

The Role of Electric Energy Efficiency in Reducing PNW Carbon Emissions

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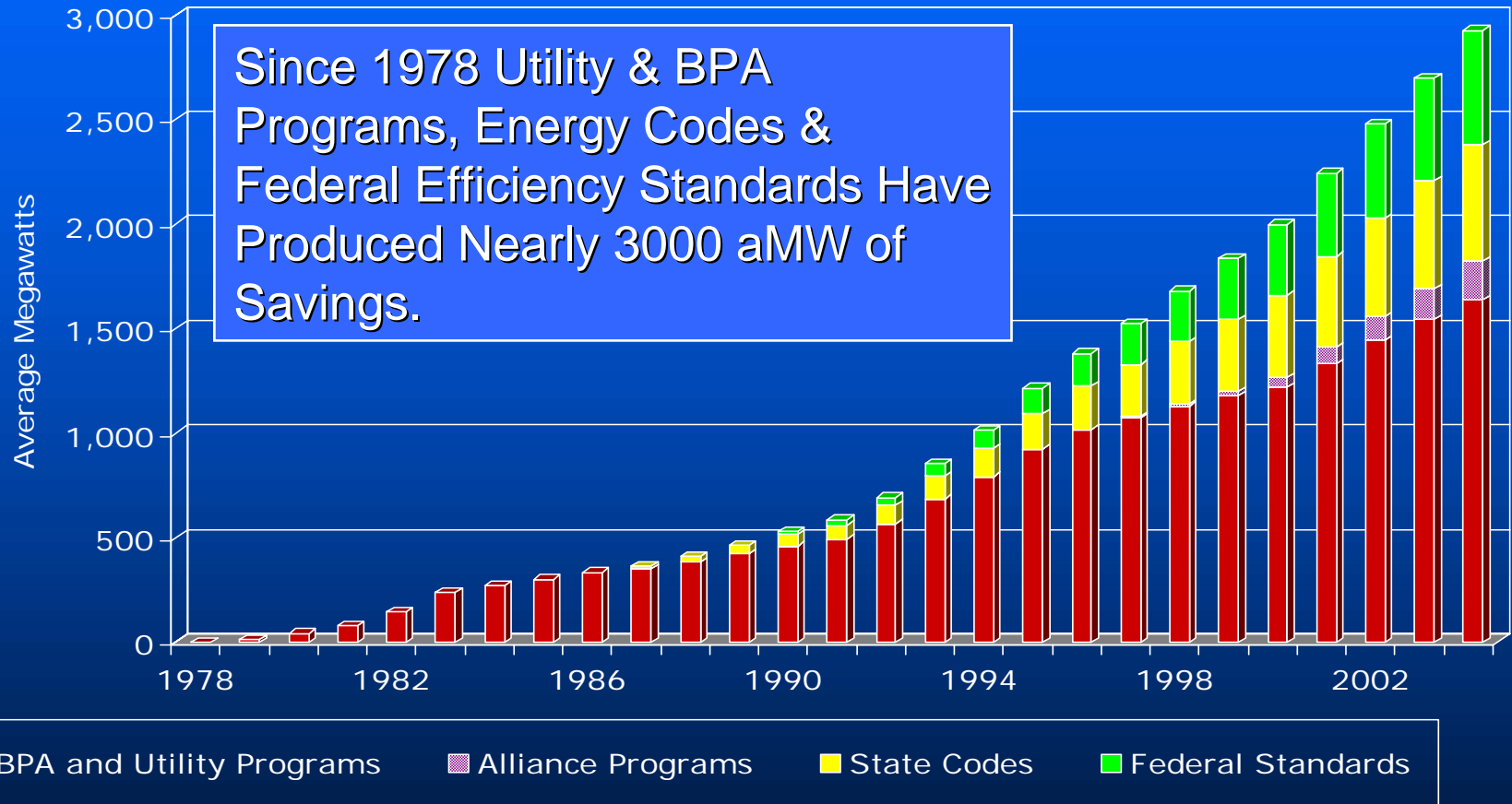
Presented June 8, 2006

Global Warming in the Pacific Northwest: Consequences and Choices

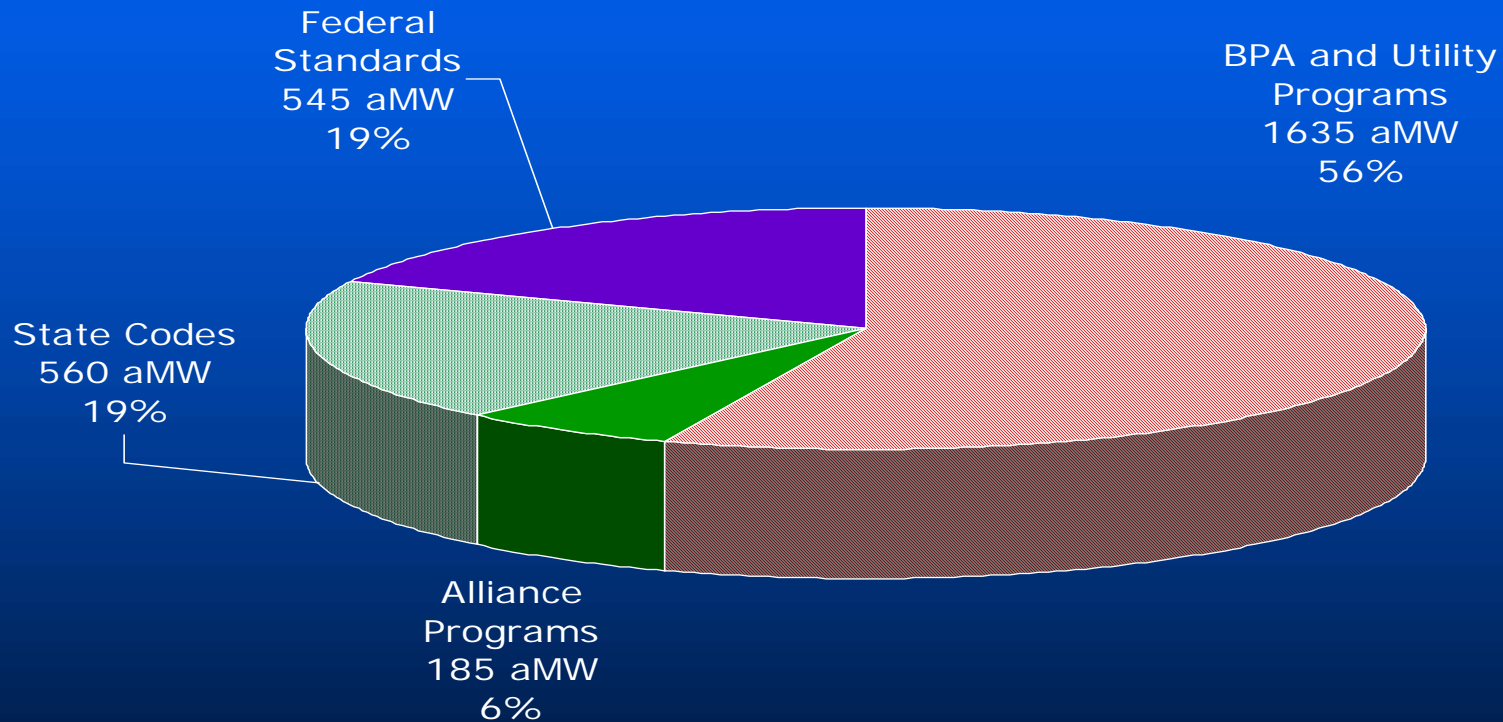
What You're About To Hear

- Energy Efficiency and the Current PNW Resource Mix
- Regional Efficiency Goals
 - 5th Northwest Power and Conservation Plan
- What's Behind the Goals
 - Money, Risk and Carbon Benefits
- Could We Do More?

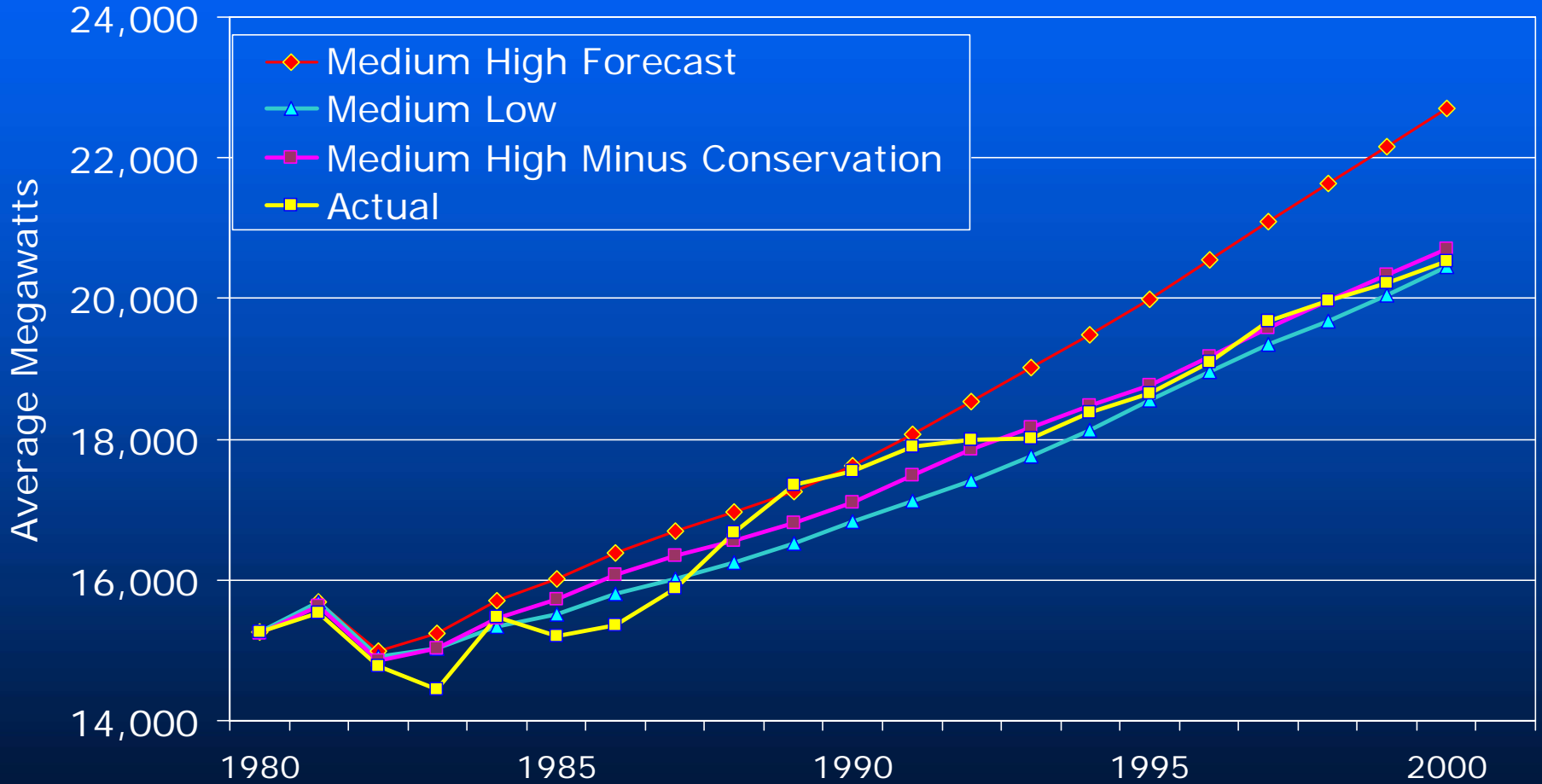
PNW Energy Efficiency Achievements 1978 - 2004



