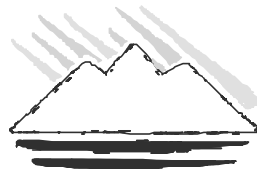


A Balanced Energy Plan for the Interior West: Transmission Implications



**WESTERN RESOURCE
ADVOCATES**

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Questions:

- **What might a cleaner, more diversified electric system in the Interior West look like?**
- **What are the broader economic, risk reduction and environmental benefits of a more diversified system?**
- **What are the transmission implications of such a system?**

Balanced Energy Plan

Study Objectives:

- **Develop aggressive but feasible cleaner, diversified energy plan for the Interior West – AZ, CO, NM, NV, UT & WY**
- **Compare costs, benefits & transmission implications of the Plan to a business-as-usual scenario relying primarily on fossil fuels**
- **Relative to Business-as-Usual, Balanced Plan includes:**
 - Significantly increased reliance on renewable energy, energy efficiency and distributed combined-heat & power resources
 - Retirement of some older, less efficient, more polluting fossil resources now on the system

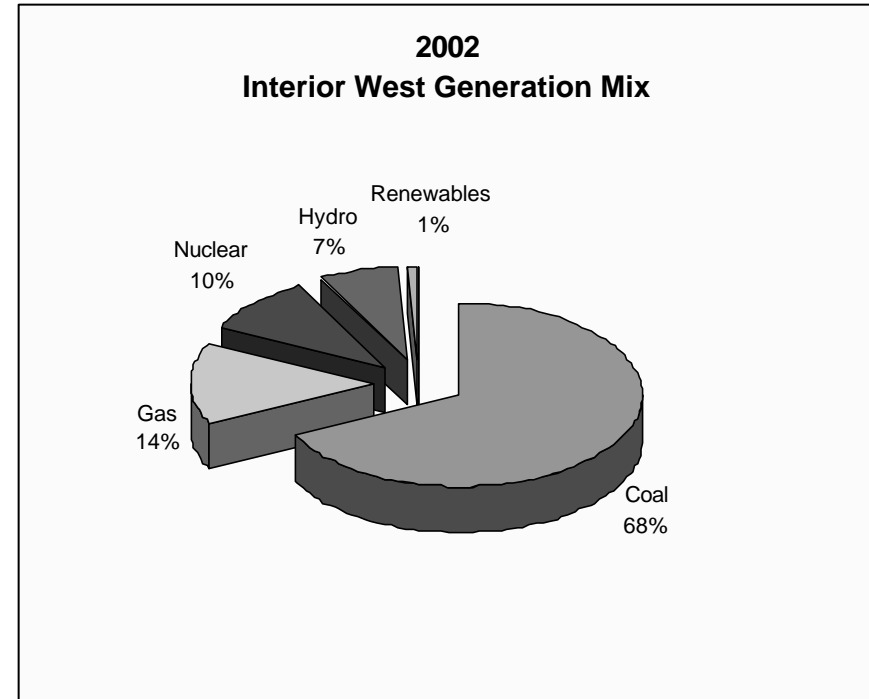
Historically, Interior West has relied on:

- Large power plants remote from load centers
- Long transmission lines to deliver electricity
- Fossil fuels, especially coal
- More recently natural gas plants closer to load centers

