

Synapse
Energy Economics, Inc.

Don't Get Burned: The Risks of Investing in New Coal-Fired Power Plants

NARUC Summer Meetings

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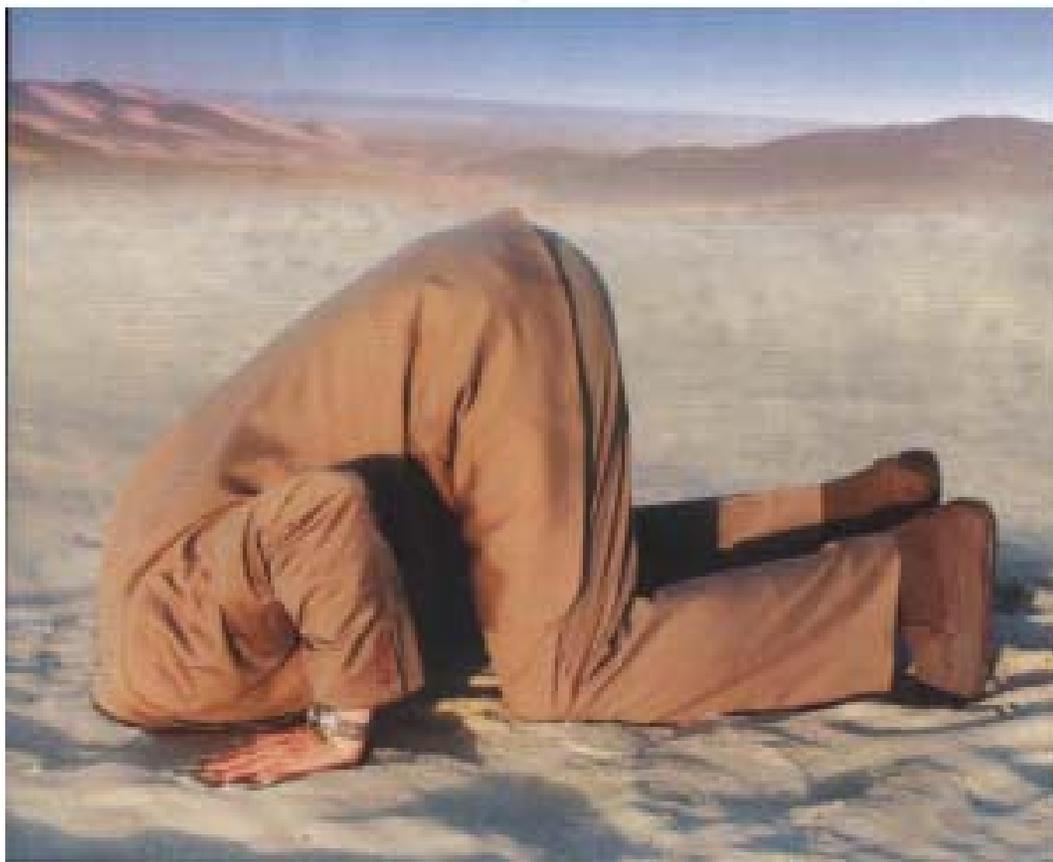
Deja Vu – All Over Again?

- Nuclear power plants originally promoted as “too cheap to meter” but nuclear units became very expensive to build in the 1970s and 1980s:
 - Construction costs spiraled out of control – actual plant costs double to triple estimated costs
 - “Rate Shock” for regulators and ratepayers
 - Owners experienced severe financial problems
 - More than one-half of proposed plants eventually cancelled
 - From 1984 to 1993, more than \$17 billion in nuclear investments written off, net of tax effects
 - Over \$7 billion in nuclear construction costs disallowed in the 1990s by regulatory commissions

Uncertainties and Risks Facing Investments in New Coal Plants Today

1. The likelihood of federally-mandated reductions in greenhouse gas emissions.
2. State mandated reductions in greenhouse gas emissions and the adoption of policies promoting increased use of energy efficiency and renewable resources.
3. Uncertainties surrounding the technical and economic viability of carbon capture and sequestration for pulverized coal-fired power plants.
4. Skyrocketing plant construction costs and extended construction schedules.
5. More stringent regulation of the current criteria pollutants.
6. Coal price increases and supply disruptions.