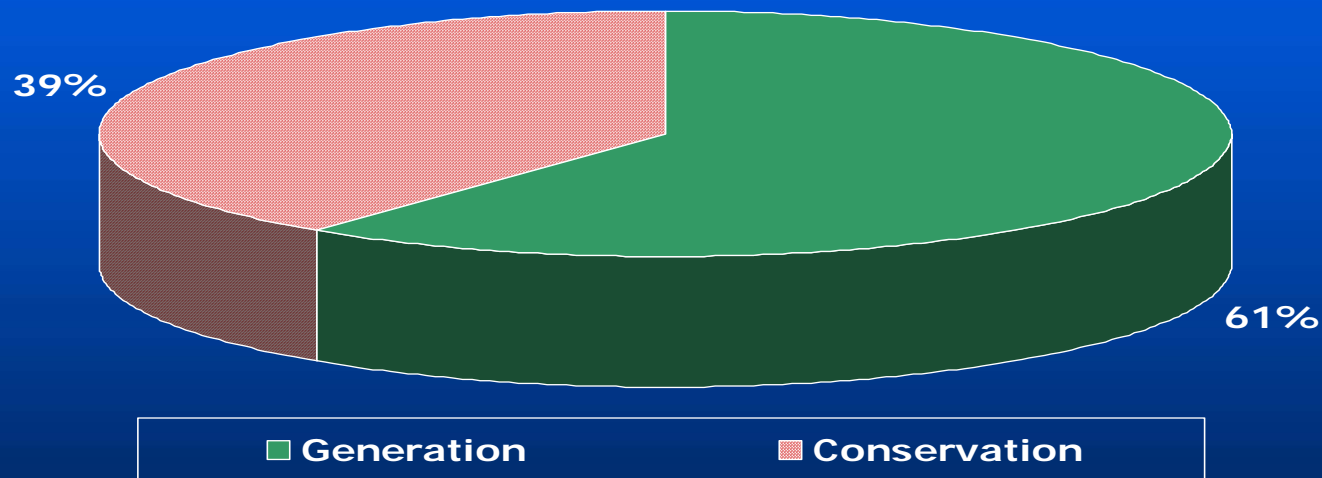
Cumulative 1978 - 2004 Efficiency Achievements by Source



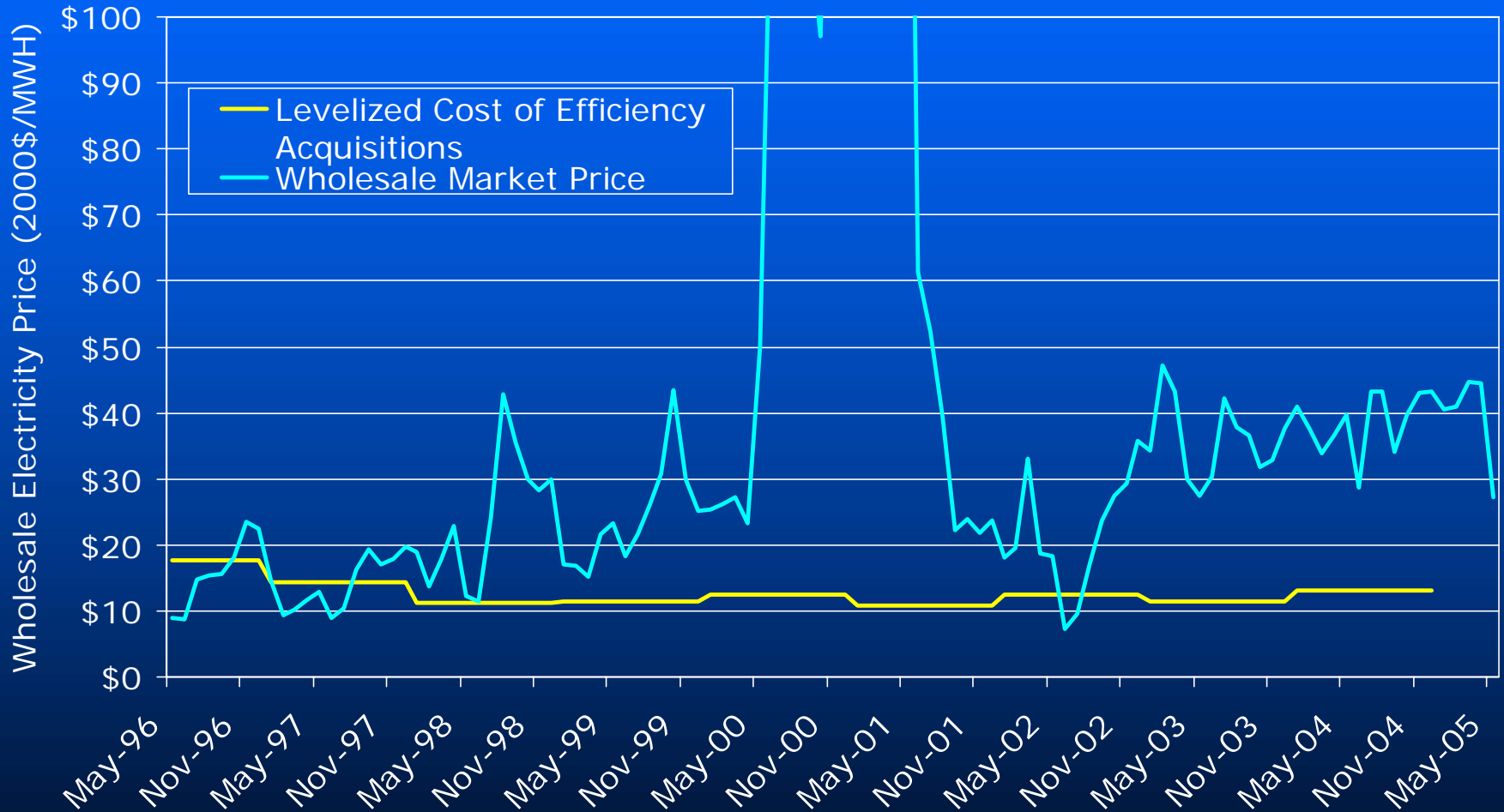
Energy Efficiency Resources Significantly Reduced Projected PNW Electricity Sales



Energy Efficiency Met Nearly 40% of PNW Regional Firm Sales Growth Between 1980 - 2003

