California’s Renewable Portfolio Standard

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Overview of Presentation

- Introduction
- Current RPS policy in California
- Which resources are being procured and at what cost?
- Challenges with renewable integration
- Potential “bumps in the road”
California’s RPS Program

- Current program covers all California entities
  - Investor-Owned Utilities
  - Publicly-Owned Utilities
  - Retail Electric Service Providers, and
  - Community-Choice Aggregators

- Sets 2020 target for 33% of energy to be from eligible renewable energy resources
  - Large hydro and rooftop solar under the California Solar Initiative (CSI) program are excluded from RPS eligibility

- Many alternatives for obtaining renewables
  - Large projects procured through Requests for Offers and bilateral negotiations
    - Not IOU self-builds
  - CPUC programs for mid-size and small projects
    - ReMAT, successor to Feed-In Tariff (0-3 MW)
    - Renewable Auction Mechanism (3-20 MW)
History of RPS in California

- Established in 2002 by Senate Bill 1078
  - 20% renewables by 2017; only applied to Investor-Owned Utilities
- Accelerated in 2006 by Senate Bill 107
  - 20% renewables by 2010
- Current target set in April 2011 by SB1X-2
  - 33% renewables by 2020 with interim target of 25% by 2016
  - Included Publicly-Owned Utilities
  - Defined three categories of eligible renewables for procurement going forward
Renewable Energy Needed to Meet RPS Target in 2020

Source: SB 1X-2 and CEC Demand Forecast
IOU Renewable Resource Mix

Source: CPUC Report to Legislature, March 2013; IOUs’ RPS Procurement Reports, August 2013
California – IOU Procurement Progress

- California IOUs have signed contracts to meet much of their RPS requirements through 2020
- The IOUs are selling excess renewable generation in the near-term
- Project failure and contract expirations may present sales opportunities for new projects in the mid- to long-term

Source: August 2013 RPS Compliance Reports
While CA IOUs appear over-procured in the short term there has been significant project failure in the past. Past failure rates have been as much as 35-40%. This could create opportunities for new projects to obtain Power Purchase Agreements. Charts show failure rates of up to 40% for new projects coming online after 2012.

Source: August 2013 RPS Compliance Reports
Procurement Status for Large Publicly-Owned Utilities

- **Los Angeles Department of Water and Power (LADWP)**
  - Currently meets 18% of energy requirements with renewables, has an additional 10% of current energy requirements under construction or planned.
  - Last renewable RFP was in 2010

- **Sacramento Municipal Utility District (SMUD)**
  - Early actor in renewables procurement, achieved 20% by 2010, however many contracts are short-term.
    - Will need additional capacity as contracts expire and RPS target increases
Evolution of Solar and Wind Prices

- Recent research shows decreasing solar prices and possible inflection point for wind prices

**California Residential and Commercial Solar PV System Median Installed Price per Unit Capacity**

- Prices decrease over time

**Generation-Weighted Average Levelized Wind PPA Prices in the Western U.S.**

- Prices increase over time

Source: Lawrence Berkeley National Laboratory (LBNL), Tracking the Sun VI, July 2013; LBNL, 2012 Wind Technologies Report, August 2013
Evolution of Solar and Wind Prices

IOUs’ Aggregated Solar PV and Wind Contract Prices
(Estimated Based on Limited Contract Data)

- Recent IOU information shows decreasing PV prices and relatively flat wind prices
- In July 2013 the City of Palo Alto entered into three 30-year PPAs for up to 182,500 MWh of solar annually for $69/MWh

Source: Padilla Report, 2012; IOUs’ RPS Compliance Reports, August 2013
Future Wholesale Renewables Costs - EIA

Source: EIA Forecast, 2013
Rate Impact of RPS Program

- Chart shows cost increases:
  - Renewables - $7 Billion
  - Fossil Fuel Resources - $3 Billion
  - Transmission and Distribution - $8 Billion

- Renewables are expected to put upward pressure on rates, but they are only part of the picture

Source: Commissioner Ferron, CPUC, May 2012
Rate Impact of RPS Program – E3 Model

- 8% rate increase due to meeting 33% RPS by 2020
  - Based on 33% RPS scenario vs. “all-gas” scenario in 2020
  - 20% total rate increase from 2011 to 2020 (~2% per year) due to:
    - Increasing transmission and distribution costs
    - Increasing fuel and generation costs (not only due to renewables)

Source: E3 Law Seminars International presentation, November 2012, and E3 2010-2011 LTPP filings, CPUC “trajectory case.”
Renewable Cost Containment

- **2002-2007: Supplemental Energy Payments (SEPs)**
  - CEC funds available to generators to cover costs above the Market Price Referent

- **2007-2009: Above Market Funds (AMF)**
  - Electric corporation now responsible for cost recovery of above-market transactions
  - Utility AMFs exhausted by the end of 2009

- **2009-Present**
  - IOUs must demonstrate reasonableness of PPAs to CPUC

- **New Method in Development**
  - Slated for implementation in 2014
  - Recent CPUC staff proposal: Procurement Expenditure Limitation
  - Controversial proposal uses ratio of IOU RPS procurement expenditure to total IOU revenue requirement to determine appropriateness of renewable costs
Challenge of Integrating Increasing Levels of Renewable Generation

- The chart shows the hourly average breakdown of renewable resources for April 1, 2013, and August 1, 2013.

