



Role of Resource Sufficiency Tests in the Energy Imbalance Market

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Mission of independent market monitors

“Each independent system operator ... must include a mission statement ... that identifies the Market Monitoring Unit’s goals, including the protection of consumers and market participants by the identification and reporting of market design flaws and market power abuses.”

FERC Order 719

To provide independent oversight and analysis of the CAISO Markets for the protection of consumers and Market Participants by the identification and reporting of market design flaws, potential market rule violations, and market power abuses.

Department of Market Monitoring Mission Statement
CAISO Tariff, Appendix P

Core functions of independent market monitors (FERC Order 719)

1. Review and report on the performance of wholesale markets, including quarterly and annual reports. *(provide transparency)*
2. Evaluate existing and proposed market rules, and provide recommendations. *(promote market efficiency)*
3. Notify FERC Office of Enforcement when a market participant or the ISO has engaged in conduct that may require investigation. *(deter detrimental behavior and maintain confidence in market)*
4. Market monitors may also perform functions related to market software inputs for market power mitigation and bid caps.
 - DMM plays lead role in developing generating unit bids caps, but CAISO ultimately approves or disapproves.
 - Participants can appeal or file at FERC in case of disagreement with CAISO.

Background

- Resource adequacy vs resource sufficiency
- Day-ahead vs real-time resource sufficiency
- Two key tests performed as part of *resource sufficiency evaluation* each hour for each 15-minute interval:
 - Bid range capacity test (“*capacity test*”)
 - Flexible ramping sufficiency test (a.k.a. “*sufficiency test*”)
- If a balancing area fails one of these tests, net EIM imports into the area cannot increase beyond level of net imports at that time.
- Purpose of tests:
 - **Reliability:** Ensure sufficient resources are scheduled/offered in EIM to cover load forecast and ramping needs (plus some uncertainty.)
 - **Equity:** Deter excessive or intentional “leaning” by individual EIM areas for capacity needed to meet loads and uncertainty
 - **Efficiency:** Avoid excessive costs or inefficient consequences of failing test

Capacity test failures increased in summer 2021 due to corrections and changes in tests – but still represent small percent of intervals

Frequency of upward capacity test failures (percent of intervals)

Arizona PS	—	—	—	—	—	0.3	0.2	0.4	—	—	0.3	—	0.2	0.3	0.2		
BANC	0.0	0.0	—	0.1	0.0	—	—	—	0.1	—	—	—	0.2	—	0.0		
California ISO	—	—	—	—	—	—	—	—	—	—	—	0.1	0.2	0.0	0.2		
Idaho Power	—	—	—	—	—	—	—	—	—	—	—	—	0.4	0.8	0.1		
LADWP	—										—	—	0.1	—	—	—	
NorthWestern	—										—	—	0.6	1.2	0.6	0.2	
NV Energy	—	—	—	0.1	0.2	—	—	0.3	—	0.0	0.5	0.8	0.5	0.2	0.2		
PacifiCorp East	—	—	—	—	0.1	—	—	—	—	—	—	0.3	0.3	0.1	0.2		
PacifiCorp West	—	—	—	—	0.1	—	—	—	0.1	—	0.0	0.1	0.2	0.1	0.1		
Portland GE	—	—	—	—	—	—	—	0.1	—	0.4	—	0.7	0.8	1.0	1.4		
Powerex	—	—	0.1	0.1	0.1	—	0.1	0.0	—	—	—	0.0	0.0	—	0.1		
PSC New Mexico	—										—	—	—	0.4	—	0.2	
Puget Sound En	—	—	—	—	—	—	—	0.1	0.6	1.0	0.6	1.6	0.5	0.7	0.6		
Salt River Proj.	—	—	—	0.1	0.1	—	—	8.0	—	0.1	0.1	0.7	3.0	2.6	2.0		
Seattle City Light	0.2	0.1	—	—	—	—	—	—	—	—	—	—	—	0.0	0.5		
Turlock ID	—										—	—	0.0	—	—	1.1	0.8
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
	2020						2021										

.2% =
~1.5 hours/month

Capacity test failures often caused by relatively small amount of capacity (in MW or percent of total load)

Average capacity shortfall during upward capacity test failures (MW)