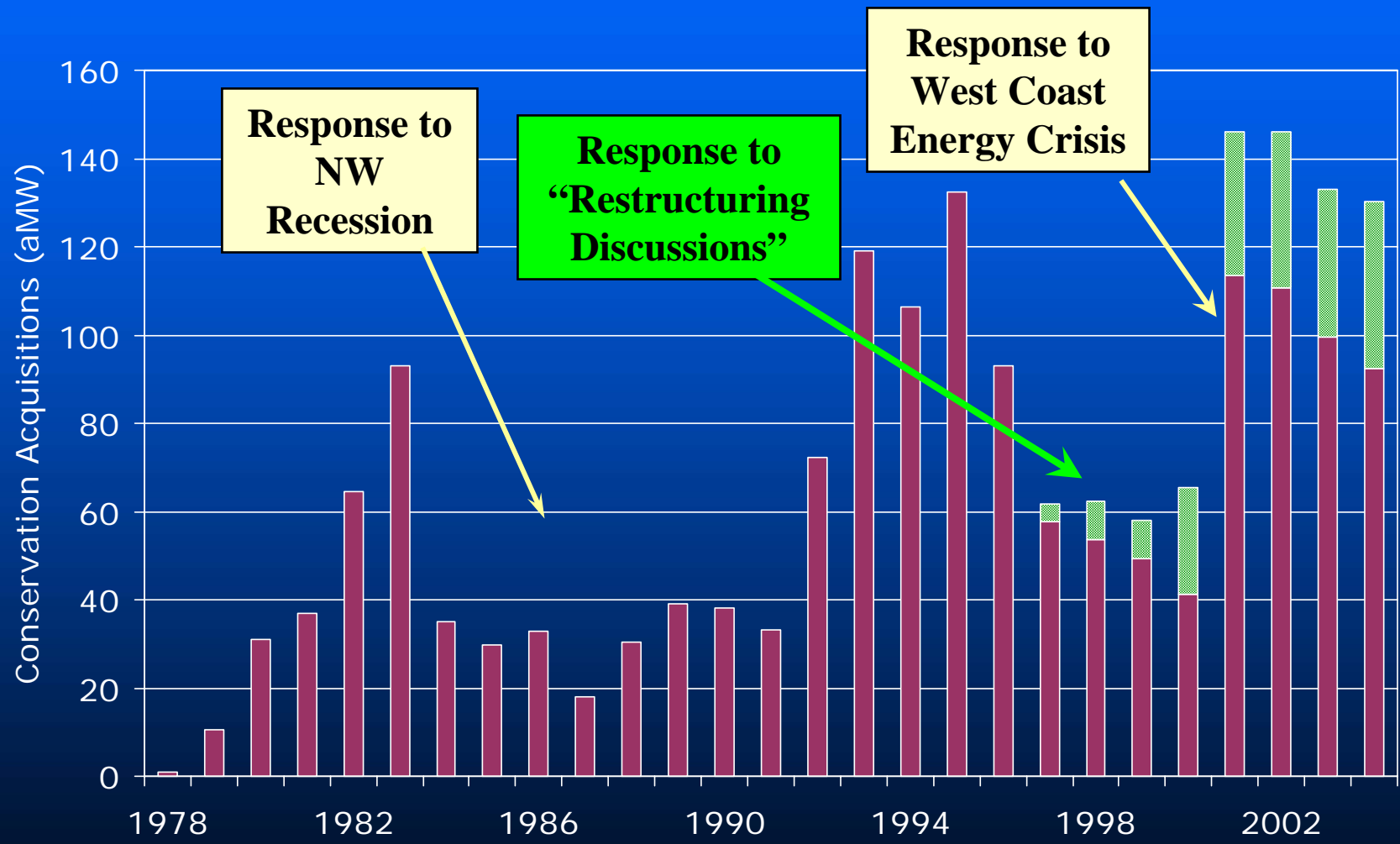


Utility Acquired Energy Efficiency Has Been **A BARGAIN!**



Regional Utility Conservation Acquisitions Have Also Helped Balance Loads & Resources

Creating Mr. Toad's Wild Ride for the PNW's Energy Efficiency Industry

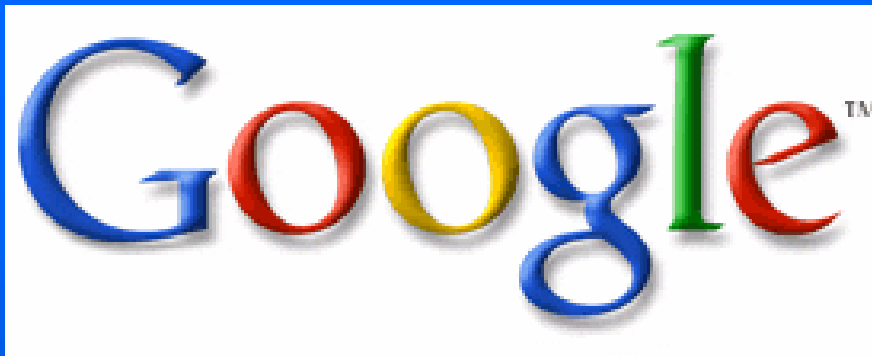


So What's 3000 aMW?

- It's enough electricity to serve the entire state of Idaho and all of Western Montana
- It's enough electricity to meet nearly 60% of Oregon total electricity use
- It saved the region's consumers more than \$1.25 billion in 2004
- It lowered 2004 PNW carbon emissions by an estimated 13 million tons.



IS THAT AS GOOD AS IT GETS?



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PNW Energy Efficiency Potential

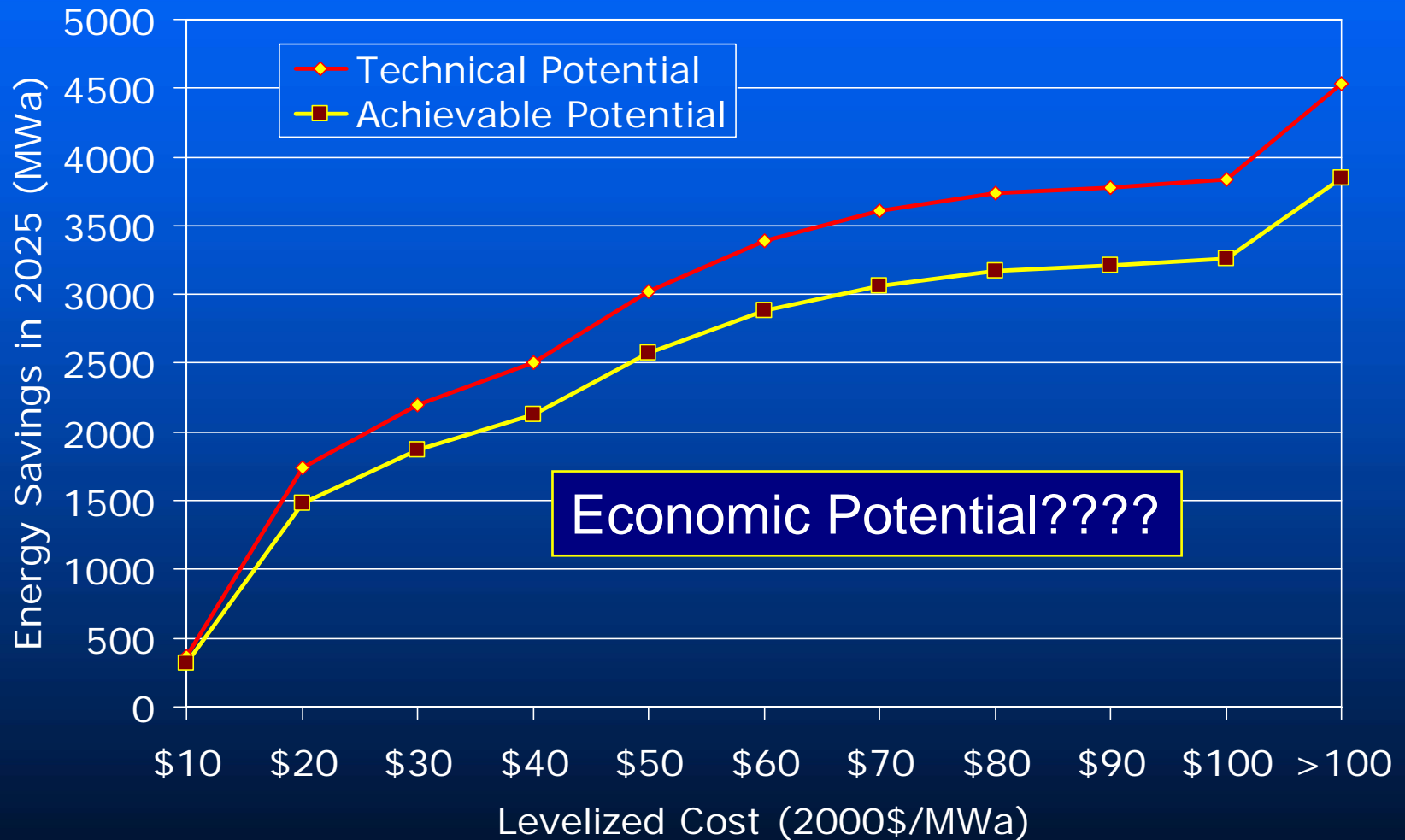
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PNW Energy Efficiency Potential



WILLIAM FULD Talking Board Set

YES

OUIJATM
MYSTIFYING ORACLE

NO



ABCDEFGHIJKLM
NOPQRSTUVWXYZ

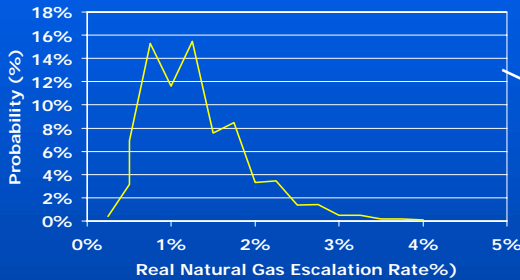
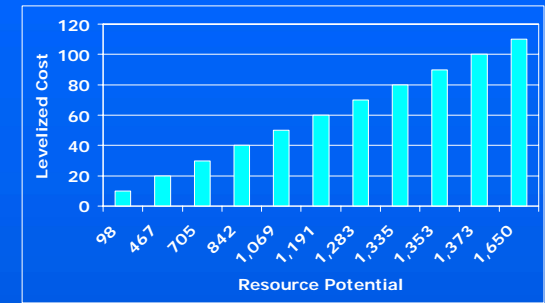
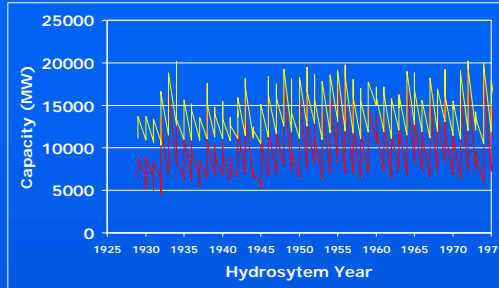
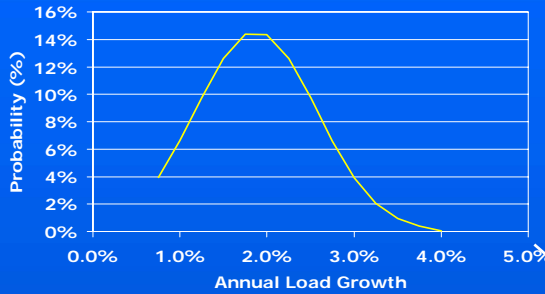
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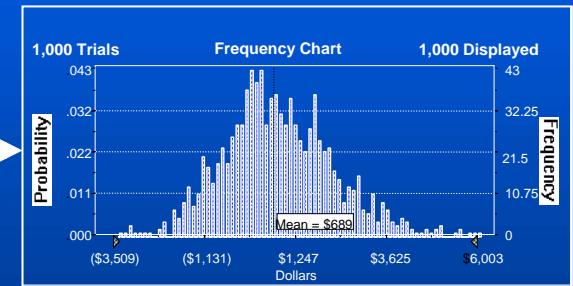


