

# The Sixth Northwest Electric Power and Conservation Plan

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# Goal of the Sixth Power Plan

- Recommend a low-cost and low-risk resource strategy to assure the region of an adequate, efficient, economic, and reliable power system
- Support adequate and reliable implementation of fish operations

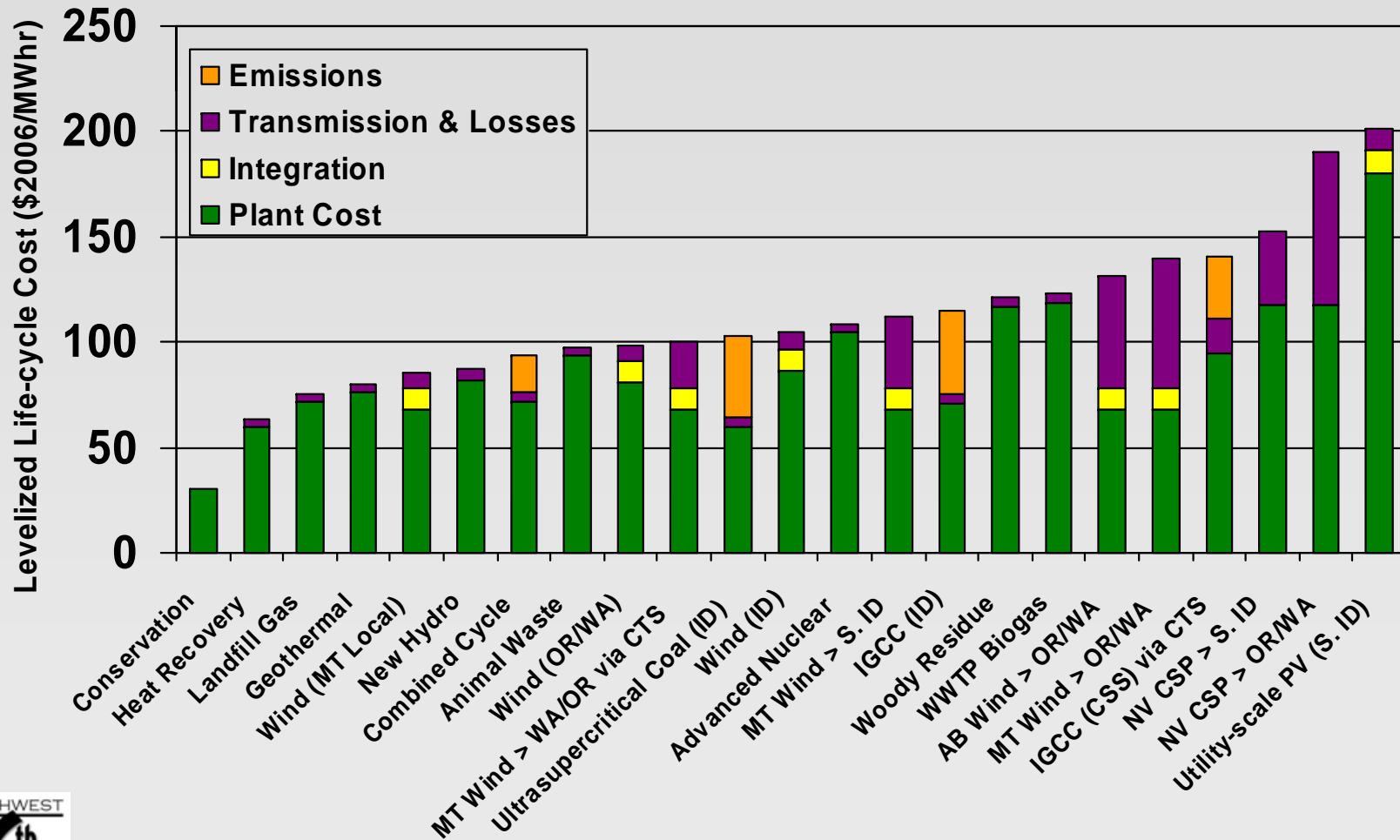
# Major Issues for the Plan

- How should the region respond to:
  - Probable but uncertain future carbon control policies?
  - Higher and more volatile energy prices?
  - Growth of variable output generation?
- The changing role of Bonneville
- Potential of emerging technologies such as smart grid and demand response

# Plan in a Nutshell

- Aggressive conservation
- Renewable generation to meet RPS requirements
- Additional energy, capacity, and flexibility needs provided by natural gas-fired generation
- Cost-effective, small-scale, local renewable and cogeneration opportunities should be developed

