Cost and Risk Management Benefits from Energy Efficiency in the Northwest Power and Conservation Plan

Tom Eckman

Manager, Conservation Resources

Northwest Power and Conservation Council

Presented February 16, 2005

to

NARUC Committees on Energy Resources & Environment and Electricity

Northwest Power and Conservation Council

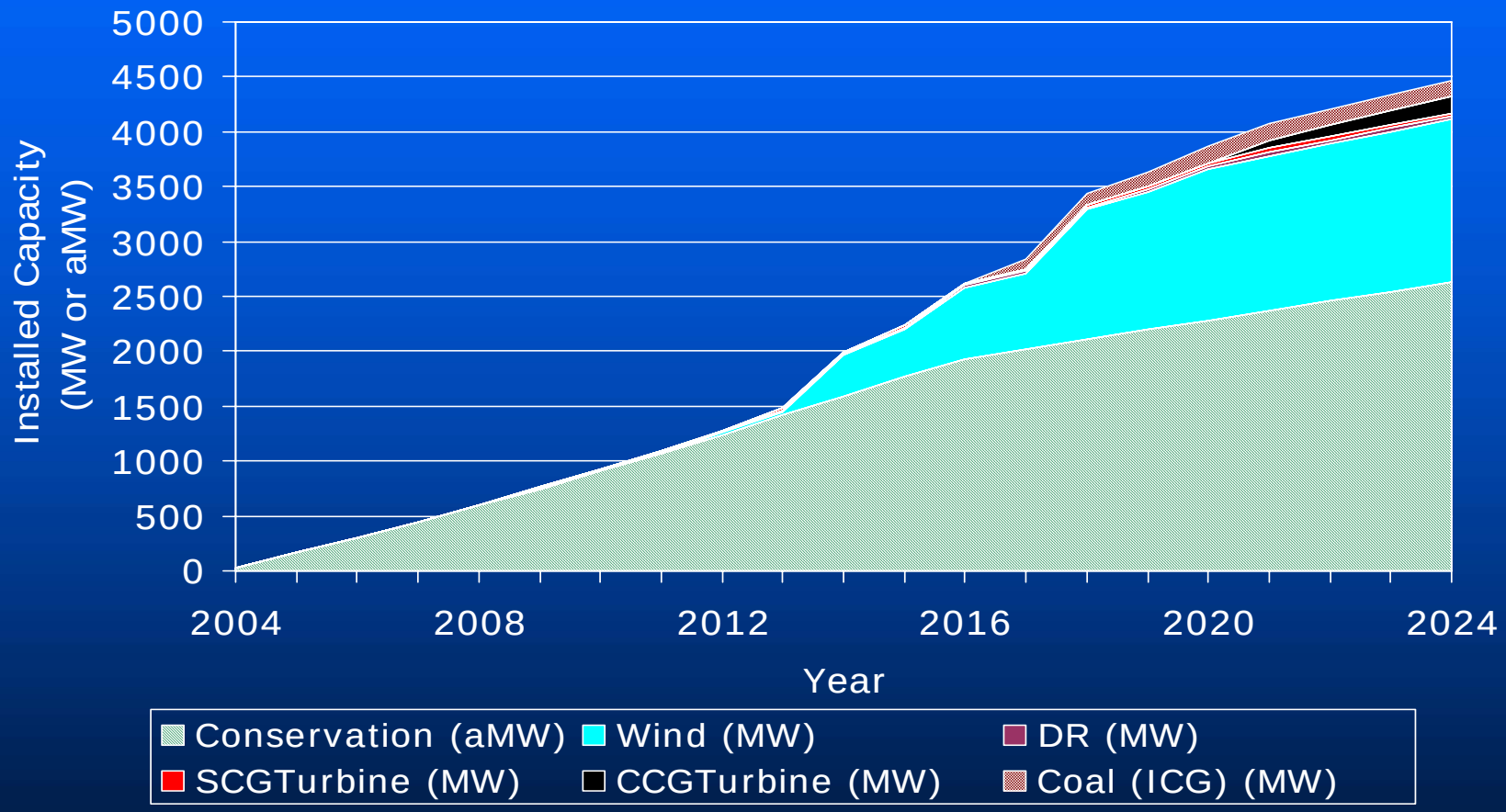
What You're About To Hear

- Brief summary of 5th Regional Power Plan
- Conservation/Energy Efficiency Resources in the 5th Plan
  - How Much is Available and Achievable
  - How Much Should Be Developed
  - How Soon Should It Be Developed
  - Why It Provides Cost and Risk Management Benefits

Brief Summary of 5th Power Plan
Actions for next 5 years 2005-2009

- Develop 700 aMW of conservation
- Develop 500 aMW of demand response
- Develop cost-effective cogeneration & renewable resources, primarily wind
- Maintain an inventory of ready-to-construct coal & wind generation for post 2009
- Plan for needed transmission & improve use of existing transmission

5th Plan Resource Development Schedule*



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

How Big is the PNW Region's Conservation/Energy Efficiency Resource?

