement:</p> <ul style="list-style-type: none"> <li>• calculate Daily offset revenue, daily target CRR revenue and Daily CRR Clawback revenue</li> <li>• calculate Daily CRR payment and Daily Remainder revenue</li> <li>• settle each CRR over all constraints</li> </ul> <p>Monthly re-settlement - at end of each month</p> <ul style="list-style-type: none"> <li>• net daily offset revenue, target revenue and Clawback revenue over the month</li> <li>• settle each CRR over all the constraint</li> <li>• remainder is paid to measured demand.</li> </ul> <p><b>CMRI:</b> potential report CRR offset MW</p> <p><b>Market Clearing/Credit Tracking:</b> potential process offset revenue in CRR accrual accounts</p>

# 2018 - CRR Auction Efficiency – 1B

Project Info	Details/Date
BPM Changes	<ul style="list-style-type: none"> <li>• Congestion Revenue Rights</li> <li>• Credit Management and Market Clearing</li> <li>• Definitions &amp; Acronyms</li> <li>• Market Instruments</li> <li>• Market Operations</li> <li>• Settlements &amp; Billing</li> </ul>
Business Process Changes	<ul style="list-style-type: none"> <li>• Manage Market &amp; Reliability Data &amp; Modeling (MMR)/Manage Credit &amp; Collateral Market Performance &amp; Reporting</li> <li>• Manage Operations Support &amp; Settlements (MOS) / Manage Market Billing &amp; Settlements</li> <li>• Manage CRR Auction</li> </ul>

Milestone Type	Milestone Name	Dates	Status
Board Approval	BOG Presentation and Approval - Track 1B	Jun 21, 2018	✓
External BRS	Post External Draft BRS	Aug 06, 2018	✓
Config Guides	Post Draft Configuration Guides	Sep 10, 2018	
Tech Spec	Create ISO Interface Spec (Tech spec)	Sep 10, 2018	
Tariff	File Tariff	Jul 17, 2018	✓
BPMs	Post BPM (Draft)	Oct 25, 2018	
External Training	Deliver external training	TBD	
Production Activation	65% Transmission Capacity for CRR Allocation & Auction	Sep 24, 2018	
	Settlement Provisions	Dec 28, 2018	

# 2018 Fall Release

# Fall 2018 Release – Overview

	Board Approval	External BRS	Config Guide	Tech Spec	Draft Tariff**	BPMs	External Training	Market Sim	Production Activation
<b>Fall 2018 Release - Overview</b>	<b>01/01/18</b>	<b>05/22/18</b>	<b>06/22/18</b>	<b>06/22/18</b>	<b>08/01/18</b>	<b>08/10/18</b>	<b>08/13/18</b>	<b>08/20/18 - 09/28/18</b>	<b>11/01/18</b>
ESDER Phase 2	07/26/17	03/01/18	05/18/18	05/21/18	04/09/18	06/28/18	08/07/18	08/20/18 - 10/05/18	11/01/18
Settlements Performance Improvements	N/A	02/20/18	N/A	N/A	N/A	N/A	08/14/18	08/20/18 - 10/05/18	11/01/18
Green House Gas Enhancements for EIM	07/25/18	05/30/18	N/A	N/A	07/12/18	09/04/18	08/16/18	09/17/18 - 10/12/18	11/01/18
CRR Auction Efficiency 1A	03/22/18	05/11/18	N/A	06/26/18	04/09/18	09/07/18	09/13/18	09/17/18 - 10/12/18	11/01/18
EIM Enhancements 2018	N/A	07/31/18	N/A	06/25/18	N/A	08/10/18	08/16/18	09/12/18 - 10/12/18	11/01/18
Commitment Costs Phase 3	03/25/16	08/21/17	05/17/18	08/13/18	07/31/17	08/29/18	8/30/18	08/20/18 - 10/05/18	4/1/2019
Generator Contingency and RAS Modeling	09/19/17	03/16/18	N/A	N/A	11/28/18	09/07/18	09/06/18	09/17/18 - 10/12/18	02/01/19

