Synapse
Energy Economics, Inc.

Kansas is Not Alone:
The New Climate for Coal

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Kansas is Not Alone

Recently Cancelled New Coal Plants in the United States

Kansas is Not Alone in Rejecting New Coal Fired Power Plants

- Just since December 2006 -- proposed coal-fired power plants have been rejected by regulators in Oregon, Washington, North Carolina, Florida, and Oklahoma.

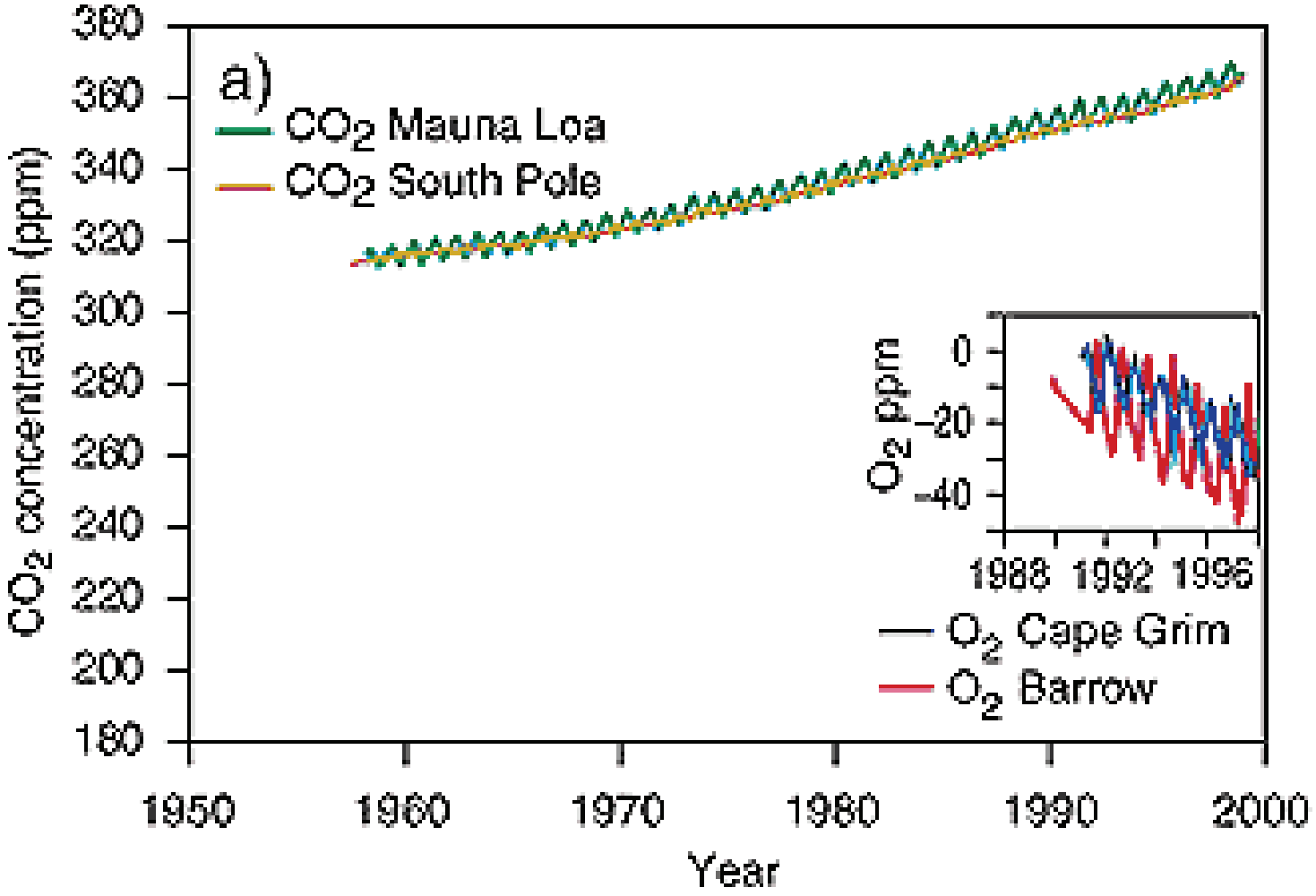
- For example, in Florida, the 1960 MW Glades Power Project was rejected due to concern over uncertainties in plant costs and future environmental costs.

Kansas in Not Alone

- Since December 2006, more than 20 proposed coal-fired power plants have been cancelled.
- More than 3 dozen others have been delayed.
- Other companies have announced plans not to pursue new coal plants due to uncertainty about construction costs and environmental compliance, i.e., costs of carbon dioxide emissions.