# Resource Costs: Long Term



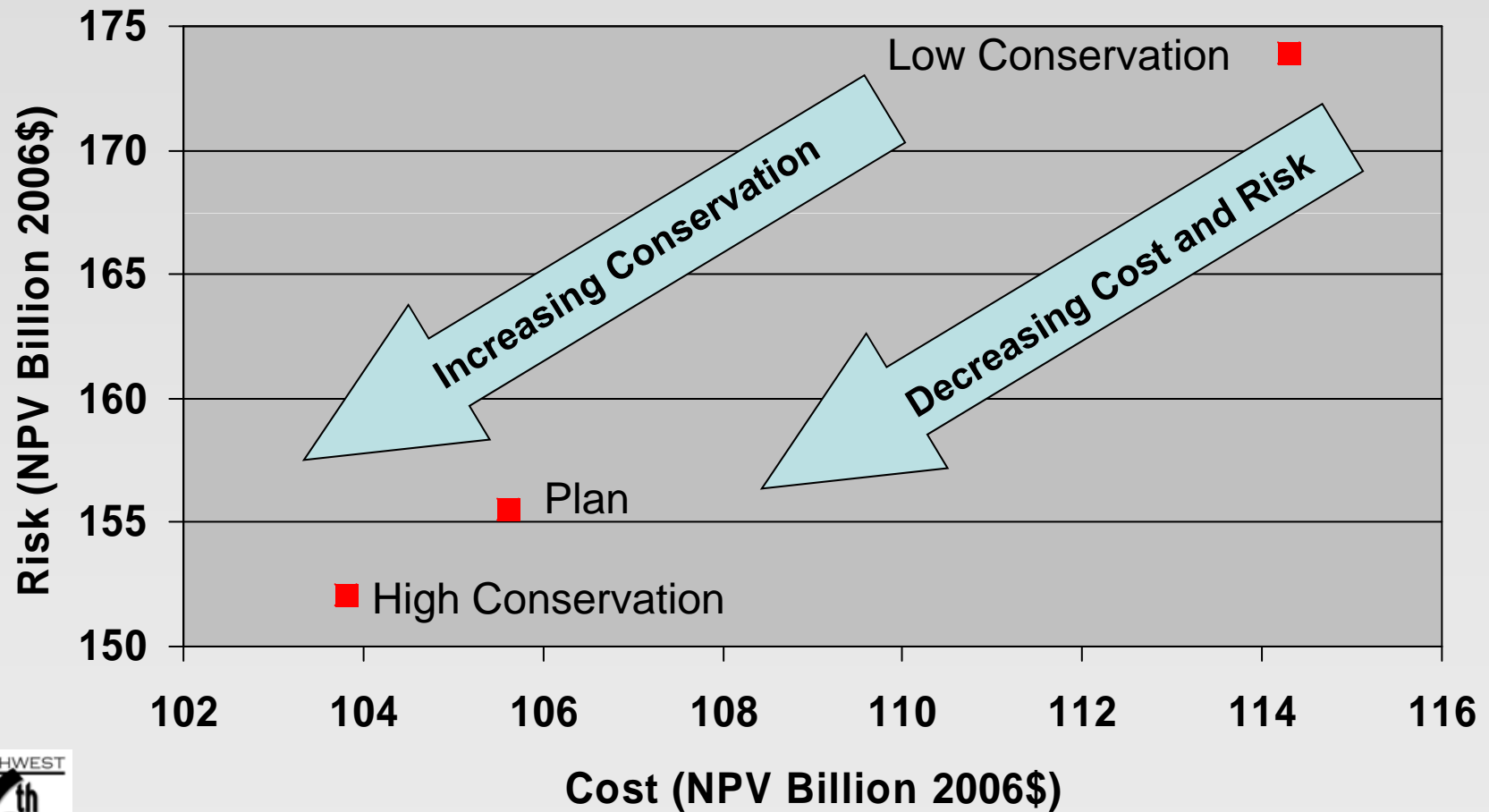
# Other Potential Contributors

- Demand response (firm capacity, flexibility)
- Smart grid development (system operation, demand-side opportunities)
- Energy storage (firm capacity, flexibility)
- Carbon sequestration (reduced CO2)
- System operations (flexibility, market access)
- Transmission expansion (firm capacity, flexibility and energy via access to resources and markets)
- Direct use of natural gas (?)

# Conservation

- Conservation is first priority because:
  - It is the lowest cost resource by far
  - It has no greenhouse gas emissions and therefore reduces risk from potential carbon pricing policies
  - It avoids fuel price risks
  - It provides both capacity and energy
  - It is a source of local jobs and economic activity

