

AUGUST 2020 CAISO LOAD SHEDDING EVENTS: PRELIMINARY ROOT CAUSE ANALYSIS

Riverside Public Utilities

Board of Public Utilities
January 11, 2021

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BACKGROUND

1. August 14-19, 2020, the western US experienced an extreme heat storm, with temperatures 10-20 degrees above normal.
2. CAISO bulk electric transmission system was already threatened by multiple fires and loss of critical generation units.
3. Ultimately, the CAISO was forced to declare Stage 3 Emergencies at 6:38 PM on 8/14 and 6:28 PM on 8/15 – instituted rolling electricity outages (i.e., load shedding) that impacted multiple CA utilities.

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BACKGROUND

4. RPU is a participating Load Serving Entity (LSE) within the CAISO Balancing Area (BA):
 - a) RPU mandated under NERC and FERC tariffs to follow all CAISO dispatch instructions, including load shedding orders under emergency conditions.
5. Shortly before 7 PM on 8/14, the CAISO called on all BA LSEs to shed a total of 1,000 MW of load:
 - a) RPU specifically had to shed 12.7 MW (for approximately 50 minutes).

BACKGROUND

6. Shortly before 7 PM on 8/15, the CAISO called on the three large IOUs to shed a total of 500 MW of load:
 - a) Fortunately, RPU was not instructed to shed any additional load during this second event.
7. On 8/16, Governor Newsom declared a State of Emergency due to the ongoing heat storm impacting California.
8. On 8/17, Governor Newsom ordered the CAISO, CPUC and CEC (i.e., the joint agencies) to jointly perform a root cause analysis of the factors leading to the rotating outages:
 - a) The joint agencies issued their preliminary findings on October 6.

DISCUSSION

The joint agency (CAISO, CPUC, CEC) Preliminary Root Cause Analysis document provides a detailed analysis of the conditions and events that contributed to the rotating electricity outages on August 14 and 15:

1. A review of Resource Adequacy (RA) and how RA obligations are assigned to jurisdictional LSEs;
2. An overview of the mid-August heat storm event;

DISCUSSION

3. A comprehensive discussion on the various factors contributing to the outages;
4. An overview of the steps taken to mitigate further supply shortfalls (during August 16 through 19); and
5. Several preliminary recommendations for how California can avoid such outages in the future.

DISCUSSION

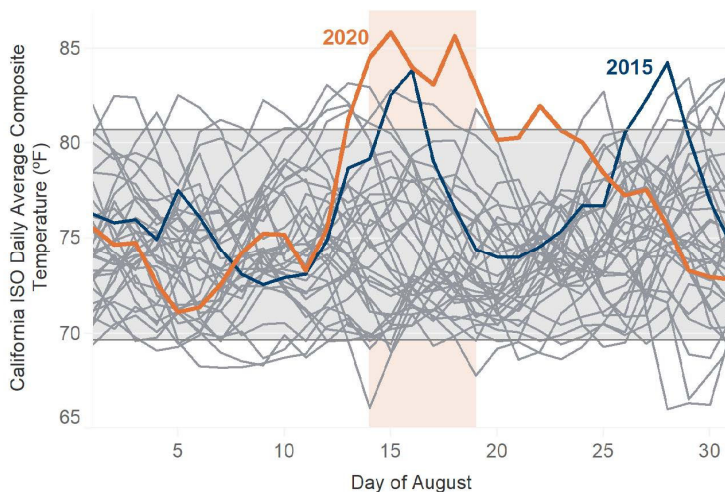
The joint agencies identified three primary factors that contributed to the Stage 3 emergencies:

1. The extreme heat storm across the western United States resulted in the demand for electricity exceeding the existing electricity resource planning targets.

DISCUSSION

2. As California has continued to transition to a grid based on more variable renewable resources, resource planning targets have not kept pace to ensure that there are still enough dispatchable resources that can be relied upon to meet demand in the early evening hours.
3. Some practices in the day-ahead energy market exacerbated the supply challenges under highly stressed conditions.