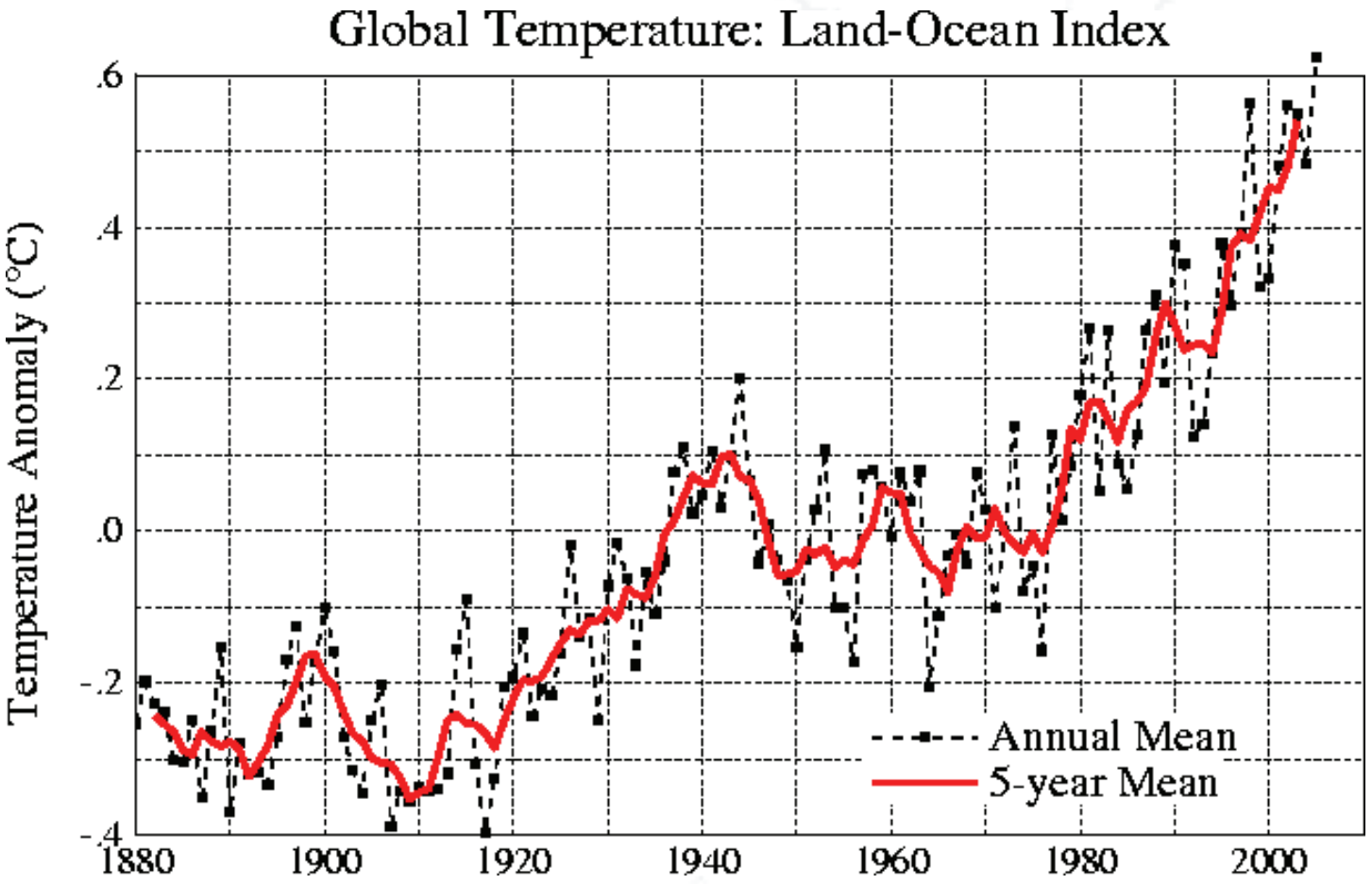
Human-Caused Global Climate Change is Real – It can't be Ignored or Legislated Away

Increase in CO_2 since ca. 1960



Human-Caused Global Climate Change is Real – It can't be Ignored or Legislated Away

100 years of rising global temperature



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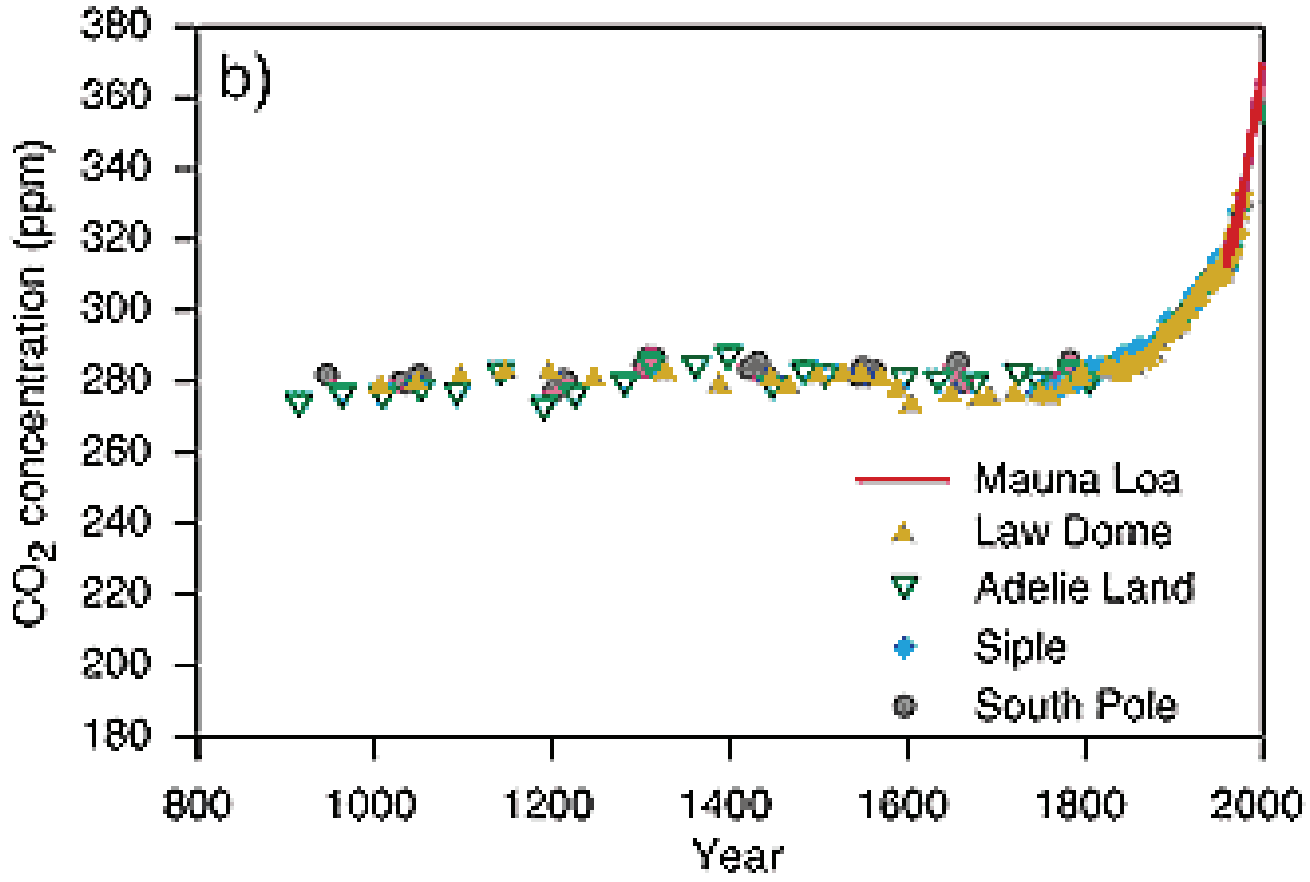
1,000 years of CO_2 (note modern Measurements on far right)



