KEY FINDINGS AND RESOURCE STRATEGY
The Council’s Power Plan

- Goal - Ensure an adequate, efficient and affordable regional power system

- Major Components
  - Forecast of regional electricity demand over the next 20 years
  - A “least cost with acceptable risk” Resource Strategy
  - Regional action plan to implement Resource Strategy

- Use
  - By statute, plan guides Bonneville Power Administration’s resource decisions
  - By tradition, plan serves as an independent reference for all of the region’s utilities, regulatory commissions and policy-makers
The Seventh Power Plan – Major Issues

Impact of announced coal-plant retirements on need for new resource development
- Centralia 1 & 2 – 1340 MW
- Boardman – 550 MW
- North Valmy – 522 MW

POWER PLANTS ARE THE SINGLE LARGEST SOURCE OF CARBON POLLUTION

Implications of and options for addressing EPA’s Clean Power Plan
How to best meet regional need for capacity (i.e., peaking) resources
The Region’s Population and Economy Are Expected To Grow

- Population: 114%
- Employment: 120%
- Households: 127%
- Commercial Floor Space: 126%
- Industrial Output: 136%
Key Finding

- Energy Efficiency and Demand Response can meet nearly all growth in energy and capacity needs.
Key Finding: Energy Efficiency Meets Load Growth Over The Next Two Decades

Regional Load Growth Met with Energy Efficiency

Load Reduction from Federal Standards Adopted Post-Sixth Power Plan

Regional Load Net of Energy Efficiency
Northwest Loads After Accounting for Energy Efficiency Are Forecast To Remain At or Below Current Levels Until 2035
Key Finding:
Least Cost Resource Strategies Rely on Conservation and Demand Response to Meet Nearly All Forecast Growth in Regional Energy and Capacity Needs
Why the Seventh Power Plan Relies on Energy Efficiency and Demand Response Resources

Because they cost less!
All Resource Cost – Energy

- Natural Gas - Aero GT East
- Natural Gas - Recip Engine East
- Solar PV - S. ID w/ Transm. Expan.
- Natural Gas - Frame GT East
- Wind - Colum. Basin
- Wind - MT w/ Transm. Upgrade
- Wind - MT w/ new transm.
- Solar PV - S. ID
- Natural Gas - CCCT Adv2
- Natural Gas - CCCT Adv1
- Solar PV - Low Cost S. ID

Energy Efficiency (Average Cost w/o T&D Credit)
Energy Efficiency (Average Cost w/ T&D Credit)

Real Levelized Cost (2012$/MWh)

- Capital
- O&M + Property Taxes + Insurance
- Fuel + Transmission
All Resource Cost – Peak Capacity

- Wind - MT w/ Transm. Upgrade
- Wind - MT w/ new transm.
- Solar PV - S. ID w/ Transm. Expan.
- Wind - Colum. Basin
- Solar PV - S. ID
- Natural Gas - CCCT Adv2
- Natural Gas - Aero GT East
- Natural Gas - Recip Engine East
- Demand Response Price Block 4
- Natural Gas - CCCT Adv1
- Natural Gas - Frame GT East
- Solar PV - Low Cost S. ID
- Demand Response Price Block 3
- Demand Response Price Block 2
- Demand Response Price Block 1

Real Levelized Cost (2012$/kW-yr)

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

- Demand Response resources should be developed to meet regional peak demands
Key Finding:
There is a high probability that at least 600 MW of Demand Response should be developed across all scenarios tested.
Key Finding:
The Probability and Amount of Demand Response Deployment Varies Over a Wide Range, But There is a Very High (70%+) Probability of Needing at least 600 MW

Minimum Probability of **600 MW DR Deployment by 2021** is 70%
Key Finding

- Retiring coal plant generation can be replaced by greater reliance on existing natural gas plants very limited development of new gas-fired generation
Key Finding:
Existing Natural Gas Offsets Announced Coal Plant Retirements, Resulting in Lower CO2 Emissions
Key Finding

- No immediate need to acquire or build new generating resources
  - Unless, regional energy efficiency and demand response goals are not achieved
  - OR
  - Unless, additional coal plants are retired
Probability of Needing New Natural Gas Generation by 2021