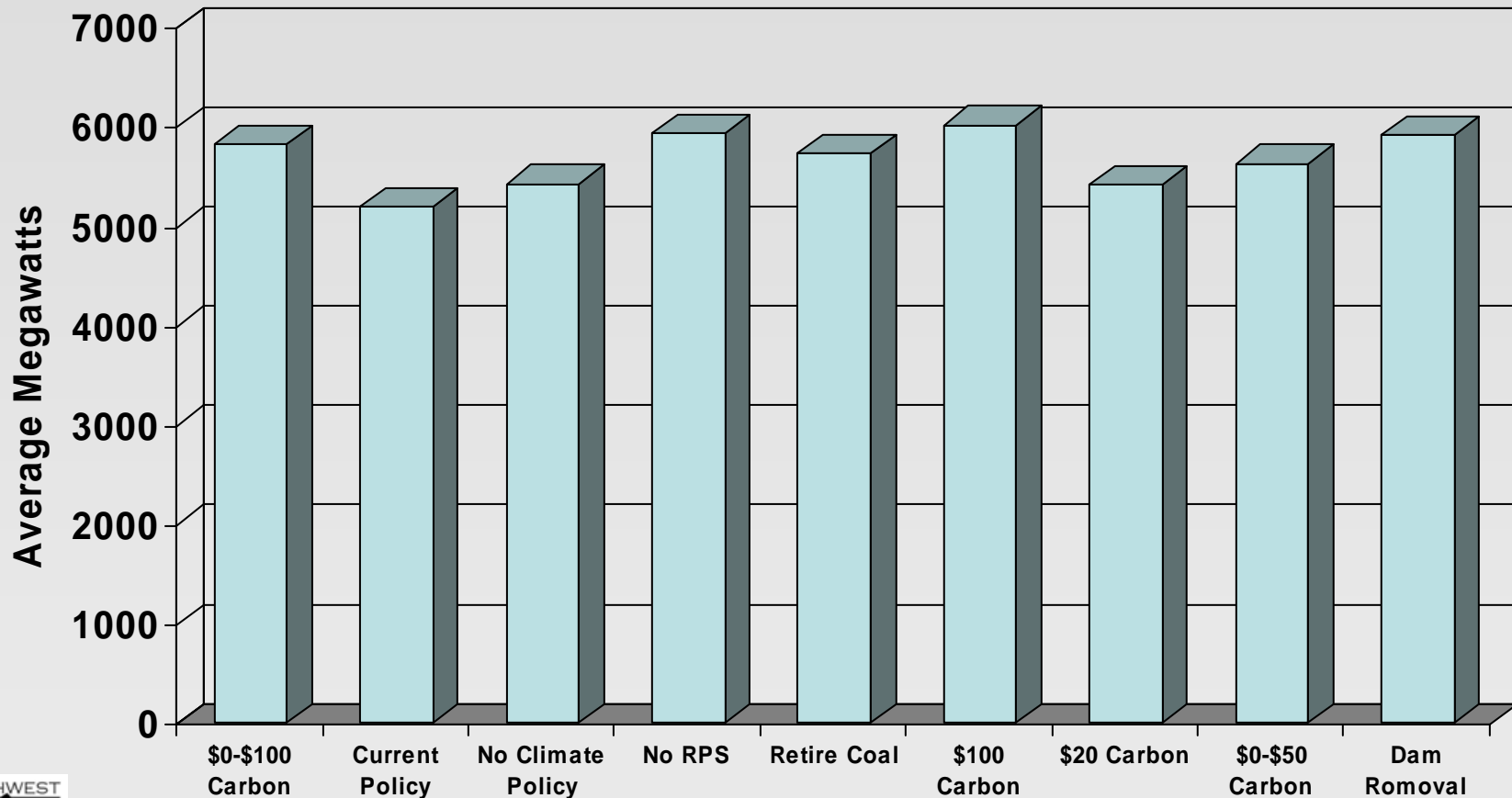
# Conservation Reduces Power System Cost and Risk



# Scenarios Examined

- No Carbon Policy Case: no RPS, no RECs, but no new coal allowed
- Current policy only: with no carbon price risk
- Current policy + \$0 to \$50 carbon price risk
- Current policy + \$0 to \$100 carbon price risk
- Current policy + \$0 to \$100 carbon price risk without RPS
- Current policy + fixed carbon prices: at \$100 and \$20
- Coal retirement cases: with and without carbon price risk
- Removing lower Snake River dams

