
National Interest Transmission Bottlenecks

Midwest to East and South

July 14, 2004

NATIONAL INTEREST TRANSMISSION BOTTLENECKS

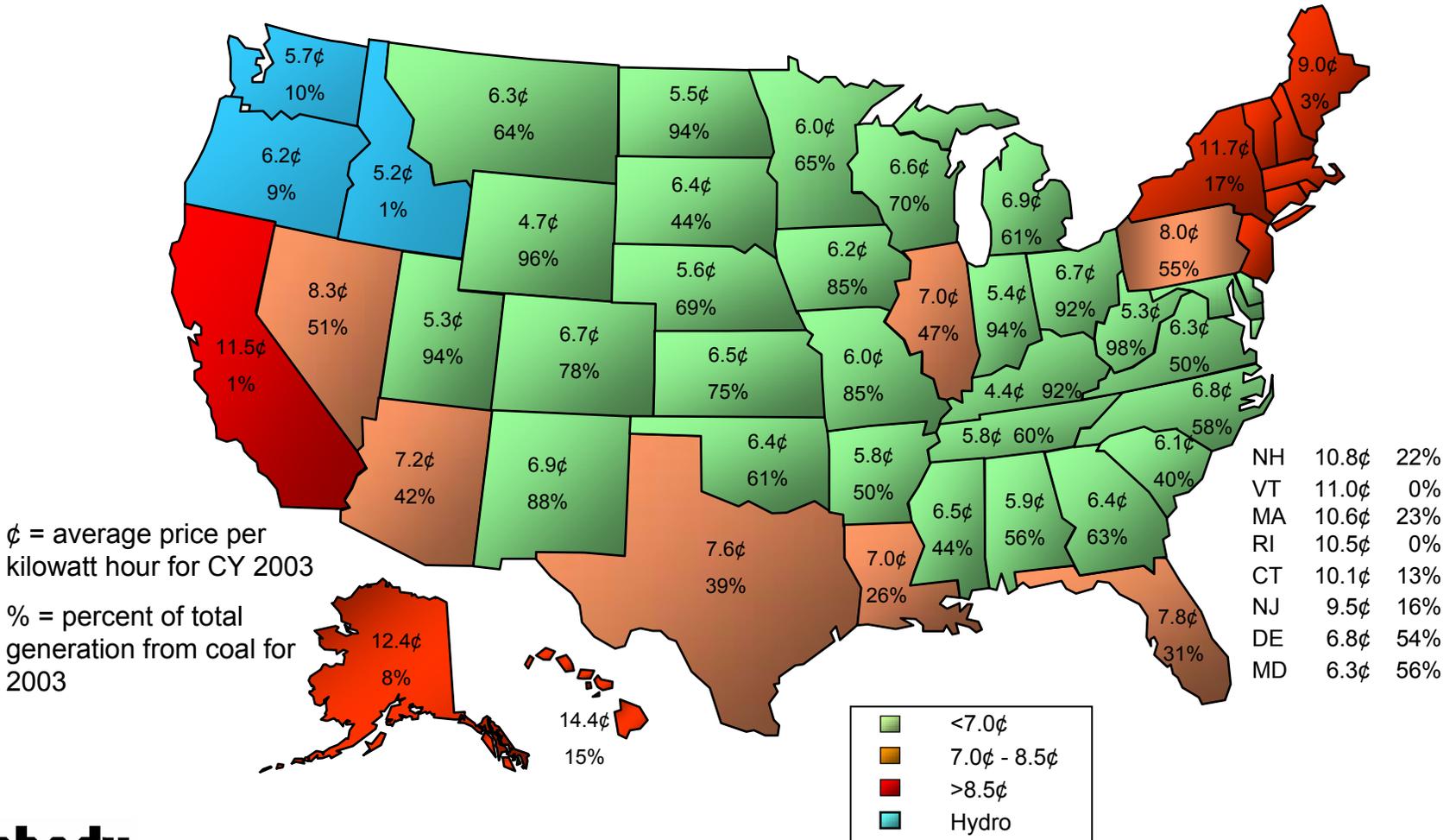
Midwest to East and South, Coal to Gas

- Major regional transmission bottlenecks in the Eastern Interconnect are driven by excess low cost coal from Midwest displacing higher cost gas in East and South
- Increasing spread between coal and gas prices over last 3 years dramatically increasing the value of solving these bottlenecks
- Evolving price differentials between Powder River Basin and Midwest coal versus Eastern coals adding to the strong bias of power flows from the Midwest to the East and South
- Enhancing the transmission system between the Midwest and the East/South reduce natural gas demand by 0.5 – 1.5 TCF per year over the next 5 years reducing the gas cost to all customers in the US