Ignoring Risks or Pretending There Will Be Easy Solutions Will Lead To



A Train Wreck for Consumers and Investors



The Paradigm Must Change – New Solutions Are Needed

- Standard & Poor's – January 2008

What To Do About Coal?

“The single biggest challenge regulated electric utilities will tackle is the discharge of carbon dioxide (CO₂) into the air.... Three items that will have the biggest credit impact are integrated resource plans that reduce or eliminate the building of new coal-fired power plants, the need for carbon sequestration on existing coal units to meet newer, more exacting standards, and research and development for cleaner coal technologies. All are potentially large ticket items that electric utilities might have to confront.”

Financial Community Warnings (2)

- Standard & Poor's – March 2008

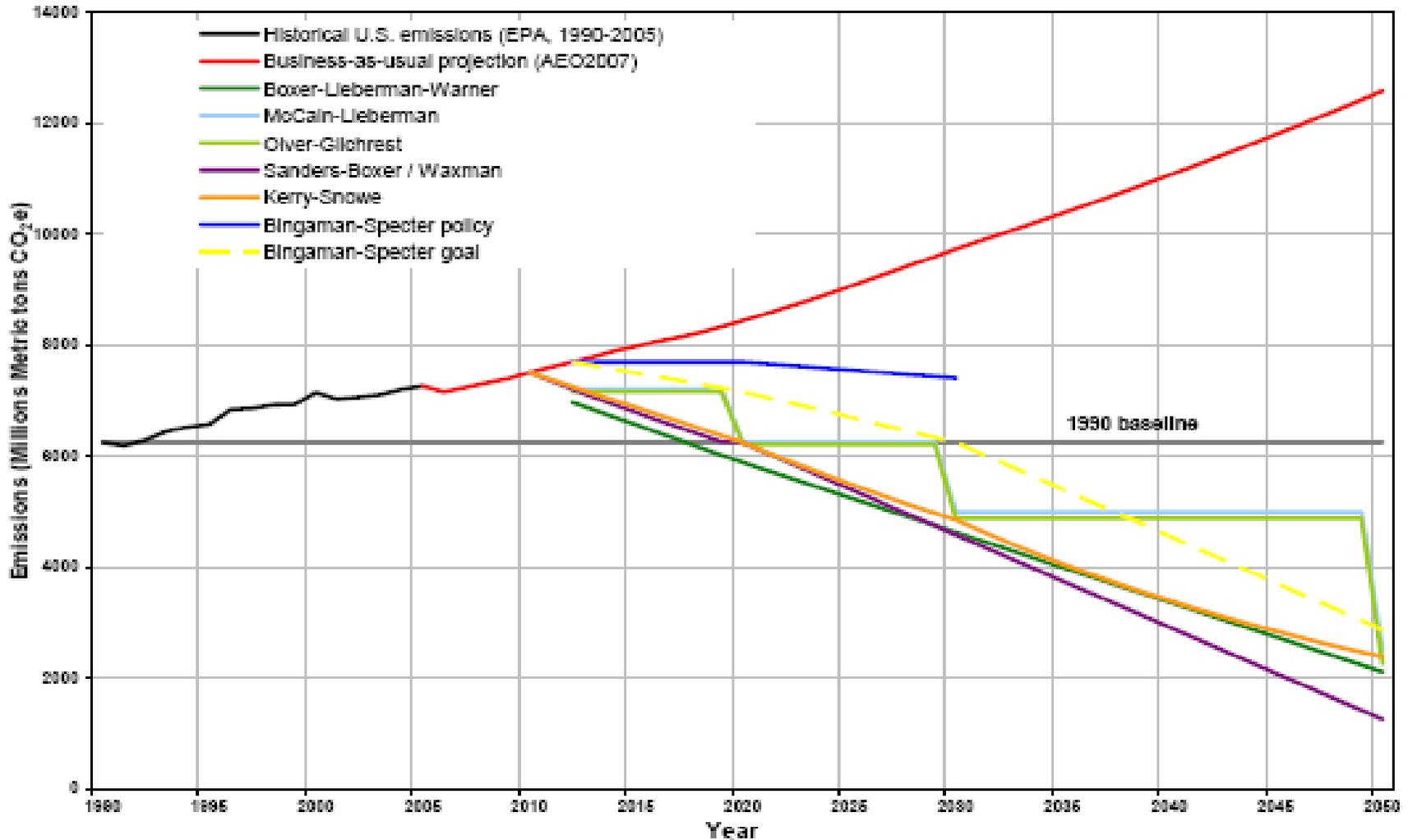
Credit Week Issue *The Credit Cost of Going Green for U.S. Utilities*