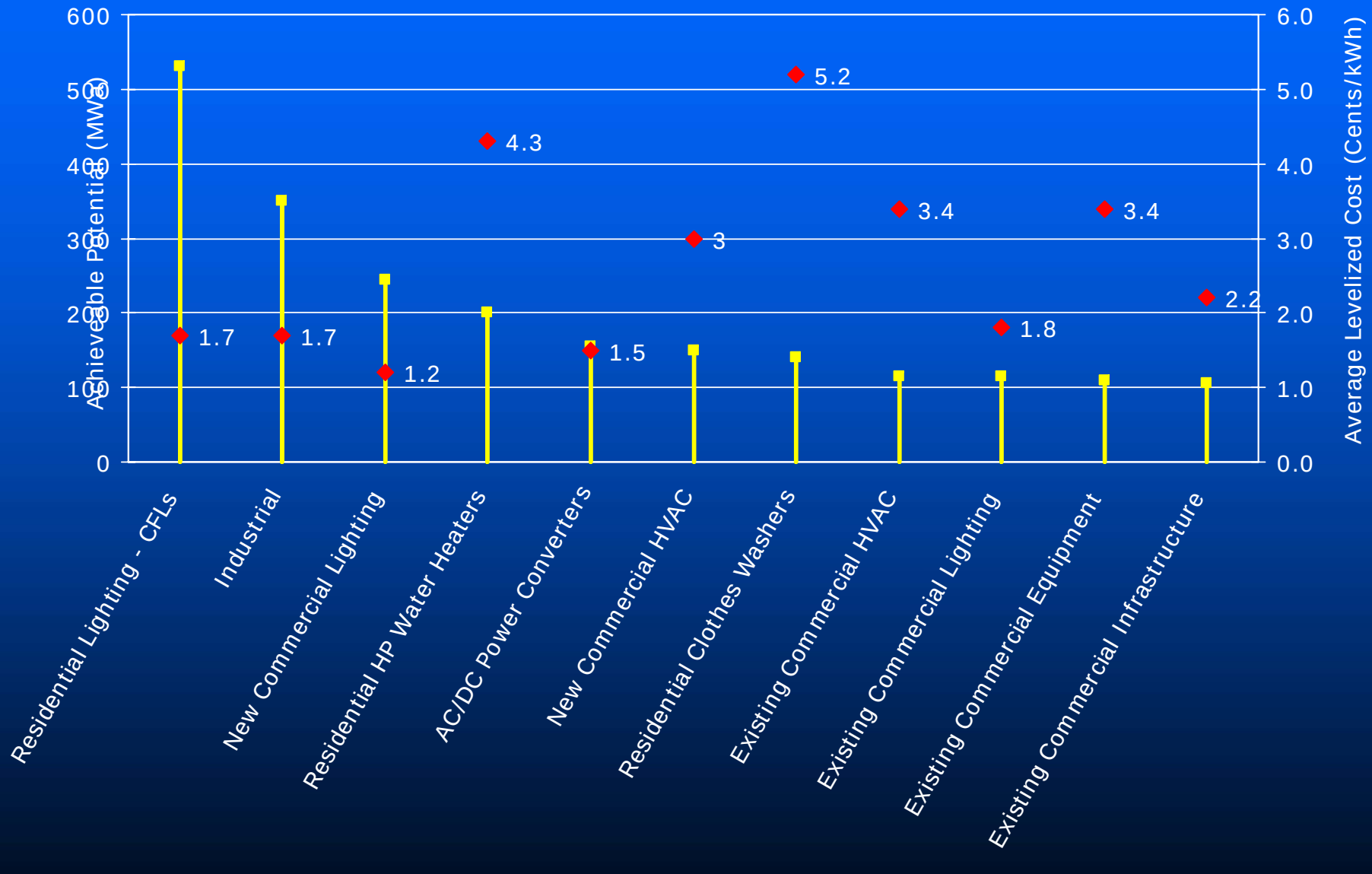
- Remaining Potential Equivalent to Regional Accomplishments 1980 - 2001
- *Could meet half of the region's annual load growth under "medium" forecast*
- Total conservation identified 4600 aMW
- Cost effective & achievable potential 2800 aMW
  - By 2025 medium loads & avoided costs
  - Estimate 85% is achievable

Cost-Effective and Achievable Conservation Could Meet Over 10% of PNW Loads in 2025 (Medium Forecast Loads & Prices)

- 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

Northwest Power and Conservation Council

Major Sources of Efficiency Resource



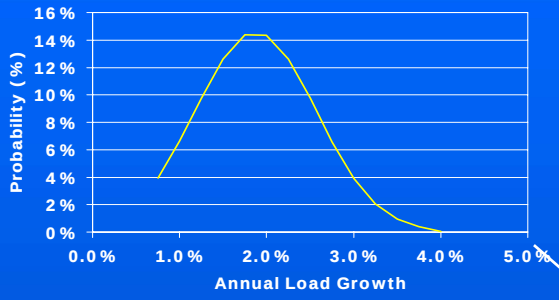
Where Did All This Potential Come From?

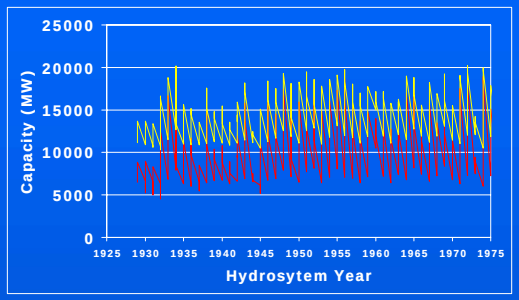
- New technology and/or lower cost of existing technologies, e.g.,
  - High performance T8 and ceramic metal halide lighting
  - Residential compact fluorescent lighting
  - Control optimization
- New applications, e.g.,
  - Sewage treatment
  - LED traffic signals
- New end uses now have efficient options
  - Network PC control
  - AC/DC power converters

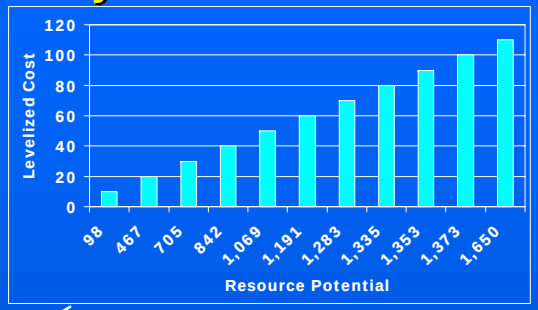
How Much Energy Efficiency Should the Region Develop?

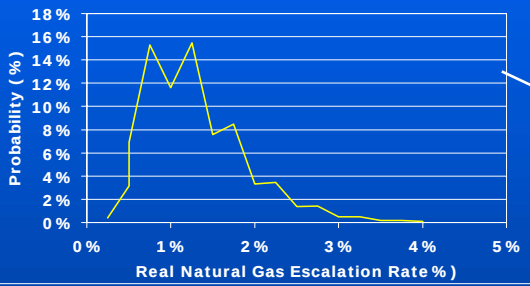
- 2800 aMW appears cost-effective today
  - Medium forecast of market prices (i.e., avoided costs)
  - Medium growth rate
  - Medium gas price forecast
  - Average hydro-conditions
  - Minimal carbon control actions
  - Etc.
- But we know this isn't the future . . .

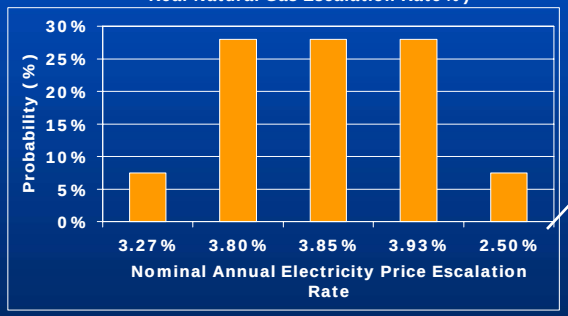
Portfolio Analysis Determines How Much Energy Efficiency to Develop in the Face of Uncertainty

