2020 Q4 Report on Market Issues and Performance

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http://www.caiso.com/Documents/2020-Fourth-Quarter-Report-on-Market-Issues-and-Performance-April-28-2021.pdf

Highlights of Q4 2020 market performance

- Prices and wholesale energy costs higher
  - lower hydro
  - slightly higher gas prices
- Average and peak loads increase
- Generation outages increase
- High real-time offset costs
- New minimum area flexible ramping requirement

Western energy imbalance market highlights

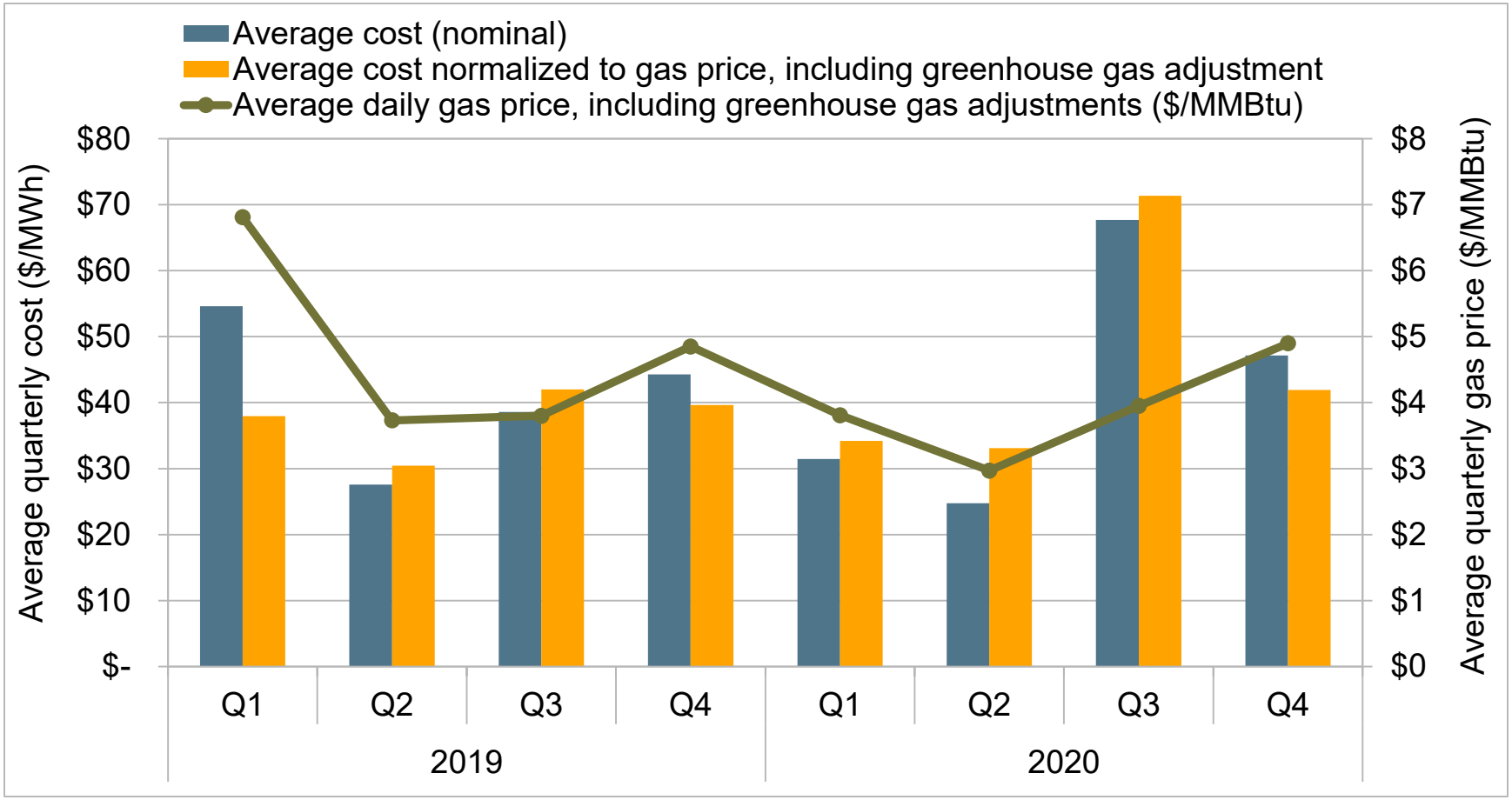
- Peak prices in BANC and the ISO exceeded the rest of the system due to GHG and congestion.
- Northwest prices regularly lower than the rest of the system due to limited transfer capability.
- Sufficiency test failures and power balance violations drove prices up, particularly in Arizona Public Service, NV Energy, the Salt River Project.
- Rates of market power mitigation continue to be low.

Special issues covered in Q4 market report

- Energy imbalance market resource sufficiency tests
  - Detailed results for CAISO, August 14 and 15
  - Impact of two issues resolved February 4, 2021
  - Recommendation: consider eliminating additional categories of unavailable capacity

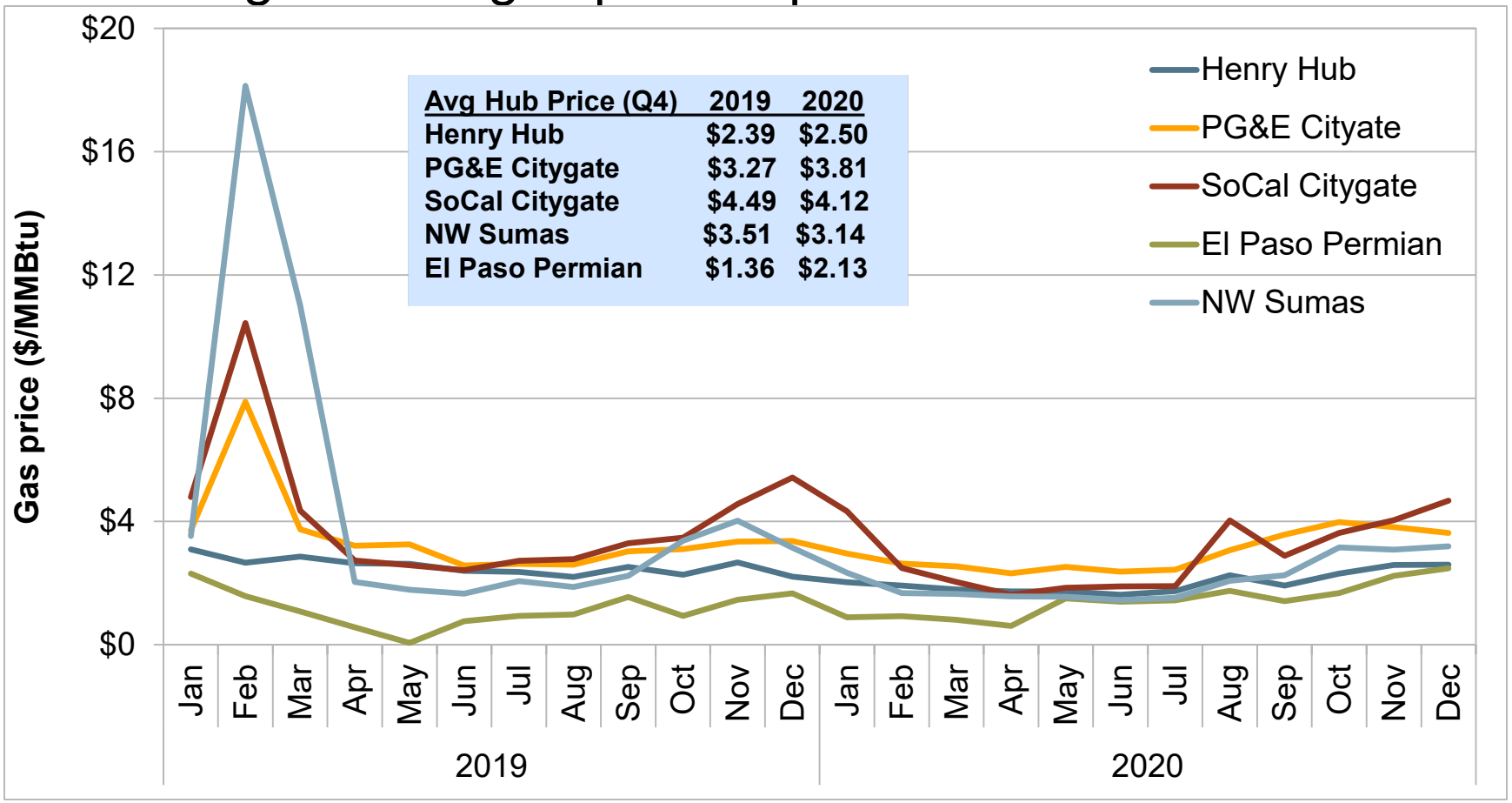
- System market power
  - Structural competitiveness
  - Market power had very limited effect on system prices

Total CAISO Q4 wholesale costs increased ~7% to $2.4 billion compared to Q4 2019 -- driven by lower hydro and slightly higher gas prices.

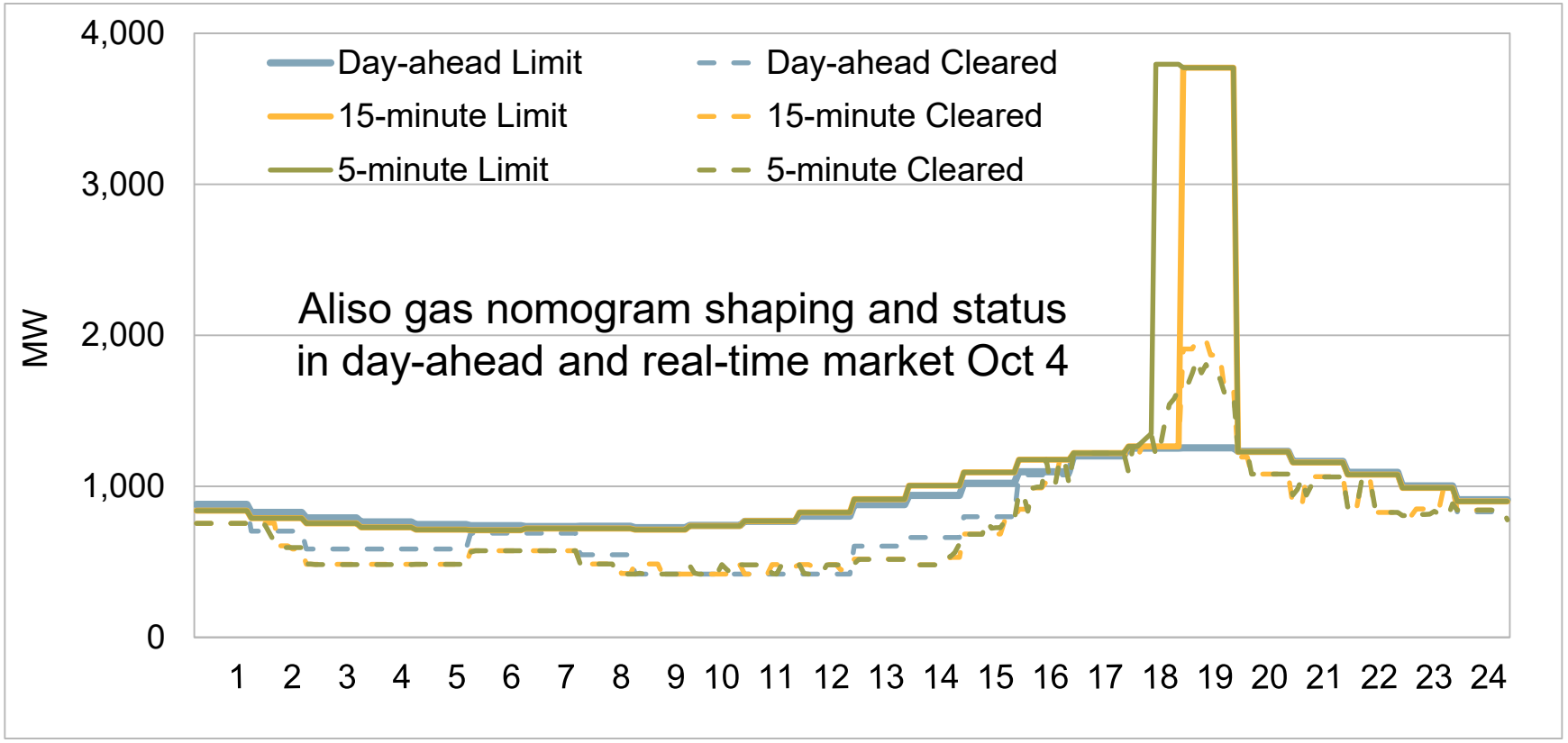


Gas prices increase in some major gas trading hubs in the west compared to Q4 2019.

