



California ISO

# DMM Report on resource sufficiency evaluation in the EIM (October 2021)

Kyle Westendorf  
Department of Market Monitoring

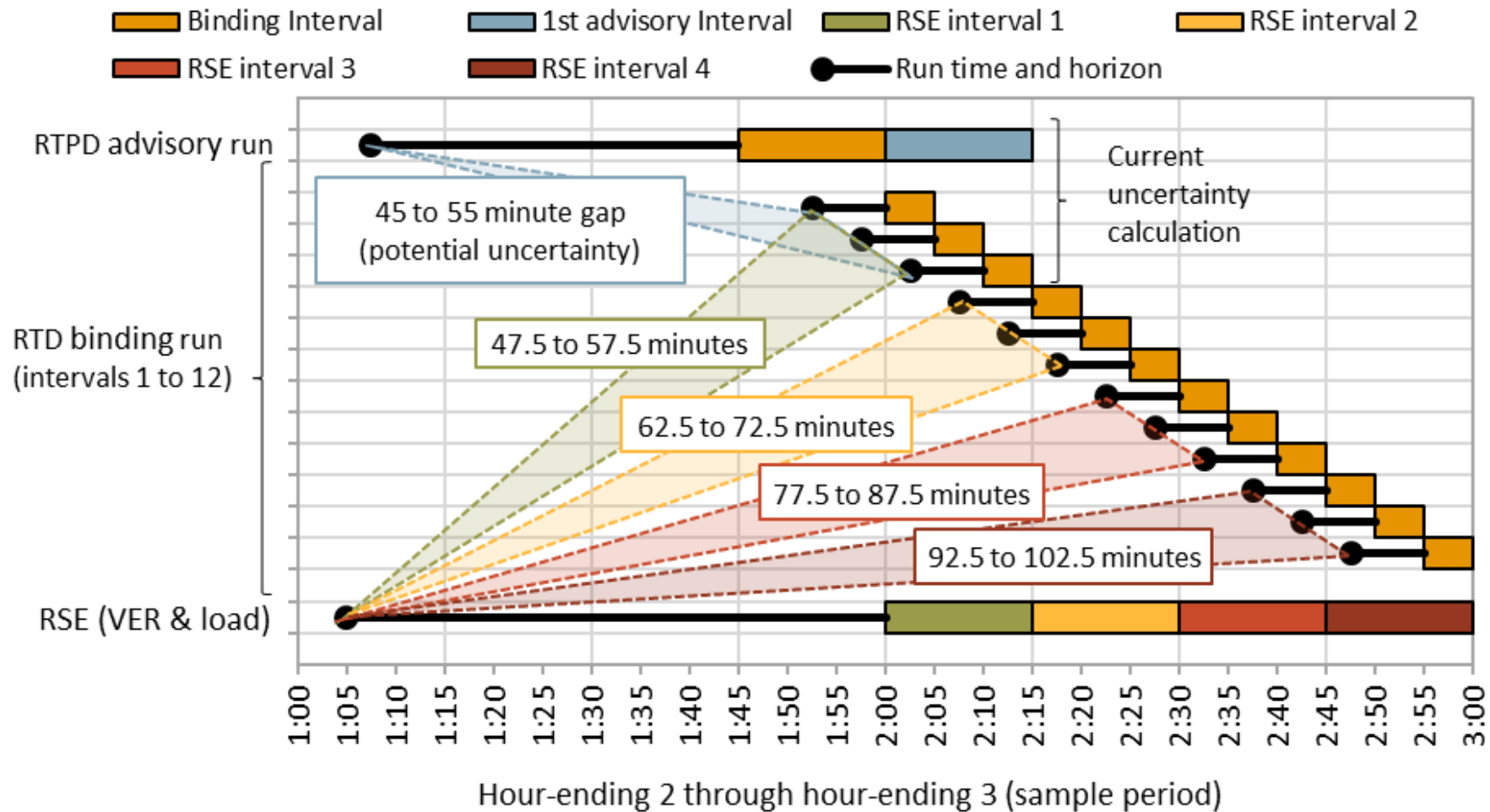
November 16, 2021

# Overview

- **Reports covering September and October published**
  - <http://www.caiso.com/Documents/Report-Resource-Sufficiency-Evaluation-in-the-Energy-Imbalance-Market-for-October-2021-November-12-2021.pdf>
  - <http://www.caiso.com/Documents/Report-Resource-Sufficiency-Evaluation-in-the-Energy-Imbalance-Market-for-September-2021-Oct-14-2021.pdf>
- **Two new special sections**
  - Net load uncertainty
  - Unloaded capacity versus net EIM imports
- **Metric updates and additions**
  - Incremental EIM limits following failures
  - Imbalance conformance
- **Underlying interval-level data**
- **Questions and suggestions from stakeholders**

