Synapse
Energy Economics, Inc.

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

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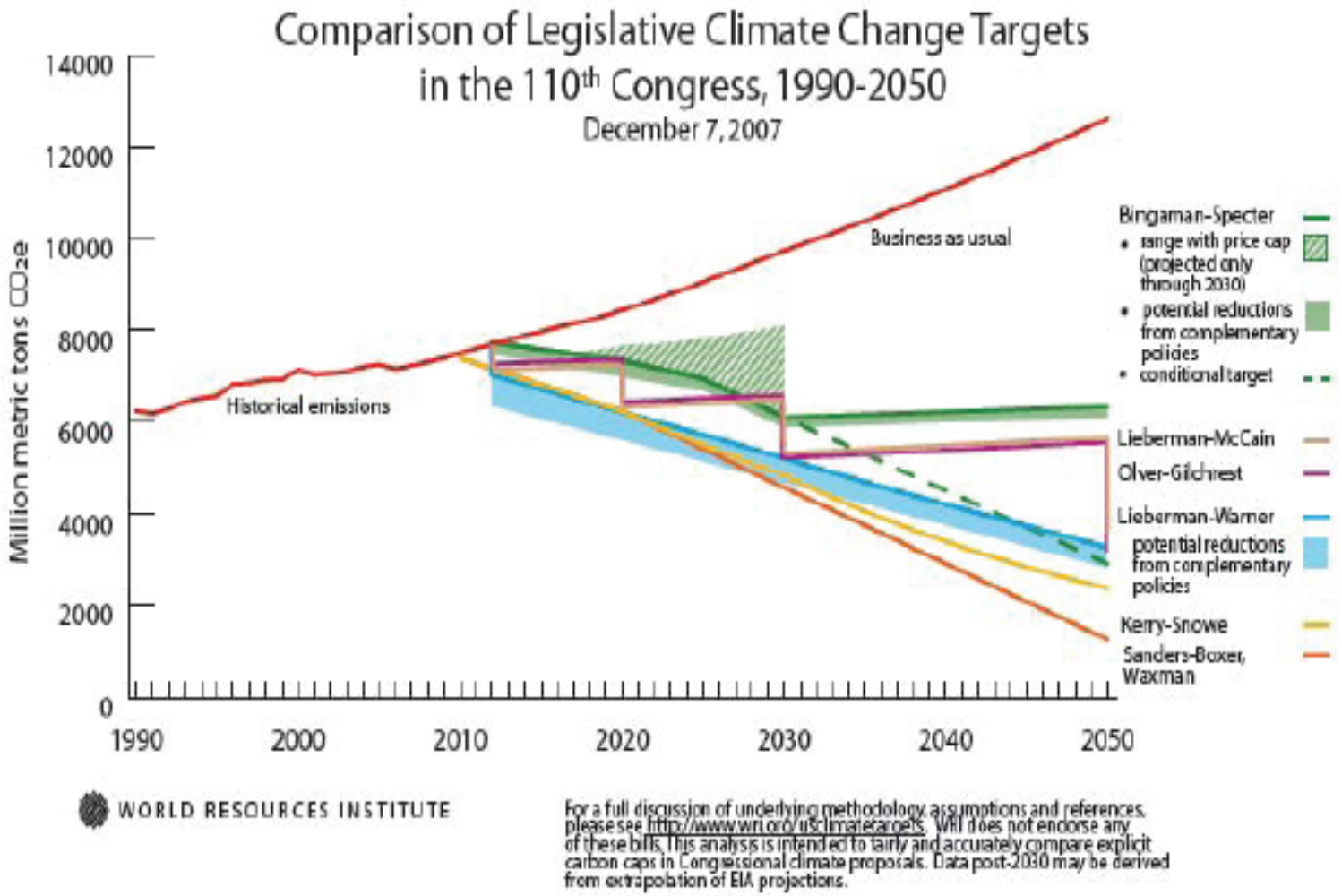
Deja Vu – All Over Again?