"OUIJA", "WILLIAM FULD", "MYSTIFYING ORACLE" AND THE DISTINCTIVE DESIGNS OF THE BOARD, INDICATOR AND PACKAGE, ARE TRADEMARKS FOR THE TALKING BOARD SET BY
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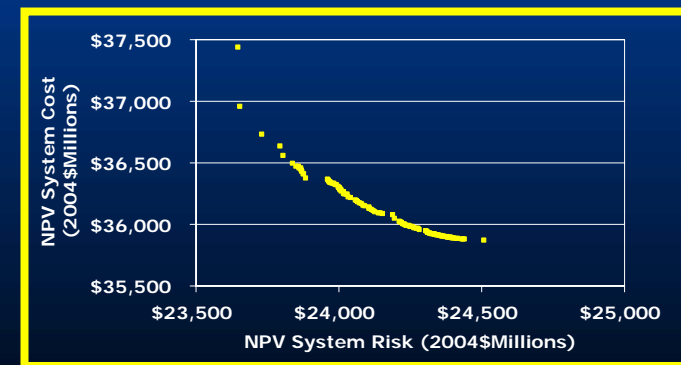
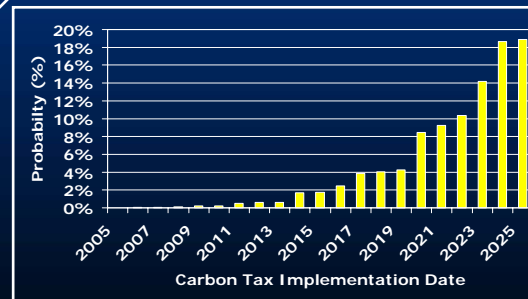
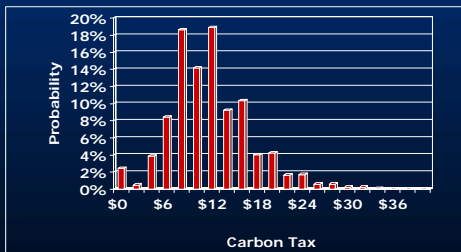
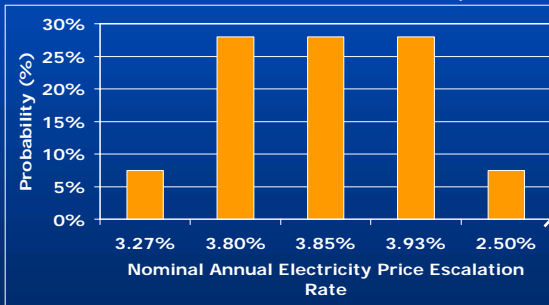
PNW Portfolio Planning – Scenario Analysis on Steroids