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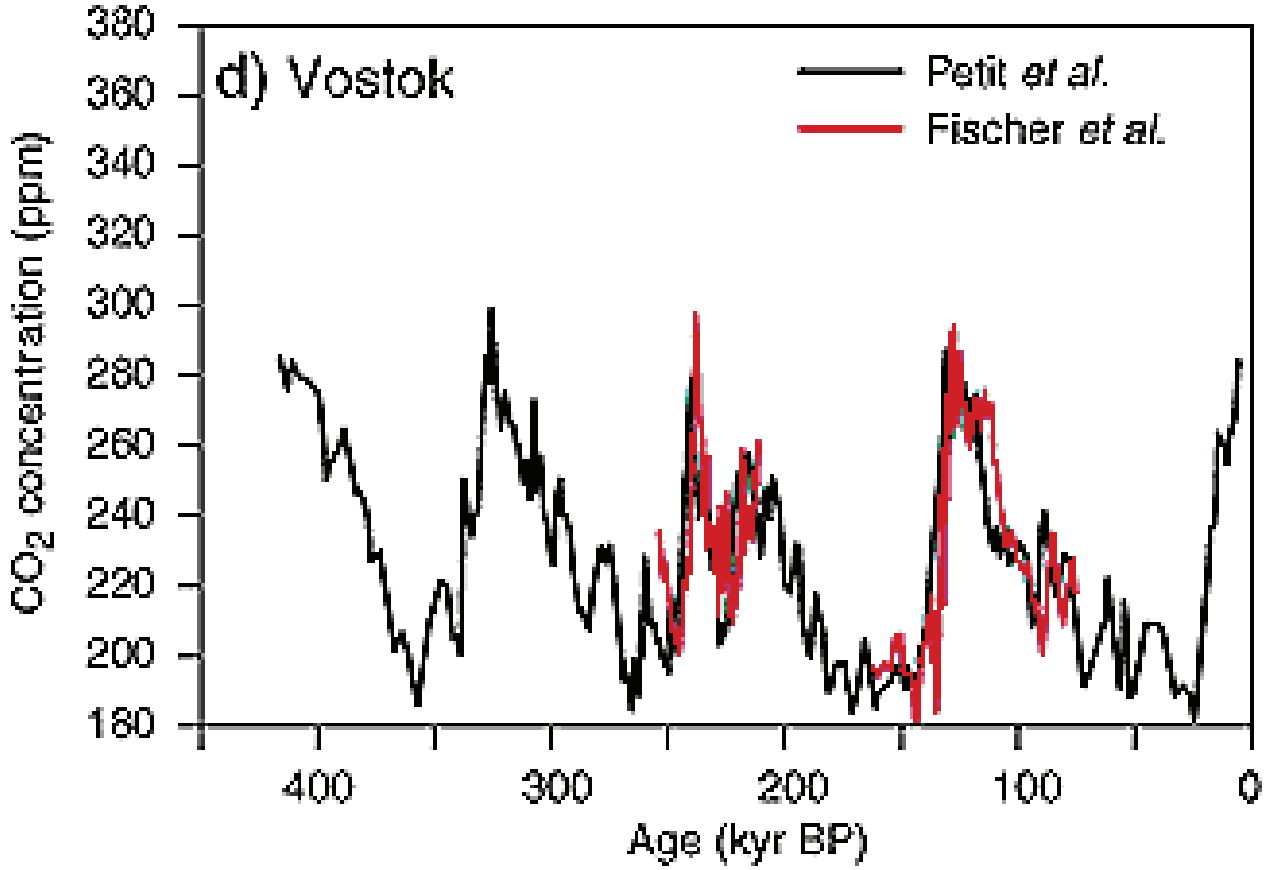
400,000 years of CO_2 (Current level is about 380 ppm)