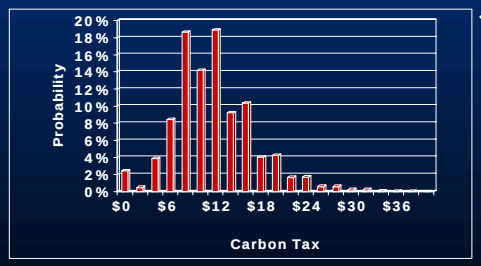


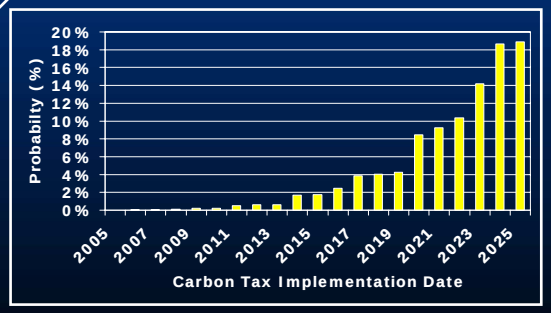




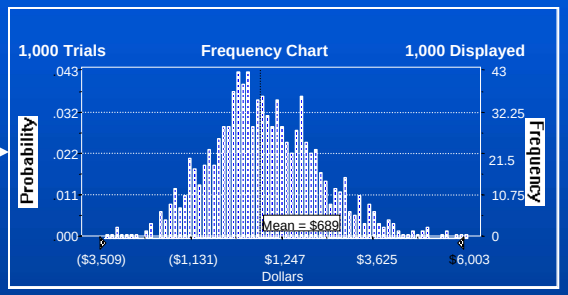




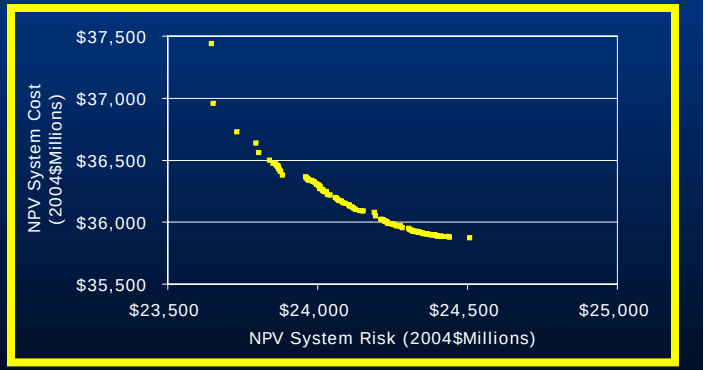




Portfolio Analysis Model

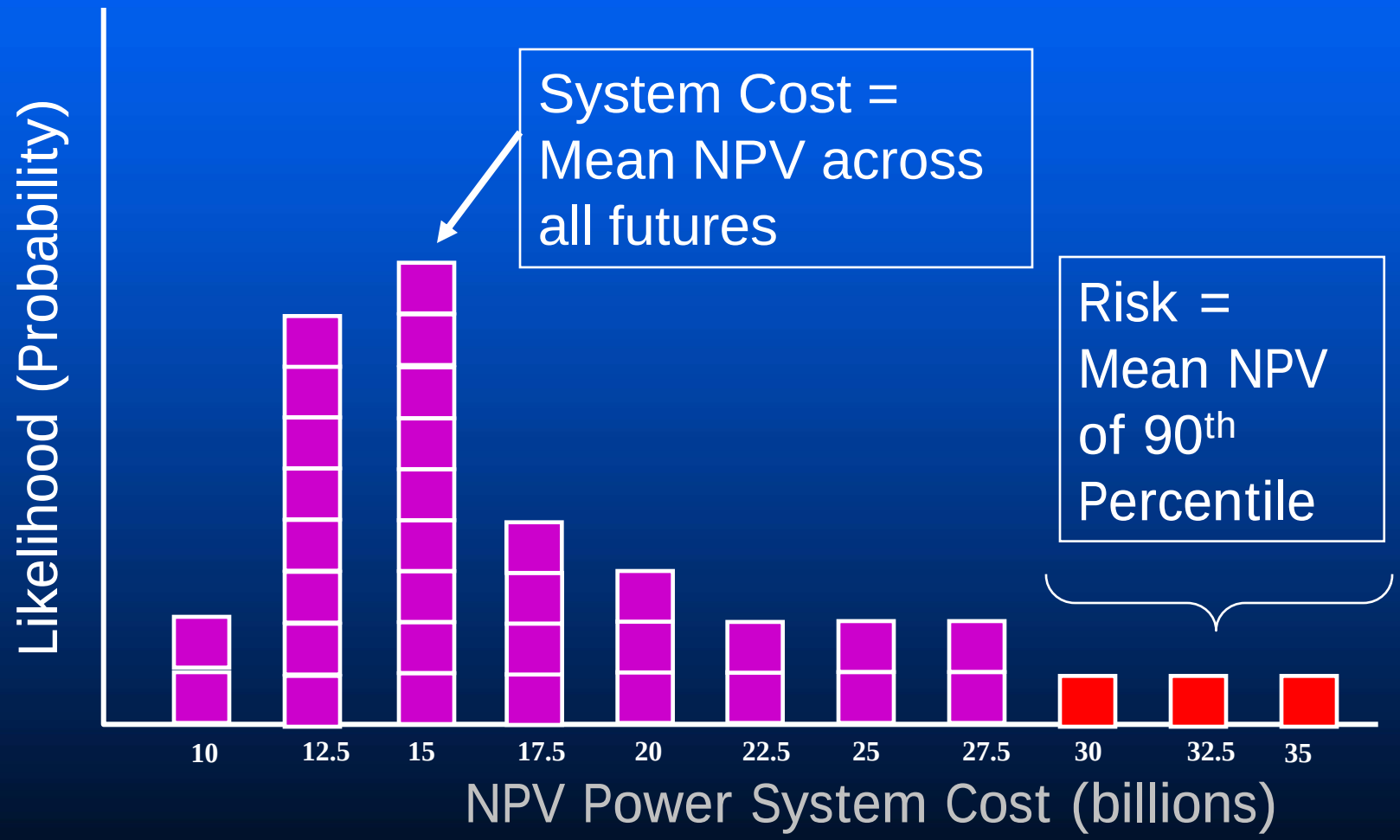


NPV System Cost

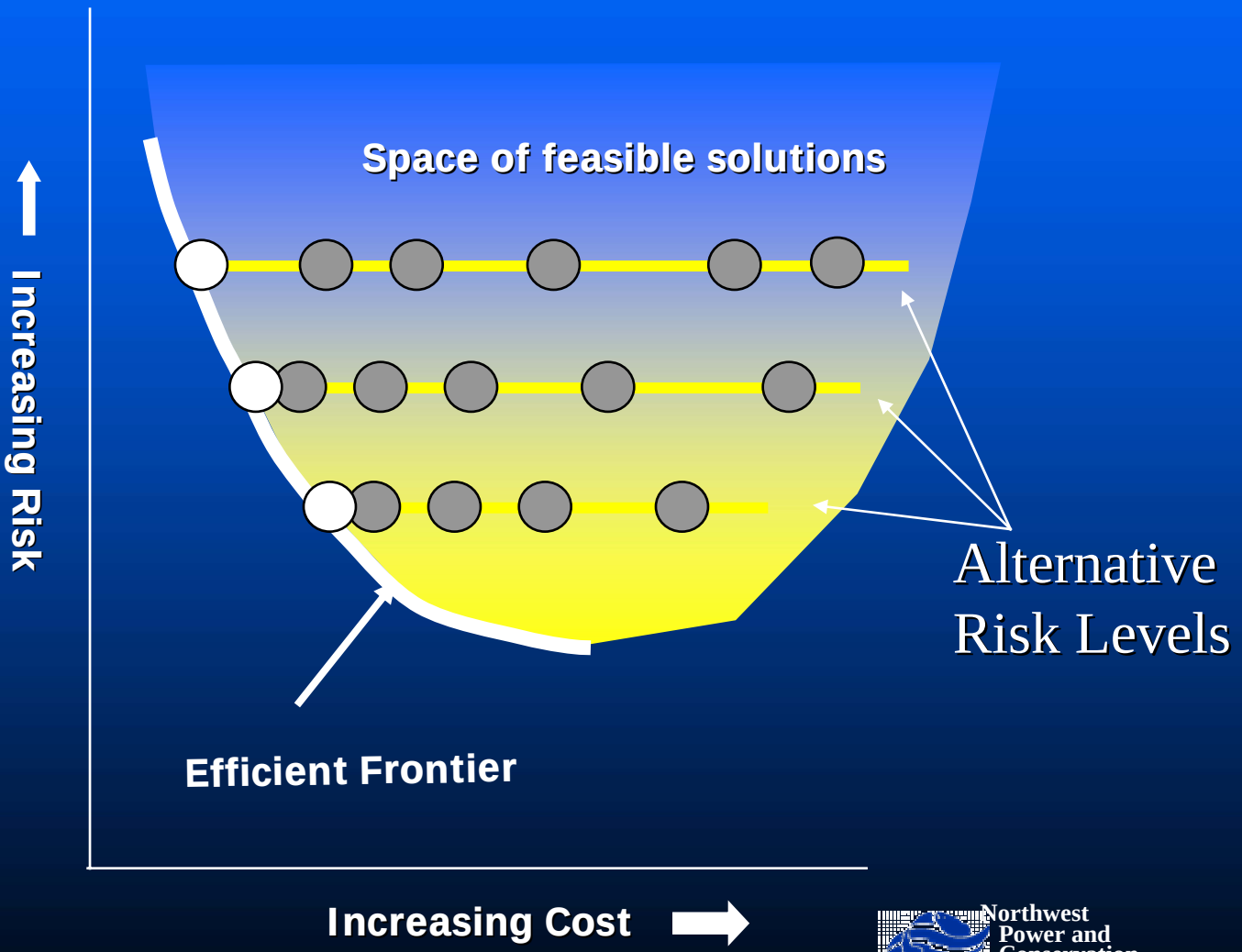


