California’s Transmission Challenges for Interconnecting Renewables

Presentation for Delegation from Nigeria

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Ean O’Neill
Electric Transmission System Program Specialist
Strategic Transmission Planning Office
Siting, Transmission and Environmental Protection Division

California Energy Commission
eoneill@energy.state.ca.us
Transmission – Who are the Regulators?

- California Independent System Operator (CAISO) – Plans and operates the overall transmission system for a number of California’s transmission owners, including all IOUs.
- Publicly owned utilities – Plan, permit, own, and operate their transmission systems.
- California Energy Commission (CEC) – Responsible for demand forecasting, overall energy planning, creation of biennial strategic transmission investment plan, and designation of transmission corridors.
- California Public Utilities Commission (CPUC) – Responsible for permitting transmission projects (including CEQA and maybe coordinate with NEPA) and regulates distribution system and procurement programs for IOUs.
Who are the Transmission Owners?

• Investor Owned Utilities
  • Pacific Gas and Electric (PG&E)
  • Southern California Edison (SCE)
  • San Diego Gas & Electric Company (SDG&E)

• Publicly Owned Utilities
  • Imperial Irrigation District (IID)
  • Los Angeles Dept. of Water and Power (LADWP)
  • Sacramento Municipal Utility District (SMUD)
  • Turlock Irrigation District (TID)

• Federal Entity
  • Western Area Power Administration (Western)
## Overview of California’s Transmission System

### Transmission Line Ownership in California

<table>
<thead>
<tr>
<th>Utility</th>
<th>Circuit Miles</th>
<th>% of state total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PG&amp;E</td>
<td>18,491</td>
<td>58.3</td>
</tr>
<tr>
<td>SCE</td>
<td>5,129</td>
<td>16.2</td>
</tr>
<tr>
<td>SDG&amp;E</td>
<td>1,906</td>
<td>6.0</td>
</tr>
<tr>
<td>Municipal utilities</td>
<td>5,224</td>
<td>16.4</td>
</tr>
<tr>
<td>Federal (Western)</td>
<td>971</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>Total In-state Line Mileage</strong></td>
<td><strong>31,721</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

This includes all lines with voltages of 69 kilovolts (kV) and above that have a bulk transmission function (e.g., they carry electrical energy from where it is generated to the distribution system, other load centers, or a neighboring control area).
Balancing Authority Areas in California
Transmission Planning

- No standard set of assumptions being used by transmission planning entities, but planning entities making strides towards that goal.

- California Transmission Planning Group (CTPG)
  - Forum for conducting joint transmission planning and coordination in transmission activities to meet the needs of California.
  - Consists of transmission owners with an obligation to serve and transmission operators.
  - Develop a conceptual statewide transmission plan to meet the state’s 33% RPS goal.
  - Plan to be used as starting point by balancing authorities as part of their transmission planning process.

Transmission Planning (cont.)

• CAISO’s Transmission Planning Process
  • CAISO’s Large Generation Interconnection Procedures Process
    • Generators request interconnection to CAISO grid
    • CAISO conducts interconnection studies and identifies transmission upgrades needed for reliable interconnection to CAISO grid.
    • Upon completion, parties negotiate Large Generation Interconnection Agreements (LGIA).
  • CAISO added “policy-driven” category to its Transmission Planning Process that identifies potential transmission elements needed to achieve the state’s environmental goals such as the 33% RPS goal by 2020.

• Municipal Transmission Planning Processes
  • Imperial Irrigation District (IID)
  • Los Angeles Dept. of Water and Power (LADWP)
  • Sacramento Municipal Utility District (SMUD)
  • Turlock Irrigation District (TID)
Transmission Projects to Access Renewables
Thermal Generation Challenges

- Thermal generation sited closer to load centers where transmission infrastructure already in place.
- Air permitting and new water regulation more of an issue.
- New generators not able to obtain air permits in the South Coast Air Quality Management District.
- AB 1318 requires Energy Agencies to prepare a report for the Governor and Legislature that evaluates the electrical system reliability needs of the South Coast Air Basin.
Thermal Generation Challenges (cont.)

- 19 existing power plants located on the California coast must comply with once-through cooling (OTC) regulation.
  - Power plants withdraw over 15 billion gallons per day from the state's coastal and estuarine waters to cool their turbines and then return the water at higher temperatures.
  - The new regulation requires power plants to replace their once through cooling systems with the "best technology possible" in the interest of protecting marine life.
- OTC compliance dates have been linked to infrastructure replacement timelines.
- Nuclear power plants were granted an extension for compliance with new regulations.
  - SCE’ San Onofre plant has until 2022 to comply.
  - PG&E’s Diablo Canyon plant has until 2024 to comply.
Renewable Generation Challenges

• Achieving state policy goals will require new transmission to connect remote renewable generation sources to the load centers.

• Given the remote location there may a “chicken and egg” problem.
  • Transmission projects may be viable only with a sufficient quantity of renewable projects.
  • The transmission owner requires firm commitments from enough renewable projects to justify the costs of the transmission.
  • The renewable generation owner requires transmission infrastructure will be available when project completed.

• Disconnect between permitting and construction time for transmission projects, and permitting and construction time for renewable generation projects.
Renewable Generation Challenges (cont.)

• Renewable generation resources are located on geographically sensitive land.

• Broad range of groups have an interest in where new transmission lines are sited.
  • Utilities
  • Generators
  • Regulatory agencies
  • Public interest and environmental groups
Renewable Energy Transmission Initiative

• Stakeholder-driven collaborative planning process that includes utilities, generators, regulatory agencies, and public interest and environmental groups.
• Identified and ranked Competitive Renewable Energy Zones (CREZ) in California and adjacent lands.
• Developed a transmission plan to access CREZ to meet the state’s 33% RPS goal.
• Prioritize CREZ and required transmission to access renewable resources taking into consideration:
  • Development potential
  • Resource cost and value
  • Environmental issues
• RETI results provided a foundation for identifying renewable development zones for the DRECP process
• RETI used to inform CPUC RPS procurement process, CTPG statewide planning process, and the CAISO and municipals transmission planning processes.
• RETI Link: http://www.energy.ca.gov/reti/index.html
Desert Renewable Energy Conservation Plan (DRECP)

- Development plan for the Mojave and Colorado deserts that will provide binding, long-term endangered species permit assurances and facilitate renewable energy project review and approval process.
- Clearly identifies and maps areas for renewable energy project development and areas intended for long-term natural resource conservation.
- Provides a forum for public participation and input from stakeholders representing the interests of the counties in the desert region, renewable energy developers, environmental organizations, electric utilities, and Native Americans.
- Provides for effective protection and conservation of desert ecosystems while allowing for the appropriate development of renewable energy projects.
- More information: http://www.drecp.org/
Governor Brown Renewable Energy Plan

- California should produce 20,000 Megawatts of new renewable electricity.
  - Build 12,000 MW of localized electricity generation.
  - Build 8,000 MW of large-scale renewables and necessary transmission lines.
    - Legislature nearing passage of SBX1 2 that will codify the 33 percent renewables requirement.
    - CEC will prepare a renewable energy plan that will expedite permitting of high-priority generation and transmission projects.
Summary

- California continues to address challenges to ensure adequate transmission is built to access renewable resources.
- Regulatory bodies and transmission planning entities are working together to develop a common set of assumptions for future transmission planning.
- CEC will prepare the Strategic Plan for Renewable Generation and Transmission Infrastructure Development by November 2011.