“Among the risks are that CO₂ compliance costs could spiral out of control, those costs could be up for rate recovery at the same time that other expenses are rising, and the costs could then get “crowded out” if regulators try to ease customer rate shock. Any disallowance would not necessarily be explicit, since it is difficult and legally suspect to keep prudent, legislatively mandated costs out of rates.

- Standard & Poor's – March 2008 (continued)

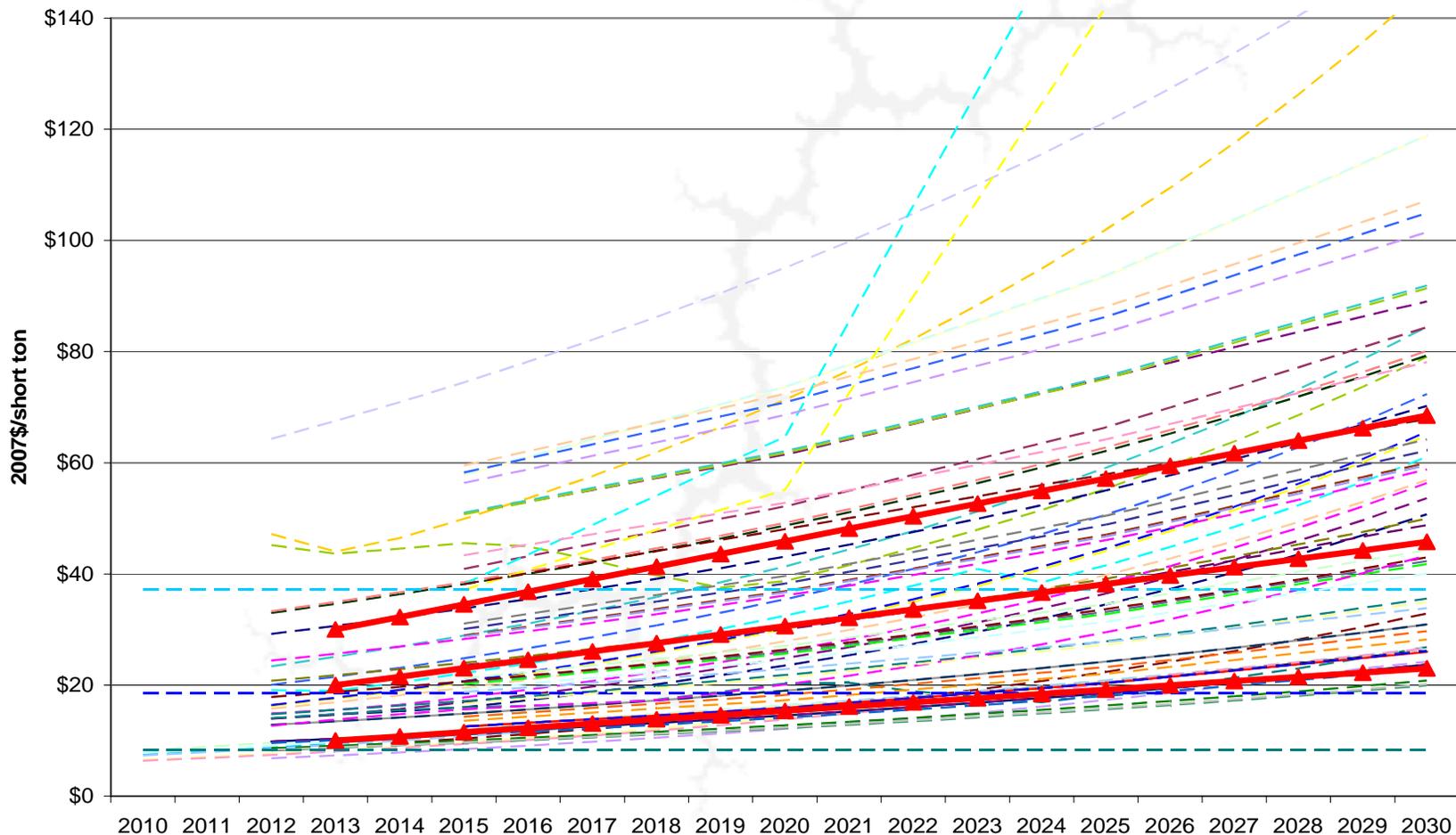
The real risk to credit quality is the prospect that CO₂ compliance costs will be the proverbial straw that leads to harsh regulatory responses such as a disallowance or deferral because of cost pressures tied to commodity prices, more capital spending for basic reliability needs on the transmission and distribution system, and added construction costs for new generation to meet rising demand..... *Clearly, the pursuit of a cooler planet will leave utilities sweating over the risk to their credit quality.*" (Emphasis added)