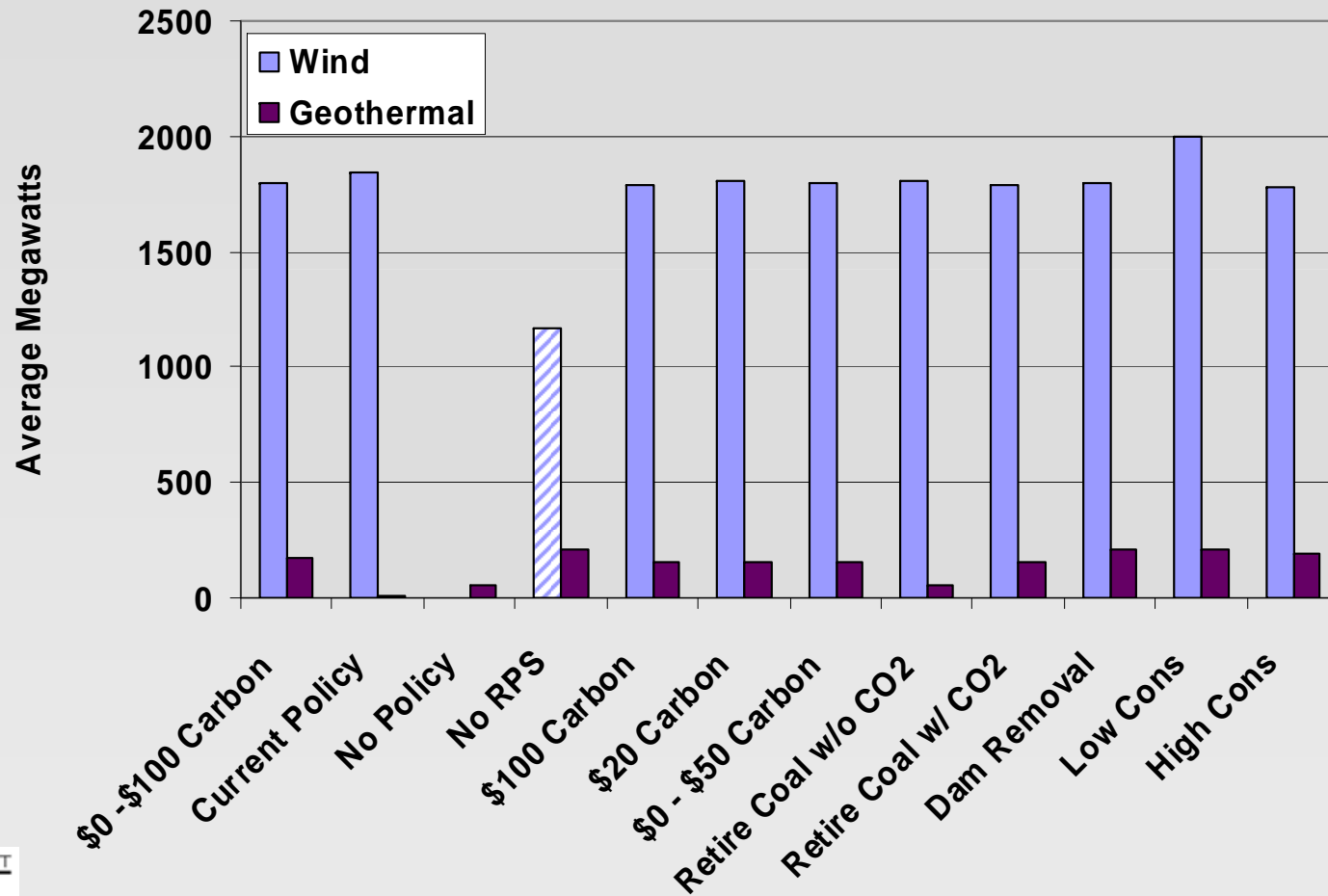
# Conservation is Cost-effective Under Many Different Future Scenarios



