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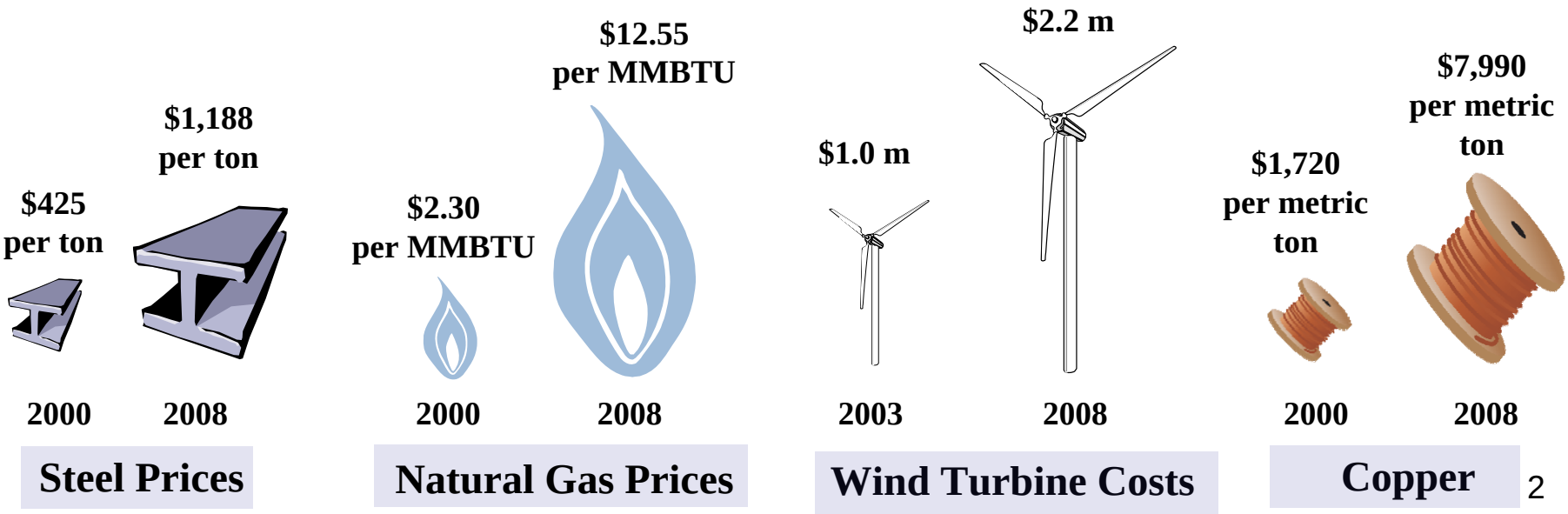
NW Investor Owned Utility Perspective: Climate Policy and the WCI

A Joint Presentation to the NW Power & Conservation Council

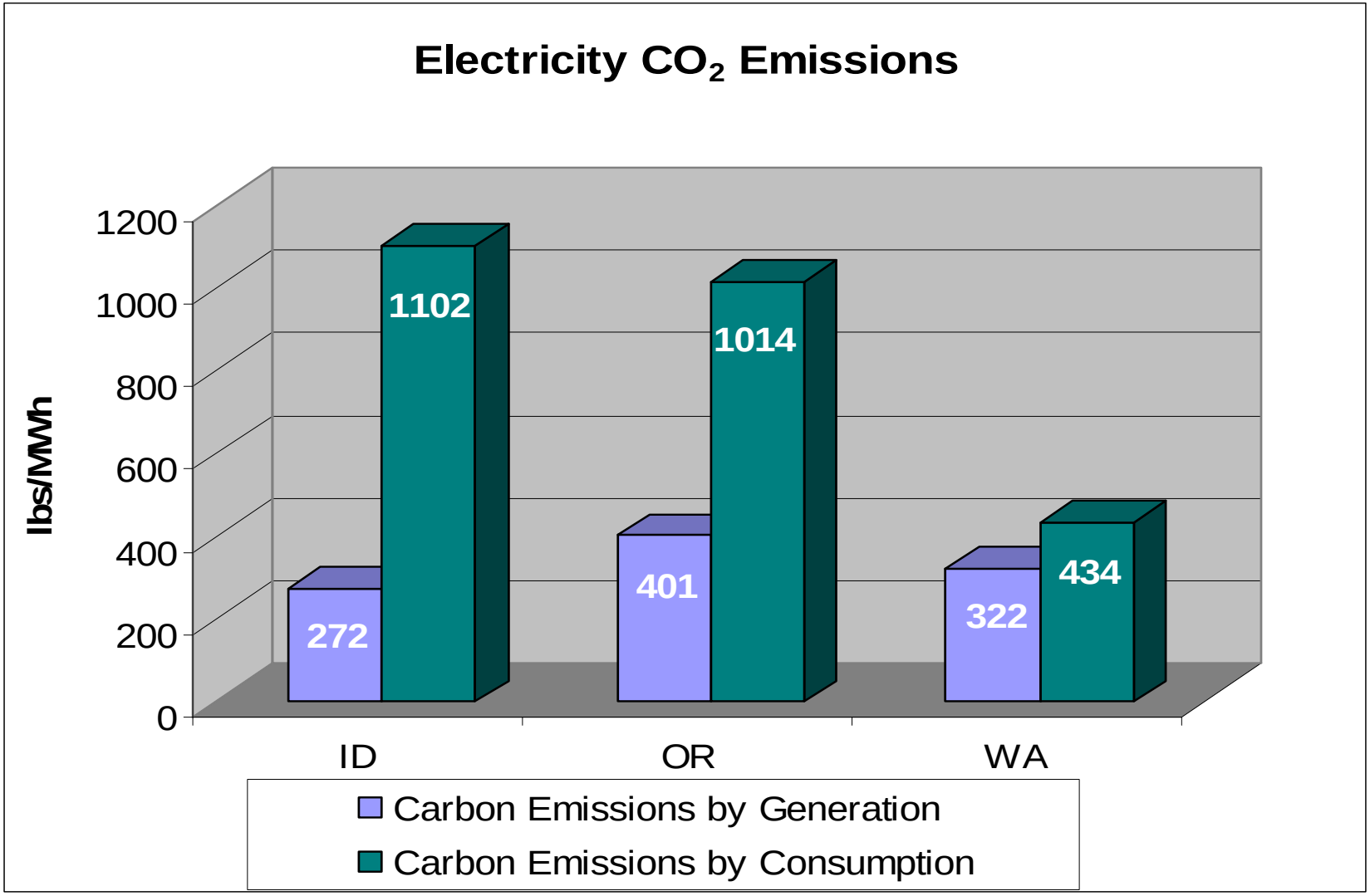
September 16, 2008

Northwest Carbon Reduction Challenges

- Load Growth
- Generation Deficit
- Transmission Capacity Needs
- Renewable Portfolio Standards
- Carbon emissions reduction goals require technologies yet to be developed
- Public opposition to infrastructure/generation in their backyards
- Dramatically increased costs of raw materials, transportation and labor:

