



Market Disruption Report June 16, 2019 to July 15, 2019

August 15, 2019

CAISO Market Quality and Renewable Integration

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I. Background

A Market Disruption is an action or event that causes a failure of a CAISO Market, related to system operation issues or System Emergencies.¹ Pursuant to Section 7.7.6 of the CAISO Tariff, the California Independent System Operator Corporation (ISO or CAISO) can take one or more of a number of specified actions in the event of a Market Disruption, to prevent a Market Disruption, or to minimize the extent of a Market Disruption. The CAISO reports Market Disruption occurrence in any of the following circumstances:

- When any of the CAISO market processes fail to publish, including the Integrated Forward Market (IFM), Residual Unit Commitment (RUC), the Real-Time Market, which includes the Hour-Ahead Scheduling Process (HASP), Fifteen Minute Market (FMM), and the Real-Time Dispatch (RTD) processes;
- When the CAISO manually overrides the closing of the Day-Ahead Market; or
- Any time that the CAISO removes Bids from a CAISO Market to prevent a Market Disruption or to minimize the extent of a Market Disruption.

The Market Disruption report contains the following information:

- The frequency and types of actions taken by the CAISO pursuant to Section 7.7.6;
- The nature of the Market Disruptions that caused the CAISO to take action, or the Market Disruptions that were successfully prevented or minimized by the CAISO as a result of taking action, and the CAISO's rationale for taking such actions pursuant to Section 7.7.6;
- Information about the Bids (including Self-Schedules) removed pursuant to Section 7.7.6 (*i.e.*, megawatt quantity, point of interconnection, specification of the Day-Ahead versus Real-Time Bid, and Energy or Ancillary Services Bid); and
- The CAISO's rationale for its removal of Bids (including Self-Schedules) pursuant to Section 7.7.6.²

¹ Section 7.6 and 7.7 of the CAISO Tariff refer to these system operation issues or System Emergencies, respectively. CAISO Tariff, Appendix A, definition of Market Disruption. Capitalized terms not otherwise defined herein have the meanings set forth in the CAISO Tariff.

² *Id.* at P 29 & n.29.

II. Report on Market Disruptions Occurring from June 16, 2019 through July 15, 2019

The CAISO’s report on Market Disruptions that occurred from June 16, 2019 through July 15, 2019, is provided in Table 1 and Attachment A below. Attachment A includes an entry for each reportable Market Disruption event and each indicates:

- (1) The date of the Market Disruption;
- (2) The hour and Dispatch Interval when the Market Disruption ended;
- (3) The type of CAISO Market in which the Market Disruption occurred; and
- (4) A description of the nature of the Market Disruption, the nature of any actions taken by the CAISO, the rationale for such actions, and the Market Disruption prevented or minimized as a result of taking such actions.

For each of the CAISO Markets, Table 1 lists the number of Market Disruptions and the number of times that the CAISO removed Bids (including Self-Schedules) during the time period covered by this report. As shown in Table 1, there were a total of 101 Market Disruptions for the reporting period. Table 1 also indicates that the CAISO did not remove any Bids (including Self-Schedules) in any of its markets during the reporting period.

Table 1: Summary of Market Disruption Report

Type of CAISO Market	Market Disruption or Reportable Events	Removal of Bids (including Self-Schedules)
Day-Ahead		
IFM	0	0
RUC	0	0
Real-Time		
Fifteen Minute Market Interval 1	5	0
Fifteen Minute Market Interval 2	3	0
Fifteen Minute Market Interval 3	3	0
Fifteen Minute Market Interval 4	4	0
Real-Time Dispatch	86	0

Table 1 above shows the market disruptions in the real time market in order to incorporate the FMM binding intervals.

The frequency of RTD failures increased from 48 to 86 in comparison to the report for the period of May 16, 2019 through June 15, 2019. RTD failures accounted for approximately 85 percent of all of the Market Disruptions during this reporting period.

Planned Maintenance occurred on June 20th, June 26th, and from July 10th to July 11th. On June 20th there were 4 (3 RTD, 1 FMM) disruptions and on June 26th there were 5 (3 RTD, 2 FMM) disruptions due to IFM/RTN patching. From July 10th to July 11th there were 5 (4 RTD, 1 FMM) disruptions due to database maintenance.

On July 10th there were 11 RTD disruptions due to a data issue.