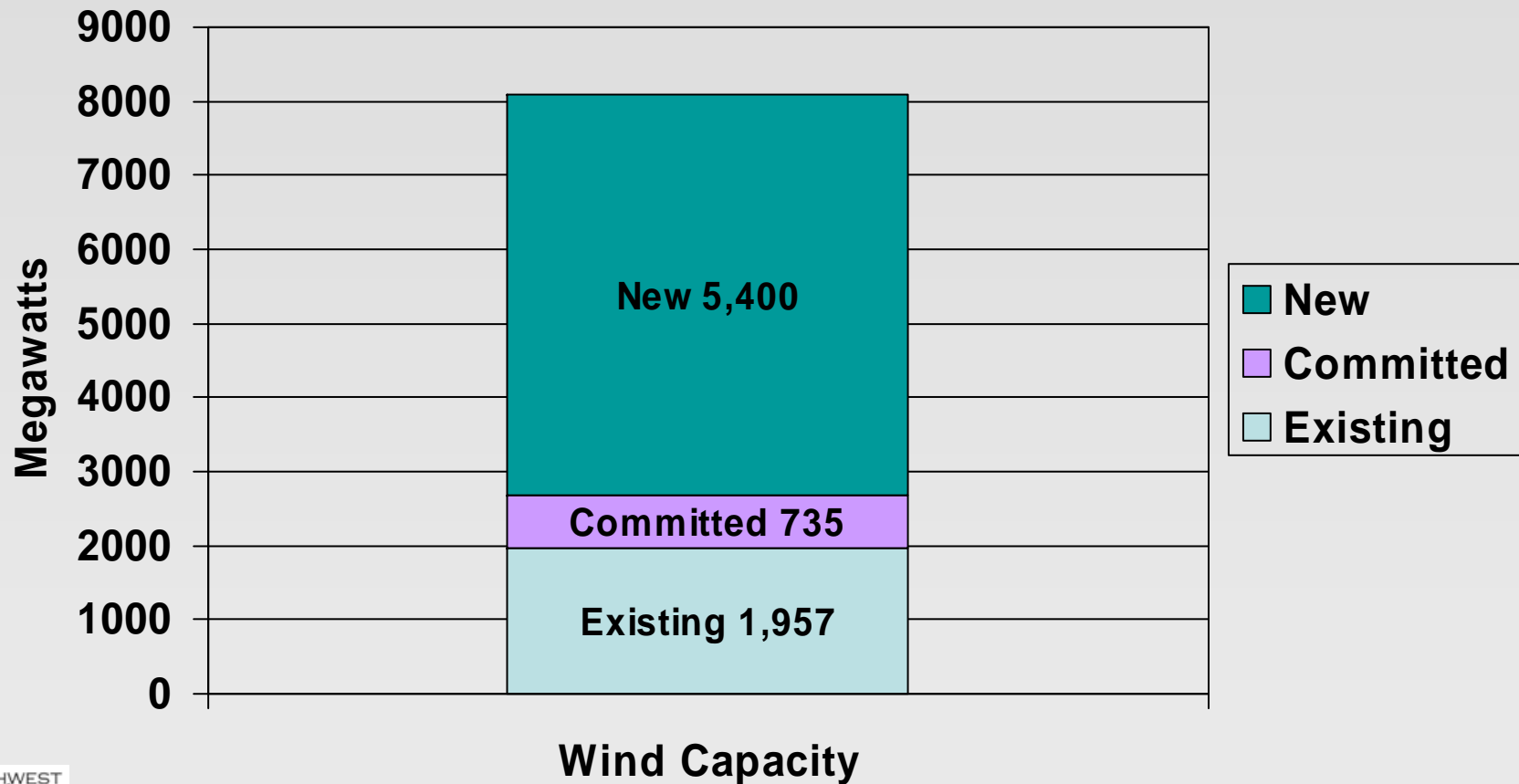
# Renewable Generation

- Wind power is expected to meet the majority of RPS requirements
  - About 1,800 average megawatts (5,400 nameplate)
  - Variable wind output creates integration challenges
- Geothermal and other smaller-scale renewables such as biogasification, bioresidue combustion, hydropower upgrades, and new hydropower may be cost-effective and should be explored when available at the local level

# Wind Development is Driven by Renewable Portfolio Standards



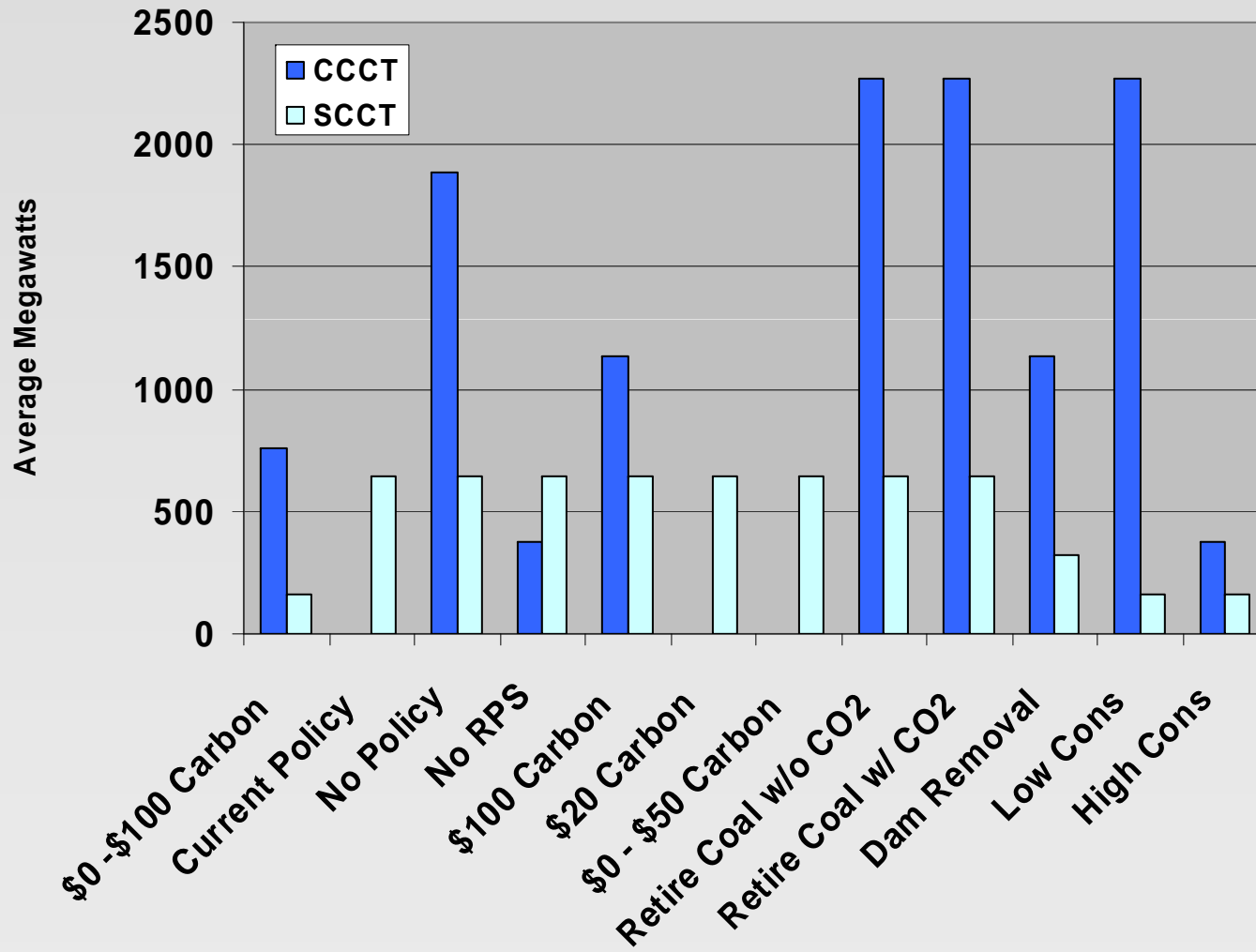
# Existing, Committed, and New Wind Generating Capacity