- Solar and wind production volatile from day-to-day.
- Relative uncertainty regarding future need for integration resources.
- Disagreement among key players whether additional integration resources are needed.

Source: CAISO Daily Renewables Watch for April 1, 2013 and August 1, 2013.
Challenge of Integrating Increasing Levels of Renewable Generation

- While wind and solar production varies significantly day-to-day, overall production of renewables remains rather steady.
- Evolving challenge as renewable percentage continues to increase.

Source: CAISO Daily Renewables Watch for April 1, 2013 and August 1, 2013.
The “Duck Curve”

- Shows California load net of solar and wind resources on a typical March day.
- Significant increases in solar and wind may shift system peak, resulting in steep evening ramp and need for flexible resources.

Source: CAISO, 2013
Challenges for Out of State Renewable Providers

Categories for RPS Compliance

- Category 1: Direct connection, scheduling without substitution, or dynamic transfer to a California balancing authority
- Category 2: Firmed and shaped resources delivered into a California balancing authority
- Category 3: Other resources and unbundled RECs
Market Price for Renewable Attributes by Category

Note: Prices shown are for renewable attributes only; they do not include energy.
Source: Platt’s Megawatt Daily
Challenges for Out of State Renewable Providers

- Virtually all contracts since the new RPS requirements went into effect are Category 1 resources
- Very few out-of-state power purchases are expected to qualify as Category 1
  - Mesquite (AZ) contract with PG&E
  - Copper Mountain Solar II (NV) contract with PG&E
  - Silver State Solar South (NV) contract with SCE
- PG&E and SCE have not yet contracted any additional Category 2 or 3 resources
- SDG&E has purchased a small amount of Category 3 resources (RECs)
  - Details are not publicly available

Source: August 2013 RPS Compliance reports
Potential Bumps in the Road

- **Commerce Clause: U.S. Constitution, Article 1, Section 8**
  - Bars states from erecting unfair barriers to interstate commerce
  - Renewable Categories in SB1X-2 sparked controversy
    - Do limits specified by SB 2(1X) regarding different categories of electricity discriminate based on state lines? If so, can any discrimination be justified by reasons other than economic protectionism?
    - In January 2012 Cowlitz County Public Utility District in Washington requested that the CPUC rehear its decision establishing the RPS categories, claimed most out-of-state generators will not qualify for Category 1 treatment and therefore the RPS rules discriminate against out-of-state generators in violation of the commerce clause
    - Several parties supported this filing but the CPUC has not yet issued a formal ruling
  - Renewable categories likely to cause ongoing legal uncertainty
### Potential Bumps in the Road: Many Large Solar Projects in Trouble

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Project Type</th>
<th>Capacity (MW)</th>
<th>Expected Date Online</th>
<th>Reason for Project Termination</th>
<th>Date PPA/Project Terminated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hidden Hills</td>
<td>Solar thermal power tower</td>
<td>500</td>
<td>Third quarter 2015</td>
<td>Scheduling and transmission issues</td>
<td>April 3, 2013 (on hold indefinitely)</td>
</tr>
<tr>
<td>Rio Mesa 2</td>
<td>Solar thermal power tower, without storage</td>
<td>200</td>
<td>December 31, 2015</td>
<td>PPA cancelled</td>
<td>January 18, 2013</td>
</tr>
<tr>
<td>Rio Mesa 1</td>
<td>Solar thermal power tower, without storage</td>
<td>200</td>
<td>September 30, 2015</td>
<td>CPUC denied cost recovery</td>
<td>September 13, 2012</td>
</tr>
<tr>
<td>Siberia 1</td>
<td>Solar thermal power tower, with storage</td>
<td>200</td>
<td>December 31, 2016</td>
<td>CPUC denied cost recovery</td>
<td>September 13, 2012</td>
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<td>December 31, 2016</td>
<td>CPUC denied cost recovery</td>
<td>September 13, 2012</td>
</tr>
<tr>
<td>Imperial Valley Solar 2</td>
<td>Solar dish Stirling system</td>
<td>750</td>
<td>2013</td>
<td>PPA cancelled</td>
<td>August 17, 2011</td>
</tr>
<tr>
<td>San Joaquin Solar Units 1 &amp; 2</td>
<td>Solar thermal/biomass hybrid</td>
<td>107</td>
<td>First quarter 2011</td>
<td>Project economics and biomass supply</td>
<td>June 17, 2010</td>
</tr>
<tr>
<td>Blythe Solar Power Project</td>
<td>Solar PV; previously solar thermal</td>
<td>485 (reduced from 1000)</td>
<td>June 2018</td>
<td>PPA not renegotiated since project design modified to PV</td>
<td>Prior to June 2012</td>
</tr>
</tbody>
</table>

**Total Capacity: 3,306 MW**
Questions?

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