Efficient Frontier

Comparing Plans for System Cost and Risk

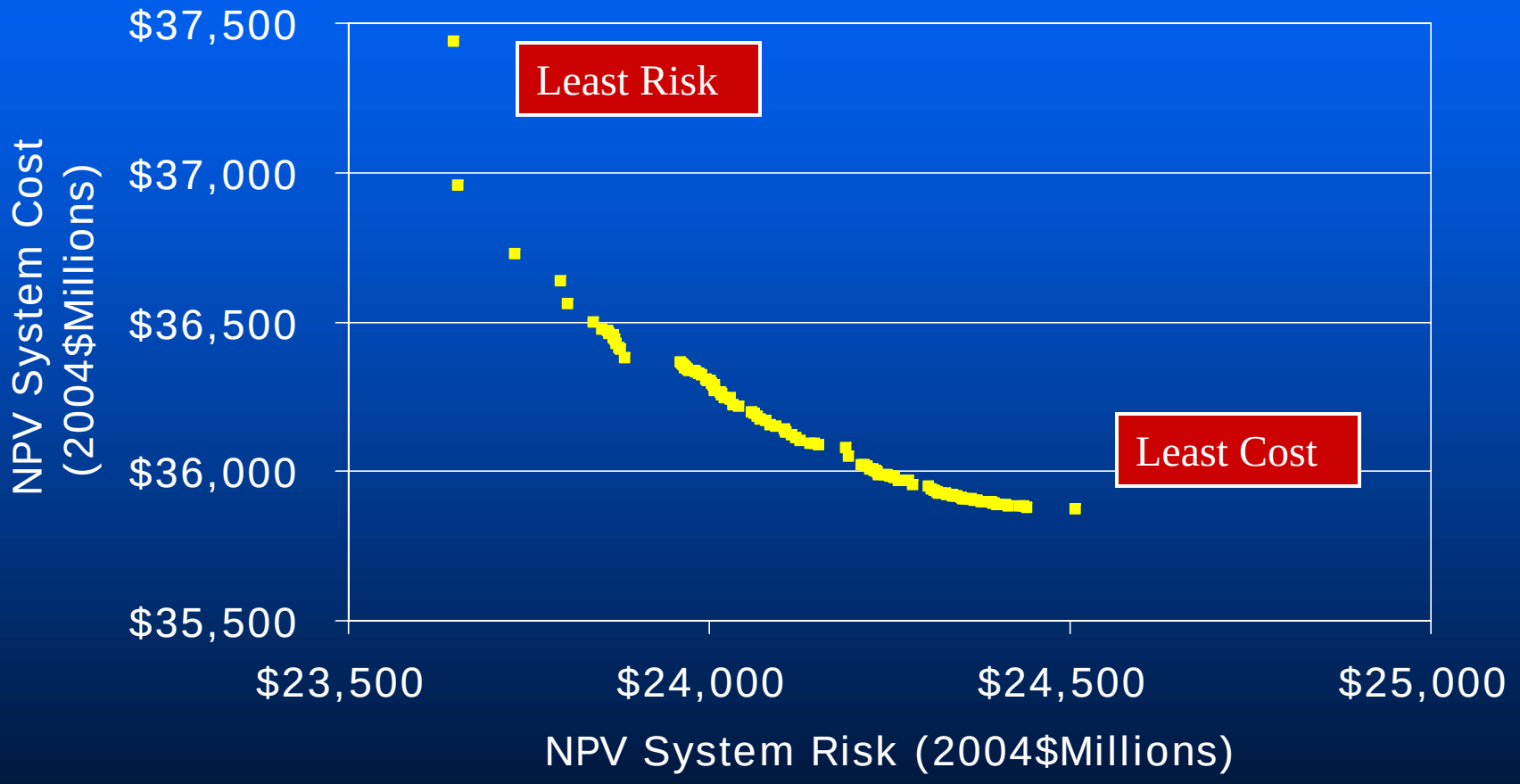


Efficient Frontier = Least Cost Plans for Given Level of Risk



Northwest Power and Conservation Council

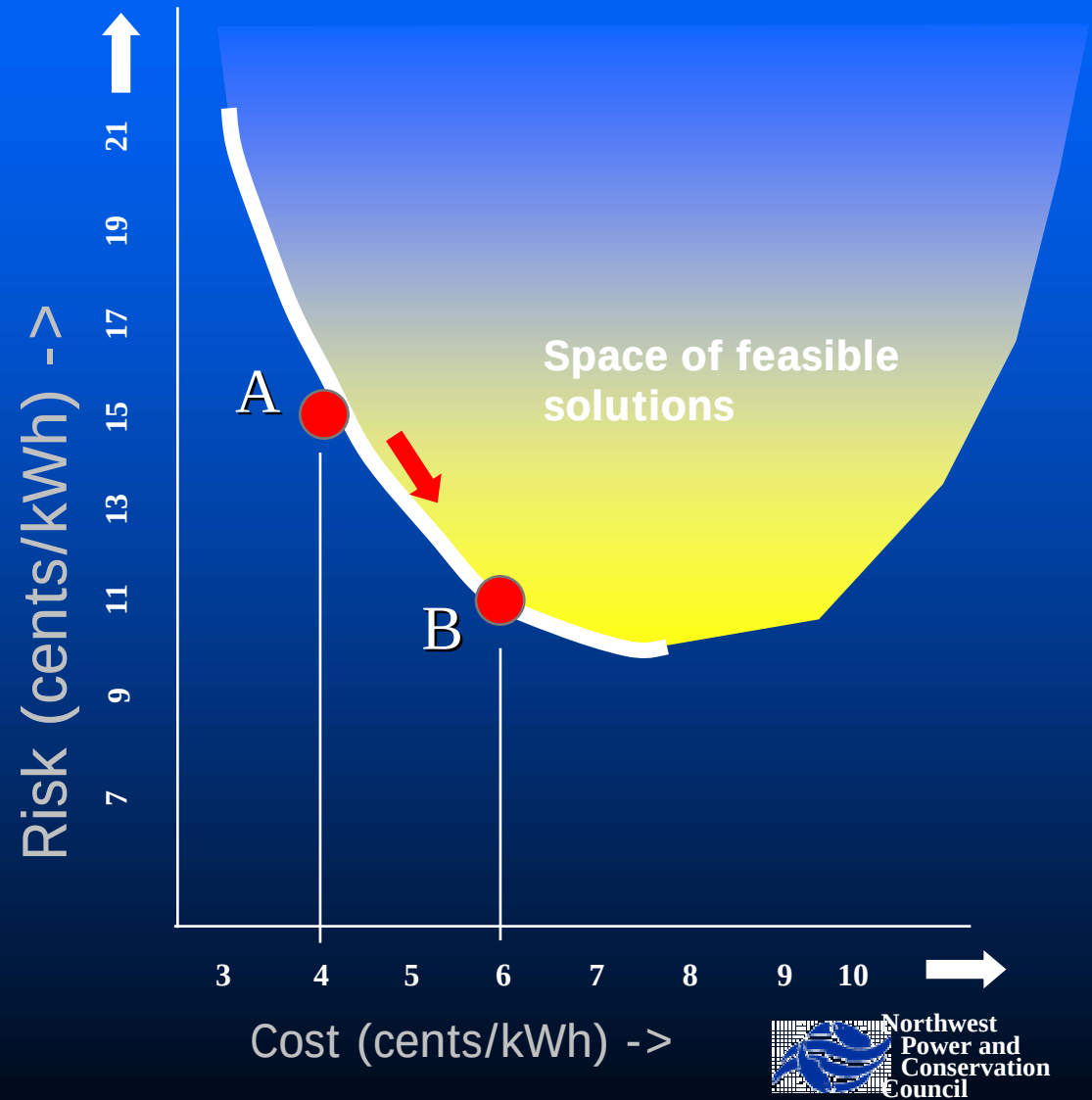
Plans Along the Efficient Frontier Permit Trade-Offs of Costs Against Risk



