



California Energy Commission

# California Electricity Generation Issues

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## Discussion Topics

- Renewable Net Short Calculations
- Electricity imports and redispatch considerations
  - Electricity System Dispatch Scenarios
  - Long-Term Coal Generation Contracts



## Comparison of Different Renewable Net Short Calculations

- Several studies on implementation of 33 percent renewable energy generation policy goal
- Each includes a calculation of renewable net short
- Use different accounting conventions and future program assessments
- Results range from 45,000 GWh to 65,000 GWh
- Creates uncertainty for evaluating system reliability and transmission requirements



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### Comparison of Different Renewable Net Short Calculations

|   |               | 1                                | 2a                           | 2b                            | 3   | 4            | 5a                                 | 5b                                 | 6                 |
|---|---------------|----------------------------------|------------------------------|-------------------------------|---|--------------|------------------------------------|------------------------------------|-------------------|
| All Values in GWh for the year 2020                 | Formula       | CEC IEPR 09<br>Impact of<br>AB32 | ARB 33%<br>RES - Low<br>Load | ARB 33%<br>RES - High<br>Load | CAISO/CPUC<br>33%<br>Operational<br>Study | RETI<br>CTPG | WECC<br>TEPPC<br>Reference<br>Case | WECC<br>TEPPC<br>State<br>Adjusted | CPUC 2010<br>LTPP |
| 1 Net Energy For Load                               |               | 341,755                          |                              |                               |   |              | 326,509                            | 328,172                            |                   |
| 2 Statewide Total Deliveries (Retail Sales)         |               | 320,368                          | 303,253                      | 303,253                       | 301,385                                   | 300,098      | 303,653                            | 305,200                            | 303,253           |
| 3 Non RPS Deliveries (CDWR, WAPA, MWD)              |               | 12,298                           | 4,500                        | 4,500                         | 12,299                                    | 13,556       | 13,556                             | 13,556                             | 13,556            |
| 4 Small LSE Sales (<200 GWh)                        |               | 0                                | 0                            | 0                             | 0   | 0            | 2,260                              | 2,260                              | 2,260             |
| 5 Retail Sales for RPS                              | 5=2-3-4       | 308,070                          | 298,753                      | 298,753                       | 289,086                                   | 285,734      | 287,837                            | 289,384                            | 287,437           |
| 6 Additional Energy Efficiency                      |               | 34,707                           | 22,000                       | 0                             | 0   | 0            | 0                                  | 19,359                             | 17,144            |
| 7 Additional Combined Heat and Power                |               | 32,304                           | 14,000                       | 0                             | 0   | 0            | 0                                  | 7,021                              | 8,198             |
| 8 Additional Rooftop PV                             |               | 4,845                            | 2,000                        | 0                             | 0   | 0            | 0                                  | 1,754                              | 0                 |
| 9 Adjusted Statewide Retail Sales for RPS           | 9=5-6-7-8     | 236,214                          | 260,753                      | 298,753                       | 289,086                                   | 285,734      | 287,837                            | 261,250                            | 262,095           |
| Existing Renewable Generation                       |               |                                  |                              |                               |   |              |                                    |                                    |                   |
| 10 Total Instate Renewable Generation               |               | 29,780                           | 28,804                       | 28,804                        | 28,804                                    | 39,413       | 29,796                             | 29,796                             | 29,796            |
| 11 Out of State Claims                              |               | 2,689                            | 3,728                        | 3,728                         | 2,468                                     | 2,116        | 0                                  | 0                                  | 2,818             |
| 12 Total Existing Renewable Generation for CA RPS   | 12=10+11      | 32,469                           | 32,532                       | 32,532                        | 31,272                                    | 41,529       | 29,796                             | 29,796                             | 32,614            |
| 13 Total RE Net Short to meet 33% RPS In 2020 (GWh) | 13=(9*33%-)12 | 45,482                           | 53,516                       | 66,056                        | 64,126                                    | 52,763       | 65,190                             | 56,417                             | 53,877            |



## **CEC Staff Report on Renewable Net Short Methodologies and Assumptions**

- To develop a single methodology and coordinated rules for choosing assumptions
- To promote consistency and facilitate an analytical link between the different infrastructure studies
- Goal of better informed policy development
- Expected to be completed end of November
- Integrated Energy Policy Report Committee Workshop on December 13, 2010



