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Hedging Against Carbon Risk with Wind

Liz Salerno
Manager of Policy Analysis
American Wind Energy Association

The Risk of Carbon Limits is Real

- ✓ Climate change regulations, particularly for the electric sector, are coming.
- ✓ States and Regions are already moving ahead.
- ✓ Corporations, electric power trade groups, and others are calling for national carbon regulations.
- ✓ Public Utility Commissions and Public Service Commissions are requiring utilities to incorporate the risk of carbon regulation.

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What is the Status of Climate Change Regulations?

- 10 bills are proposed in the House and Senate co-sponsored by Congress Members from AZ, CA, CT, DE, MA, ME, NM, TN, VT
- Key Design elements:
 - Level of Reductions?
 - Economy-wide or sector specific?
 - Give away emission credits/allowances or auction them?
 - Include a price cap on carbon allowances or not?
 - How to treat early action?

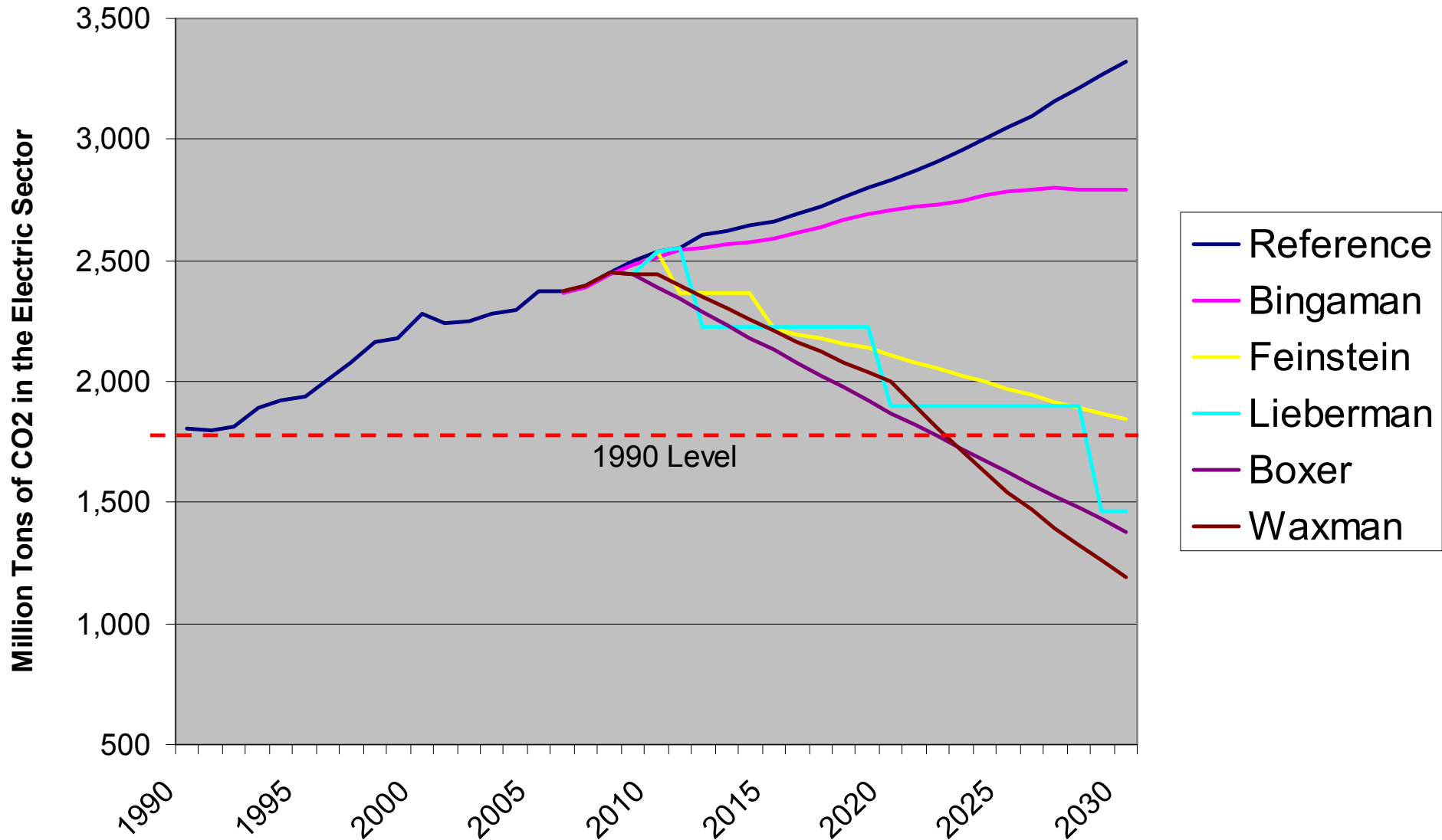
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How Stringent are Federal Climate Bills?