Market Disruption for Unique Pricing Feature

The CAISO implemented a feature to ensure unique pricing under a degenerate condition in November 2015, which was implemented along with other pricing enhancements to improve market efficiency. This feature was effective until August 14, 2018. On this day, the real-time five-minute market application failed to produce an optimal dispatch in a reasonable time and the unique pricing feature was disabled to obtain a valid solution. The problem associated with this feature propagated to the day-ahead market on August 21, 2018, and the fifteen-minute market on August 26, 2018.

Table 2 captured below shows the dates and market in which the pricing feature was disabled between June 16, 2019 until July 15, 2019. The uniqueness feature was enabled for all other intervals across all the markets for the timeframe captured in this report.

Table 2: Status of Unique Pricing Feature across Various Markets

Date	Market	Number of Intervals
6/19/2019	RTD	4
6/20/2019	RTD	29
6/21/2019	RTD	18
6/22/2019	RTD	5
6/23/2019	RTD	3
6/24/2019	RTD	5
6/25/2019	RTD	10
6/26/2019	RTD	1
7/3/2019	RTD	1
7/10/2019	RTD	2
7/12/2019	RTD	2
7/13/2019	RTD	1
7/15/2019	RTD	3

ATTACHMENT A

**California Independent System Operator Corporation
Market Disruption Report
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Table 3: Market Disruptions, Nature of Actions Taken by the CAISO, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
1	6/19/2019	16	1	RTD	RTD results were blocked and previous solution used.
2	6/20/2019	16	1	FMM	FMM did not run due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
3	6/20/2019	15	7	RTD	RTD did not run due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
4	6/20/2019	15	8	RTD	RTD did not run due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
5	6/20/2019	15	9	RTD	RTD did not run due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
6	6/20/2019	16	5	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
7	6/20/2019	16	6	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
8	6/20/2019	16	8	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
9	6/20/2019	16	9	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
10	6/20/2019	16	10	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
11	6/20/2019	17	2	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
12	6/20/2019	17	8	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
13	6/20/2019	17	9	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
14	6/20/2019	17	10	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
15	6/20/2019	18	4	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
16	6/20/2019	18	9	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
17	6/20/2019	18	10	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
18	6/26/2019	16	1	FMM	FMM did not run due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
19	6/26/2019	16	2	HASP	HASP did not run due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
20	6/26/2019	15	7	RTD	RTD Broadcast failed due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
21	6/26/2019	15	8	RTD	RTD did not run due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
22	6/26/2019	15	9	RTD	RTD did not run due to patch related system issues. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
23	6/29/2019	11	3	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
24	6/29/2019	11	4	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
25	6/29/2019	12	3	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
26	6/29/2019	12	4	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
27	6/29/2019	13	1	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
28	6/29/2019	13	4	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
29	6/29/2019	12	2	HASP	HASP did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
30	6/29/2019	13	2	HASP	HASP did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
31	6/29/2019	11	10	RTD	RTD failed due to application problem.
32	6/29/2019	11	11	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
33	6/29/2019	11	12	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
34	6/29/2019	12	1	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
35	6/29/2019	12	2	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
36	6/29/2019	12	3	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
37	6/29/2019	12	4	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
38	6/29/2019	12	5	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
39	6/29/2019	12	6	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
40	6/29/2019	12	7	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
41	6/29/2019	12	8	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
42	6/29/2019	12	9	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
43	6/29/2019	12	10	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
44	6/29/2019	12	11	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
45	6/29/2019	12	12	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
46	6/29/2019	13	1	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
47	6/29/2019	13	2	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
48	6/29/2019	13	3	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
49	6/29/2019	13	4	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
50	6/29/2019	13	5	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
51	6/29/2019	13	6	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
52	6/29/2019	13	7	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
53	6/29/2019	13	8	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
54	6/30/2019	1	1	RTD	RTD results were blocked and previous solution used.
55	7/3/2019	13	1	RTD	RTD results were blocked and previous solution used.
56	7/4/2019	14	3	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
57	7/4/2019	13	10	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
58	7/4/2019	13	11	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
59	7/4/2019	13	12	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
60	7/4/2019	14	1	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
61	7/4/2019	14	2	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
62	7/4/2019	14	3	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
63	7/4/2019	14	4	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
64	7/4/2019	15	12	RTD	RTD results were blocked and previous solution used.
65	7/4/2019	19	4	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
66	7/4/2019	19	5	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
67	7/4/2019	19	6	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
68	7/4/2019	19	7	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
69	7/4/2019	20	2	RTD	RTD failed due to application time-out. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
70	7/4/2019	20	6	RTD	RTD Broadcast failed. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
71	7/4/2019	20	7	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
72	7/6/2019	11	4	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
73	7/6/2019	22	1	RTD	RTD results were blocked and previous solution used.
74	7/6/2019	22	2	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
75	7/6/2019	22	3	RTD	RTD results were blocked and previous solution used.
76	7/6/2019	22	4	RTD	RTD results were blocked and previous solution used.
77	7/7/2019	23	3	RTD	RTD results were blocked and previous solution used.
78	7/10/2019	6	12	RTD	RTD results were blocked and previous solution used.
79	7/10/2019	18	11	RTD	RTD results were blocked and previous solution used.
80	7/10/2019	18	12	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
81	7/10/2019	19	1	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
82	7/10/2019	19	2	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
83	7/10/2019	19	3	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
84	7/10/2019	19	4	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
85	7/10/2019	19	5	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
86	7/10/2019	19	6	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
87	7/10/2019	19	7	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
88	7/10/2019	19	8	RTD	RTD results were blocked and previous solution used. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
89	7/10/2019	19	9	RTD	RTD failed due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
90	7/10/2019	19	10	RTD	RTD failed due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
91	7/10/2019	24	11	RTD	RTD did not run due to maintenance. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
92	7/10/2019	24	12	RTD	RTD did not run due to maintenance. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
93	7/11/2019	1	1	FMM	FMM did not run due to maintenance. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
94	7/11/2019	1	1	RTD	RTD did not run due to maintenance. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
95	7/11/2019	1	2	RTD	RTD did not run due to maintenance. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
96	7/13/2019	1	1	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
97	7/15/2019	16	1	FMM	FMM did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
98	7/15/2019	12	1	RTD	RTD results were blocked and previous solution used.
99	7/15/2019	15	7	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).
100	7/15/2019	15	8	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Count	Date	Hour	Interval	Market	Nature of Actions, Nature of Market Disruption, Rationale and/or Market Disruption Prevented or Minimized as a Result of such Actions
101	7/15/2019	15	9	RTD	RTD did not run due to application problem. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j).

