



Market Disruption Report December 16, 2018 to January 15, 2019

February 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 December 16, 2018 through January 15, 2019

The CAISO’s report on Market Disruptions that occurred from November 16, 2018 through December 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 65 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	4	0
Fifteen Minute Market Interval 2	5	0
Fifteen Minute Market Interval 3	3	0
Fifteen Minute Market Interval 4	8	0
Real-Time Dispatch	45	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 24 to 45 in comparison to the December 2018 Report. RTD failures accounted for approximately 69 percent of all of the Market Disruptions during this reporting period.

Planned Maintenance occurred on December 17th, December 19th, December 27th, January 8th, and January 10th. On December 19th there were 4 (3 RTD, 1 FMM) disruptions and on December 27th there were 4 (3 RTD, 1 FMM) disruptions due to IFM/RTN patching. On January 8th there were 3 (2 RTD, 1 FMM) disruptions and on January 10th there were 3 (2 RTD, 1 FMM) disruptions due to IFM/RTN patching. On December 17th there were 7 (5 RTD, 2 FMM) disruptions due to IFM/RTN fall forward.

On January 1st there were 30 (23 RTD, 7 FMM) disruptions due to application communication issues. On January 2nd there were 10 (7 RTD, 3 FMM) disruptions due to emergency maintenance for market applications.

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 December 16, 2018 until January 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
12/16/2018	RTD	2
12/19/2018	RTD	1
12/22/2018	RTD	1
12/24/2018	RTD	1
12/28/2018	RTD	1
1/2/2019	RTD	7
1/3/2019	RTD	9
1/4/2019	RTD	2
1/7/2019	RTD	7
1/8/2019	RTD	4
1/9/2019	RTD	1
1/10/2019	RTD	3
1/11/2019	RTD	1

ATTACHMENT A

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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	12/17/2018	14	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.
2	12/17/2018	14	7	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
3	12/17/2018	14	8	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
4	12/17/2018	14	9	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
5	12/17/2018	14	10	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
6	12/17/2018	14	11	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
7	12/17/2018	15	1	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.

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	12/19/2018	14	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.
9	12/19/2018	14	7	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
10	12/19/2018	14	8	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
11	12/19/2018	14	9	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
12	12/27/2018	14	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.
13	12/27/2018	14	7	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
14	12/27/2018	14	8	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
15	12/27/2018	14	9	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
16	12/30/2018	20	1	DSTUC	DSTUC 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.

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
17	12/30/2018	20	2	HASP	HASP 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.
18	1/1/2019	22	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.
19	1/1/2019	22	5	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
20	1/1/2019	22	6	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
21	1/1/2019	22	7	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
22	1/1/2019	22	8	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
23	1/1/2019	22	9	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
24	1/1/2019	22	10	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
25	1/1/2019	22	11	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
26	1/1/2019	22	12	RTD	RTD did not run due to application problem. 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
27	1/1/2019	23	1	DSTUC	DSTUC 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.
28	1/1/2019	23	1	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
29	1/1/2019	23	1	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.
30	1/1/2019	23	2	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
31	1/1/2019	23	2	HASP	HASP 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.
32	1/1/2019	23	3	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
33	1/1/2019	23	4	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
34	1/1/2019	23	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.
35	1/1/2019	23	5	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
36	1/1/2019	23	6	RTD	RTD did not run due to application problem. Admin pricing rule was applied to 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
37	1/1/2019	23	7	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
38	1/1/2019	23	8	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
39	1/1/2019	23	9	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
40	1/1/2019	23	10	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
41	1/1/2019	23	11	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
42	1/1/2019	23	12	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
43	1/1/2019	24	1	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
44	1/1/2019	24	1	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.
45	1/1/2019	24	2	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
46	1/1/2019	24	2	HASP	HASP 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.

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
47	1/1/2019	24	3	RTD	RTD did not run due to application problem. Admin pricing rule was applied to this interval.
48	1/2/2019	1	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.
49	1/2/2019	1	7	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
50	1/2/2019	1	8	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
51	1/2/2019	1	9	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
52	1/2/2019	1	10	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
53	1/2/2019	1	11	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
54	1/2/2019	1	12	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
55	1/2/2019	2	1	RTD	RTD did not run due to application problem. Loss clearing payload and LMP filled from previous good interval.
56	1/2/2019	2	1	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.

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
57	1/2/2019	2	2	HASP	HASP 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.
58	1/8/2019	14	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.
59	1/8/2019	14	8	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
60	1/8/2019	14	9	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
61	1/10/2019	14	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.
62	1/10/2019	14	7	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
63	1/10/2019	14	8	RTD	RTD did not run due to patch related system issues. Loss clearing payload and LMP filled from previous good interval.
64	1/12/2019	17	2	HASP	HASP 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.
65	1/12/2019	17	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.

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.