

# **COAL: AMERICA'S ENERGY FUTURE**



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**Presentation to the Industrial Energy Consumers of America**

**April 12, 2006**

# PRESENTATION TO THE INDUSTRIAL ENERGY CONSUMERS OF AMERICA

- Joining Us Today...

- ▶ **Paul Cicio** Industrial Energy Consumers of America
- ▶ **Bob Beck** Executive Director, National Coal Council
- ▶ **Fred Palmer** NCC Report Working Group Chair
- ▶ **Frank Clemente** Professor, Penn State University
- ▶ **Tim Considine** Professor, Penn State University



# NATIONAL COAL COUNCIL REPORT ON COAL AND BTU CONVERSION

- Private, nonprofit advisory body chartered under the Federal Advisory Committee Act
- Members appointed by Secretary of Energy
- Membership includes broad spectrum of interests and experience
  - **Coal producers**
  - **Coal users**
  - **Transportation providers**
  - **Academia**
  - **Equipment manufacturers**
  - **State governments**
  - **Consumer groups**
  - **Consultants**
  - **Native American tribes**



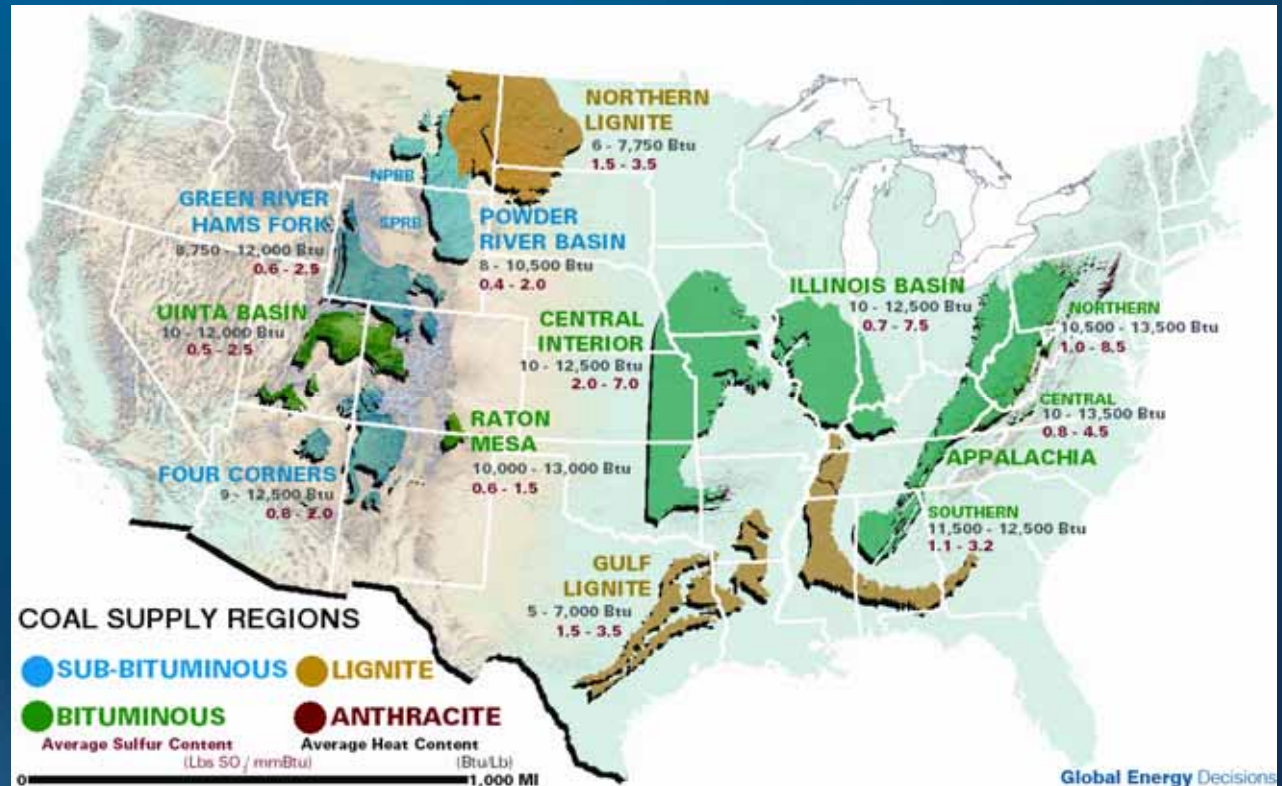
# REPORT PROCESS

- The Secretary of Energy asked the National Coal Council to study the potential for the U.S. coal industry to satisfy future U.S. energy needs using Btu Conversion technology
- The report process was comprehensive, featuring input from 54 members over nine months, including three working group drafting sessions
- We are pleased to offer eight significant findings and 11 major policy-related recommendations to the Secretary of Energy



