



The Case for Private Development: Coal Gasification Deployment in Today's Business Climate



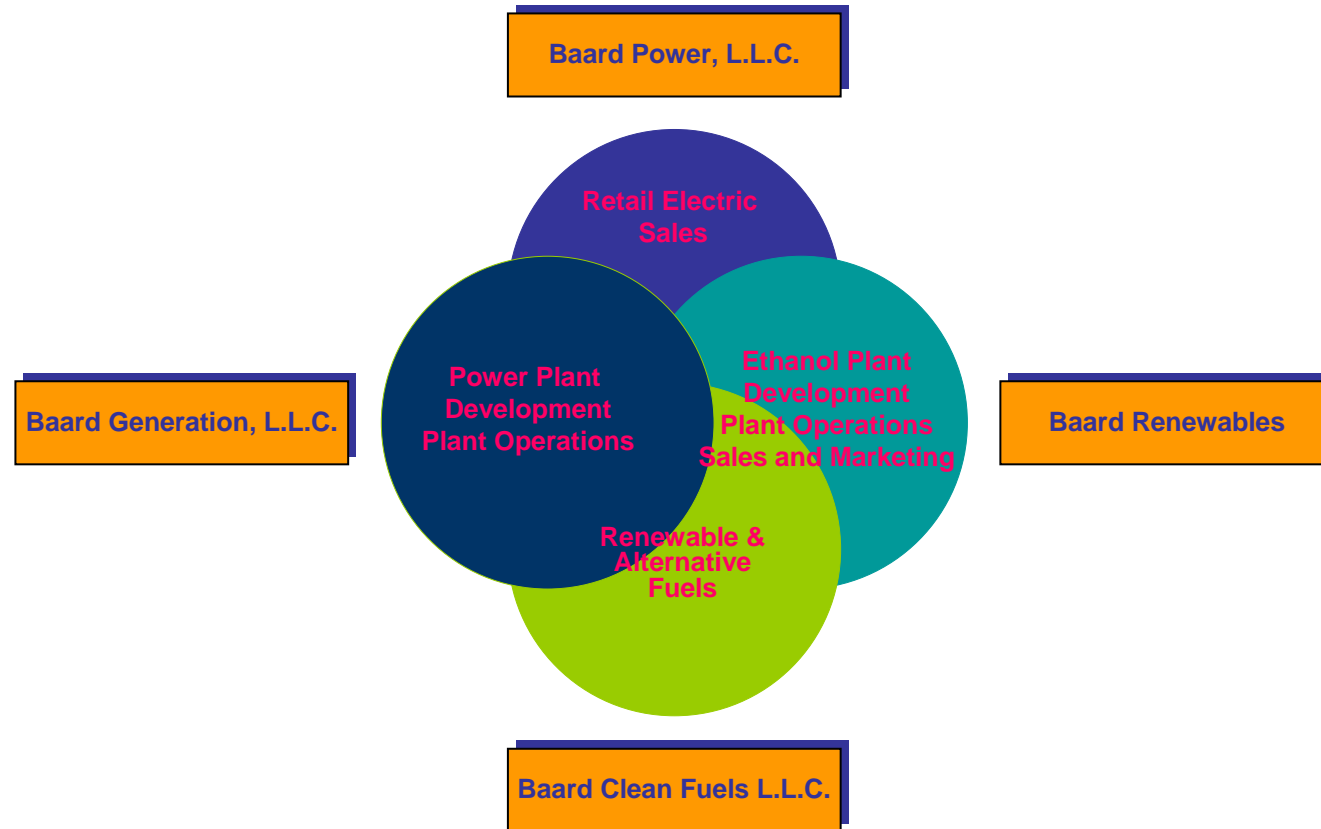
**National Association of
Regulatory Utility Commissioners**

July 27th, 2005

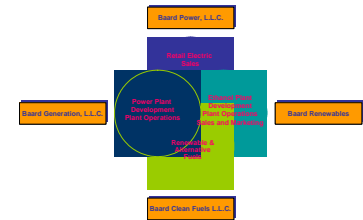
Agenda

- Review of the Beard Energy Companies
- The Case for IGCC for Power Generation
 - Technology Selection
 - Process and Process Advantages
- The Modern Energy Provider
 - Market Drivers
 - The Case for Coal
 - Managing Hydrocarbons
- Ohio Projects and Enablers: The Business Climate
 - Locations, Geography and existing infrastructure
 - Regulatory siting and air permits (PTI)
 - State Funding Initiatives
 - Business Development Climate