Portfolio Analysis Model

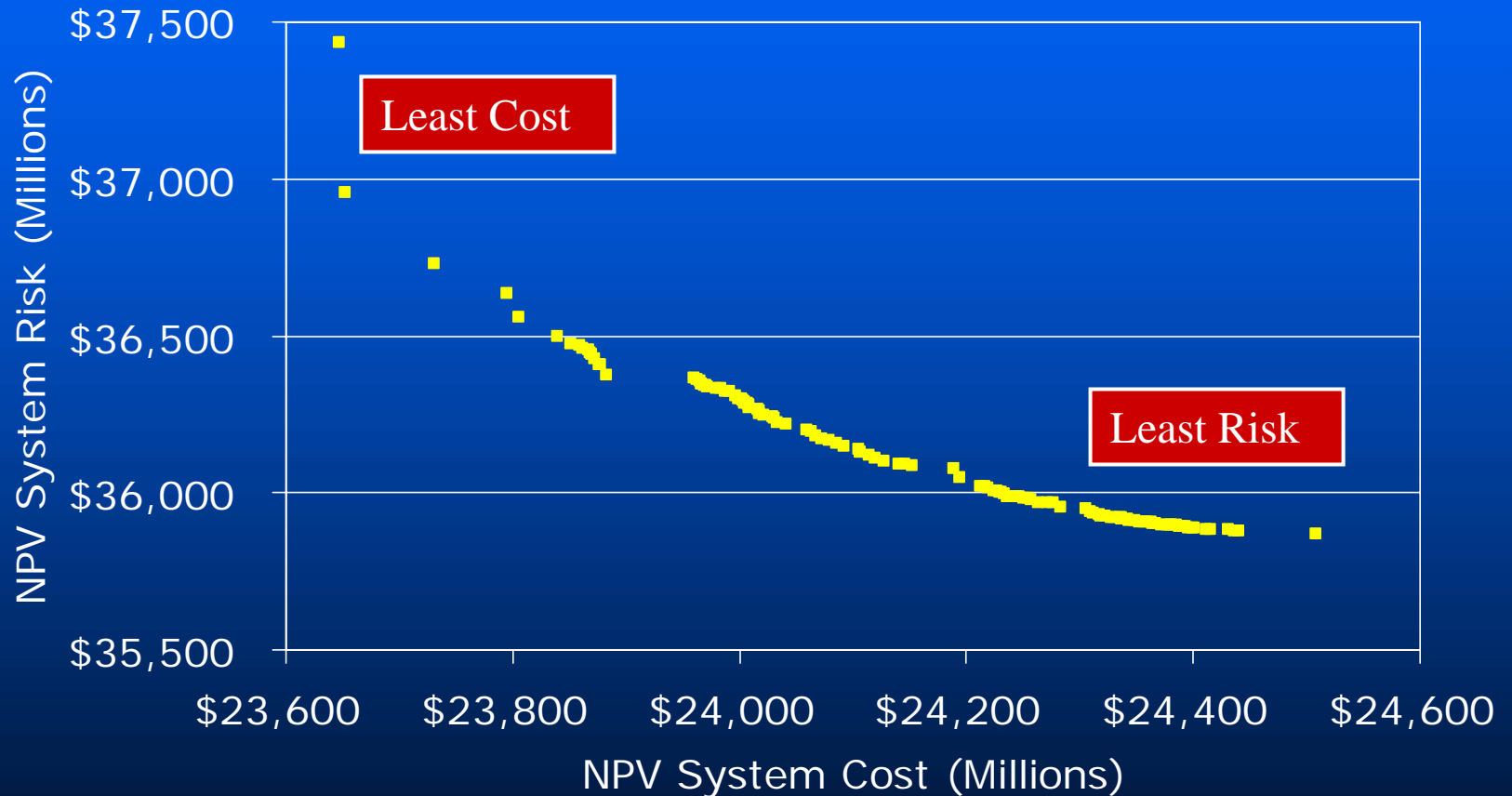


NPV System Cost

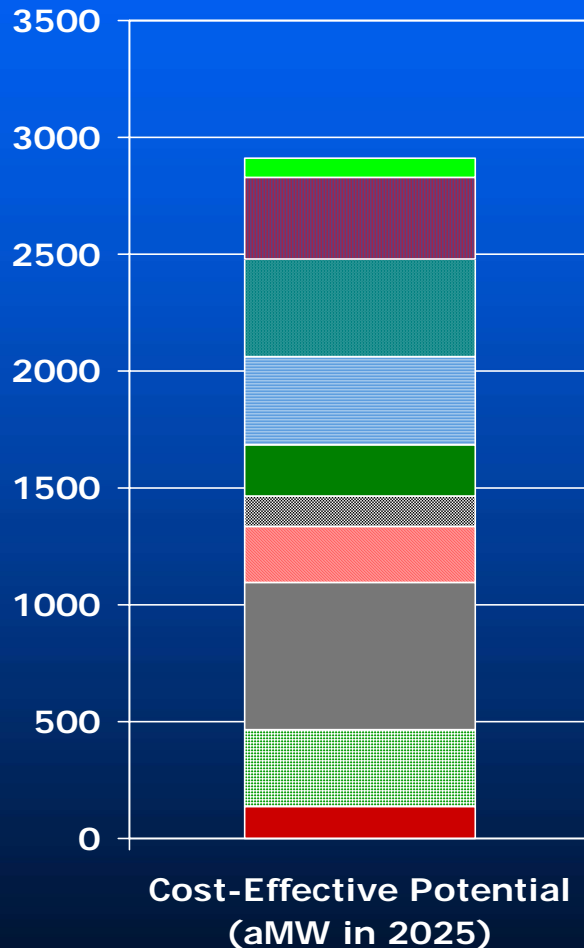


Efficient Frontier

Plans Along the Efficient Frontier Permit Trade-Offs of Costs Against Risk



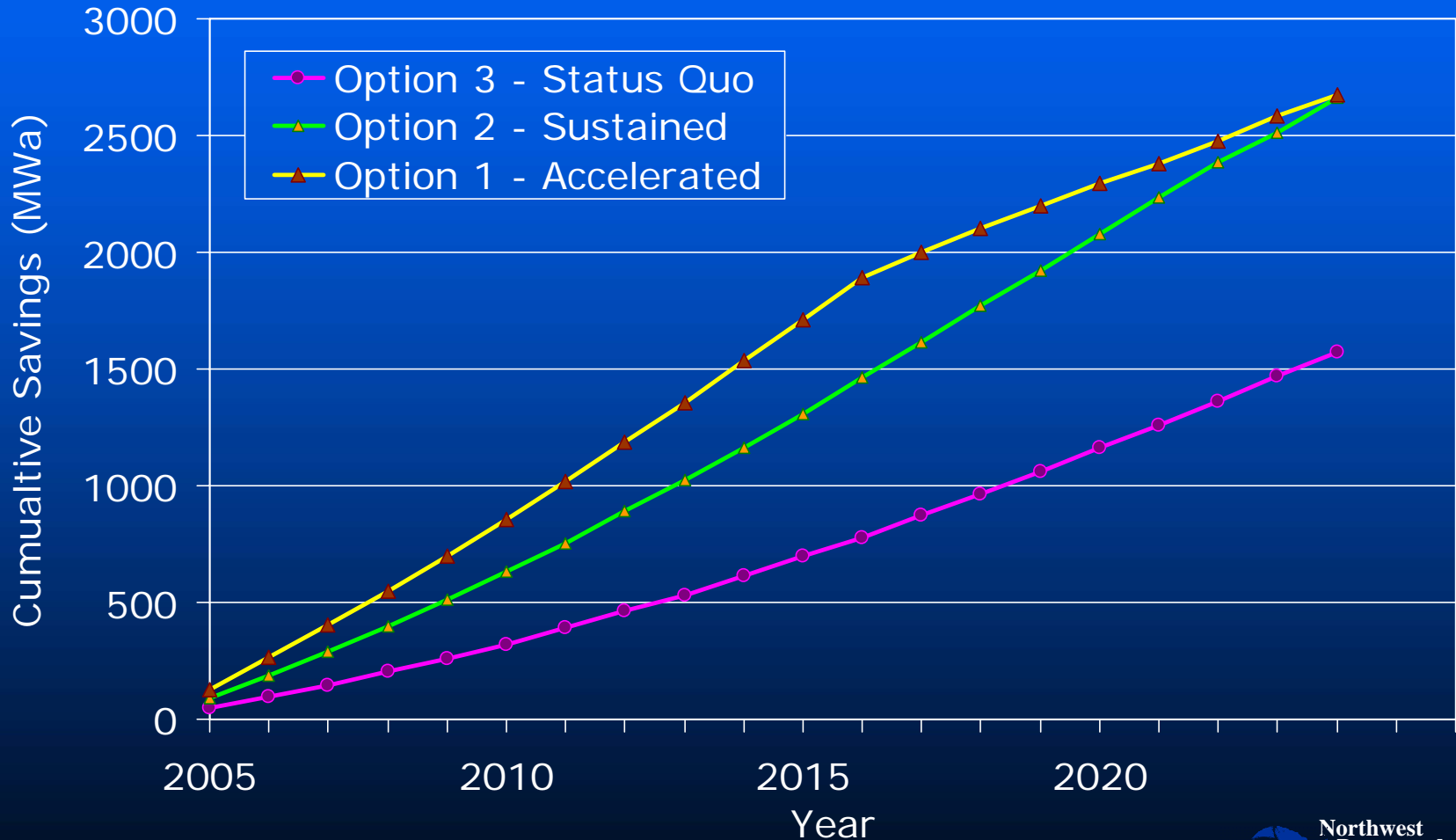
All Plans Along the “Efficient Frontier” Had Roughly Equivalent Amounts of Conservation = 2600 –2800 aMW*



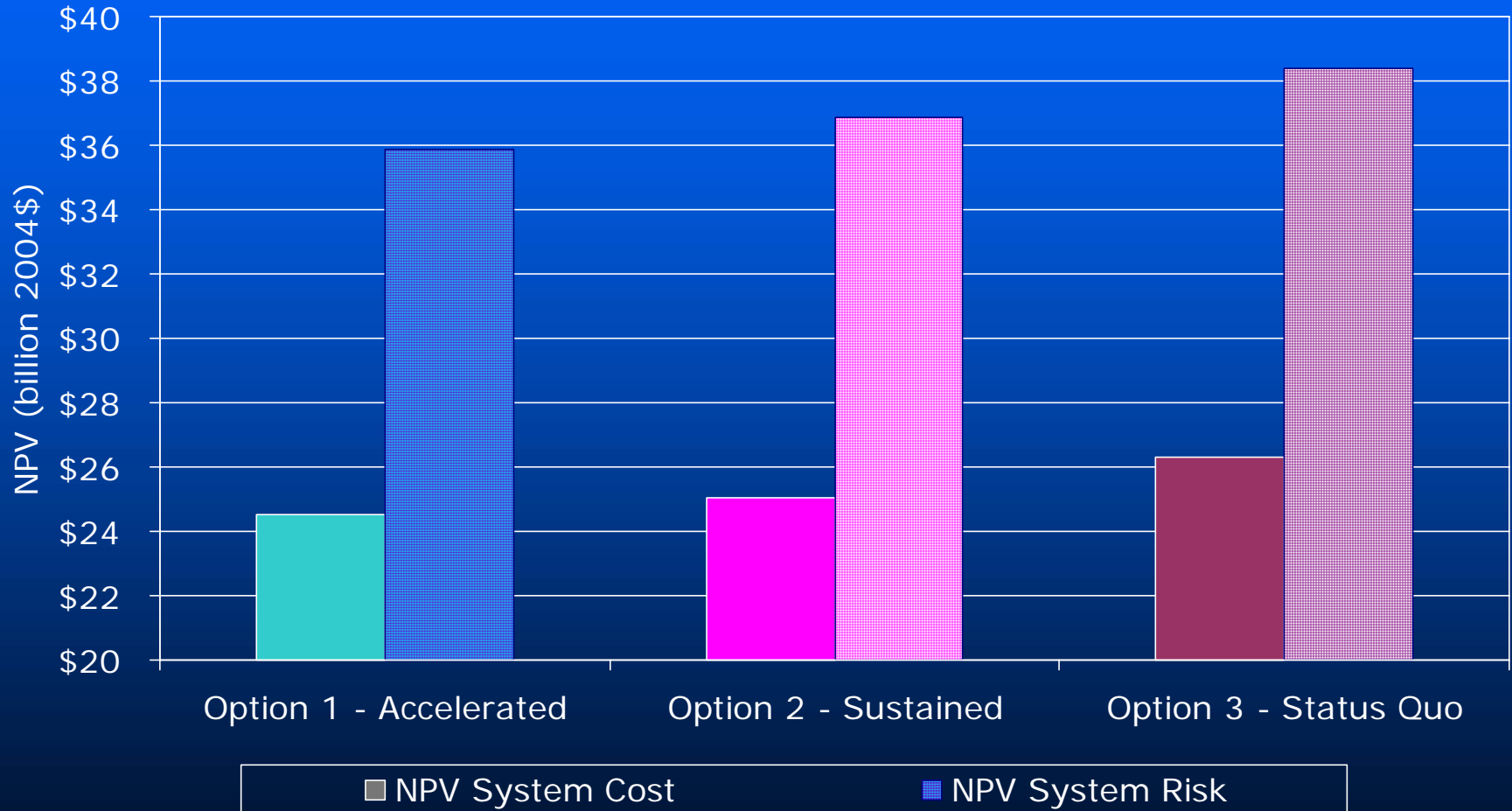
- Agricultural Sector - 80 aMW
- Non-DSI Industrial Sector - 350 aMW
- Commercial Sector Non-Building Measures - 420 aMW
- HVAC, Envelope & Refrigeration - 375 aMW
- New Commercial Building Lighting - 220 aMW
- Existing Commercial Buildings Lighting - 130 aMW
- Residential Space Conditioning - 240 aMW
- Residential Lighting - 530 aMW
- Residential Water Heating - 325 aMW
- Residential Appliances - 140 aMW

*Medium Load Forecast
Loads & Market Prices

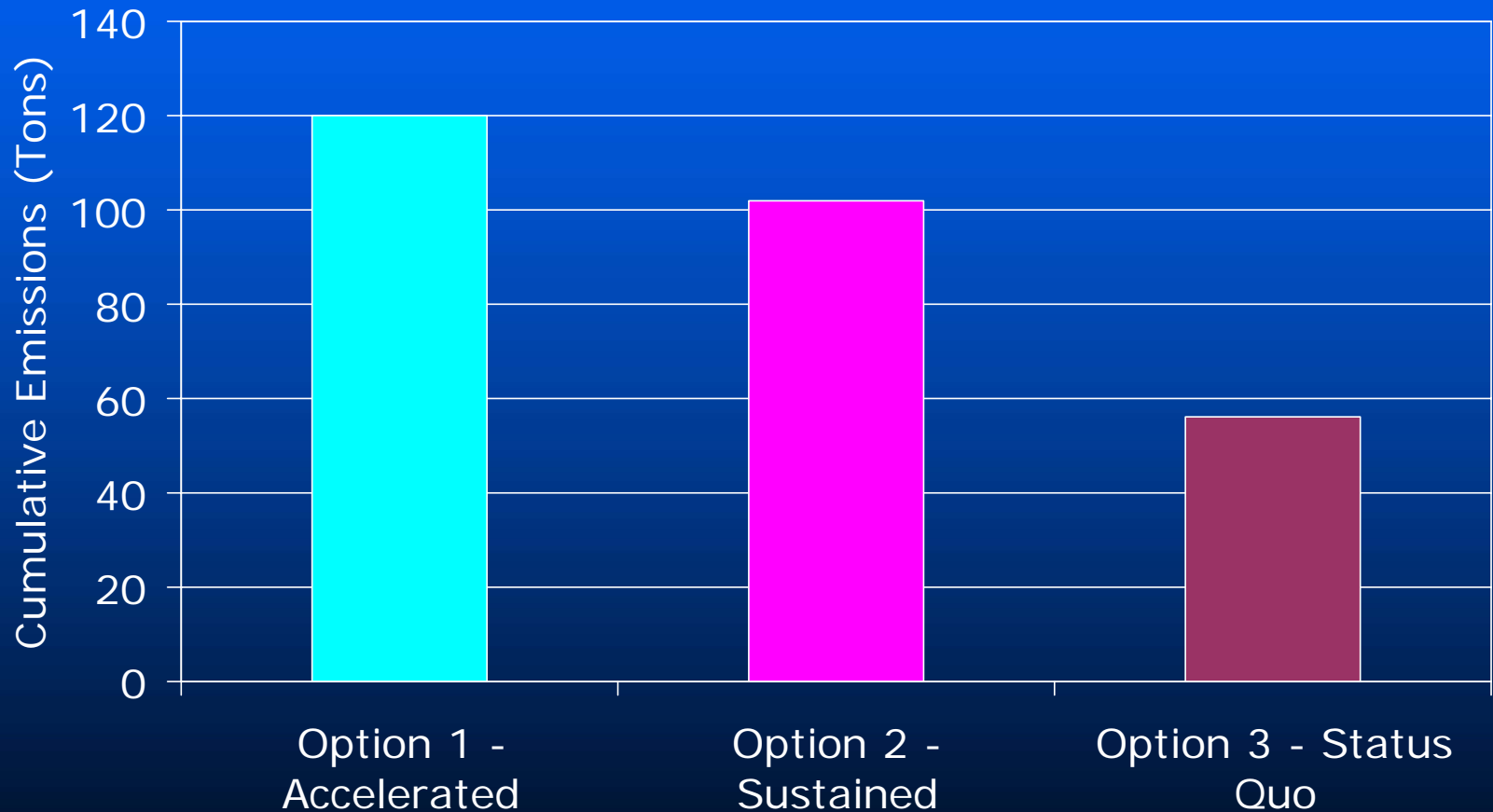
Timing Matters – Three Conservation Deployment Schedules Tested