- 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 were double to triple estimated costs
  - Regulatory uncertainty
  - 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

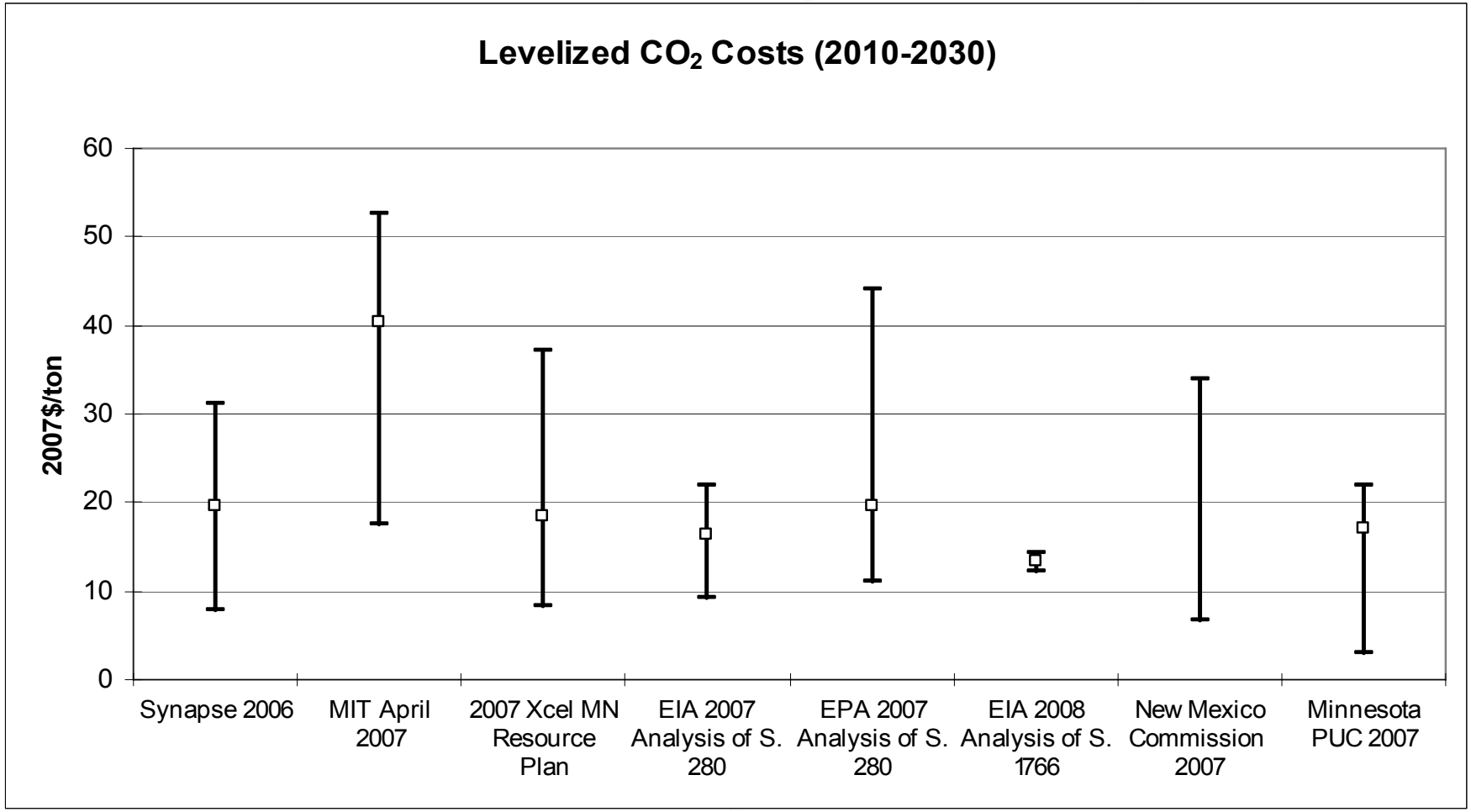
Uncertainties and Risks facing Investments in New Coal Plants Today

1. The likelihood of federally-mandated reductions in greenhouse gas emissions leading to high costs for carbon-emitting resources.
2. State mandated reductions in greenhouse gas emissions and the adoption of policies promoting increased use of energy efficiency and renewable resources that will reduce the need for new power generation and adversely affect the relative economics of proposed coal-fired power plants..
3. The uncertainties surrounding the technical and economic viability of carbon capture and sequestration for pulverized coal-fired power plants.
4. Skyrocketing plant construction costs and delayed construction schedules as a result of the worldwide competition for power plant design and construction resources, commodities and equipment.
5. More stringent regulation of the current criteria pollutants.
6. Coal price increases and supply disruptions.