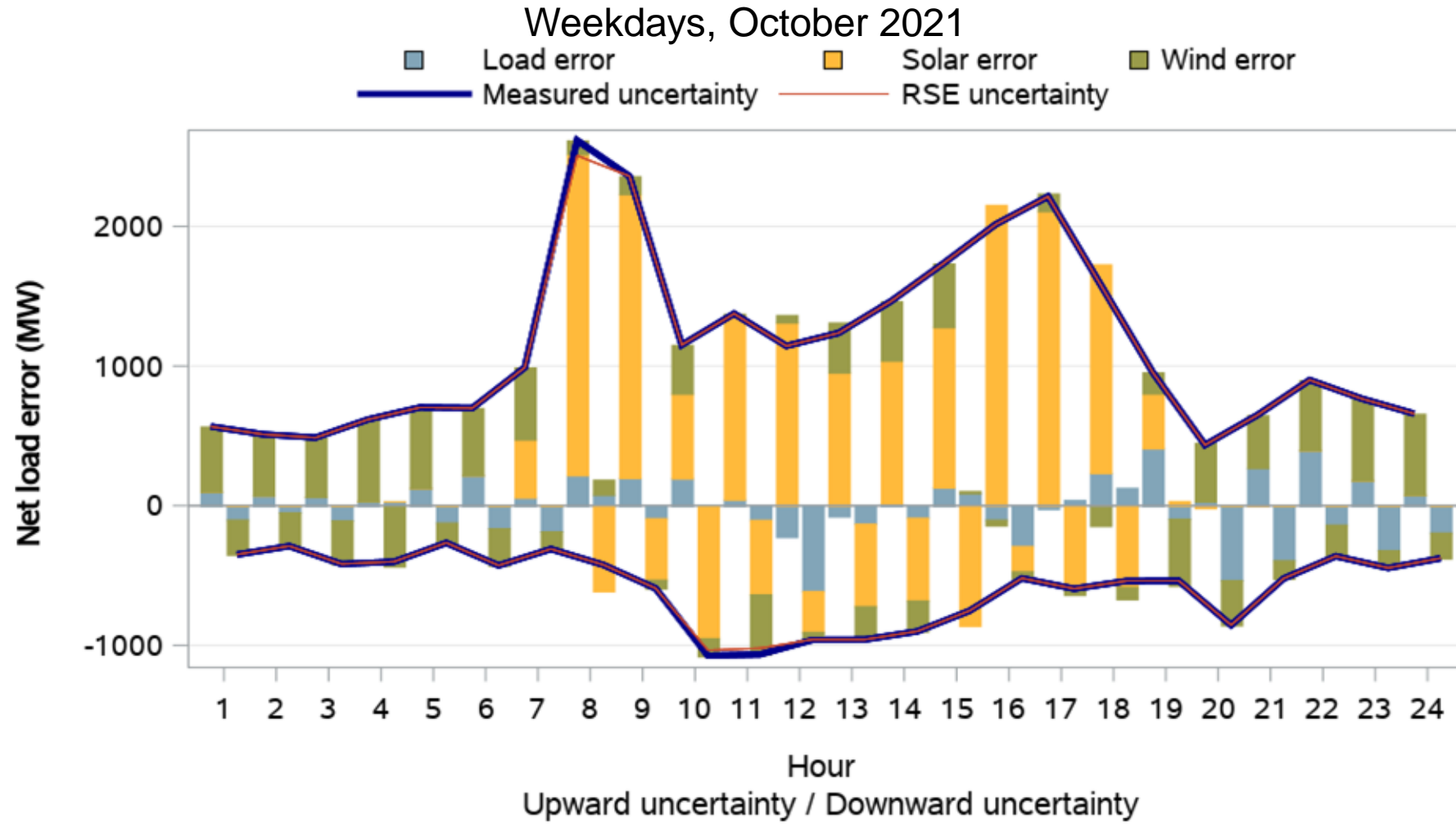
# Net load uncertainty

# Comparison of current uncertainty calculation to the timeframe of the RSE



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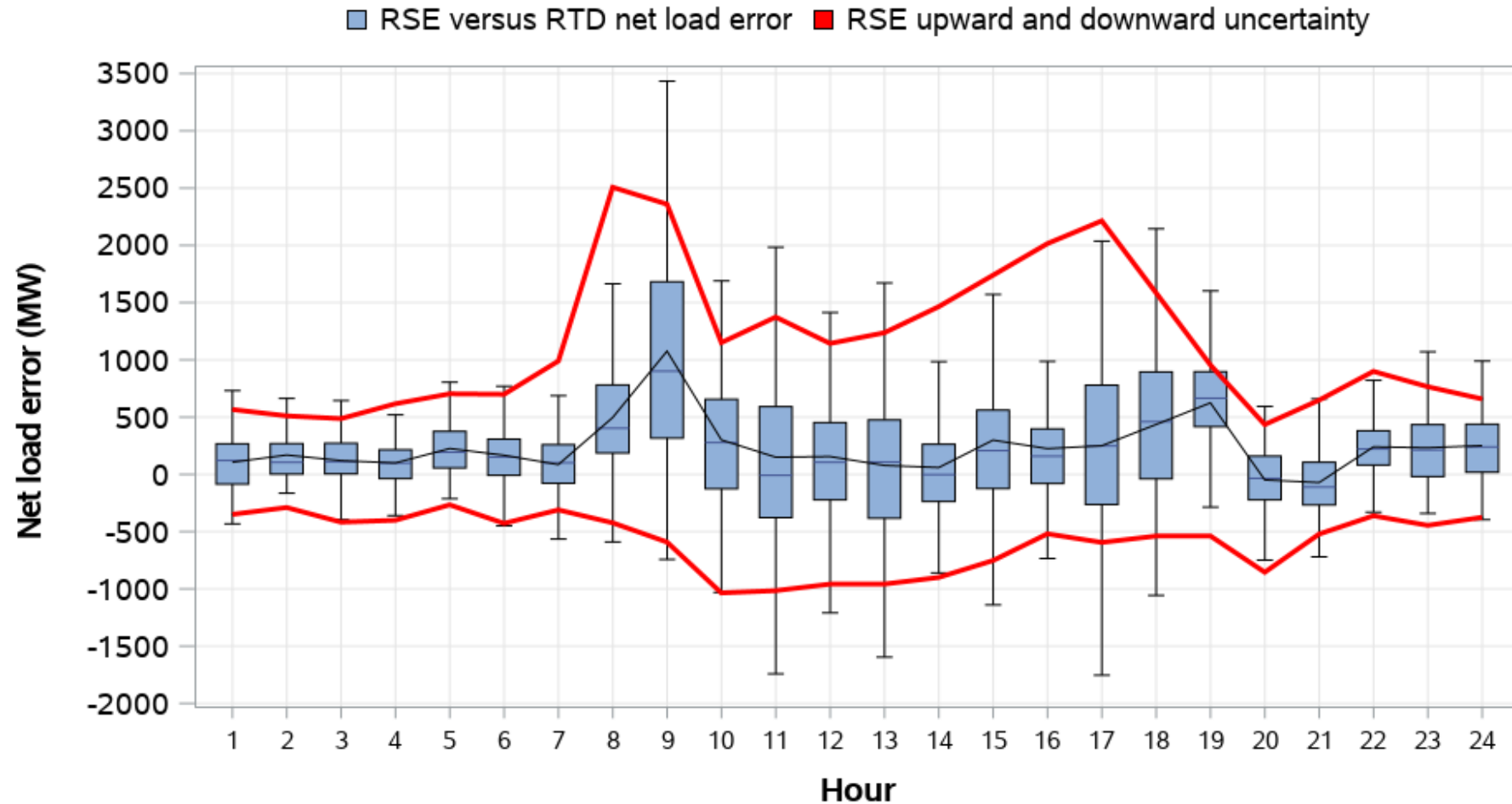
# California ISO average uncertainty by component



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# California ISO distribution of RSE versus RTD net load errors and comparison to RSE uncertainty

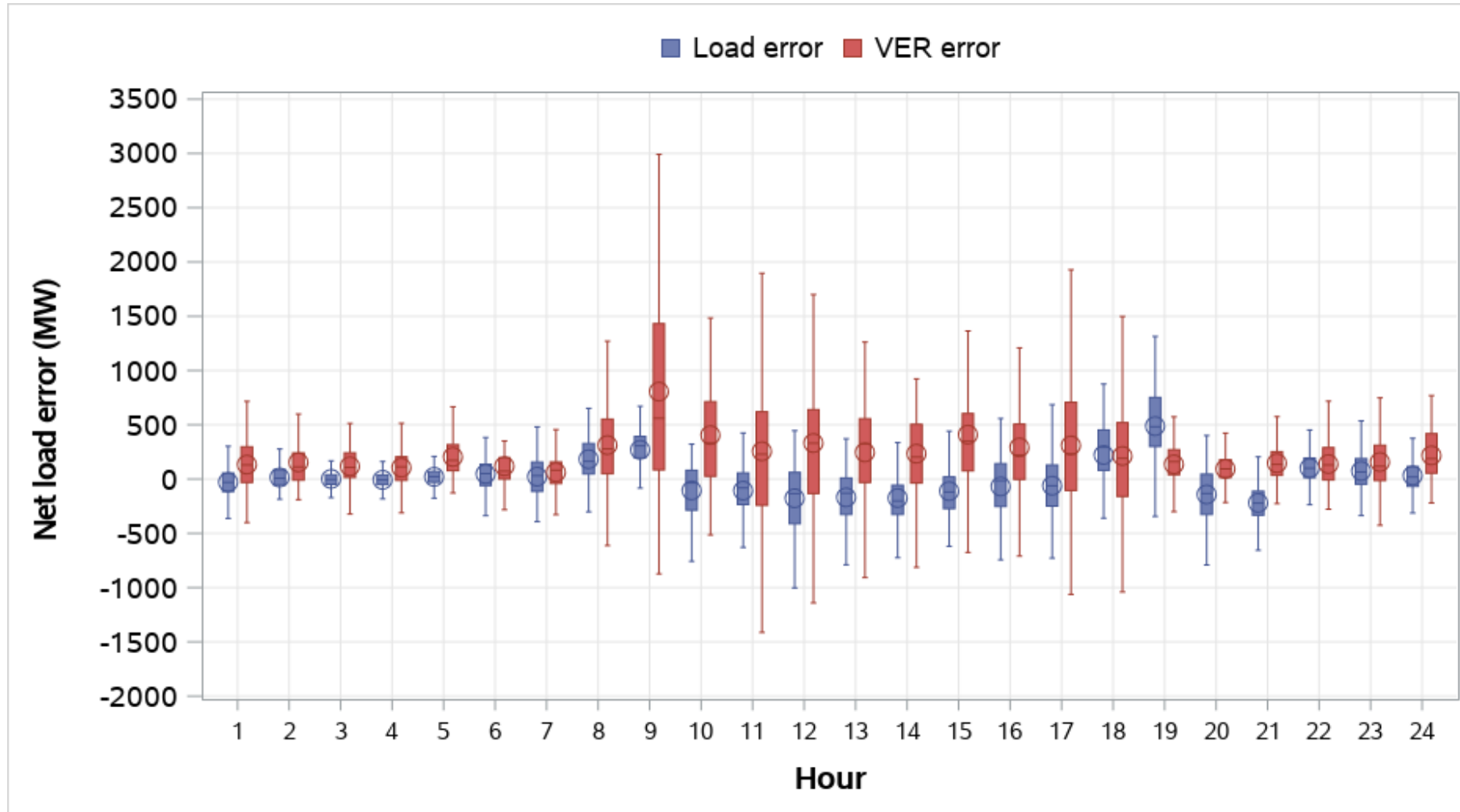
Weekdays, October 2021



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# California ISO distribution of RSE versus RTD load and VER error

## Weekdays, October 2021

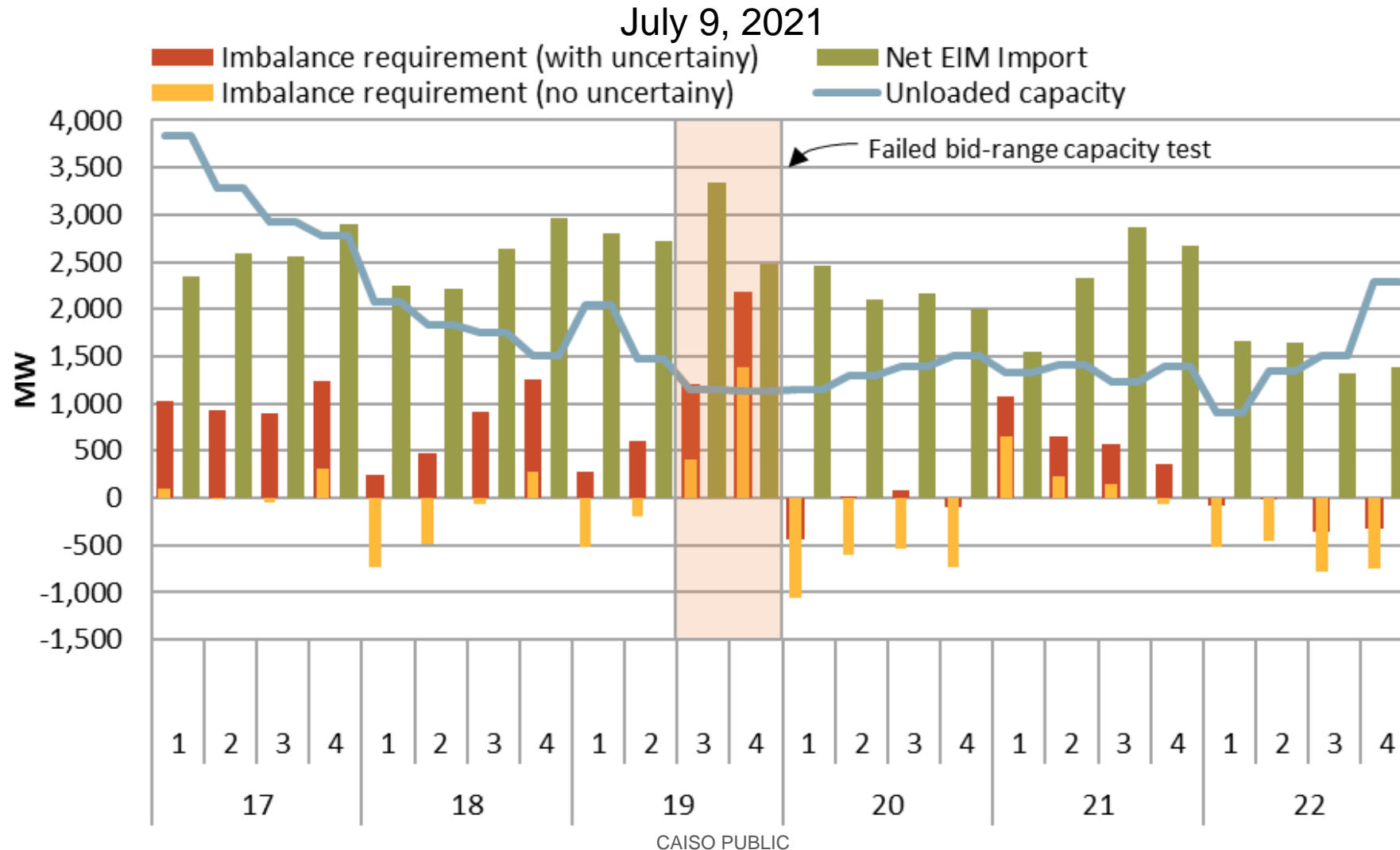


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# Unloaded capacity versus EIM imports