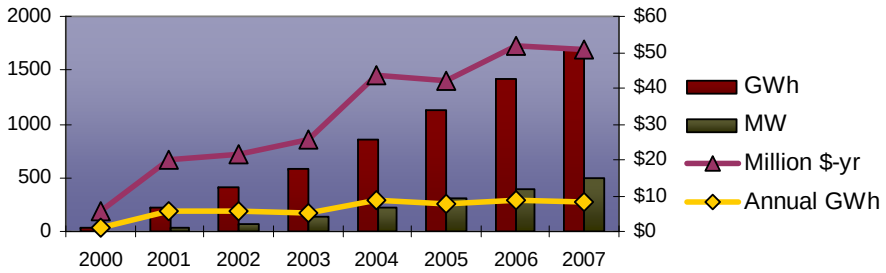


Northwest Carbon Perception vs. Carbon Reality



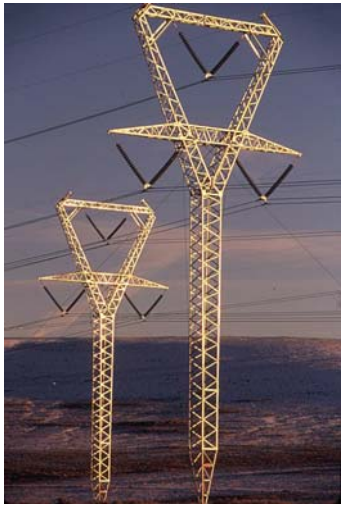
Carbon Challenge: What is Pacificorp Doing?

Energy efficiency and load control
Cumulative Spending & Savings



Renewable Energy

- 2005 - < 1700 MW of hydro and renewables
- 2008 - > 2800 MW of hydro and renewables, including 1000+ MW of wind
- 2016 – At least 1000 MW more
- $1.6 billion renewable energy investment 2006 - 2008



Transmission Investment

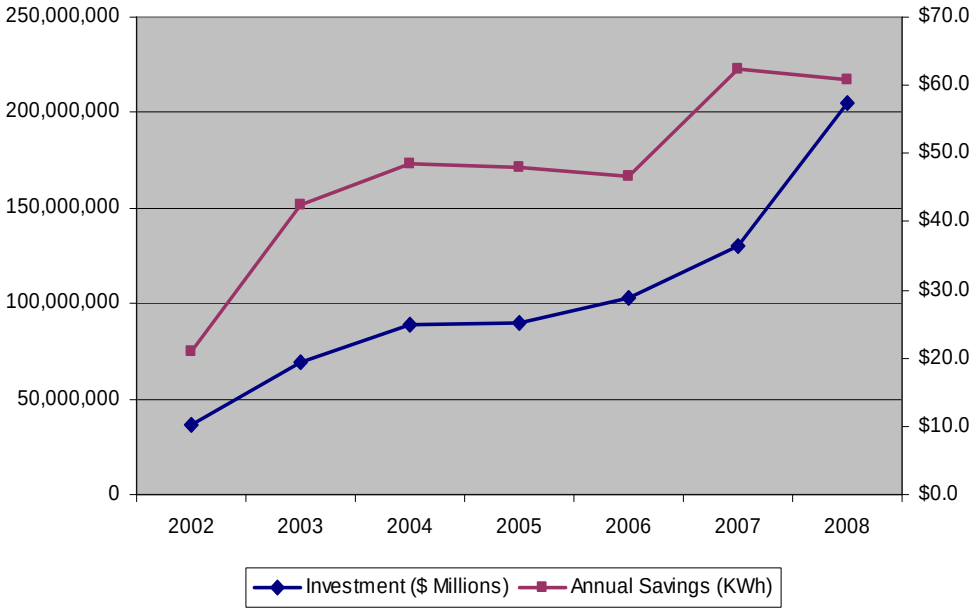
- Energy Gateway
  - o 2000 miles of backbone transmission
  - o Lines across six states
  - o $5.2 billion investment

Zero and Reduced Carbon Emission Generation

- 2006 – 2008 -- 1000 MW of new natural gas generation and 1000 MW more in negotiation
- Active exploration of IGCC and CCS technologies
- Nuclear opportunities evaluated at the holding company

Carbon Challenge: What is PSE Doing?

Energy Efficiency- Our First Resource



Wind Resources

Hopkins Ridge

- Land area – 11,000 acres
- Turbines – 87
- Power output – 157 megawatts (MW) at peak capacity

Wild Horse

- Land area – 9,000 acres,
- Turbines – 127
- Power output – 229 MW at peak capacity

Solar Resources

- Fixed-angle, multicrystalline photovoltaic solar-panel technology
- Three times bigger than Northwest's next-largest solar generating system (in Klamath, Ore.)
- Development Cost - approximately $4.5 million
- Generating Capacity - 500 kWs at peak-rated (full-sun) generation

Carbon Challenge: What is PGE Doing?