Federal Regulation of CO₂ Emissions is a Matter of When, Not If



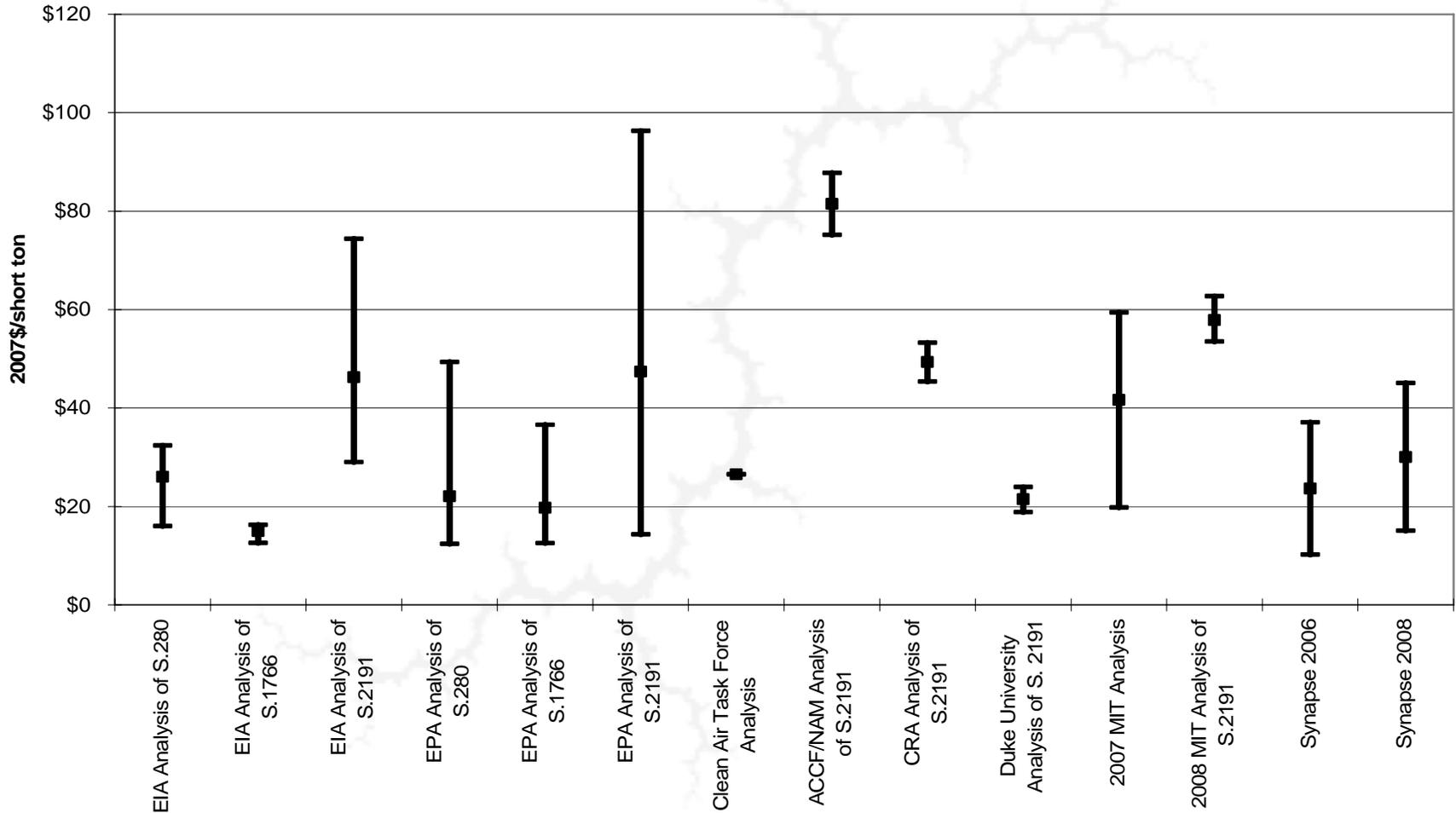
Results of Modeling of Current GHG Legislative Proposals (Annual CO₂ Prices)

CO₂ Allowance Prices (2010-2030)



Results of Modeling of Current GHG Legislative Proposals (Levelized Prices)