U.S. LOW-COST ELECTRICITY COMES FROM COAL

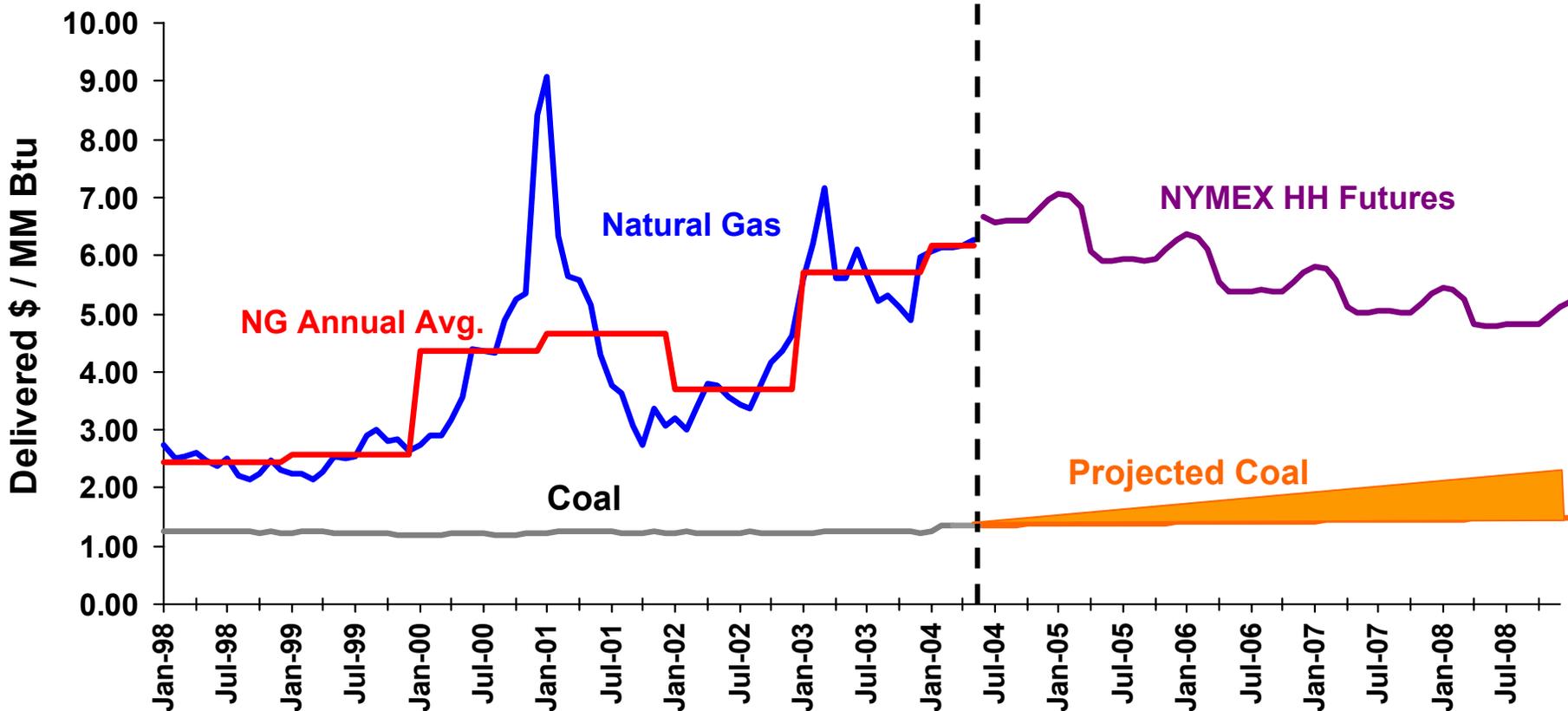
Over 50% of the Electricity from Coal

Cost Per kWh & Percent of Electricity from Coal



SPREAD BETWEEN COAL AND GAS **Dramatically Increased in last 5 Years**

Delivered Cost of Fuel for Generation



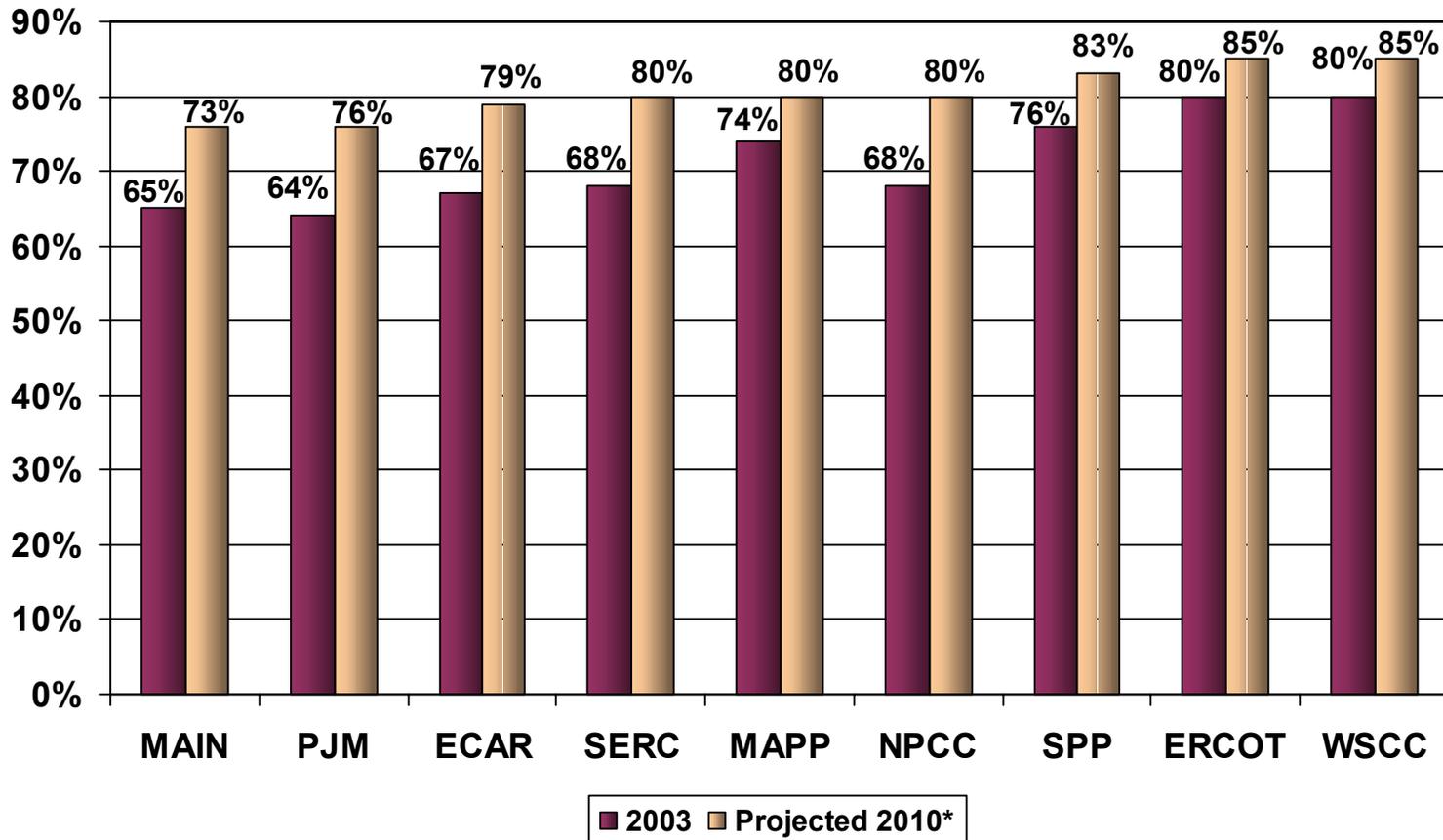
Delivered cost of fossil fuel at steam electric utility plants.

Source: Energy Information Administration, Electric Power Monthly and April 2004 Short-Term Energy Outlook. NYMEX HH Futures closing price for June 2004.