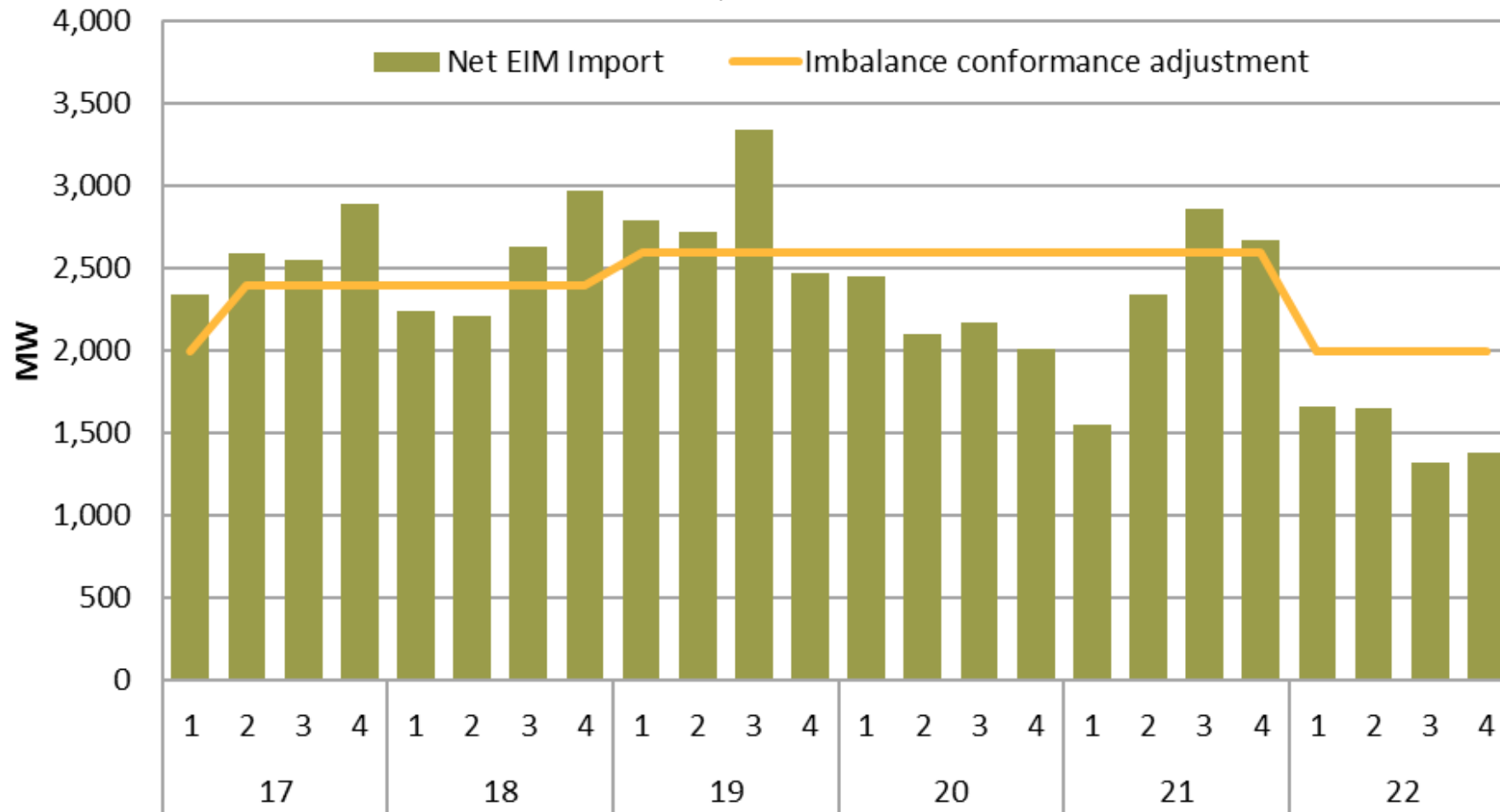


# Comparison of current uncertainty calculation to the timeframe of the RSE



# Net EIM imports and imbalance conformance adjustments

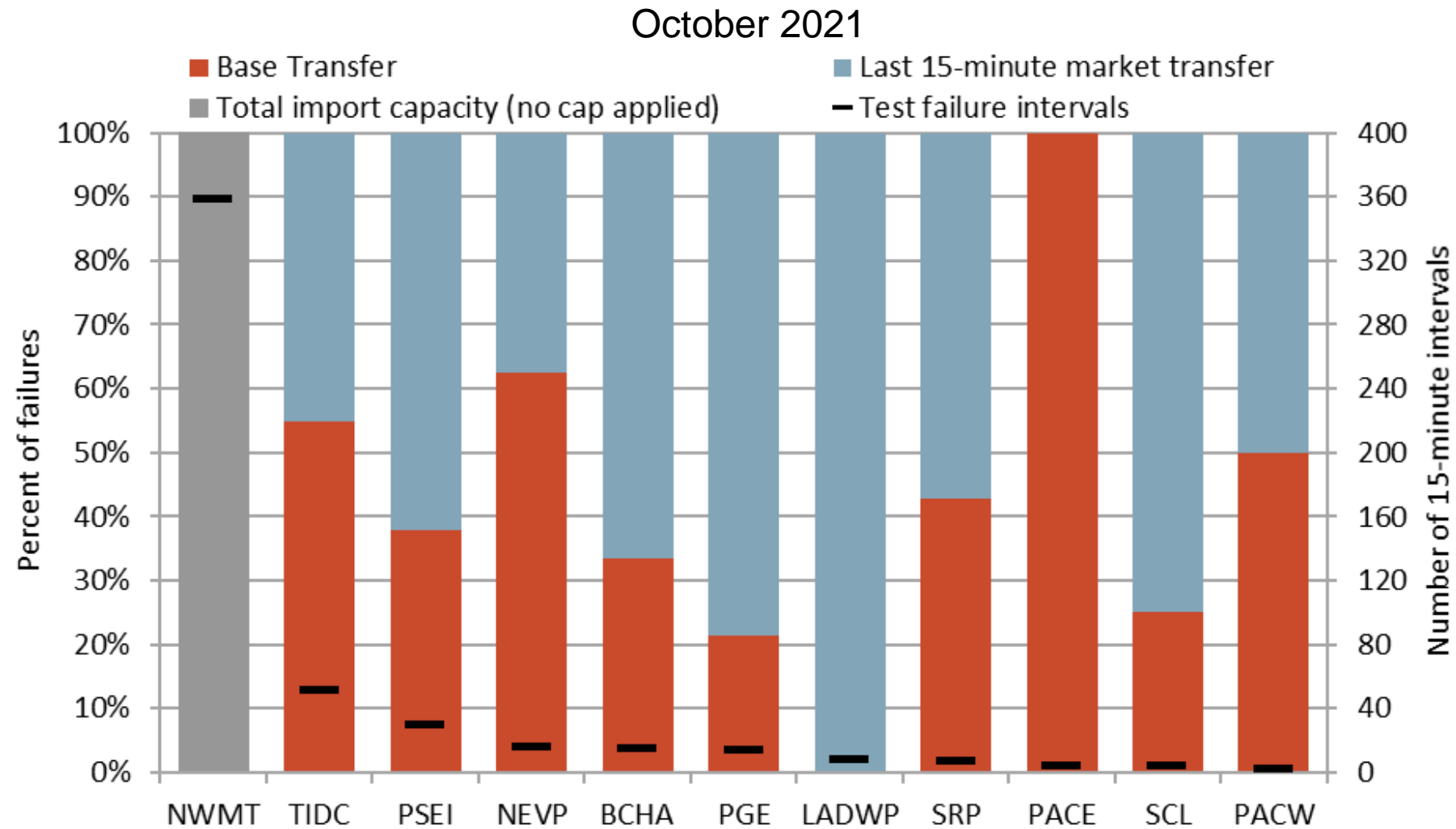
July 9, 2021



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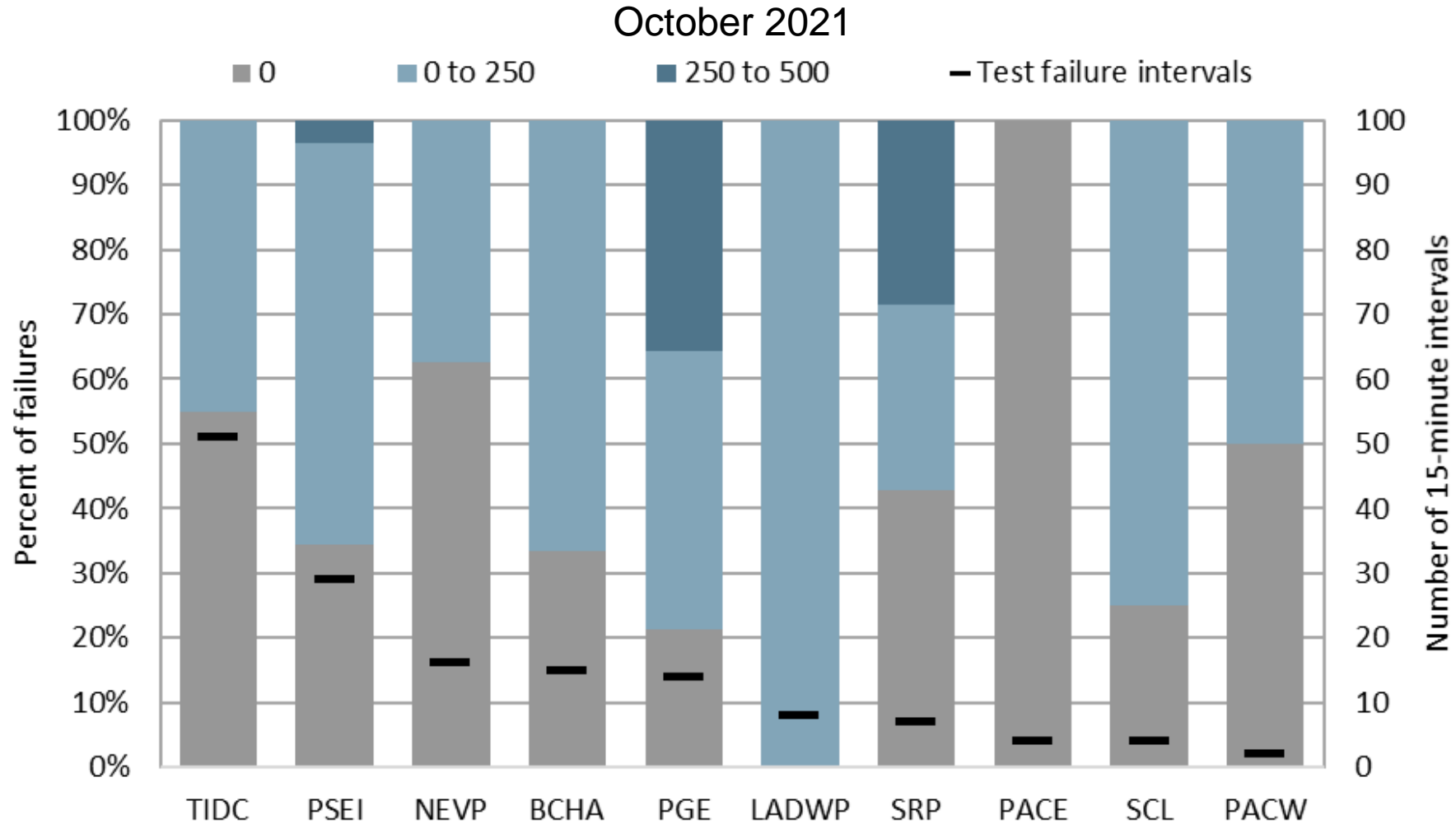
# EIM import limits following upward test failures