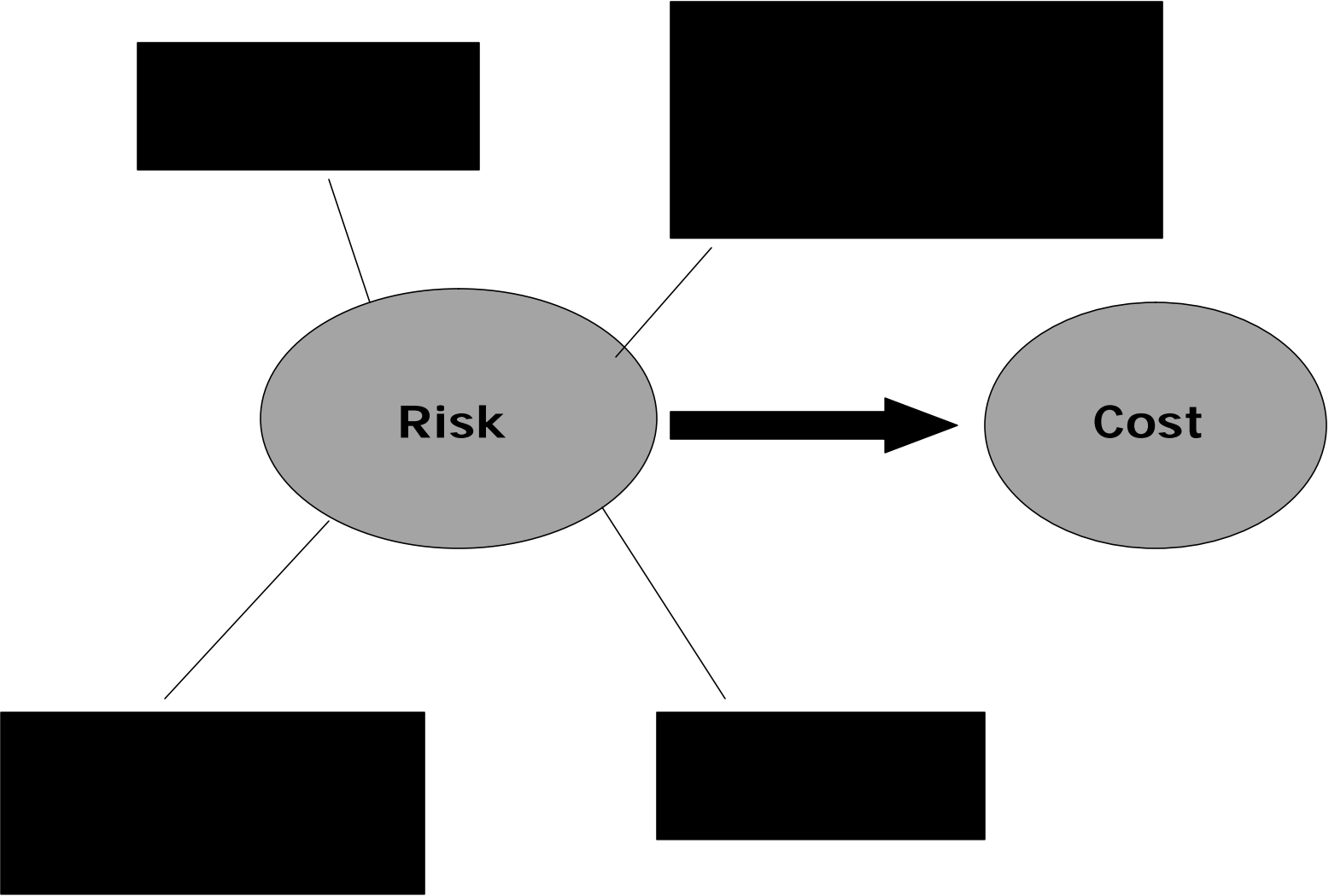
Historic benefits:

- Reliable electricity supply
- Stable, generally low electricity rates

But



Current system subject to growing risks



Balanced Energy Plan seeks to:

- Reduce and manage risks
- Lower the cost of electric energy services
- Reduce environmental impacts of power production
- Ensure transmission and generation reliability

Analytical Tools

- **PROSYM model used to compare operation of regional electric system under a Balanced Energy Plan with the Business-as-Usual scenario**
- **PROSYM**
 - Production cost model of the western electric system
 - Simulates optimal dispatch of power plants to meet electricity demands in the region, subject to transmission and other constraints
- **Used PROSYM to ensure that both the BAU scenario and the Balanced Energy Plan maintain transmission and generation reliability**