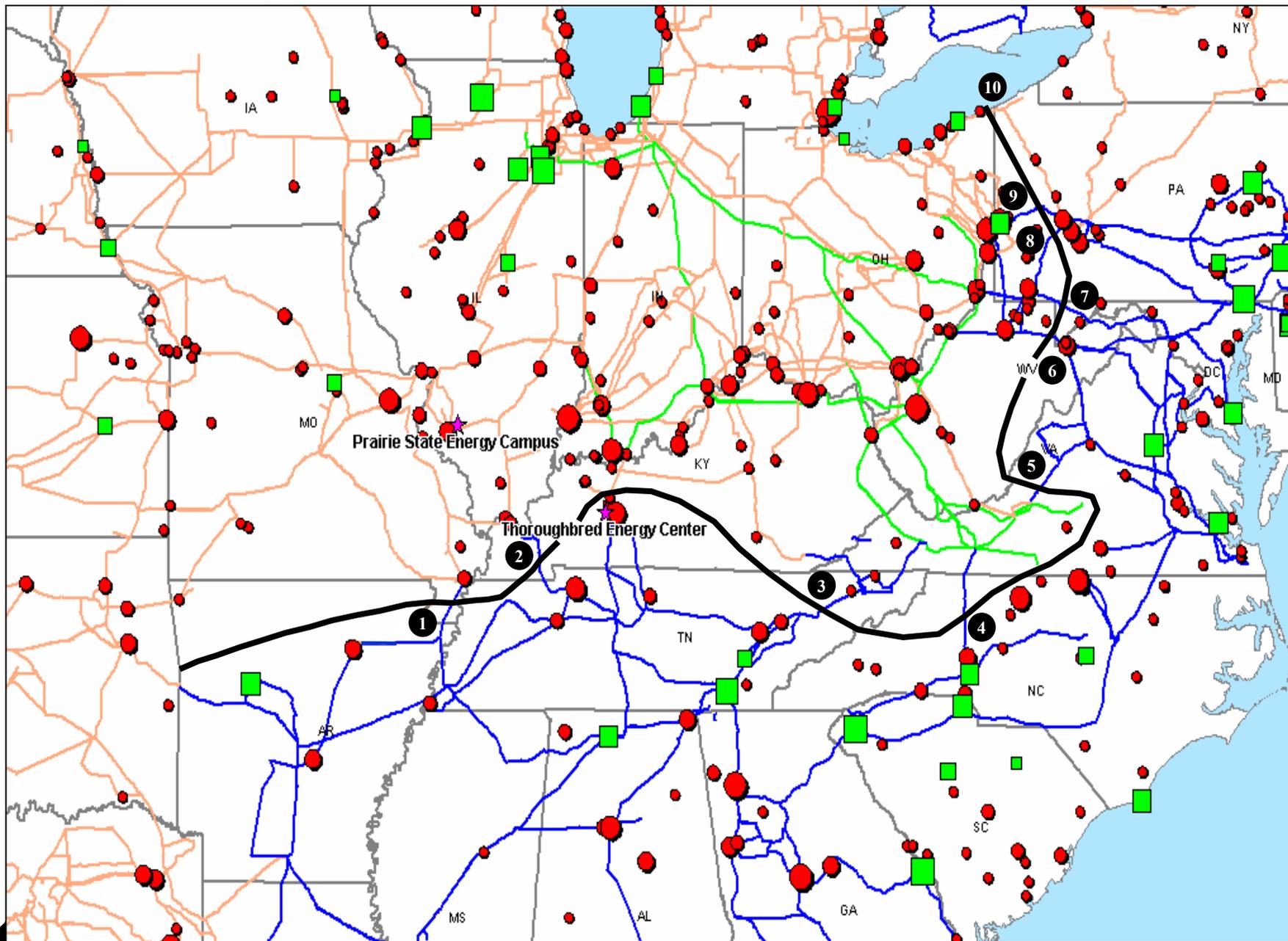
MIDDLE US SOURCE OF EXCESS COAL

Transmission Enhancements Needed to Unlock

Stranded Middle US Coal Region



Only 10 High Voltage Paths out of Coal Rich Middle US



Legend.

● Coal

■ Nuclear