# Upward capacity/sufficiency test failure intervals by source of import limit



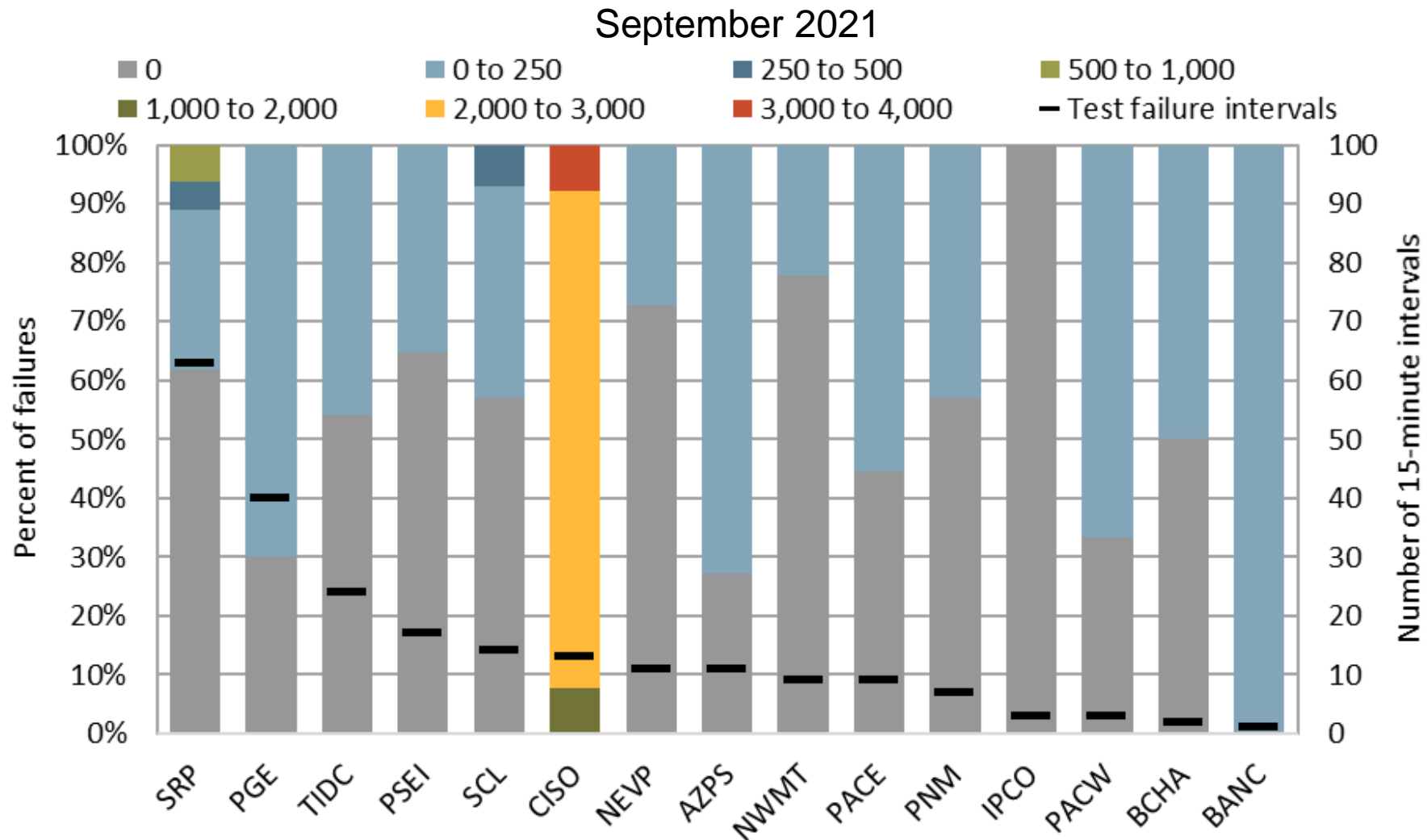
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# Upward capacity/sufficiency test failure intervals by incremental import limit



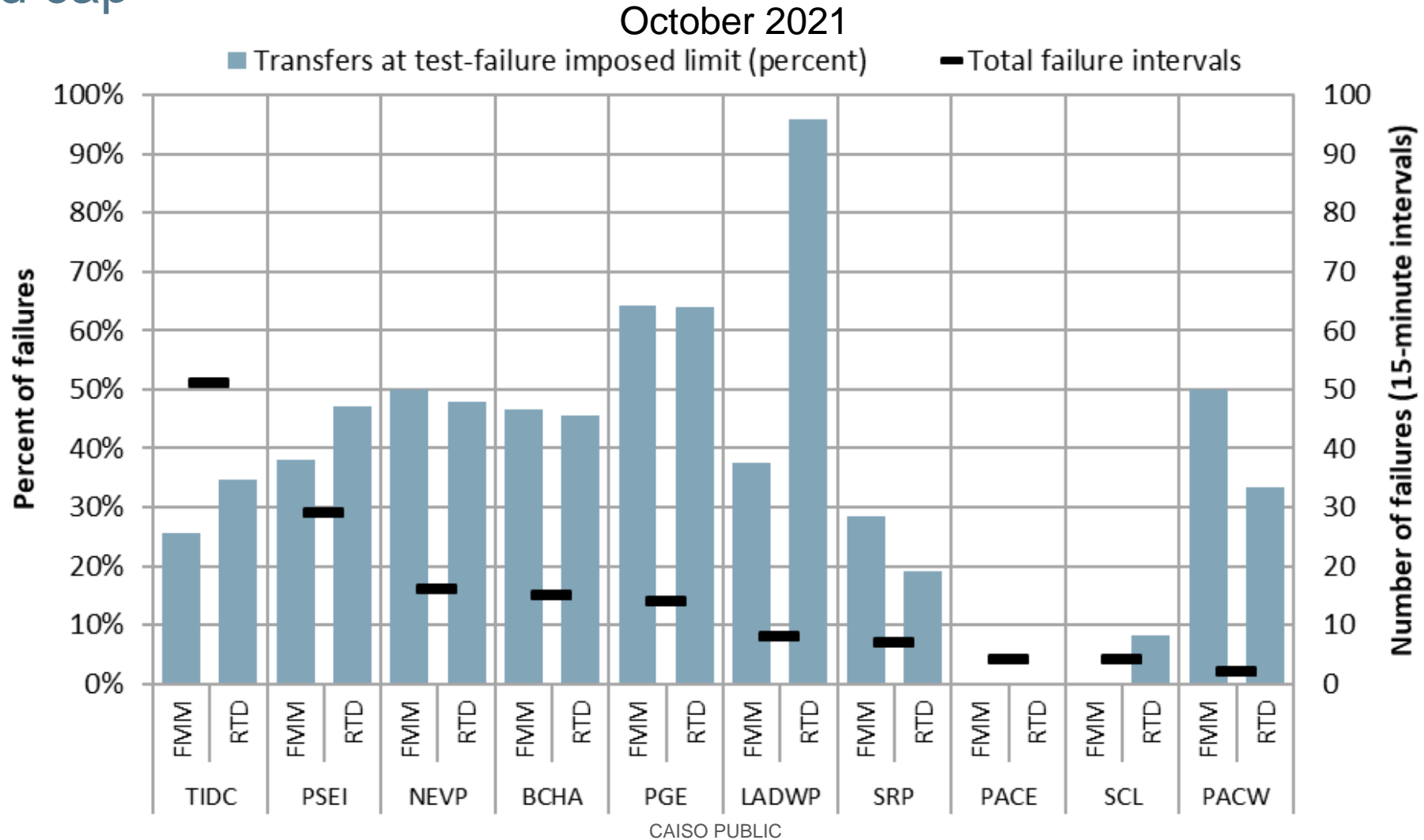
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# Upward capacity/sufficiency test failure intervals by incremental import limit