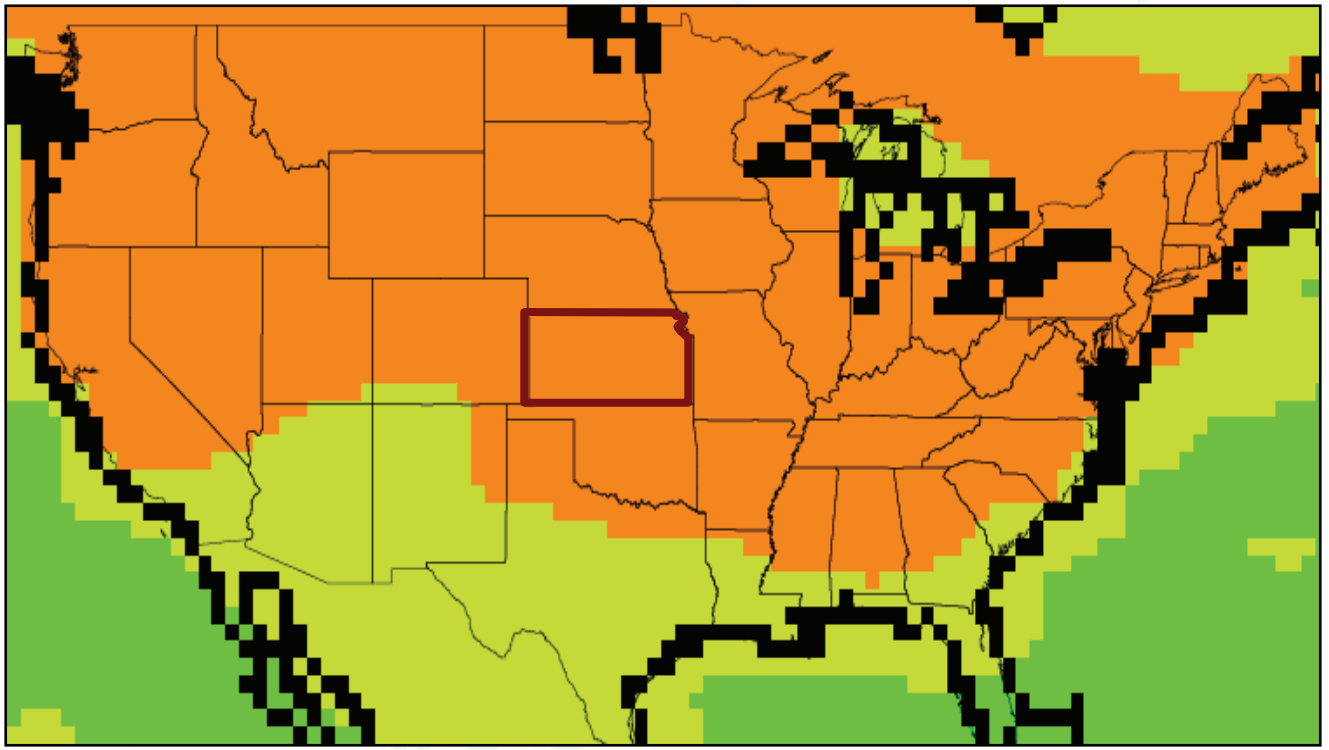


Global Climate is Real – It can't be Ignored or Legislated Away

Probable impacts of global warming in Kansas

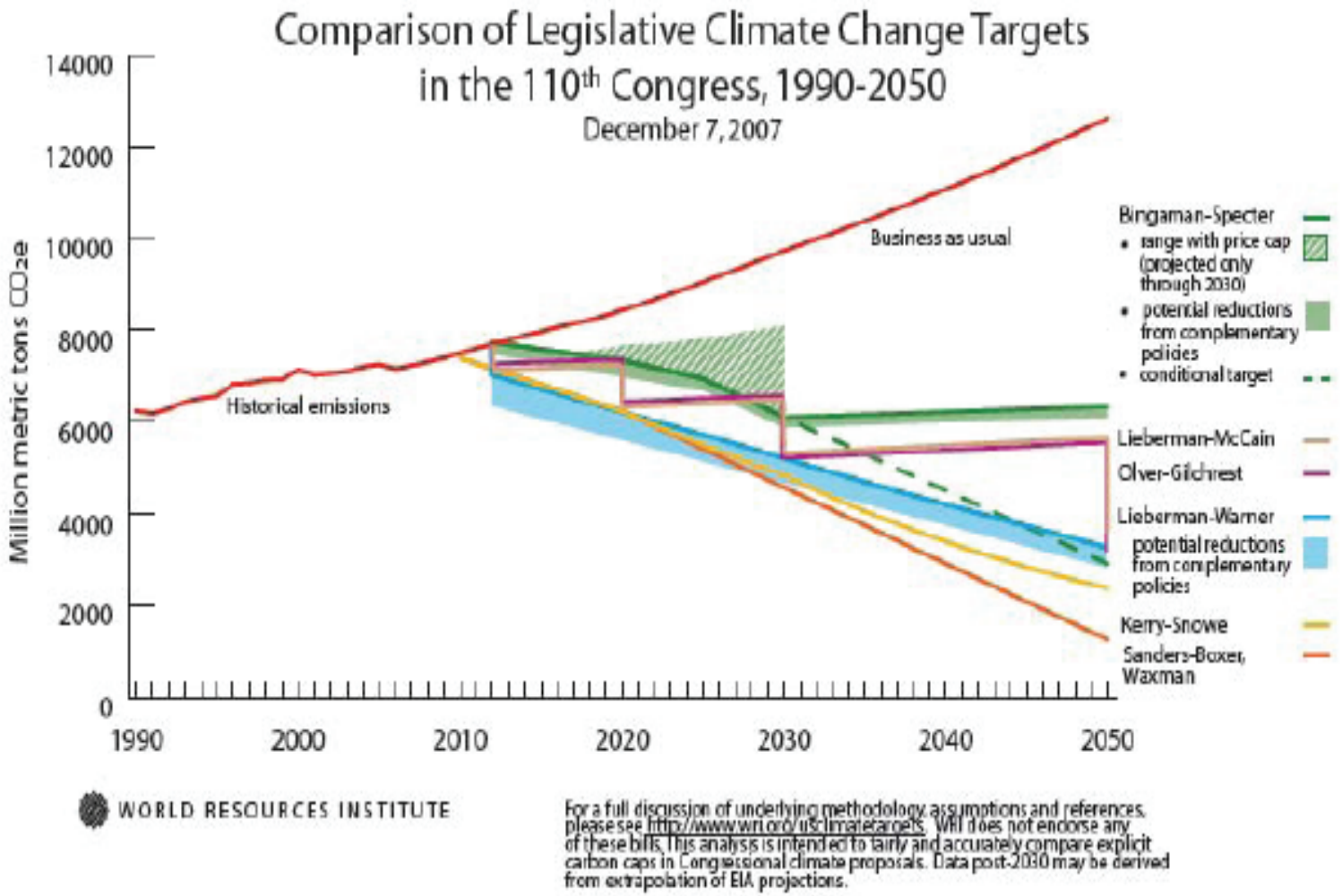
- higher average temperatures
- increasing number of extreme heat waves
- while overall precipitation is expected to increase, rainfall expected to become increasingly concentrated in short, extreme events, leading to floods and soil erosion.
- increased heat stress and concentration of rainfall likely to decrease crop yields.