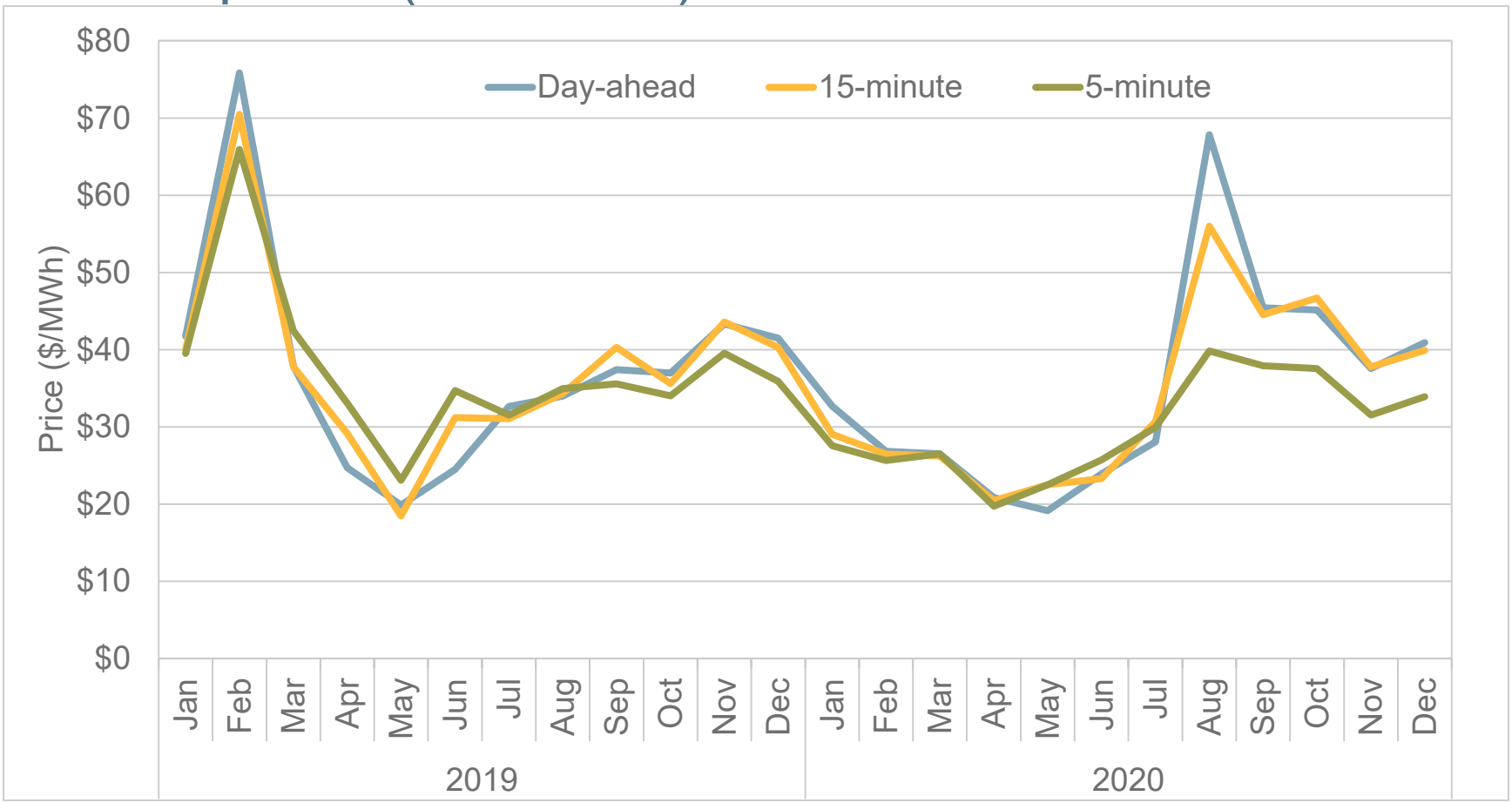
Load weighted Q4 gas prices up 1% from Q4 2019



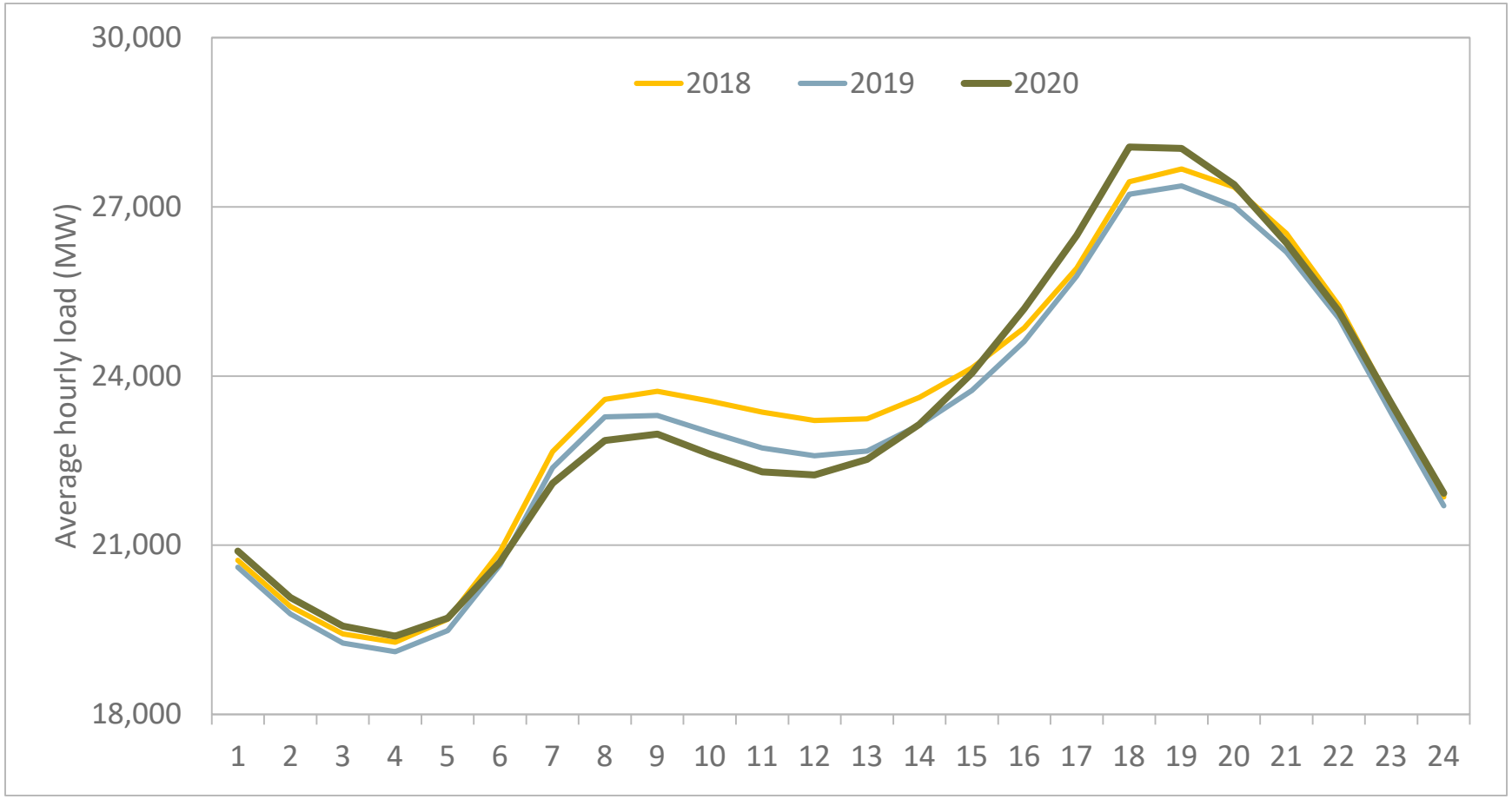
Gas constraints enforced Sep 14 – Oct 24
Constraints bound frequently: day-ahead (25%) real time (14%)
New shaping functionality implemented November 4



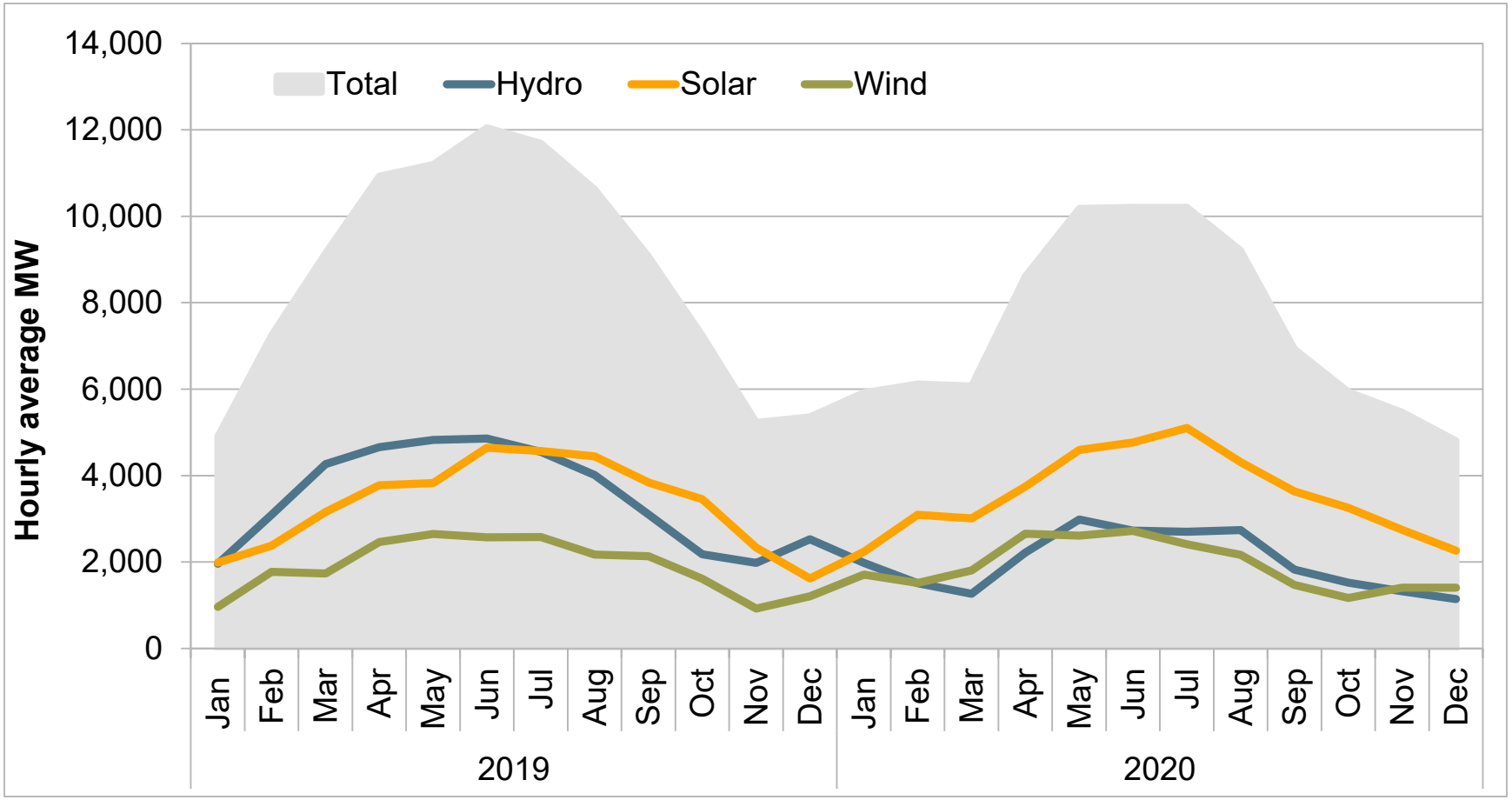
Average day-ahead prices ($41.20/MWh) close to 15-minute prices ($41.50/MWh), but much higher than 5-minute prices ($34/MWh)