## Notes:

Items in BLUE are **complete**

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

# Product View - CMRI UI and API changes

Release	Project	Change Type	External Impact	MP Action	UI Change	Service Name & Major Version	Minor Version	MAP Stage	Production Activation	Artifacts Package	Tech Spec Version
Fall 2018	CCE3	New	CAISO Market	Adopt when ready	Tab: Default Bids New Report: Actual Limitation Values	retrieveActualLimitationValues_v1 retrieveActualLimitationValues_v1_DocAttach	20171001	Sept 12, 2018	1 Nov 2018	v1.0 (Fall)	3.6.3
Fall 2018	CCE3	New	CAISO Market	Adopt when ready	Tab: Default Bids New Report: Resource Opportunity Costs	retrieveResourceOpportunityCost_v1 retrieveResourceOpportunityCost_v1_DocAttach	20171001	Sept 12, 2018	1 Nov 2018	v1.0 (Fall)	3.6.3
Indp.	EIM WNTR 2017	New	CAISO Market	Adopt when ready	Tab: Real-Time New Report: Resource Operating Limits	TBD	TBD	TBD	TBD	TBD	TBD
Indp.	EIM WNTR 2017	New	CAISO Market	Adopt when ready	Tab: EIM New Report: Resource Operating Limits	TBD	TBD	TBD	TBD	TBD	TBD

Application access: <http://www.caiso.com/participate/Pages/ApplicationAccess/Default.aspx>

CAISO new developer site: <https://developer.caiso.com>

# Product View - OASIS UI and API changes

Release	Project	Change Type	External Impact	MP Action	UI Change	Web Service	MAP Stage	Production Activation	Artifacts Package	Tech Spec Version
Fall 2018	EIM 2018	New	CAISO Market	Adopt when ready	Tab: Energy New Report: BAA Market Events	ENE_BAA_MKT_EVENTS	Aug 20, 2018	1 Nov 2018	v1.0 (Fall)	v5.1.4
Fall 2018	CRR Auc Eff 1A	Update	CAISO Market	Adopt when ready	Tab: Public Bids Report: CRR Public Bids	PUB_CRR_BID	September 17, 2018	1 Nov 2018	v1.0 (Fall)	v5.1.4
Indp.	SPI	New	CAISO Market	Adopt when ready	Tab: Transmission Report: Current Transmission Usage Transmission Outages Transmission Interface Usage Market Available Transmission Capacity	TRNS_CURR_USAGE TRNS_OUTAGE TRNS_USAGE TRNS_ATC	September 2018	1 Nov 2018	N/A (data change)	N/A (data change)

Application access: <http://www.caiso.com/participate/Pages/ApplicationAccess/Default.aspx>

CAISO new developer site: <https://developer.caiso.com>

# CMRI Day-Ahead Variable Energy Resource Forecast

As part of an enhancement project, Day-ahead Variable Energy Resource Forecast data set will updated as follows:

	AS-IS	TO-BE
UI Change	Data is available for one trade date, which is Day Ahead  Example: If user selects 6/26/18 as a trade date, CMRI will display data for 6/26/18.	Data is available for four trade dates  Example : If user selects 6/26/18 as a trade date, CMRI will display data for 6/26/18 ,6/27/18,6/28/18 and 6/29/18
API Change	retrieveEIRForecast_v1 service returns data for DA trade dates which are in between dateTimeStart and dateTimeEnd	retrieveEIRForecast_v1 service will return data for Trade Day +1 through Trade Day +4 where Trade Day +1 trade dates are in-between dateTimeStart and dateTimeEnd