Arizona PS	—	—	—	—	—	1387	2325	1443	—	—	48	—	92	45	97	
BANC	6	3	—	20	5	—	—	—	13	—	—	—	53	—	6	
California ISO	—	—	—	—	—	—	—	—	—	—	—	405	601	274	125	
Idaho Power	—	—	—	—	—	—	—	—	—	—	—	—	17	34	6	
LADWP	[Redacted]									—	—	46	—	—	—	
NorthWestern	[Redacted]									—	—	—	25	24	61	9
NV Energy	—	—	—	23	15	—	—	26	—	15	27	82	55	25	42	
PacifiCorp East	—	—	—	—	1214	—	—	—	—	—	—	73	40	38	63	
PacifiCorp West	—	—	—	—	2228	—	—	—	12	—	4	10	26	16	36	
Portland GE	—	—	—	—	—	—	—	268	—	42	—	34	46	36	38	
Powerex	—	—	85	79	258	—	41	32	—	—	—	63	3	—	22	
PSC New Mexico	[Redacted]									—	—	—	129	—	57	
Puget Sound En	—	—	—	—	—	—	—	21	68	28	49	50	58	74	46	
Salt River Proj.	—	—	—	26	72	—	—	54	—	25	38	30	75	121	74	
Seattle City Light	131	2	—	—	—	—	—	—	—	—	—	—	—	4	151	
Turlock ID	[Redacted]									—	—	1	—	—	7	7
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	2020						2021									

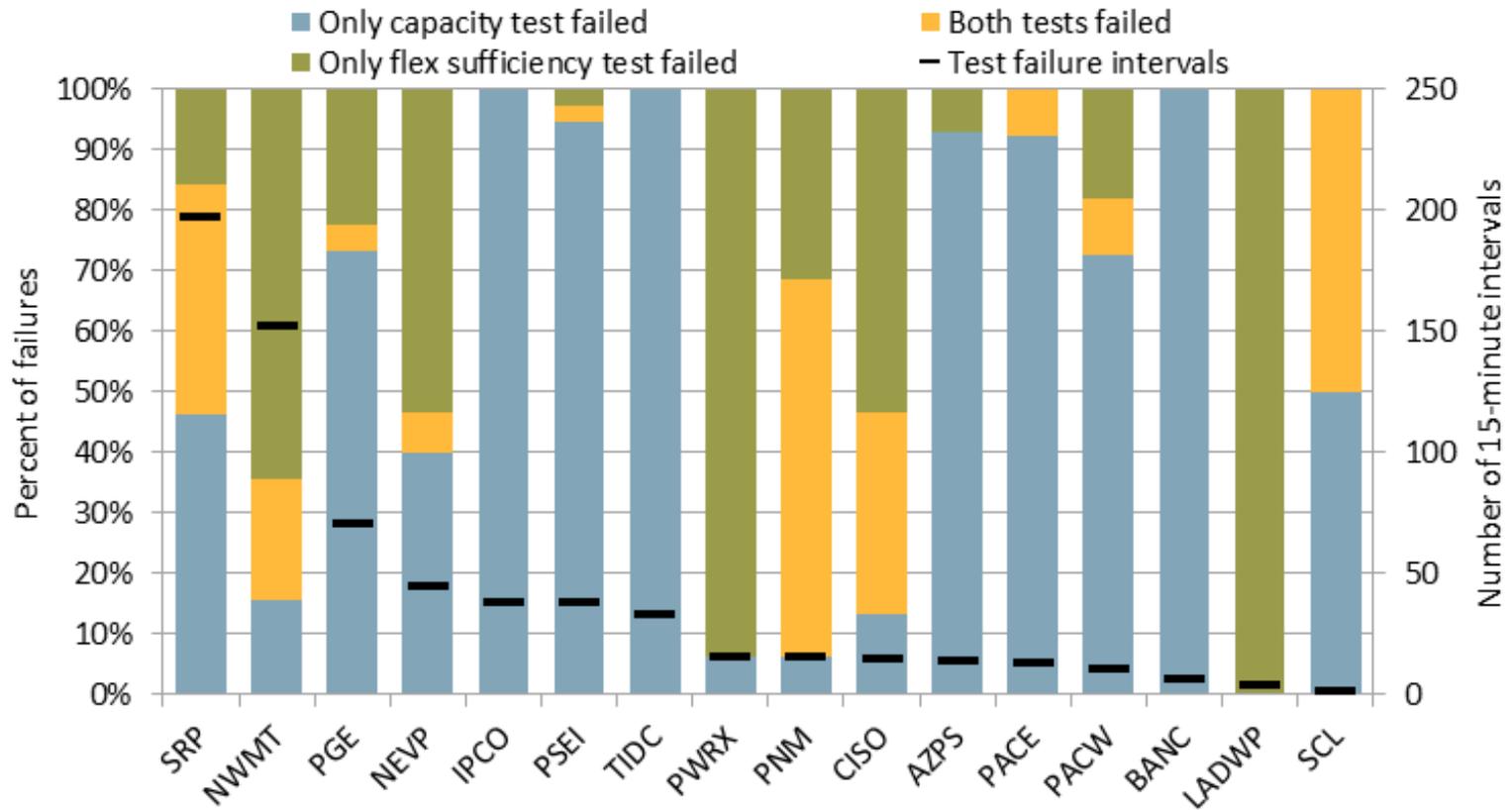
Flexible ramping capacity test failures are also relatively infrequent, but occur mainly during net peak ramping hours