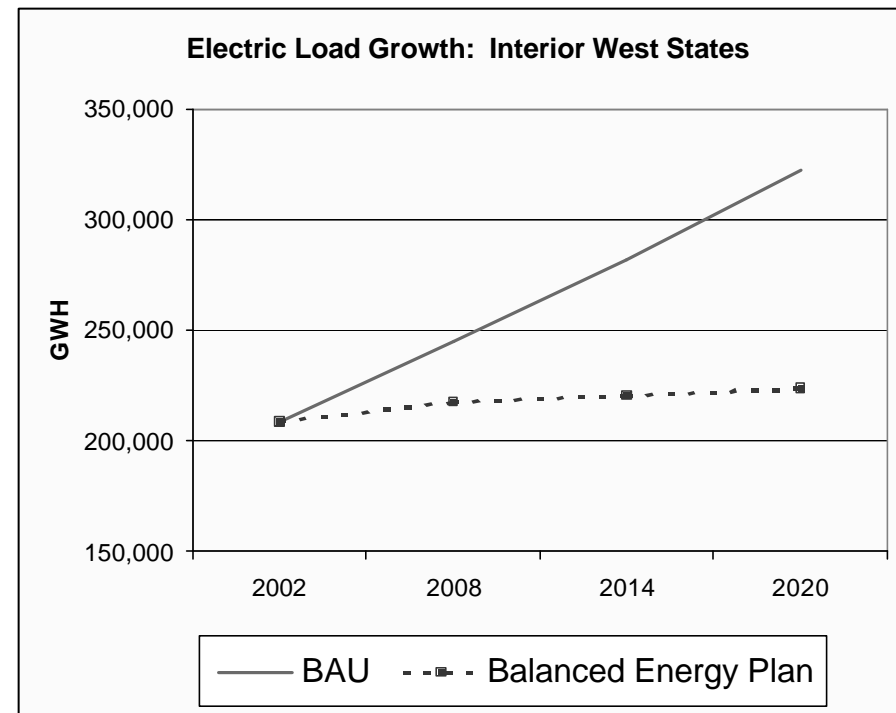
Geographic Scope

- **Focus is seven state Interior West region**
- **PROSYM modeling includes CA and PNW**



Role of Energy Efficiency

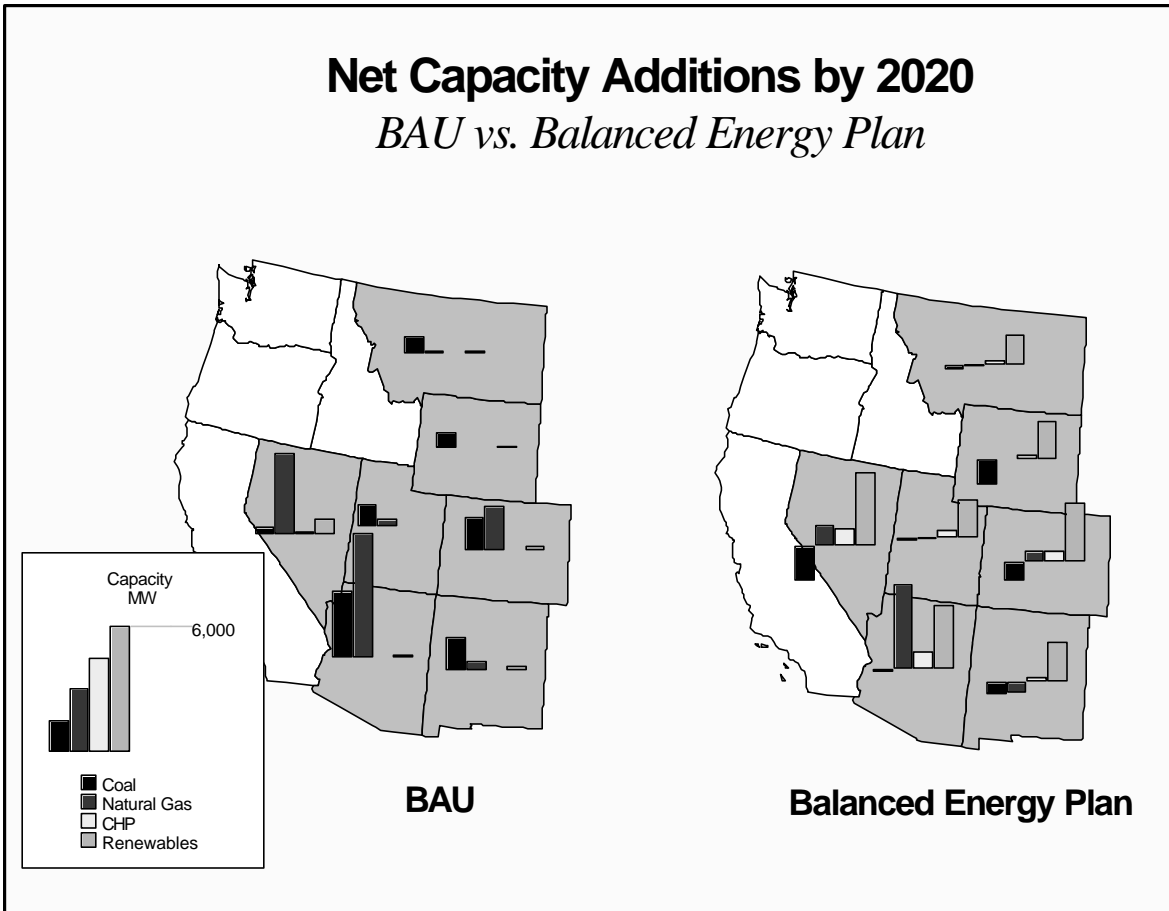
- **The Balanced Energy Plan employs large amounts of cost effective energy efficiency consistent with the Southwest Energy Efficiency Project (SWEEP) study: *The New Mother Lode*.**
- **Efficiency reduces electricity consumption in the region by 30 percent, relative to BAU**