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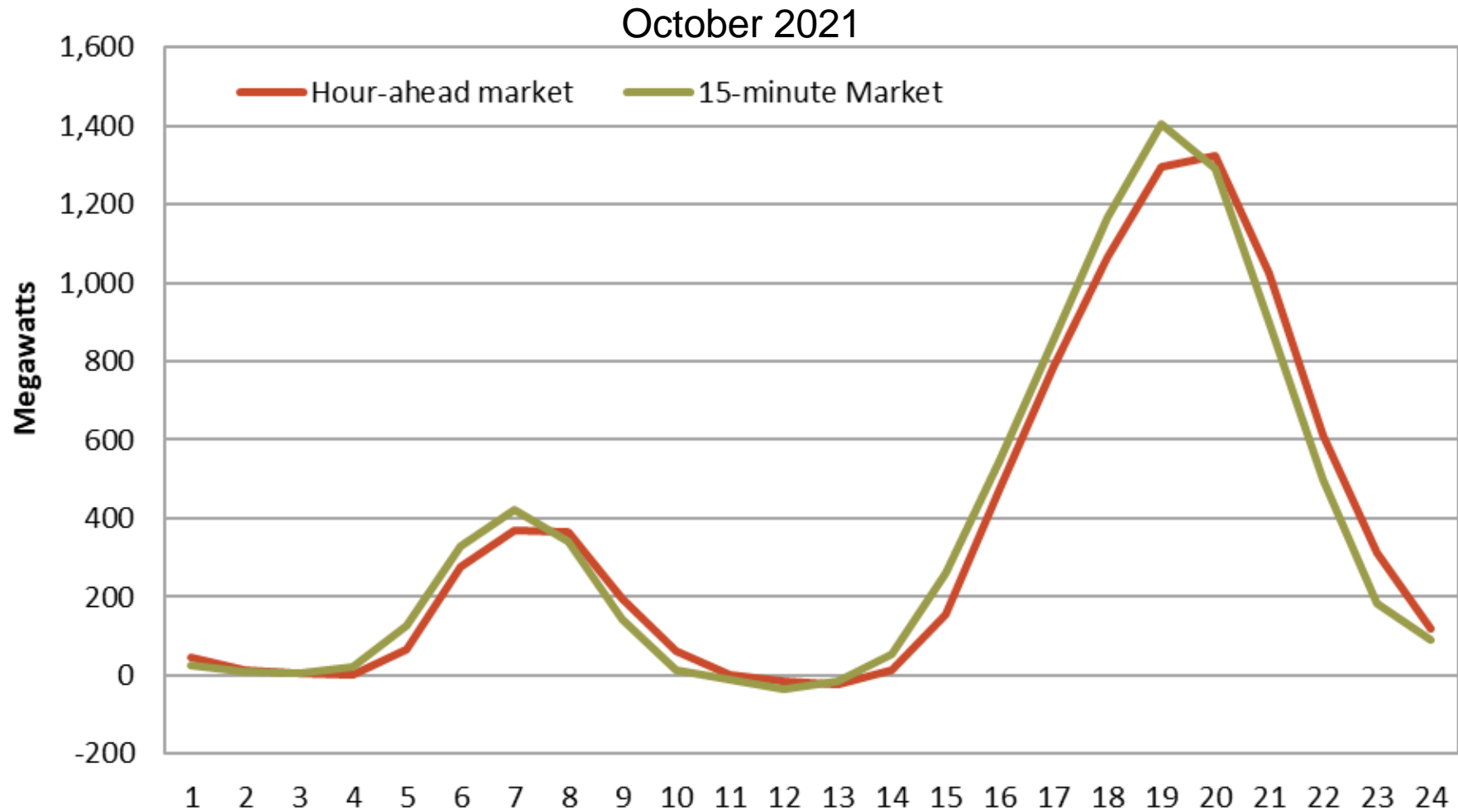
# Percent of upward test failure intervals with market transfers at the imposed cap



# Imbalance conformance adjustments

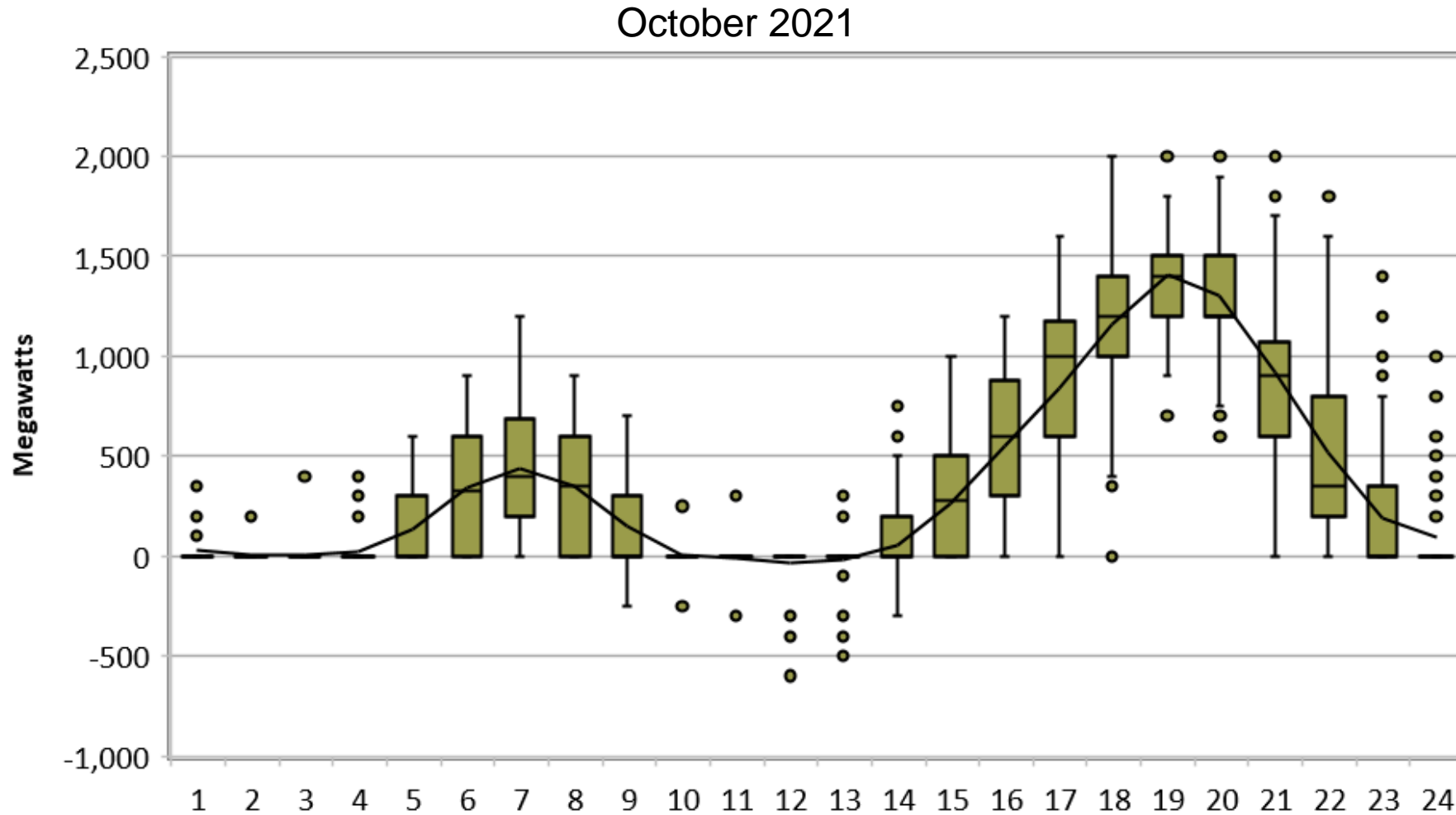


# Average ISO hour-ahead and 15-minute market imbalance conformance



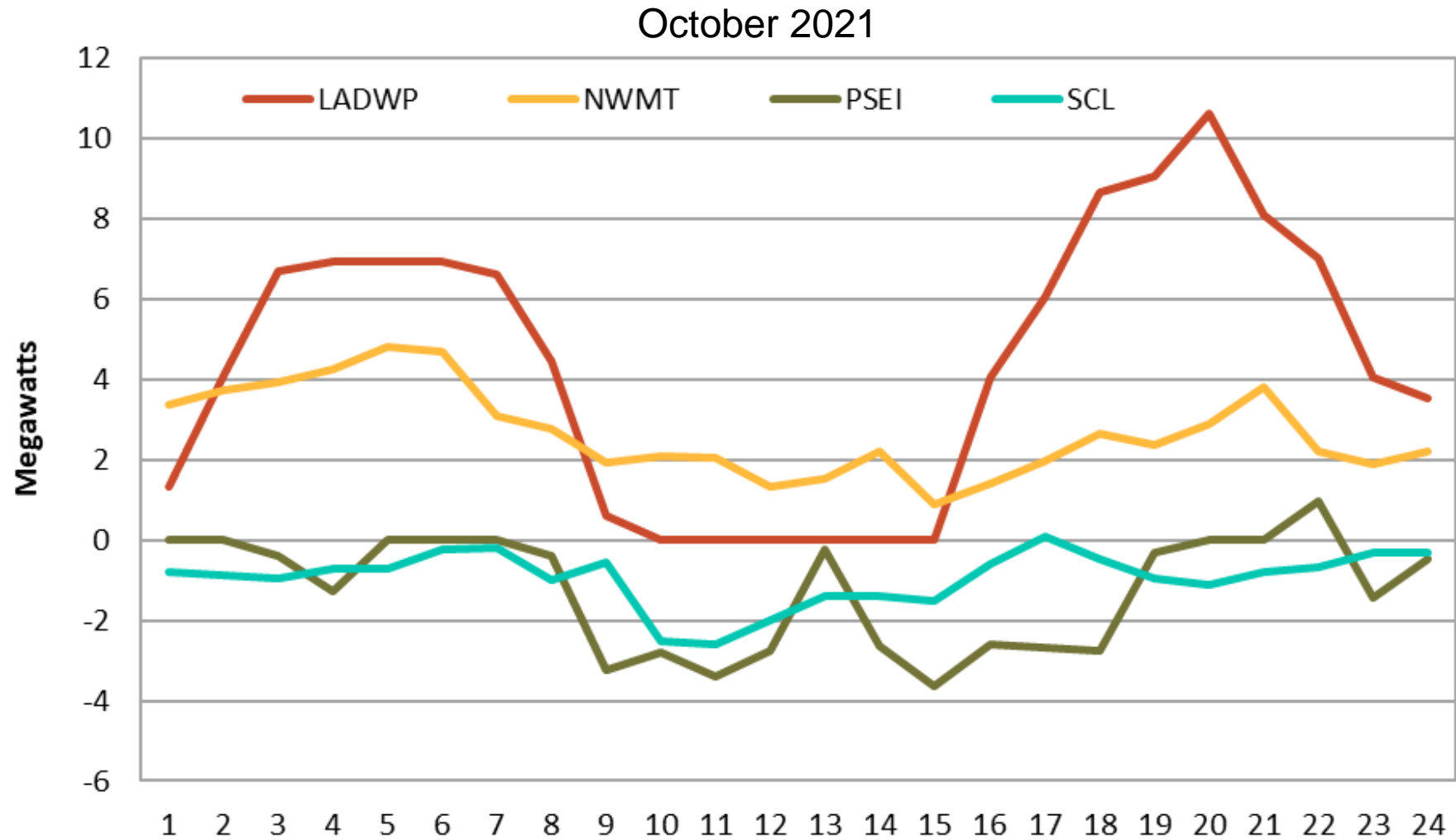
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# Distribution of ISO 15-minute market imbalance conformance



