



Market Disruption Report October 16, 2019 to November 15, 2019

December 16, 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 October 16, 2019 through November 15, 2019

The CAISO’s report on Market Disruptions that occurred from October 16, 2019 through November 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 during the time period covered by this report. As shown in Table 1, there were a total of 51 Market Disruptions for the reporting period.

Table 1: Summary of Market Disruption Report

| Type of CAISO Market | Market Disruption or Reportable Events |
|----------------------------------|---|
| Day-Ahead | |
| IFM | 0 |
| RUC | 0 |
| Real-Time | |
| Fifteen Minute Market Interval 1 | 4 |
| Fifteen Minute Market Interval 2 | 3 |
| Fifteen Minute Market Interval 3 | 0 |
| Fifteen Minute Market Interval 4 | 1 |
| Real-Time Dispatch | 43 |

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 decreased from 67 to 43 in comparison to the report for the period of September 16, 2019 through October 15, 2019. RTD failures accounted for approximately 84 percent of all of the Market Disruptions during this reporting period.

Planned Maintenance occurred on October 21st, October 31st, November 5th, November 11th, and November 13th. On October 21st there were 4 (3 RTD, 1 FMM) disruptions, on October 31st there were 4 (3 RTD, 1 FMM) disruptions, on November 5th there were 2 (RTD) disruptions, on November 11th there were 8 (6 RTD, 2 FMM) disruptions, and on November 13th there were 8 (6 RTD, 2 FMM) disruptions due to IFM/RTN patching.

On October 30th there were 3 (RTD) disruptions due to a contingency dispatch for the loss of generation.

On October 22nd the CAISO made a resource non-participating in FMM and RTD due to market failures. The resource was made non-participating strictly to resolve the FMM and RTD issue and not due to bidding concerns.

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, 2019 until November 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 |
|-------------|---------------|----------------------------|
| 11/7/2019 | RTD | 1 |
| 11/9/2019 | RTD | 1 |
| 11/12/2019 | RTD | 1 |
| 11/13/2019 | RTD | 1 |

ATTACHMENT A

**California Independent System Operator Corporation
Market Disruption Report
December 16, 2019**

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 | 10/17/2019 | 13 | 4 | RTD | RTD results were blocked and previous solution used. |
| 2 | 10/17/2019 | 13 | 5 | RTD | RTD results were blocked and previous solution used. |
| 3 | 10/19/2019 | 18 | 1 | RTD | RTD results were blocked and previous solution used. |
| 4 | 10/19/2019 | 18 | 2 | RTD | RTD results were blocked and previous solution used. |
| 5 | 10/21/2019 | 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). |
| 6 | 10/21/2019 | 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). |
| 7 | 10/21/2019 | 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). |

| 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 | 10/21/2019 | 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). |
| 9 | 10/22/2019 | 11 | 10 | RTD | RTD failed due to application problem. |
| 10 | 10/22/2019 | 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). |
| 11 | 10/22/2019 | 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). |
| 12 | 10/22/2019 | 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). |
| 13 | 10/22/2019 | 12 | 2 | HASP | HASP 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). |
| 14 | 10/22/2019 | 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). |
| 15 | 10/22/2019 | 12 | 4 | FMM | FMM failed due to application problem. |
| 16 | 10/22/2019 | 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). |

| 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 | 10/22/2019 | 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). |
| 18 | 10/22/2019 | 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). |
| 19 | 10/22/2019 | 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). |
| 20 | 10/22/2019 | 18 | 7 | RTD | RTD results were blocked and previous solution used. |
| 21 | 10/23/2019 | 23 | 1 | RTD | RTD results were blocked and previous solution used. |
| 22 | 10/24/2019 | 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). |
| 23 | 10/26/2019 | 5 | 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). |
| 24 | 10/28/2019 | 18 | 9 | RTD | RTD results were blocked and previous solution used. |
| 25 | 10/30/2019 | 21 | 10 | RTD | RTD Broadcast failed due to RTCD. 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 |
|-------|------------|------|----------|--------|--|
| 26 | 10/30/2019 | 21 | 11 | RTD | RTD did not run due to RTCD. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j). |
| 27 | 10/30/2019 | 21 | 12 | RTD | RTD did not run due to RTCD. The market results for this interval were filled based on the tariff sections 7.7.9 and 29.7(j). |
| 28 | 10/31/2019 | 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). |
| 29 | 10/31/2019 | 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). |
| 30 | 10/31/2019 | 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). |
| 31 | 10/31/2019 | 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). |
| 32 | 11/2/2019 | 19 | 4 | RTD | RTD results were blocked and previous solution used. |
| 33 | 11/5/2019 | 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). |
| 34 | 11/5/2019 | 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). |

| 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 |
|-------|------------|------|----------|--------|---|
| 35 | 11/11/2019 | 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). |
| 36 | 11/11/2019 | 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). |
| 37 | 11/11/2019 | 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). |
| 38 | 11/11/2019 | 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). |
| 39 | 11/11/2019 | 15 | 10 | 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). |
| 40 | 11/11/2019 | 15 | 11 | 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). |
| 41 | 11/11/2019 | 15 | 12 | 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). |
| 42 | 11/11/2019 | 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). |
| 43 | 11/13/2019 | 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). |

| 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 |
|-------|------------|------|----------|--------|---|
| 44 | 11/13/2019 | 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). |
| 45 | 11/13/2019 | 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). |
| 46 | 11/13/2019 | 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). |
| 47 | 11/13/2019 | 15 | 10 | 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). |
| 48 | 11/13/2019 | 15 | 11 | 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). |
| 49 | 11/13/2019 | 15 | 12 | 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). |
| 50 | 11/13/2019 | 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). |
| 51 | 11/14/2019 | 1 | 1 | RTD | RTD results were blocked and previous solution used. |

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.

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| 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. |