# COAL SUPPLY REGIONS

*The Resource: 27% of the World's Coal is in the United States*



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**FUTURE**

# COUNCIL FINDINGS

## *The Council Reports to the Secretary of Energy That...*

- Clean coal technologies are available to turn abundant U.S. coal into multiple energy forms including electricity, natural gas, transportation fuels and hydrogen
- By 2025, new capital investments of \$515 billion (present value of \$350 billion) in Btu Conversion technologies would create:
  - 100 GW in new generation capacity
  - 4 TCF of coal-to-natural-gas facilities
  - 2.6 million barrels per day of coal-to-liquids
- U.S. coal production would more than double to 2.4 billion tons of coal per year



# ENORMOUS ECONOMIC BENEFITS

## *This Growth in U.S. Coal Use Translates Into Enormous Benefits*

- Greater coal use and conversion into multiple energy forms translates into substantial U.S. economic benefits
  - ▶ Energy prices would be reduced by nearly 33% from the business-as-usual case
  - ▶ The GDP would be more than \$600 billion higher in 2025
  - ▶ The net present value of the benefit is \$3 trillion, increasing to \$4 trillion with enhanced oil recovery
  - ▶ Employment would be increased by 1.4 million per year by 2025
- These benefits are further enhanced by the tremendous upside to U.S. energy security



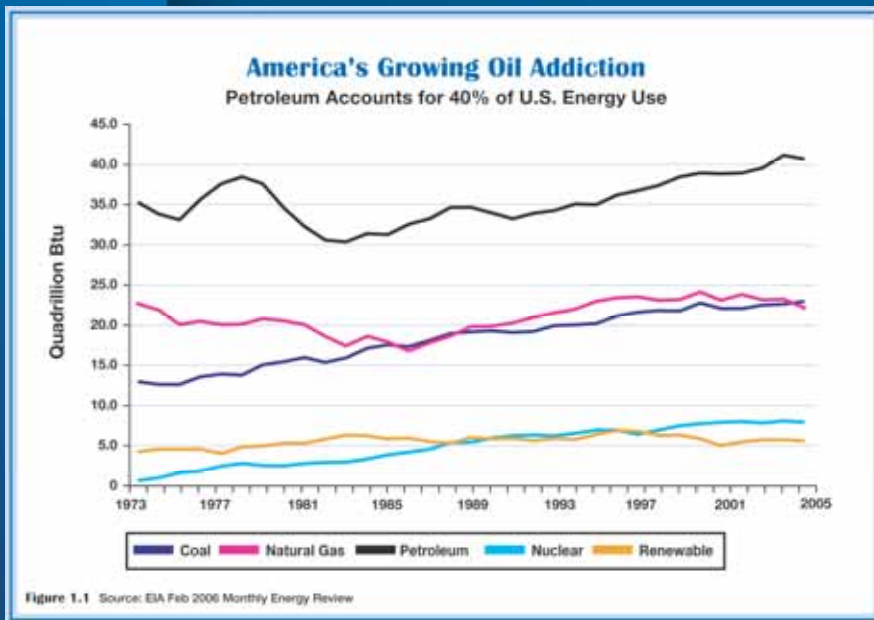
# REPORT BASED ON SEVERAL FUNDAMENTAL PREMISES

- Energy demand will increase significantly by 2025
- Coal is the only domestic fuel with the flexibility and reserve base to meet burgeoning demand
- By maximizing coal use, we free the next generation from increased dependence on foreign energy suppliers
- Imported energy comes with a staggering cost
- Clean coal technologies are commercially available to produce exceptionally clean, reliable, low-cost electricity and other fuels