Capacity Additions

Net Capacity Additions by 2020

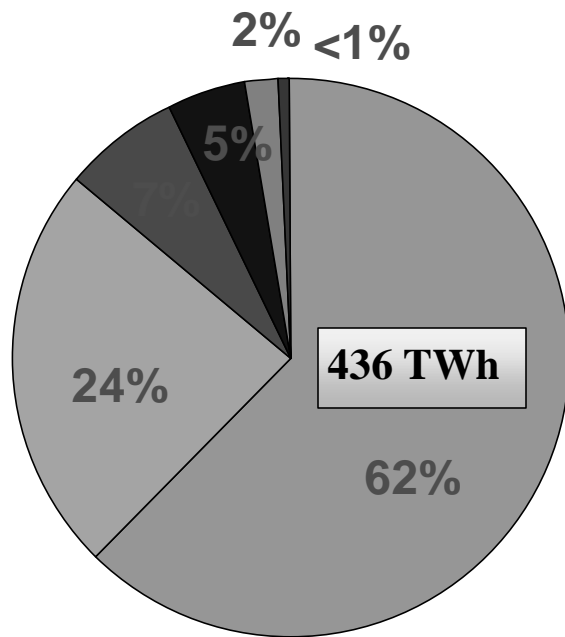
BAU vs. Balanced Energy Plan



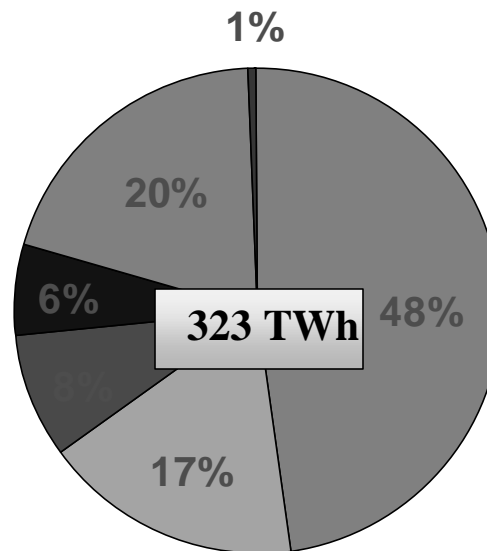
Balanced Energy Plan Adds:

- 15,000 MW of renewable capacity
- 3000 MW of CHP
- 7500 MW of natural gas
- Retires about 5,000 MW of older, more polluting coal-fired capacity