# Natural Gas

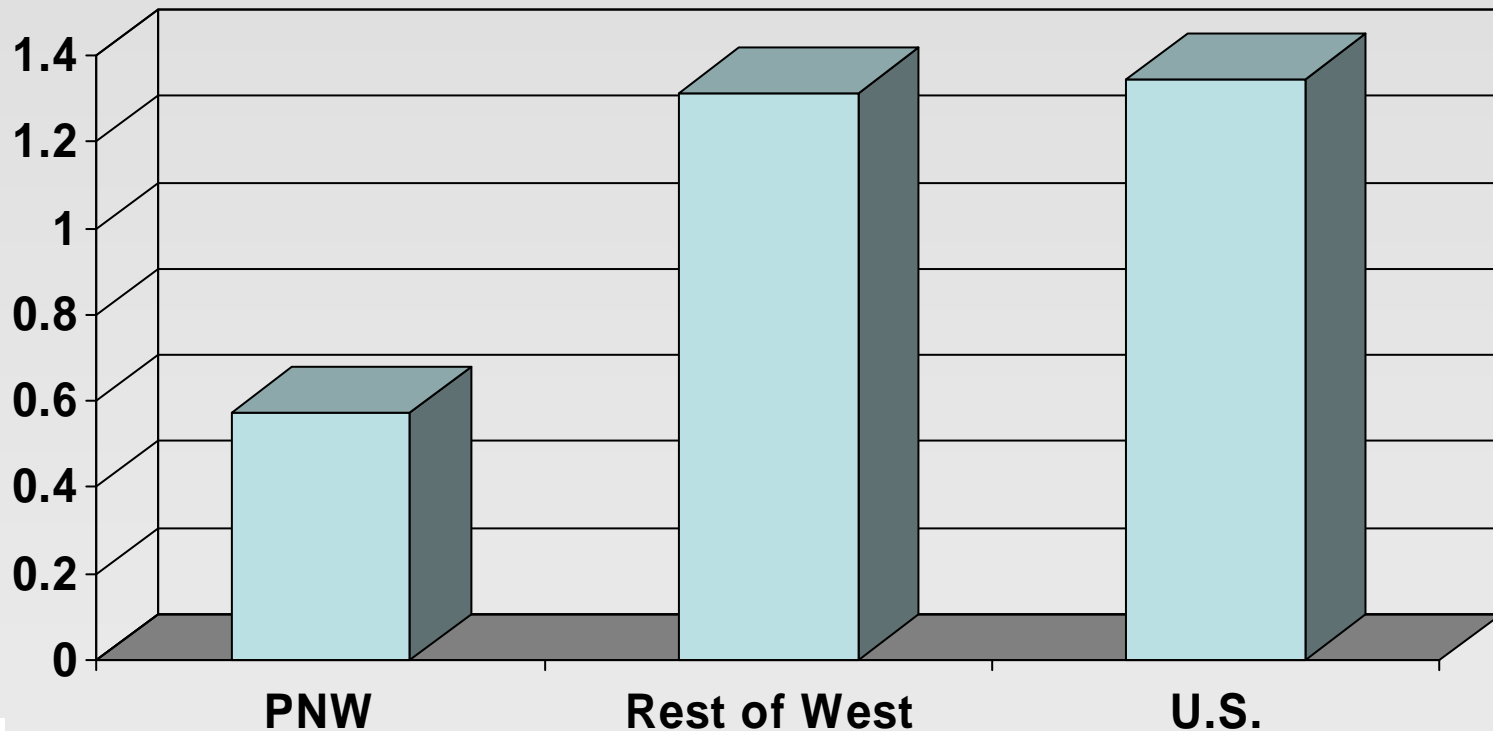
- Natural gas-fired generation can provide energy, firm capacity and flexibility when needed
  - Substantial fuel price risk
  - Moderate capital risk and short lead time
  - Lower carbon emissions than coal
- Gas-fired generation options provide protection against rapid growth and offer reduced carbon-emission generation if carbon prices are high
- The role of natural-gas fired generation varies among scenarios