**Deployment to MAP Stage: July 11, 2018**

**Deployment to production: Aug 27**

# Fall 2018 – ESDER Phase 2

Project Info	Details/Date
Application Software Changes	<p><b>Settlements:</b></p> <ul style="list-style-type: none"> <li>Alternative Baselines:           <ul style="list-style-type: none"> <li>Possible system changes to include addition of an automated monitoring tool for performance measurement data received from external participants.</li> <li>Changes to the DRRS registration system for the selection of the new baselines and allowing for ISO approval prior to use in the market.</li> <li>Settlement configuration will need to be evaluated and revised to assure PDRs that provide AS services can be calculated correctly based on the submitted SQMD.</li> </ul> </li> </ul> <p><b>ECIC:</b></p> <ul style="list-style-type: none"> <li>EIM Net Benefits Testing:           <ul style="list-style-type: none"> <li>Code modification to calculation to accommodate addition of all applicable gas price indices.</li> </ul> </li> </ul> <p><b>MRI-S:</b></p> <ul style="list-style-type: none"> <li>Alternative Baselines:           <ul style="list-style-type: none"> <li>The DRS Decommissioning project seeks to retire the current DRS system. Once this system is retired all current functionality will reside in the MRI-S (Market Results Interface – Settlements) system. It should be noted that all available customer load baseline calculations will be submitted into the MRI-S system once the DRS system is retired.</li> </ul> </li> </ul>
BPM Changes	<p><b>Market Instruments:</b></p> <ul style="list-style-type: none"> <li>EIM Net Benefits Testing:           <ul style="list-style-type: none"> <li>Changes will include addition of all gas price indices used in calculation.</li> </ul> </li> </ul> <p><b>Metering:</b></p> <ul style="list-style-type: none"> <li>Alternative Baselines:           <ul style="list-style-type: none"> <li>Need to revise the BPM to explain new baselines and changes to existing systems.</li> </ul> </li> <li>Station Power:           <ul style="list-style-type: none"> <li>Need to revise BPM to provide examples of wholesale/retail uses for generation and storage</li> <li>Need to revise BPM to clarify permitted/prohibited netting rules.</li> </ul> </li> </ul> <p><b>Definitions &amp; Acronyms:</b></p> <ul style="list-style-type: none"> <li>Station Power:           <ul style="list-style-type: none"> <li>Revision of Station Power definition to match Tariff language.</li> </ul> </li> </ul> <p><b>Settlements &amp; Billing:</b></p> <ul style="list-style-type: none"> <li>Alternative Baselines:           <ul style="list-style-type: none"> <li>Possible changes to reflect settlements configuration changes.</li> </ul> </li> </ul>

# Fall 2018 – ESDER Phase 2

Project Info	Details/Date
Business Process Changes	<ul style="list-style-type: none"> <li>• Develop Infrastructure (DI) (80001)</li> <li>• Manage Market &amp; Reliability Data &amp; Modeling (MMR) (80004)</li> <li>• Manage Operations Support &amp; Settlements (MOS) (80007)</li> <li>• Support Business Services (SBS) (80009)</li> <li>• Other</li> </ul>

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Jul 26, 2017	✓
External BRS	Post External BRS	Oct 17, 2017	✓
	Post Revised External BRS	Mar 01, 2018	✓
Config Guides	Settlements Config Guides	May 18, 2018	✓
Tech Spec	Publish ISO Interface Spec (Tech spec)	May 21, 2018	✓
Tariff	File Tariff with FERC	Aug 17, 2018	✓
	Post Draft Tariff	Nov 17, 2017	✓
	Post Updated Draft Tariff (based on feedback)	Apr 09, 2018	✓
CPG	Next CPG Meeting	Aug 14, 2018	✓
BPMs	Post Draft BPM changes	Jun 28, 2018	✓
External Training	Deliver external training	Aug 07, 2018	✓
Market Sim	ESDER Phase 2 - Market Sim	Aug 20, 2018 - Sep 28, 2018	
Production Activation	ESDER Phase 2 - DRRS Production Deployment	Oct 01, 2018	
	ESDER Phase 2 Production Deployment	Nov 01, 2018	

# Fall 2018 – Settlement Performance Improvements

Project Info	Details/Date
Application Software Changes	<p>The scope of the Settlements Performance Improvements include:</p> <ul style="list-style-type: none"> <li>• Performance improvements for Post Bill Determinant Mapping process - Non-production storage issue causing delays to the statement publication</li> <li>• Performance improvements of Statement Generation (BD File Size issue):                      Daily Statements generation                      Monthly Statements and Invoice generation</li> </ul> <p>Systems: Settlements</p>
BPM Changes	Settlements and Billing
Business Process Changes	Settlements & Billing: Application Flow should be reviewed for possible changes
Sample BD Files	Sample split CAISO Bill Determinant files posted externally on 6/22