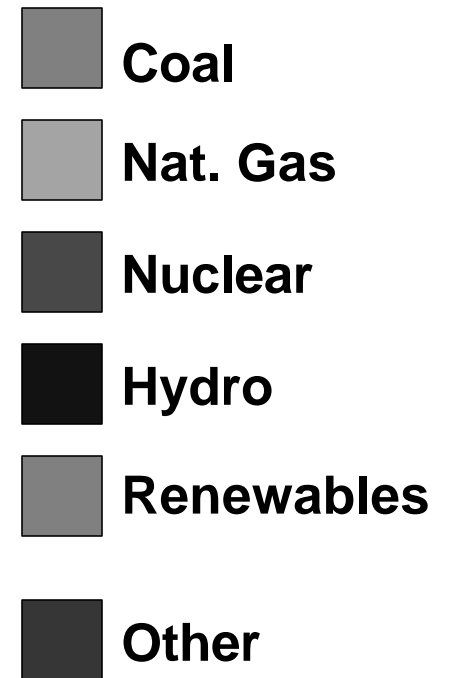
Generation Mix



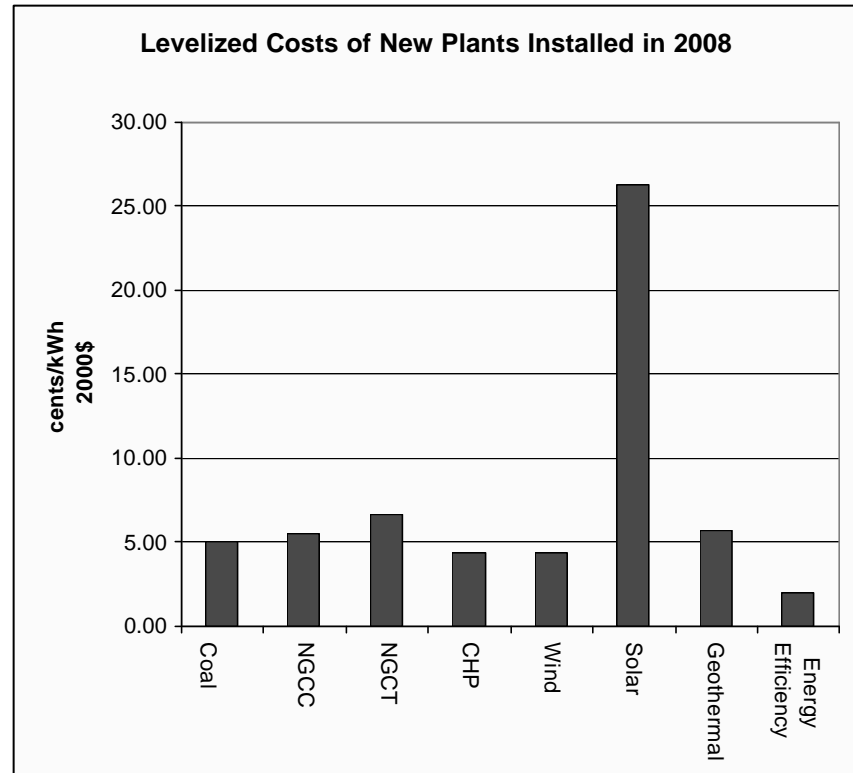
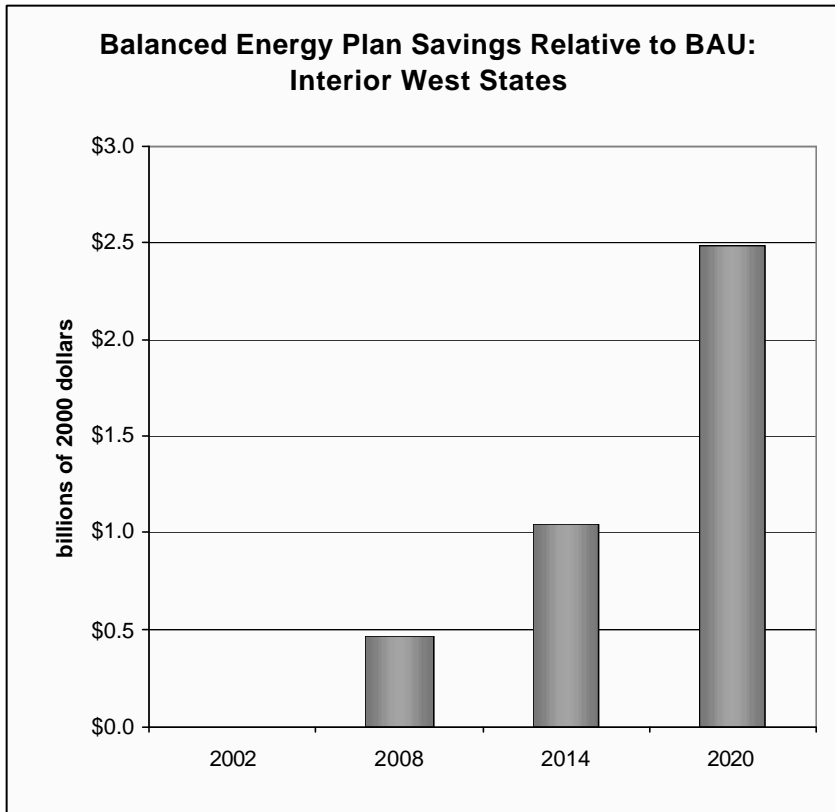
**BAU
2020**