EXTREME HEAT STORM



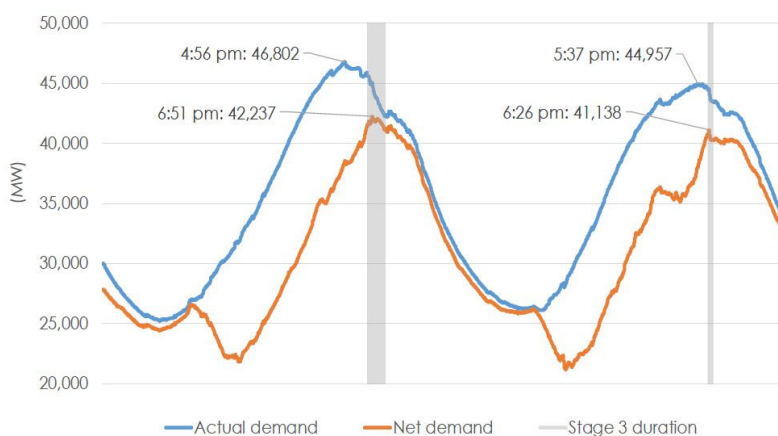
1. Daily average composite August temperatures for 1985 to 2020.
2. Shaded gray region: 90% of all temp patterns
Orange line: August 2020 data.
3. CEC staff have determined that the August 2020 heat storm was a **1-in-35-year** event.



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INSUFFICIENT DISPATCHABLE RESOURCES



1. Net peak demand: defined as peak demand net of all solar and wind generation.
2. Typically occurs one to two hours after system peak demand.
3. Stage 3 Emergency declared when CAISO is unable to meet minimum contingency reserve requirements.



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DAY-AHEAD MARKET ISSUES

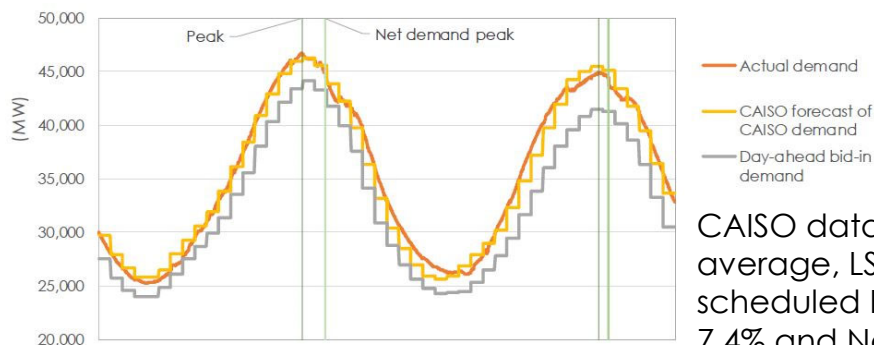
1. Approximately 1,500 MW of forced outages or derates to the natural gas fleet due to the extreme heat.
2. Import constraints caused by the heat storm extending across the broader area of the western United States.
3. Demand Response (DR) resources apparently providing less energy savings than anticipated.

DAY-AHEAD MARKET ISSUES

4. Load under-scheduling in the day-ahead market by some (still to be identified) LSEs.
5. Convergence bidding and residual unit commitment algorithms that partially masked this load under-scheduling issue.

MARKET ISSUE – LOAD UNDERSCHEDULING

8/14 and 8/15 day-ahead bid-in demand, CAISO forecast, and actual demand



CAISO data shows that on average, LSEs under-scheduled Peak demand by 7.4% and Net Peak demand by 6.0% across 8/14 and 8/15.