# STEP ONE: TURNING COAL INTO LIQUIDS

*Technologies Can Relieve Costs and Reduce  
Dependence on Foreign Sources*

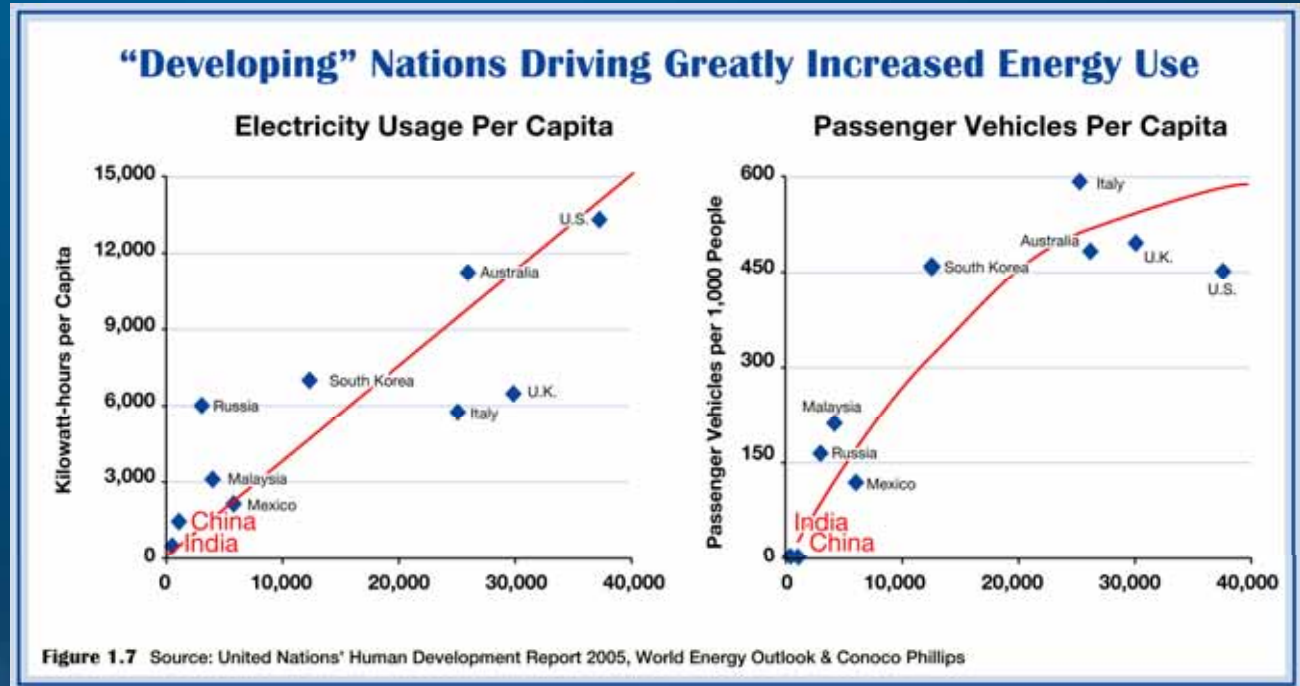


- The U.S. continues to increase dependence on foreign oil
- Domestic oil production declined 11% just between 2001 and 2005
- Global demand is growing, led by “developing” nations
- Concerns are mounting that oil production is depleting faster than it can be replenished
- CTL technologies can enhance U.S. oil supply by 10% using an additional 475 million tons of coal per year

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# STEP ONE: TURNING COAL INTO LIQUIDS