Transmission Lines:

— 345 kV

— 500 kV

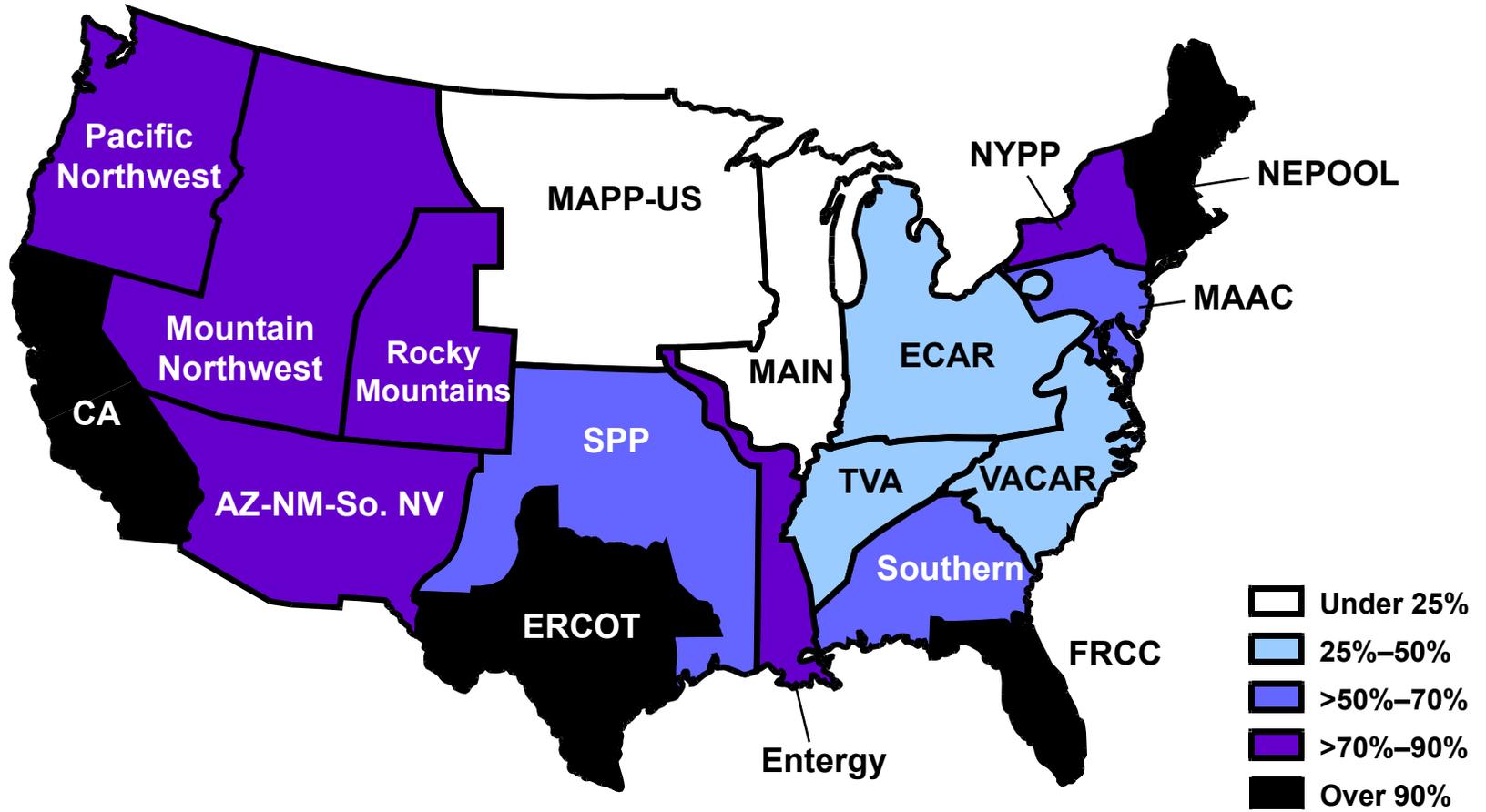
— 765 kV

— Transmission Tie⁶

NEED FOR NEW BASELOAD GENERATION

Natural Gas Frequently Sets Regional Price

(Percent of time gas and oil on the margin projected in 2004)