## **STUDY on IMPACT OF AB 32 SCOPING PLAN GOALS ON NATURAL GAS-FIRED GENERATION**

- For 2009 Integrated Energy Policy Report
- Examines whether a significant impact on the location and amount of incremental natural gas generation
- Used electricity system dispatch model to evaluate changes between reference case and AB 32 scenarios (EE, CHP, rooftop PV, 33% renewable generation goals)
- Re-dispatch Implications



## Resource Development Scenarios

| Year 2020         | EE and Rooftop PV Goals                     | CHP Goals     | Renewables Goal (Statewide Retail Sales) | OTC Compliance Plan                     |
|-------------------|---|---------------|--|---|
| Case 1 Reference  | No additional                               | No additional | 20% by 2012<br>29,145 GWh<br>Net Short   | 12,655 MW Retired and<br>7,758 MW Added |
| Case 2 High Solar | 34,707 GWh<br>EE<br>4,845 GWh<br>Rooftop PV | 32,304 GWh    | 33% by 2020<br>45,481 GWh<br>Net Short   | 12,655 MW Retired and<br>7,758 MW Added |
| Case 3 High Wind  | 34,707 GWh<br>EE<br>4,845 GWh<br>Rooftop PV | 32,304 GWh    | 33% by 2020<br>45,481 GWh<br>Net Short   | 12,655 MW Retired and<br>7,758 MW Added |



## Electricity System Simulation Results

- Scenarios reduced overall natural gas generation by 15 percent
- Three-quarters of the gas reductions occurred out-of-state
- More in-state gas generation was needed in the High Wind case
- The natural gas results were heavily influenced by the planned replacement or retrofit of coastal units



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## Natural Gas Use For Electric Generation (2020)

| Bcf/Day | California | Rest of WECC | Total WECC |
|---------|------------|--------------|------------|
| Case 1  | 2.88       | 3.16         | 6.04       |
| Case 2  | 2.52       | 2.60         | 5.12       |
| Case 3  | 2.60       | 2.55         | 5.15       |



## Electricity Imports Decline

- More must-run generation in California
- Less ability to take advantage of electricity spot market purchases to displace in-state generation
- Natural gas-fired generation declines in WECC regions
- Coal generators continue to operate at high capacity factors



## CEC Approach to Redispatch Question

- If new renewable generation or demand reducing programs are assumed to be part of the future resource mix, this avoids the need for a new generic natural gas plant
- Existing generation does not get “backed down”
- Fundamentally different than the CTPG approach



## Coal Generation Contracts

- California utilities have ownership agreements and long-term contracts for remote coal generation
- About 3,500 MW and 28,000 GWh per year
- Emission Performance Standard prohibits new contracts or generation with more than 1,100 lbs CO<sub>2</sub>e/MWh
- Half of coal ownership and contracts expected to expire by 2020



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### CA Utility Ownership of Out-of-State Plants (Summer Capacity MW)