Northwest Power and Conservation Council

Restated = Efficient Frontier Can Be Used to Compare Cost of Risk Management

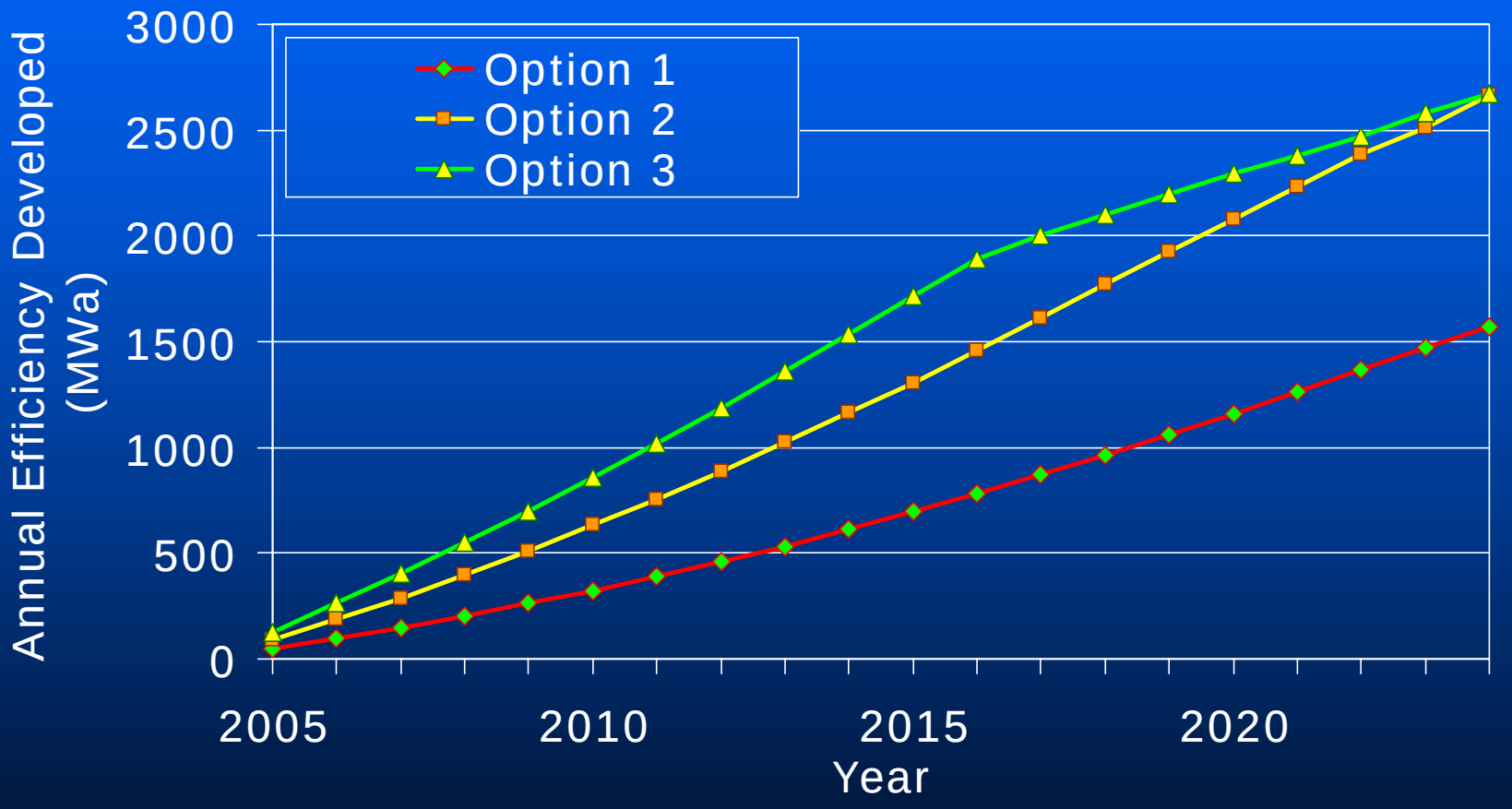
- For, example, if we are currently at point A, we can see it will cost us 2 cents/kWh to move to point B