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board Approval	N/A	
External BRS	Complete and Post External BRS	Feb 20, 2018	✓
	Updated External BRS Published (ver 1.1)	Jul 27, 2018	✓
	Updated External BRS Published (ver 1.2)	Aug 10, 2018	✓
Config Guides	Design Review - BPM and Tariff SMEs	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec)	N/A	
Tariff	File Tariff	N/A	
BPMs	Post Draft BPM changes	N/A	
External Training	Post User Guides	Aug 14, 2018	✓
OTHER	Settlement Interface Specification for Scheduling Coordinators	Mar 16, 2018	✓
Market Sim	Market Sim Window	Aug 20, 2018 - Sep 28, 2018	
Production Activation	Settlements Performance Improvements	Nov 01, 2018	

# Fall 2018 - Green House Gas Enhancements for EIM

Project Info	Details/Date
Application Software Changes	<p>The CA ISO proposes to adjust its solution to address emissions associated with secondary dispatch. CAISO will limit the GHG bid quantity of EIM participating resources to the MW value between the EIM participating resource's base schedule and the resource's upper economic limit (UEL).</p> <p>Since the GHG bid quantity is now limited, this will change the market dispatch to identify other EIM participating resources that have available capacity above their base schedule to support EIM transfers into CAISO to serve CAISO demand. The GHG emissions of these resources will now be appropriately reflected in the market attribution.</p> <p>The CA ISO decided to withdraw the two-pass solution previously proposed.</p>
BPM Changes	Energy Imbalance Market (EIM)

Milestone Type	Milestone Name	Dates	Status
Board Approval	Present report to BOG	Jul 25, 2018	✓
	Present report to EIM Governing Body	Jul 12, 2018	✓
External BRS	Post External BRS to CAISO website	May 30, 2018	✓
Config Guides	Publish Configuration Guides	N/A	
Tech Spec	Publish Technical Specifications	N/A	
Tariff	Draft Tariff	Jun 18, 2018	✓
	File Tariff	Aug 31, 2018	
BPMs	Publish Draft BPMs	Sep 04, 2018	
External Training	Deliver external training	Aug 16, 2018	✓
Market Sim	Market Sim Window	Sep 17, 2018 - Oct 12, 2018	
Production Activation	Green House Gas Enhancements for EIM	Nov 01, 2018	

# Fall 2018 - CRR Auction Efficiency – 1A

Project Info	Details/Date	
Application Software Changes	<p>CRR Auction Efficiency 1A project is focused on:</p> <ol style="list-style-type: none"> <li>1. Creating an annual outage reporting deadline to be aligned with the annual congestion revenue rights allocation and auction process to improve the congestion revenue rights model used in the annual process.</li> <li>2. Limiting the congestion revenue right source and sink combinations that market participants can purchase in the auctions to better align the congestion revenue rights product with the purpose of hedging congestion charges associated with supply delivery in the CAISO's locational marginal price-based day-ahead market.</li> <li>3. Introducing a mechanism to allow market participants to sell previously acquired CRRs into subsequent auctions</li> </ol> <p>System Impacts: CRR, OASIS, EDR.</p> <p>The Technical Specification will address a new Transaction Type column in OASIS.</p>	
BPM Changes	<ul style="list-style-type: none"> <li>• CRR</li> <li>• Credit Management and Market Clearing</li> <li>• Market Instruments</li> </ul>	<ul style="list-style-type: none"> <li>• Outage Management</li> <li>• Settlements &amp; Billing</li> </ul>
Business Process Changes	<ul style="list-style-type: none"> <li>• Manage Market &amp; Reliability Data &amp; Modeling (MMR) - Manage Outage Data</li> <li>• Manage Markets &amp; Grid (MMG) -Manage Congestion Revenue Rights &amp; Prepare CRR Allocation Data</li> </ul>	