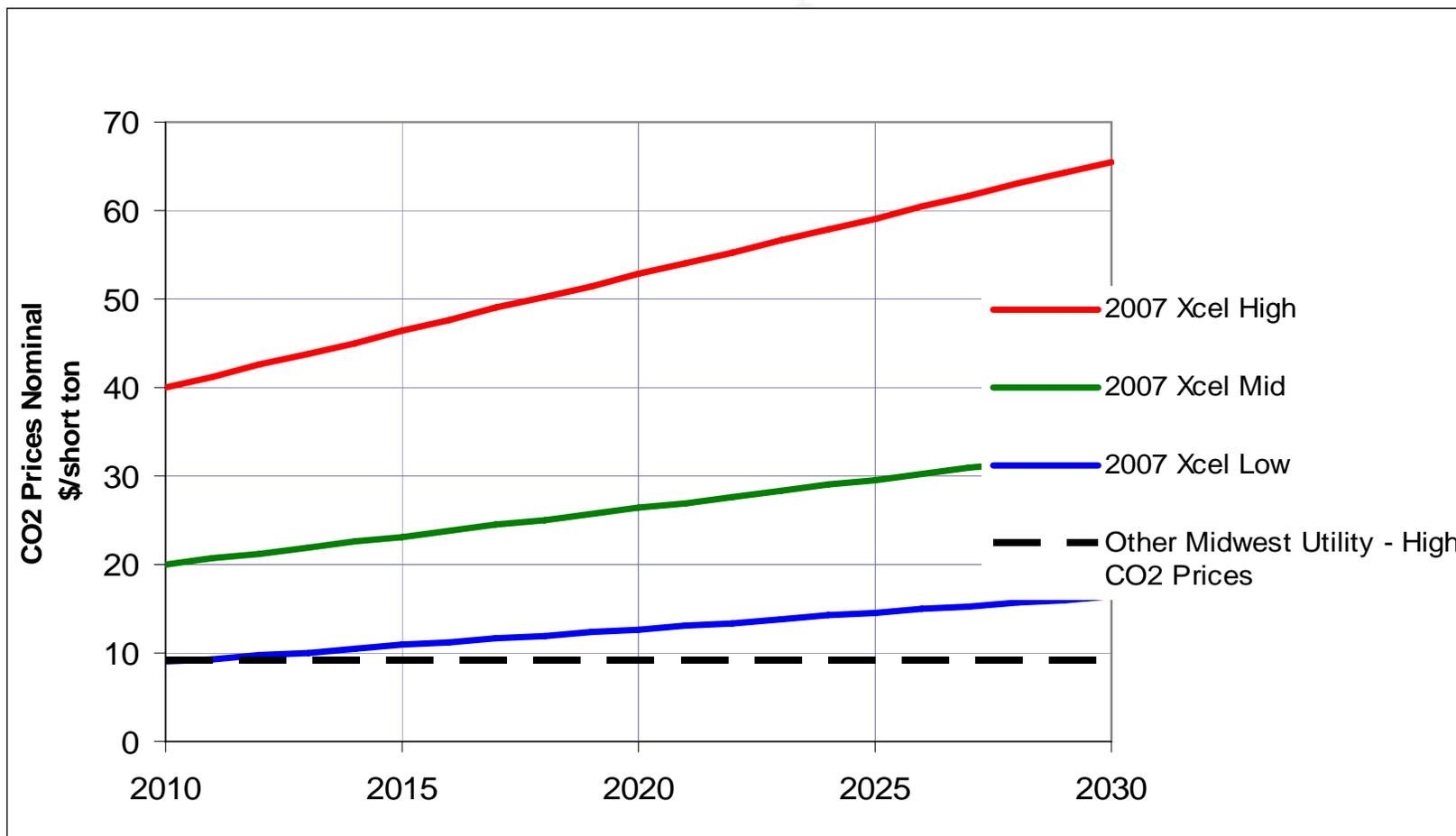
Levelized Cost of CO₂ Allowances (2013-2030)



Examples of Meaningful Ranges of CO₂ Prices Adopted for Recent Resource Planning

- **New Mexico Public Regulation Commission (June 2007)**
 - \$40/metric ton “High” CO₂ price
 - \$20/metric ton “Mid” CO₂ price
 - \$8/metric ton “Low” CO₂ price
 - All three prices start in 2010 and escalate at 2.5% per year
- **Xcel Energy (December 2007)**
 - \$40/ton “High” Case
 - \$20/ton “Mid” Case
 - \$10/ton “Low” Case
 - All start in 2010 and escalate at 2.5% per year