Baard Energy, L.L.C. – Business Synergies



Baard Company Credentials



- Baard Generation LLC had 20 years experience in the development of power plants in the USA & Canada:
 - Three 16 MW wood-fired QF projects, Michigan and Pennsylvania
 - Windsor Power – 440 MW Natural Gas
 - South Point AZ – 500 MW Natural Gas
 - Wyandotte MI – 572 Natural Gas
- Baard Renewables LLC develops ethanol facilities in the USA
 - Ravenna, NE – 88 million gallons/yr
 - Coshocton, OH – 55 million gallons/yr
- Baard Power owns and operates various power marketing businesses in Michigan, Texas, Illinois.
 - Michigan – 1300 Customers
 - Texas – 1600 Customers
- Baard Clean Fuels: FT Project Developer

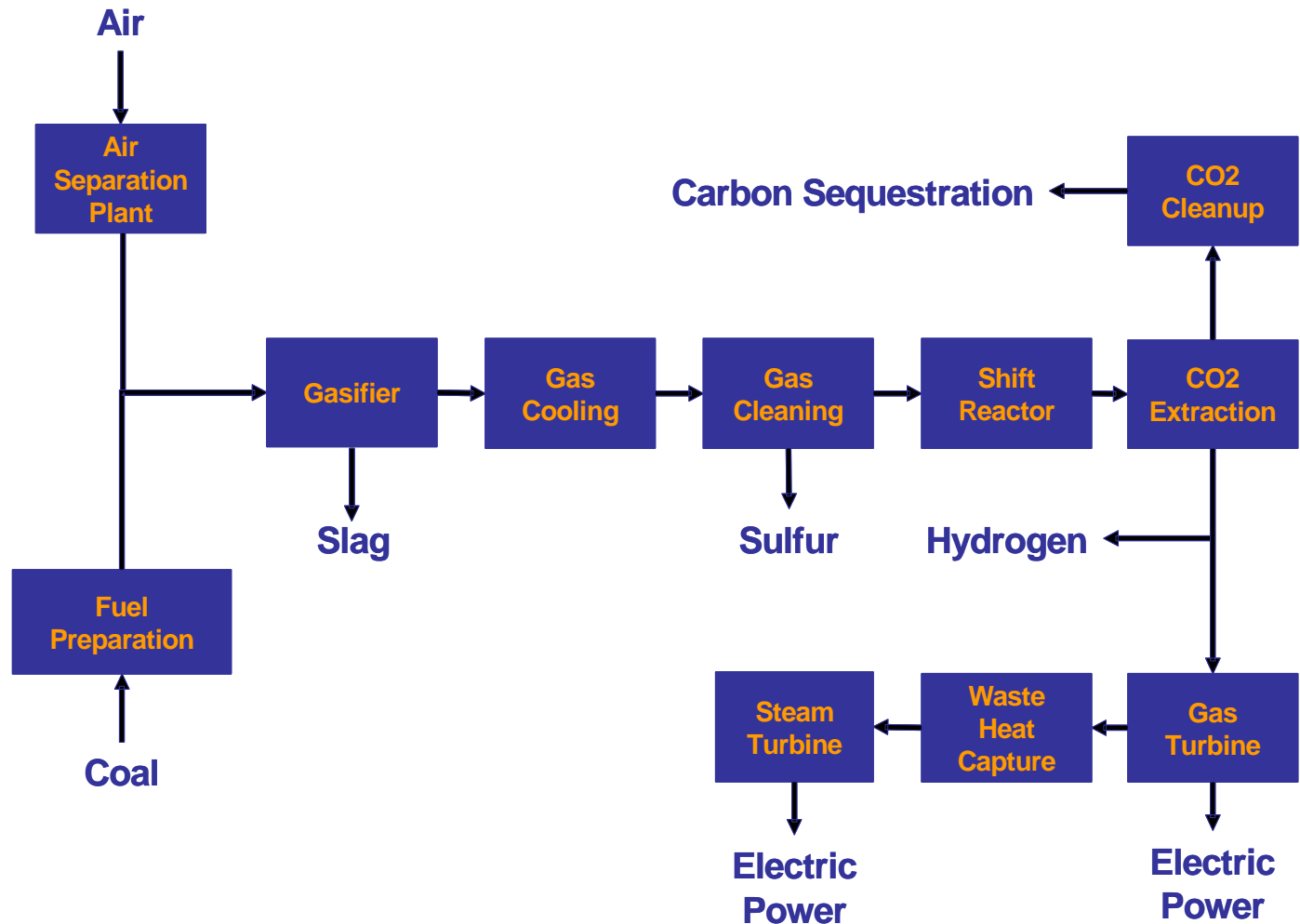
Integrated Gasification Combined Cycle

Gasification for Power Generation

- **Dry Processes:**
 - Shell Coal Gasification Process
 - Future Energy
- **Wet Processes:**
 - GE Energy (ChevronTexaco Process)
 - ConocoPhillips (Dow Process)

