CAISO Outlooks

Mark Rothleder
SVP & Chief Operating Officer

SMUD – Energy Resources & Customer Services Committee Meeting
May 9, 2023
The September heat wave was extraordinary in duration and intensity.

Historical Loads for CAISO area
Sep. 6 demand response and emergency resources

![Demand trend graph](image)

- 4pm: Flex Alert in effect
- 5pm: RDRR dispatched
- 5:17pm: ISO declared EEA3
- 5:55pm: WEA text
Sept 6th peak and net peak resource stack

Peak (52,061 MW)  
(4:58 pm)

Net peak (45,141 MW)  
(6:58 pm)
Above normal snow pack to help improve reservoir conditions

Snow Water Equivalent Percent
As of end of March 2023

Source: https://www.nrcs.usda.gov/wps/portal/wcc/home/snowClimateMonitoring/snowpack/snowpackMaps

Lake Mead Level

Source: https://mead.uslakes.info/level.asp

Source: https://www.deanfarr.com/western_water/
Western Weather Outlook – Temperature June 2023 – August 2023

- Warmer than normal average temperatures are forecast for California and the Pacific Northwest
- Expecting milder conditions along the coastal regions in June and July due to cool Sea Surface Temperatures off the coast
Western Weather Outlook – Temperatures: September 2023 – October 2023

• The chances of above normal temperatures for far western United States increases in August or September due to warming sea surface temperatures

Seasonal Temperature Outlook

Valid: Aug-Sep-Oct 2023
Issued: April 20, 2023
The ISO is showing considerable improvement in the resource situation driven off of new resources and high hydro conditions

- New resource development is continuing through the summer:

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Incremental Installed Capacity Between Sept 1 2022 and June 1, 2023</th>
<th>Incremental Installed Capacity Between Sept 1 2022 and Sept 1, 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind</td>
<td>518</td>
<td>518</td>
</tr>
<tr>
<td>Solar</td>
<td>2,478</td>
<td>3,774</td>
</tr>
<tr>
<td>Battery Storage</td>
<td>2,293</td>
<td>4,302</td>
</tr>
</tbody>
</table>

- Hydro conditions are tracking to record highs:
The improved resource situation more than offset modest increases in CEC load forecasts

**CEDU 2022 Planning Forecast for ISO Balancing Authority Area**

<table>
<thead>
<tr>
<th>Forecast for 2023</th>
<th>Last year’s forecast for 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-in-2 forecast</td>
<td>46.8 GW</td>
</tr>
<tr>
<td>1-in-5 forecast</td>
<td>48.8 GW</td>
</tr>
<tr>
<td>1-in-10 forecast</td>
<td>49.9 GW</td>
</tr>
</tbody>
</table>

In 2022, while the actual peak demand reached 52,061 MW in 2022 – a 1-25 year event (weighted 3-day temperature using 28 years of weather data).
Overall, the ISO balancing authority area is expected to achieve the reliability planning target of 1-in-10 LOLE

<table>
<thead>
<tr>
<th>Progress to achieving a 1-in-10 reliability planning target</th>
<th>Resources scheduled online by June 1</th>
<th>Resources scheduled online by September 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>With current high hydro conditions</td>
<td>~ 200 MW Surplus</td>
<td>~ 2300 MW Surplus</td>
</tr>
<tr>
<td>With average hydro conditions</td>
<td>~ 1100 MW Shortfall</td>
<td>~ 960 MW Surplus</td>
</tr>
</tbody>
</table>

There was an estimated **1,700 MW capacity shortfall** in 2022 to meet the planning target.
Peak load analysis also shows a significant improvement over 2022 in meeting operating reserves at peak load

September 2022 and 2023 base case and sensitivities at 8 pm on peak day (MW) – No Solar

<table>
<thead>
<tr>
<th>Year</th>
<th>Max RA Imports (total of 8,500 MW)</th>
<th>Economic imports above max RA contracts</th>
<th>Max level Import import RA contracts</th>
<th>Ave level import RA contracts</th>
<th>New Resources</th>
<th>Existing DR resources</th>
<th>Existing non-DR resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>43,922</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2023</td>
<td>2,477</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

An 18.5% reserve margin is needed to meet reserve requirements and allowances for forced outages and to accommodate a 1-in-5 load level.
Non-carbon resources grow to meet 119.6 percent of load plus exports
The actual net load and 3-hour ramps are years ahead of the ISO’s original estimate primarily due to under forecasting rooftop solar PV installation.

Typical Spring Day

Actual 3-hour ramp of 18,261 MW on 2/15/23

Net load of 2,874 MW on 3/27/22
WEIM Implementation Status
WEIM transfer paths and entity map 2023
California’s climate change goals and escalating load forecasts lead to unprecedented resource needs
2022-2023 draft transmission plan uses a zonal approach which enables clear direction and prioritization.