# Gas-Fired Generation Options

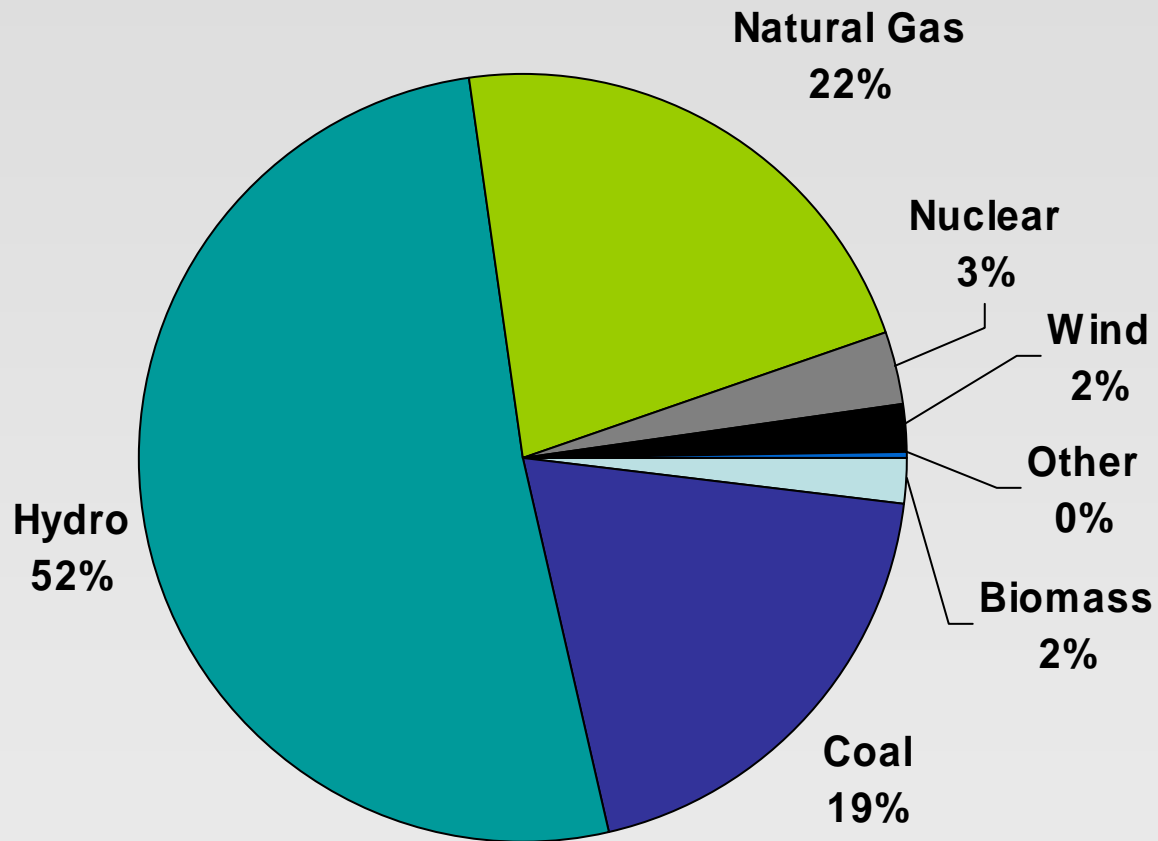


The Pacific Northwest produces about half of the CO<sub>2</sub> per kilowatt-hour of electricity consumption of the rest of the country due to the extensive hydroelectric system.

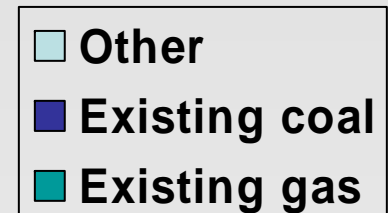
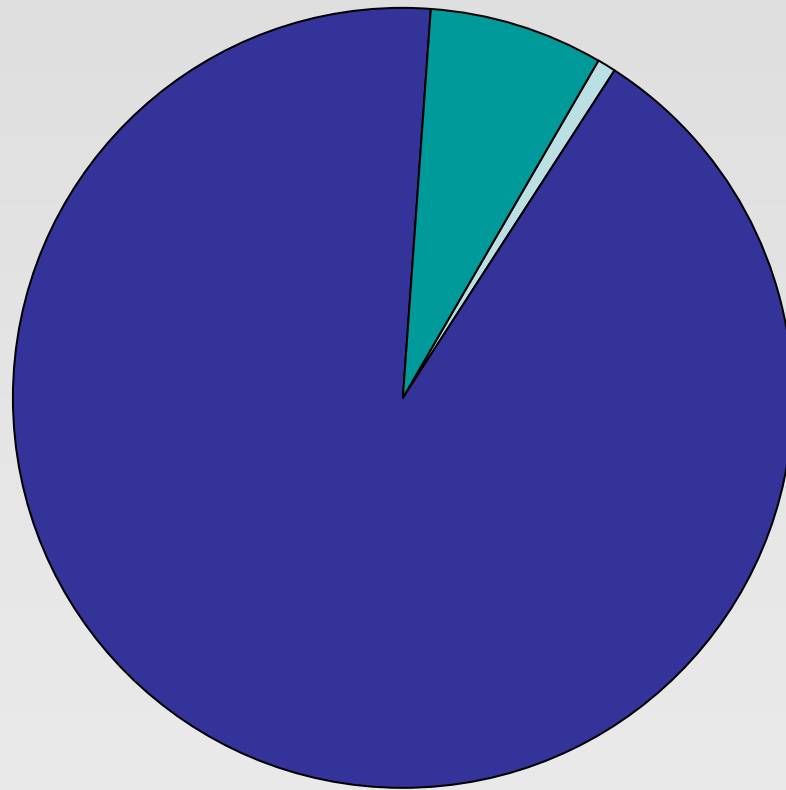
**Pounds of CO<sub>2</sub> Per kWh**