Generic Process Description

Integrated Gasification Combined Cycle



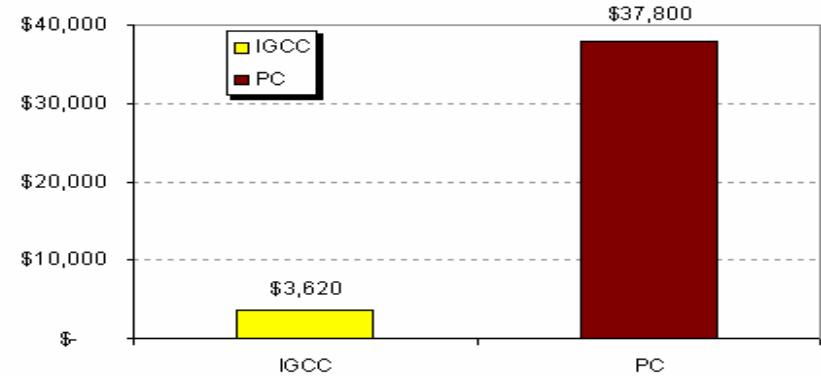
Gasification Advantage – Emissions

Excluding CO₂ Sequestration Deployment

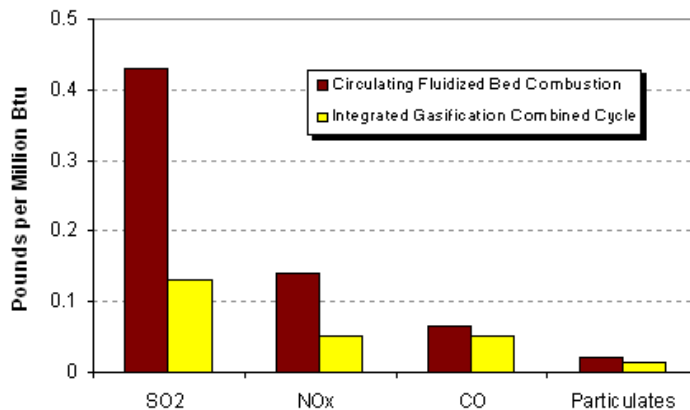
Courtesy: Gasification Technologies Council

Future investments in large coal-based power plants must take into account the superior environmental performance and future costs to address increasing environmental demands by the community.

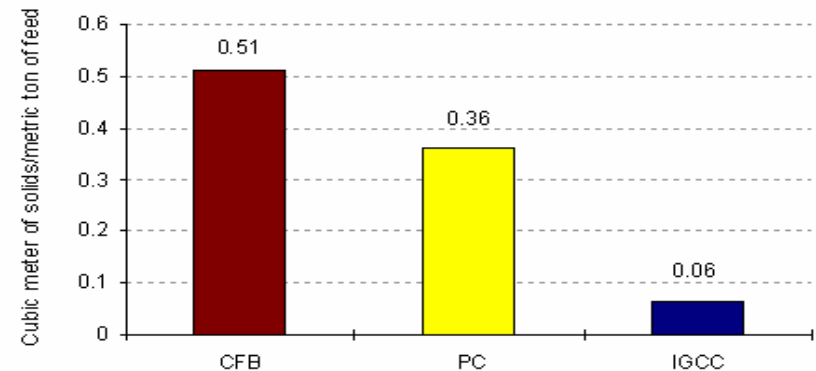
IGCC Offers Lowest Cost Mercury Removal
(Dollars per lb. Mercury removed)



Air Emissions of IGCC vs. Fluidized Bed Power Generation using Petroleum Coke



Solids Volume Production by Power Generation Technologies



Comparative Assessment of Coal Technologies

Developments of the past few years have significantly narrowed the measurable and perceived risks of IGCC investment.