# Fall 2018 - CRR Auction Efficiency – 1A

Milestone Type	Milestone Name	Dates	Status
Board Approval	BOG Presentation and Approval	Mar 22, 2018	✓
External BRS	Post External Draft BRS	May 11, 2018	✓
Config Guides	Post Draft Configuration Guides	N/A	
Tech Spec	Publish Technical Specifications Complete	Jun 26, 2018	✓
Tariff	File Tariff	Apr 09, 2018	✓
BPMs	Post BPM (Draft)	Sep 07, 2018	
External Training	Deliver external training	Sep 13, 2018	
Market Sim	Market Sim Window	Sep 17, 2018 - Oct 12, 2018	
Production Activation	CRR Auction Efficiency 1A	Nov 01, 2018	

# Fall 2018 – EIM Enhancements 2018

Project Info	Details/Date
Application Software Changes	<ul style="list-style-type: none"> <li>• Markets to exclude Flex Ramp provision of EIM BAAs undergoing contingency</li> <li>• ISO Enhancement to BAAOP EIM operator screens to review active market data and Flex Ramp Sufficiency Test inputs</li> </ul> <p><b>Systems:</b></p> <ul style="list-style-type: none"> <li>• <b>BAAOP</b> – New display screens presenting currently active market data for market data submissions, flex ramp sufficiency test inputs</li> <li>• <b>RTM Market Application</b> <ul style="list-style-type: none"> <li>• Exclude Flex Ramp Product provision for EIM BAAs undergoing contingency (FRU/FRD awards and prices set to zero); EIM Area footprint's FRP requirements are reduced by a diversity benefit pro rata amount based on excluded EIM BAAs</li> </ul> </li> <li>• <b>OASIS</b> – new report displays real-time intervals where BAAs (ISO and EIM) are in contingency</li> <li>• <b>Integration</b> – OASIS API will support new report</li> </ul>
BPM Changes	Energy Imbalance Market (EIM), Market Instruments, Market Operations
Business Process Changes	<ul style="list-style-type: none"> <li>• Manage Entity &amp; Resource Maintenance Updates</li> <li>• Manage Real Time Interchange Scheduling</li> <li>• Manage Real Time Operations- Maintain Balancing Area</li> <li>• Perform Price Validation, Manage Price Corrections</li> </ul>

# Fall 2018 – EIM Enhancements 2018

Milestone Type	Milestone Name	Dates	Status
Board Approval	Board of Governors Approval	N/A	
External BRS	Post External BRS	Apr 30, 2018	✓
	Post Revised External BRS	Jun 01, 2018	✓
	Post Revised External BRS v1.2	Jul 31, 2018	✓
Config Guides	Post Config Guides	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec)	Jun 25, 2018	✓
Tariff	File Tariff	N/A	
BPMs	Post Draft BPM changes	Aug 10, 2018	✓
	Publish Final Business Practice Manuals	Oct 02, 2018	
External Training	Deliver external training	Aug 16, 2018	✓
Market Sim	Market Sim Window	Sep 17, 2018 - Oct 12, 2018	
Production Activation	EIM Enhancements 2018	Nov 01, 2018	

# 2019 Spring Release

# Spring 2019 - Commitment Cost Enhancements Phase 3

Project Info	Details/Date
Application Software Changes	<p><b>Scope:</b></p> <ol style="list-style-type: none"> <li>1. Clarify use-limited registration process and documentation to determine opportunity costs</li> <li>2. Determine if the ISO can calculate opportunity costs                             <ul style="list-style-type: none"> <li>• ISO calculated; Modeled limitation Start/run hour/energy output</li> <li>• Market Participant calculated; Negotiated limitation</li> </ul> </li> <li>3. Clarify definition of “use-limited”; add MSG Configuration ID to ULPDT</li> <li>4. Change Nature of Work attributes (Outage cards)                             <ul style="list-style-type: none"> <li>• Modify use-limited reached for RAAIM Treatment</li> <li>• Allow PDR to submit use-limit outage card for fatigue break.</li> </ul> </li> <li>5. Market Characteristics (added to GRDT in Spring 2018) shall be Read-Only and set to Null                             <ul style="list-style-type: none"> <li>• Maximum Daily Starts</li> <li>• Maximum MSG transitions</li> <li>• Ramp rates</li> </ul> </li> </ol> <p><b>Impacted Systems:</b></p> <ol style="list-style-type: none"> <li>1. Master File: Set use-limited resource types and limits</li> <li>2. ECIC: Process use limited resource input values for and Receive opportunity cost adders from opportunity cost tool</li> <li>3. CIRA: RAAIM exempt rule for “use-limited reached”</li> <li>4. CMRI: Publish opportunity cost</li> <li>5. SIBR: Add Opportunity cost adders on bid caps</li> <li>6. OMS: “Use-Limited Reached” nature of work attribute for Generation Outage Card</li> <li>7. Settlements: Publish the actual start up, run hour and energy output for the use-limited resources</li> <li>8. Opportunity cost calculator (OCC): Calculate and publish opportunity costs for start-up, MLC and DEB</li> </ol>
BPM Changes	Market Instruments, Outage Management, Reliability Requirement, Market Operations
Business Process Changes	<ul style="list-style-type: none"> <li>• Manage Market &amp; Reliability Data &amp; Modeling</li> <li>• Manage Markets &amp; Grid</li> </ul>