- No Demand Response
- Retire Coal w/SCC_MidRange
- Retire Coal and Inefficient Gas
- Regional RPS @ 35%
- Existing Policy
- Increased Market Reliance
- Social Cost of Carbon - MidRange

0% 25% 50% 75% 100%
Key Finding

- Resource strategies that maximize the use of existing regional resources to satisfy the region’s resource adequacy standards are lower cost, require less resource development and produce fewer emissions.
Key Finding:
Net Exports (Exports-Imports) Are Strongly Influenced By Regional Resource Development
Key Finding

- EPA carbon emission reduction regulations can be met regionally
  - However, some states, especially Montana, face significant challenges
Key Finding:
Regional Annual Average CO2 Emissions for Least-Cost Resource Strategies Are Below EPA’s Emission Limits

![Graph showing annual average CO2 emissions from 2015 to 2035 for different scenarios: No Coal Retirement, Existing Policy, Social Cost of Carbon - Mid-Range, Reire Coal w/SCC MidRange & No New Gas. The graph indicates that all strategies keep CO2 emissions below EPA’s limits.](image-url)
Key Findings:
Annual Regional power system CO2 emissions could be reduced by 70% by retiring all existing coal plants, and 80% if these plants were replaced with Renewable Resources.

*Scenario assumes Centralia, Boardman and North Valmy are not retired.*
Key Finding:

<table>
<thead>
<tr>
<th>Policy Description</th>
<th>PV Carbon Emissions Reduction Cost (2012$/MT)</th>
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<tbody>
<tr>
<td>Retire Coal</td>
<td>$78</td>
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<td>Retire Coal w/SCC_MidRange</td>
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<td>Regional RPS at 35%</td>
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($11)
Key Finding:
Increased renewable portfolio standards are not necessary to comply at the regional level with recently promulgated federal carbon dioxide emissions regulations, nor are they an element of a regional least cost resource strategy.

- Why Increasing RPS Isn’t the Least Cost Option for Reducing CO2 Emissions
  - RPS don’t reduce coal use
  - RPS don’t change the fact that the “wind don’t blow and the sun doesn’t shine all of the time”
  - RPS lower the amount of cost-effective energy efficiency
Resource Strategy

- **Energy Efficiency Development**
  - 1400 aMW by 2021
  - 3000 aMW by 2026
  - 4300 aMW by 2035

- **Expand Use of Demand Response**
  - Develop at least 600 MW of demand response resources by 2021

- **Natural Gas**
  - Increase use of existing gas generation to offset coal plant retirements
  - While there is a very low probability of regional need for new gas-fired generation prior to 2021, individual utility circumstances and need for capacity and other ancillary services may dictate development
Resource Strategy

- **Renewable Resources**
  - Develop local renewable alternatives that are cost-effective now.
  - Develop solar PV systems to comply with existing renewable portfolio standards, especially in areas with increasing summer peak loads.
  - Conduct research on and demonstration of renewable energy with a more consistent output like geothermal or wave energy.

- **Carbon Policies**
  - Support policies that cost effectively achieve state and federal carbon dioxide emissions reduction goals, while maintaining regional power system adequacy by:
    - Develop the energy efficiency and demand response.
    - Replace retiring coal plants increased use of existing gas-fired generation.
    - Dispatch existing regional generation to meet adequacy standards for energy and capacity rather than to serve external markets.
    - No increasing the requirements of state renewable portfolio standards alone, since this would not result in the development of the least cost resource strategy for the region nor the least cost resource strategy for reducing carbon at the regional level.
Resource Strategy

- **Regional Resource Use**
  - Continue to improve system scheduling and operating procedures across the region’s balancing authorities to maximize cost-effectiveness and minimize the need for new resources to integrate renewable generation
  - Improve use of existing regional resource to meet regional adequacy standards

- **Expand Resource Alternatives**
  - Energy efficiency
  - Renewable with less variable output (e.g., enhanced geothermal, wave)

- **Adaptive Management**
Questions?
Backup Slides
Carbon Dioxide Emission Reduction Policies

- Council Tested Multiple Policy Options for Reducing Carbon Emissions

- **Non-Pricing Policies**
  - Existing state and federal policies (RPS & CPP)
  - Retire Coal (all plants beyond those plants already announced)
  - Retire Coal and Inefficient Natural Gas (below 40% efficiency)
  - Increase Regional RPS to 35% of All Retail Sales