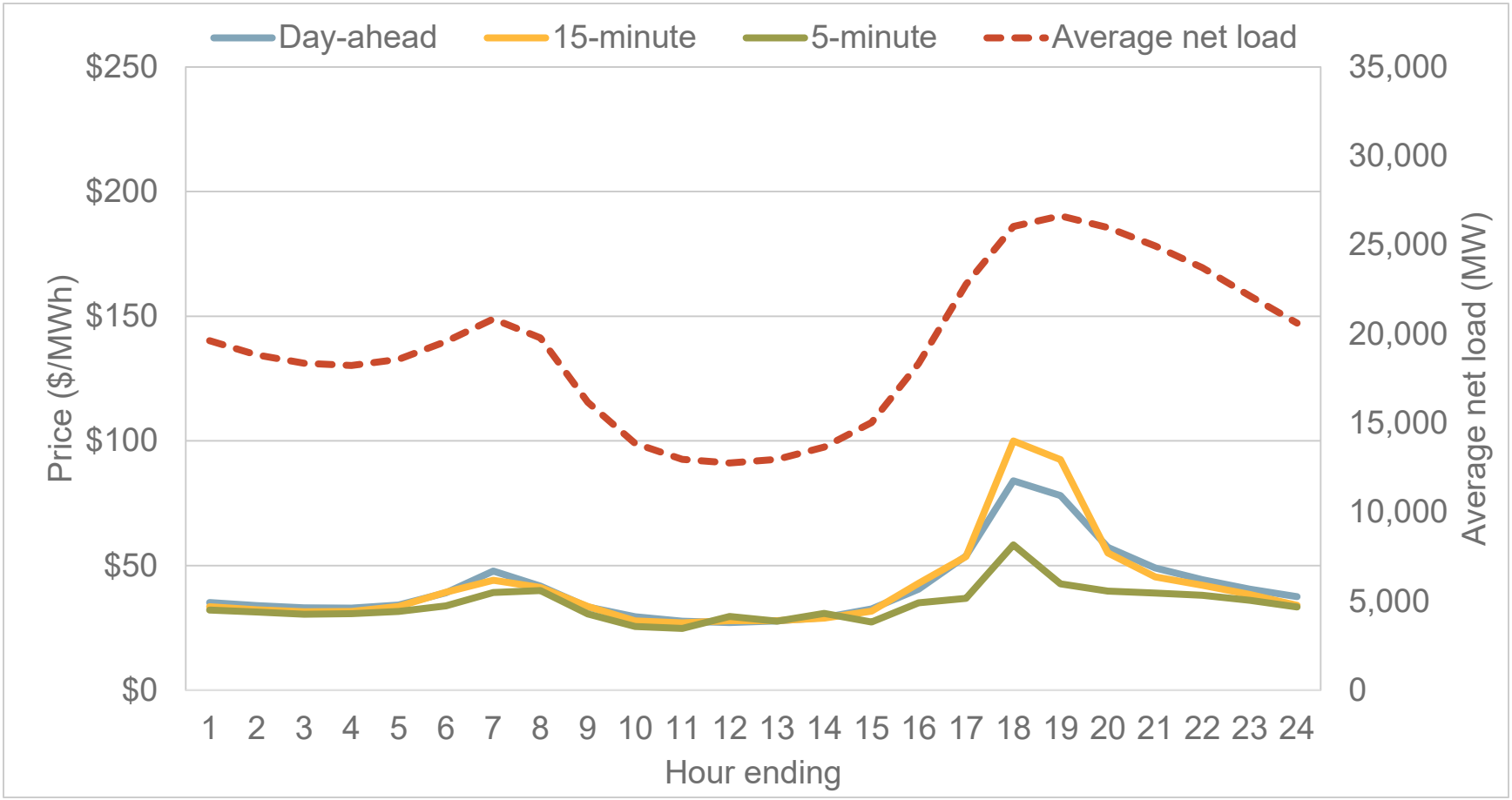
In Q4, average and peak loads increase, despite behind-the-meter solar generation and energy efficiency initiatives, due to higher statewide temperatures in October



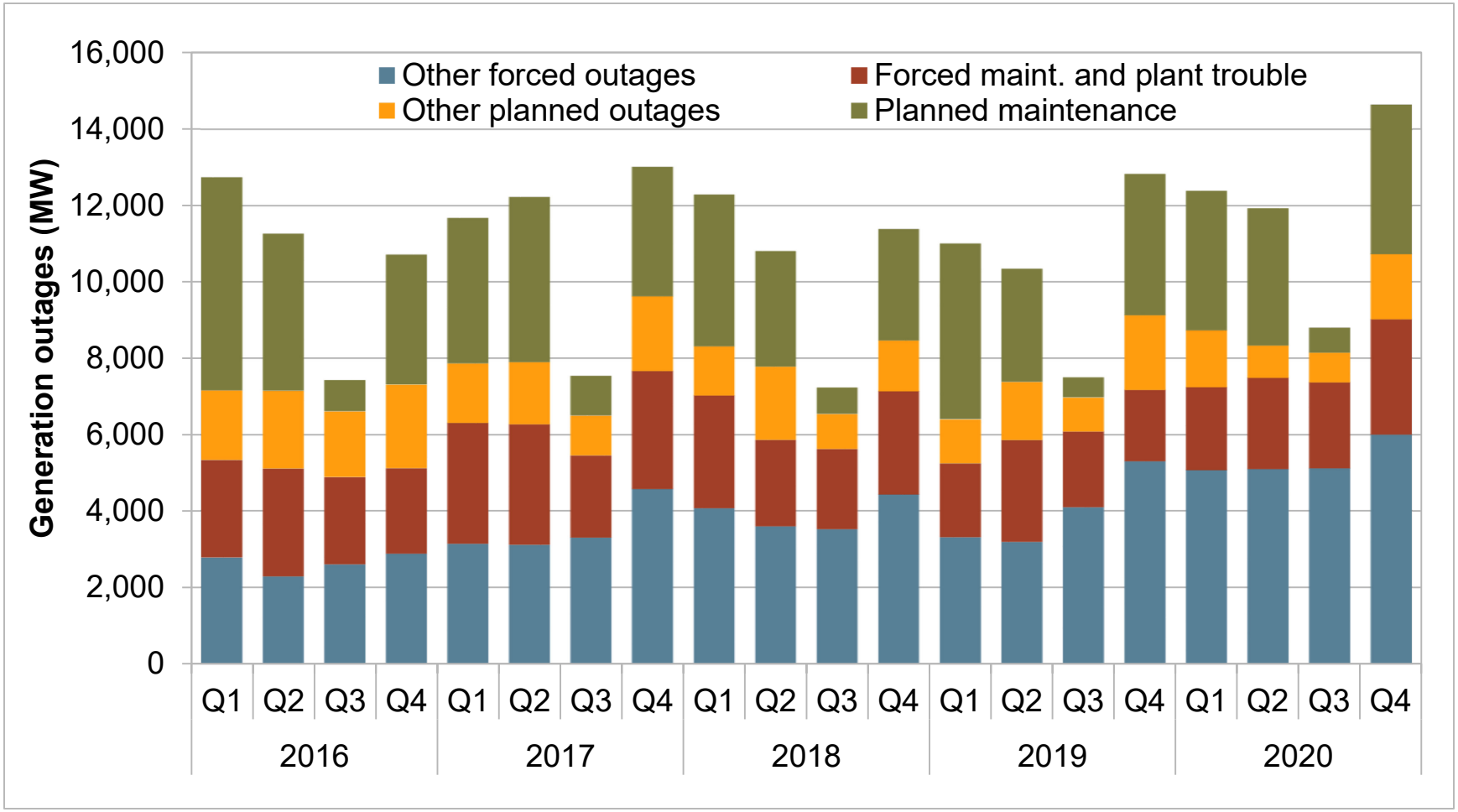
Renewable production increased 11% compared to Q4 2019 for non-hydro resources, while hydroelectric production decreased 40%



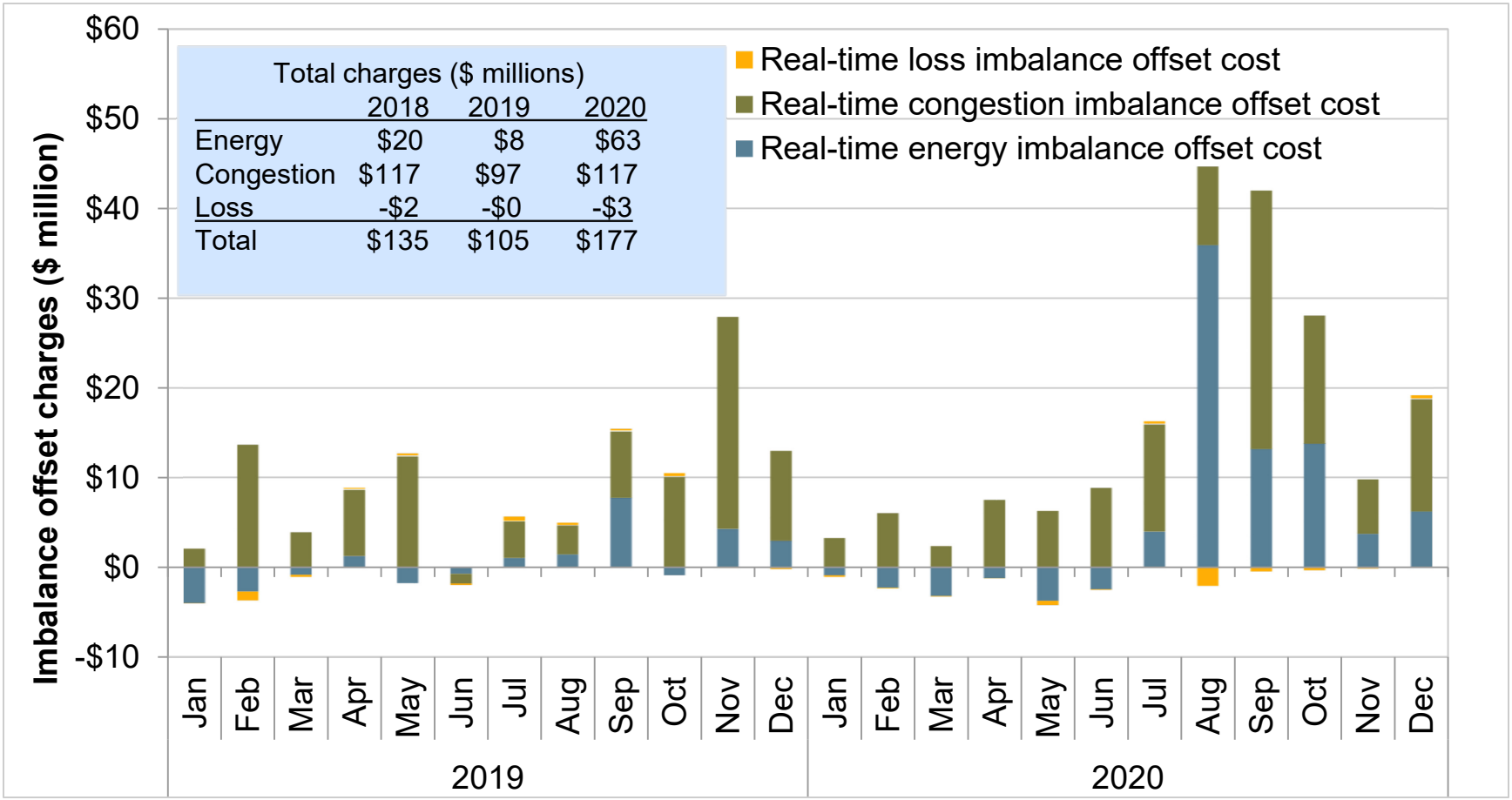
Average prices up – with highest average prices in net load peak hours



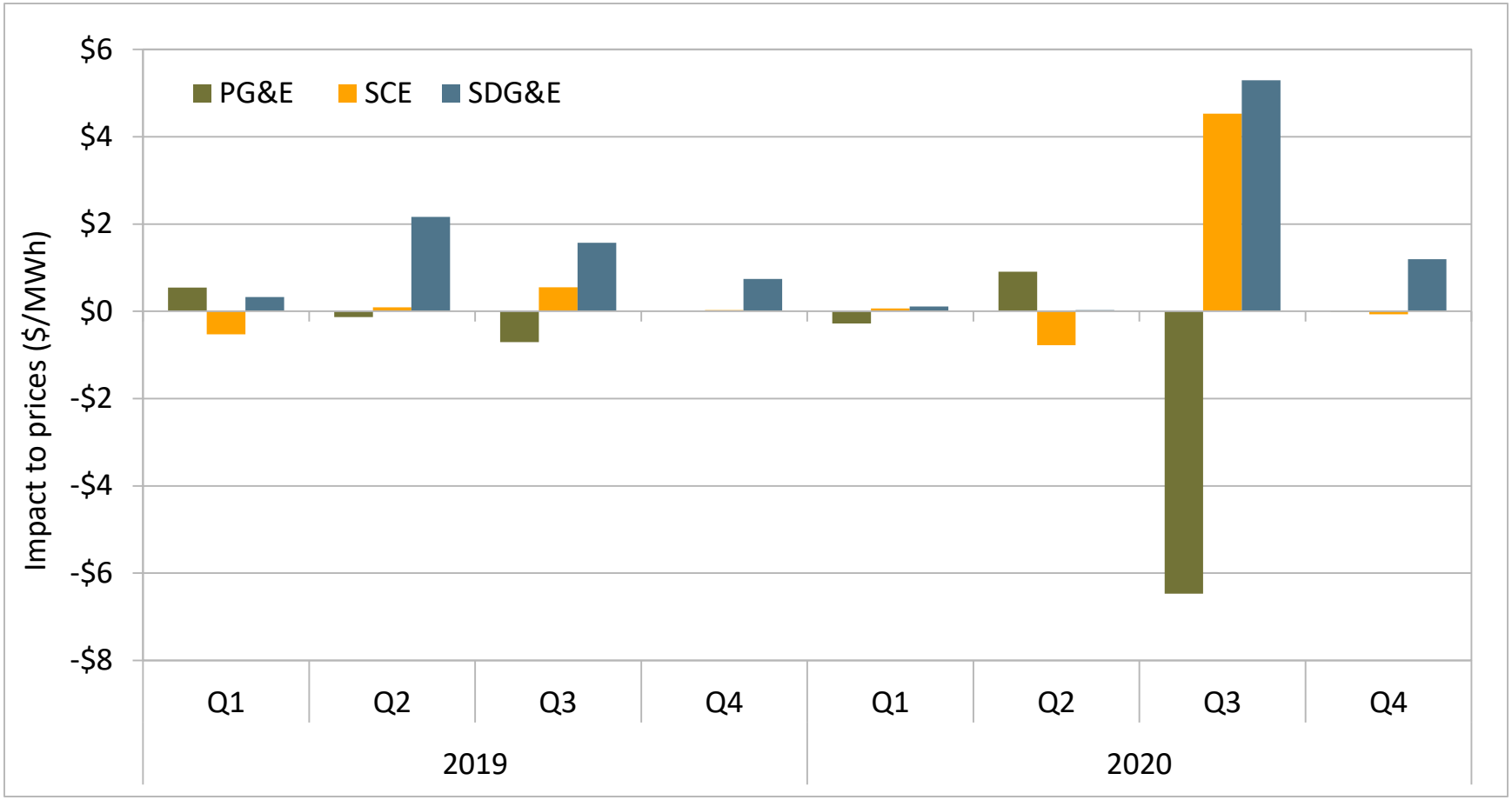
Generation outages increase relative to prior years