Frequency of upward ramping test failures (percent of intervals)

Arizona PS	—	—	0.3	0.8	0.7	0.6	0.5	0.5	0.2	—	0.6	—	0.0	—	0.2		
BANC	—	0.2	0.0	0.1	—	0.1	—	—	—	—	—	—	—	—	—		
California ISO	0.1	1.1	0.5	0.4	0.5	—	—	—	—	—	—	0.0	0.3	0.1	0.4		
Idaho Power	0.1	0.2	—	—	—	—	—	0.1	—	—	—	—	—	—	—		
LADWP											0.0	0.1	—	0.1	—	—	
NorthWestern													1.3	3.6	0.7	1.6	
NV Energy	4.5	7.1	2.6	1.4	0.8	—	0.1	0.5	0.4	0.4	0.7	0.9	0.4	0.5	0.1		
PacifiCorp East	0.2	0.2	0.1	0.5	0.0	—	0.1	0.1	0.1	0.1	0.0	0.1	0.0	—	0.1		
PacifiCorp West	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.2	0.1	0.1	0.0	—	0.0	0.1	—		
Portland GE	0.2	0.2	0.6	0.1	0.1	0.2	0.3	0.6	0.1	0.2	0.2	0.3	0.5	0.2	—		
Powerex	0.2	0.1	0.3	0.1	0.6	0.2	0.2	0.1	0.1	0.1	—	0.1	0.5	—	—		
PSC New Mexico											0.4	0.0	0.1	0.5	—	0.1	
Puget Sound En	0.6	0.4	—	0.2	—	—	—	—	—	—	0.1	0.1	0.0	0.0	—		
Salt River Proj.	0.7	1.8	1.1	1.7	0.9	0.3	0.2	7.1	0.3	0.5	0.2	0.9	1.9	1.7	0.8		
Seattle City Light	0.1	—	0.1	0.2	0.2	0.1	—	—	—	—	—	—	0.0	—	0.1		
Turlock ID											—	—	0.3	—	—	—	0.1
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		
	2020						2021										

