Regional Capacity and New Projects

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Manager, Generation Market Analysis and Planning
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Agenda

• Summary & Conclusions
• WECC Supply and Demand
• Power Supply Assessment
• New Generation
Summary & Conclusions

- **WECC 2006 actual values**
  - Peak load 161,000 MW
  - Installed generation 192,000 MW (summer rating)
  - Reserve margin 14.8% after adjustments
- **Desert Southwest (DSW) 2006 actual values**
  - Peak load 30,011 MW
  - Installed generation 35,000 MW (summer rating, after firm transfers)
  - Reserve margin 16.9% after adjustments
- **DSW transmission ties** are strong with Southern California, weak with rest of WECC
- **DSW load** is projected to grow about 2.8% per year (900 MW per year), 33% higher than WECC average
- **Southern California** is projected to grow at an average of about 600 MW per year
- Based on the WECC’s 2007 Power Supply Assessment (PSA) supply margins in the DSW and Southern California appear to be adequate through 2010
- **New dependable generation capacity needed by 2016**
  - WECC wide 17,000 MW
  - Desert Southwest 8,000 MW
- **Over 40,000 MW** of new generation is under construction, under regulatory review or announced in the WECC
- Several interregional transmission projects are being evaluated which may deliver power from resource rich areas in the Rocky Mountain / Northwest areas to the DSW and California in the long term
- **Renewable resources** will play an important role in the West’s energy future, and much additional firm capacity additions will still be required
WECC
Sub-Regions

Canada
Northwest
Rocky Mtn
N. Cal.
S. Cal/Mex
Desert Southwest

TOTAL WECC
Hydro 62,652 32.5%
Nuclear 9,555 5.0%
Coal 36,450 18.9%
Gas/Oil 79,361 41.2%
Other 4,803 2.5%
192,821 100%
Capacity Mix of WECC Sub-Regions
Based on Geographic Location and Summer Capacity Ratings

Canada
- Coal: 25%
- Gas/Oil: 23%
- Hydro: 50%
- Other: 2%

Northwest
- Coal: 17%
- Gas/Oil: 16%
- Hydro: 64%
- Nuclear: 2%

Rocky Mtn
- Coal: 30%
- Gas/Oil: 30%
- Hydro: 62%
- Other: 8%

California
- Coal: 1%
- Gas/Oil: 64%
- Hydro: 22%
- Nuclear: 8%

Desert Southwest
- Coal: 27%
- Gas/Oil: 53%
- Hydro: 9%
- Nuclear: 10%
- Other: 1%
Transmission Transfer Capability Between Sub-Regions
(Used in 2007 WECC PSA)
## Average Annual Load Growth

**Ten Years Historical, Ten Years Projected**

<table>
<thead>
<tr>
<th>Region</th>
<th>Actual 95-00</th>
<th>Actual 00-05</th>
<th>Forecast 05-10</th>
<th>Forecast 10-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSW</td>
<td>4.3%</td>
<td>5.2%</td>
<td>2.8%</td>
<td>2.9%</td>
</tr>
<tr>
<td>California</td>
<td>0.5%</td>
<td>2.3%</td>
<td>2.0%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Northwest</td>
<td>2.5%</td>
<td>0.4%</td>
<td>1.3%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Rocky Mtn</td>
<td>3.4%</td>
<td>5.2%</td>
<td>2.5%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Canada</td>
<td>2.8%</td>
<td>2.2%</td>
<td>2.7%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Mexico</td>
<td>7.4%</td>
<td>3.3%</td>
<td>4.9%</td>
<td>4.4%</td>
</tr>
<tr>
<td>WECC</td>
<td>3.0%</td>
<td>2.1%</td>
<td>2.2%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>
### WECC Summer Peak Load

