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<tr>
<td><strong>Project Title:</strong></td>
<td>Energy System Reliability</td>
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<td>Presentation - Diablo Canyon Power Plant Workshop</td>
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<tr>
<td><strong>Description:</strong></td>
<td>Transitioning to a Clean Energy Future: Electric Reliability Outlook</td>
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<td><strong>Filer:</strong></td>
<td>Dorothy Murimi</td>
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<td><strong>Organization:</strong></td>
<td>California Energy Commission</td>
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Transitioning to a Clean Energy Future: Electric Reliability Outlook
Progress to 100% Clean Electricity

- **2013**: 41%
  - 9% Large Hydro
  - 22% Renewables
  - 10% Nuclear

- **2020**: 59%
  - 13.9% Large Hydro
  - 34.5% Renewables
  - 10.6% Nuclear

- **2045**: 100%
California Energy Entities

**California Energy Commission**
- Develops and adopts long term electricity forecasts used for long term planning and resource adequacy
- Provides assessments of reliability outlook
- Siting of thermal power plants and now opt-in permitting for clean energy projects

**California Public Utilities Commission**
- Sets resource adequacy requirements for its jurisdictional load serving entities, including IOUs, CCAs and ESPs
- Authorizes procurement for IOUs.

**California ISO**
- Operates energy market and transmission for 80% of California
Reliability Planning is Essential

Before 2030
- Experiencing effects of climate extremes
- Procurement deficit and delay
- Emergency measures to maintain reliability
- Understanding uncertainties and adapting planning to climate extremes
- “Catching up” clean energy procurement to meet reliability needs

2030 and Beyond
- Achieve SB 100 and climate neutrality goals while maintaining reliability and affordability with clean energy resources
Expected Additions

Planned Retirements

Authorized Procurement of Long Lead Time Resources

Authorized Procurement

Planned Retirements

- 3700 MWs of OTC retirements:
  - Redondo Beach: 834 MWs
  - Alamitos: 1,137 MWs
  - Huntington Beach: 226 MWs
  - Ormond Beach: 1,491 MWs

- 2,280 MWs of Diablo retirement
Compounding Reliability Risks

Planning

• Historic conditions
• Average climate change trends
• Begin to incorporate climate change uncertainty
• Increase effective PRM
• Identify contingency measures
• Re-assessing PRM
• Identifying need for a strategic reserve

Events

2020
• Extreme heat

2021
• Extreme heat
• Extreme drought
• Wildfire
• Supply chain

2022
• Extreme heat
• Extreme drought
• Wildfire
• Supply chain
• Tariff issues
• Inflation

2023+
• ?
Reliability Impacts

Capacity Needed During Coinciding Extreme Events

- Capacity to Cover Coincident Extreme Heat, Drought and Fire Events
- Capacity to Cover Extreme Heat Similar to August 2020 Conditions
- Capacity to Cover Developmental Delays to Authorized Procurement (e.g., supply chain, inflation)
- Needed Capacity to meet 1-in-10 LOLE* Traditional Planning Standard

*1-in-10 LOLE standard is a loss-of-load-expectation (an outage) due to supply shortfall maximum of once in ten years.
Meeting Reliability Challenges

Near Term Extraordinary Measures
• Emergency Measures
  • Contingency Measures
  • 2020 & 2021 Emergency Proclamations
• AB 205
  • Strategic Reliability Reserve
  • Demand Side Grid Support
  • Distributed Electricity Backup Assets

Long Term Measures
• Adapting Planning and Procurement
  • Fully incorporate climate change uncertainty
  • Increase effective Planning Reserve Margin (PRM) and authorize additional procurement
• Transitioning to a Clean and Dependable Reserve
California Independent System Operator (CAISO)

• The CAISO is an independent public benefits corporation responsible for reliably operating the high voltage transmission system pursuant to CAISO, local, and national standards to:
  – Balance supply and demand
  – Maintain sufficient reserves
  – Manage reliable electricity flows

• Serves 80% of the electricity demand in California

• The CAISO independently:
  – Manages the flow of electricity but does not own any generation - relies on load serving entities (e.g., utilities) to procure generation
  – Oversees transmission planning and operations but does not own any transmission assets – relies on transmission owners (e.g., PG&E)
  – Operates wholesale electricity market to minimize cost to consumers independent of technology
Comparison of Capacity vs Performance Target
(2022-2025 Based on September 8pm authorized procurement NQC MW)
(2020-2021 Based on actual NQC MW)

~1700 MWs of contingency measures to meet planning standards in 2022

Gap of ~1800 MW results in need for incremental procurement by Summer 2025
Midterm: Significant Procurement Underway, but Challenges Undermine Reliability

11,500 MW NQC
New Procurement
Challenges:
• Procurement delays
• Load growth uncertainty
• Climate-driven extreme weather events

Net Qualifying Capacity (NQC) is the total capacity contribution of a resource that counts towards meeting resource adequacy obligations.
Midterm: Significant Procurement Underway, but Challenges Undermine Reliability

11,500 MW NQC

New Procurement Challenges:

• Procurement delays
• Load growth uncertainty
• Climate-driven extreme weather events

Net Qualifying Capacity (NQC) is the total capacity contribution of a resource that counts towards meeting resource adequacy obligations.
Need for Peak Capacity in 2025
Diablo Canyon Can Fill Capacity Need and Reduce Gas Burn

Sept 2025 Outlook with Diablo
(40-20% Cumulative Buildout Delay Scenario)
Certainty for OTC Gas Retirements and Reduced Risk for Load Growth

40-20% Cumulative Delay in Authorized Procurement

Procurement Authorized Through 2026

New Procurement Need to be Authorized Beyond 2026

Year: 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035

Capacity (MW NQC):
0, 10,000, 20,000, 30,000, 40,000, 50,000, 60,000, 70,000, 80,000

Diablo Extension
40-20% Cumulative Delay in Authorized Procurement
Existing Non-Gas Resources (Excluding RDRR)
Existing RDRR Resources
OTC SSR
Demand + 21%
Demand + 22.5% + 4,000 MW of Fire Risk

Flex Alert, BA Transfers
Emergency Resources (Contingencies, DSGS etc.)
Sept mid-mid Demand @HE 19 + 22.5%
Steps to Address California’s Electricity System Challenges and Meet SB 100

• **Project build rates will catch up with authorized procurement**
  - Over 14,000 MW of new resources ordered by the CPUC to come online through 2028
  - Additional procurement needed, to meet the traditional planning standards

• **Enhancing Planning and Diversification of Resources**
  - Opportunity to consider longer time periods in planning and procurement
  - Fully considering climate and extreme impacts in electricity planning
  - Considering uncertainty in load growth
  - SB 100 build out coordination
  - AB 525 for offshore wind
  - Proposed I-bank transmission financing to unlock geothermal
  - Technology innovation and deployment (LDES, etc)

• **Accelerating clean energy** through permitting and project tracking and facilitation