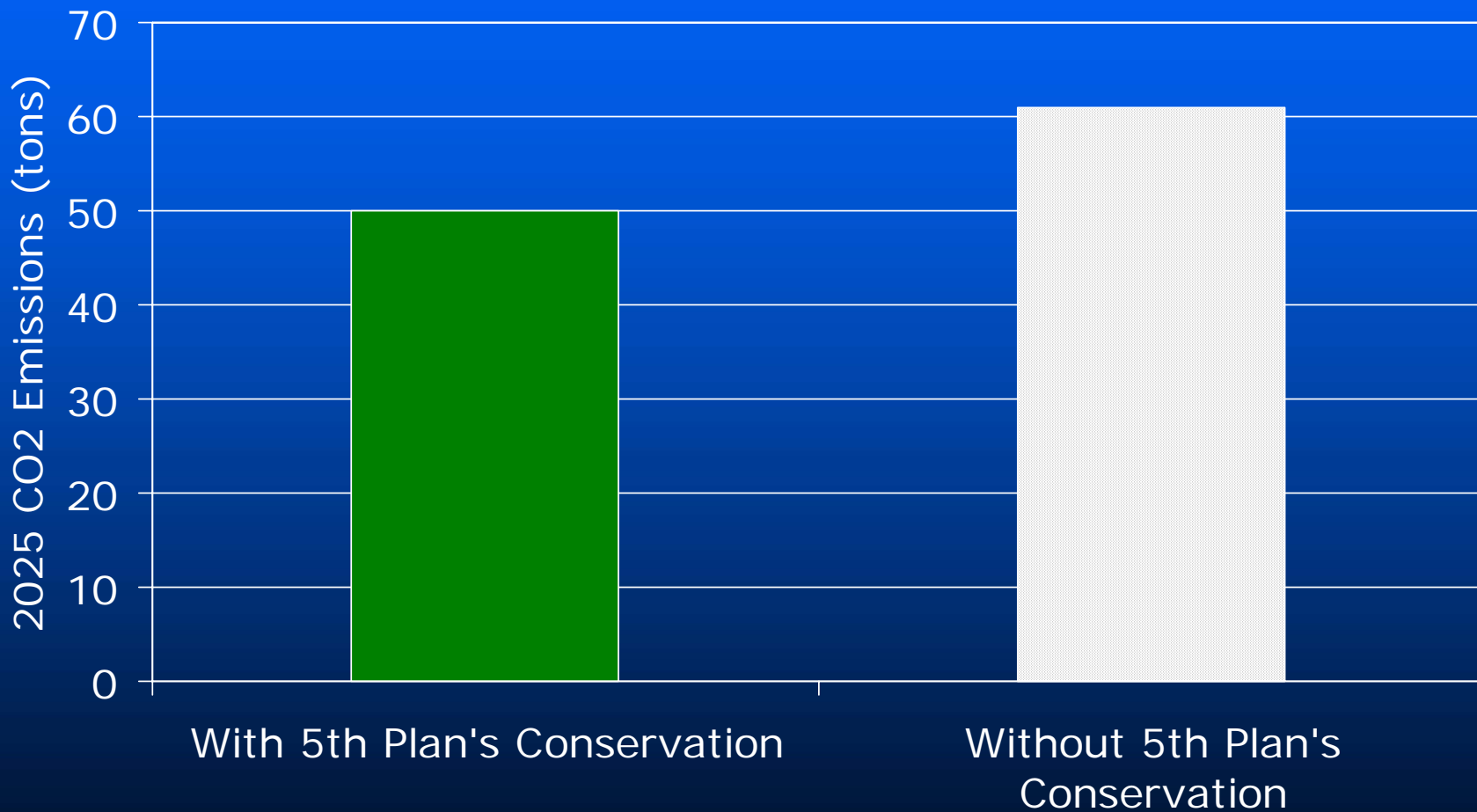
Accelerating Conservation Development Reduces Cost & Risk



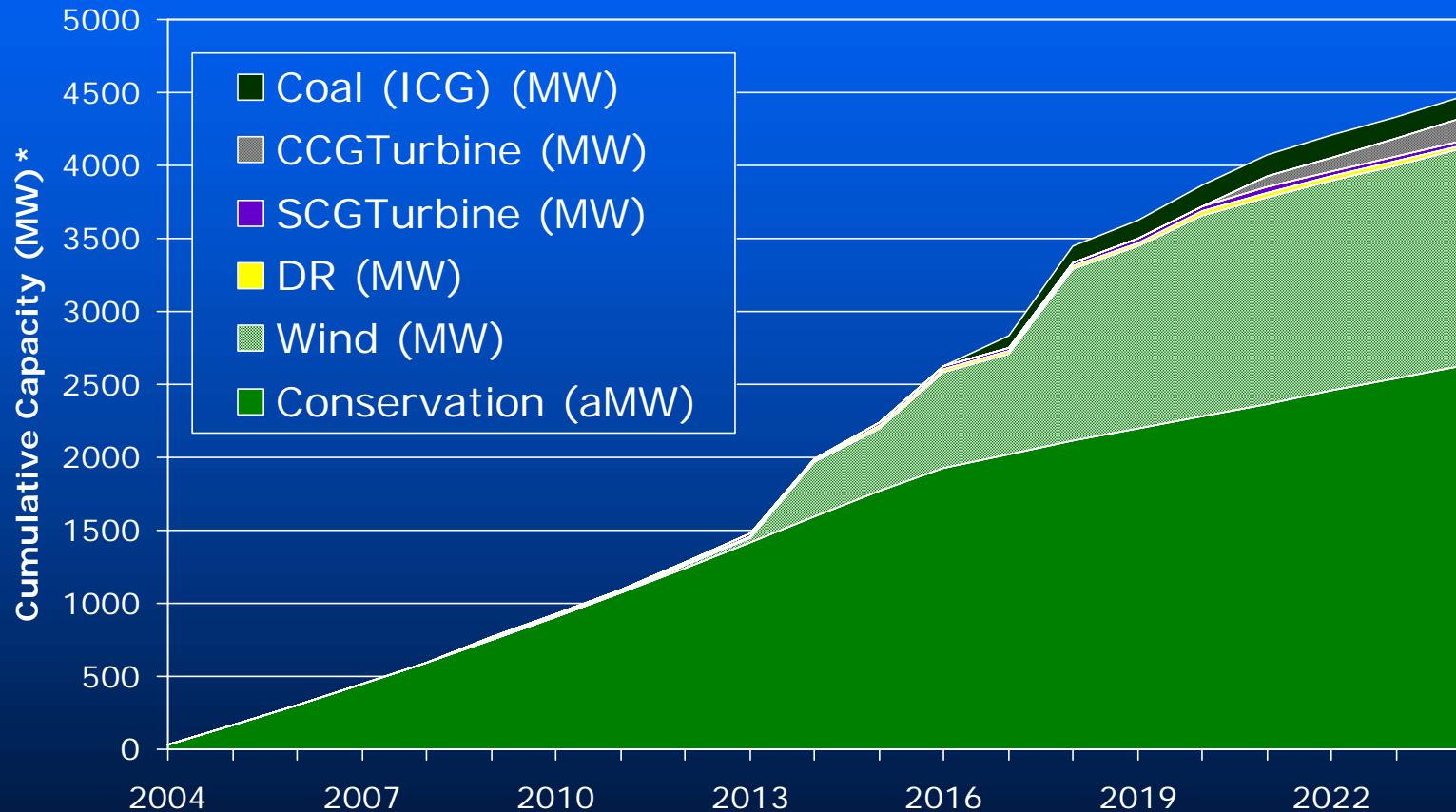
Accelerating Conservation Reduces Carbon Dioxide Emissions



Meeting 5th Plan's Conservation Targets Reduces Forecast PNW Power System CO2 Emissions in 2025 by Nearly 20%