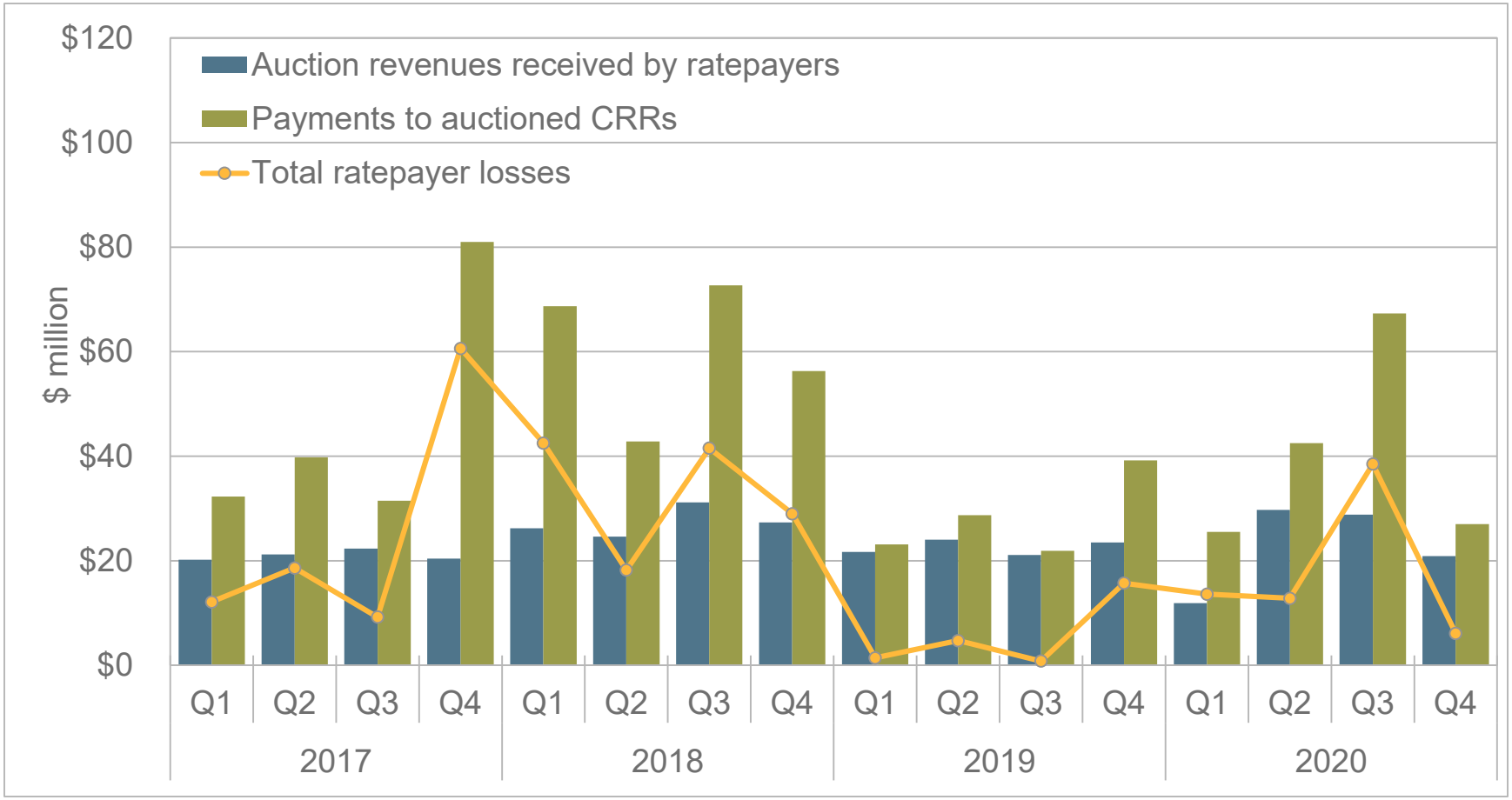
Real-time offset costs increased to $177 million in 2020, highest cost since 2014. Q4 costs ($57 million)



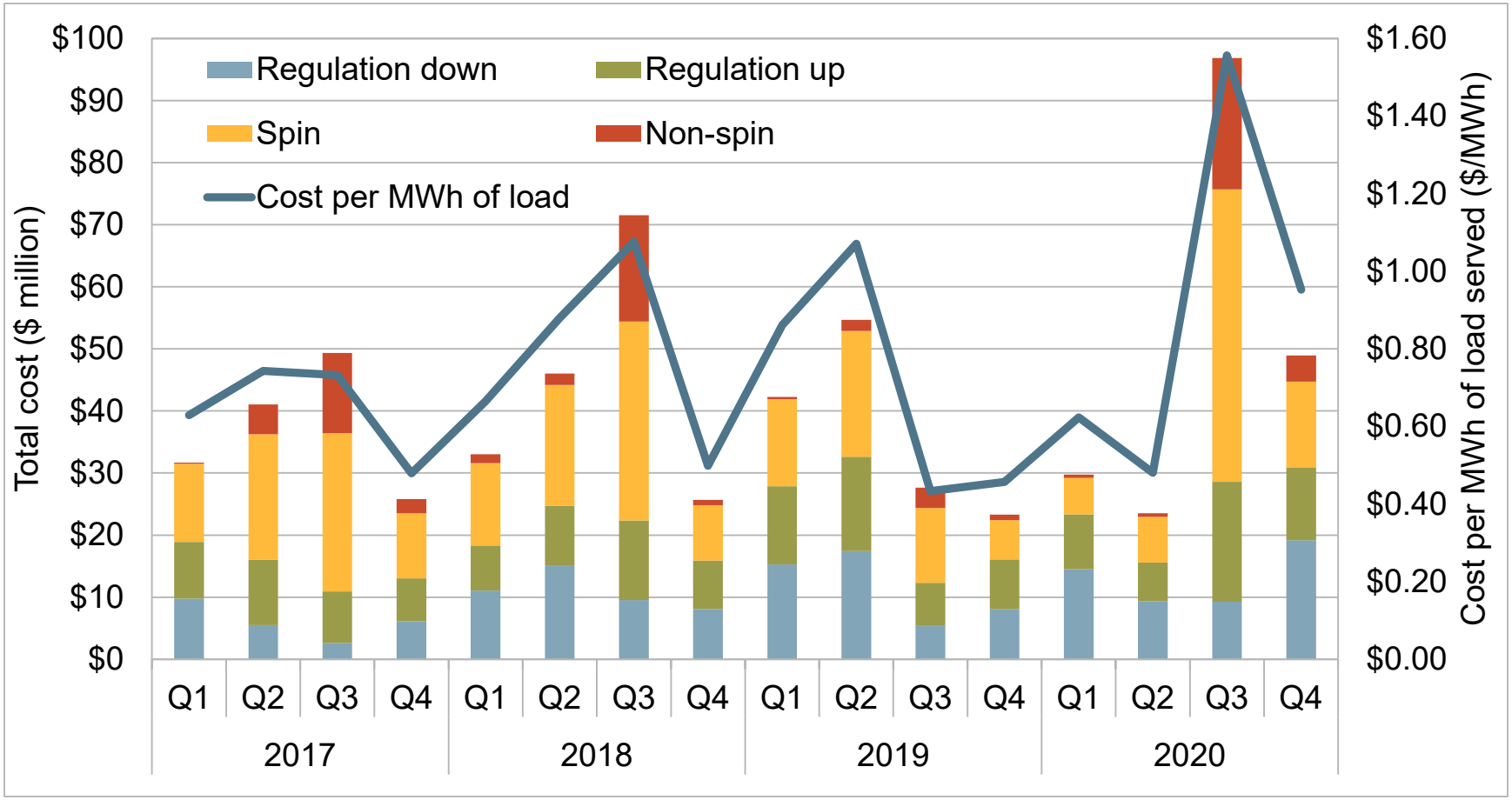
Congestion decreased in the fourth quarter. The $103 million day-ahead congestion rent was less than the fourth quarter of 2019 ($104 million).



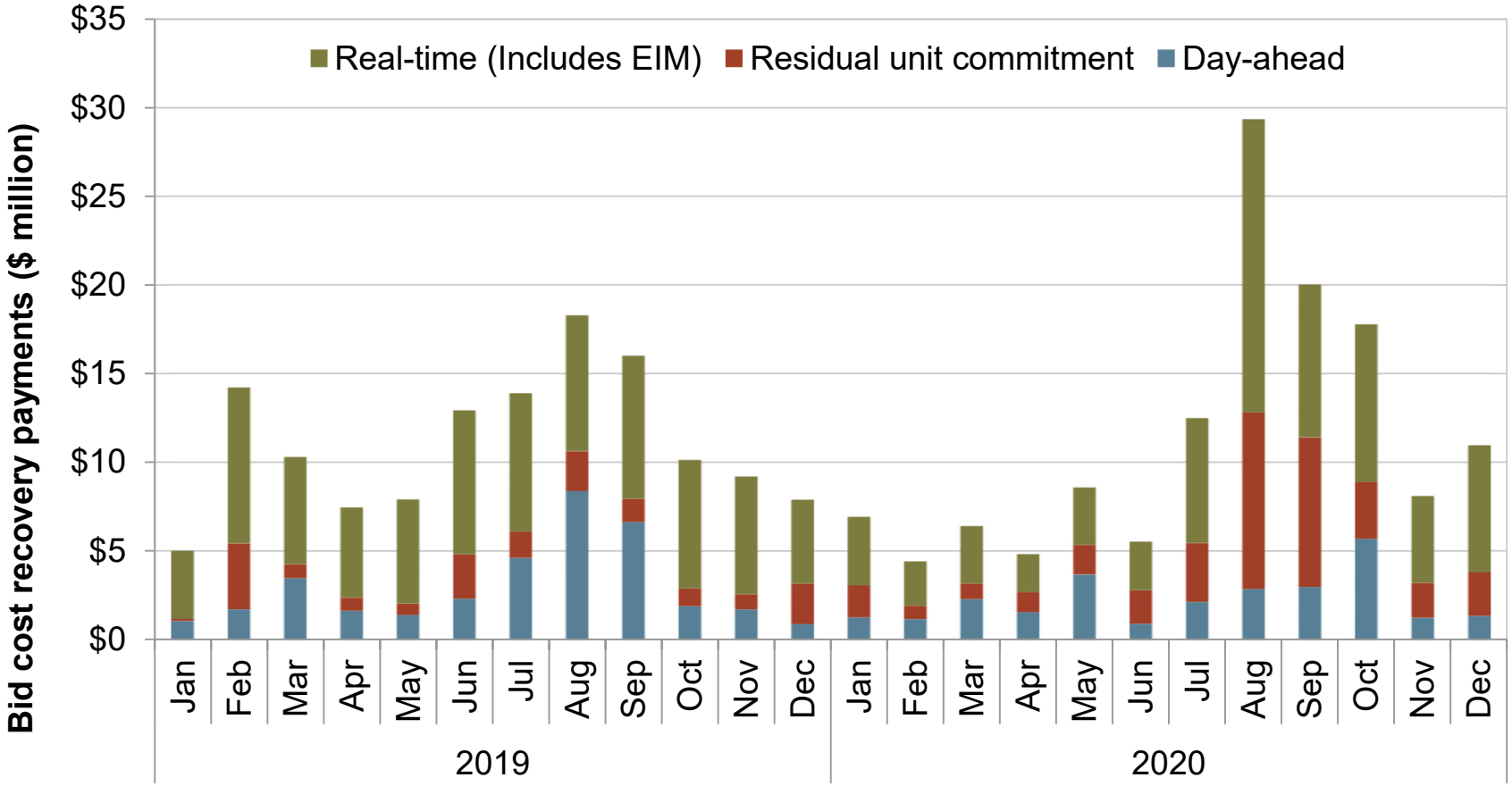
Congestion revenue rights auction revenues were $6 million less than payments made to non-load-serving entities, about 6 percent of day-ahead congestion rent.