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

Project Info	Details/Date
FERC ruling: CCE3 changes	<p><b>Updates:</b></p> <ol style="list-style-type: none"> <li>1. As a result of FERC's ruling against CAISO's proposal to allow scheduling coordinators to register market values for resource characteristics in the Master File, changes have been made to prevent the collection of this data.</li> <li>2. This resulted in Technical Specification, RDT, and validation rule changes, which have been posted to the CAISO website.</li> </ol>

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	Post Draft BPM changes	Sept 5, 2018	
External Training	Deliver external training	Sept 10, 2018	
Market Simulation	Full Market Simulation Testing	Aug 20, 2018 - Oct 05, 2018	
Production Activation	Commitment Costs Phase 3	Apr 01, 2019	
	CCE3 Deployment to Production: Master File	May 16, 2018	✓

## Market Simulation Overview Timeline & MP Preparation

- Wednesday, 9/5: Deadline for MPs to submit ULPDT in MAP-Stage
- 9/6-9/7: ISO to process the submitted ULPDTs. In MAP Stage, ISO will approve all ULPDTs for market simulation purposes only
- 9/12: CMRI reports available in MAP Stage for connectivity testing
- 9/17-9/21: ISO runs opportunity cost calculation for October 2018
- 9/25: ISO publishes in CMRI the
  - actual usage of use limit type for records submitted into MAP Stage
  - Opportunity cost adders viewable in CMRI
- 9/30: Opportunity costs available in SIBR for trade date 10/1

# Spring 2019 – EIM BANC/SMUD

Project Info	Details/Date
Application Software Changes	Implementation of SMUD as an EIM Entity
BPM Changes	EIM BPM will be updated if needed to reflect new modeling scenarios identified during implementation and feedback from SMUD.
Market Simulation	December 3, 2018 – January 31, 2019
Parallel Operations	February 1, 2019 – March 30, 2019

Milestone Type	Milestone Name	Dates	Status
Tariff	File Readiness Certification	Mar 01, 2019	
Market Sim	Market Sim Window	Dec 03, 2018 - Jan 31, 2019	
Parallel Operations	Parallel Operations	Mar 30, 2019	
Production Activation	EIM - BANC-SMUD	Apr 03, 2019	

# 2019 Independent

# 2019 – Generator Contingency and Remedial Action Scheme Modeling

Project Info	Details/Date	
Application Software Changes	<ul style="list-style-type: none"> <li>Enhance the Security Constrained Economic Dispatch                             <ul style="list-style-type: none"> <li>Model generation/load loss in the dispatch</li> <li>Model transmission loss along and generation/load loss due to RAS operation dispatch</li> <li>Model transmission reconfiguration due to RAS operation in the dispatch</li> </ul> </li> <li>Update the congestion component of LMP so that it considers the cost of positioning the system to account for generator contingencies and RAS operations</li> <li>Enhance DAM, RTM and EIM to support generator contingencies</li> </ul> Impacted systems: <ul style="list-style-type: none"> <li>CRR, EDR, EMMS, IFM/RTM, Integration, MF.</li> </ul>	
BPM Changes	Managing Full Network Model Market Operations	CRR EIM
Business Process Changes	<ul style="list-style-type: none"> <li>Manage Congestion Revenue Rights (MMR LII)</li> <li>Manage Operations Planning</li> <li>Manage Real Time Operations - Transmission &amp; Electric System (MMG LII)</li> </ul>	