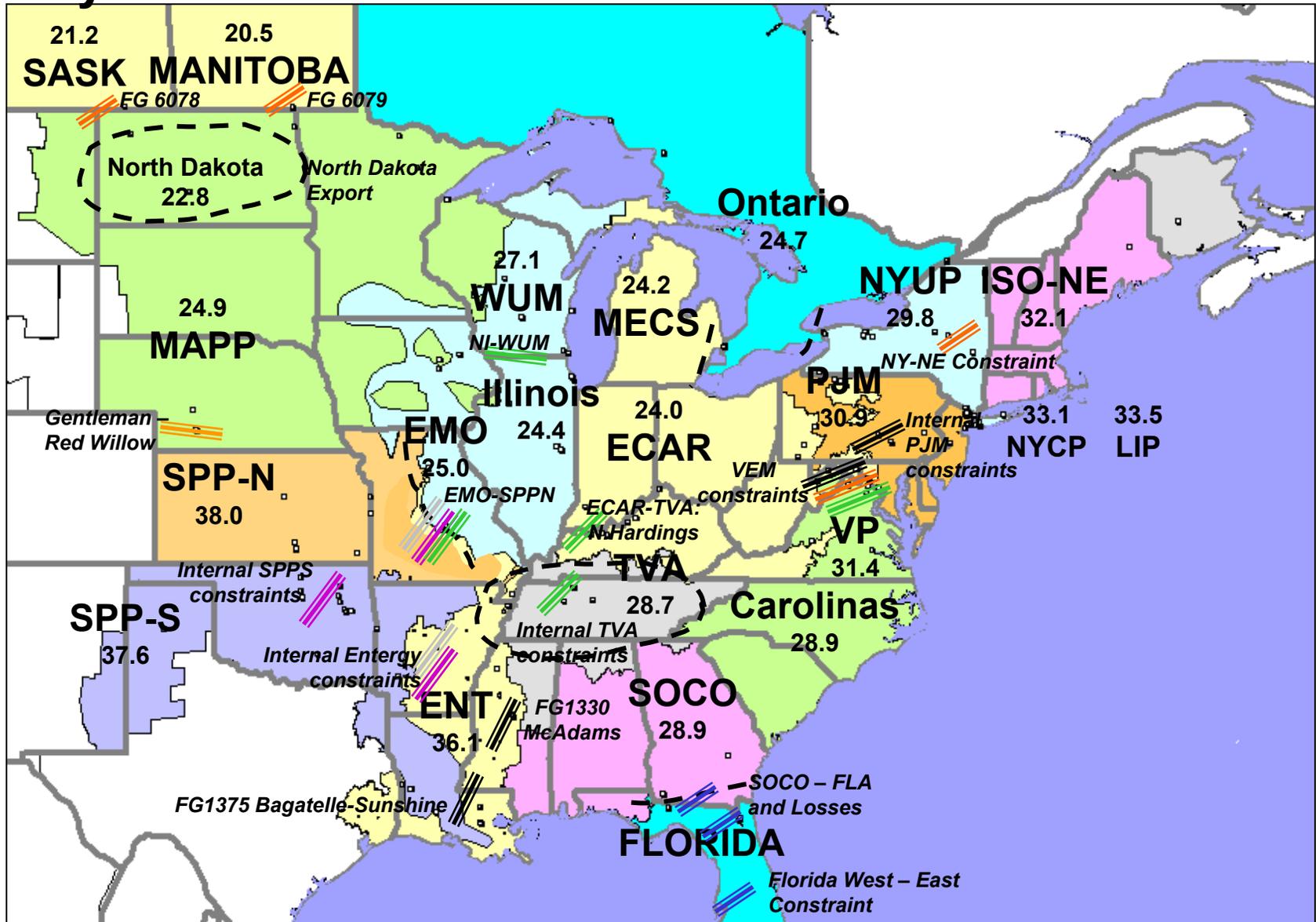
CERA EASTERN INTERCONNECTION STUDY 2004

Upgrades for Moving Coal to Gas Areas

- Assumed \$4.20/mmbtu gas prices and historical coal price spreads in 2010
- Identified roughly \$2.2 billion of investment that pays for itself in customer savings within 7 years with very conservative assumptions above
- Major projects identified include:
 - Western PJM to Eastern PJM - \$8/MWh price spread
 - Midwest to Virginia (Western Virginia to Eastern Virginia) - \$6/MWh spread
 - Entergy
 - Midwest to TVA/SOCO to Entergy: \$8 – 10/MWh spread
 - Within Entergy – La Fayette and New Orleans: \$7 – 12/MWh spread
 - SOCO to Florida: \$8/MWh spread
 - Within SPP – Tulsa/Ok. City/Lubbock: \$7/MWh spread
- New coal plants in Illinois Basin are cost effective in serving Virginia and Florida even with enhanced transmission
- “The cost of transmission congestion...is mainly caused by the relative prices of coal and natural gas. Transmission constraints limit the amount of the relatively low-marginal-cost coal-fired generation in the Midwest from reaching load centers in the East, South and Southeast, where more expensive oil- and gas- fired generation sets the price of power.”