1990 levels -30% below 1990 levels by 2030



State and Regional Efforts

- Regional Greenhouse Gas Initiative (RGGI): 10 Northeast and Mid-Atlantic States under a cap and trade program
- Western Regional Climate Action Initiative: 5 Western States to develop reduction goals and market-based solution

Goals: 1990 emission levels to 85% below 1990 levels



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Map Source: PEW Center



Who else is getting involved?

- Edison Electric Institute (EEI) came out with Climate Change Principles, as well as the Electric Power Supply Association (EPSA)

EPSA supports enactment of comprehensive, mandatory federal legislation to require steps to minimize the impact of greenhouse gases on the environment, consistent with the principles stated below.

- U.S. Climate Action Partnership (USCAP)

Group of businesses and leading environmental organizations that have come together to call on the federal government to quickly enact strong national legislation to require significant reductions of greenhouse gas emissions.

(GE, Alcoa, General Motors, Environmental Defense...)

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Public Utility and Service Commissions requiring carbon risk to be included in Utility IRP

GHG in resource planning	MT	IRP statute includes an "Environmental Externality Adjustment Factor" which includes risk due to greenhouse gases. PSC required Northwestern to account for financial risk of carbon dioxide emissions in 2005 IRP.	August 17, 2004	Written Comments Identifying Concerns with NWE's Compliance with A.R.M. 38.5.8209-8229; Sec. 38.5.8219, A.R.M.
GHG in resource planning	KY	KY staff reports on IRP require IRPs to demonstrate that planning adequately reflects impact of future CO ₂ restrictions	2003 and 2006	Staff Report On the 2005 Integrated Resource Plan Report of Louisville Gas and Electric Company and Kentucky Utilities Company - Case 2005-00162, February 2006
GHG in resource planning	UT	Commission directs PacifiCorp to consider financial risk associated with potential future regulations, including carbon regulation	June 18, 1992	Docket 90-2035-01, and subsequent IRP reviews
GHG in resource planning	MN	Commission directs Xcel to "provide an expansion of CO ₂ contingency planning to check the extent to which resource mix changes can lower the cost of meeting customer demand	August 29, 2001	Order in Docket No. RP00-787

How are Utilities responding?

- As utilities incorporate the cost of carbon into their energy resource plans, there is a shift away from conventional technology toward clean technology, including wind.
- For example...



Pacificorp's 2006 Integrated Resource Plan (IRP), incorporating the cost of CO₂

- ▶ At \$15/ton, CEM delays the 2016 coal build to 2018, delays gas additions, and builds 800 MW more wind than CAF 11 in 2018.
- ▶ At \$20/ton, further delays and reductions in gas build, and another 100 MW of wind is added by 2018.
- ▶ At \$25/ton, the coal plant is fully displaced, and an additional 1,000 MW of wind is added (2,600 MW total).
- ▶ At \$40/ton, gas build is all but eliminated (25 MW CHP still in), and an additional 400 MW of wind is added (3,000 MW total).