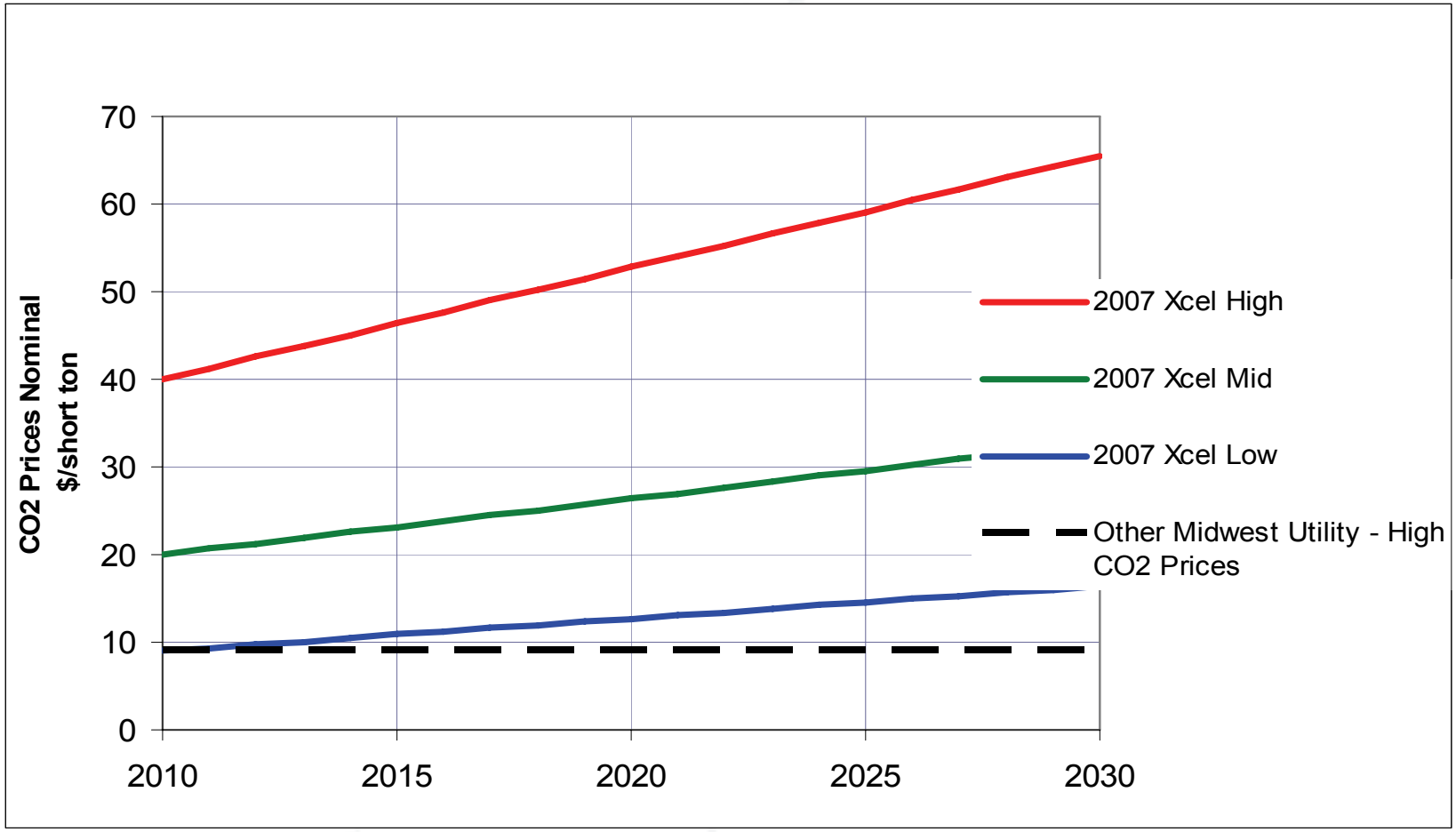
Federal Regulation of Carbon Dioxide Emissions is a Matter of When, Not If