"No-Action" Change in Average Summer Temperature

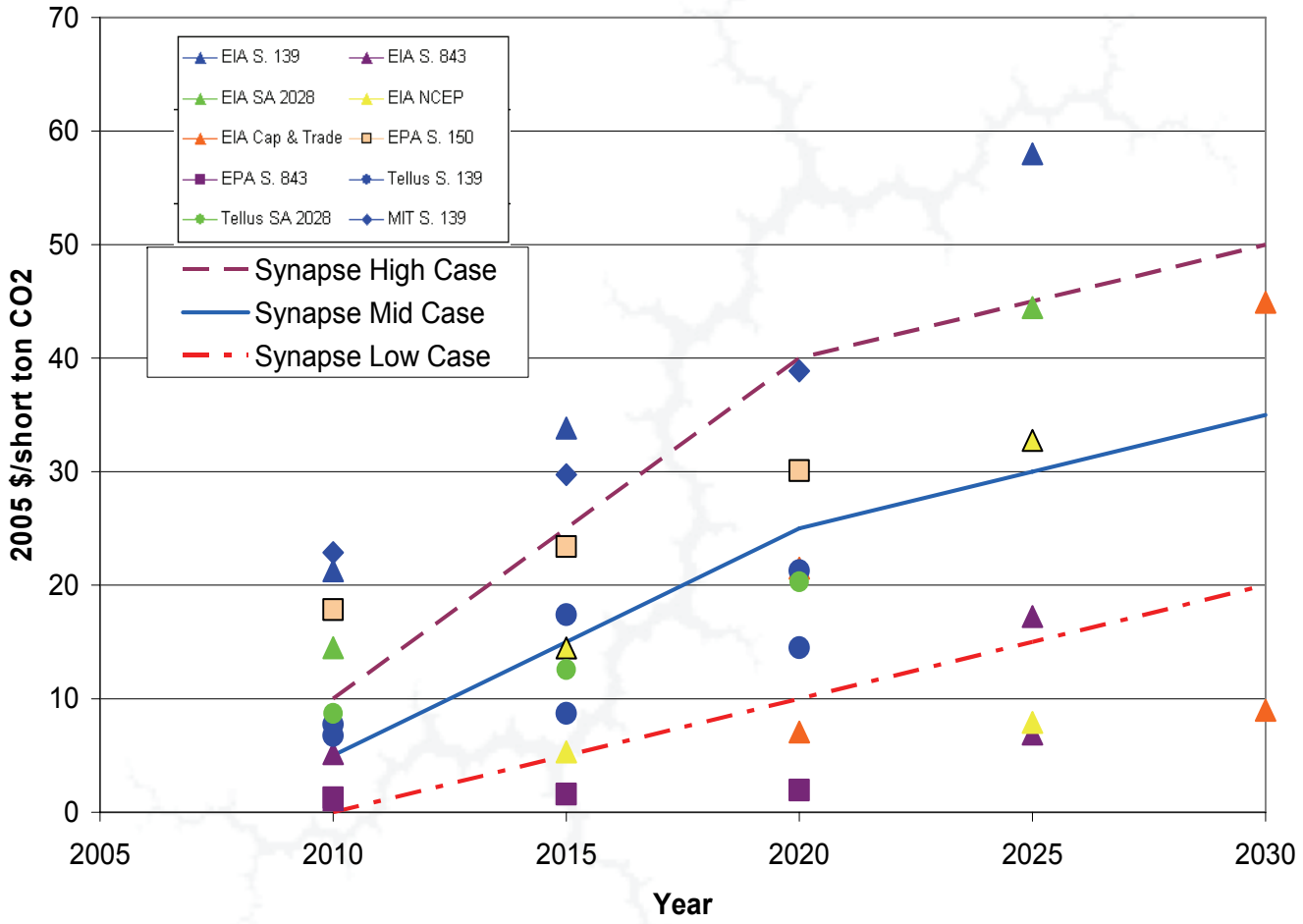


Change in average surface air temperature
from 1960-1990 to 2070-2100 from HadCM3 IS92a