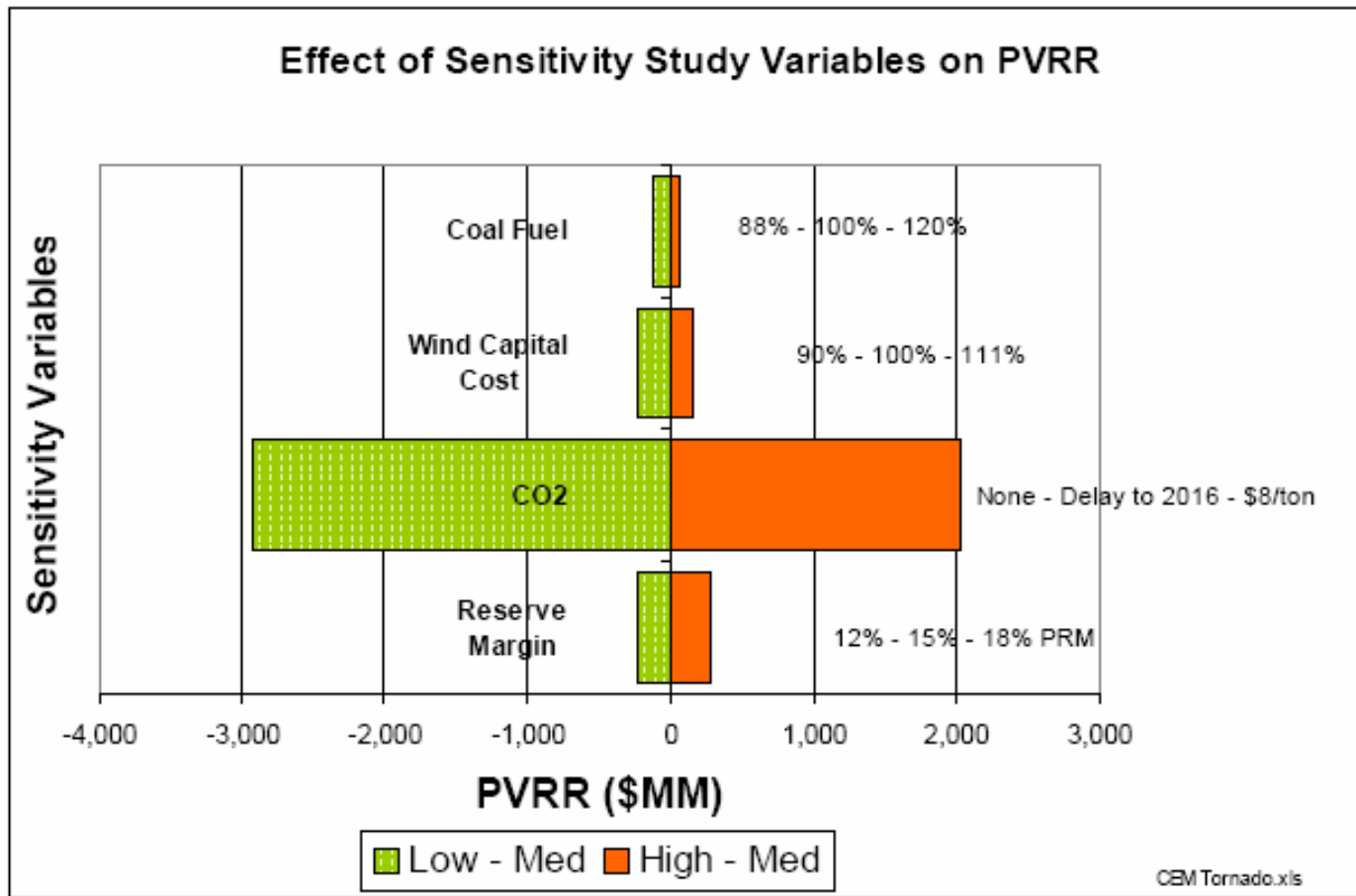
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Comparative Utility Risk on Required Revenue

PVRR = Present Value Revenue Requirement



Note: The cost impact of a CO₂ cap-and-trade program is not reflected in the CEM results. The PVRR impact may be significantly reduced by such a program, which will be modeled as part of the detailed simulations.



How much will Federal Climate Change Regulations cost?

