September 9, 2020

MEMORANDUM

TO: Council Members

FROM: Brian Dekiep and Ben Kujala

SUBJECT: What we know about the California rolling blackouts. Initial thoughts on August 2020 challenges with adequacy in California ISO

BACKGROUND:

Presenters: Brian Dekiep; Montana Senior Energy Analyst and Ben Kujala; Power Division Director

Summary: On Friday August 14th through the week starting on Monday, August 17th, the CAISO experienced extremely high temperature and near record load forecasts. This resulting in curtailment of load on the evening of August 14th and 15th. Many factors lead up to this event including: Heavy reliance on import, resource adequacy forecasts not accounting for extreme weather, energy market mechanisms and forced outage of resources. We will go over the circumstances leading up the events and how additional events were mitigated during the week starting Monday, August 17th.

We will also cover the current situation within the Pacific Northwest and how the California events could impact the development of the 2021 NW Power Plan.
What we know about the California rolling blackouts
Initial thoughts on August 2020 challenges with adequacy in California ISO

Functions of the CAISO:

• Transmission
• Energy Markets
• Reliability Coordination
• Planning
Resource Adequacy Planning

- The resource adequacy procurement requirements are set by the California Public Utilities Commission (CPUC), to be based on a 1-in-2 peak forecast, i.e., an average year forecast.
- This forecast is developed by the California Energy Commission (CEC) based on an agreed-upon methodology between the CEC, the CPUC, and the CAISO.
- To account for contingencies such as outages, import variability, load forecast error, and reserve requirements, the program requires utilities to procure a 15% planning reserve margin above the monthly 3 peak load forecast.

Loss of Load Events in California

- CAISO anticipated high loads and temperatures beginning on August 14:
  - Issued an order restricting maintenance operations on August 12,
  - Issued an alert identifying a possible system reserve deficiency on August 13, and a Flex Alert for August 14. (No load curtailment on the 13th)
  - The situation deteriorated on the afternoon of August 14 as well as the 15th, with the unanticipated loss of supply and severe constraints on imports because of a developing, historic west-wide heat wave.
  - The imbalance in supply and demand led to the need to order the utilities to turn off power to their customers in the evenings of August 14th and 15th.
**Restricted Maintenance Operations**: requires generators and transmission operators to postpone any planned outages for routine equipment maintenance, ensuring all grid assets are available for use.

- **Alert** Issued by 3 p.m. the day before anticipated operating reserve deficiencies. The ISO may require additional resources to avoid an emergency.

- **Warning** Indicate that grid operators anticipate using electricity reserves. Activates demand response programs (voluntary load reduction) to decrease overall demand.

- **Stage 1 Emergency** is declared by the ISO Contingency Reserve shortfalls exist or are forecast to occur. Strong need for conservation.

- **Stage 2 Emergency** is declared by the ISO when all mitigating actions have been taken and the ISO is no longer able to provide for its expected energy requirements. Requires ISO intervention in the market, such as ordering power plants online.

- **Stage 3 Emergency** is declared by the ISO when unable to meet minimum contingency reserve requirements, and load interruption is imminent or in progress. Notice issued to utilities of potential electricity interruptions through firm load shedding.

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**California Flex Alert**

**Use fans when possible**

- Limit time the refrigerator door is open

**California ISO**

For more information, visit FlexAlert.org or call 760-396-9800.

**Conservation needed earlier today; Flex Alert issued for 2 to 9 p.m.**

Grid operators urge consumers to continue doing their part to keep power on.

- Use fans when possible
- Limit time the refrigerator door is open

**California Flex Alert** is triggered when the electricity grid is experiencing high projected demands or when system operators need to conserve energy reserves to meet system needs.

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Sequence of events Friday August 14

12:00 p.m. Unable to secure additional energy, a Warning was issued effective 12:00 p.m. through midnight

2:56 p.m. Loss of generation – 475 MW
2:58 p.m. Dispatched contingency reserves to recover

3:20 p.m. Forecasting a shortage of energy for next few hours - Declared CAISO Stage 2 Emergency, began procuring Emergency Assistance from external entities

5:15 p.m. Dispatched approximately 800 MW of demand response to maintain load and resource balance

6:36 p.m. Unable to maintain load and contingency reserve obligation – ordered 500 MW of load shed pro-rata to CAISO Utility Distribution Companies (UDC’s) – Stage 3 Emergency declared

6:46 p.m. Ordered an additional 500 MW of load shed pro-rata to CAISO UDC’s

7:58 p.m. Load decreased and resources were adequate to meet CAISO load and contingency reserve obligations. Ordered all load to be restored.
CAISO Real-time Price Spikes
A major feature of the EIM market is the Flexible Ramp Sufficiency Test.

If a BA does not pass the Flexible Ramp Sufficiency Test, their real-time EIM transfers are locked at a specific level in real-time.

CAISO failed this test on August 14th limited imports to 1544MW. CAISO also failed the test on August 15th.
DC Intertie Flowed Heavily North to South

AC Intertie Flowed Heavily North to South
BPA Control Area Generation Shows Substantial Hydro Response

Ongoing Concerns in August

Monday & Tuesday Outlook

- Monday August 17, 2020
  - Load forecast 49,792 MW
  - Resource deficiency from 111 MW to 4,400 MW

- Tuesday August 18, 2020
  - Load forecast 50,123
  - Resource deficiency to be determined
Call to Conserve Response

- August 17th and 18th:
- Reduction of nearly 4,000 MW in demand and addition of 950 MW of “available temporary generation”

Monday August 17th CAISO BA Demand Curve
Actions Taken on week of August 17th

Demand Side and Supply Side actions:

- DR and demand relief
- back-up generation,
- Solar and storage
- Navy and Marine Fleet

Resource Adequacy and Planning

- Outgoing CAISO CEO Steve Berberich on Aug. 17 stated part of the problem is the state’s resource-adequacy program regulated by the California PUC,

  “Berberich stated “the ISO had pointed out issues with capacity procurement “over and over again.” “I think it is important to understand the ISO operates the system it is given.”

- He also said CAISO should have pointed out the possibility of outages sooner, but was caught by a 500-MW generation unit tripping off line at about 3 p.m. and the loss of wind generation between 4:10 p.m. and 5:10 p.m. on Aug. 14.
2020 Pacific Northwest Conditions

High Prices in CA Lift Mid-C Prices
Above Average Water Runoff

Average August Water Runoff
Markets versus Adequacy

California could face power shortages if these gas plants shut down, officials say

California OKs early end for GE gas plant; big battery peaker planned

Table 5. Options for assumed import capability for resource adequacy.

<table>
<thead>
<tr>
<th>Import Option</th>
<th>Capacity (MW)</th>
</tr>
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<tbody>
<tr>
<td>Maximum</td>
<td>90,000</td>
</tr>
<tr>
<td>Default</td>
<td>5,000</td>
</tr>
<tr>
<td>Low</td>
<td>3,000</td>
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Does This Impact the Power Plan?

- Adequacy Assessment
  - Summer import limits
  - Competition for in-region resources
- Market Prices
  - Challenges with California’s Planning Reserve Margin
  - Scale of resource builds with different generating technologies
What We’ll Be Watching

• Was this an exceptional event or are future Augusts likely to have similar challenges?
• What are any post-mortem conclusions from the California regulators/planners/operators?
• What actions or responses are implemented – how will they impact the Northwest?

Questions?