Coal Technology	PC	CFB	IGCC	Sensitivity - Comments
Technology Risk	Less	Less	Most	Performance guarantees and warranties are now offered by Technology alliances. Federal & State incentives for IGCC becoming available. Numerous (non-USA) projects providing operating expertise and incremental improvements. Trends favor IGCC.
Resource Requirements	High	High	Less	Water, land (footprint) and overall developer costs are best for IGCC. Reagent costs, ash handling and disposal costs favor IGCC and reduce future legacy risk.
Capital and O&M	Same	Same	Same	Recent studies indicate CAPEX cost differentials are now narrowing. IGCC Fuel costs (efficiencies) are superior. Operating costs are higher for IGCC but narrow when taking into account environmental advantages. CAPEX positively impacted by foreign projects and construction/manufacturing improvements. Gasifier availability per technology selection is extremely important with respect to operating costs.
Permitting, Licensing, Environmental	Worst	Better	Best	All three technologies meet or exceed present regulatory requirements. Future demands on carbon sequestration, mercury removal and public awareness to these pollutants must be taken into consideration. Future environmental requirements clearly favor IGCC. Progressive States have a great influence on coal technology selection.

Conclusions:

A Private Developer Perspective of IGCC for Power

- Projected capital costs for coal-based generation are narrowing and very similar in the long view:
 - Long term maintenance (O&M) and environmental concerns must be factored into a 30 year project.
- Projected busbar costs have also narrowed:
 - Increasing costs for conventional PC and CFB primarily due to anticipated environmental demands.
 - Improved IGCC costs due to anticipated reduction in financing costs, CAPEX and O&M costs.
 - ***Carbon Sequestration must be part of the agenda.***
- Technology Risks:
 - Availability improvements: Operations strategies have been demonstrated and along with spare gasifier or design options, risks have been improved,
 - Fuel flexibility, cost and efficiencies (HV) favor IGCC,
 - More stringent emissions controls in the near future favor IGCC,
 - Technology risks are being addressed by the IGCC alliances.

The Modern Energy Provider Model

Managing Hydrocarbons as a Business Strategy

- Working inside our box, sometimes we limit our focus on only one output:
 - Utilities focus on fuels for producing electricity,
 - Refineries on crude sources for liquid fuels,
- While our economy (Manufacturing & Consumption) is dependent upon stability; especially in the areas of
 - Energy and energy costs,
 - Cost of Raw Materials.
- Therefore, the critical questions is: *“What are the overall needs of the public as our focus on energy is sharpening?”*

IGCC for USA Energy Strategies

- IGCC is a method of distilling and utilizing a hydrocarbon for its energy value in an environmentally friendly and efficient manner.
 - Step One: Break down the hydrocarbon (coal) and remove trash such as Sulfur, Ash, Volatiles, Mercury,
 - Step Two : Use the valued hydrocarbons (CO & H₂) for their BTU value in a combustion process.
- A second cycle of power is achieved by capturing waste heat and producing electric power through steam generation.
- Thus, the present utility model is to use these hydrocarbons to produce electric energy through combustion and steam turbines.

IGCC for USA Energy Strategies

- Gasification of coal is the BAT for coal-based power generation, but is this the best use of these hydrocarbons?
- Our country is highly dependent on energy from hydrocarbons, including petroleum & natural gas. Over 55% comes from unstable countries and the trend is worsening:
 - Production of electricity (coal & NG combustion for steam production)
 - Production of transportation fuels (crude oil distillation, hydrocracking, hydrotreating and blending)
 - Production of Chemicals (natural gas & naphtha, cracking and reforming)
 - Production of food (natural gas for nitrogen delivery)

Light Crude Oil

- **August 2005 NYMEX Oil Contract up over 42% since the beginning of 2005.**
- **Energy and chemicals are closely coupled to the price of crude**

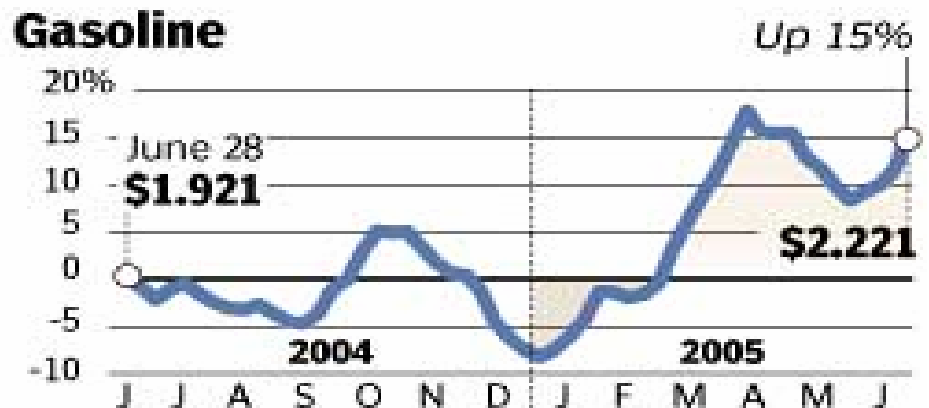


Transportation Fuels

Spot Diesel prices are up 37% over the past year...

