Key Findings from 7th Plan’s Resource Strategy Scenario Analysis

Resource Strategy Advisory Committee
September 9, 2015
Scope of Scenario Analysis

- Over 20 scenarios and sensitivity studies analyzed
  - Resource Uncertainty (DR or No DR, Lower Conservation, Major Resource Loss)
  - Carbon emissions compliance policy options
    - Regional analysis only, no state level findings
  - Sustained low gas and electricity prices
  - External Market Reliance
- All least cost plans required to satisfy Regional Resource Adequacy Standards
Key Findings

- Least Cost Resource Strategies Consistently Rely on Conservation and Demand Response to Meet Nearly All Forecast Growth in Regional Energy and Capacity Needs
- Regional Resource Adequacy Requirements for Winter Capacity Could Be Met by Increased Reliance on Demand Response and/or Supplied by External Markets Depending Upon Their Availability, Reliability and Cost
- Replacement of Announced Coal Plant Retirements Can Generally be Achieved Through Increased Use of Existing Natural Gas Plants and with Modest New Development of Natural Gas Generation
- Northwest Exports Play A Significant Role in Regional Resource Development
- Compliance with EPA 111(d) CO2 emissions limits at the regional level, is attainable through resource strategies that do not depart significantly from those that are not constrained by those regulations.
Key Finding:
Average Conservation Development Varies Little Across Scenarios
Except Under Sustained Low Gas Prices and Increased RPS
Key Finding:
Conservation Development by 2021 in Least Cost Resource Strategies
Varies Over A Small Range Across Most Scenarios

- **Existing Policy, No Carbon Risk**
  - Mean = 1315 aMW

- **Social Cost of Carbon - Base**
  - Mean = 1310 aMW

- **Maximum Carbon Reduction, Existing Technology**
  - Means = 1395 to 1430 aMW

- **Social Cost of Carbon - High**

- **No Coal Retirement**

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*Northwest Power and Conservation Council*
Key Finding:
Least Cost Resource Strategies Offset Load Growth with Efficiency
Key Finding:
Net Load After Conservation for The 6th Plan and 7th Plan Draft Resource Strategies Are Forecast to Be Similar
Key Finding:
Least Cost Resource Strategies Consistently Rely on Conservation and Demand Response to Meet Nearly All Forecast Growth in Regional Energy and Capacity Needs

- Social Cost of Carbon - High
- Unplanned Loss of Major Resource
- Social Cost of Carbon - Base
- Faster Conservation Deployment
- Planned Loss of Major Resource
- No Demand Response, No Carbon Risk
- Carbon Risk
- Slower Conservation Deployment
- Maximum CO2 Reduction
- Existing Policy, No Carbon Risk
- Low Gas Prices with Carbon Risk
- Increased Market Reliance
- RPS at 35%
- Low Gas Prices, No Carbon Risk
- Lower Conservation. No Carbon Risk

Average Development by 2035 (aMW)
Key Finding:
Energy Efficiency Is The Largest Source of Future Winter Capacity

- Social Cost of Carbon - High
- Unplanned Loss of Major Resource
- Social Cost of Carbon - Base
- Faster Conservation Deployment
- Planned Loss of Major Resource
- No Demand Response, No Carbon Risk
- Carbon Risk
- Slower Conservation Deployment
- Maximum CO2 Reduction
- Existing Policy, No Carbon Risk
- Low Gas Prices with Carbon Risk
- Increased Market Reliance
- RPS at 35%
- Low Gas Prices, No Carbon Risk
- Lower Conservation, No Carbon Risk

Winter Peak Capacity by 2035 (MW)

- Thermal
- Renewable
- Demand Response
- Conservation
Key Finding:
The Regional Potential for Demand Response Appears Significant