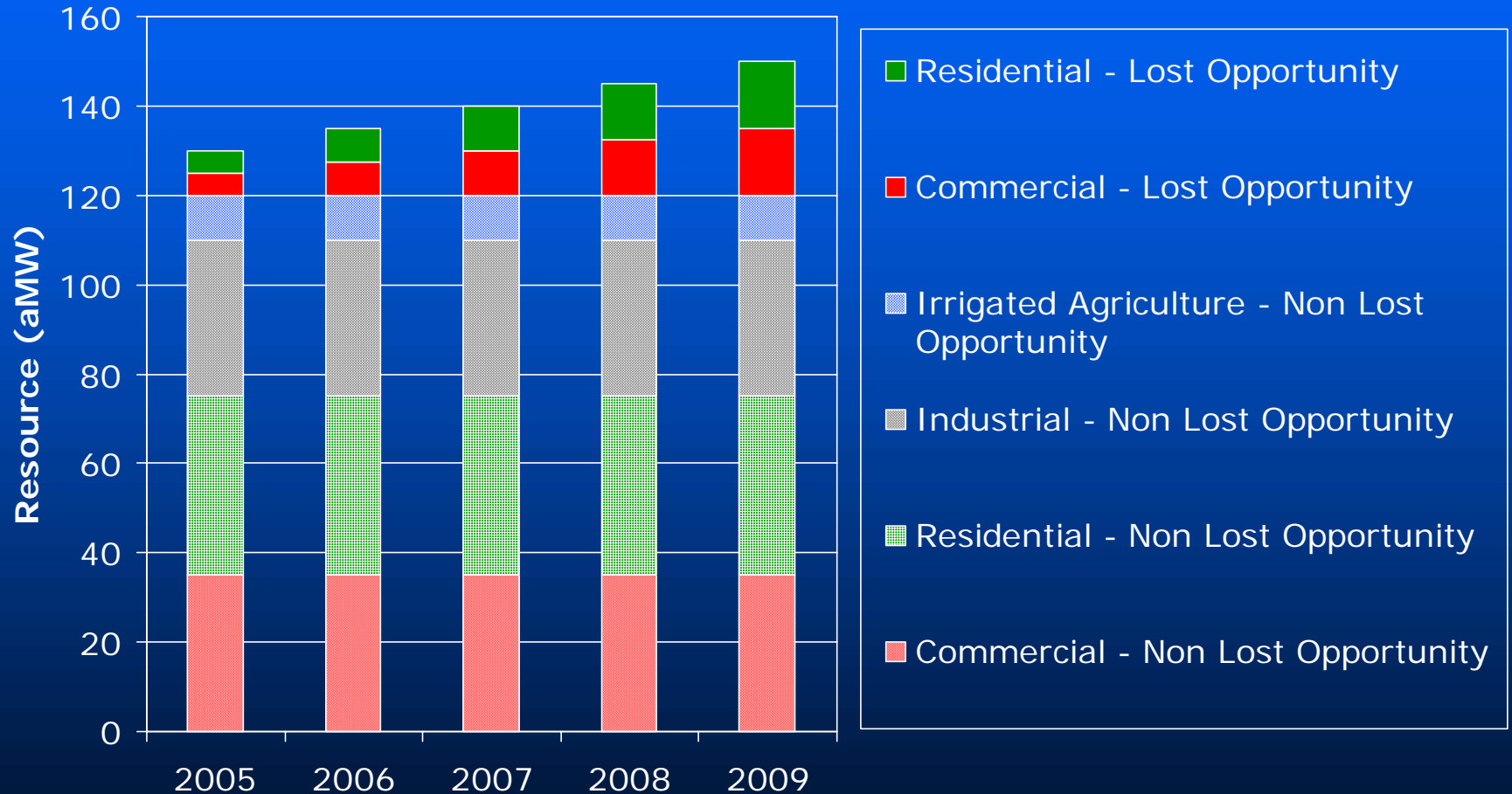


5th Plan Relies on Conservation and Renewable Resources to Meet Load Growth *



*Actual future conditions (gas prices, CO2 control, conservation accomplishments) will change resource development schedule and amounts

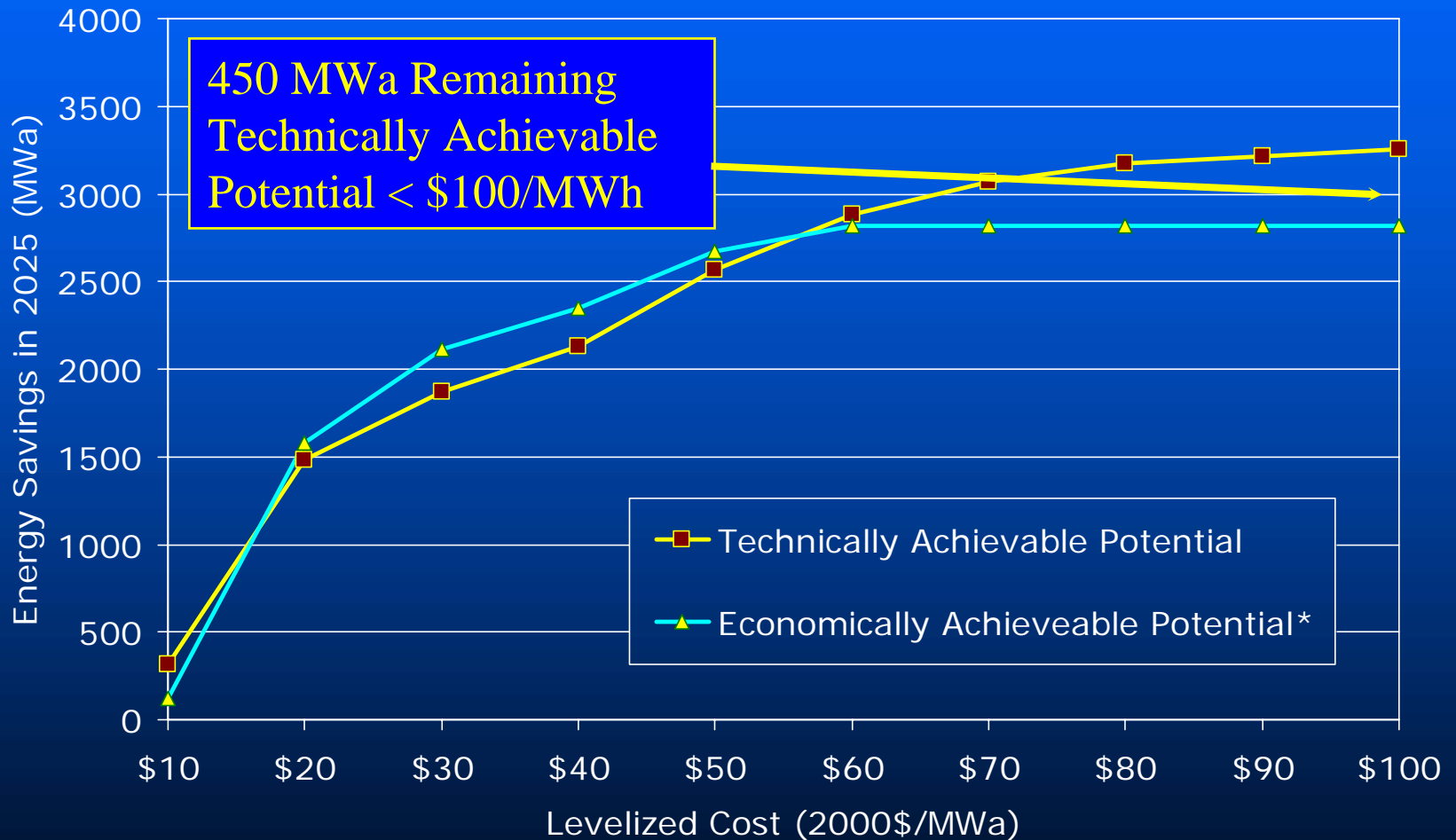
Near-Term Conservation Targets (2005-2009) = 700 aMW



Could We Do More?

Would Higher Carbon Control Cost Assumptions Significantly Increase the Amount of Cost-Effective PNW Electricity Conservation Potential (and reduced carbon emissions)?

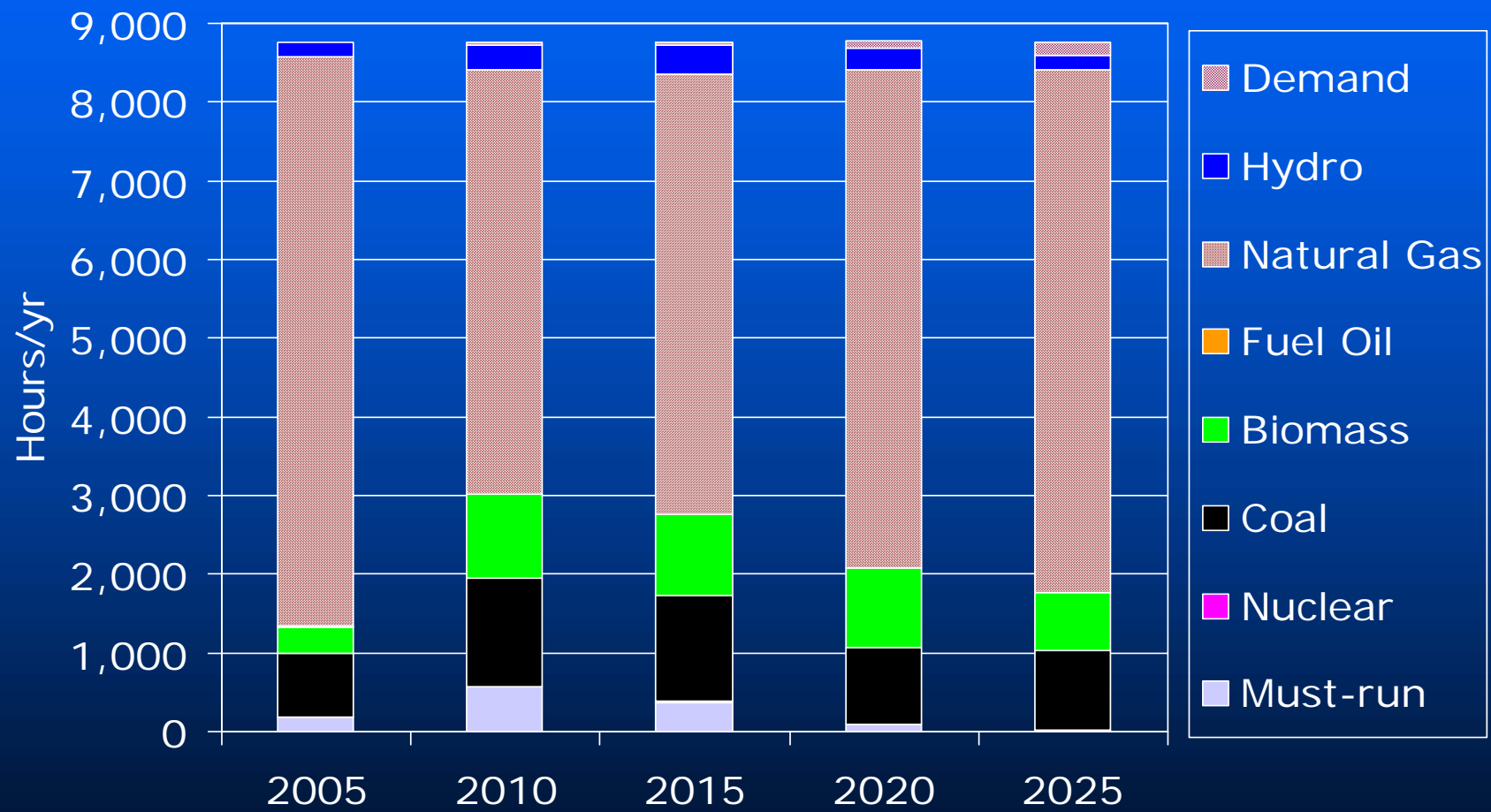
There's Remaining Electric Energy Efficiency Potential