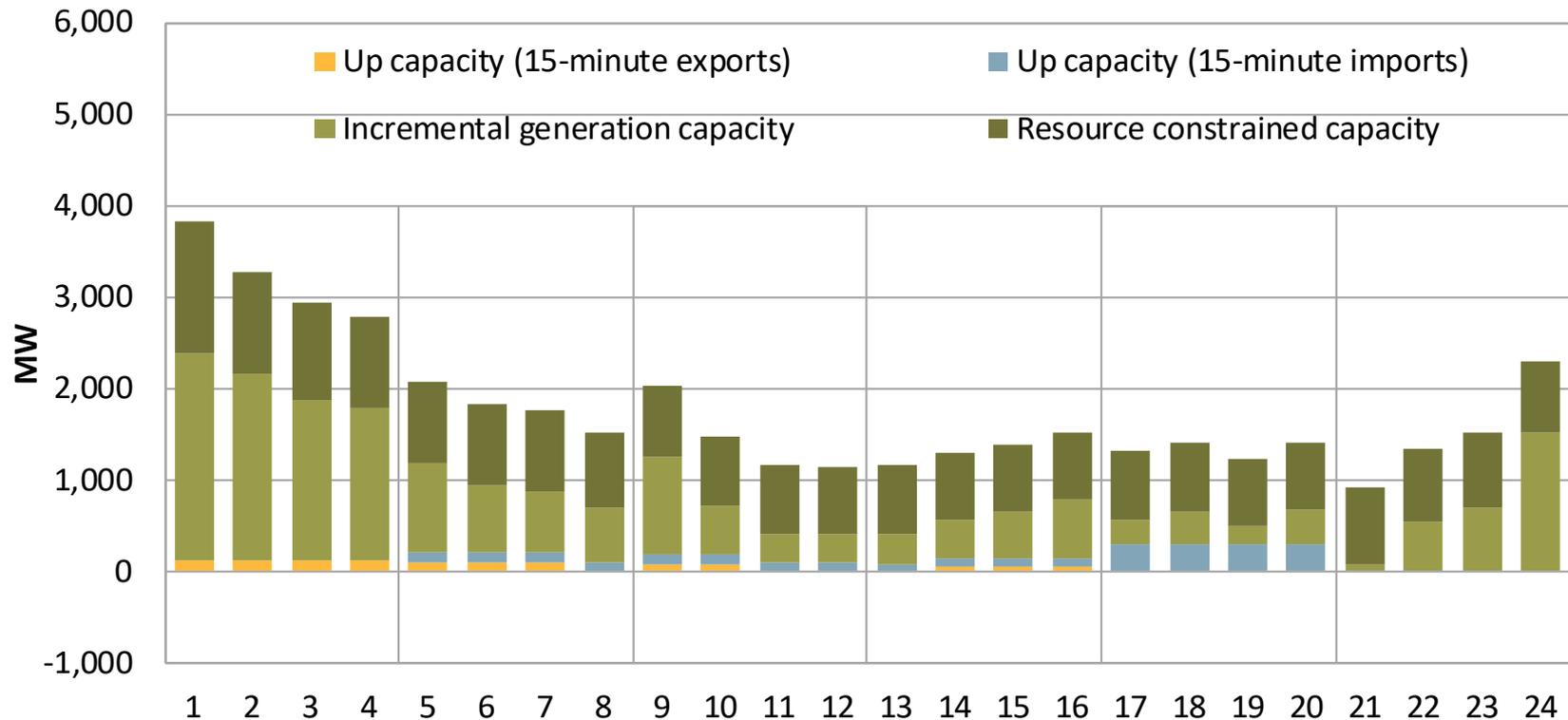
If a balancing area fails either test, then EIM imports are capped at the level of EIM imports during interval prior to failures

Failures of bid capacity and flexible capacity (July-August 2021)