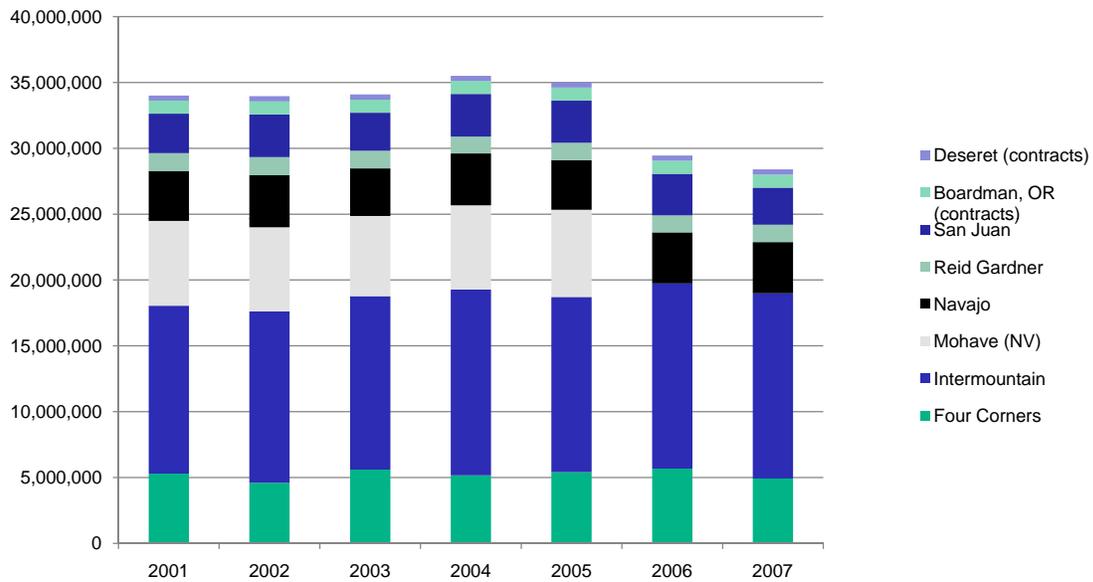
| Owner Name         | Bloomington<br>Power PL | IPP*            | Four<br>Corners | Navajo        | Palo<br>Verde   | Reid<br>Gardner | San Juan      | Yucca        | Yuma<br>Axis | Grand<br>Total  |
|--------------------|-------------------------|-----------------|-----------------|---------------|-----------------|-----------------|---------------|--------------|--------------|-----------------|
| Anaheim            |                         | 239.00          |                 |               |                 |                 | 50.81         |              |              | 289.81          |
| Azusa              |                         |                 |                 |               | 2.32            |                 | 30.47         |              |              | 32.79           |
| Banning            |                         |                 |                 |               | 2.32            |                 | 20.31         |              |              | 22.64           |
| Burbank            |                         | 62.00           |                 |               | 10.07           |                 |               |              |              | 72.07           |
| CA DWR             |                         |                 |                 |               |                 | 179.67          |               |              |              | 179.67          |
| Colton             |                         |                 |                 |               | 2.32            |                 | 30.47         |              |              | 32.79           |
| Glendale           |                         | 30.00           |                 |               | 10.07           |                 | 20.31         |              |              | 60.39           |
| IID                |                         |                 |                 |               | 14.73           |                 | 105.52        | 95.00        | 22.00        | 237.25          |
| LADWP              |                         | 1,189.00        |                 | 477.00        | 374.32          |                 |               |              |              | 2,040.32        |
| MID                |                         |                 |                 |               |                 |                 | 72.63         |              |              | 72.63           |
| Pasadena           |                         | 80.00           |                 |               | 10.07           |                 |               |              |              | 90.07           |
| Redding            |                         |                 |                 |               |                 |                 | 21.81         |              |              | 21.81           |
| Riverside          |                         | 138.00          |                 |               | 12.40           |                 |               |              |              | 150.40          |
| SVP                | 0.13                    |                 |                 |               |                 |                 | 50.86         |              |              | 51.00           |
| SCE                |                         |                 | 710.40          |               | 612.25          |                 |               |              |              | 1,322.65        |
| Vernon             |                         |                 |                 |               | 11.24           |                 |               |              |              | 11.24           |
| <b>Grand Total</b> | <b>0.13</b>             | <b>1,738.00</b> | <b>710.40</b>   | <b>477.00</b> | <b>1,062.13</b> | <b>179.67</b>   | <b>403.19</b> | <b>95.00</b> | <b>22.00</b> | <b>4,687.52</b> |

\* IPP figures represent contracted capacity.  
\*\* Source: Global Energy Decisions



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### Coal Based Generation from California Utility Ownership Shares and Contracts (Gigawatt hours per year)





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### Expected Coal Generation Reductions by 2020 (GWh/Year)

| Plant Name                        | 2007          | 2020          | CONTRACT STATUS                                 |
|-----------------------------------|---------------|---------------|---|
| Four Corners                      | 4,920         | 0             | Expires 2016                                    |
| Intermountain                     | 13,944        | 10876         | Currently 97%, drops to 75% over 5 years        |
| Mohave (NV)                       | 0             | 0             | Expired   |
| Navajo                            | 3,832         | 0             | Expires in 2020                                 |
| Reid Gardner                      | 1,211         | 0             | Expires in 2013                                 |
| San Juan Boardman, OR (contracts) | 2,760         | 2,760         | Expires in 2030                                 |
| Deseret (contracts)               | 925           | 0             | One contract expires in 2013, the other in 2018 |
|                                   | 385           | 0             | Expires in 2009                                 |
| <b>Total</b>                      | <b>27,977</b> | <b>13,636</b> | <b>49% Decline from 2007</b>                    |



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