Three Energy Efficiency Development Portfolio Options Tested

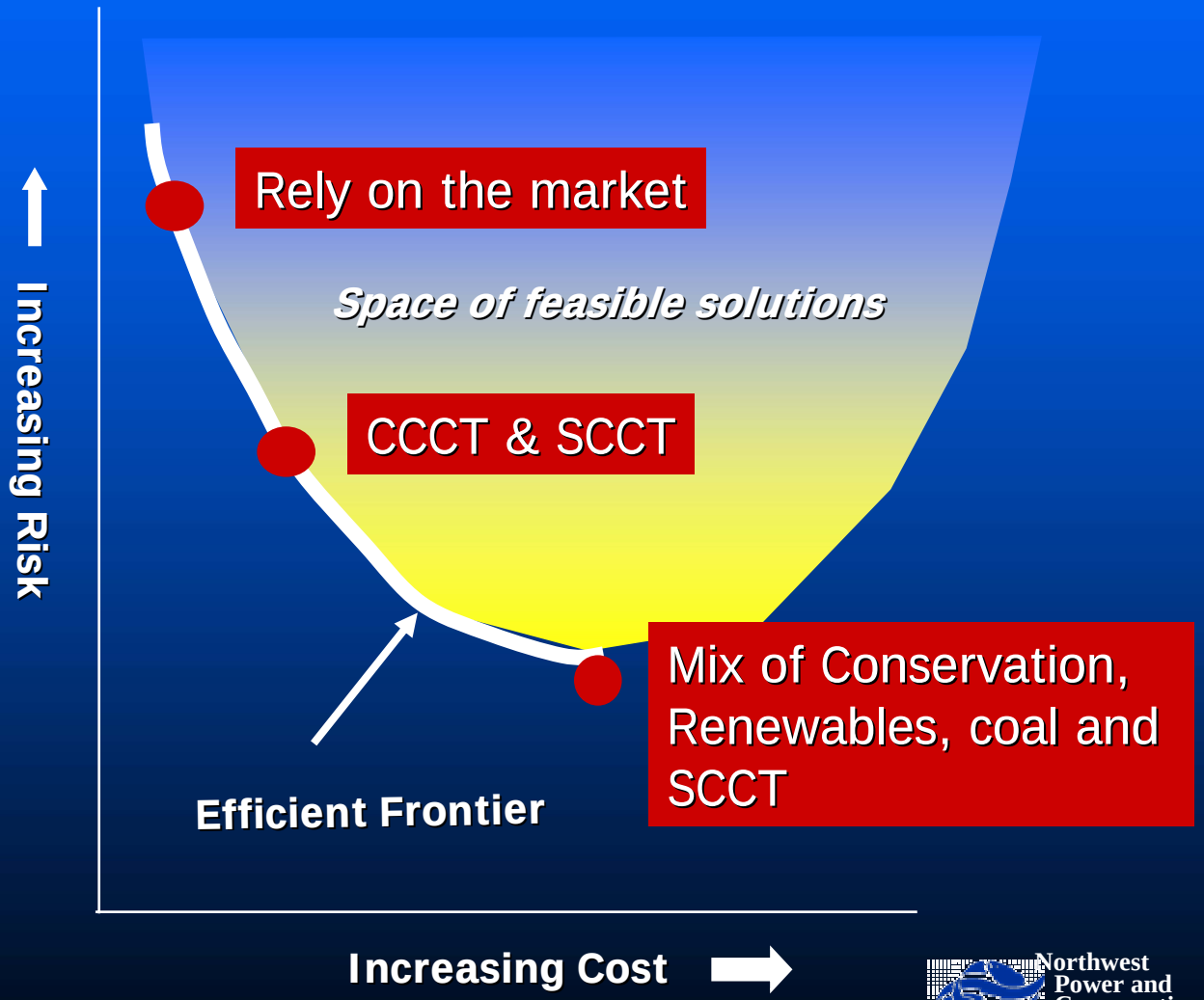
- **Option 1**: Similar to lowest rates over last 20 years
  - Non-lost opportunity limited to 40 aMW/year
  - Ramp-up lost-opportunity to 85% penetration by 2025
- **Option 2**: Similar to typical rates over last 20 years
  - Non-lost opportunity limited to 80 aMW/year
  - Ramp-up lost-opportunity to 85% by 2017
- **Option 3**: Accelerated non-lost opportunity
  - Non-lost opportunity limited to 120 aMW/year
  - Ramp-up lost-opportunity to 85% by 2017

Average Annual Energy Efficiency Development for Alternative Levels of Deployment Tested



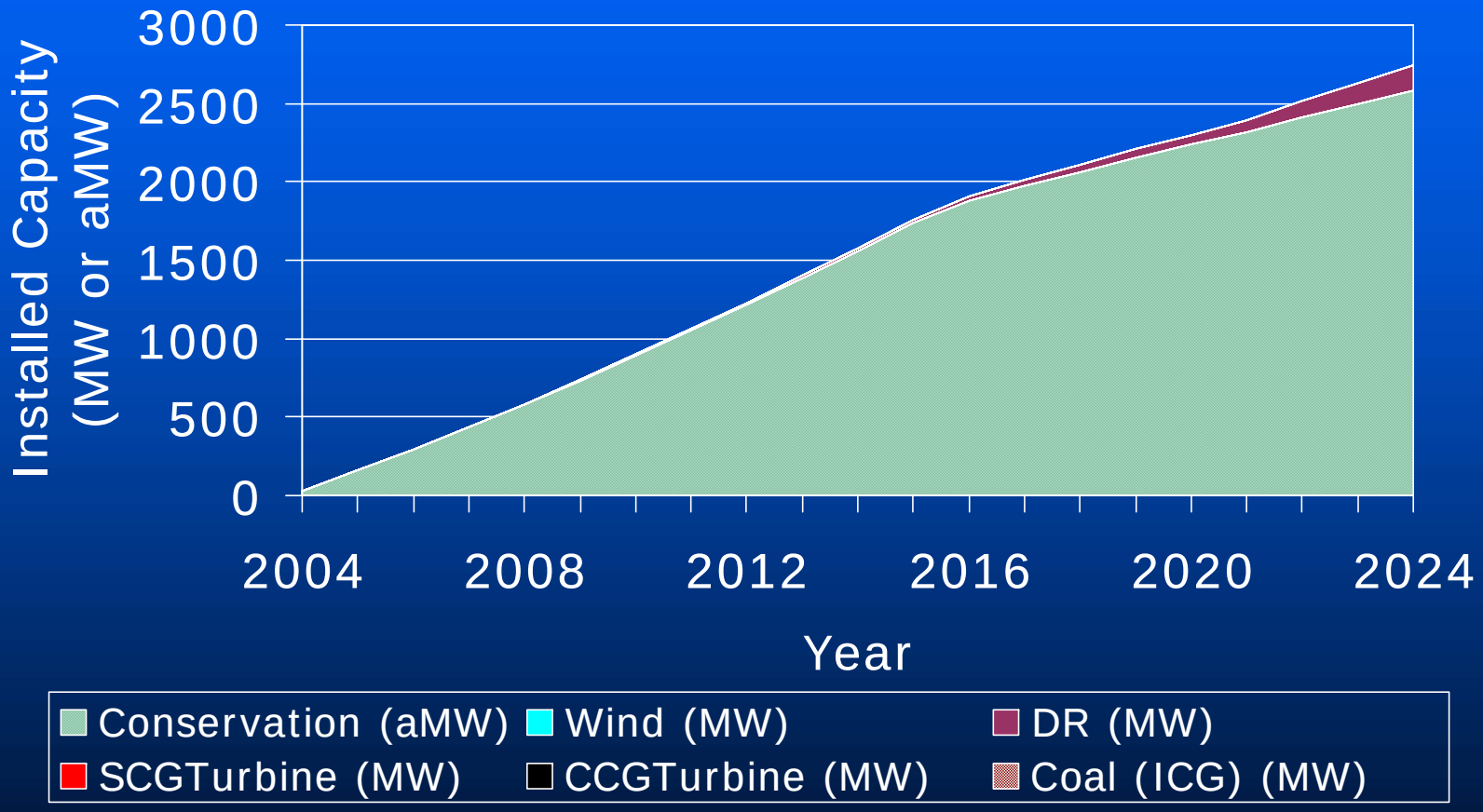
Northwest Power and Conservation Council