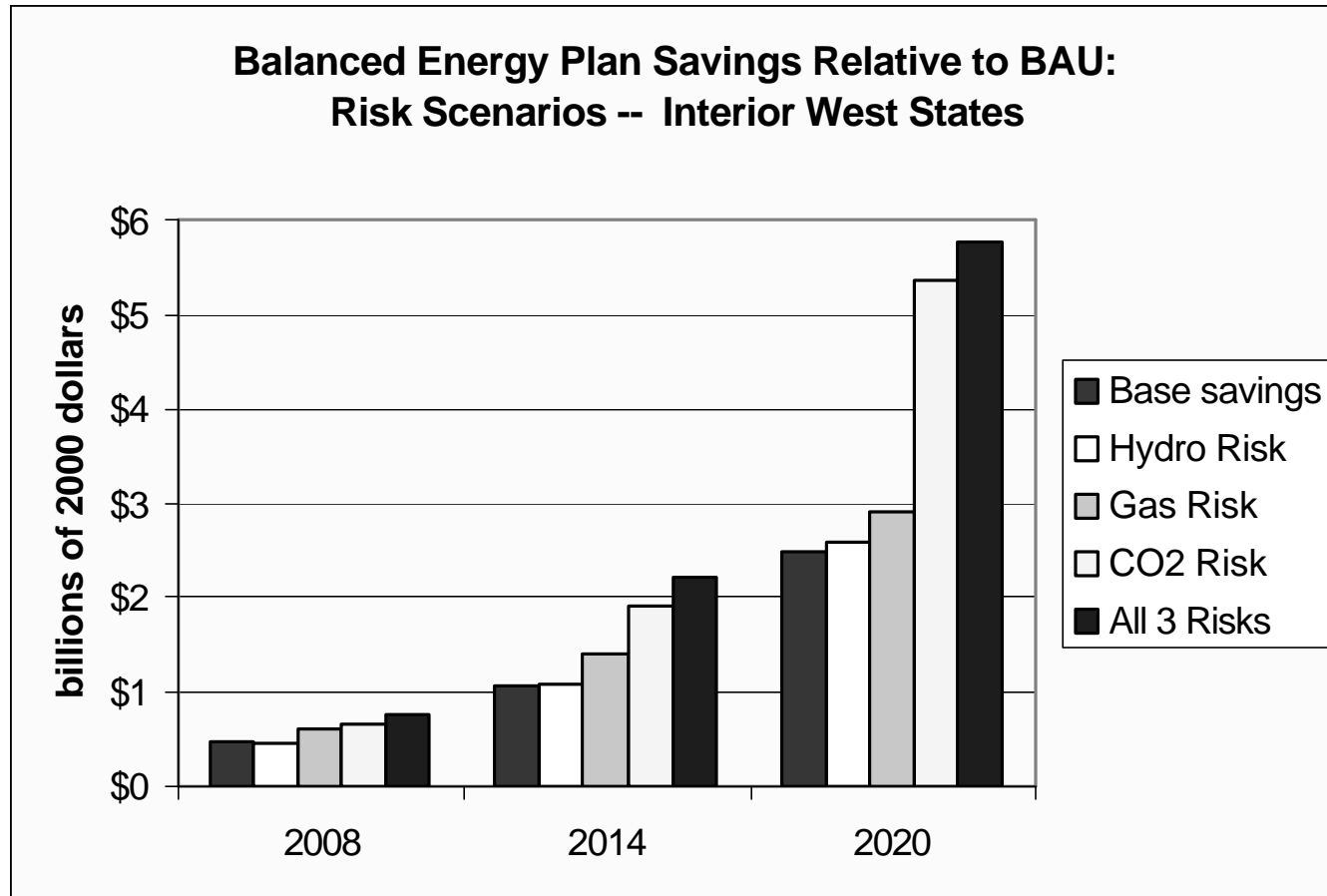
**Balanced Plan
2020**



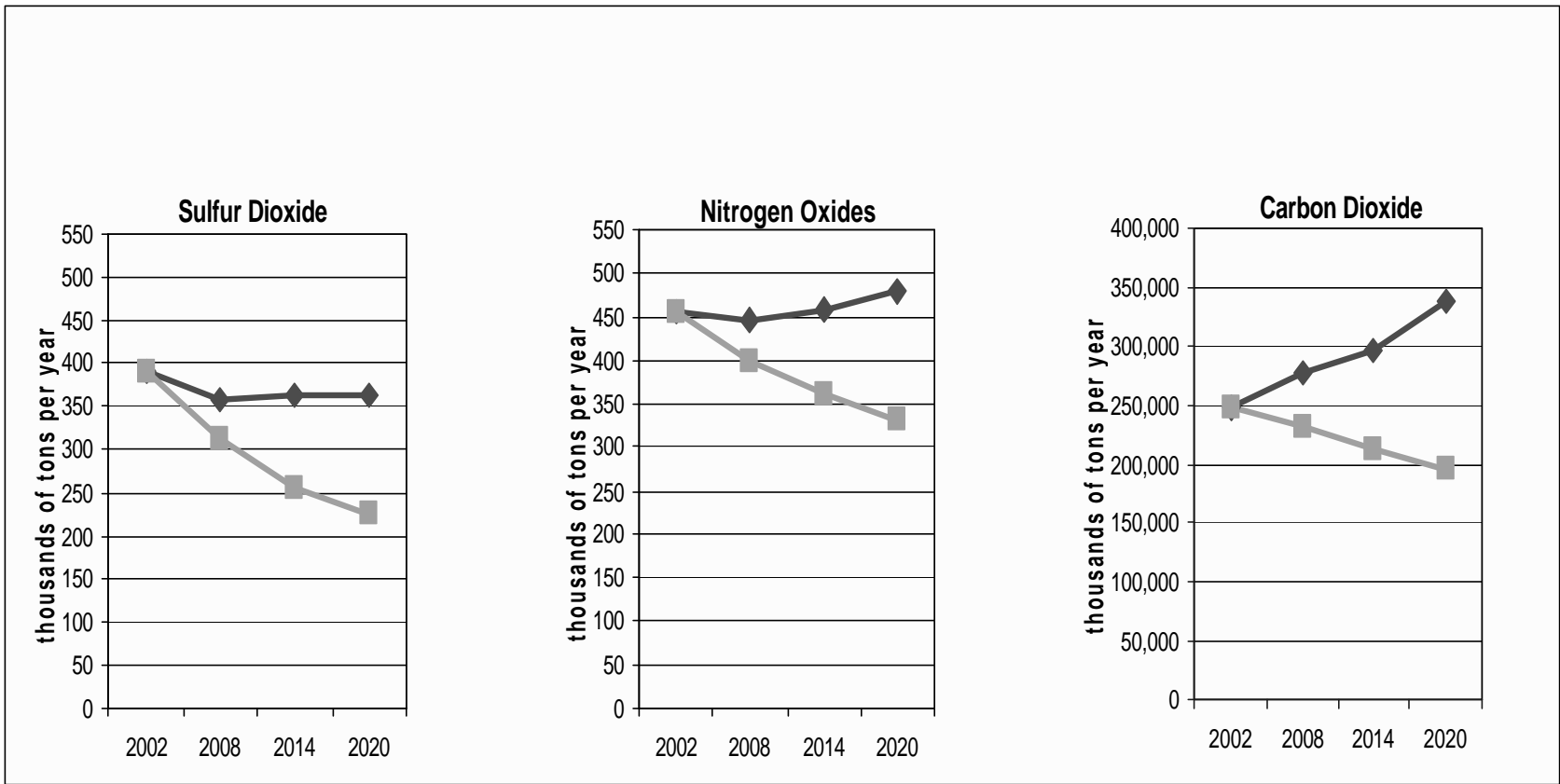
Benefits: Cost Savings



Benefits: Risk Mitigation