Notes:					
Integrated Forward Market (IFM): The Day-Ahead Market run in which the CAISO conducts the market for purchases and sales of Energy for all hours of the next Trading Day based on submitted supply and demand bids, and performs the procurement of Ancillary Services.					
Residual Unit Commitment (RUC): The Day-Ahead Market run in which the CAISO conducts unit commitment of additional resources based on submitted availability bids and the forecast of demand for every hour of the next Trading Day.					
Fifteen Minute Market (FMM) Interval 1: The first of a series of four market runs conducted every Trading Hour in advance of the Operating Hour. In this run the CAISO conducts the Market Power Mitigation for submitted Bids, which applies to all of the Real-Time Market processes for the given Trading Hour. In this interval the CAISO also conducts the procurement of incremental Ancillary Services from internal resources and dynamic external resources.					
Fifteen Minute Market (FMM) Interval 2: The second of a series of four market runs conducted every Trading Hour in advance of the Operating Hour during which the CAISO conducts the HASP. In the HASP, the CAISO conducts the procurement and sale of Energy and Ancillary services from non-dynamic System Resources based on submitted Bids and the CAISO Forecast of CAISO Demand. In this interval the CAISO also conducts the advisory procurement of incremental Ancillary Services from internal resources and dynamic external resources from T to T+60 minutes and procurement for the given Trading Hour.					
Fifteen Minute Market (FMM) Interval 3: The third of a series of four market runs conducted every Trading Hour. During this interval the CAISO conducts the commitment of internal Short-Start and Fast Start Units for the Time Horizon of T-30 minutes to T+240 minutes. In this interval the CAISO also conducts the procurement of incremental Ancillary Services from internal resources and dynamic external resources for the given Trading Hour.					
Fifteen Minute Market (FMM) Interval 4: The fourth of a series of four market runs conducted every Trading Hour. This interval is for the Fifteen Minute Market for the T-105 minutes to T+60 minutes time horizon. In this interval the CAISO also conducts 15-minute Ancillary Service Awards for non-Hourly System Resources, internal resources and dynamic external resources for the given Trading Hour.					
Real-Time Dispatch (RTD): The five-minute interval of any given Operating Hour during which the CAISO conducts the market for Energy based on submitted bids and the CAISO Forecast of CAISO Demand.					