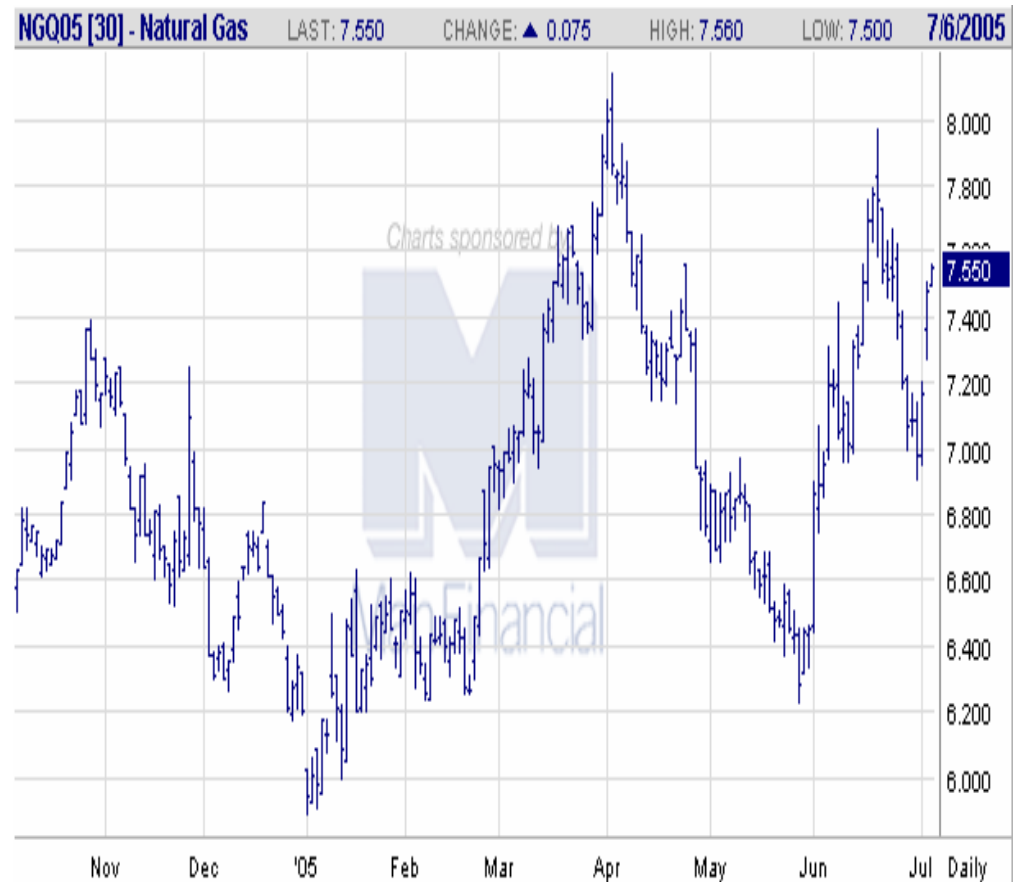


Spot Regular Unleaded Gasoline up over 15% over the past year...