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Sep 19, 2017	✓
External BRS	Complete and Post External BRS	Mar 16, 2018	✓
Config Guides	Post Draft Config Guides	N/A	
Tech Spec	Create ISO Interface Spec (Tech spec)	N/A	
Tariff	File Tariff	Nov 28, 2018	
BPMs	Post Draft BPM changes	Sep 07, 2018	
External Training	Deliver external training	Sep 12, 2018	
Market Sim	Market Sim Window	Sep 17, 2018 - Oct 12, 2018	
Production Activation	Generator Contingency and RAS Modeling	Feb 01, 2019	

# 2019 – ADS Replacement

Project Info	Details/Date
Application Software Changes	<ul style="list-style-type: none"> <li>• Transition to web-based user interface to eliminate the need to install thick client</li> <li>• Transition ADS provisioning to the Access and Identity Management (AIM) application including Resource Level Access Controls (RACL) access</li> <li>• The query tool will provide 30 days of historical data</li> <li>• Move near-term transactions for FERC-764 15-minute awards to ADS; This will include user interface; historical transactions will stay in CMRI.</li> <li>• Various user interface enhancements adding content per Operation's request</li> <li>• ADS B2B services will not otherwise change.</li> </ul>
BPM Changes	<ul style="list-style-type: none"> <li>• Market Instruments</li> <li>• Market Operations</li> </ul>
Business Process Changes	To Be Determined

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	N/A	
BPMs	Post Draft BPM changes	TBD	
	Publish Final Business Practice Manuals	TBD	
External Training	Conduct External Training	TBD	
Market Sim	Market Sim Window	TBD	
Production Activation	ADS Replacement	TBD	

# 2019 Fall Release

# Fall 2019 – Commitment Cost and Default Energy Bid Enhancements

Project Info	Details/Date
Application Software Changes	<p><b>Scope:</b>            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"> <li>• Support integration of renewable resources through incentivizing flexible resources participation during tight fuel supply</li> <li>• Account for costs of flexible resources (gas and non-gas) to reduce risk of insufficient cost recovery</li> <li>• Encourage participation of non-RA and voluntary EIM resources; compliance with FERC Order 831</li> <li>• Raises energy bid cap from \$1,000/MWh to \$2,000/MWh:</li> <li>• Requires supporting verified costs of energy bids above \$1,000/MWh</li> <li>• Introduces market power mitigation (MPM) measures for commitment costs.</li> </ul> <p><b>Impacted Systems:</b></p> <ul style="list-style-type: none"> <li>• SIBR: Incorporate negotiated default commitment bids, allow the submittal of Ex Ante cost adjustments. Increase commitment cost caps, increase energy bid caps, incorporate soft energy bid cap. Allow for hourly submittal of minimum load bids into day-ahead market.</li> <li>• 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. Recalibrate the penalty price parameters in response to raising energy bid cap to \$2,000/MWh.</li> <li>• CMRI: Provide resource-specific reporting on mitigation results for commitment costs. Provide additional source information for default bids.</li> <li>• 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.</li> <li>• 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.</li> <li>• CIDI: Incorporate templates for submitting request for manual consultation and ex-post default bid adjustments.</li> </ul>

# Fall 2019 – Commitment Cost and Default Energy Bid Enhancements

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

Milestone Type	Milestone Name	Dates	Status
Board Approval	Obtain Board of Governors Approval	Mar 22, 2018	✓
External BRS	Complete and Post External BRS	Apr 27, 2018	✓
Draft Policy	Publish Draft Business Rules externally	Jan 31, 2018	✓
Config Guides	Post Draft Config Guides	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	CCDEBE	Oct 01, 2019	