Investing in Renewables & Efficiency

Current

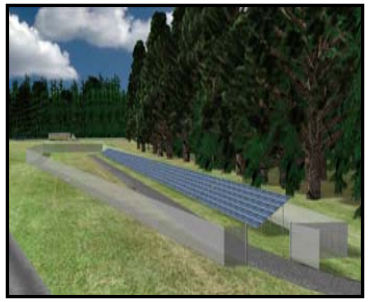
Vansycle Ridge – 25 MW
Klondike II – 75 MW
Biglow Canyon Phase I -- 126 MW

Under Development

Biglow Canyon II and III -- 325 MW
Current RFP - Up to 218 MW by 2014 requested

Solar Project

ODOT Solar Highway Program
Proof-of-Concept project
Output: 104 kW - 111,000 kWh annually
Provides ¼ of the energy needed to light the I-5/I-205 Interchange



Generation Efficiency Improvements
108 additional MW over last 10 years

Boardman Carbon Capture Pilot Project

Pipe CO2 emission stream into algae tanks to consume CO2
Dewater algae and separate oils from solids
Produce biodiesel from oil
Preliminary results by 12/2008

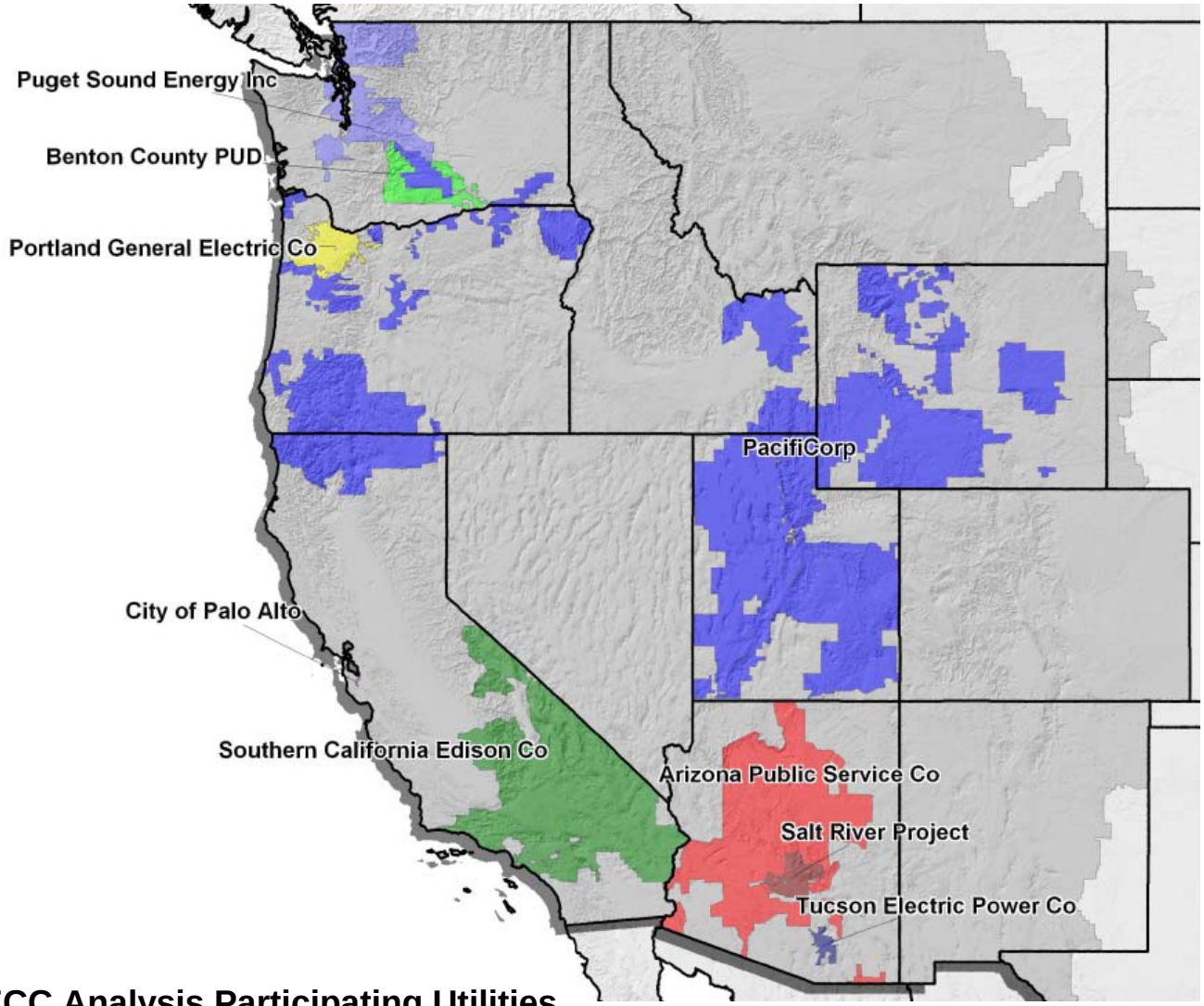
Electric Vehicle Charging Network

Deploying first 12 electric vehicle charging stations in Portland area

Investing in Transmission Infrastructure

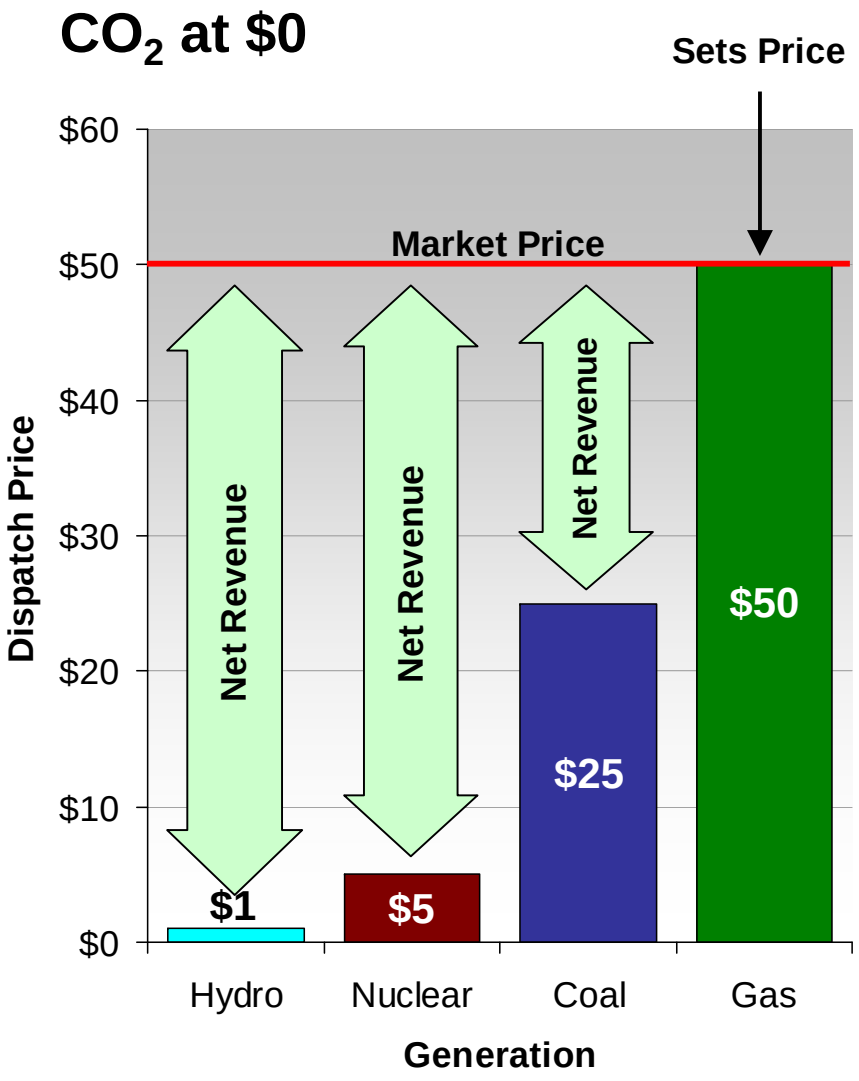
PGE evaluating potential “Southern Crossing” 500kv line from Boardman area to the Willamette Valley