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

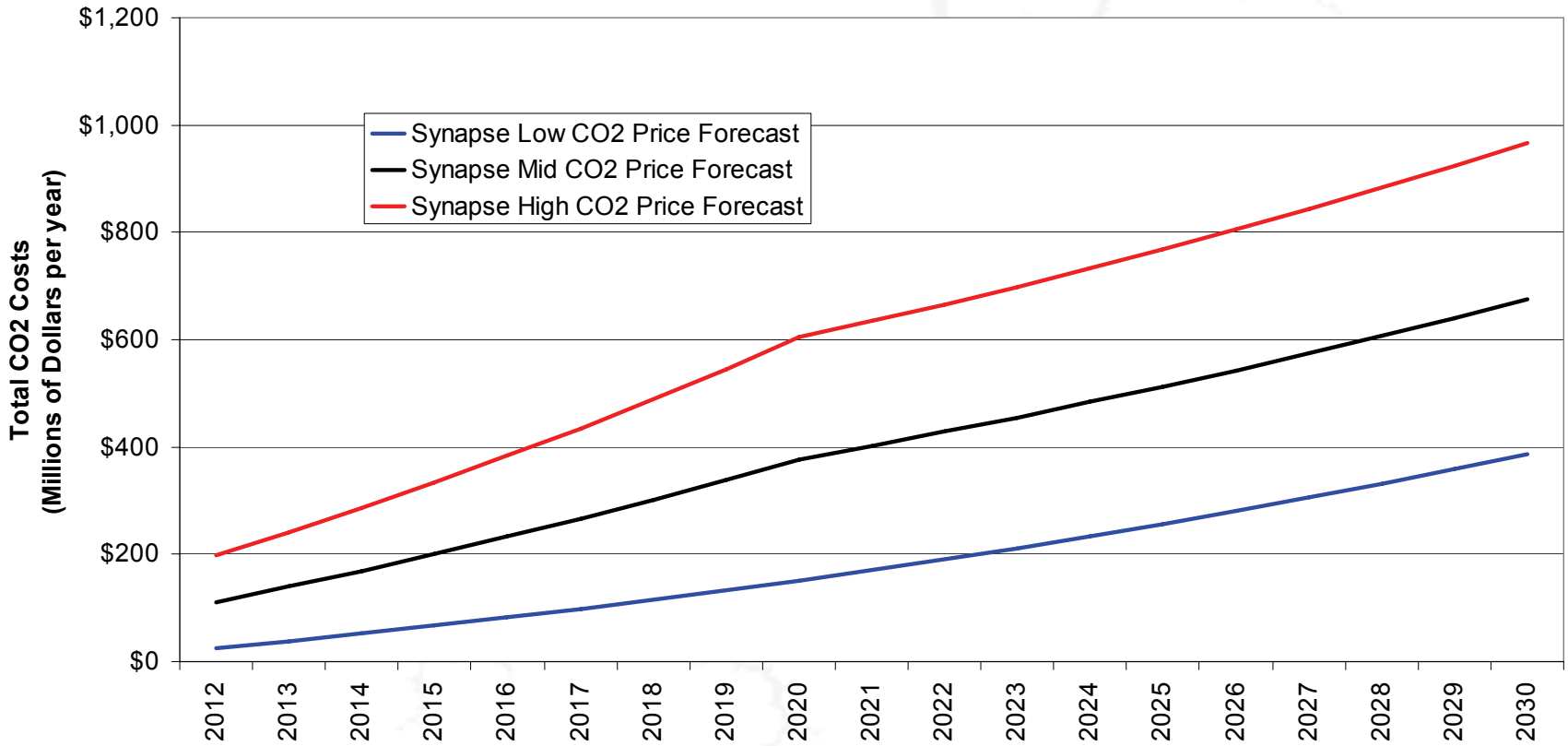


Synapse CO_2 Price Forecast



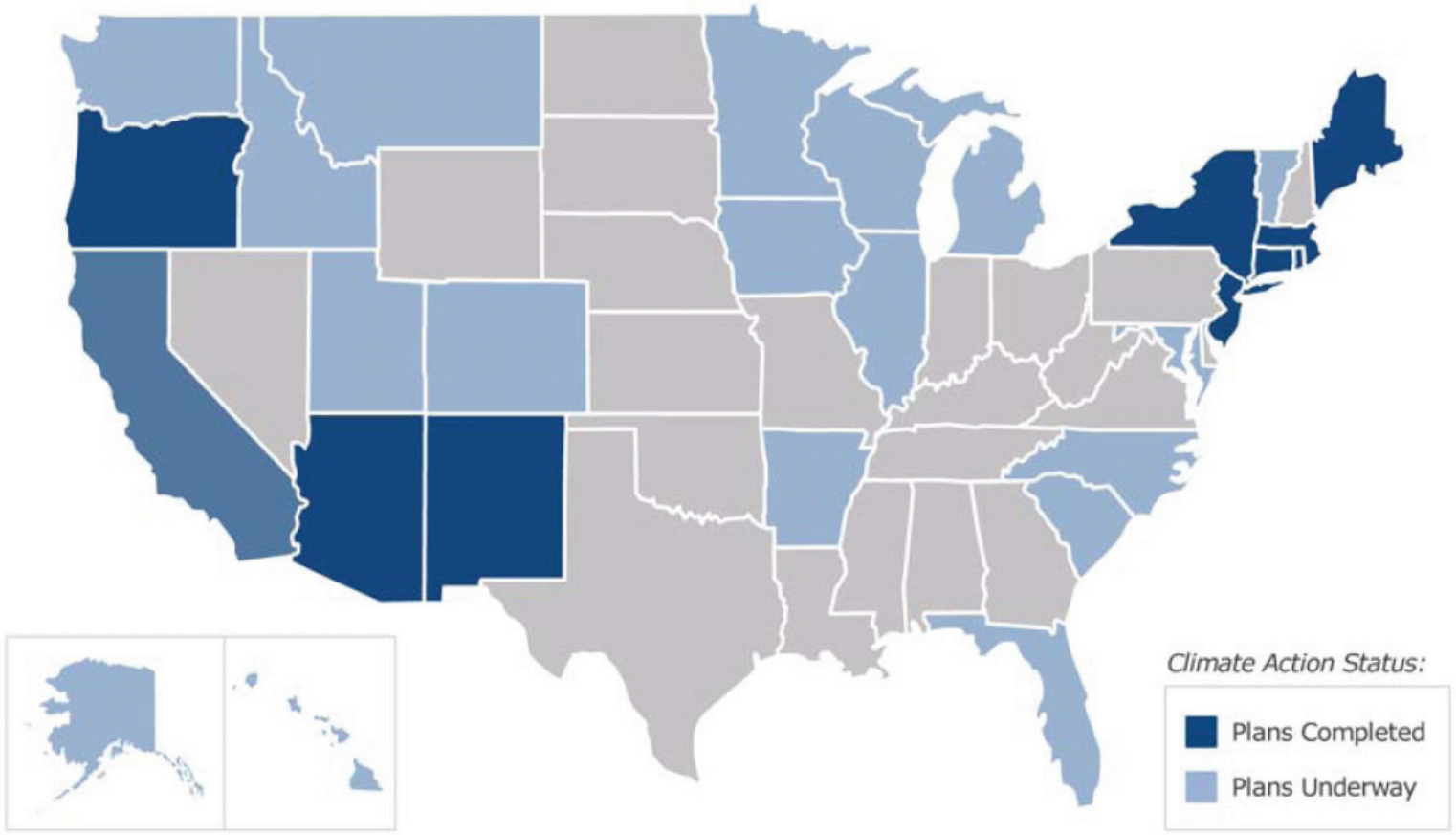
Total Cost of Holcomb Expansion Carbon Dioxide Emissions Likely to Be Very Expensive

Likely Annual Cost of CO_2 Emissions from Holcomb Expansion



States are Increasingly Acting to Reduce Carbon Dioxide Emissions

A growing number of states are pursuing climate action plans



States are Increasingly Acting to Reduce Carbon Dioxide Emissions

- November 2006, Governors of 6 Midwestern states, including Kansas, signed Midwestern Greenhouse Gas Accord – includes commitment to establish greenhouse gas emission reduction targets and timetables.
- Eleven northeast states plus DC and two Canadian provinces participating in Regional Greenhouse Gas Initiative (RGGI)
- Colorado Governor has announced a goal of reducing greenhouse gas emissions 20% below 2005 levels by 2020.
- New Mexico has adopted a plan to reduce greenhouse gases by 10% below 2000 levels by 2020 and 75% below 2000 levels by 2050.