# 2020 Fall Release

# Fall 2020 – Contingency Modeling Enhancements Transmissions

Project Info	Details/Date
Application Software Changes	<ul style="list-style-type: none"> <li>• Positions available resources so that the ISO has sufficient capability to respond to contingency events and return facilities to normal ratings within the emergency rating time frame</li> <li>• Enhances the LMP formulation to provide market price signal related to this reliability constraint</li> <li>• Creates a Locational Marginal Capacity Price (LMCP) which reflects:                             <ul style="list-style-type: none"> <li>• A resource’s opportunity costs</li> <li>• Marginal congestion cost savings, and/or</li> <li>• The marginal capacity value to follow dispatch</li> </ul> </li> </ul> <p><b>Systems:</b></p> <ul style="list-style-type: none"> <li>• ADS - Modified to display corrective capacity awards similar to AS</li> <li>• CMRI - New or modified reports to display LMCP prices and awards</li> <li>• IFM/RTM - Model new capacity awards and Locational Marginal Capacity Price (LMCP).</li> <li>• Integration</li> <li>• OASIS - New or modified reports to display LMCP prices and awards</li> <li>• PCA</li> <li>• Settlements</li> </ul>
BPM Changes	Market Operations, Market Instruments, Definitions and Acronyms, Settlements and Billing
Business Process Changes	<ul style="list-style-type: none"> <li>• Manage Operations Planning</li> <li>• Manage Day-Ahead Market</li> <li>• Manage Operations Engineering Support</li> <li>• Manage Real Time Operations - Transmission &amp; Electric System</li> <li>• Manage Market Billings &amp; Settlements</li> </ul>

# Fall 2020 - DAME 15 Minute Granularity

Project Info	Details/Date
Application Software Changes	<p>These are preliminary impact assessments</p> <p>DAM Enhancements include change the day-ahead market from hourly to 15 minute granularity, combine IFM and RUC, procure imbalance reserves</p> <ul style="list-style-type: none"> <li>• Calculate Imbalance Reserve (IR) Requirements in 15 minute interval (DAM)</li> <li>• EIM interface to submit Base schedule in 15 minute interval (BSAP)</li> <li>• EIM balance test, capacity test and sufficiency test in 15 minute interval (RTM)</li> <li>• Report DAM market results in 15 minute Interval (CMRI)</li> <li>• MP can bid IRU and IRD price in SIBR</li> <li>• DAM co-optimize Energy, AS and IR in 15 minute intervals (DAM)</li> <li>• Remove RUC</li> <li>• Get as self-scheduled 15 minute DAM award of energy in RTM if no real time bids (RTM)</li> <li>• Calculate Settlement DAM Expected Energy in 15 minute interval (RTM)</li> <li>• Calculate Bid cost recovery (MQS)</li> <li>• Settle DAM based on 15 minute interval schedules (Settlement)</li> <li>• Settle CRR in DAM 15 minute intervals (Settlement)</li> <li>• Publish DAM energy and AS requirements and prices in 15 minute interval in OASIS</li> </ul>
BPM Changes	Market Instruments, Market Operations, Settlements & Billing, Energy Imbalance markets
Business Process Changes	<ul style="list-style-type: none"> <li>• Manage Day Ahead Market</li> <li>• Manage D+X analysis</li> <li>• Manage Real Time Operations- Maintain Balancing Area</li> <li>• Manage Market Billings &amp; Settlements</li> </ul>

# Stay Informed

# Ways to participate in releases

- Visit the Release Planning page
  - <http://www.aiso.com/informed/Pages/ReleasePlanning/Default.aspx>
- Attend meetings
  - Release Users Group (RUG) bi-weekly meetings
    - Initiative status updates
    - System change updates on independent releases
  - Market Simulation calls
    - Visit the ISO calendar at [www.aiso.com](http://www.aiso.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

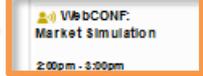
# What to look for on the calendar...

## Calendar of Meetings, Training and Events

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

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



Market Sim



Release Users Group (RUG)



# Market Performance and Planning Forum

## *2018 Schedule*

- October 24
- December 19

Questions or meeting topic suggestions:

Submit through CIDI - select the “*Market Performance and Planning Forum*” category or email suggestions to [initiativecomments@caiso.com](mailto:initiativecomments@caiso.com).