Regional Need for Electricity

Washington Solar Summit
October 15, 2016
Forecast Load Growth Over The Next Two Decades
(Average Over 800 Futures)

Regional Load Net of Energy Efficiency

Load Reduction from Federal Standards
Adopted Post-Sixth Power Plan

Regional Load Growth Met with Energy Efficiency
2021 Power Supply Adequacy

- 2021 power supply expected to be inadequate (LOLP = 13%)
  - For medium load forecast
  - Existing resources + 121 MW planned DR
  - Seventh plan EE target (1,400 aMW)

- Primarily capacity short – 1,360 to 2,560 MW of new capacity needed (med to high load)

- Results are consistent with the Seventh Power Plan

- Demand response could play a role in maintaining adequacy but uncertainties remain about its availability and viability

- About 550 MW of planned (but not sited and licensed) new resources (from PNUCC)
## Effect of Load on LOLP

<table>
<thead>
<tr>
<th>Case</th>
<th>No Boardman No Centralia 1</th>
<th>No Boardman No Centralia 1 No Colstrip 1 &amp; 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loads Down</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Load</td>
<td>24</td>
<td>31</td>
</tr>
<tr>
<td>Med Load</td>
<td>10</td>
<td>13.2</td>
</tr>
<tr>
<td>Low Load</td>
<td>4</td>
<td>5.1</td>
</tr>
</tbody>
</table>
How CO2 is treated impacts the projected 2030 emissions in MMT

Average 2000-2012: 55.0
Expected without Coal Retirements*: 45.0
Expected with Planned Coal Retirements: 33.5
Northwest Regional 35% RPS: 21.7
Internalized Social Cost of Carbon: 18.2
No Coal: 13.4
No Coal, Carbon Cost and No New Gas: 10.8

*Assumes Centralia, Boardman and North Valmy are not retired.
System Capacity Contribution from the Seventh Power Plan

<table>
<thead>
<tr>
<th></th>
<th>Q1</th>
<th>Q2&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar PV&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.26</td>
<td>N/A</td>
<td>0.80</td>
<td>0.42</td>
</tr>
<tr>
<td>Geothermal</td>
<td>1.28</td>
<td>N/A</td>
<td>1.02</td>
<td>1.20</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>1.24</td>
<td>N/A</td>
<td>1.14</td>
<td>1.16</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>1.28</td>
<td>N/A</td>
<td>1.02</td>
<td>1.20</td>
</tr>
<tr>
<td>Columbia Gorge Wind&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.03</td>
<td>N/A</td>
<td>0.11</td>
<td>0.08</td>
</tr>
</tbody>
</table>

<sup>1</sup>The lack of adequacy issues in Q2 makes the system capacity contribution meaningless.

<sup>2</sup>Within-hour balancing reserves were not adjusted for the solar or wind analyses.
All Resource Cost – Energy

Real Levelized Cost (2012$/MWh)

- Fuel + Transmission
- O&M + Property Taxes + Insurance
- Capital

- Energy Efficiency (Average Cost w/ T&D Credit)
- Energy Efficiency (Average Cost w/o T&D Credit)
- Solar PV - Low Cost S. ID
- Natural Gas - CCCT Adv1
- Natural Gas - CCCT Adv2
- Solar PV - S. ID
- Wind - MT w/ new transm.
- Wind - MT w/ Transm. Upgrade
- Wind - Colum. Basin
- Natural Gas - Frame GT East
- Solar PV - S. ID w/ Transm. Expan.
- Natural Gas - Recip Engine East
- Natural Gas - Aero GT East

Northwest Power and Conservation Council
Questions about the Seventh Power Plan or other regional energy issues:

- Call us at 503-222-5161 or 800-452-5161

See what we’re working on at:

- [https://twitter.com/nw council](https://twitter.com/nw council)
- [https://www.linkedin.com/company/northwest-power-and-conservation-council](https://www.linkedin.com/company/northwest-power-and-conservation-council)

Or contact me at:

- bkujala@nw council.org
- [https://www.linkedin.com/in/kujala](https://www.linkedin.com/in/kujala)
Additional Slides
Composition of Existing Regional Power System

Northwest Installed Nameplate Capacity - 63,103 MW

- Hydro: 54%
- Natural Gas Baseload: 12%
- Natural Gas Peaking: 4%
- Nuclear: 2%
- Wind: 14%
- Coal: 11%
- Biomass: 2%
- Other*: 1%

Located in Power Act Region or contracted to PNW loads; WECC In-service, under construction, standby or idle
Includes PacifiCorp WY wind plants
*Other - Geothermal, Petroleum, Solar
What resources are being developed and proposed in the region? (1)
How does this compare to projects that were built- and proposed projects that were terminated- since 2010? (2)
Solar PV

- **Operating since 2010:** ~75 MW installed capacity
  - Boise City Solar – 40MW, online June 2016
- **Under construction:** ~20 MW (ish!)
- **Proposed:** ~670 MW
  - 48 individual projects, 80% have PPAs secured
  - Most in the 5MW/10MW/20MW project size range
  - Majority located in S. ID/S. OR.
    - ~280MW PPA w/ IPC, ~190MW PPA w/ PAC
- **Terminated since 2010:** ~270 MW
Regional Hydro Power Depends on Water Runoff
Columbia River Runoff and Storage Compared to the Colorado and Missouri Rivers

- AVERAGE ANNUAL RUNOFF
- TOTAL STORAGE CAPACITY

All Measurements in Million Acre-feet
1 Million Acre Feet = 1.2335 billion cubic meters

Columbia River System Storage Space

- DAM TYPE
- USAGE

Public Utilities
Private Utilities
Other Federal
Major Federal Storage Dams 30%
Canadian Dams 28%
Non-Treaty Storage 9%

All Measurements in Million Acre-feet
1 Million Acre Feet = 1.2335 billion cubic meters