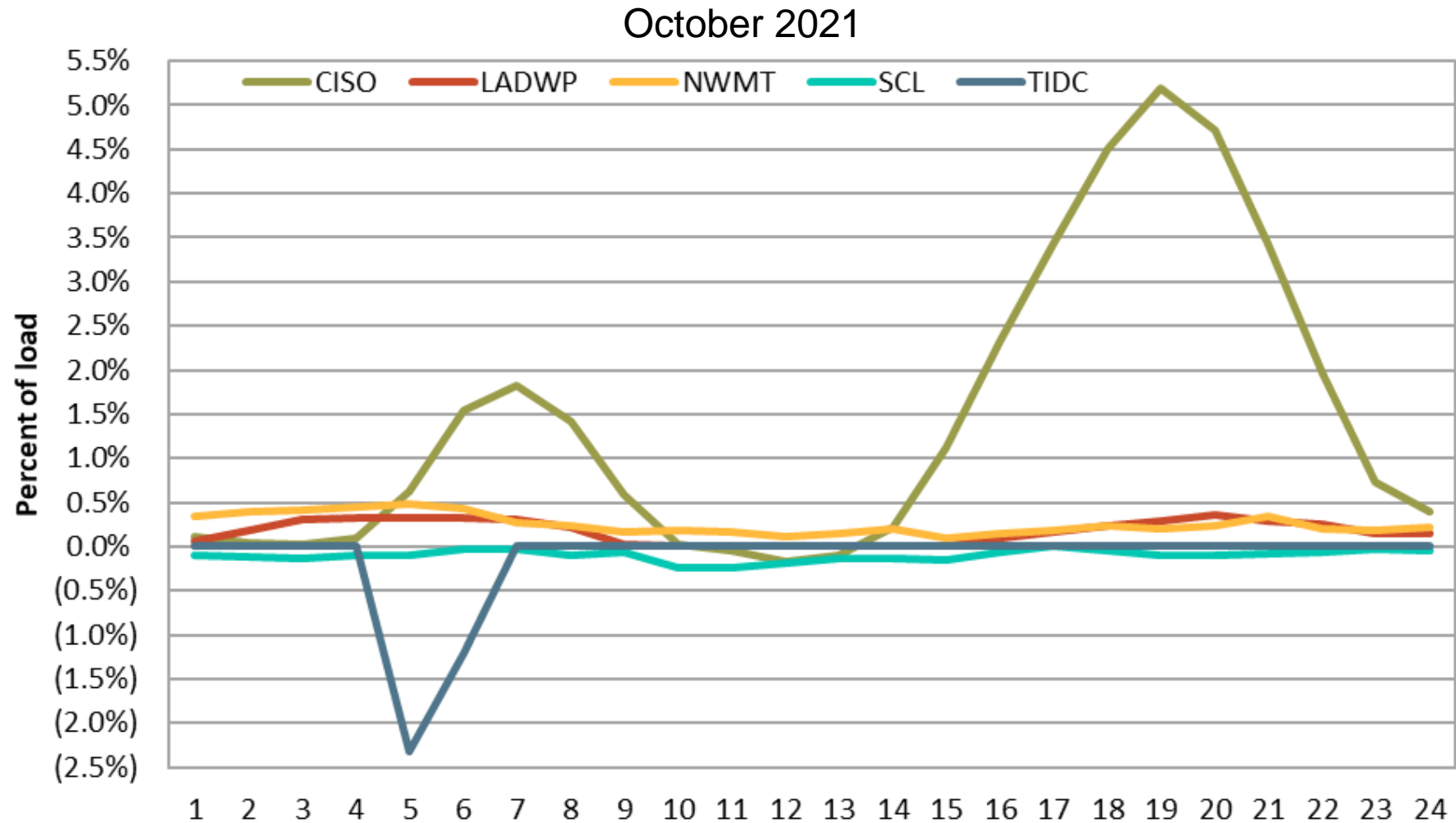
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# Average ISO hour-ahead and 15-minute market imbalance conformance



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# Average hourly 15-minute market imbalance conformance as a percent of load



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# Summary metrics

# Frequency of upward capacity test failures

(Number of 15-minute intervals)

Arizona PS	—	—	—	—	9	5	10	—	—	8	—	5	8	5	—	
BANC	1	—	2	1	—	—	—	3	—	—	—	7	—	1	—	
California ISO	—	—	—	—	—	—	—	—	—	—	4	6	1	5	—	
Idaho Power	—	—	—	—	—	—	—	—	—	—	—	13	25	3	—	
LADWP	[REDACTED]								—	—	2	—	—	—	8	
NorthWestern	[REDACTED]								[REDACTED]			9	36	18	6	253
NV Energy	—	—	3	6	—	—	9	—	1	14	22	15	6	7	8	
PacifiCorp East	—	—	—	4	—	—	—	—	—	—	10	9	4	6	4	
PacifiCorp West	—	—	—	4	—	—	—	2	—	1	4	7	2	3	2	
Portland GE	—	—	—	—	—	—	4	—	11	—	21	25	30	41	13	
Powerex	—	2	2	3	—	4	1	—	—	—	1	1	—	2	15	
PSC New Mexico	[REDACTED]								—	—	—	11	—	5	—	
Puget Sound En	—	—	—	—	—	—	2	17	29	18	45	16	21	17	29	
Salt River Proj.	—	—	3	2	—	—	215	—	2	4	19	90	76	56	3	
Seattle City Light	2	—	—	—	—	—	—	—	—	—	—	—	1	14	4	
Turlock ID	[REDACTED]								—	—	1	—	—	33	22	46
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
	2020					2021										

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# Average shortfall of upward capacity test failures (MW)

Arizona PS	—	—	—	—	1387	2325	1443	—	—	48	—	92	45	97	—	
BANC	3	—	20	5	—	—	—	13	—	—	—	53	—	6	—	
California ISO	—	—	—	—	—	—	—	—	—	—	405	601	274	125	—	
Idaho Power	—	—	—	—	—	—	—	—	—	—	—	17	34	6	—	
LADWP	[REDACTED]								—	—	46	—	—	—	95	
NorthWestern	[REDACTED]								—	—	—	25	24	61	9	38
NV Energy	—	—	23	15	—	—	26	—	15	27	82	55	25	42	57	
PacifiCorp East	—	—	—	1214	—	—	—	—	—	—	73	40	38	63	79	
PacifiCorp West	—	—	—	2228	—	—	—	12	—	4	10	26	16	36	2	
Portland GE	—	—	—	—	—	—	268	—	42	—	34	46	36	38	31	
Powerex	—	85	79	258	—	41	32	—	—	—	63	3	—	22	78	
PSC New Mexico	[REDACTED]								—	—	—	129	—	57	—	
Puget Sound En	—	—	—	—	—	—	21	68	28	49	50	58	74	46	33	
Salt River Proj.	—	—	26	72	—	—	54	—	25	38	30	75	121	74	27	
Seattle City Light	2	—	—	—	—	—	—	—	—	—	—	—	4	151	53	
Turlock ID	[REDACTED]								—	—	1	—	—	7	7	8
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
	2020					2021										

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# Frequency of upward flex ramp sufficiency test failures

(Number of 15-minute intervals)

Arizona PS	—	10	24	19	19	15	13	7	—	19	—	1	—	7	—	
BANC	7	1	4	—	4	—	—	—	—	—	—	—	—	—	—	
California ISO	32	14	13	14	—	—	—	—	—	—	1	10	3	11	—	
Idaho Power	5	—	—	—	—	—	4	—	—	—	—	—	—	—	—	
LADWP									1	3	—	4	—	—	1	
NorthWestern											18	108	20	46	247	
NV Energy	212	74	41	24	—	4	13	11	12	20	27	12	15	4	8	
PacifiCorp East	5	2	14	1	—	4	2	4	4	1	2	1	—	4	—	
PacifiCorp West	4	4	3	1	3	1	5	3	4	1	—	1	2	—	—	
Portland GE	5	17	3	3	5	10	15	3	7	7	8	14	5	—	1	
Powerex	4	10	4	16	7	7	4	4	4	—	4	15	—	—	7	
PSC New Mexico									11	1	3	15	—	2	—	
Puget Sound En	12	—	5	—	—	—	—	—	—	4	2	1	1	—	—	
Salt River Proj.	54	33	49	25	8	5	192	8	15	6	26	57	49	24	5	
Seattle City Light	—	2	5	5	4	—	—	—	—	—	—	1	—	4	—	
Turlock ID									—	—	9	—	—	—	2	5
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
	2020					2021										

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# Average shortfall of upward flex ramp sufficiency test failures (MW)

Arizona PS	—	232	56	60	716	913	1140	57	—	33	—	38	—	42	—		
BANC	52	8	15	—	18	—	—	—	—	—	—	—	—	—	—		
California ISO	710	1031	872	516	—	—	—	—	—	—	404	585	400	735	—		
Idaho Power	19	—	—	—	—	—	8	—	—	—	—	—	—	—	—		
LADWP										32	59	—	70	—	—	10	
NorthWestern													45	36	18	25	31
NV Energy	77	94	82	99	—	87	56	59	60	47	39	45	36	94	82		
PacifiCorp East	33	95	64	20	—	62	26	61	67	47	53	44	—	21	—		
PacifiCorp West	74	38	58	17	15	27	20	21	18	8	—	2	33	—	—		
Portland GE	20	20	11	31	27	30	33	77	105	20	36	33	19	—	11		
Powerex	664	48	64	115	65	82	64	26	69	—	137	111	—	—	50		
PSC New Mexico										21	58	19	112	—	47	—	
Puget Sound En	31	—	27	—	—	—	—	—	—	47	24	6	24	—	—		
Salt River Proj.	69	46	56	49	52	20	64	27	75	27	69	61	53	50	32		
Seattle City Light	—	10	9	6	4	—	—	—	—	—	—	7	—	14	—		
Turlock ID									—	—	6	—	—	—	2	18	
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct		
	2020					2021											

