



Market Disruption Report October 16, 2018 to November 15, 2018

December 17, 2018

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 October 16, 2018 through November 15, 2018

The CAISO’s report on Market Disruptions that occurred from October 16, 2018 through November 15, 2018, 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 46 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	2	0
Fifteen Minute Market Interval 2	1	0
Fifteen Minute Market Interval 3	1	0
Fifteen Minute Market Interval 4	4	0
Real-Time Dispatch	38	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 13 to 38 in comparison to the October 2018 Report. RTD failures accounted for approximately 83 percent of all of the Market Disruptions during this reporting period.

Planned Maintenance occurred on October 17th, October 24th, and October 30th. On October 17th there were 4 (3 RTD, 1 FMM) disruptions, on October 24th there were 7 (4 RTD, 3 FMM) disruptions, and on October 30th there were 3 (2 RTD, 1 FMM) disruptions due to IFM/RTN patching.

On November 7th there was a contingency dispatch due to the loss of generation resulting in 2 (RTD) disruptions. On November 8th there were two contingency dispatches due to the loss of transmission resulting in 4 (RTD) disruptions. On November 9th there was a contingency dispatch due to the loss of generation resulting in 3 (RTD) disruptions.

On November 15th there were application issues following an IFM/RTN patch resulting in 21 (18 RTD, 3 FMM) disruptions.

On October 25th the CAISO delayed the closing of the Day Ahead market until 11:00 due to an issue with bid submission by a scheduling coordinator with a significant generation portfolio.

Market Disruption Related to Implementation of New Bid Adder Functionality

October 31, 2018, during final testing of the new bid adder functionality for the western Energy Imbalance Market (EIM), the CAISO discovered an anomaly that could cause inaccurate dispatch instructions for resources using the CAISO’s non-generator resource generic modeling functionality. The CAISO declared a disruption of the new bid adder functionality to prevent the possibility of inaccurate dispatches. The CAISO corrected the software issue using an emergency patch that went to production at about 13:00 on trade date November 1, 2018 and ended the disruption.

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 October 16, 2018 until November 15, 2018. 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	RTD
10/16/2018	Disabled
10/19/2018	Disabled
10/20/2018	Disabled
10/21/2018	Disabled
10/23/2018	Disabled
10/24/2018	Disabled
10/25/2018	Disabled
10/26/2018	Disabled
10/29/2018	Disabled
10/30/2018	Disabled
10/31/2018	Disabled
11/1/2018	Disabled
11/2/2018	Disabled

Date	RTD
11/5/2018	Disabled
11/6/2018	Disabled
11/7/2018	Disabled
11/9/2018	Disabled
11/11/2018	Disabled
11/14/2018	Disabled
11/15/2018	Disabled

ATTACHMENT A

**California Independent System Operator Corporation
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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	10/17/2018	16	4	FMM	FMM did not run due to patch related system issues. This interval was filled either automatically or interactively. MQS published Pnode clearing and resource awards for this interval.
2	10/17/2018	16	7	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
3	10/17/2018	16	8	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
4	10/17/2018	16	9	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
5	10/18/2018	17	9	RTD	RTD Broadcast failed. Loss clearing payload and LMP filled from previous good interval.
6	10/24/2018	16	4	FMM	FMM did not run due to patch related system issues. This interval was filled either automatically or interactively. MQS published Pnode clearing and resource awards for this interval.

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
7	10/24/2018	16	7	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
8	10/24/2018	16	8	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
9	10/24/2018	16	9	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
10	10/24/2018	16	10	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
11	10/24/2018	17	1	FMM	FMM did not run due to patch related system issues. This interval was filled either automatically or interactively. MQS published Pnode clearing and resource awards for this interval.
12	10/24/2018	17	2	HASP	HASP did not run due to patch related system issues. This interval was filled either automatically or interactively. MQS published Pnode clearing and resource awards for this interval.
13	10/30/2018	15	4	FMM	FMM did not run due to patch related system issues. This interval was filled either automatically or interactively. MQS published Pnode clearing and resource awards for this interval.
14	10/30/2018	15	7	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
15	10/30/2018	15	8	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.

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
16	11/7/2018	23	6	RTD	RTD Broadcast failed due to RTCD run. Loss clearing payload and LMP filled from previous good interval.
17	11/7/2018	23	7	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
18	11/8/2018	17	1	RTD	RTD results were blocked and previous solution used.
19	11/8/2018	19	10	RTD	RTD did not run due to RTCD run. Loss clearing payload and LMP filled from previous good interval.
20	11/8/2018	19	11	RTD	RTD did not run due to RTCD run. Loss clearing payload and LMP filled from previous good interval.
21	11/8/2018	19	12	RTD	RTD did not run due to RTCD run. Loss clearing payload and LMP filled from previous good interval.
22	11/8/2018	20	1	RTD	RTD did not run due to RTCD run. Loss clearing payload and LMP filled from previous good interval.
23	11/9/2018	8	8	RTD	RTD Broadcast failed due to RTCD run. Loss clearing payload and LMP filled from previous good interval.
24	11/9/2018	8	9	RTD	RTD did not run due to RTCD run. Loss clearing payload and LMP filled from previous good interval.
25	11/9/2018	8	10	RTD	RTD did not run due to RTCD run. Loss clearing payload and LMP filled from previous good interval.

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
26	11/15/2018	17	4	FMM	FMM did not run due to application problem. This interval was filled either automatically or interactively. MQS published Pnode clearing and resource awards for this interval.
27	11/15/2018	17	7	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
28	11/15/2018	17	8	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
29	11/15/2018	17	9	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
30	11/15/2018	18	9	RTD	RTD failed due application problem. Loss clearing payload and LMP filled from previous good interval.
31	11/15/2018	18	10	RTD	RTD failed due application problem. Loss clearing payload and LMP filled from previous good interval.
32	11/15/2018	18	11	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
33	11/15/2018	18	12	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
34	11/15/2018	19	1	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
35	11/15/2018	19	1	FMM	FMM failed due to application problem. This interval was filled either automatically or interactively. MQS published Pnode clearing and resource awards for this interval.

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	11/15/2018	19	2	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
37	11/15/2018	19	3	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
38	11/15/2018	19	3	FMM	FMM did not run due to application problem. This interval was filled either automatically or interactively. MQS published Pnode clearing and resource awards for this interval.
39	11/15/2018	19	4	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
40	11/15/2018	19	5	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
41	11/15/2018	19	6	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
42	11/15/2018	19	7	RTD	RTD Broadcast failed. Loss clearing payload and LMP filled from previous good interval.
43	11/15/2018	19	8	RTD	RTD Broadcast failed. Loss clearing payload and LMP filled from previous good interval.
44	11/15/2018	19	9	RTD	RTD Broadcast failed. Loss clearing payload and LMP filled from previous good interval.
45	11/15/2018	19	10	RTD	RTD Broadcast failed. Loss clearing payload and LMP filled from previous good interval.

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
46	11/15/2018	20	2	RTD	RTD Broadcast failed. Loss clearing payload and LMP filled from previous good interval.

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.					