On average, \$9.80 – 33/ton of CO₂

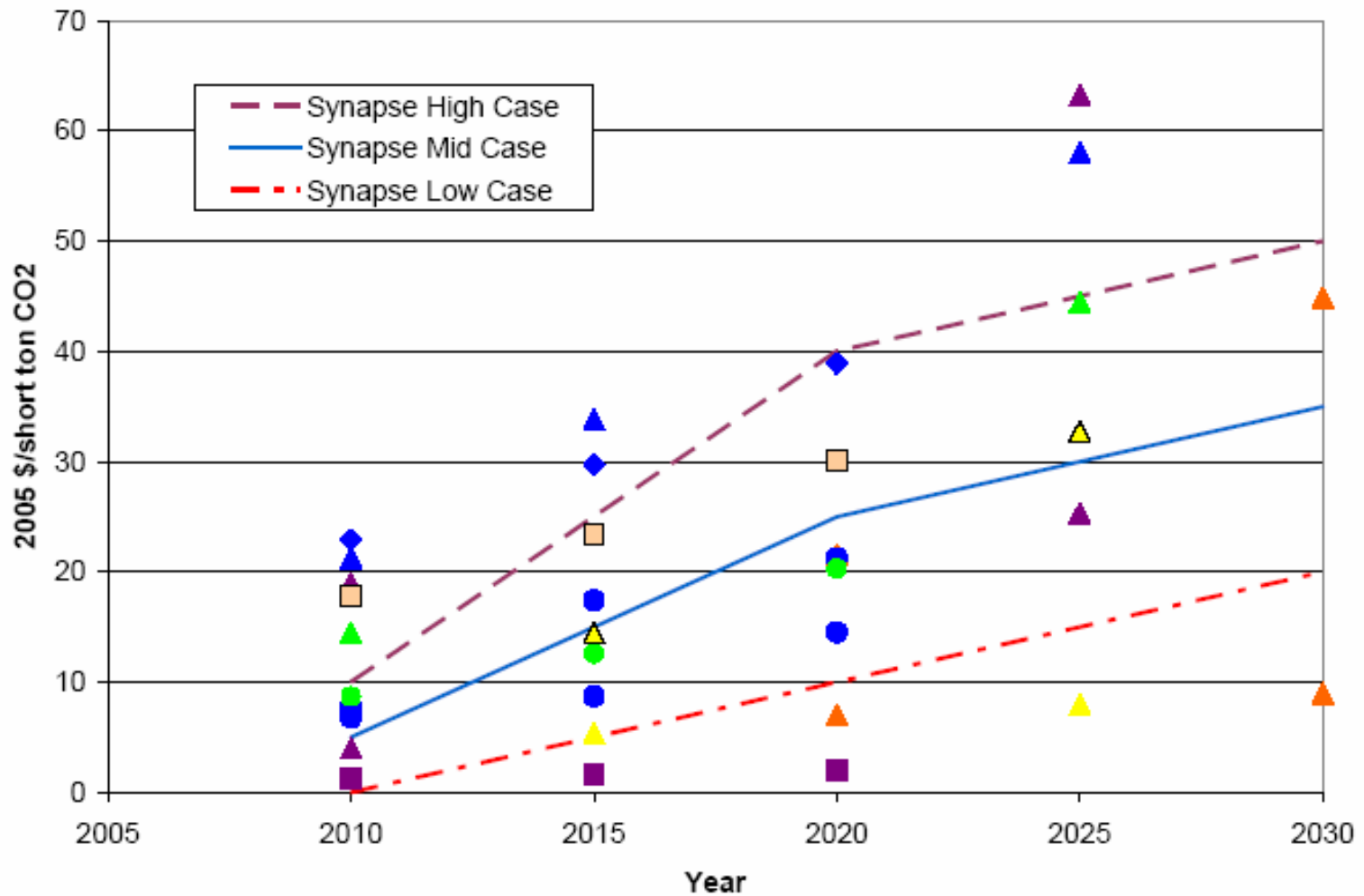


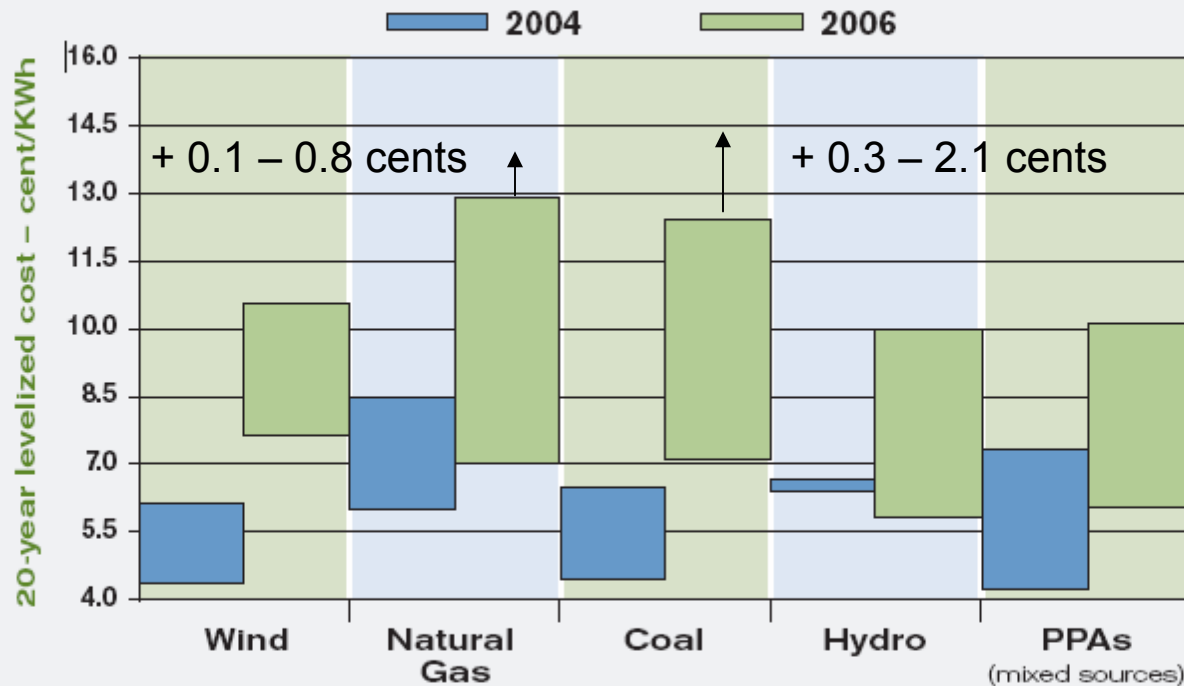
Figure ES-1. Synapse Forecast of Carbon Dioxide Allowance Prices



What is the cost of developing wind compared to other sources?

What if CO2 cost \$10 -30/ton?