- **Pricing Policies**
  - Assume carbon cost equivalent to Federal Government’s estimate of the Social Cost of Carbon (SCC)
    - Mid-Range SCC Estimate ($40/MT in 2016, escalating to $60/MT in 2035)
    - 95th Percentile SCC Estimate ($160/MT in 2016, escalating to $180/MT in 2035)

- **Non-Pricing Combined with Pricing Policies**
  - Retire Coal w/MidRange SCC
  - Retire Coal w/MidRange SCC and Restrict Development to Renewable Resources
Key Finding:
Carbon Pricing Policies Drive Cumulative Emissions Reduction and System Cost

Present Value System Cost (billion 2012$)

- Existing Policy
- Retire Coal
- SCC - Mid-Range
- Retire Coal w/SCC_MidRange
- SCC_MidRange & No New Gas

Cumulative CO2 Emission Reduction Over Existing Policy Scenario

Present Value Average System Cost (2012$)
### Summary of Carbon Reduction Policy Costs and Impacts

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Key Finding:
Increased renewable portfolio standards are not necessary to comply at the regional level with recently promulgated federal carbon dioxide emissions regulations, nor are they an element of a regional least cost resource strategy.

- Why Increasing RPS Isn’t the Least Cost Option for Reducing CO2 Emissions
  - RPS don’t reduce coal use
  - RPS don’t change the fact that the “wind don’t blow and the sun doesn’t shine all of the time”
  - RPS lower the amount of cost-effective energy efficiency
Two Carbon Emission Reduction Policies Result in Significant Renewable Resource Development


- Existing Policy
- Social Cost of Carbon - MidRange
- Retire Coal and Inefficient Gas
- Retire Coal
- Retire Coal w/SCC MidRange
- Retire Coal w/SCC MidRange and No New Gas
- Regional RPS @ 35%
Neither of These Policies Significantly Reduce Coal Use

Average Annual Coal Generation Dispatch 2015-2035
Under Alternative Resource Strategies

Annual Average Dispatch (aMW)

- Existing Policy
- Social Cost of Carbon - MidRange
- Retire Coal and Inefficient Gas
- Retire Coal
- Retire Coal w/SCC MidRange
- Regional RPS @ 35%
- Retire Coal w/SCC MidRange and No New Gas
However, Increased Reliance on Renewable Resources Does Reduce Reliance on Existing Natural Gas Generation

Average Annual Existing Gas Generation Dispatch 2015-2035
Under Alternative Resource Strategies

- 500
- 1,000
- 1,500
- 2,000
- 2,500
- 3,000
- 3,500
- 4,000
- 4,500
- 5,000

2015 2020 2026 2031
Annual Average Dispatch (aMW)

- Existing Policy
- Social Cost of Carbon - MidRange
- Retire Coal and Inefficient Gas
- Retire Coal
- Retire Coal w/SCC MidRange
- Retire Coal w/SCC MidRange and No New Gas
- Regional RPS @ 35%

Northwest Power and Conservation Council
And, Increased Reliance on Renewable Resources Does Decrease New Gas-Fired Generation Development

Average Annual New Natural Gas Generation Dispatch 2015-2035
Under Alternative Resource Strategies

<table>
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<th>Year</th>
<th>Existing Policy</th>
<th>Social Cost of Carbon - MidRange</th>
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Annual Average Dispatch (aMW)
Increased Reliance on Renewable Resources Produces Less Energy Efficiency Development By Lower Market Prices
Cumulative Energy Efficiency Development 2016-2035
Under Alternative Resource Strategies

![Cumulative Development Chart](chart.png)

- **Existing Policy**
- **Social Cost of Carbon - MidRange**
- **Retire Coal and Inefficient Gas**
- **Retire Coal**
- **Retire Coal w/SCC MidRange**
- **Retire Coal w/SCC MidRange and No New Gas**
- **Regional RPS @ 35%**
As A Result, Increased Reliance on Renewable Resources (Without Also Retiring Coal Generation) Produces the Least Carbon Emission Reductions of All Policies Tested

Average Annual Carbon Dioxide Emissions 2015-2035 Under Alternative Resource Strategies