Carbon Capture and Sequestration

- Clean Coal with carbon capture is touted by industry as solution to global warming.
- However, there currently is no commercially viable technology for carbon capture from pulverized coal plants like the proposed Holcomb Station Expansion
- Projected to be very expensive -- $30/ton to $70/ton of carbon dioxide emissions avoided.
- Significant water usage – triple that of a pulverized coal plant without carbon capture.
- Will not be available for years, if not decades.

Costs of New Power Plants Have Skyrocketed

- It is generally accepted that power plant capital costs have increased dramatically in the past 2-3 years.
- For example, Duke Energy originally estimated that its two unit Cliffside coal project would cost $2 billion. Now Duke estimates that the cost of a single unit will be $2 billion.
- Westar Energy announced in Dec. 2006 that it was deferring site selection for new 600 MW coal plant due to significant increases in estimated costs of 20 to 40 percent in just 18 months. Westar CEO said:

  "When equipment and construction cost estimates grow by $200 million to $400 million in 18, it's necessary to proceed with caution."

- Cost of now cancelled Taylor Energy Center in Florida increased by 25 percent, $400 million, in just 17 months between Nov. 2005 and March 2007.

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 the supply.
- Demand from China and India.
- Despite recent cancellations there is a 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.

Rising Power Plant Cost Escalation

- Significant cost increases for critical power plant commodities, e.g., steel, copper, cement, fabricated alloy piping.

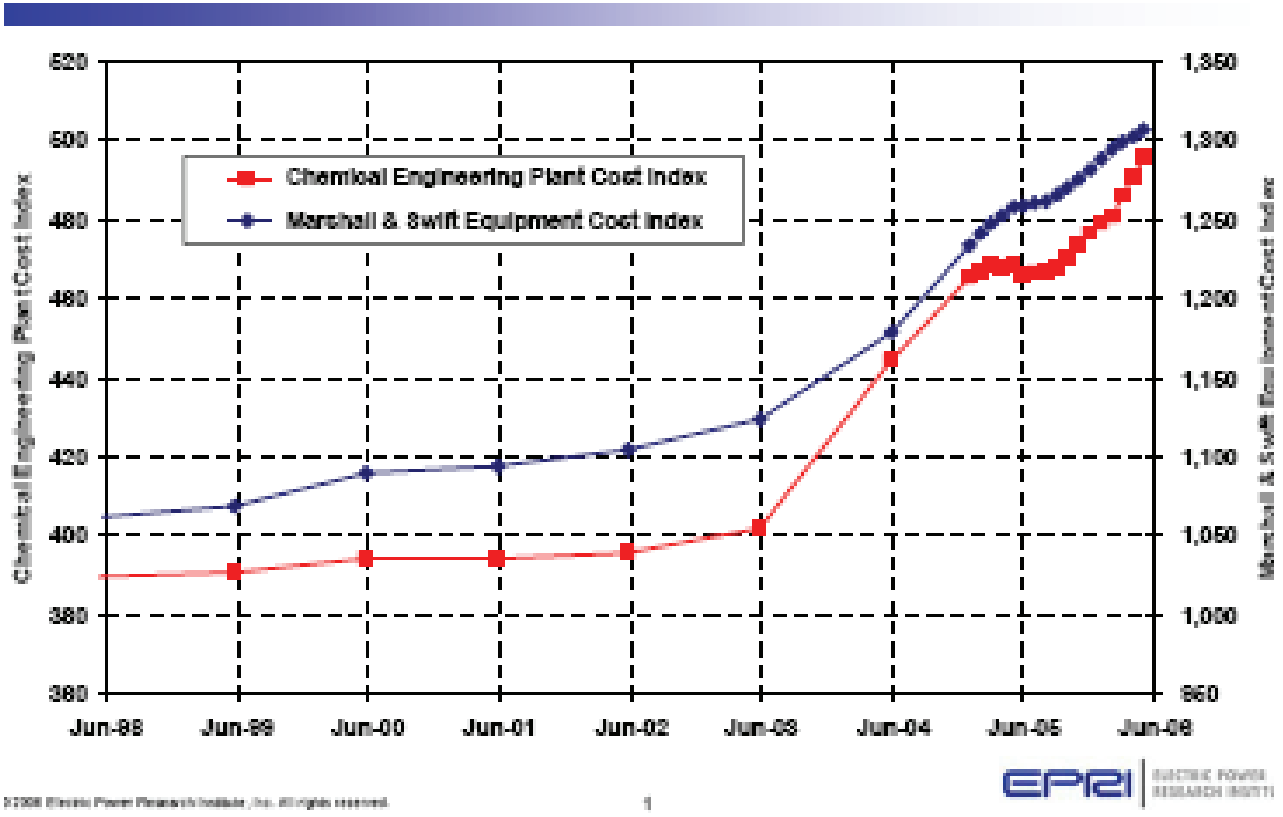
Table 1

Commodity/ Construction Material	Avg. Annual Escalation from ~1986 – 2003 (Recent Historic Average)	Avg. Annual Escalation Since Dec. 2003 – April 2007 (Last 40 Months)	Last 40 Mo. Of Escalation As Ratio of Recent Historic Avg.
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

Sources: Nickel, Copper: London Metal Exchange
Cement, Iron, Steel & Heavy Construction: U.S. Bureau of Labor Statistics

Construction Cost Indices

Source: Chemical Engineering Magazine, August 2006



Source: *Chemical Engineering Magazine*, 2006.