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# Frequency of downward capacity test failures

(Number of 15-minute intervals)

Arizona PS	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
BANC	—	—	4	4	—	—	1	2	—	—	—	—	—	—	—
California ISO	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Idaho Power	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
LADWP	[Greyed out]								—	—	2	—	—	—	5
NorthWestern	[Greyed out]								—	—	—	—	—	—	29
NV Energy	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
PacifiCorp East	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PacifiCorp West	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Portland GE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Powerex	1	—	1	—	—	—	—	—	1	—	8	3	—	24	9
PSC New Mexico	[Greyed out]								—	—	—	—	—	—	7
Puget Sound En	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Salt River Proj.	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—
Seattle City Light	—	—	—	—	—	—	—	—	—	—	—	1	1	1	—
Turlock ID	[Greyed out]							—	—	8	6	1	6	5	20
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	2020					2021									

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# Average shortfall of downward capacity test failures (MW)

Arizona PS	—	—	—	—	—	—	—	—	—	8	—	—	—	—	—	
BANC	—	—	831	341	—	—	1	6	—	—	—	—	—	—	—	
California ISO	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Idaho Power	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
LADWP	[REDACTED]								—	—	16	—	—	—	30	
NorthWestern	[REDACTED]								—	—	—	—	—	—	55	
NV Energy	—	—	—	—	—	—	—	—	—	—	26	—	—	—	—	
PacifiCorp East	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
PacifiCorp West	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Portland GE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Powerex	29	—	13	—	—	—	—	—	8	—	350	33	—	144	51	
PSC New Mexico	[REDACTED]								—	—	—	—	—	—	22	
Puget Sound En	—	—	—	—	—	—	—	—	—	—	—	—	—	—	33	
Salt River Proj.	—	—	—	—	—	—	—	—	11	—	29	—	—	—	—	
Seattle City Light	—	—	—	—	—	—	—	—	—	—	—	8	8	5	—	
Turlock ID	[REDACTED]								—	—	4	4	3	8	2	5
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
	2020					2021										

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# Frequency of downward flex ramp sufficiency test failures

(Number of 15-minute intervals)

Arizona PS	—	4	57	27	75	64	61	129	55	8	4	—	4	2	3
BANC	—	—	4	8	—	—	17	10	—	—	—	—	—	—	—
California ISO	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Idaho Power	—	—	1	1	—	—	—	—	—	1	—	—	—	—	—
LADWP	[REDACTED]								—	—	2	—	—	—	2
NorthWestern	[REDACTED]										10	18	11	33	68
NV Energy	24	64	16	39	32	6	163	42	15	127	58	88	74	48	34
PacifiCorp East	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
PacifiCorp West	—	—	—	—	—	—	—	2	—	—	4	—	—	—	—
Portland GE	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Powerex	2	2	2	—	—	12	—	42	6	27	36	12	6	29	12
PSC New Mexico	[REDACTED]								39	—	1	—	—	4	11
Puget Sound En	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Salt River Proj.	1	3	3	5	23	33	43	35	5	2	5	—	2	1	2
Seattle City Light	5	5	3	2	4	—	—	—	—	—	—	6	—	—	—
Turlock ID	[REDACTED]							3	4	16	—	—	1	—	18
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	2020					2021									

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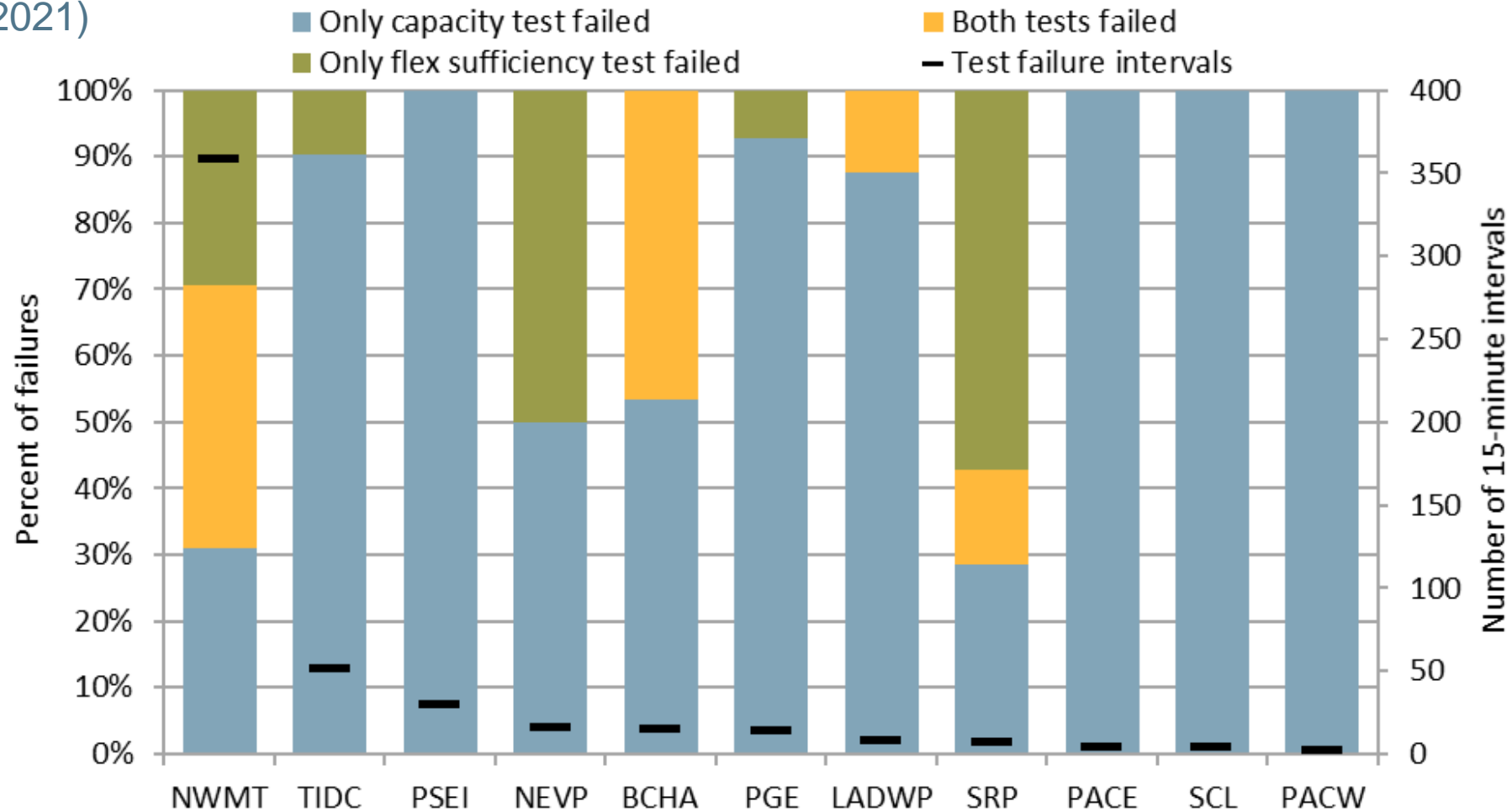
# Average shortfall of downward flex ramp sufficiency test failures (MW)

Arizona PS	—	36	73	44	55	63	94	52	73	38	26	—	50	27	36	
BANC	—	—	63	98	—	—	16	13	—	—	—	—	—	—	—	
California ISO	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Idaho Power	—	—	5	10	—	—	—	—	—	9	—	—	—	—	—	
LADWP	[REDACTED]								—	—	14	—	—	—	5	
NorthWestern	[REDACTED]								[REDACTED]			259	14	29	17	25
NV Energy	71	87	30	31	32	150	49	56	64	74	65	141	70	83	39	
PacifiCorp East	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
PacifiCorp West	—	—	—	—	—	—	—	9	—	—	140	—	—	—	—	
Portland GE	—	—	—	—	—	10	—	—	—	—	—	—	—	—	—	
Powerex	54	47	71	—	—	95	—	64	26	38	199	83	44	121	101	
PSC New Mexico	[REDACTED]								124	—	12	—	—	102	56	
Puget Sound En	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Salt River Proj.	118	92	58	26	33	57	45	55	47	65	44	—	25	100	22	
Seattle City Light	8	7	25	20	88	—	—	—	—	—	—	2	—	—	—	
Turlock ID	[REDACTED]							2	6	7	—	—	4	—	16	
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
	2020					2021										

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# Upward capacity/flex ramp sufficiency test failure intervals by concurrence