Investing in Research and Analysis: EPRI WECC Study

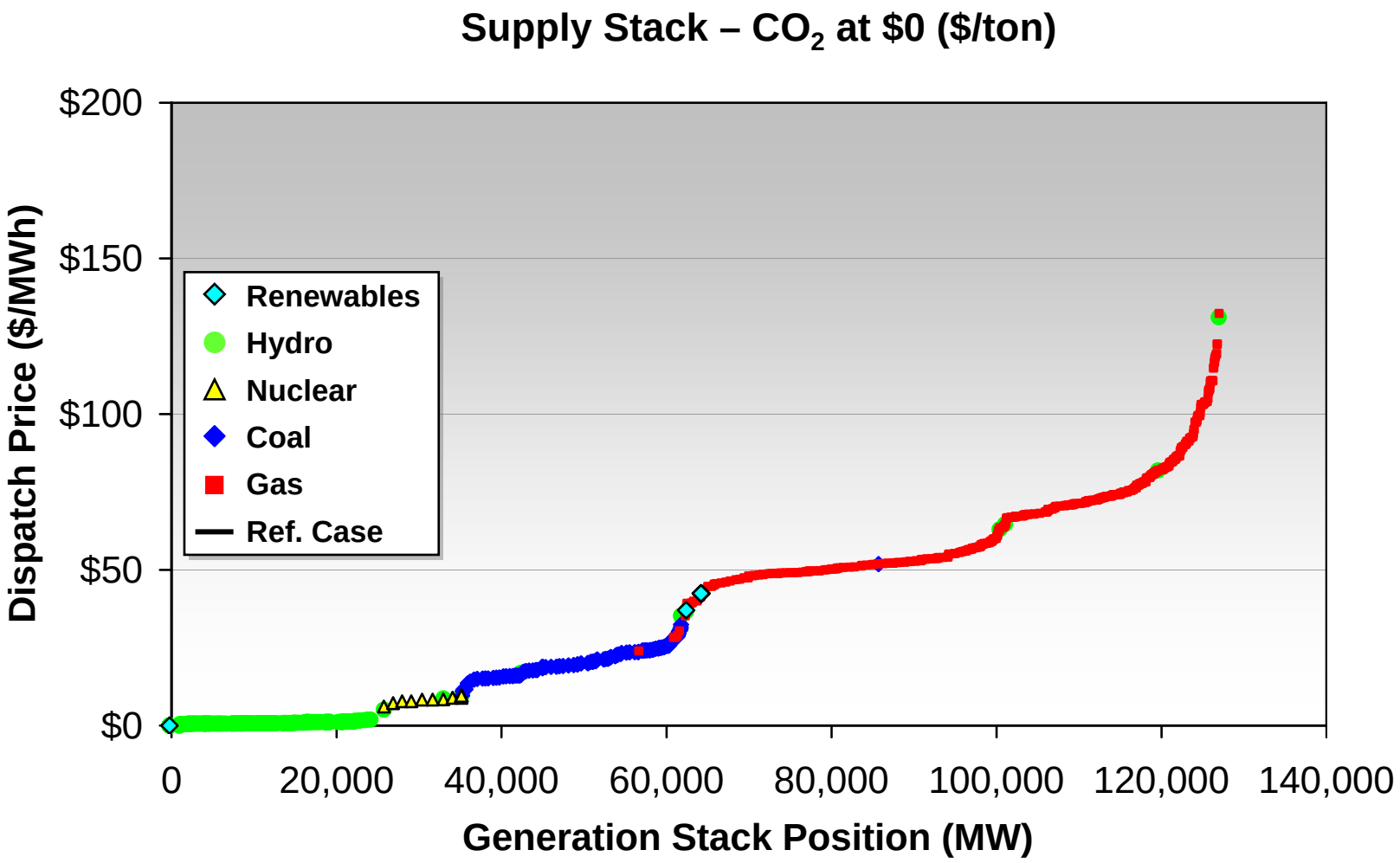


EPRI WECC Analysis Participating Utilities

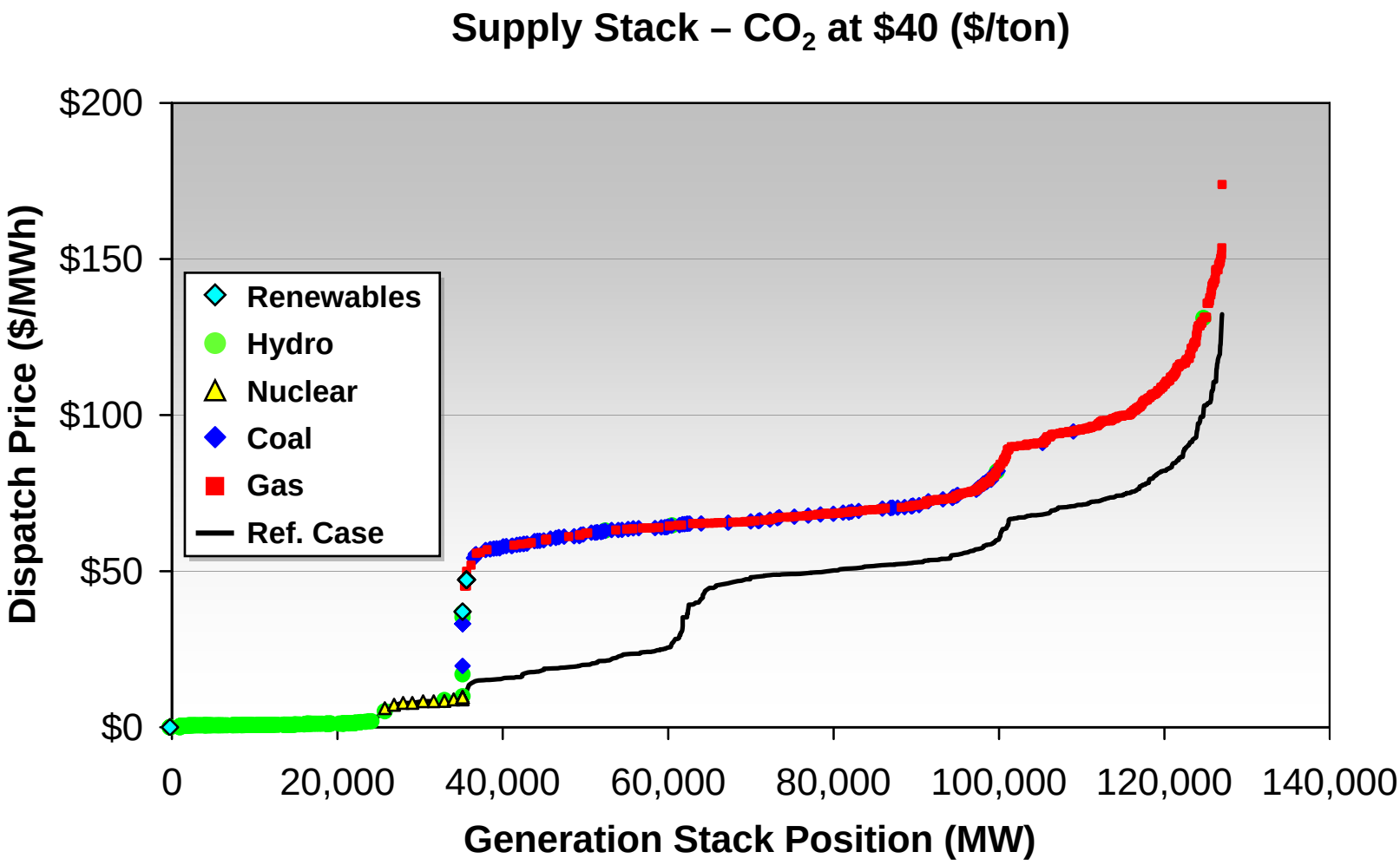