Traditional Utility Fuels: Natural Gas

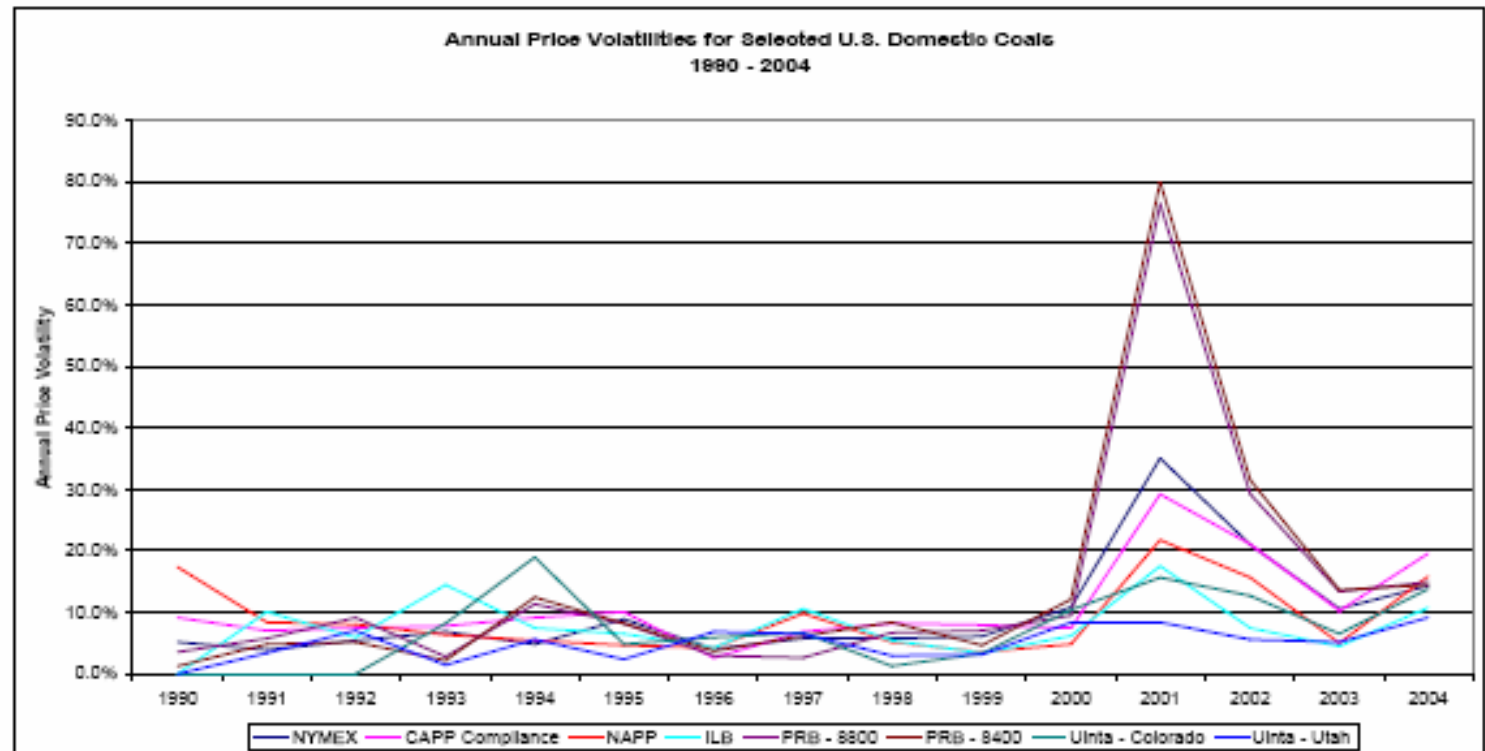
August 2005 NYMEX Natural Gas Contract – up over 25% since the beginning of 2005...