*“Developing” Nations Driving Greatly Increased Energy Use*

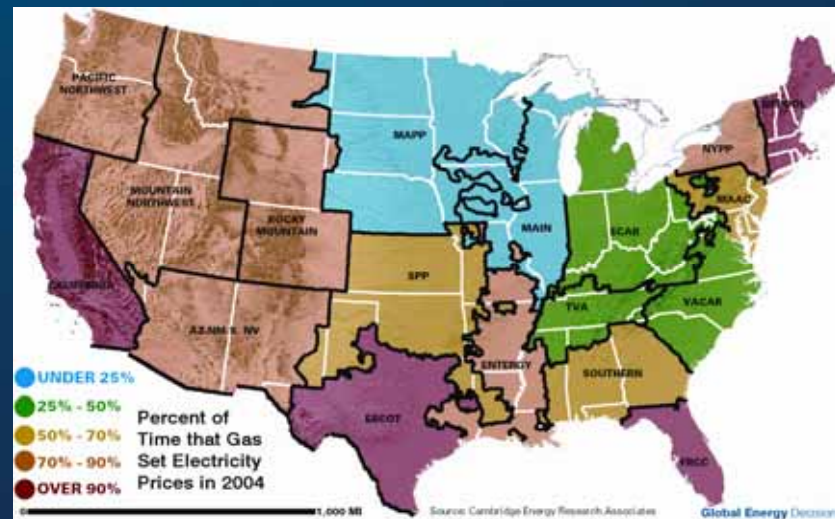


# STEP TWO: TURNING COAL INTO NATURAL GAS

## *Coal Can Lower Natural Gas Costs and Reduce Dependence on Foreign Sources*

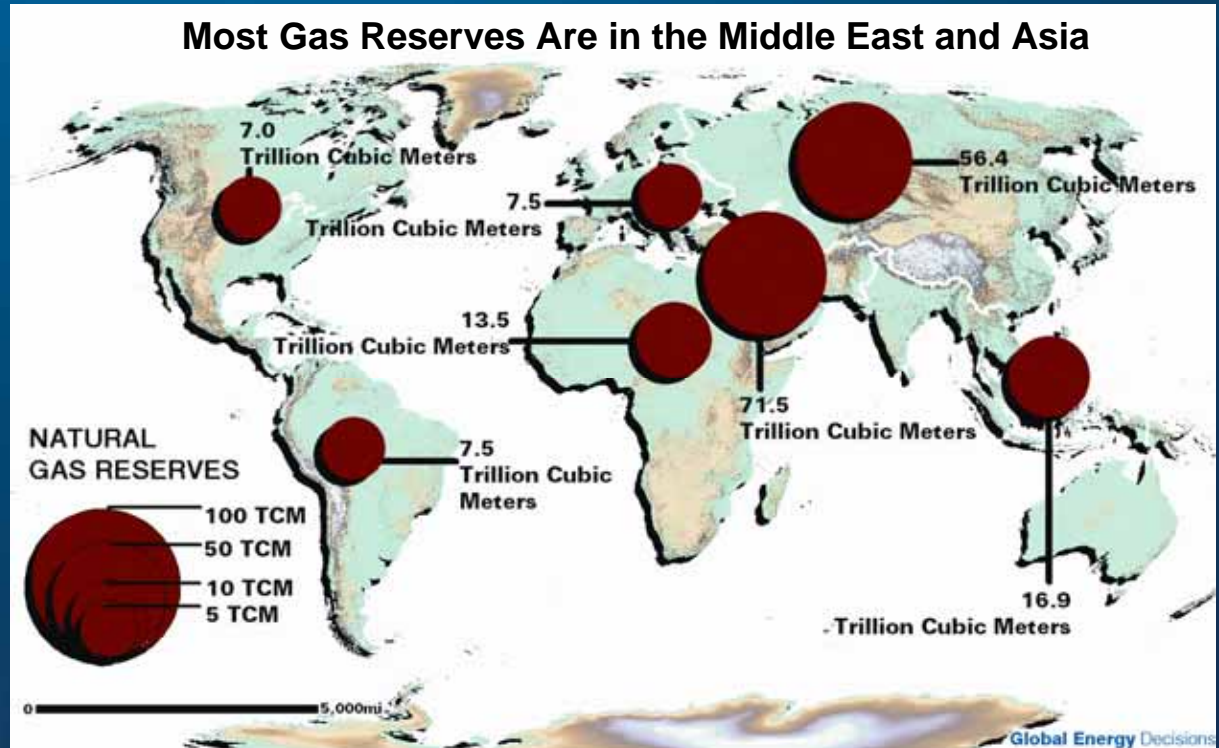
- Conventional natural gas production is in decline, leading to supply issues, high prices and increasing dependence on foreign sources
- Growing risk as natural gas sets power prices
- LNG represents same cost and security issues as foreign oil
- Coal-to-gas technologies allow coal to replace 15% of U.S. natural gas needs, using 340 million tons per year