Insights from 5th Plan Portfolio Analysis – Diverse Portfolios Decrease Risk, but Increase Cost



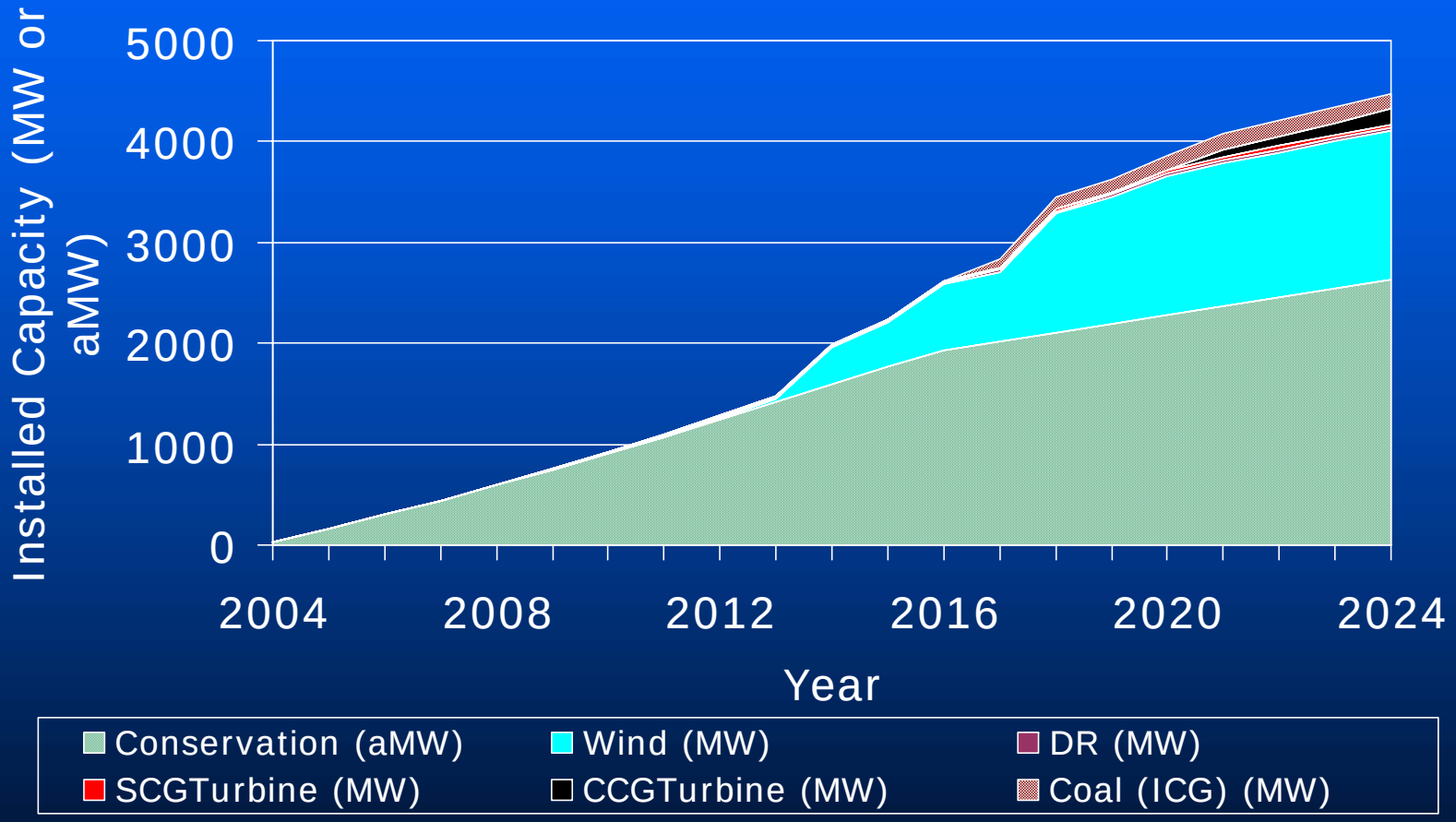
Northwest Power and Conservation Council