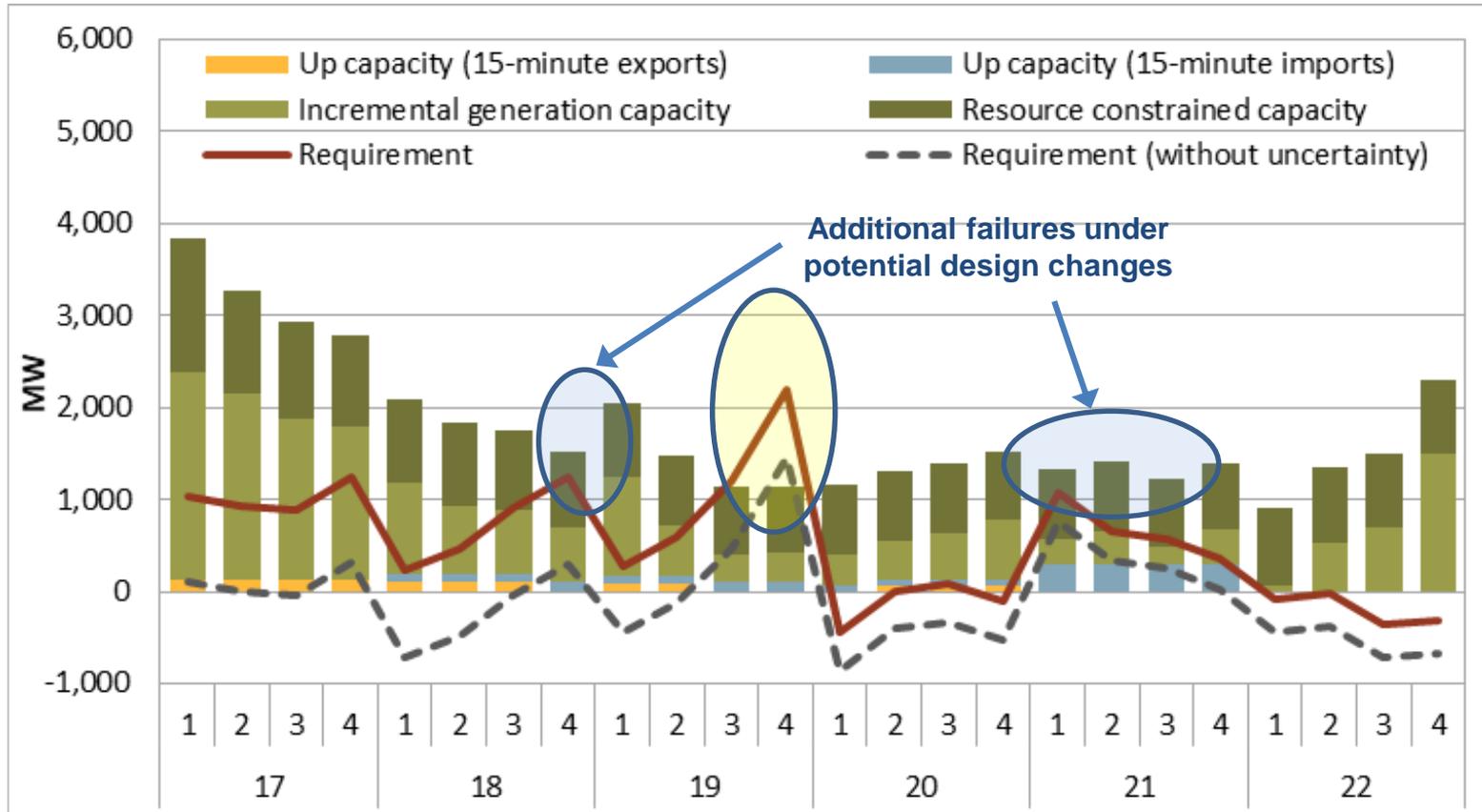
Currently, a significant portion of capacity counted toward meeting the bid capacity test is constrained so that it may not be fully available that hour

CAISO upward bid range capacity (July 9, 2021)



