RUC Uncertainty Requirement

Lysha Matsunobu, Power Systems Forecaster Specialist
Tobiah Steckel, Forecast Modeler
Amber Motley, Director Short Term Forecasting

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General Session
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Outline

• Forecasting analysis
  – Background
  – Performance review and summary
  – Takeaways
Motivation

Net load uncertainty continues to grow with increasing renewables.

ISO continues to enhance the guiding logic for RUC adjustments through techniques similar to the proposed Imbalance Reserves to assist with growing net load uncertainty and RUC adjustments.

DAME, and the imbalance reserve product, is not going live until 2026.

Above: Figure 8 from DAME Analysis Report (Jan 2022)

RUC adjustments have been shown to increase in magnitude and frequency.
This review and analysis is a subset of a larger process.
Current RUC methodology
Conditions-based values implemented 12/21/23

- ISO operator may adjust RUC Net Short as necessary.
- Conditions-based values allowed for lower percentiles on non-alert days, driving lower requirements.

Uncertainty is defined as the hourly max difference between the hourly net load DA forecast and 15-min net load FMM forecast

\[ \text{uncertainty} = \max(NL_{FMM} - NL_{DA}) \]

Conditions for RUC adjustment considerations as listed in A.3.2.3. in Operating Procedure 1210 (v19.4)

- Demand Response.
- Load Forecast errors – Risk Predictor.
- Fire dangers – Cal Fire and PTO updates.
- Weather changes – updated weather forecasts and PTO updates.
- Reliability Coordinator next-day analysis – from the RC.
- Potential loss of resources – test energy, update from PTOs, subsequent Outages.
- Stranded Capacity – potential for transmission Outages or overloads.
- Address reliability concerns or need for additional capacity “insurance” to cover the following non-summer operational risks:
  - Tighter Resource Adequacy (RA) supply margins as identified by the Assistance Energy Transfer (AET) Yellow System Conditions Alert email, including days where the CAISO opts-in to AET.
  - Weather forecasts where additional Regulation is procured to cover cloudy and other weather-related volatility.
  - West-wide grid impacts where the WEIM footprint is experiencing weather as designated by a Peak Outlook alert as extreme conditions within the 95-98th percentile of normal ranges.
Definitions

• Uncertainty: $x_h = \max(NL_{FMM} - NL_{DA})$

• Performance metrics
  
  – Coverage: $\frac{1}{N} \sum^N_h (r_h \geq x_h)$
    
    • Average of binary coverage over hourly intervals
    
    • Ought to be considered in tandem with daily RUC Net Short adjustments and targets

  – Requirement: $\frac{1}{N} \sum^N_h r_h$
    
    • Average of requirement values over hourly intervals
Summary metrics

<table>
<thead>
<tr>
<th>Requirement Description</th>
<th>Coverage [-]</th>
<th>Requirement [MW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (50\textsuperscript{th})</td>
<td>0.52</td>
<td>723</td>
</tr>
<tr>
<td>Uncertain forecast (75\textsuperscript{th})</td>
<td>0.68</td>
<td>1231</td>
</tr>
<tr>
<td>Operational RA or West-wide grid impacts (97.5\textsuperscript{th})</td>
<td>1.00</td>
<td>2438</td>
</tr>
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</table>

Metrics given for sample period 12/21/2023 to 3/13/2024
Takeaways

• ISO continues to assess the best methodology for the need and the use of load conformance in RUC to protect against net load uncertainty in varying conditions.
• Operator-adjusted conditions-based targets allowed lower percentiles on non-alert days.
APPENDIX
January cold event days. RUC percentiles on 1/14 forward were adjusted following excessive coverage on 1/13. RUC performed as expected during this event.
For a sample of recent days under normal conditions, requirement magnitudes are comparable to max hourly uncertainty, though coverage falls below target during this period.