CO_2 Price Impacts Electric Market Price and Generator Net Revenue for Each Hour of Dispatch



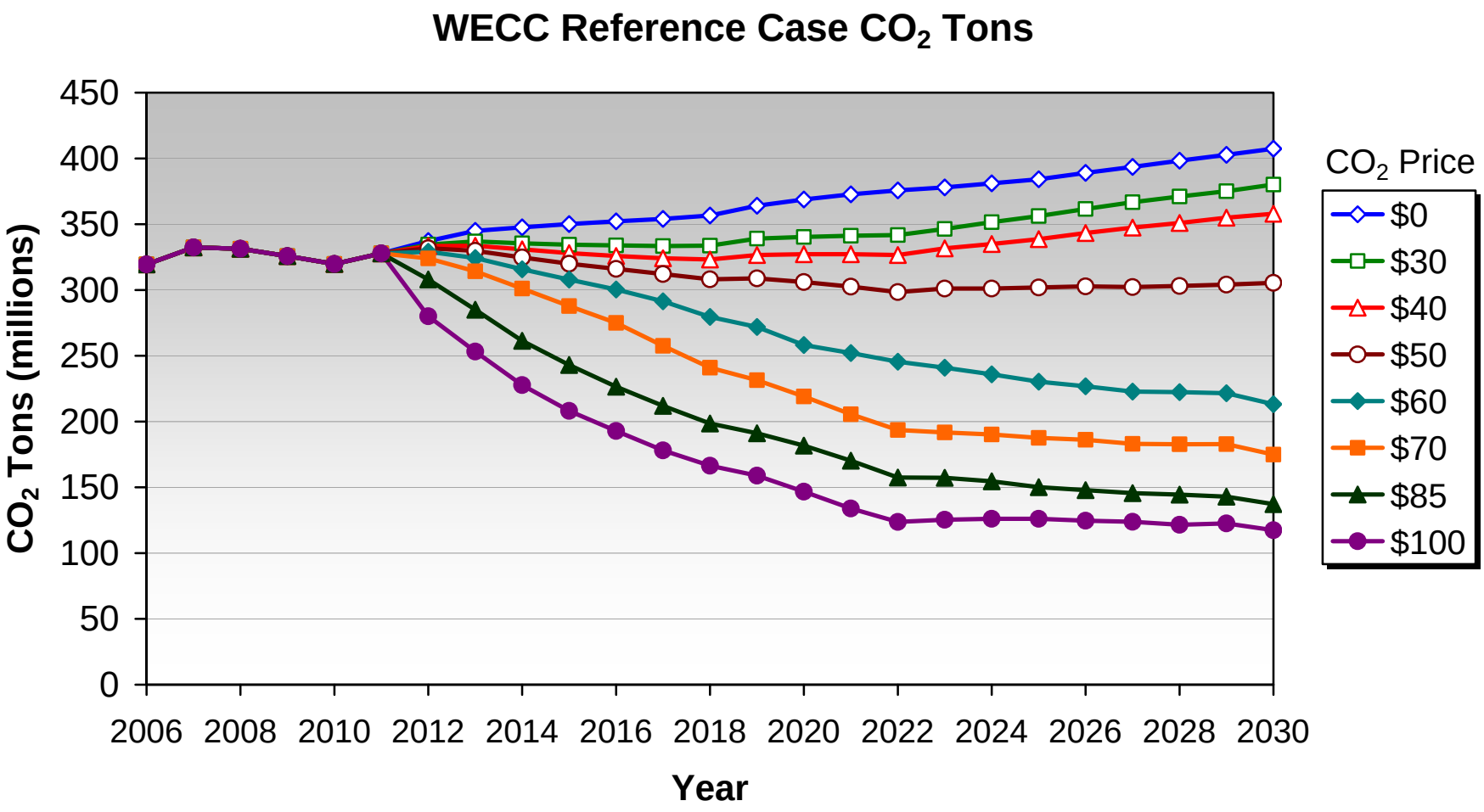
What Happens When CO_2 Has a Price?
$0 per ton