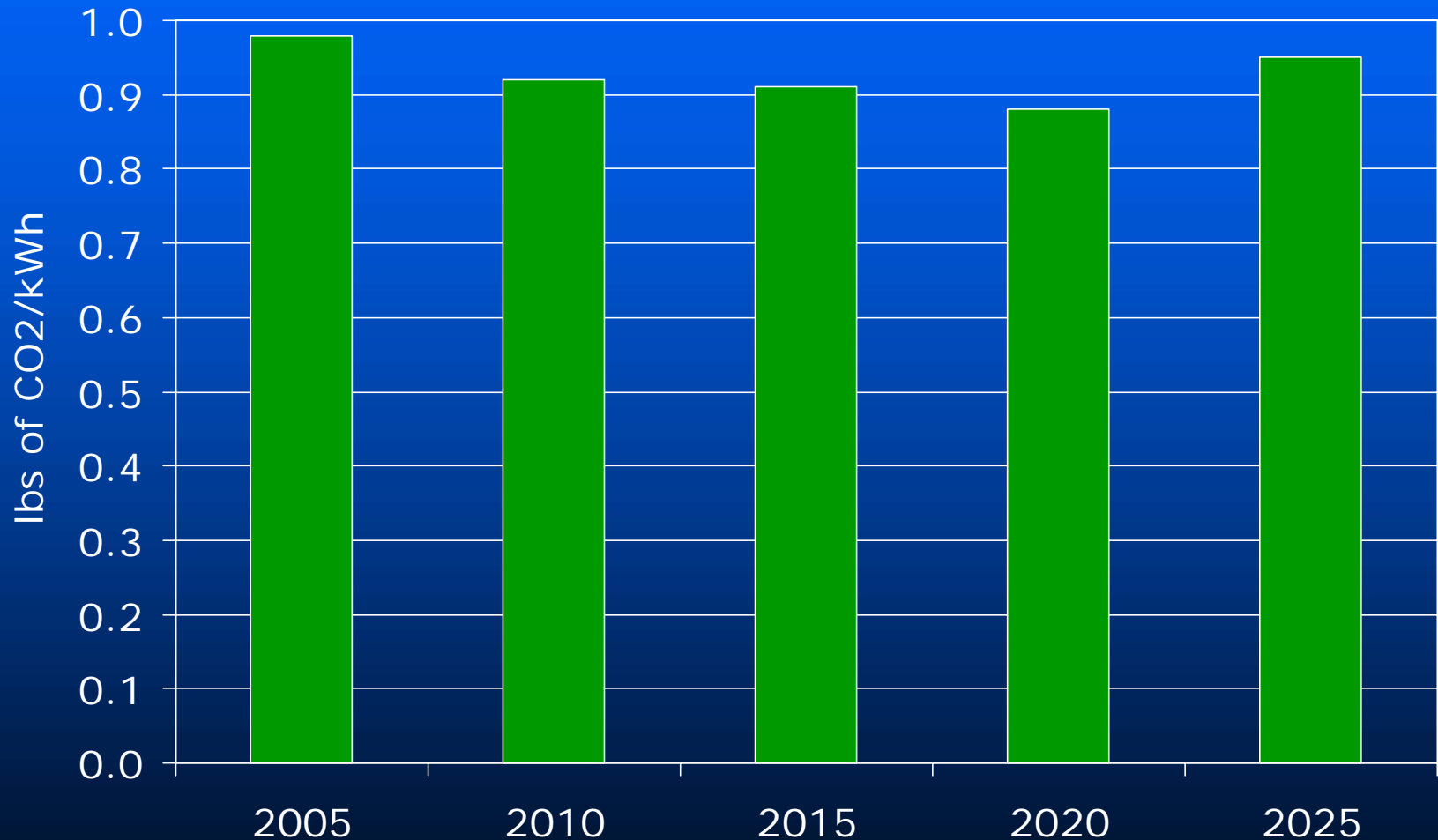
The 5th Plan Already Includes Expected Value of CO2 Control "Risk"



Northwest Resources “on the margin” 5th Plan Resource Portfolio



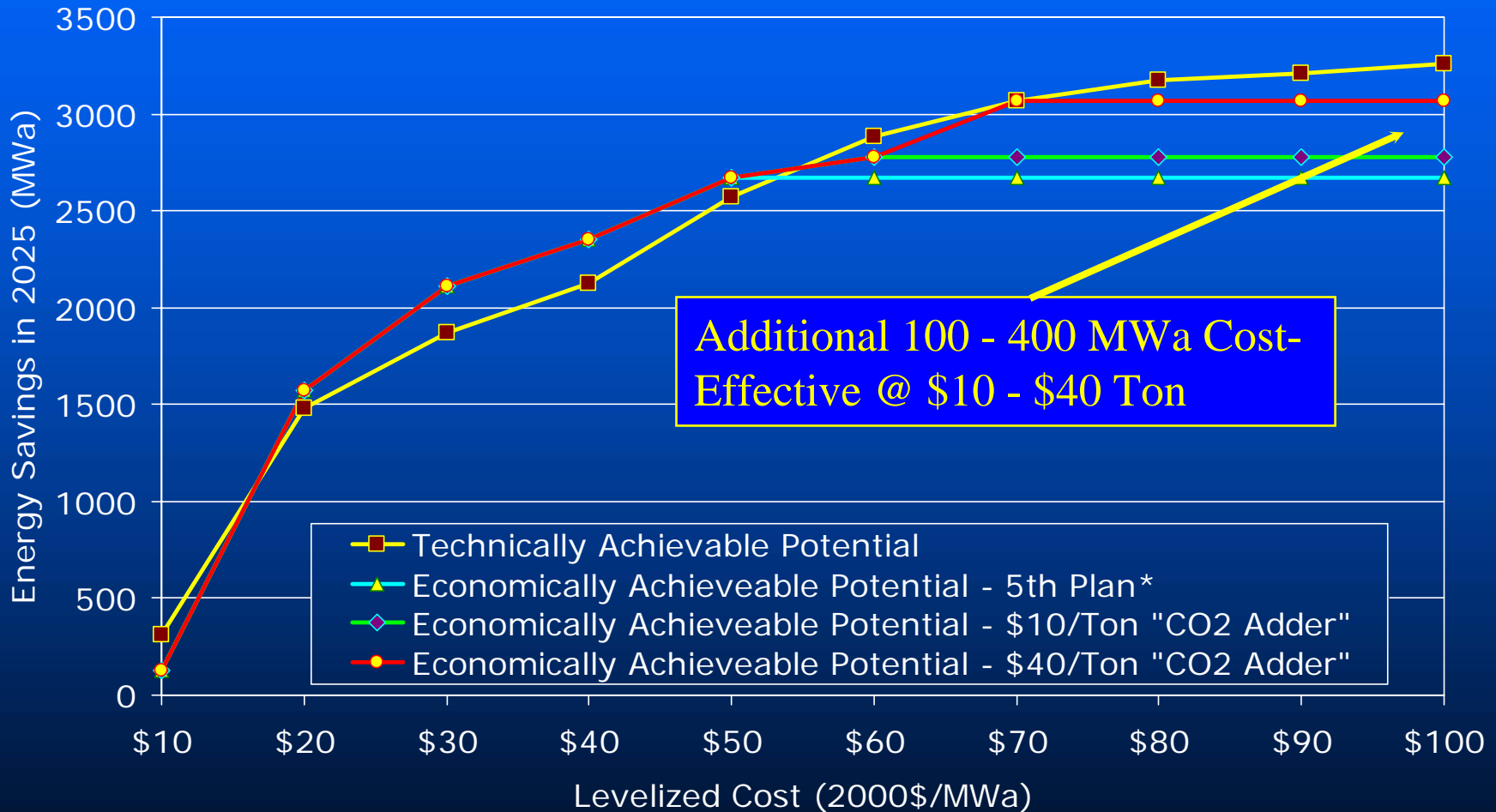
Estimated Annual Average Marginal PNW Power System CO2 Emissions Factors



Impact of Higher Assumed CO₂ “Control” Cost

- Assuming PNW CO₂ Emissions Factor of ~ 1 lb/kWh
 - A \$10/ton CO₂ change in emissions “control” cost increases *forecasted* market prices by approximately \$4/MWh
 - A \$40/ton CO₂ change in emissions “control” cost increases *forecasted* market prices by approximately \$16/MWh

Carbon Control Might Make 4% to 15% More Conservation "Cost-Effective"



Summary

- The 5th Plan relies on “non-carbon” producing resources to meet 85-90% of anticipated load growth
- The Plan considered “carbon control” risk
- Higher and more certain carbon control costs assumptions could make 4-15% more conservation cost-effective
- There are probably cheaper near-term options for carbon control than the PNW Power System

PNW Energy Efficiency Resource Development 2000-2004