CO₂ Prices Used in Resource Planning – Xcel Energy and Other Midwest Utility



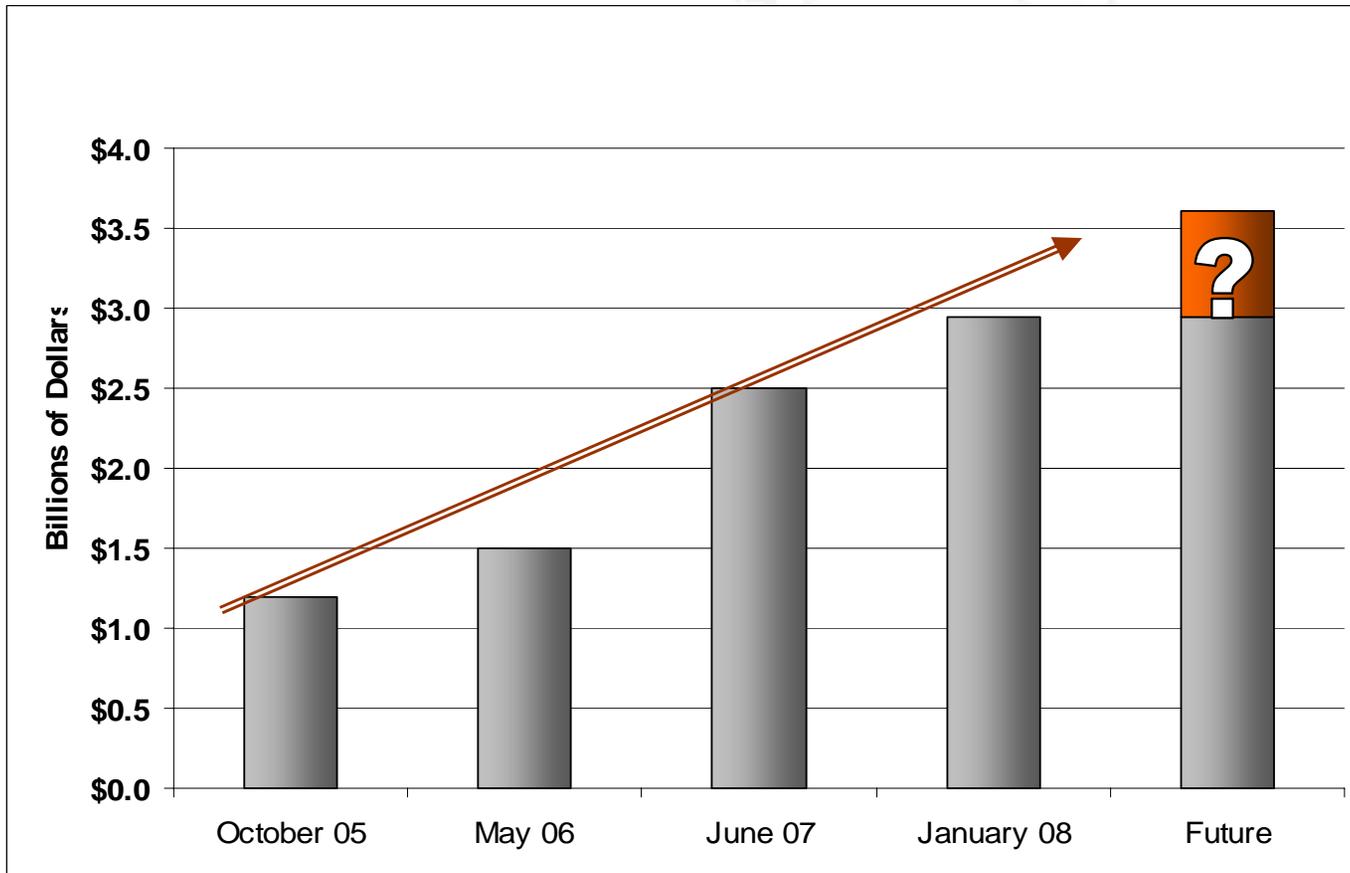
New Climate Change Related Risks for New Coal Plants

- Adoption of carbon principles by the Citibank, J.P. Morgan, Morgan Stanley and Bank of America – need to perform enhanced due diligence and consider CO₂ costs. (February 2008)
- Georgia state court decision on Longleaf Project – a PSD air permit cannot be issued without CO₂ emissions limitations based on a BACT analysis. (June 2008)

Costs of New Power Plants Have Skyrocketed

- Power plant construction costs have increased dramatically since early 2000's.
- Descriptive terms used are “skyrocketing,” “staggering” and “sticker shock.”
- Estimated costs of new coal plants have increased above \$3,500/kW.