CERA EASTERN INTERCONNECTION STUDY 2004

Key Transmission Constraints 2010

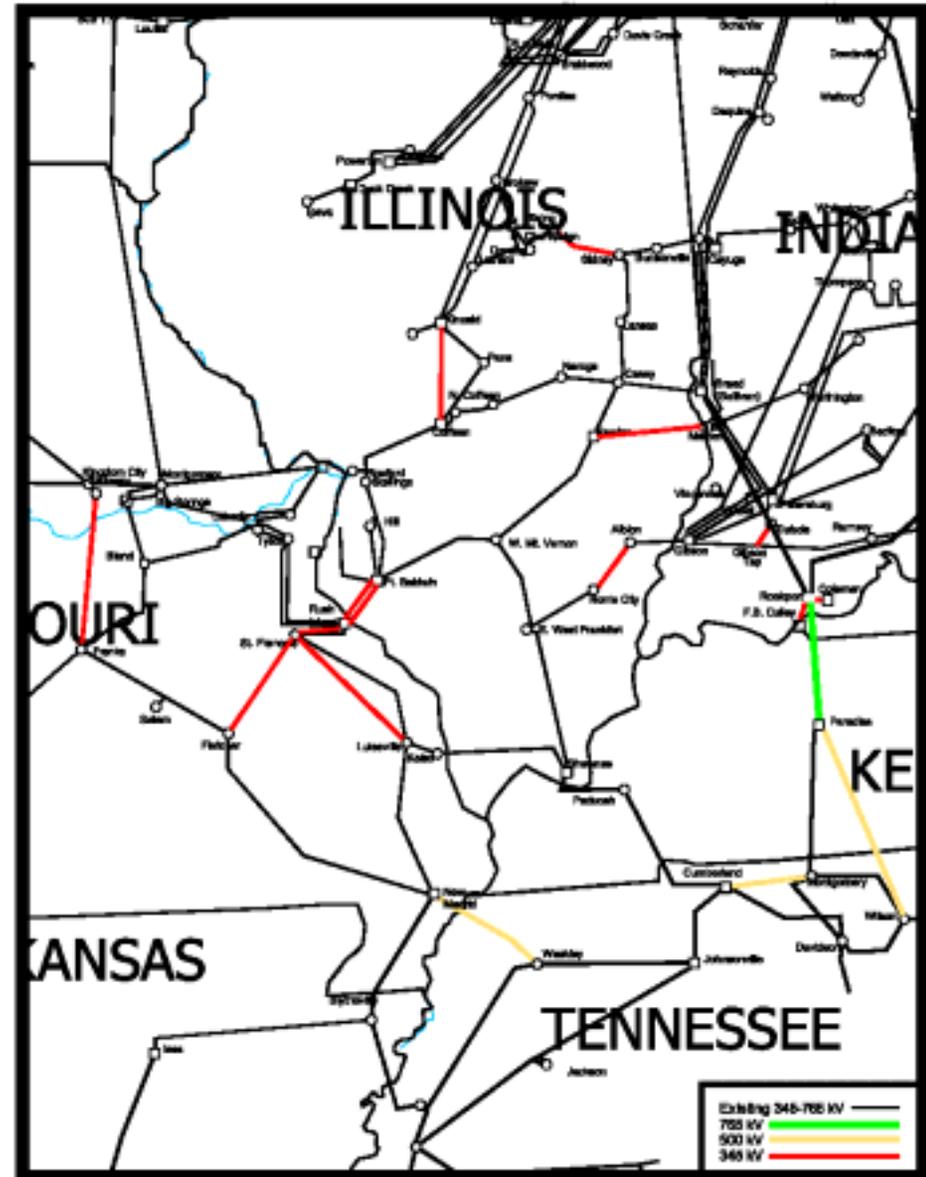


MISO TRANSMISSION EXPANSION PLAN 2003

Valuable for Customers

**Study Results for Select Scenarios in 2007
Consumer Savings in Millions of \$/Year**

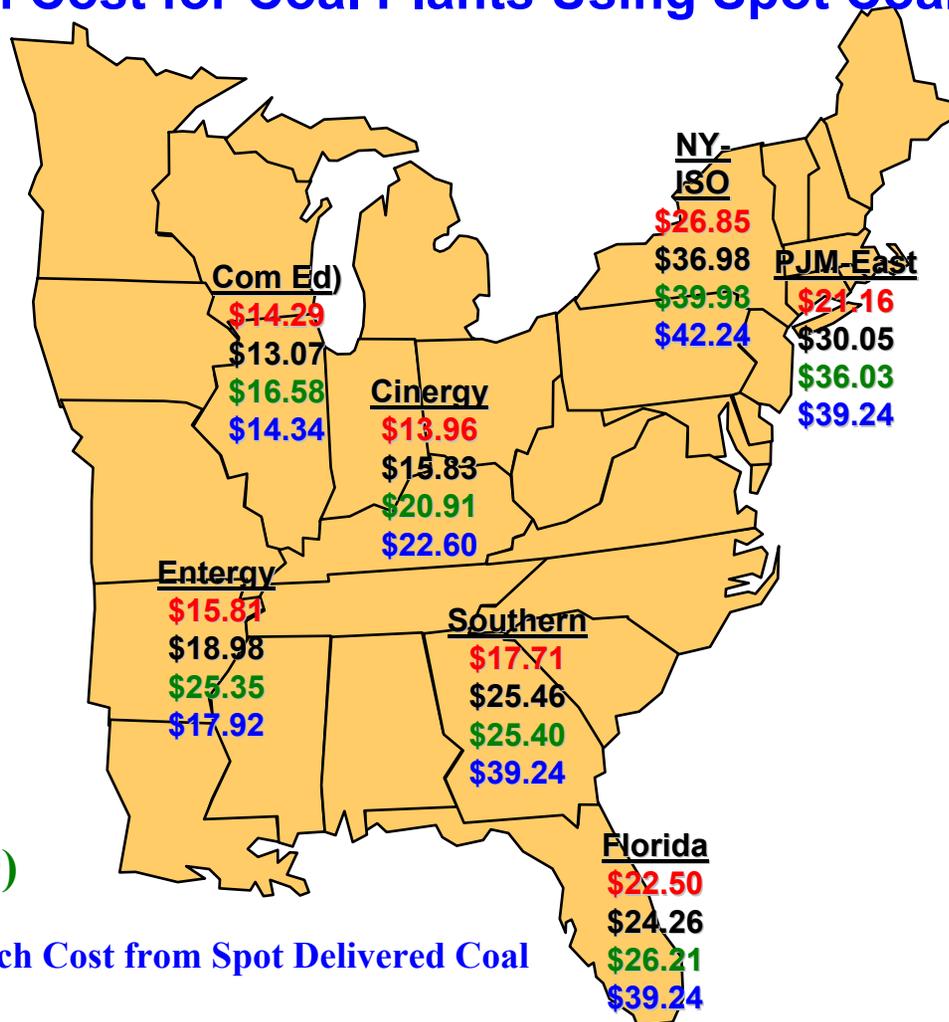
Transmission & Generation Development	Rockport, IN Paradise, KY Nashville, TN	Rockport, IN Paradise, KY Nashville, TN	Rockport to Nashville, New Coal Gen & modest 345/500 kV
Capital Cost Transmission Plan	\$288	\$288	\$844
Gas Price \$/mmbtu	\$3.24	\$5.00	\$5.00
TVA, SOCO & Entergy	\$62	\$201	\$429
Remainder of Eastern Interconnect	(\$17)	(\$5)	\$159
Total Eastern Interconnect	\$45	\$196	\$588



KEEP YOUR EYE ON OFF-PEAK PRICES

Off-Peak Hub Prices On the Move

Average Day Ahead Firm Off Peak Power Prices (7x8)
 Dispatch Cost for Coal Plants Using Spot Coal Prices



Red – 2002

Black – 2003

Green – 2004 (YTD)

Blue – Estimate Dispatch Cost from Spot Delivered Coal



EVOLVING COAL SPREADS

Greater Opportunity to Move Low-Cost PRB/Midwest Coal

PRB/Midwest Coal

- PRB prices have remained stable
- PRB's Lower SO₂ content and lower NO_x created makes coal less sensitive to emission credits
- Dispatch Rate \$/MWh
 - Fuel \$8 + Rail \$9/ton \$10.14
 - SO₂ @ \$600/ton \$ 1.58
 - NO_x @ \$2,500/ton \$ 2.63

\$14.34

Eastern Coal

- Run up in Eastern coal pricing
- More susceptible to emission credits
- Dispatch Rate \$/MWh
 - Fuel \$60 + Rail \$15/ton \$31.50
 - SO₂ @ \$600/ton \$ 3.15
 - NO_x @ \$2,500/ton \$ 4.59