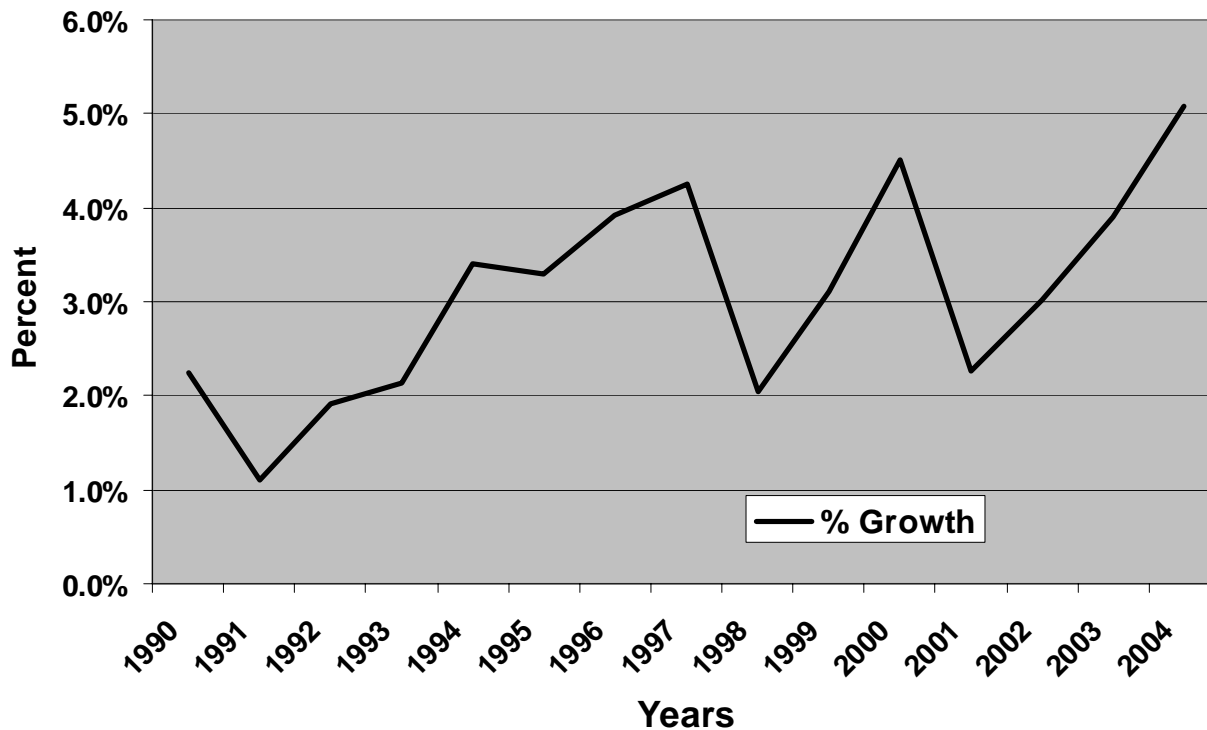
Traditional Utility Fuels: Coal

Although coal spot prices have seen increases, long term contract prices have been relatively flat for 10 years...

Annual Coal Price Volatility for Selected U.S. Domestic Coals
1990 through 2004



Global Economy



- The World Economy grew by 5.1 % in 2004 (fastest in nearly three decades)
 - China 9.5%
 - Argentina 9%
 - India 7.3%
 - United States 4.4%
- World Output of Goods and Services increased from \$53.2 trillion in 2003 to \$55.9 trillion in 2004

USA Energy Constraints

Capacity & Transmission

- Increasing demand for energy in localized markets (concentration of refinery assets, transmission constraints) changes the equation for natural gas, diesel, heating oil, and electricity; thus straining the existing energy infrastructure.
- Strategic location of baseload generation must view existing ISO transmission constraints and load sinks.
- Oil Refineries are running at 96% capacity. No new refineries are being built.
- Natural threats negatively affecting the highly concentrated refining capacity in the USA.
- The majority of our crude supply is concentrated in unstable regions of the world.

Peak Oil – The Only Argument is When

Recent News...

Boston News

ChevronTexaco Warns of Global Bidding War

By Deepa Babington | February 15, 2005

HOUSTON (Reuters) - Asia's insatiable appetite for oil coupled with tight supplies has triggered the start of a global bidding war for oil from the Middle East, the head of ChevronTexaco Corp. said on Tuesday.

Resource Investor

Famed Oil Tycoon Sounds Off on Peak Oil

By Michael J. DesLauriers
23 Jun 2005 at 03:17 PM EDT

TORONTO

In recent months, legendary oil baron, T. Boone Pickens has become increasingly vocal about his view that peak oil is upon us and high prices are here to stay.

Mexico Daily

Pemex: Reserves overestimated BY NOÉ CRUZ SERRANO/EL UNIVERSAL

April 18, 2005

The national petroleum giant reports that deepwater deposits in the Gulf of Mexico may be half of what was initially predicted.

The Daily Telegraph

Unrest 'could double' oil price

By Ambrose Evans-Pritchard
(Filed: 27/06/2005)

A warning of a possible near doubling in the cost of oil was issued yesterday as UK prices rose to more than £4 a gallon and the AA Motoring Trust said the price of diesel was approaching £5 a gallon.

Boston Herald

Taking a peak: Concern over world's oil supply fuels discussion over alternatives, technology