Proposed AMP-Ohio Coal Plant - Increases in Estimated Construction Costs Since 2005



Other Significant Coal Plant Cost Increases Announced in 2008

- Estimated cost of the Iatan 2 project in Missouri increased by 15% in April 2008. Project already under construction with completion due in 2010 - shows that even projects under construction are susceptible to increasing costs. (April 2008)
- Estimated cost of Duke Energy Indiana's Edwardsport IGCC Project increased by 18 percent from spring 2007 to spring 2008. Company says costs increased when it went out for actual project contracts and procurement. (May 2008)
- Wisconsin Power & Light announced that estimated cost of proposed circulating fluid bed coal plant had increased to about \$3,500/kW and that cost of an alternate supercritical coal plant also had risen to above \$3,500/kW. These represented increases of approximately 38% since late 2006. In support, the company submitted testimony to the Public Service Commission which said that the EPC (Engineering, Procurement and Construction) costs of many coal-fired projects were in the range of \$2,500/kW to \$3,800/kW – that means a single 600 MW unit may cost between \$2 billion to \$3 billion, or more.

Factors Which Have Led to Rising Power Plant Construction Costs

- Cost increases are due, in large part, to significant increase in worldwide demand for power plants. Demand for plants is straining supply of design and construction resources.
- Increased demand from China and India.
- Despite recent cancellations, there is strong U.S. demand for new power plants and pollution control projects for older plants.
- Limited capacity of EPC (Engineering, Procurement and Construction) firms and manufacturers.
- Fewer bidders for work, higher prices, earlier payment schedules and longer delivery times.

Factors Which Have Led to Rising Power Plant Construction Costs (2)

- Significant cost increases for critical power plant commodities.

Commodity	Average Annual Escalation Dec. 2003 – April 2007
Nickel	60%
Copper	69%
Cement	12%
Iron & Steel	20%

- Wall St. Journal – Steel prices up 40% to 50% in 2008.
- Worldwide competition for resources and supply and manufacturing bottlenecks unlikely to clear in the foreseeable future.

No Commercially Viable Carbon Capture Technology for Pulverized Coal Plants

- Timeline for developing commercially viable post-combustion carbon capture and sequestration technology uncertain.
- Pilot projects being planned for near future.
- Impact on cost of generating power currently expected to be significant – 60% to 80%, perhaps \$40-\$80/ton avoided.

Source	Projected Increase in Cost of Electricity from Addition of CCS
Duke Energy Indiana	69%
MIT Future of Coal Report	61%
Edison Electric Institute	79%
National Energy Technology Laboratory	81%

Poor Electric Resource Planning Practice

- Passive attitude toward information.
- Rely on out-of-date construction cost estimates.
- Ignore CO₂ price, look at a single, low set of CO₂ prices, or treat CO₂ “at the end” as a sensitivity case.
- Overly constrain alternatives such as renewables and energy efficiency.
- Claim that the proposed coal plant is part of a strategy or plan for reducing CO₂ emissions.

IMPRUDENT!

Good Electric Resource Planning Practice

- Actively seek out relevant information.
- Rely on up-to-date and realistic construction cost estimates.
- Include reasonable CO₂ price forecasts in the reference case, and analyze high and low sensitivities.
- Include full consideration of alternatives.

PRUDENT!

Virginia SCC Decision Denying Request to Build New Coal Power Plant (April 2008)

- VA SCC Press Release headed “SCC denies APCo request for rate increase and approval of new power plant; cites uncertainties of costs, technology, unknown federal mandates.”
- Found Company’s (APCo) cost estimate for project “not credible” -- had not been updated since November 2006.
- SCC said “... APCo has no fixed price contract for any appreciable portion of the total construction costs; there are no meaningful price or performance guarantees or controls for this project at this time. This represents an extraordinary risk that we cannot allow the ratepayers of Virginia in APCo’s service territory to assume.”
- SCC also noted the uncertainties surrounding federal regulation of carbon emissions and carbon capture and sequestration technology and costs and observed that the Company was asking for a “blank check.” On this basis, the Commission concluded that “We cannot ask Virginia ratepayers to bear the enormous costs – and potentially huge costs – of these uncertainties in the context of the specific Application before us.”

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