Benefits: Less Pollution



BEP 38% below BAU

BEP 31% below BAU

BEP 42% below BAU

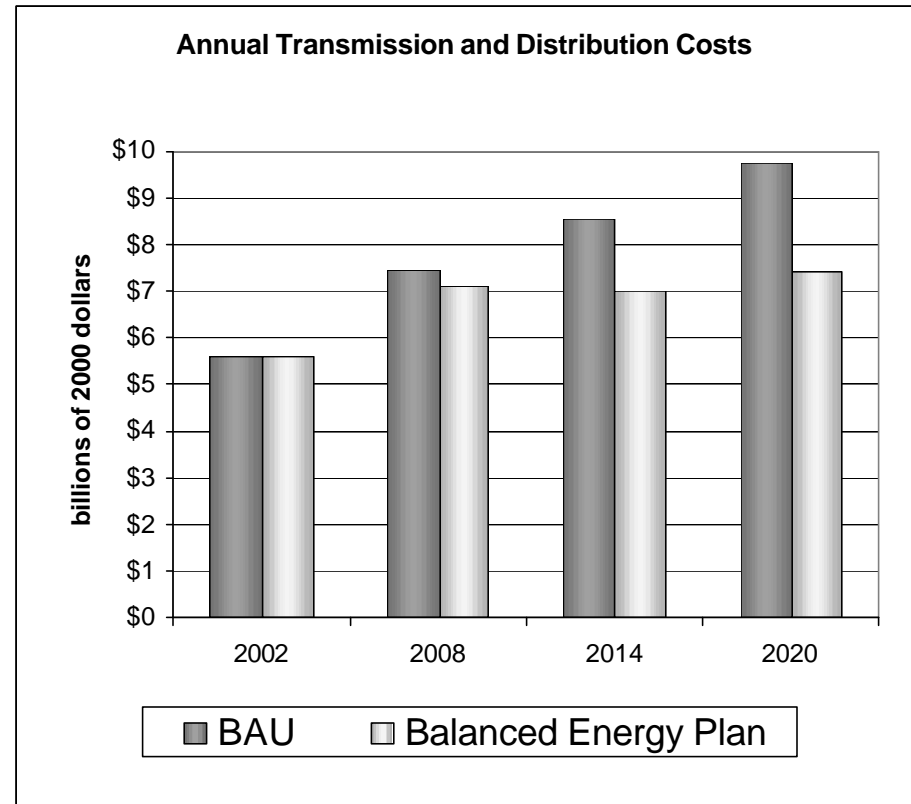
Transmission Issues

As part of the analysis we:

- Analyzed extent to which energy efficiency and distributed CHP and renewables could reduce transmission needs and lower transmission related costs
- Identified areas where transmission system upgrades are needed to bring remote renewables — mainly wind — to market
- Weighed costs of tapping higher quality, higher transmission cost remote renewables versus lower quality renewable resources closer to load

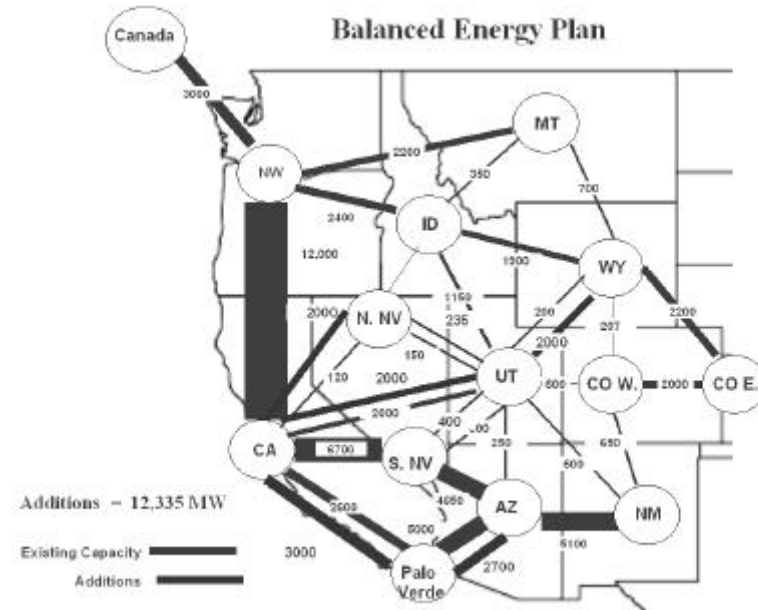
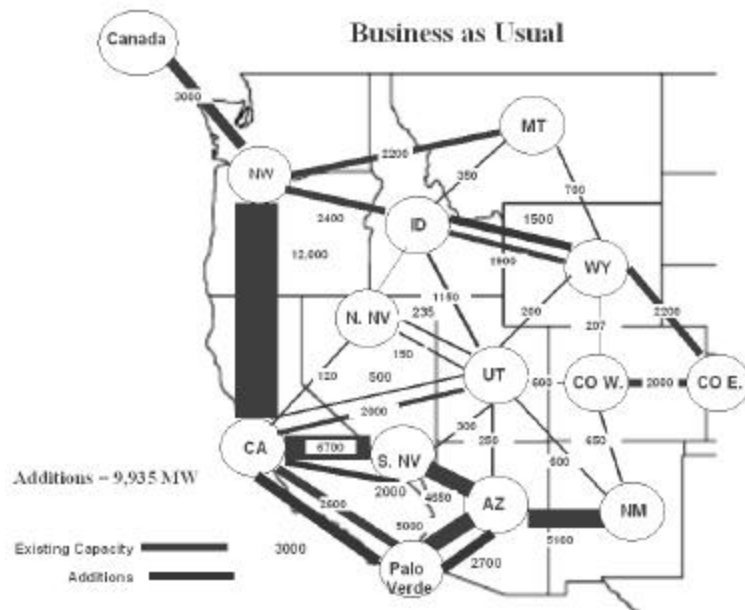
Transmission Results

- Overall, BEP results in the need for fewer transmission & distribution system upgrades and lower overall T&D costs
- Why? Reduced loads on the system due to energy efficiency and CHP investments



Transmission Results

- However, BEP does require more major interstate transmission upgrades to move remote renewable resources to load centers



Implications for Transmission Planning and Development

- **Recognize the benefits of energy efficiency and CHP in reducing the need for transmission upgrades and lowering transmission costs**
- **Transmission planning and development should facilitate the movement of remote renewable resources to market**
- **Transmission and generation planning should anticipate fuel price, future environmental regulation and drought risks**

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