### *Natural Gas Increasingly Setting Power Prices*



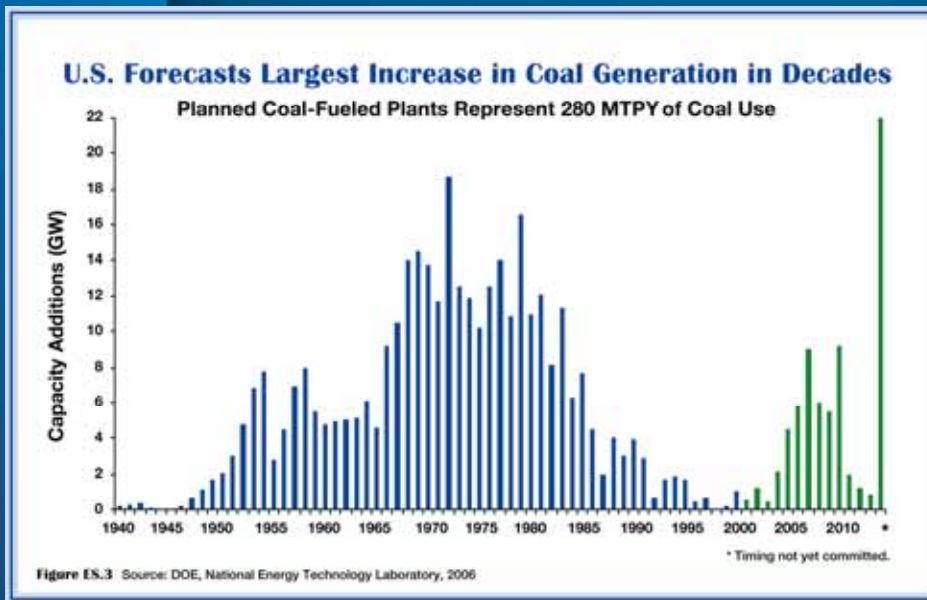
# STEP TWO: TURNING COAL INTO NATURAL GAS

*Like Oil, Natural Gas Supplies Rely on High-Risk Regions*



# STEP THREE: TURNING COAL INTO CLEAN ELECTRICITY

## *The Next Generation: Coal Use for Electricity is Growing*

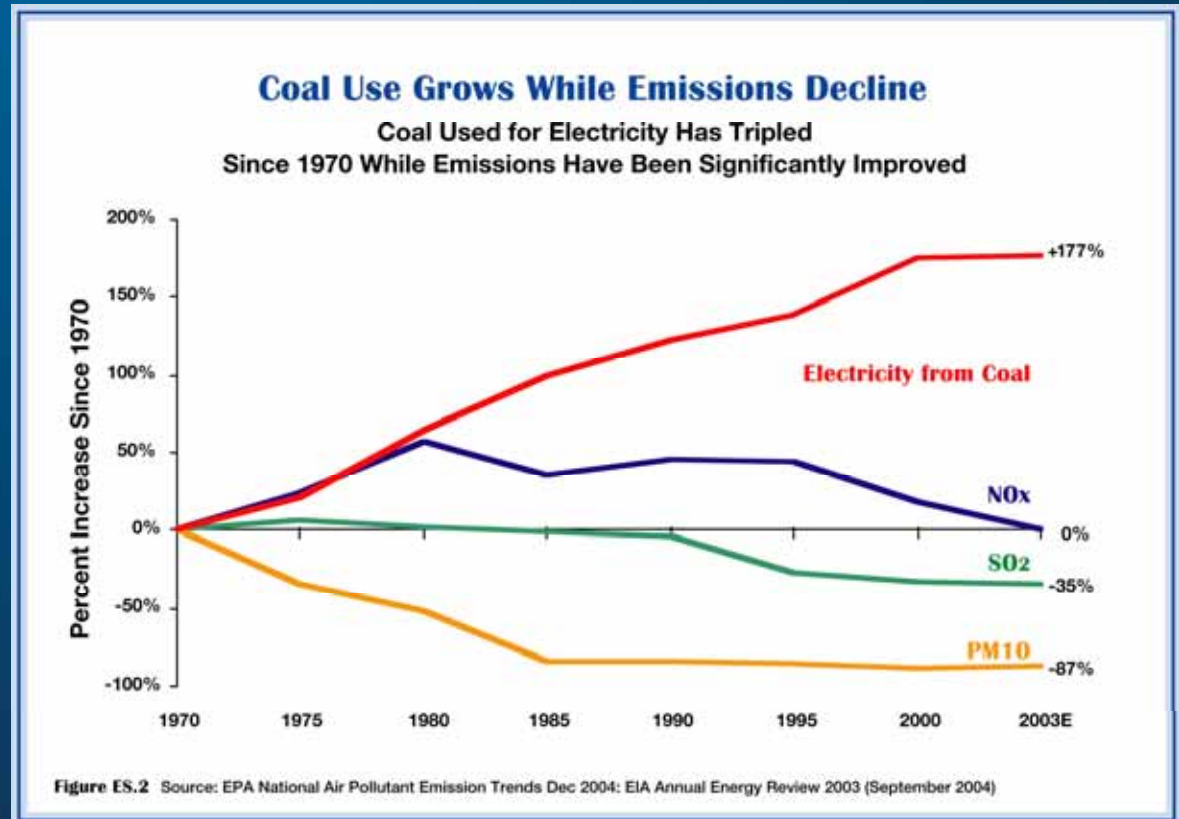


- The U.S. is forecasting the largest increase in coal generation capacity in decades
- Growing reliance on natural gas for generation has harmed the nation's economy and energy security
- Construction of 100 GW of coal to clean electricity plants by 2025 = 60% of nation's increased use
- Requires 375 million tons per year of added coal use