Least Cost Portfolio



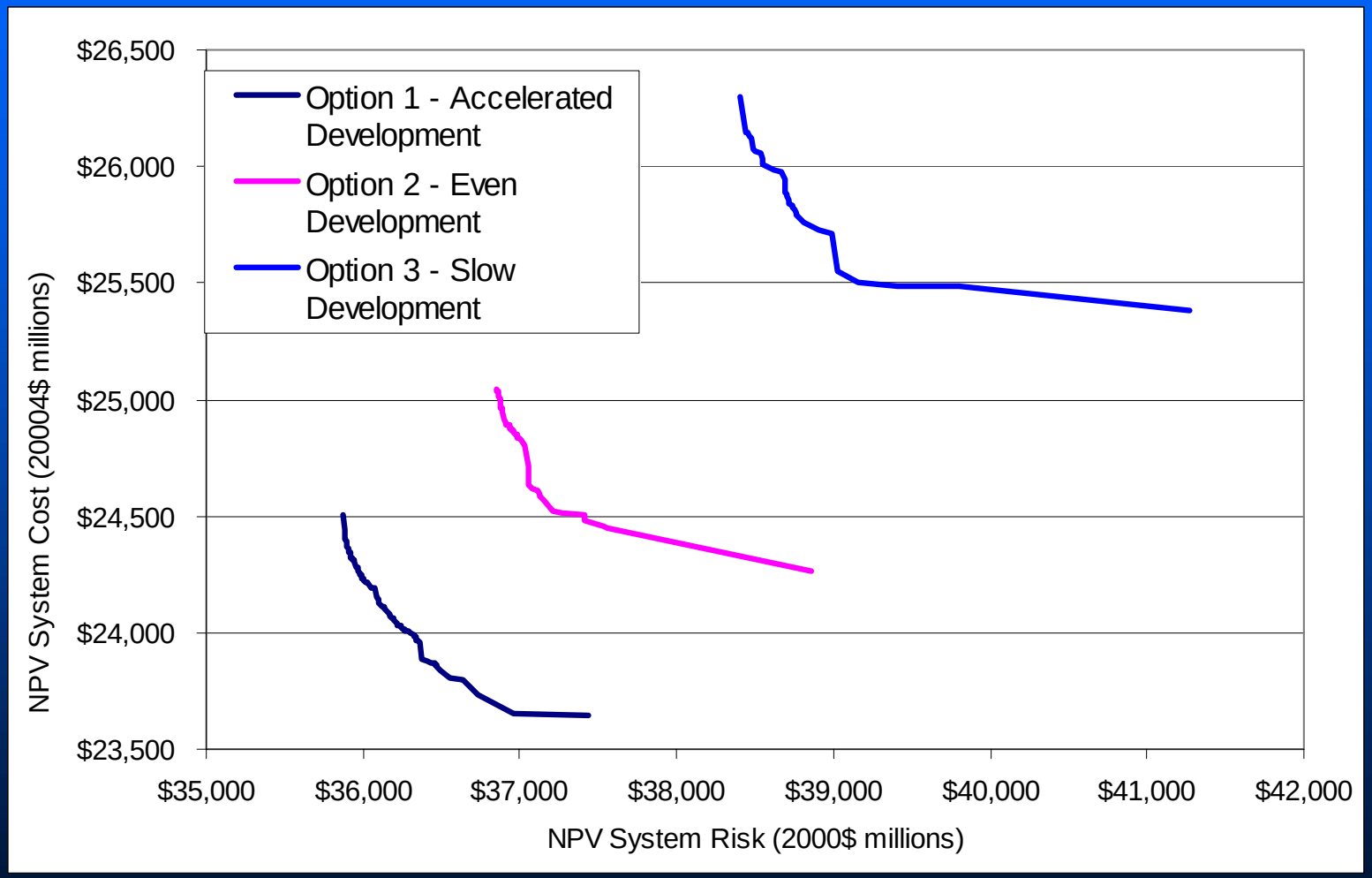
Northwest Power and Conservation Council

Least Risk Portfolio



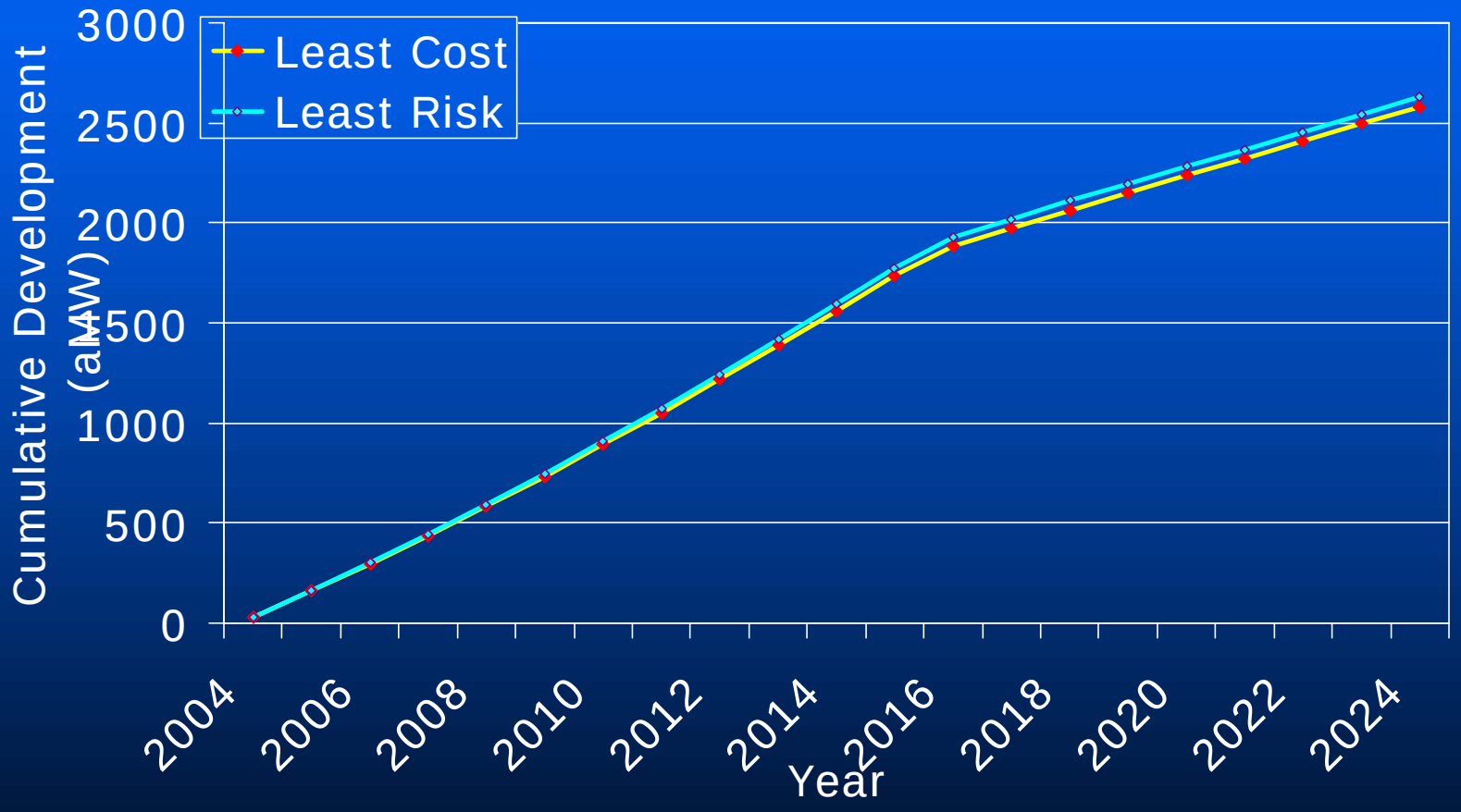
Northwest Power and Conservation Council

Accelerated Development of Energy Efficiency Reduces Both System Cost & Risk



Northwest Power and Conservation Council

The Pace of Energy Efficiency Development Does Not Vary Significantly Between Least Cost and Least Risk Portfolios



Northwest Power and Conservation Council

The Amount of Demand Response Resources Developed Varies with the Degree of Portfolio Risk

Northwest Power and Conservation Council

Why Energy Efficiency Reduces NPV System Cost and Risk

- It's A Cheap (avg. 2.4 cents/kWh) Hedge Against Market Price Spikes
- It's Not Subject to Fuel Price Risk
- It's Not Subject to Carbon Control Risk
- It's Significant Enough In Size to Delay "build decisions" on generation
- IF you can find some other resource with the same characteristics . . . go for it.