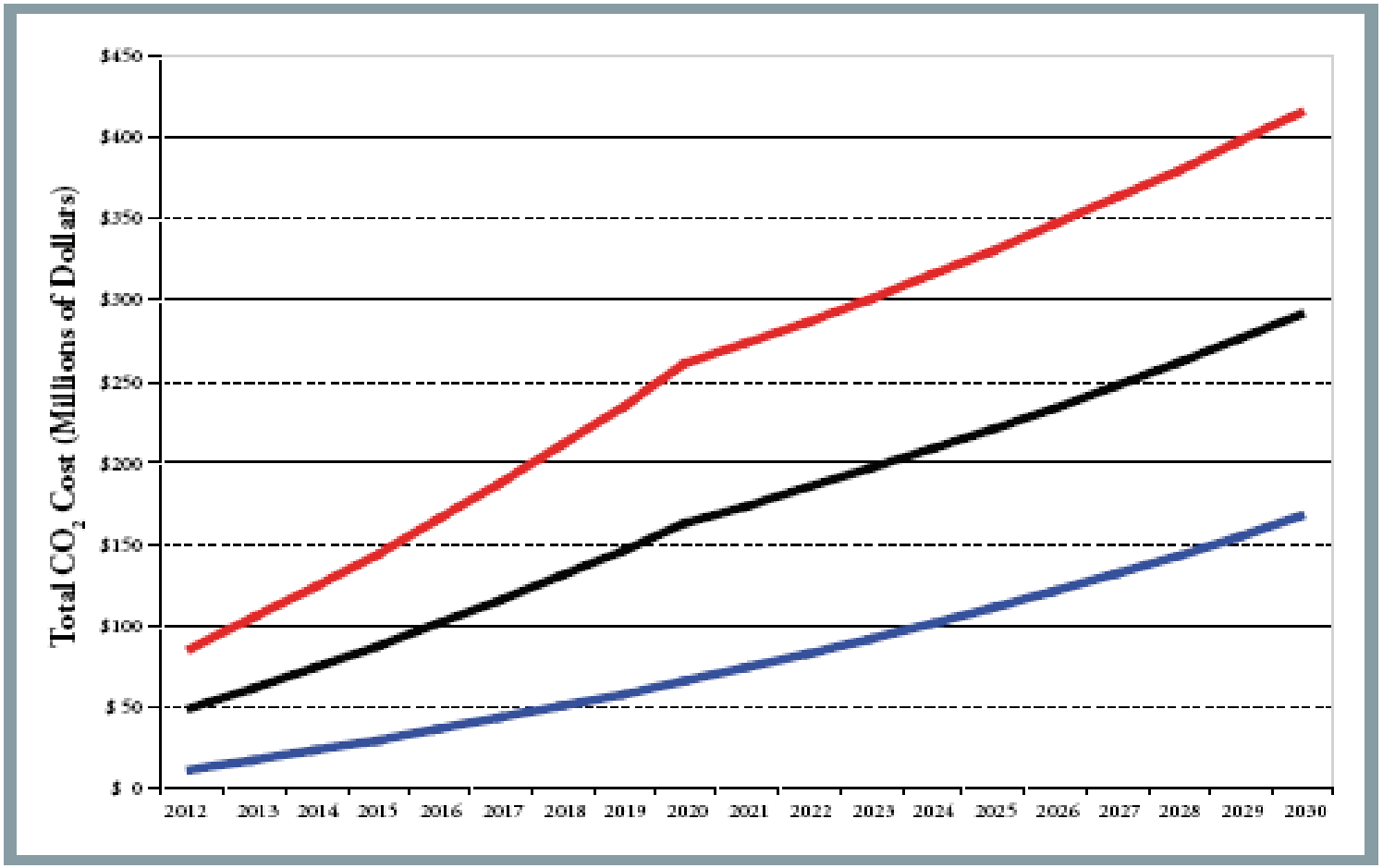
Synapse and other Recent CO_2 Price Forecasts



CO_2 Prices Used in Resource Planning – Xcel Energy and Another Midwestern Utility