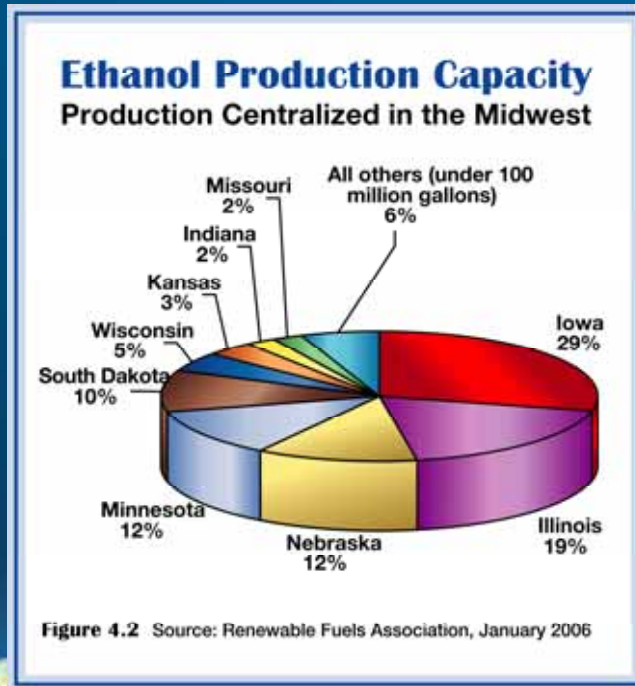
# STEP THREE: TURNING COAL INTO CLEAN ELECTRICITY

*Coal Use Will Continue to Grow As Emissions Decline*



# STEP FOUR: USING COAL TO PRODUCE ETHANOL

## *Ethanol Production Represents Security and Renewables*



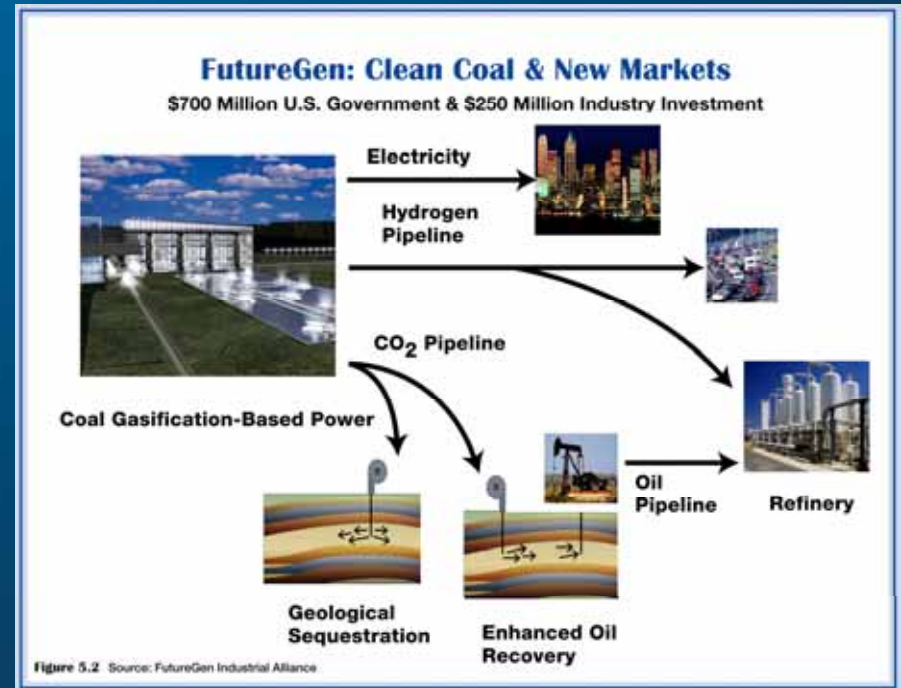
- U.S. is expanding use of ethanol to displace oil
- Increasing use of coal for heat and electricity to produce ethanol would reduce costs and displace oil and natural gas
- Coal use could increase by 40 million tons per year for ethanol production