**Ten Years Historical / Ten Years Projected (MW)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DSW</td>
<td>17,632</td>
<td>21,724</td>
<td>27,974</td>
<td>32,178</td>
<td>37,047</td>
<td>9,073</td>
</tr>
<tr>
<td>California</td>
<td>48,340</td>
<td>49,638</td>
<td>55,535</td>
<td>61,448</td>
<td>67,401</td>
<td>11,866</td>
</tr>
<tr>
<td>Northwest</td>
<td>31,426</td>
<td>35,535</td>
<td>36,165</td>
<td>38,588</td>
<td>42,508</td>
<td>6,343</td>
</tr>
<tr>
<td>Rocky Mtn</td>
<td>7,266</td>
<td>8,589</td>
<td>11,086</td>
<td>12,556</td>
<td>14,029</td>
<td>2,943</td>
</tr>
<tr>
<td>Canada</td>
<td>12,945</td>
<td>14,861</td>
<td>16,533</td>
<td>18,874</td>
<td>20,621</td>
<td>4,088</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,104</td>
<td>1,575</td>
<td>1,854</td>
<td>2,359</td>
<td>2,920</td>
<td>1,066</td>
</tr>
<tr>
<td>WECC</td>
<td>115,681</td>
<td>134,232</td>
<td>149,147</td>
<td>166,003</td>
<td>184,526</td>
<td>35,379</td>
</tr>
</tbody>
</table>
Desert Southwest Summer/Winter Peak Load

2007 Power Supply Assessment
WECC December, 2007

- Assessment of generation resource capacity margins (in MW) for the WECC summer and winter peak hours 2008-2016
- Conducted by WECC staff
- Based on data submitted by WECC member utilities
- Identifies sub-regions within the WECC that have the potential for electricity supply shortages based on reported demand, resource, and transmission data
- At some point study results shift from a determination of supply margin to an estimate of future resource needs
- Capacity margin is a measure of a sub-region’s ability to meet its load requirements
  - Including a specified reserve amount
  - Uses resources in the sub-regions and imports from other sub-regions as calculated by SAM
- Supply Adequacy Model (SAM) used to conduct study
- 26 zones aggregated to seven sub-regions shown in graphs
- Analysis for the Northwest sub-region does not adequately capture the limitations on the ability of the NW hydro system to sustain capacity output levels beyond a single hour
- APS participates in many WECC subcommittees, including Load and Resource Subcommittee
### SAM Zones and Building Block Margins

<table>
<thead>
<tr>
<th>Sub-Region</th>
<th>SAM Zones Included in Sub-Area</th>
<th>Summer Margin</th>
<th>Winter Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>British Columbia, Alberta</td>
<td>12.0%</td>
<td>12.8%</td>
</tr>
<tr>
<td>Northwest</td>
<td>Pacific Northwest, COB, Montana</td>
<td>13.7%</td>
<td>16.3%</td>
</tr>
<tr>
<td>Basin</td>
<td>Idaho, Northern Nevada, Utah, IPP</td>
<td>12.8%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Rockies</td>
<td>Colorado East, Colorado West, Wyoming</td>
<td>14.2%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Desert Southwest</td>
<td>Arizona, New Mexico, Southern Nevada, IID, Four Corners, Palo Verde</td>
<td>15.7%</td>
<td>14.6%</td>
</tr>
<tr>
<td>Norther California</td>
<td>Northern California, Central California, San Francisco, SMUD</td>
<td>16.5%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Southern California/Mexico</td>
<td>Southern California, San Diego, LADWP, Comision Federal de Electricidad (CFE)</td>
<td>16.6%</td>
<td>13.0%</td>
</tr>
<tr>
<td>WECC Total</td>
<td></td>
<td>15.0%</td>
<td>14.1%</td>
</tr>
</tbody>
</table>

**Notes:**
1) Planning Reserve Margin (MW) = Generation Resources – Peak Load
2) Reserve Requirement (%) = Reserve Margin / Peak Load
3) Building Block Planning Reserve Margin is WECC Guideline/Target, NOT a requirement
4) Building Block Components include contingency reserves, regulating reserves, forced outages, and temperature adders
New Resource Addition Categories

• Class 1 – Reported to be under active construction as of the reporting date (12/06) and projected to be in service before January 2011
• Class 2 – Reported to be under active regulatory review with an expected in-service date before January 2013
• Class 3 – Reported, but didn’t meet the criteria for Class 1 or Class 2.
  – Not included in the analysis
  – Intended to highlight the importance of ongoing resource development and acquisition to bring resources on line at appropriate times
## Desert Southwest
### Class 1 Additions