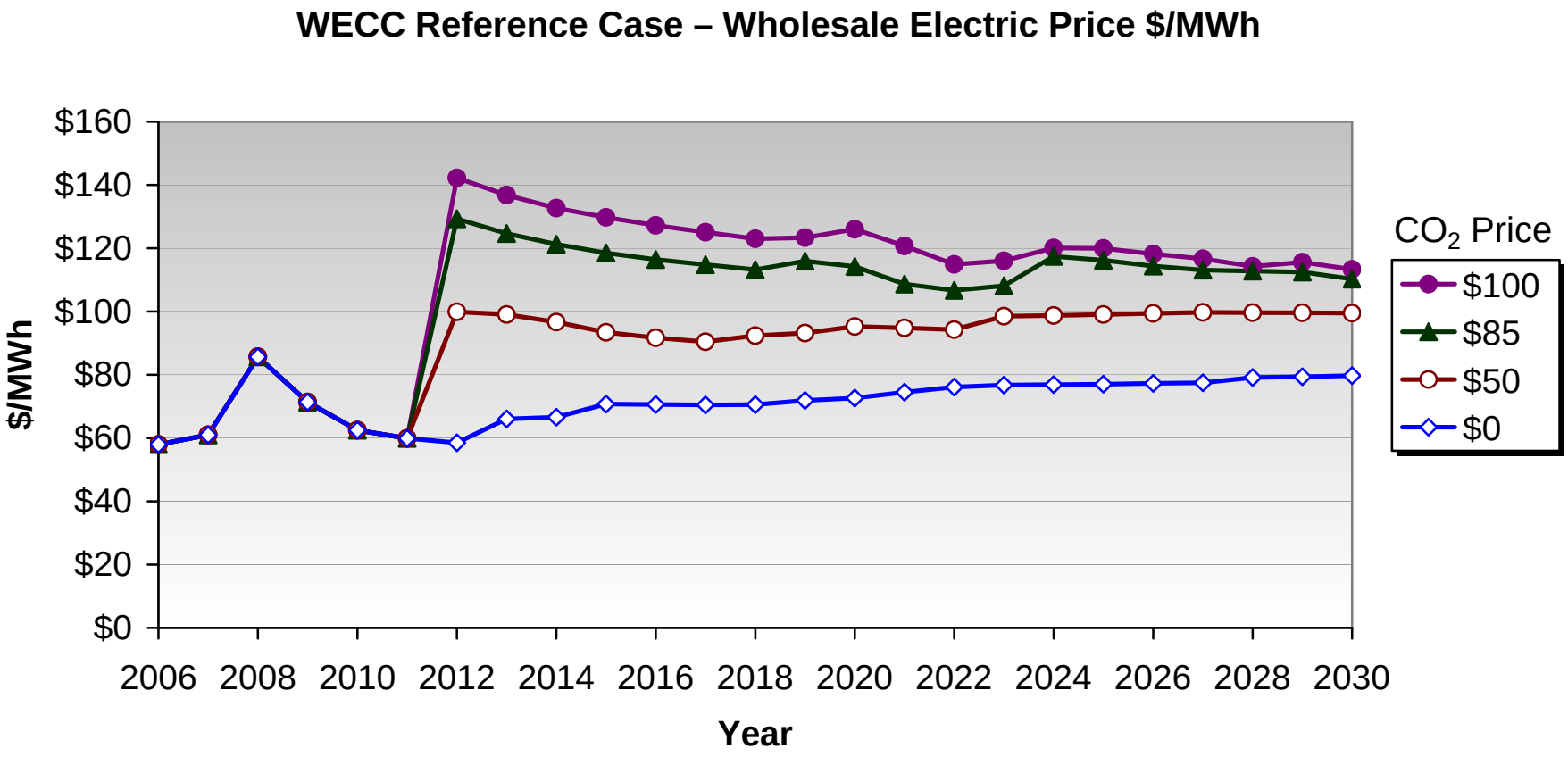
What Happens When CO_2 Has a Price? $40 per ton