Ancillary service payments ($49 million) increased relative to $23 million in Q4 2019.

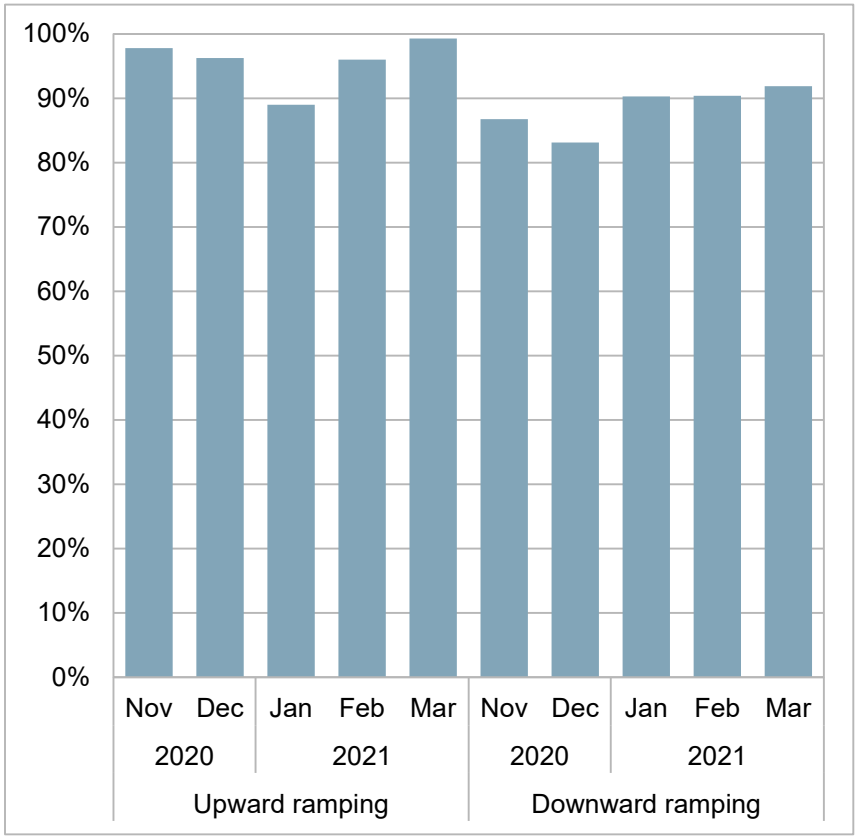


Bid cost recovery payments rose to $37 million, about $10 million more than Q4 2019.

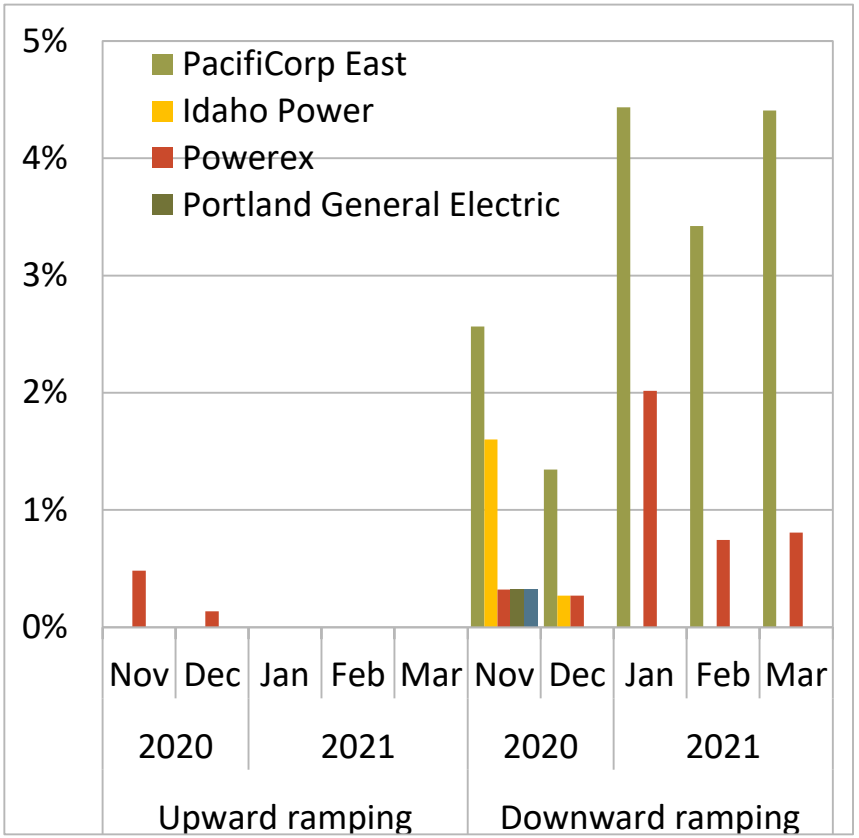


Minimum area requirement introduced November
Frequency minimum area requirement enforced

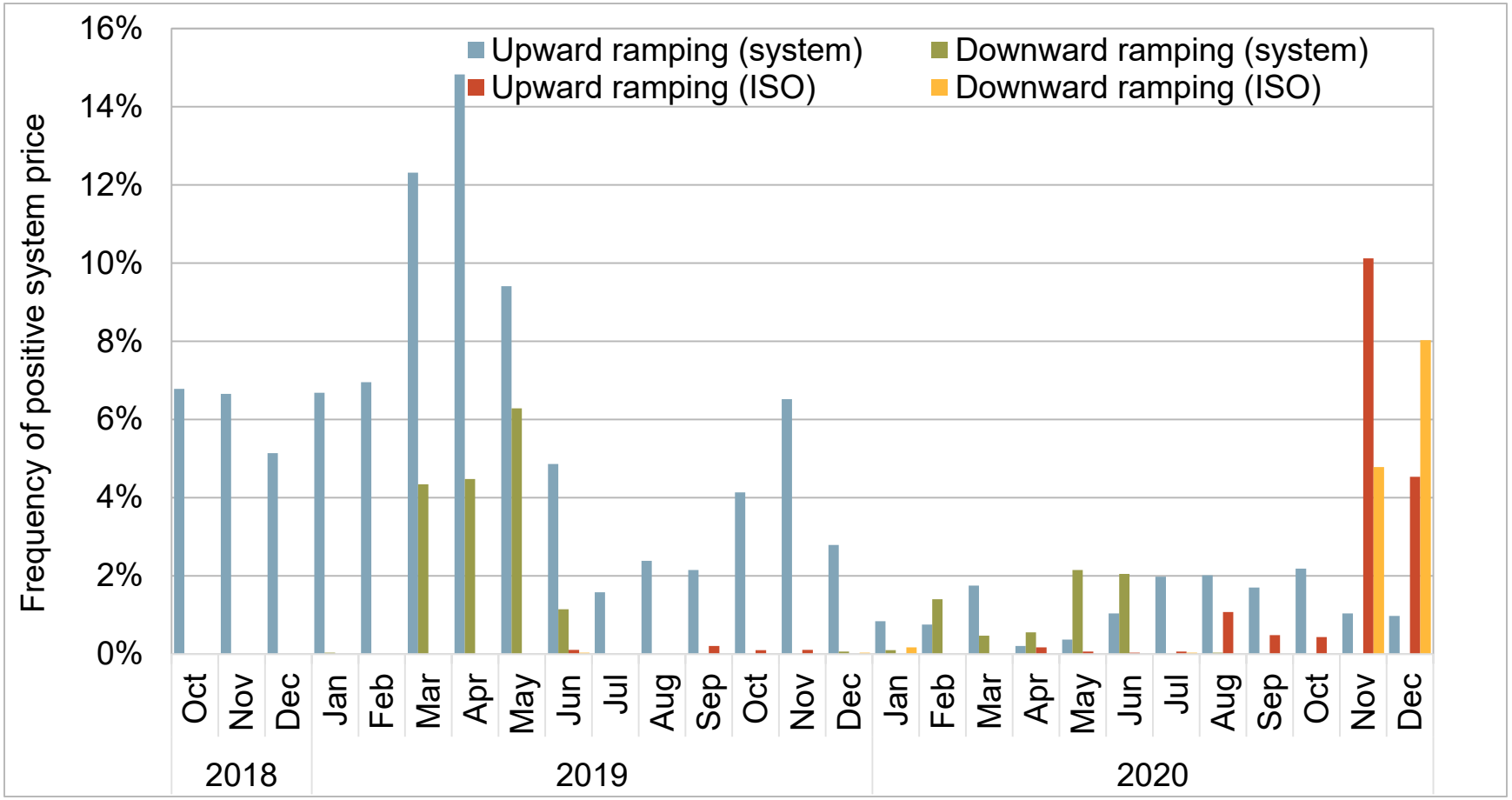
California ISO



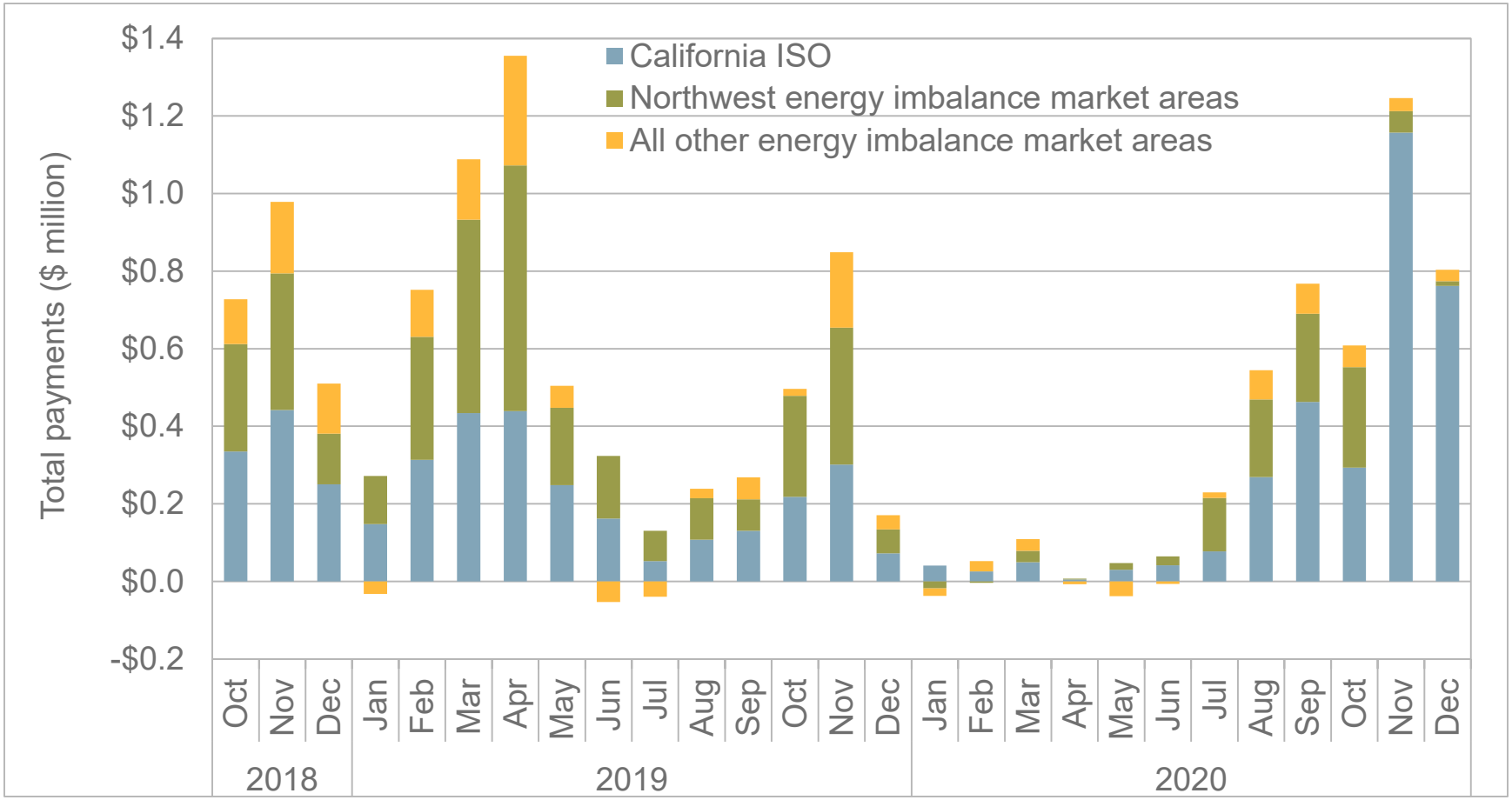
Energy Imbalance Market



Monthly frequency of positive system or ISO flexible ramping shadow price (15-minute market)