<table>
<thead>
<tr>
<th>Area</th>
<th>Balancing Authority</th>
<th>Name</th>
<th>Unit Type</th>
<th>Summer</th>
<th>Winter</th>
<th>Fuel Type</th>
<th>COD</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVS</td>
<td>NPC</td>
<td>Clark</td>
<td>GT</td>
<td>416</td>
<td>416</td>
<td>NG</td>
<td>2008</td>
</tr>
<tr>
<td>PV</td>
<td>APS</td>
<td>Palo Verde</td>
<td>NP</td>
<td>71</td>
<td>71</td>
<td>NUC</td>
<td>2008</td>
</tr>
<tr>
<td>NVS</td>
<td>NPC</td>
<td>Clark</td>
<td>GT</td>
<td>208</td>
<td>208</td>
<td>NG</td>
<td>2009</td>
</tr>
<tr>
<td>AZ</td>
<td>SRP</td>
<td>Springerville</td>
<td>ST</td>
<td>400</td>
<td>400</td>
<td>SUB</td>
<td>2009</td>
</tr>
</tbody>
</table>

Total: 1,095 MW

**Net Capability**

Note: None of the reported resource additions in the DSW fell into Class 2 category.
Regional Generating Reserves
With Class 1&2 Additions
Summer, 2016

After Transfers

Over Target 5,575 MW
Under Target -17,083 MW

Regional Reserves
Over Target Margin
Regional Reserves
Under Target Margin
Power Supply Margin in the WECC
With Class 1&2 Resource Additions

Northwest
Canada
Rockies, Basin, No. Cal
Desert Southwest
So. Cal / Mexico

(MW)
-10,000
-8,000
-6,000
-4,000
-2,000
0
2,000
4,000
6,000
8,000
10,000

Reported Resource Additions
Total WECC

Class 1

Class 2

Class 3

MW
Generation Projects In the Desert Southwest

- **Ely Energy Center**
  - SP/NPC
  - 1500 MW Coal
  - Permitted

- **Clark**
  - NPC
  - 600 MW Gas
  - Under Constr (2008/9)

- **Niland CT**
  - IID
  - 100 MW Gas
  - Under Constr (2008)

- **Yuma CT**
  - APS
  - 96 MW Gas
  - Under Constr (2008)

- **Deer Valley**
  - NV Power
  - 1100 MW Coal
  - Under Constr (2009)

- **Black Mtn**
  - Unisource
  - 90 MW Gas
  - Under Constr (2008)

- **Springerville 4**
  - TEP/SRP
  - 400 MW Coal
  - Under Const (2009)

- **Los Alamos**
  - LANL
  - 25 MW Gas
  - In Service 12/07

- **Desert Rock**
  - Sithe
  - 1500 MW Coal
  - Applied for Permit
Spring Wind Resource Estimate
## Wind Capacity By State (as of 1/01/2007)

### MW

<table>
<thead>
<tr>
<th>State</th>
<th>Name Plate</th>
<th>Summer</th>
<th>Winter</th>
<th>Firm Capacity %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Summer</td>
<td>Winter</td>
<td>Summer</td>
</tr>
<tr>
<td>California</td>
<td></td>
<td>202</td>
<td>156</td>
<td>8%</td>
</tr>
<tr>
<td>Colorado</td>
<td></td>
<td>26</td>
<td>26</td>
<td>9%</td>
</tr>
<tr>
<td>Idaho</td>
<td></td>
<td>15</td>
<td>16</td>
<td>20%</td>
</tr>
<tr>
<td>Montana</td>
<td></td>
<td>36</td>
<td>36</td>
<td>25%</td>
</tr>
<tr>
<td>Nebraska</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td>Oregon</td>
<td></td>
<td>56</td>
<td>56</td>
<td>14%</td>
</tr>
<tr>
<td>Texas</td>
<td></td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Washington</td>
<td></td>
<td>169</td>
<td>169</td>
<td>19%</td>
</tr>
<tr>
<td>Wyoming</td>
<td></td>
<td>56</td>
<td>56</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total (US)</strong></td>
<td></td>
<td>561</td>
<td>516</td>
<td>12%</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total (US+Canada)</strong></td>
<td></td>
<td>561</td>
<td>516</td>
<td>10%</td>
</tr>
</tbody>
</table>