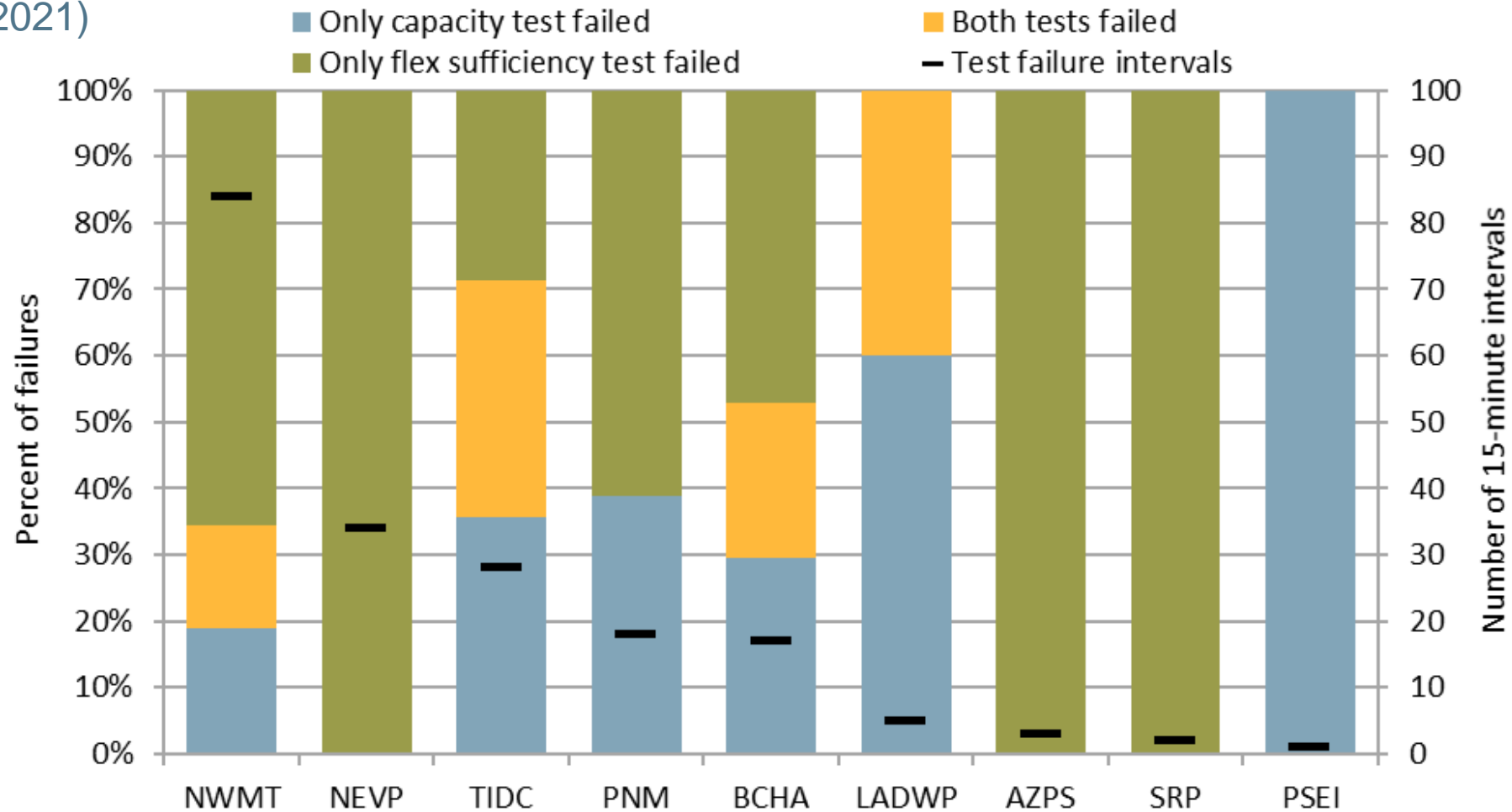
(October, 2021)



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# Downward capacity/flex ramp sufficiency test failure intervals by concurrence

(October, 2021)



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# Additional capacity test failures with implemented uncertainty

(Number of 15-minute intervals)

Arizona PS	—	3	7	2	—	—	—	—	—	—
BANC	—	3	—	1	—	—	—	—	—	—
California ISO	3	2	1	5	—	—	—	—	—	—
Idaho Power	—	13	21	3	—	—	—	—	—	—
LADWP	—	—	—	—	—	—	—	—	—	2
NorthWestern	4	30	12	6	192	—	—	—	—	15
NV Energy	3	9	6	5	6	—	—	—	—	—
PacifiCorp East	7	9	4	4	4	—	—	—	—	—
PacifiCorp West	4	7	2	2	2	—	—	—	—	—
Portland GE	17	20	25	34	13	—	—	—	—	—
Powerex	1	1	—	2	9	4	3	—	4	5
PSC New Mexico	—	3	—	2	—	—	—	—	—	7
Puget Sound En	7	8	10	8	19	—	—	—	—	1
Salt River Proj.	8	49	19	32	3	—	—	—	—	—
Seattle City Light	—	—	1	6	—	—	—	—	1	—
Turlock ID	—	—	9	10	18	4	—	1	2	3
	Jun*	Jul	Aug	Sep	Oct	Jun*	Jul	Aug	Sep	Oct
	Upward capacity test					Downward capacity test				

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# Additional capacity test failures with implemented uncertainty excluding sufficiency test failures (Number of 15-minute intervals)

Arizona PS	—	3	7	2	—	—	—	—	—	—
BANC	—	3	—	1	—	—	—	—	—	—
California ISO	3	2	—	2	—	—	—	—	—	—
Idaho Power	—	13	21	3	—	—	—	—	—	—
LADWP	—	—	—	—	—	—	—	—	—	2
NorthWestern	2	9	9	—	105	—	—	—	—	13
NV Energy	2	9	6	5	6	—	—	—	—	—
PacifiCorp East	7	8	4	4	4	—	—	—	—	—
PacifiCorp West	4	6	2	2	2	—	—	—	—	—
Portland GE	17	19	25	34	13	—	—	—	—	—
Powerex	1	1	—	2	6	3	1	—	2	4
PSC New Mexico	—	1	—	2	—	—	—	—	—	7
Puget Sound En	7	8	10	8	19	—	—	—	—	1
Salt River Proj.	5	34	15	27	2	—	—	—	—	—
Seattle City Light	—	—	1	3	—	—	—	—	1	—
Turlock ID	—	—	9	10	18	4	—	1	2	1
	Jun*	Jul	Aug	Sep	Oct	Jun*	Jul	Aug	Sep	Oct
	Upward capacity test					Downward capacity test				

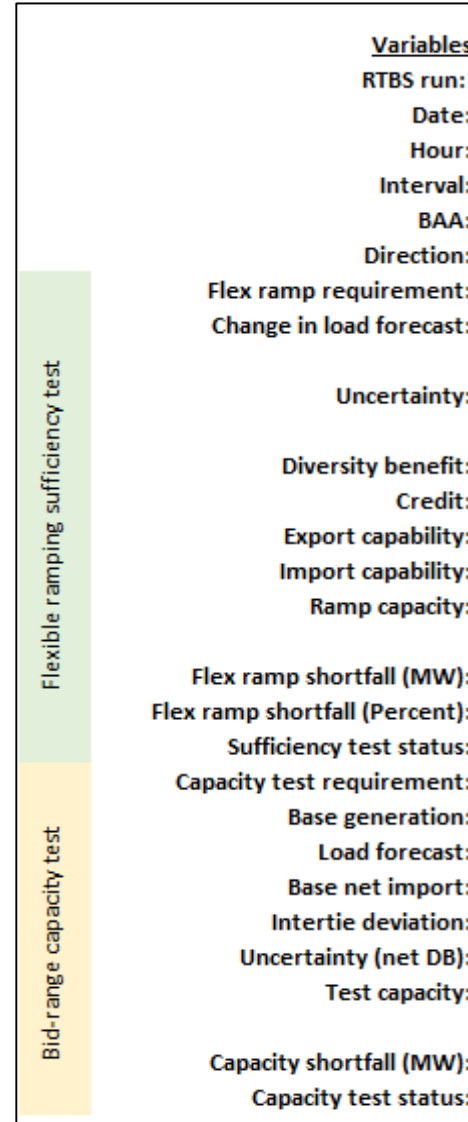
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# Underlying data

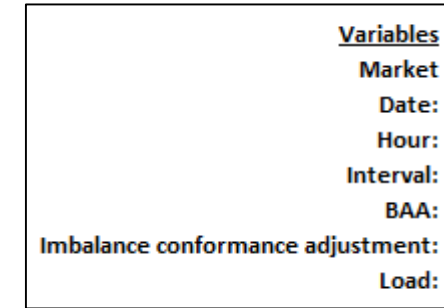
- Release of Excel files
  - July through September 2021

- (1) RSE components and outcomes
- (2) Imbalance conformance adjustments
- (3) EIM transfers and import limits during RSE failure

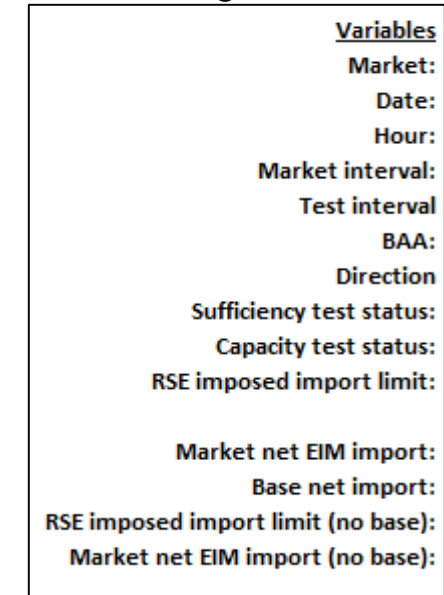
## (1) RSE components and outcomes



## (2) Imbalance conformance adjustments



## (3) EIM transfers and import limits during RSE failure



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# Underlying data

Data is currently available on DMM's website:

<http://www.caiso.com/market/Pages/MarketMonitoring/MarketMonitoringReportsPresentations/Default.aspx>

Inside *2021 Energy Imbalance Market resource sufficiency evaluation reports for September 2021*:

1. <http://www.caiso.com/Documents/Data-RSE-Components-and-Outcomes-for-July-September-2021.xlsx>
2. <http://www.caiso.com/Documents/Data-Imbalance-Conformance-Adjustments-for-July-September-2021.xlsx>
3. <http://www.caiso.com/Documents/Data-EIM-Transfers-and-Import-Limits-During-RSE-Failure-for-July-September-2021.xlsx>



Energy Imbalance Market resource sufficiency evaluation reports

- 2021 Energy Imbalance Market resource sufficiency evaluation reports
  - October 2021
    - Report - Resource Sufficiency Evaluation in the Energy Imbalance Market for October 2021 - Nov 12, 2021
  - September 2021
    - Report - Resource Sufficiency Evaluation in the Energy Imbalance Market for September 2021 - Oct 14, 2021
    - Data - Resource Sufficiency Evaluation Components and Outcomes for July-September 2021
    - Data - Imbalance Conformance Adjustments for July-September 2021
    - Data - EIM Transfers and Import Limits During Resource Sufficiency Evaluation Failure for July-September 2021

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Comments and questions to [DMM@caiso.com](mailto:DMM@caiso.com)