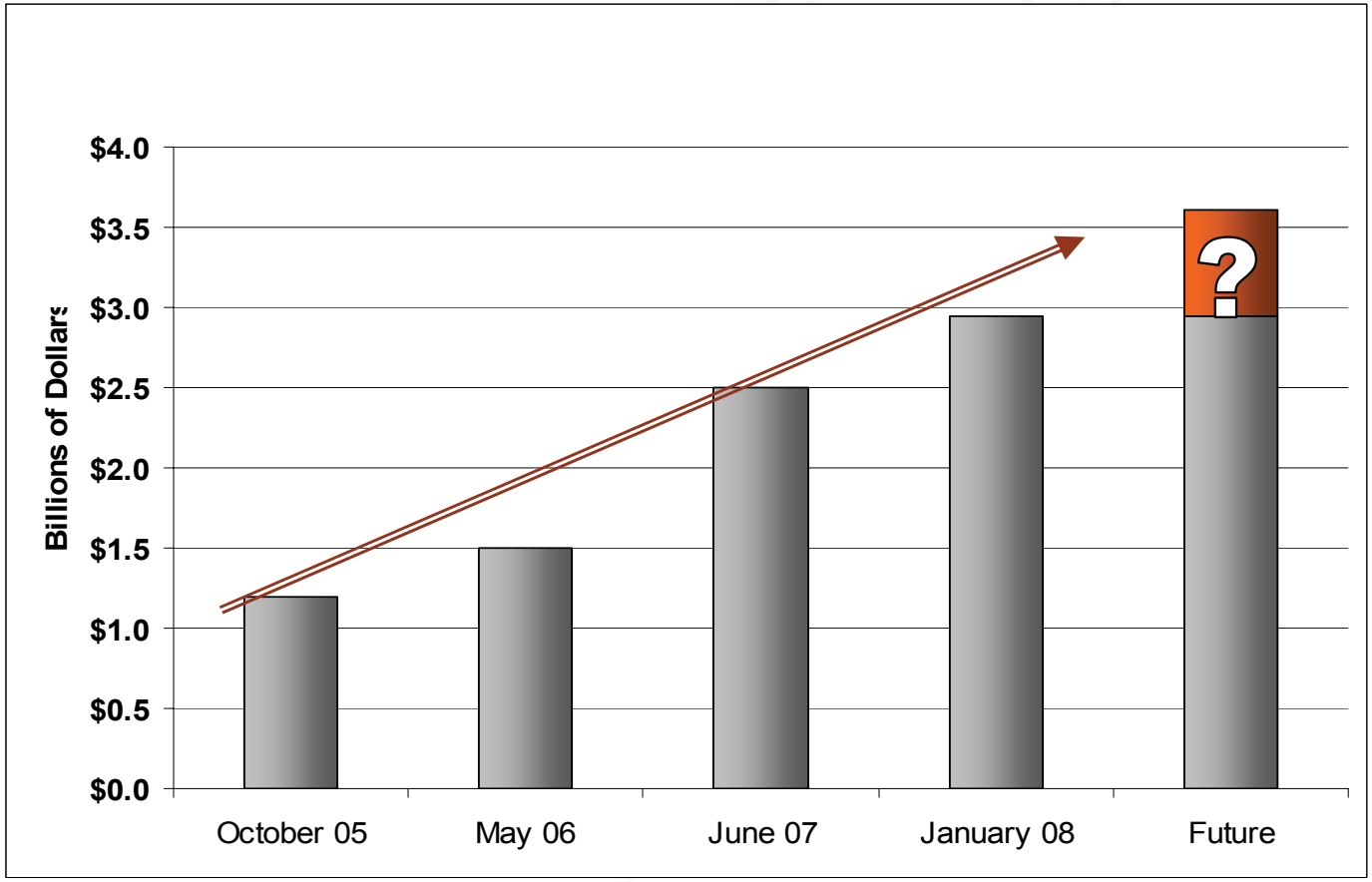
Annual Cost of Power from a Typical 600 MW Pulverized Coal Plant (Millions of Dollars)



Costs of New Power Plants Have Skyrocketed

- Power plant construction costs have increased dramatically since early 2000s.
- Descriptive terms used are “staggering” and “sticker shock”
- For example, in mid-2006 Duke Energy estimated that its two unit Cliffside coal project would cost $2 billion. By June 2007 Duke estimated that the cost of a single unit will be just under $2 billion.
- According to index published by Cambridge Energy Research Associates, U.S. power plant construction costs have increased by 131 percent since 2000 – costs increased by 27 percent in just the 12 months ending October 2007.

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



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, e.g., steel, copper, cement, fabricated alloy piping.

Commodity/ Construction Material	Average Annual Escalation from ~1986-2003	Average Annual Escalation Dec. 2003-April 2007	Escalation during Dec. 2003 – April 2007 As Ratio of Recent Historic Average
Nickel	3.80%	60.30%	15.9x
Copper	3.30%	69.20%	21x
Cement	2.70%	11.60%	4.3x
Iron & Steel	1.20%	19.60%	16.3x
Heavy Construction	2.20%	10.50%	4.8x

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

Source	Projected Increase in Cost of Electricity from Addition of CCS
Duke Energy Indiana[48]	68%
MIT Future of Coal Report[49]	61%
Edison Electric Institute[50]	75%
National Energy Technology Laboratory[51]	81%