\$39.24

Delta Off-peak Spread: \$24.90

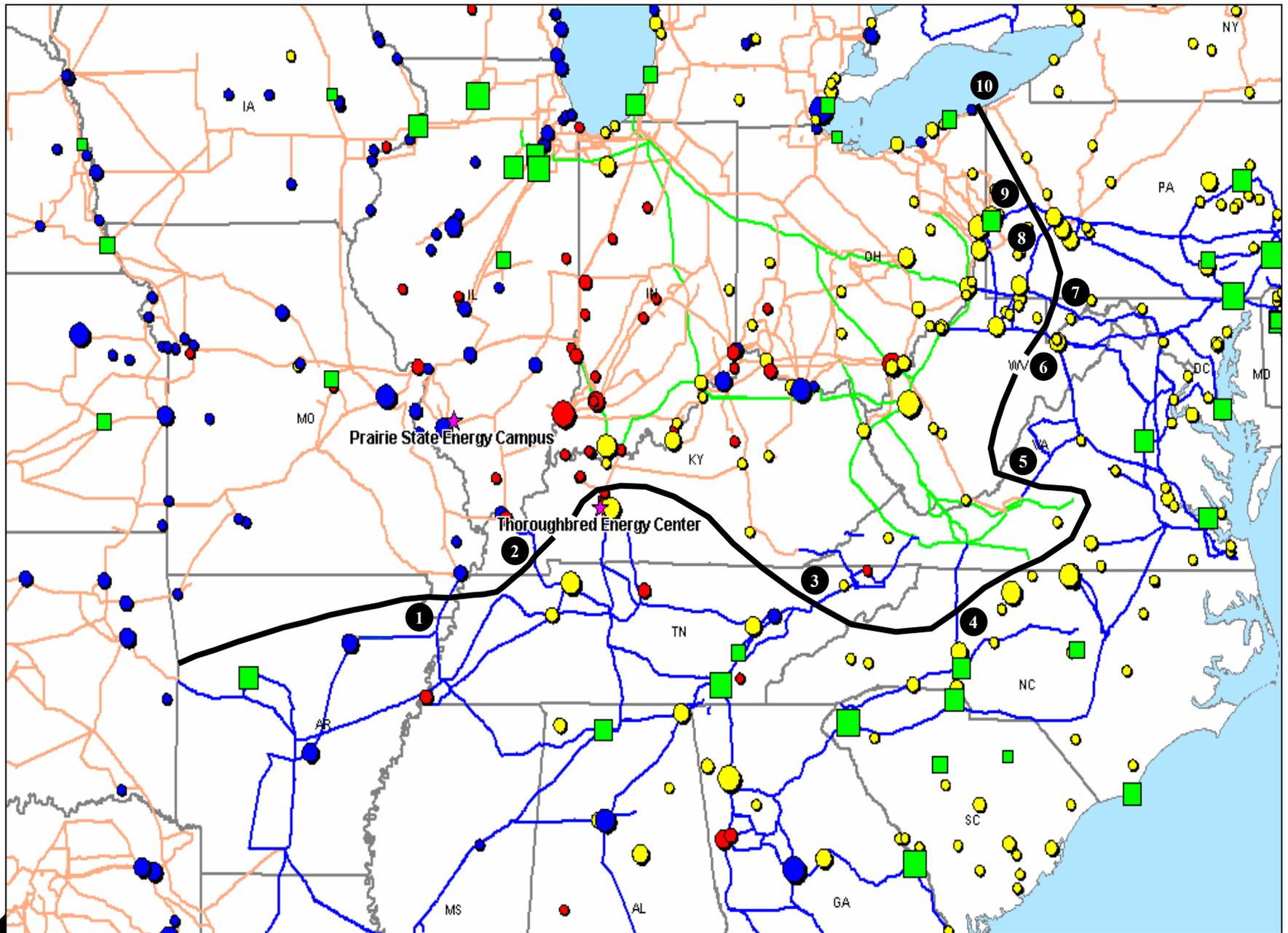
7/8/04

- Cinergy - \$15.83
- NI Hub - \$15.00
- MAIN - \$ 15.50

7/8/04

- MA Hub - \$41.00
- PJM West - \$28
- SOCO - \$24

Coal Plants in Midwest Significantly Lower Cost than East



Legend. ● Eastern ● Midwestern ● Western ■ Nuclear Transmission Lines: — 345 kV — 500 kV — 765 kV — Transmission Tie

FORWARD COAL MARKET DYNAMICS

Affect on Electricity Prices and Transmission Use

- Eastern coal prices have moved up substantially
 - Increases delivered coal cost to Southeast, Middle Atlantic and Northeast by \$0.40 – 1.00/mmbtu
 - Dispatch costs of \$28 – 40/MWh for SE and NE plants
- Will see fuel adjustments increase (or requests) in regulated states (SC, NC, GA, VA, etc) - an outcome not fully anticipated by the states
- Will increase the spread in off-peak power prices between Middle US and Southeast and Middle Atlantic, further loading constrained path to the South and East
- Will create greater incentives to build new coal plants in Middle US where lower mining cost areas are (or mine mouth) and ship coal by wire to the South and East

ENHANCED TRANSMISSION CRITICAL FOR US **Needed for Affordable & Reliable Energy**

- Enhanced transmission is needed to have
 - Affordable electricity/energy
 - A diverse energy base in the US
 - Improved reliability for electricity
- Transmission more than just for reliability – market enabler:
 - Enables lowest cost generation to serve load, be it wind, hydro, nuclear, gas or coal
 - Arbitrages hydro conditions and fuel price volatility
 - Mitigates potential market power abuse
 - Insurance against catastrophic events
- Increased coal use at existing plant in off-peak could reduce natural demand by 0.5 – 1.5 TCF per year over the next 5 years
 - Displacing gas generation in the off-peak with coal
 - Midwest to South and East/Northeast