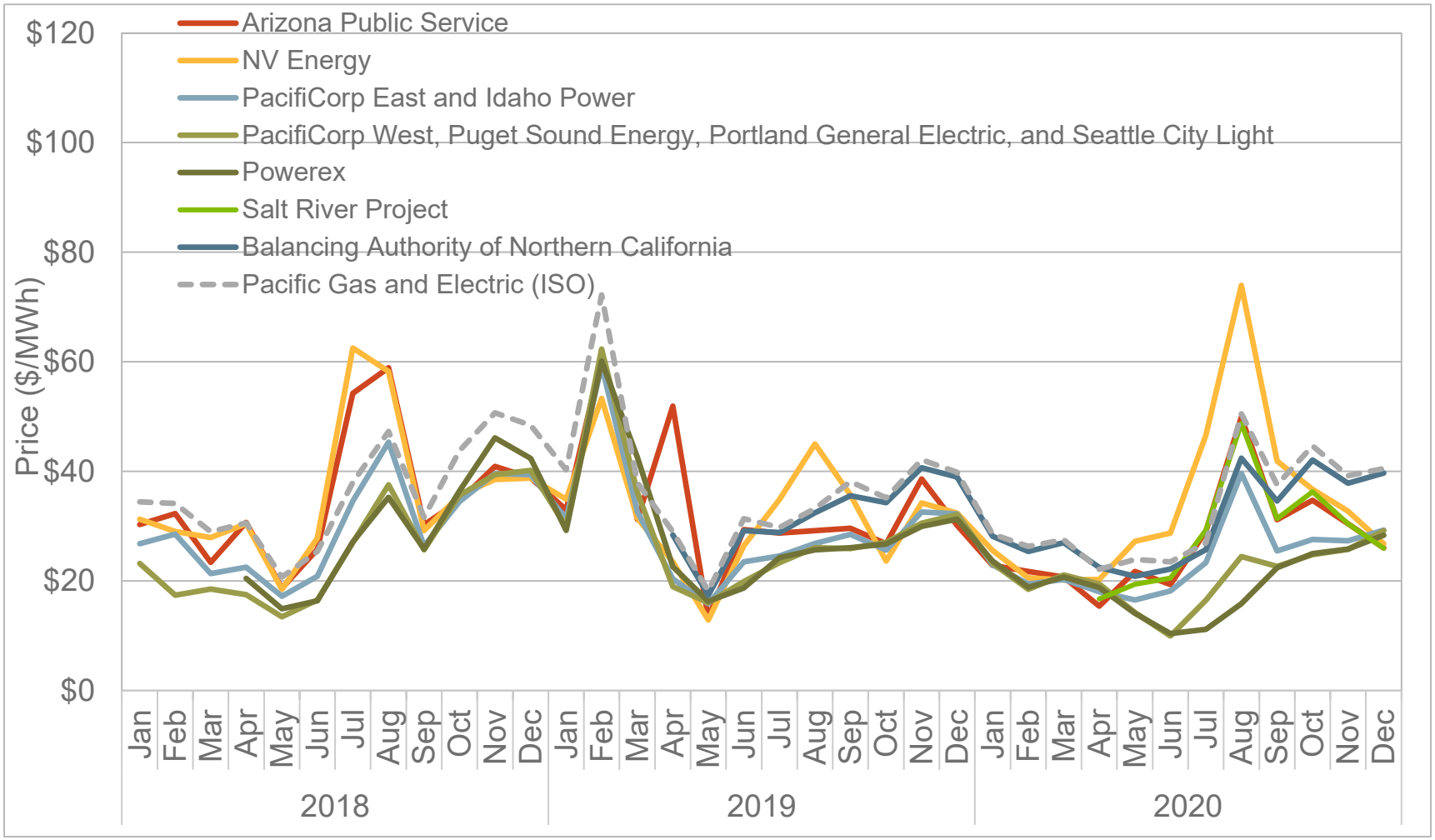


Monthly flexible ramping product uncertainty payments, $3.4m, by region shift to California ISO following introduction of minimum requirement in 15-minute market

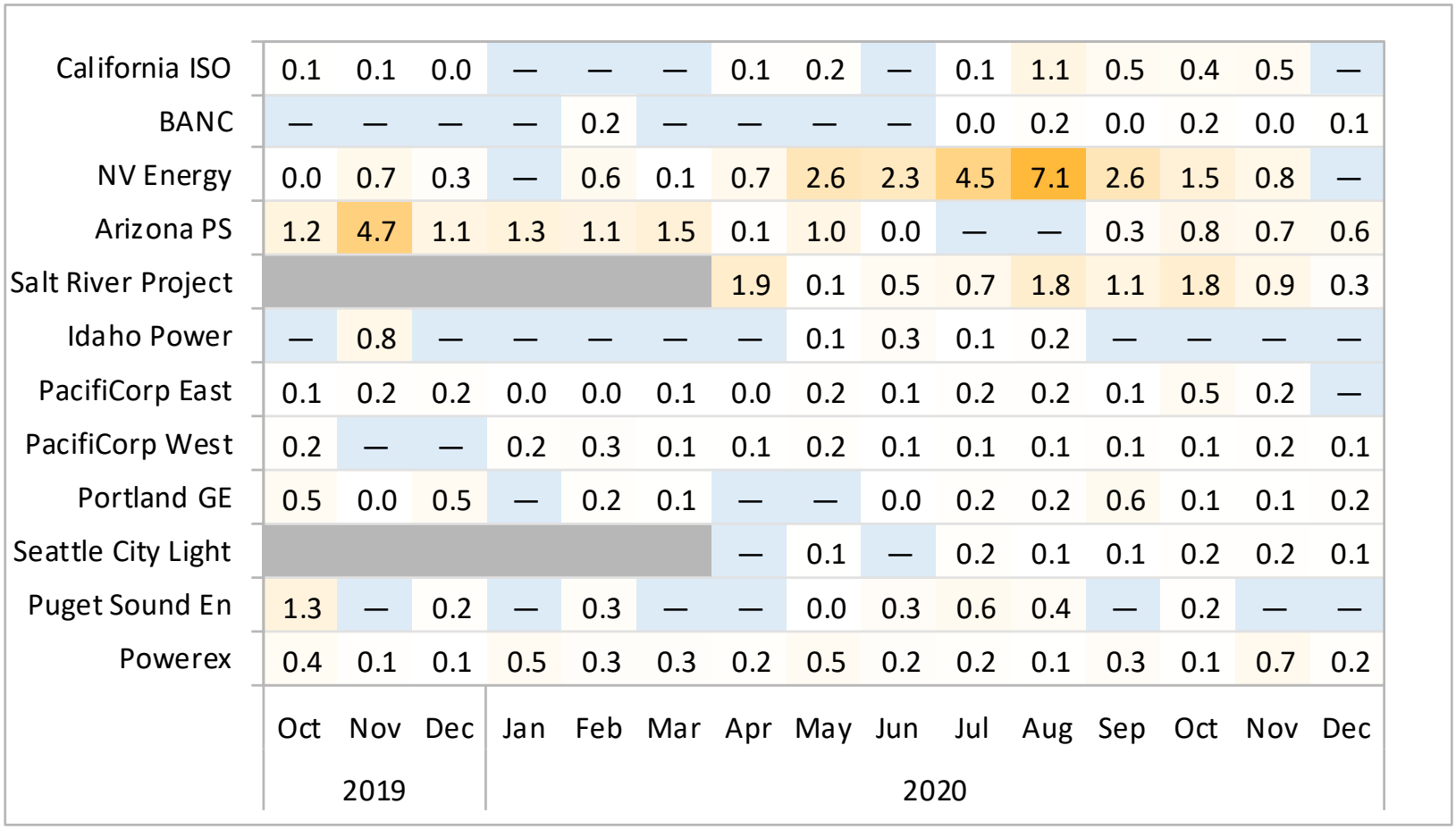


Peak prices in California exceeded the rest of the system

Average hourly 15-minute market pieces

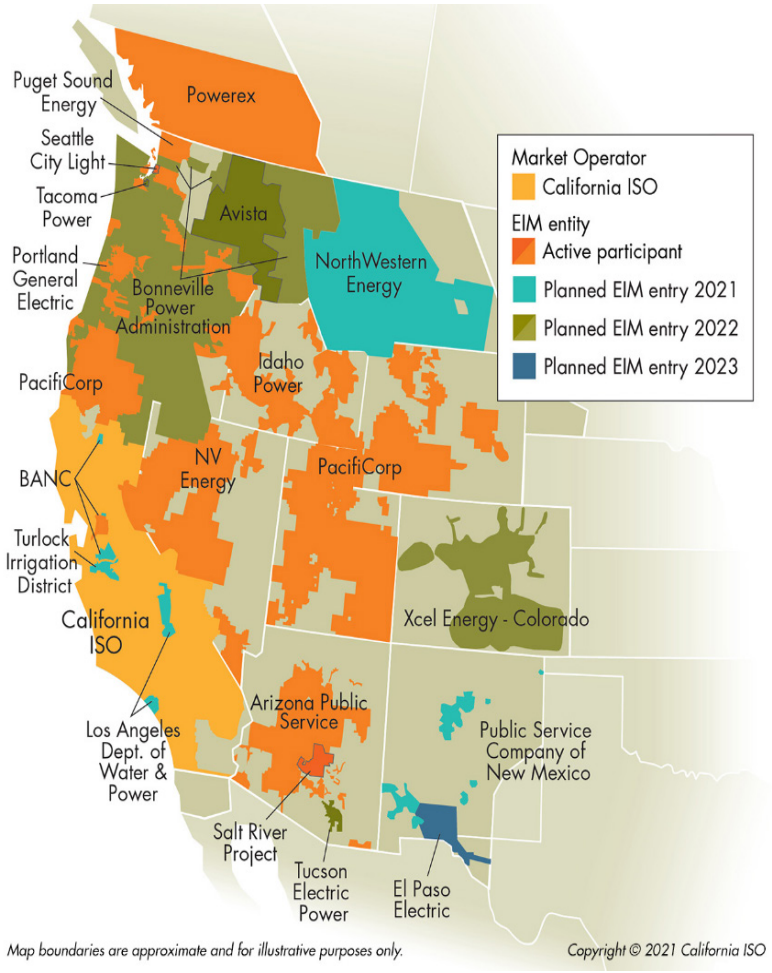


Frequency of upward failed sufficiency tests by month



	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020	Dec 2020
California ISO	0.1	0.1	0.0	—	—	—	0.1	0.2	—	0.1	1.1	0.5	0.4	0.5	—
BANC	—	—	—	—	0.2	—	—	—	—	0.0	0.2	0.0	0.2	0.0	0.1
NV Energy	0.0	0.7	0.3	—	0.6	0.1	0.7	2.6	2.3	4.5	7.1	2.6	1.5	0.8	—
Arizona PS	1.2	4.7	1.1	1.3	1.1	1.5	0.1	1.0	0.0	—	—	0.3	0.8	0.7	0.6
Salt River Project							1.9	0.1	0.5	0.7	1.8	1.1	1.8	0.9	0.3
Idaho Power	—	0.8	—	—	—	—	—	0.1	0.3	0.1	0.2	—	—	—	—
PacifiCorp East	0.1	0.2	0.2	0.0	0.0	0.1	0.0	0.2	0.1	0.2	0.2	0.1	0.5	0.2	—
PacifiCorp West	0.2	—	—	0.2	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1
Portland GE	0.5	0.0	0.5	—	0.2	0.1	—	—	0.0	0.2	0.2	0.6	0.1	0.1	0.2
Seattle City Light							—	0.1	—	0.2	0.1	0.1	0.2	0.2	0.1
Puget Sound En	1.3	—	0.2	—	0.3	—	—	0.0	0.3	0.6	0.4	—	0.2	—	—
Powerex	0.4	0.1	0.1	0.5	0.3	0.3	0.2	0.5	0.2	0.2	0.1	0.3	0.1	0.7	0.2

Energy imbalance market transfer limits



	15-minute market		5-minute market	
	Congested from area	Congested into area	Congested from area	Congested into area
BANC	0%	0%	0%	0%
NV Energy	1%	1%	1%	1%
Arizona Public Service	2%	1%	1%	1%
Salt River Project	3%	1%	2%	1%
Idaho Power	9%	0%	5%	0%
PacifiCorp East	9%	0%	5%	0%
PacifiCorp West	36%	3%	21%	2%
Portland General Electric	36%	4%	22%	3%
Puget Sound Energy	41%	4%	31%	5%
Seattle City Light	41%	4%	31%	5%
Powerex	40%	8%	33%	14%