Wind In Competitive Range Costs Going Up For All Resources

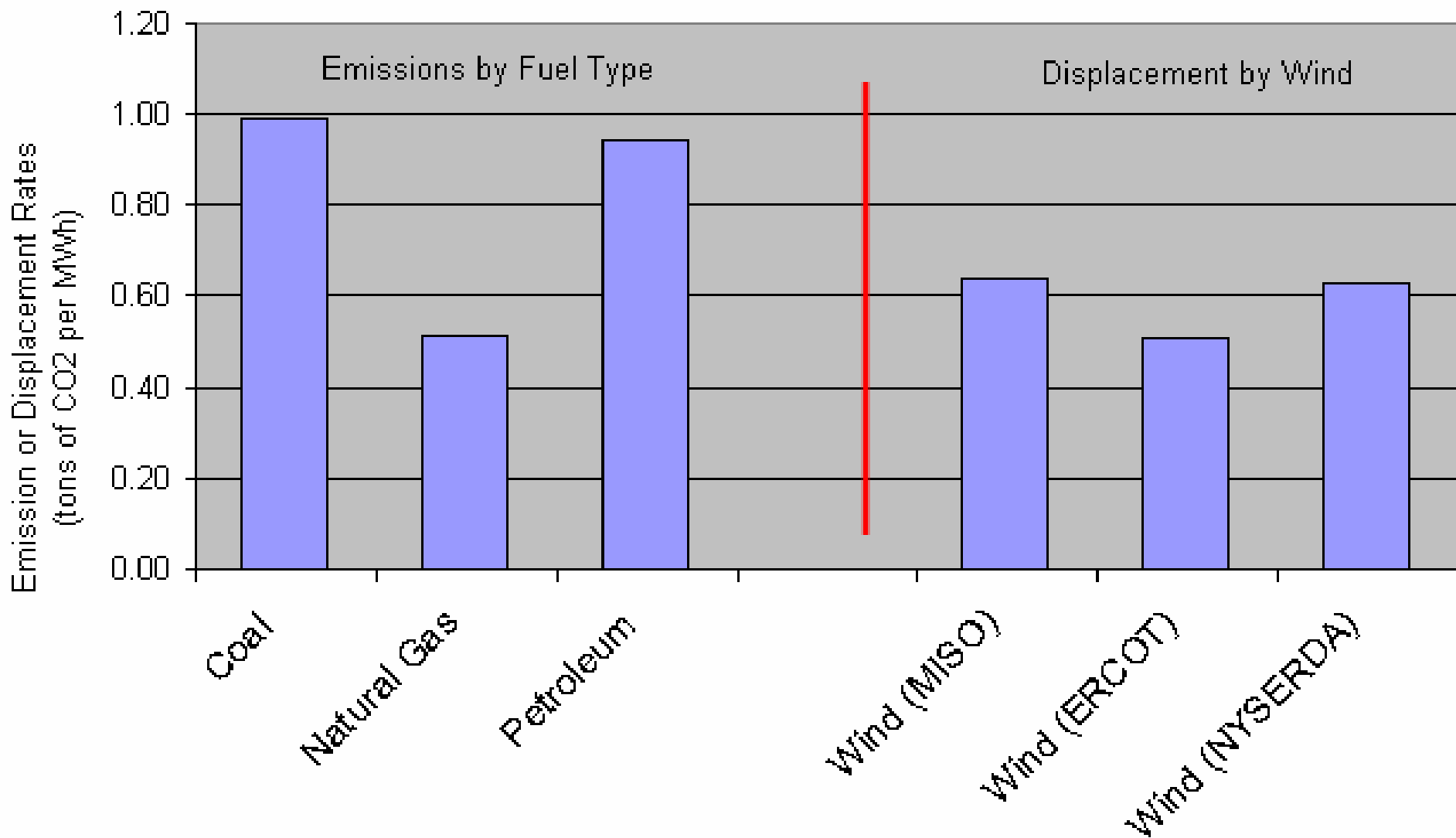


Puget Sound Energy, like other utilities throughout the country, faces significant increases in resource costs. The company's major investments in wind have made PSE the largest utility producer of renewable energy in the Pacific Northwest.

Data and slide courtesy Puget Sound Energy.

How much CO₂ can wind displace?

According to a variety of studies...



Midwest ISO (MISO) Transmission Expansion Plan 2006 – Exploratory Study

- Adding 16,000 MW of wind into the MISO region avoids 43 million tons of CO₂...
- If CO₂ costs \$10-30/ton, then wind will avoid \$430 – \$1,290 million in carbon compliance costs.

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How to harness the ability of wind to hedge against carbon cost and risk?

1. Recognizing and Promoting Renewable Energy in Climate Change Policy
2. Mitigating Economic Impact of Climate Change Policy by Encouraging Deployment of Renewable Energy
3. Integrating Energy and Environmental Policy

If interested in specific design provisions to encourage and harness the benefits of wind, please email for details, esalerno@awea.org

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1. Recognizing and Promoting Renewable Energy in Climate Change Policy

- Design the program to treat all energy resources equally through neutral emission credit or allowance allocation to encourage the cleanest and most efficient generation.
 - If free allocation, distribute emission allowances based on generation, not on fuel consumption (or set-aside)
 - If auction of allowances, use revenue to encourage deployment of available clean technology, such as wind.

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2. Mitigating Economic Impact of Climate Change Policy by Encouraging Deployment of Renewable Energy

Renewables, particularly wind, along with efficiency, are the only readily available, rapidly and vastly deployable, cost-effective solution to climate change.

- Encouraging renewables TODAY with complimentary policy will avoid installing generating capacity that has a lifetime of emissions of 40-60 years and avoids the cost associated with reducing those emissions.
- Using renewables today buys time to continue to develop additional technology solutions.

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3. Integrating Energy and Environmental Policy

The benefits of wind energy should be evaluated holistically recognizing:

- The cost savings from reduced demand for natural gas which puts downward pressure on price,
- The security benefits of reduced demand for natural gas in light of expected significant increases in imports,
- The value of payments to rural and farm landowners for hosting for wind turbines, and
- The expected surge in jobs and related economic benefits associated with construction, manufacturing, materials and services for the wind industry.

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Thank You!

Contact:

Liz Salerno

American Wind Energy Association

esalerno@awea.org

202-383-2517

Washington, DC

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