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# STEP FIVE: TURNING COAL INTO HYDROGEN

## *Coal Technologies Enable U.S. to Drive a Hydrogen Future*

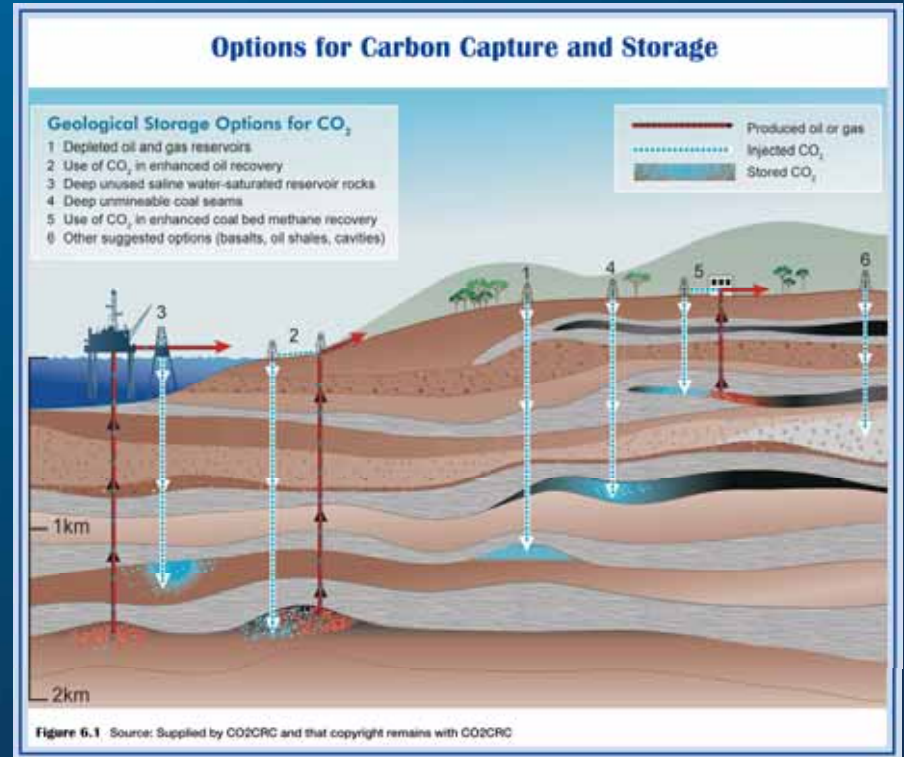
- U.S. envisions widespread use of fuel cells in future
- FutureGen is the largest global private/public hydrogen initiative
- Coal could satisfy at least 10% of the nation's transportation needs at Freedom Car efficiencies, using 70 million tons of coal per year



# STEP SIX: CAPTURING CARBON FOR ENHANCED OIL RECOVERY

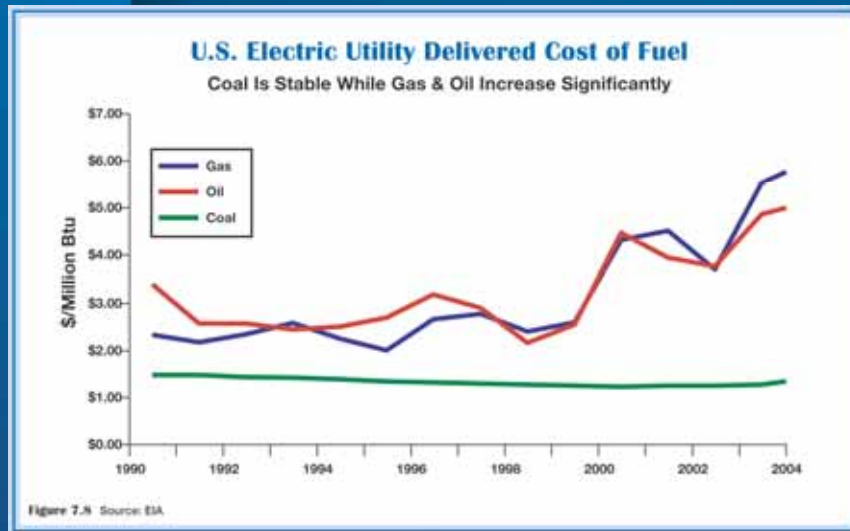
## *Enhanced Oil and CBM Recovery Comes With Carbon Management*