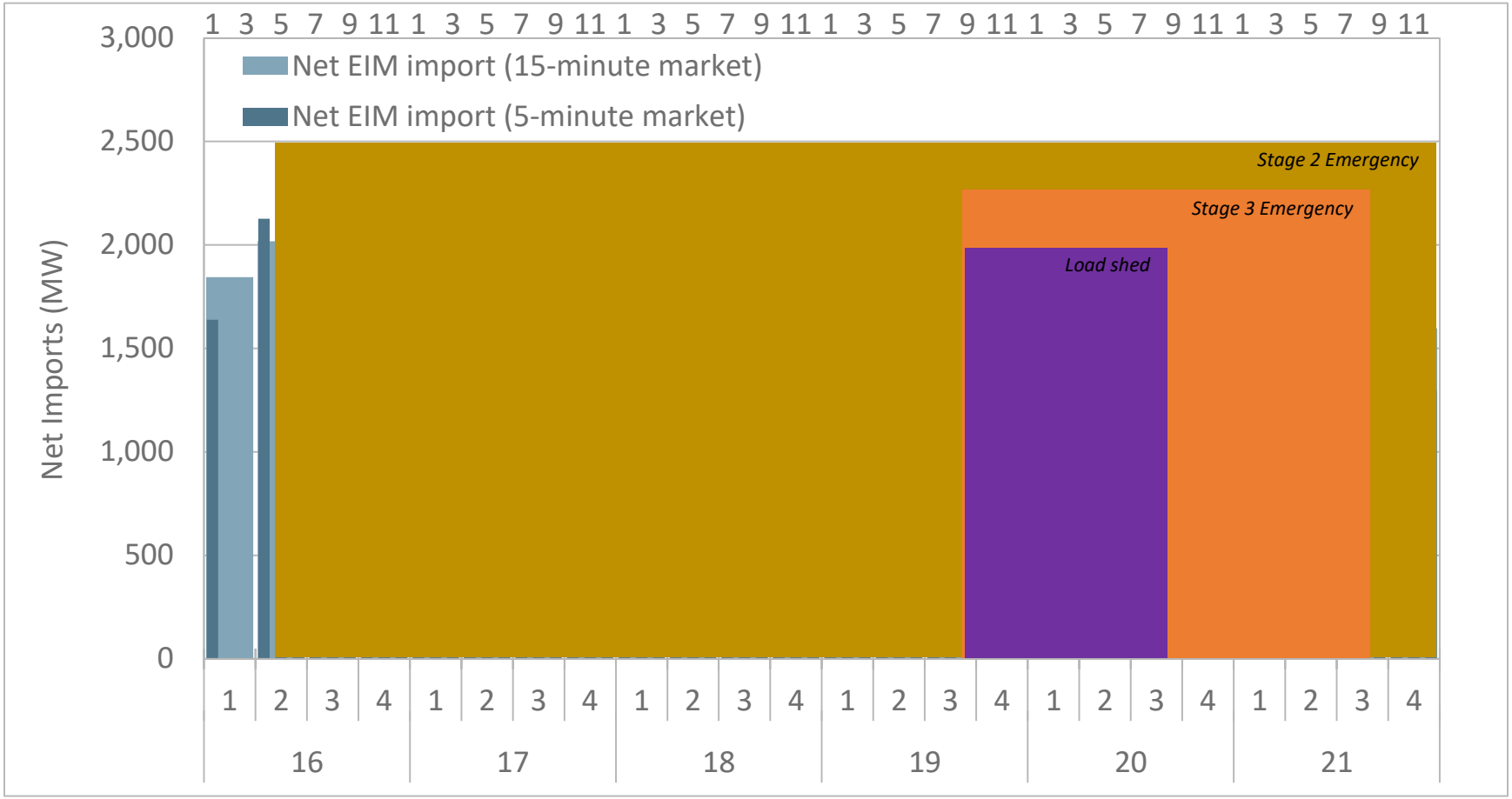
Average 15-minute market energy imbalance market limits (October - December)

From Balancing Authority Area	To Balancing Authority Area												*Total export limit*
	CISO	BANC	NEVP	AZPS	SRP	PACE	IPCO	PACW	PGE	PSEI	SCL	PWRX	
California ISO		1,340	3,660	1,230	1,980			30	40	0		110	8,390
BANC	1,330												1,330
NV Energy	3,570			330		790	440						5,130
Arizona Public Service	2,270		270		7,690	760							10,990
Salt River Project	2,380			5,420		0							7,800
PacifiCorp East			610	370	0		820	250					2,050
Idaho Power			490			1,840		500		40	30		2,900
PacifiCorp West	70					340	310		360	150	10		1,240
Portland GE	80							370		40	40		530
Puget Sound Energy	0						0	170	40		340	150	700
Seattle City Light							30	20	10	370			430
Powerex	0									330			330
Total import limit	9,700	1,340	5,030	7,350	9,670	3,730	1,600	1,340	450	930	420	260	

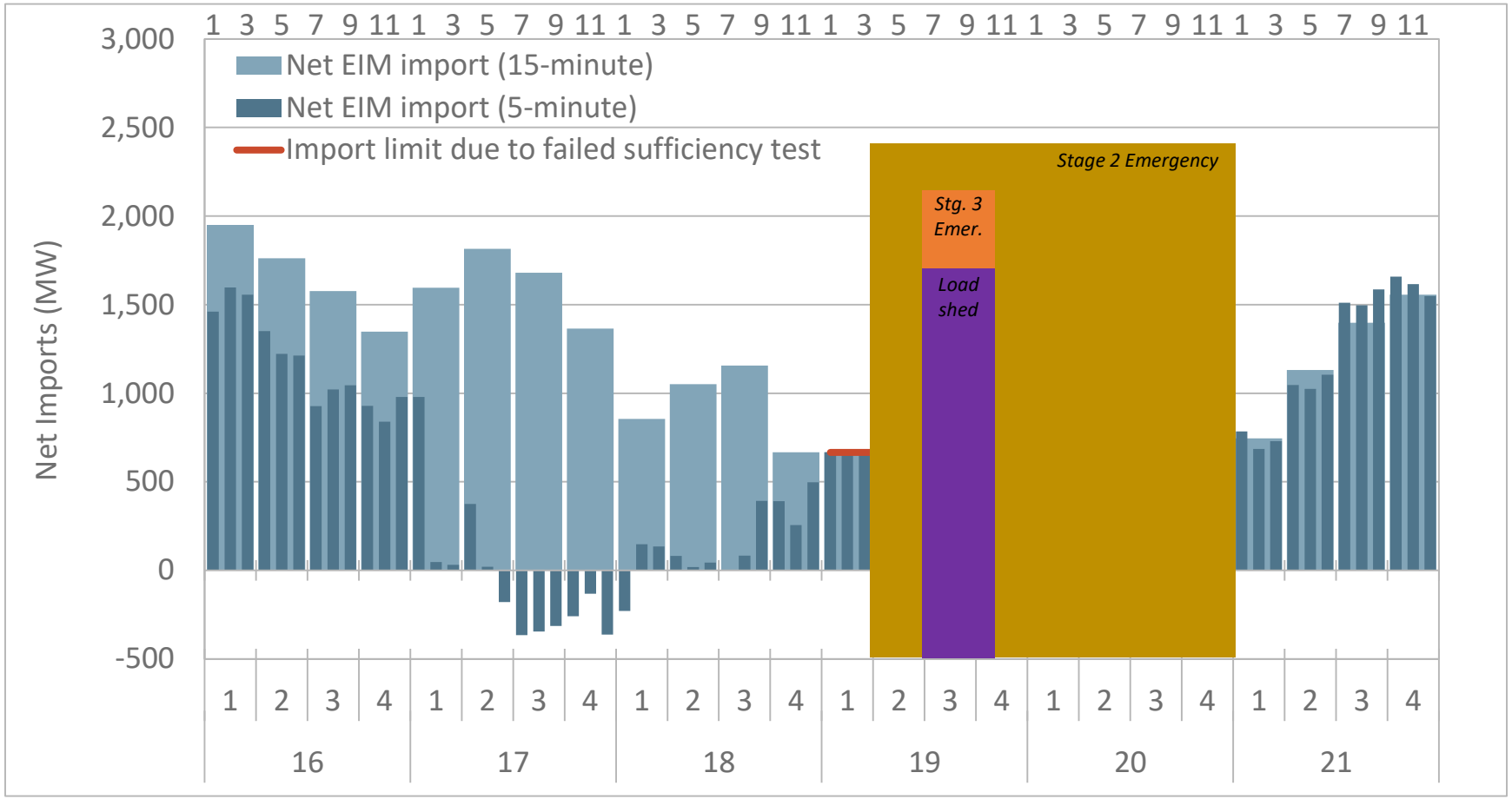
EIM Sufficiency Tests

- Two types of test performed as part of resource sufficiency evaluation each hour for each 15-minute interval:
  - Bid range capacity test (a.k.a “capacity test”)
  - Flexible ramping sufficiency test (a.k.a. “sufficiency test”)
- If an EIM balancing area fails one of these upward tests, net EIM imports into the area are capped based on advisory interval import.
- Purpose of tests:
  - Ensure sufficient resources are scheduled/offered in EIM to cover load forecast and ramping needs (plus some uncertainty.)
  - Deter excessive or intentional “leaning” by individual EIM areas for capacity needed to meet loads and uncertainty.
  - Also viewed by FERC as a mechanism to help deter exercise of market power through physical withholding of resources.

EIM transfers into CAISO system were capped after CAISO failed flexible ramping sufficiency test prior to load curtailments on August 14-15, 2020 (August 14)



EIM transfers into CAISO system were capped after CAISO failed flexible ramping sufficiency test prior to load curtailments on August 14-15, 2020 (August 15)