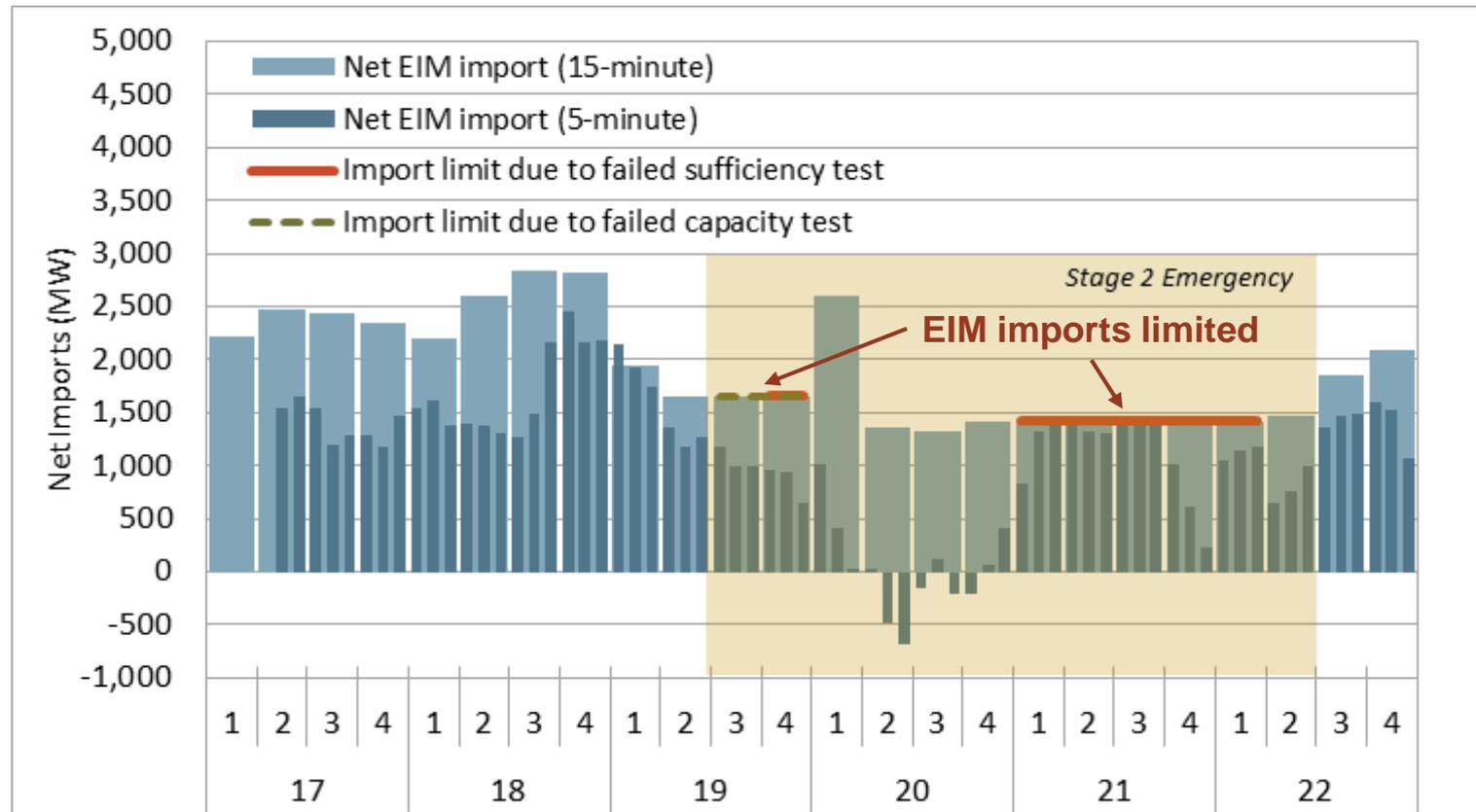
CAISO failed the bid capacity test and flexible sufficiency test during some intervals of the peak net load hours on July 9

CAISO upward bid range capacity test requirement and capacity (July 9, 2021)



EIM imports into CAISO were limited to about 1,500 MW as a result of test failures during net peak load hours on July 9

CAISO upward bid range capacity test requirement and capacity (July 9, 2021)



Current and future market design issues

- High participant interest in increased transparency about details of tests and potential consequences of changes.
 - Release of more detailed balancing area data to all stakeholders.
- Further changes in calculation of available bid range capacity and flexible ramping being considered.
 - Excluding constrained capacity from supply could significantly decrease the amount of capacity counted towards meeting requirement.
 - What is right level and type of uncertainty to incorporate in tests?
 - How to account for EIM imports and upward load bias?
- Changes to consequence of failing tests?
 - e.g. instead of limiting imports impose capacity charge?
 - Financial consequence scaled by level and frequency of failures?

For more information

- Department of Market Monitoring webpage
 - <http://www.caiso.com/market/Pages/MarketMonitoring/Default.aspx>
- Reports on EIM Resource Sufficiency Tests
 - <http://www.caiso.com/Documents/Report-Resource-Sufficiency-Evaluation-in-the-Energy-Imbalance-Market-for-September-2021-Oct-14-2021.pdf>
 - <http://www.caiso.com/Documents/Report-on-Resource-Sufficiency-Evaluation-in-the-Energy-Imbalance-Market-for-July-and-August-2021-Sep-23-2021.pdf>
- CAISO Tariff, Appendix P (Market Monitoring)
 - http://www.caiso.com/Documents/AppendixP_CAISODepartmentOfMarketMonitoring_asof_Apr1_2017.pdf
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