Emissions by CO_2 Price



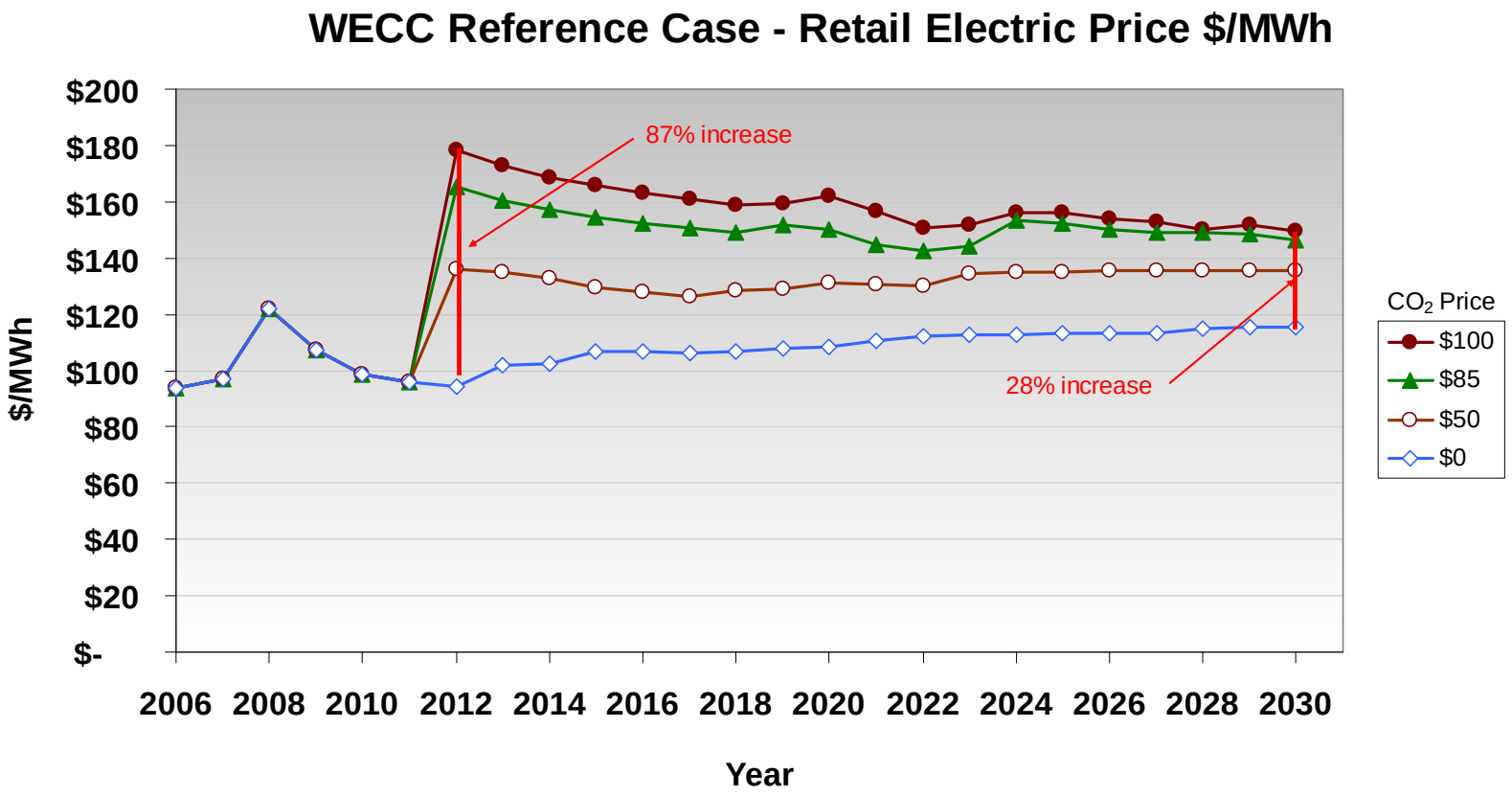
Wholesale Electric Prices



- % increase in 2012: 69% @ $50, 119% @ $85, 141% @ $100
- % increase in 2030: 25% @ $50, 38% @ $85, 41% @ $100

Impact of CO_2 Price on Retail Electric Rates

- 2006 Benchmark
  - $94/MWh - weighted average retail price for WECC
  - $58/MWh - wholesale price for WECC
  - $36/MWh - average delivery expense (38% of retail)



EPRI Study Conclusions

- **Higher electric prices will be inescapable in order to cut CO_2 emissions below historic benchmarks**
  - $50 CO_2 price stabilizes emissions (retail price +45% in 2012, +15% in 2030)
  - $75-$100 CO_2 price significantly cuts emissions (retail price +90% in 2012, +30% in 2030)

- **In a "Wild Card"/adverse effects world …**
  - $75 CO2 price achieves stabilization (retail price +60% in 2012, +20% in 2030)
  - $125-$150 CO2 price achieves significant cuts (retail price +100% in 2012, +37% in 2030)

EPRI Study Conclusions (con't)

- **Large reductions in emissions possible if given time to add significant amounts of nuclear, renewables and Carbon Capture and Sequestration**
- **Customer price response helps avoid emissions but imposes real cost to society**
- **Availability of natural gas critical to achieving near-term emission reductions**
- **RPS threshold adding generation that cuts CO_2 at implied price of $90/ton**

What We Learn From This…

- **It's expensive to cut electric sector emissions due to…**
  - High price of natural gas (vis-à-vis coal)
  - High cost of new construction
- **Lots of uncertainties drive specific results**
  - Gas prices, construction costs, constraints on nuclear and renewables, demand response, new technology
  - Response of gas market to increased gas generation
- **Meeting targets may be harder in the short term due to lead-times for new generation and demand response**
- **Carbon policy with a gradual implementation schedule can moderate prices impacts on customers**

Western Climate Initiative

- **Whether regional or national, a cap and trade program should include:**
  - Economy Wide Structure
  - Consistency of Application
  - Administrative Simplicity
  - Transparency
  - Cost Containment/Safety Valve
  - Liquidity