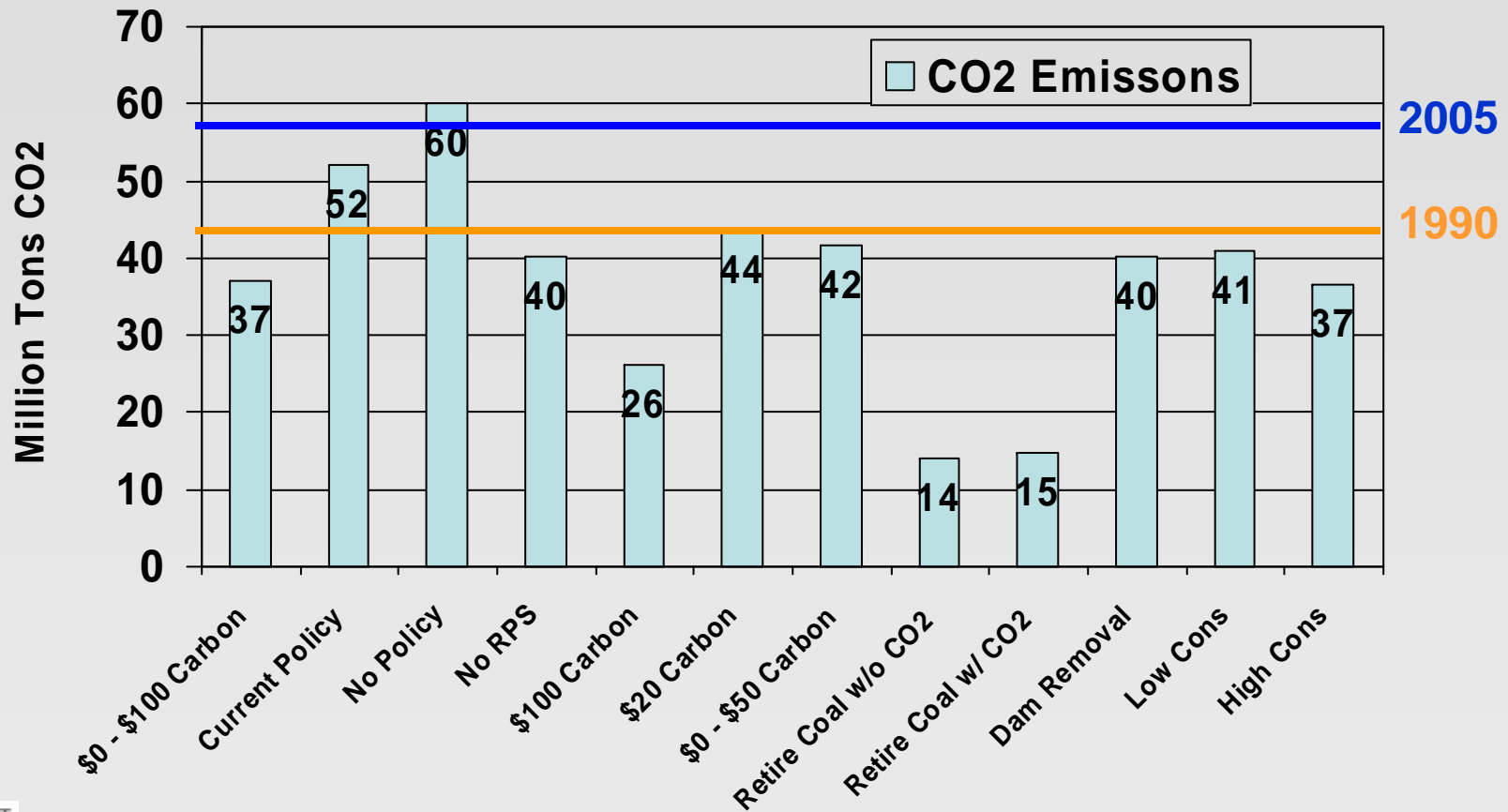
# Coal Provides 19 Percent of PNW's Energy



# Coal plants account for 88 percent of power system CO<sub>2</sub> emissions



# Carbon Emission Effects of Scenarios



# 5-Year Action Plan

- Develop 1,200 average megawatts of conservation by 2014 (1,100 to 1,400 range)
  - Evaluate midway through Action Plan
- Develop cost-effective new generation if needed for energy, firm capacity or flexibility
  - As warranted by individual utility situations
  - Special efforts to acquire small-scale renewables and cogeneration
- Improve power system operation and capability to improve market access, provide ancillary services, and integrate wind generation
- Research and demonstrate promising new technologies for improved efficiency, demand response, and generation