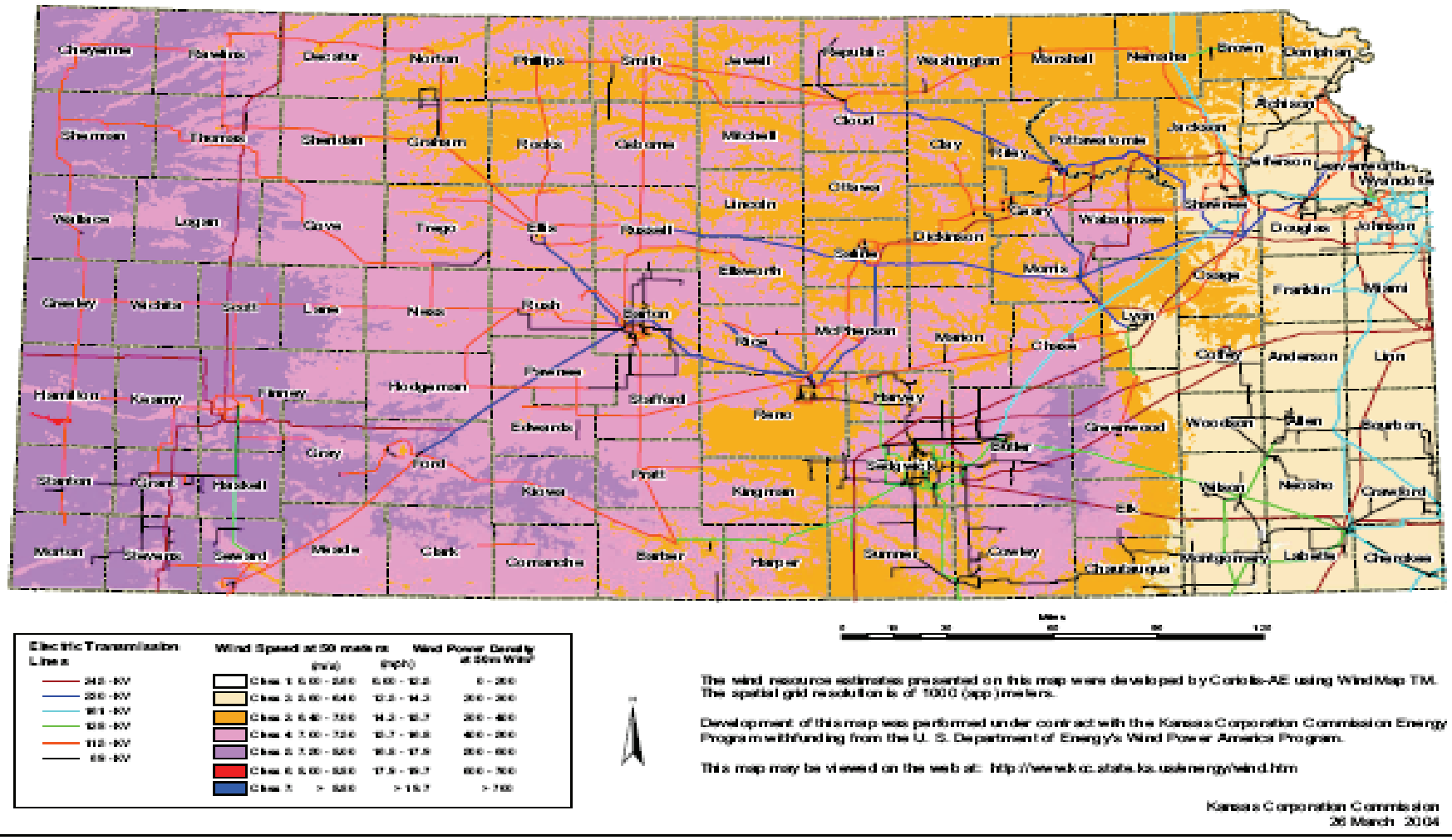
Rising Power Plant Cost Escalation

- Demand and cost have escalated significantly for both on-site construction labor and skilled manufacturing labor
- There are some regional labor shortages.

Kansas Has An Almost Unlimited Wind Potential

- 3rd Highest Wind Potential of Any U.S. State
- Many areas of the state have Class 5 or higher wind (16.8 MPH or higher)
- More than 121,000 MW according to the American Wind Energy Association.
- More than 235,000 MW, after land use and environmental exclusions, according to the National Renewable Energy Laboratory of the U.S. Department of Energy.
- **Billions of dollars** in potential annual revenues for Kansas

Kansas Has An Almost Unlimited Wind Potential



Investment in Wind and Energy Efficiency Will Create Jobs

- Investment in wind generation creates significant jobs in manufacturing, installation, operation and maintenance. According to a 2004 study by the Renewable and Appropriate Energy Laboratory at the University of California at Berkeley, wind produces between 0.71 and 2.79 jobs per MWa and coal produces 1.01 jobs per MWa.

Energy Technology	Source of Estimate	Average Employment Over Life of Facility (jobs/MWa)		
		Construction, Manufacturing, Installation	O&M and fuel processing	Total Employment
PV 1	REPP, 2001	6.21	1.20	7.41
PV 2	Greenpeace, 2001	5.76	4.80	10.56
Wind 1	REPP, 2001	0.43	0.27	0.71
Wind 2	EWEA/Greenpeace, 2003	2.51	0.27	2.79
Biomass – high estimate	REPP, 2001	0.40	2.44	2.84
Biomass – low estimate	REPP, 2001	0.40	0.38	0.78
Coal	REPP, 2001	0.27	0.74	1.01
Gas	Kammen, from REPP, 2001; CALPIRG, 2003; BLS, 2004	0.25	0.70	0.95

Table ES–1: Average employment for different energy technologies. "MWa" refers to average installed megawatts de-rated by the capacity factor of the technology; for a 1 MW solar facility operating on average 21% of the time, the power output would be 0.21 MWa. References in parentheses and sources refer to the studies reviewed in the text.