Western Climate Initiative

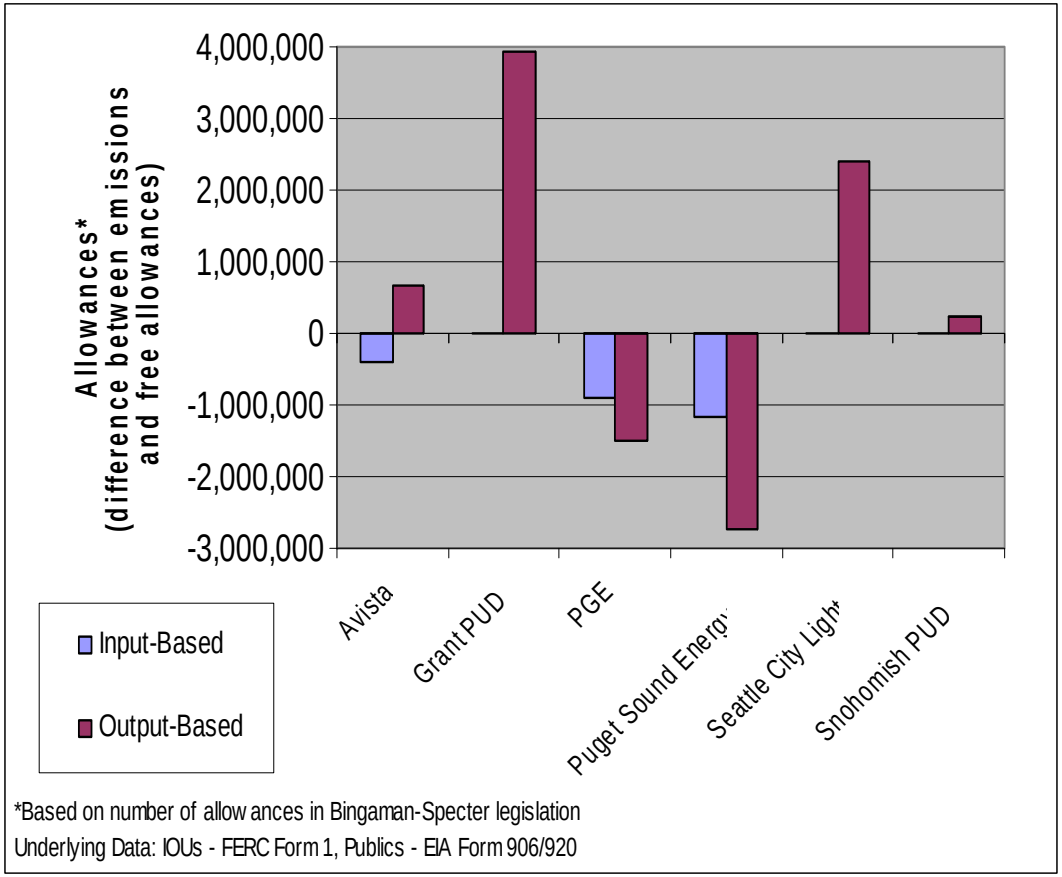
- **WCI Fundamentally Flawed:**
  - Totally Decentralized Program
  - First Jurisdictional Deliverer (FJD) Point of Regulation Conflicts with NW System Sales Approach
  - Enormously Complex Administratively
  - No Safety Valve
  - Very Limited Use of Offsets
  - Transportation, Residential Fuel Combustion Not Included At Outset

Western Climate Initiative

- **Critical Legal Issues Remain Unresolved**
  - Scope of Regulatory Authority
  - Interstate Trading
  - Collection of Taxes or Creation of Auction Revenue
  - Allocation of Auction Revenue
  - Mandatory Greenhouse Gas Reporting
  - State Legislature Support

Allowance Allocation Method Makes a Big Difference for Customers of NW Utilities

- WCI leaves this critical decision to each state
- Utilities with carbon resources start out in deficit no matter how allowances distributed – no "windfall," just new cost
- Allowances are finite – giving them to utilities without a carbon liability amounts to a wealth transfer among ratepayers
- Will result in even larger rate increases for the customers of utilities with real carbon costs to mitigate



Complementary Regulatory Measures

While WCI gets reworked and refined, there are many other policies that need action now:

- Identify additional energy efficiency and demand response funding
- Aggressively pursue/achieve transmission expansion
- Identify and remove barriers to NW renewables -- wind, wave, biomass, geothermal, and solar -- ***for NW use***
- Support technology advancement, demonstration and deployment, particularly for technologies that better integrate intermittent resources (i.e., battery storage)
- Invest in carbon capture/sequestration; its not just for coal
- Invest to make the grid smarter

Sixth Power Plan Modeling

- **Modeling Must Include Critical Sensitivity Runs:**
  - Natural gas prices higher than projected
  - A high load growth case driven by PHEV penetration
  - Higher capital costs for new generation
  - No new nuclear generation is built in future
  - “Wild Card” – several adverse outcomes happen simultaneously
  - R&D success for Carbon Capture and Sequestration
  - Energy efficiency mandates assumed
  - Flat vs. ramped CO2 price trajectory
- **Promote Accurate Accounting of Region’s Carbon Footprint …** 2007 Report was a realistic assessment

Appendix

EPRI WECC Results: Low CO_2 Prices ($0 to $40)

- At Reference Case capital costs and fuel prices, natural gas is the preferred technology to meet new load
- High construction costs limit coal additions to what is already in the pipeline, but existing coal operates to maximum potential
- Generation mix remains relatively constant
    - New generation supplied predominantly by new gas technology
    - Price response increases from 9% of the total to 14%
- CO_2 emissions continue to grow
- Inconsistent with national policy aimed at reducing CO_2 emissions

EPRI WECC Results: $40 to $70/ton CO_2 Price

- Coal generation declines from 21% of total to 7% of total in 2030
- Gas generation remains relatively constant (approximately 23% of total)
- Price response increases somewhat from 14% to 17% of total
- Nuclear is preferred technology for additions once CO_2 price passes $50
  - Nuclear generation increase from 8% to 21% of total generation
  - Increased nuclear generation drives CO_2 emissions reduction from 12% above 2006 level in the $40/ton case to 45% below in the $70/ton case

EPRI WECC Results: $70 to $100/ton CO2 Price

- Nuclear addition/generation is constrained
- 6 GW of new renewable additions (beyond the RPS) become economic
- Coal generation continues to decline while gas generation remains constant:
  - Coal generation declines from 7% of total to 2% in 2030
  - Gas generation 22% of total in 2030
- Additional price response is triggered, increasing from 17% to 21% of total supply mix
- CO_2 emissions decline from 45% below 2006 level in the $70/ton case to 64% below in the $100/ton case

EPRI - Quick Summary of Sensitivity Runs

- **Natural gas prices higher than projected**
  - Higher emissions absent policy, but higher CO_2 price reverses this
- **A high load growth case driven by PHEV penetration**
  - Higher power emissions, more than offset by transportation reductions
- **Higher capital costs for new generation**
  - Delayed emitter to non-emitter turnover; higher prices, higher emissions
- **No new nuclear generation is built in future**
  - Renewables and new gas substitute, but power prices/emissions higher
- **“Wild Card” – several adverse outcomes happen simultaneously**
  - With multiple drivers negatively impacted, response flexibility is limited
- **R&D success for Carbon Capture and Sequestration**
  - Provides a valuable alternative to nuclear, renewables
- **Energy efficiency mandates assumed**
  - Modest impact; mandates crowd out demand response
- **Flat vs. ramped CO2 price trajectory**
  - Keeps power prices down but delays capital transition