- U.S. has identified carbon capture and storage as promising method to manage carbon
- Major partnerships under way around the country
- EOR could lead to an added 2-3 million barrels per day of oil production



# STEP SEVEN: MAXIMIZING U.S. COAL PRODUCTION

## *U.S. Has World's Most Abundant Coal Reserves*



- Review of reserves and production cycle conducted
- Mining industry, transportation infrastructure can be expanded
- Growth in coal production from 1.1 billion tons per year today to 2.4 billion tons per year in 2025



# STEP EIGHT: REAPING ENORMOUS ECONOMIC/SECURITY BENEFITS

## Impacts on Gross Domestic Product and Employment

Year	Changes in GDP Billions of 2004 Dollars				Changes in Employment (Annual Jobs Created)			
	Lower Energy Prices	Plant Cons.	Energy Output	Total GDP Gains				
2006	0	0	0	0	0	0	0	0
2007	0	2.3	0	2.3	0	6,296	0	6,296
2008	0	6.3	0	6.3	0	17,314	0	17,314
2009	0	12.0	0	12.0	0	33,054	0	33,054
2010	2.3	19.5	3.6	25.4	10,153	53,517	2,670	66,339
2011	6.5	26.3	9.8	42.6	27,766	72,405	7,343	107,514
2012	12.5	33.2	18.5	64.2	52,619	91,293	14,019	157,931
2013	20.7	40.1	29.6	90.4	85,005	110,181	22,698	217,884
2014	31.0	46.9	42.6	120.6	124,833	129,069	33,379	287,281
2015	43.7	53.8	57.8	155.3	171,876	147,958	46,063	365,897
2016	58.8	60.7	75.1	194.6	226,251	166,846	60,750	453,846
2017	76.6	67.5	94.1	238.2	288,964	185,734	77,439	552,137
2018	97.0	74.4	115.5	286.9	359,390	204,622	96,131	660,144
2019	119.9	81.3	137.7	338.9	437,068	223,511	116,826	777,405
2020	145.7	88.2	160.8	394.6	521,584	242,399	139,524	903,507
2021	174.5	95.0	184.2	453.7	613,753	261,287	164,225	1,039,264
2022	206.3	101.9	207.4	515.6	713,273	280,175	190,928	1,184,376
2023	241.4	79.0	230.4	550.8	820,519	217,214	219,634	1,257,368
2024	279.6	54.4	252.4	586.4	934,010	149,532	250,342	1,333,884
2025	322.0	28.0	273.0	623.1	1,056,719	77,127	283,054	1,416,900

Figure 8.4 Source: Economic Analysis Conducted at Penn State University, 2006



# KEY POLICY RECOMMENDATIONS

- Accelerate R&D of advanced technology
- Improve industry's ability to attract private capital for new facilities
- Provide market certainty for products
- Assure coal incentives for all alternative technologies
- Minimize operating costs for new alternative fuel plants
- Reduce permitting delays & regulatory uncertainty



# KEY POLICY RECOMMENDATIONS

- Assure enhanced oil recovery using CO<sub>2</sub> extracted from coal plants as an attractive investment
- Provide incentives for upgrading the transportation infrastructure
- Ensure that existing economically recoverable U.S. reserves remain part of the resource base
- Continue to support provisions of the Mine Safety and Health Act



# GROWING BIPARTISAN INTEREST IN COAL FOR OTHER ENERGY FORMS

*“Clean coal is a sound policy that unites public and private interests. Instead of becoming more dependent on the Middle East for our fuels, we can increase our dependency on Middle America, and that makes sense to me. I call for an American Energy Harvest.”*

*– Pennsylvania Governor  
Edward G. Rendell*



# GROWING BIPARTISAN INTEREST IN COAL FOR OTHER ENERGY FORMS

*“While our traditional clean coal programs are focused on producing electricity and, in the case of FutureGen, hydrogen, I believe that our abundant coal reserves could do even more to meet our nation’s energy needs. One of the most exciting areas, I believe, is the technology for turning coal into diesel and jet fuel.”*

– U.S. Secretary of Energy  
Samuel Bodman



# COAL: AMERICA'S ENERGY FUTURE

- **New clean-coal technologies will enhance U.S. energy security and bring about enormous economic benefits**
- **These technologies are being developed; the proper policies accelerate the benefits**
- **Coal is not a bridge to the future...  
Coal *is* the future**



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