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<th>2021 Winter</th>
<th>2026 Winter</th>
<th>2035 Winter</th>
<th>2021 Summer</th>
<th>2026 Summer</th>
<th>2035 Summer</th>
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<td><strong>Regional Hourly Peak Capacity (MW)</strong></td>
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<td><strong>Levelized Cost by Resource Block (2012$/KW-year)</strong></td>
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Key Finding:
The Probability and Amount of Demand Response Deployment Varies Over a Wide Range, and is Particularly Sensitive to Extra-Regional Market Reliance Assumptions.
Key Finding:
New Renewable Resource Development Does Not Significantly Increase In Carbon Emissions Reduction Policy Scenarios Except For A Policy That Sets Renewable Portfolio Standard at 35%
Key Finding:
There is a Low Probability of Any Thermal Development by 2021
Except Under Scenarios That Increase RPS or Do Not Develop Demand Response

- Increased Market Reliance
- Slower Conservation Deployment
- Carbon Risk
- Faster Conservation Deployment
- Existing Policy, No Carbon Risk
- Maximum CO2 Reduction
- Low Gas Prices, No Carbon Risk
- Low Gas Prices with Carbon Risk
- Social Cost of Carbon - Base
- Unplanned Loss of Major Resource
- Planned Loss of Major Resource
- RPS at 35%
- No Demand Response, No Carbon Risk
- No Demand Response with Carbon Risk

Probability of Thermal Plant Option Moving To Construction
Key Finding:
The Probability of Thermal Development by 2026 Is Modest
Except in Scenarios That Assume All Coal Plants Are Retired or Do Not Develop Demand Response
Key Finding:
Increased Use of Existing Natural Gas Offsets Announced Coal Plan Retirements, Resulting in Lower CO2 Emissions

![Chart showing changes in existing gas dispatch and CO2 emissions over time. The chart includes lines for different scenarios and policies, indicating trends in existing gas dispatch and CO2 emissions from 2015 to 2035.]
Key Finding:
Increasing External Market Reliance for Winter Capacity Reduces Demand Response and Conservation Development

- **Existing Policy, No Carbon Risk - 2021**
- **Increased Market Reliance - 2021**
- **Existing Policy, No Carbon Risk - 2026**
- **Increased Market Reliance - 2026**
- **Existing Policy, No Carbon Risk - 2035**
- **Increased Market Reliance - 2035**
Key Finding:

Net Exports (Exports - Imports) Are Strongly Influenced By Regional Resource Development

[Graph showing net exports over time for different scenarios including Existing Policy, No Carbon Risk, Social Cost of Carbon - High, Carbon Risk, Maximum CO2 Reduction, Unplanned Loss of Major Resource, Planned Loss of Major Resource, Increased Market Reliance, Low Gas Prices, No Carbon Risk, and RPS at 35%]
Key Finding:
The Largest PNW Power System Cumulative CO2 Emissions Reductions Occur Under Resource Strategies That Must Respond Immediately to Carbon Reduction Policies
Key Finding:
The Lowest Cost PNW Power System CO2 Emission Reduction Resource Strategies Are Those That Re-Dispatch Coal and Existing Gas Generation

[Bar chart showing NPV of CO2 Emissions Reduction Cost (billion 2012$) with categories: Carbon Risk, Social Cost of Carbon - Base, Social Cost of Carbon - High, Maximum CO2 Reduction, RPS at 35%]
Key Finding:
Annual Average CO2 Emissions for Least Cost Resource Strategies Are Below EPA’s Clean Power Plan [111(b) & 111(d)] Emission Limits At the Regional Level
Key Finding:
There is a very high probability of meeting EPA 111(d) emissions limits at the regional level across all scenarios and future conditions tested.
Next Steps & Schedule

- Council Scheduled to Adopt Draft Plan at October 13th – 14th Meeting in Vancouver
- Public Comment Through December 18, 2015
  - Hearings in Each State - November/December
  - Consultations As Requested
- Council Scheduled to Adopt Final Plan at February 12th – 13th Meeting in Portland