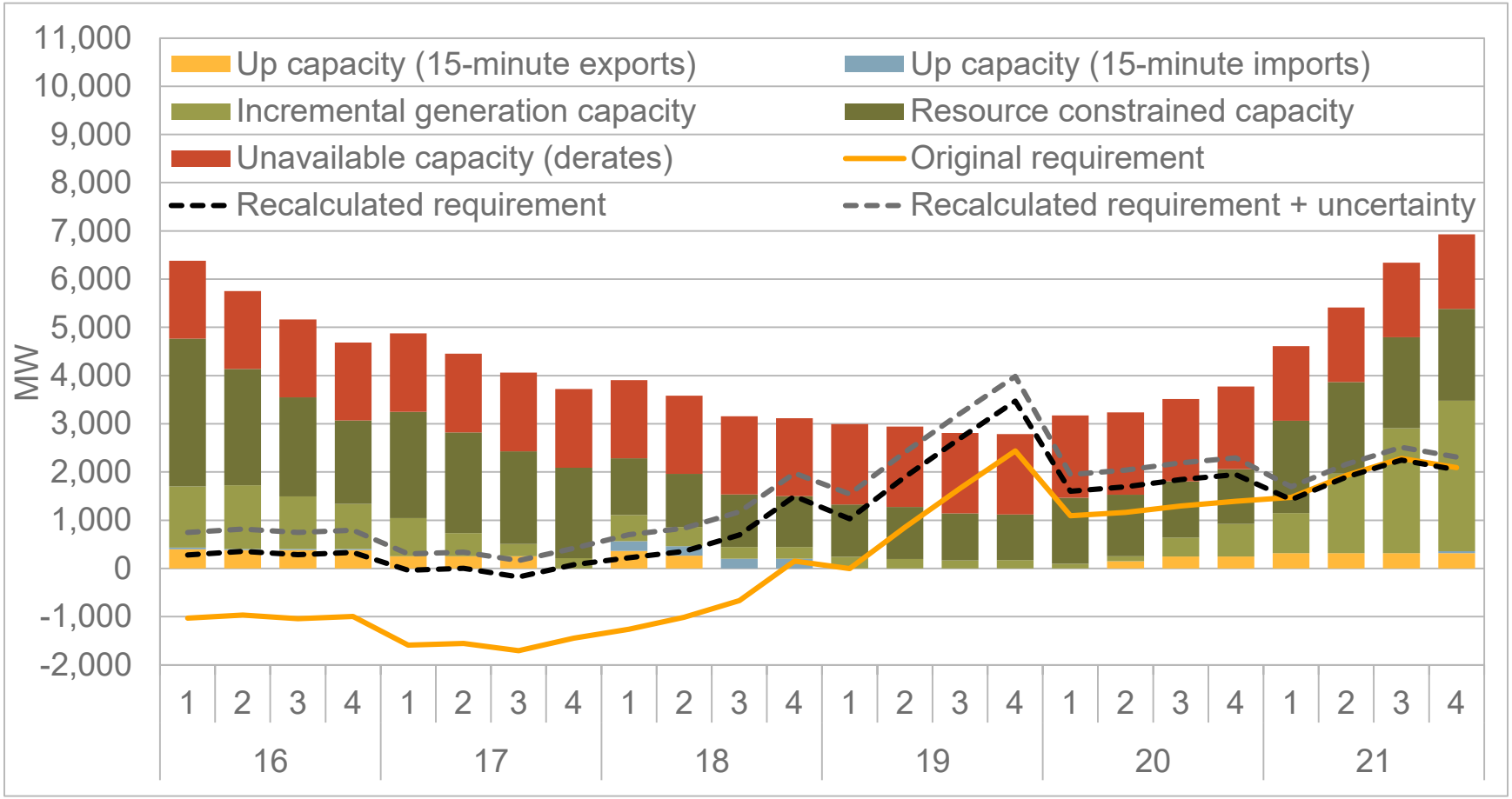


Bid range capacity test

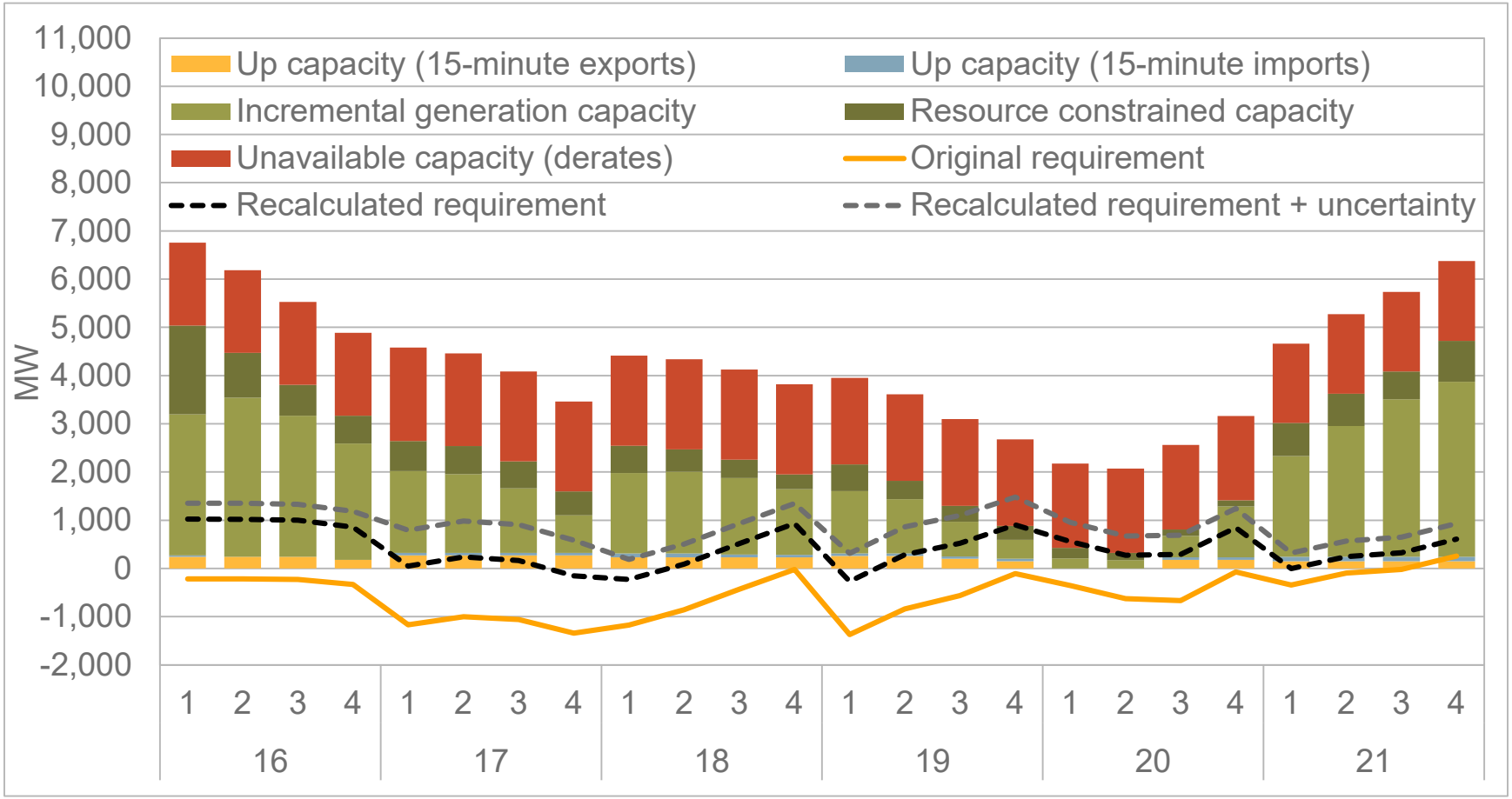
- ISO identified two issues corrected February 4, 2021:
  - Resource de-rates and outages were not accounted for resulting in higher resource capacity relative to actual availability
  - Mirror resources were incorrectly included for the ISO, impacting net scheduled interchange and the capacity test requirement

- ISO proposing to add uncertainty to bid range capacity test

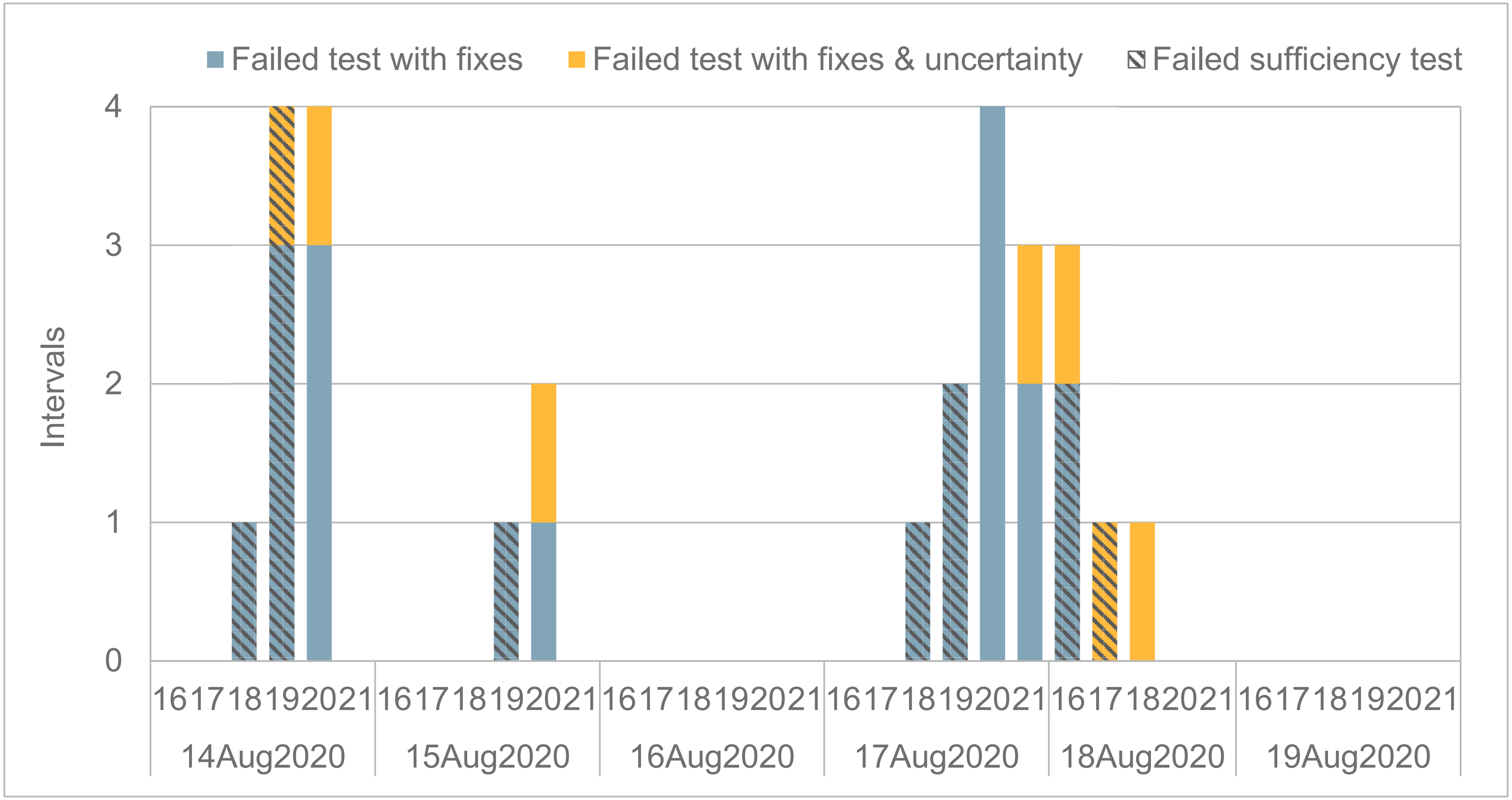
Errors in calculation of capacity test for CAISO system prevented capacity test failures prior to load curtailments on August 14-15, 2020 (August 14)



Errors in calculation of capacity test for CAISO system prevented capacity test failures prior to load curtailments on August 14-15, 2020 (August 15)

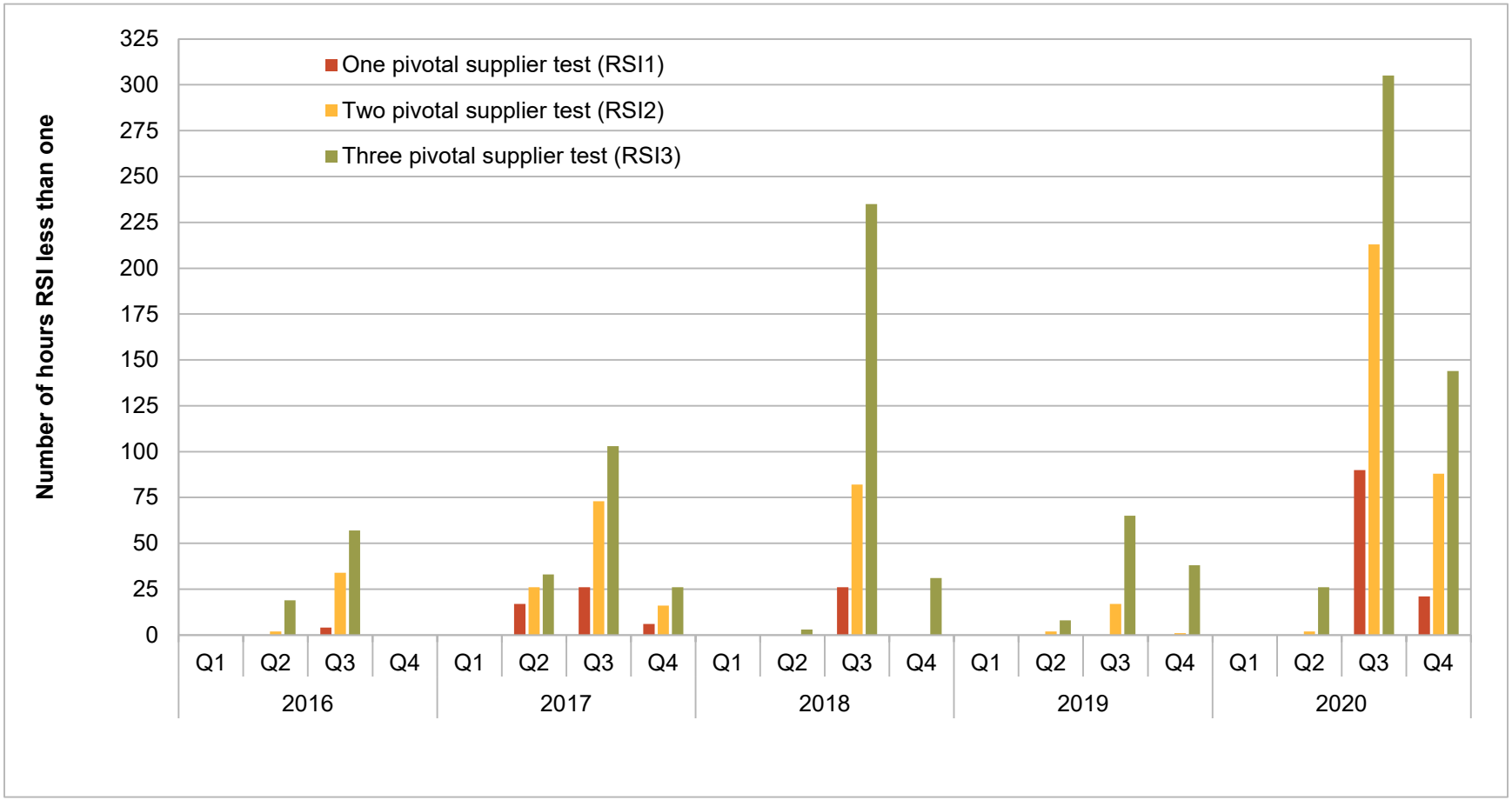


CAISO upward bid range capacity test failures with proposed enhancements (August 14 – August 19)



The CAISO market was structurally uncompetitive in a relatively high number of hours

Number of hours with residual supply index less than one



Although market was structurally uncompetitive many hours, overall market results were competitive in the fourth quarter

Quarterly average price-cost markup was about $1.11/MWh (2.5 percent)