Day-ahead bid-in demand below actual:

	8/14	8/15
At peak:	3,386	3,434
Time of net demand peak:	1,792	3,219

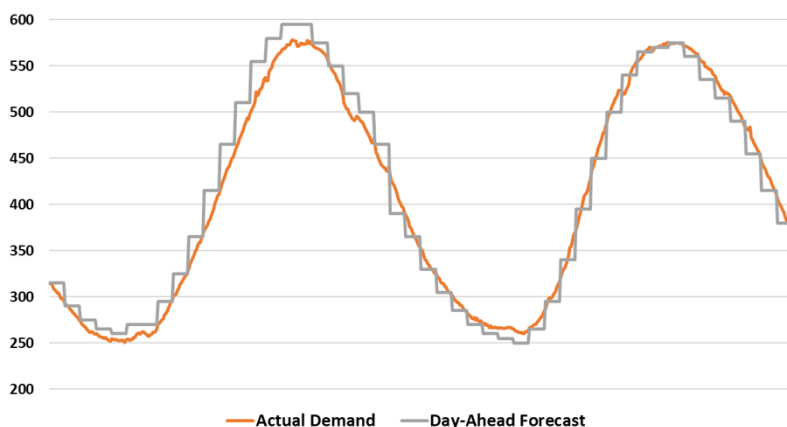
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RPU – LOAD SCHEDULES

8/14 and 8/15 RPU Metered Load and Day-Ahead Forecast (MWh)



1. 8/14: DA forecasts 3.6% higher than actual demand.
2. 8/15: DA forecasts 1.8% lower than actual demand.
3. **RPU did NOT contribute to CAISO load under-scheduling issue.**

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JOINT AGENCY REPORT RECOMMENDATIONS

1. Update future RA targets to better account for heat storms and extreme events, as well as the transitioning generation resource mix in the CAISO BA.
2. Ensure that the generation and storage projects currently under construction in California are completed on time.
3. Expedite the regulatory and procurement processes to develop additional flexible resources that can come online by the summer of 2021.

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JOINT AGENCY REPORT RECOMMENDATIONS

4. Coordinate for additional procurement of flexible resources by non-CPUC jurisdictional entities.
5. Enhance CAISO market practices to ensure that they accurately reflect the actual balance of supply and demand during high stressed operating conditions.

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POTENTIAL RA IMPACTS

% of Nameplate RA value for non-dispatchable Solar and Wind resources:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Solar	4%	3%	18%	15%	16%	31%	39%	27%	14%	2%	2%	0%
Wind	14%	12%	28%	25%	25%	33%	23%	21%	15%	8%	12%	13%

1. The joint agencies already significantly discount the RA credit received for solar and wind resources.
2. Solar resources might be further discounted in future RA proceedings, especially if LSEs must satisfy any new "Net-peak" RA requirements.
3. However, < 5% of RPU's summer 2021 RA credit is associated with Solar & Wind resources.

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POTENTIAL PROCUREMENT MANDATES

1. Long-duration bulk energy storage systems (i.e., NextEra "pumped-hydro" project).
2. New Battery Energy Storage Systems (BESS): either stand-alone or paired with new Solar or Wind projects.
3. Small-scale, behind-the-meter BESS: paired with existing or new customer solar systems.
4. Flexible demand resources, such as Demand Response or load shifting applications or paradigms (including more time-of-use rates).

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CURRENT & FUTURE PROCEEDINGS

1. Joint Agencies report issued on October 6, 2020:
 - a. 10/06 document describes findings of the preliminary investigation.
 - b. Final report due out by end of 2020.
2. CA State Assembly Utilities and Energy Committee Hearing held on October 12, 2020:
 - a. As expected, hearing was very contentious and political.
 - b. Committee to hold a second hearing prior to Summer 2021.

CURRENT & FUTURE PROCEEDINGS

3. Western Electric Coordinating Council webinar held on October 20, 2020:
 - a. Examining multiple western US Balancing Authorities, since multiple BAs declared emergency alerts during August 2020 heat storm event.
 - b. WECC investigation is ongoing.

RECOMMENDATION

That the Board of Public Utilities receive and file this update on the root causes for the August 14 and August 15, 2020 California Independent System Operator ordered load shedding events.