By Jay Fitzgerald
Sunday, January 2, 2005

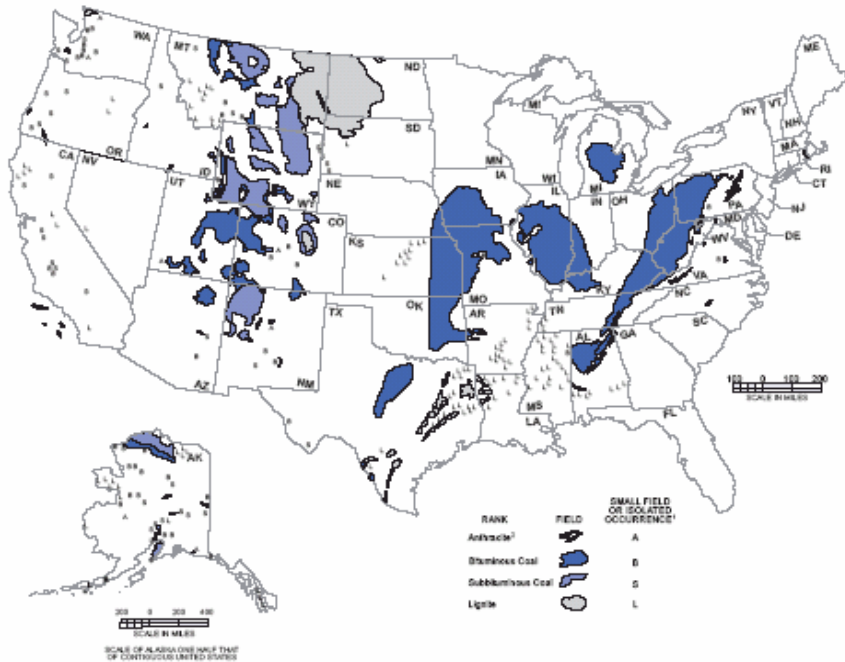
Enjoy the ride up "Hubbert's peak." The descent might not be so fun. After a 34 percent spike in the price of crude oil this past year, many industry experts and economists are wondering whether something larger was at play during 2004

USA Coal and Oil Shale Deposits

Domestic Reserves total 1.9 Trillion Barrels

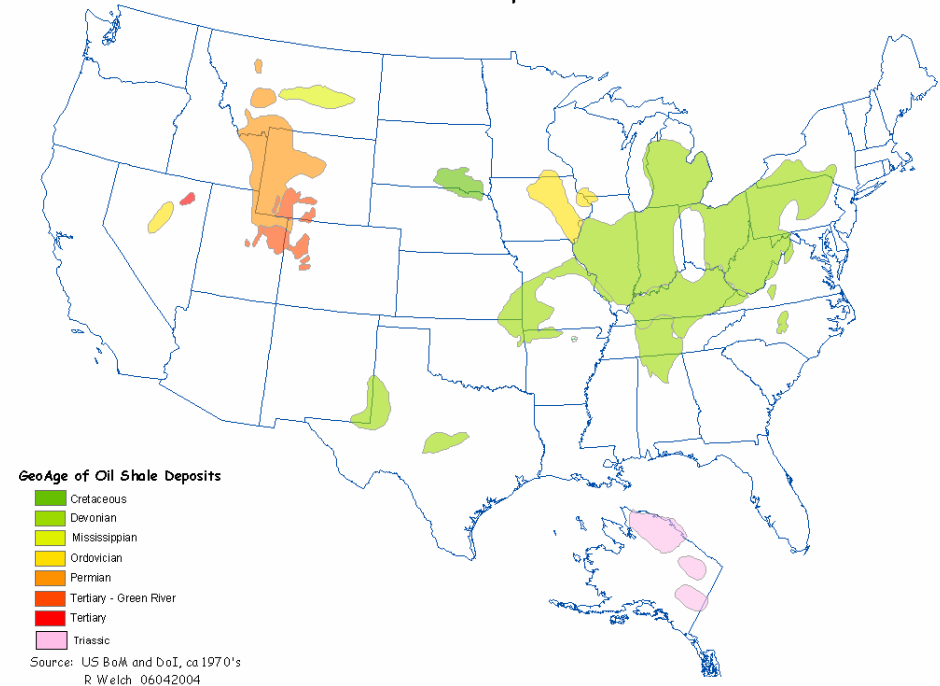
1 trillion barrels (shale crude)
 800 billion barrels of FT (coal)
 0.15 billion barrels (pet coke)
 22.7 billion barrels oil reserves
 32+ billion barrels of oil (EOR)

Figure 1. Coal-Bearing Areas of the United States



Sources: United States Geological Survey, *Coalfields of the United States, 1960-1961*; Texas Bureau of Economic Geology, *Lignite Resources in Texas, 1980*; Louisiana Geological Survey, *Near Surface Lignite in Louisiana, 1981*; Colorado Geological Survey, *Coal Resources and Development Map, 1981*; and Mississippi Bureau of Geology, 1963.

Oil Shale Deposits



GeoAge of Oil Shale Deposits

- Cretaceous
- Devonian
- Mississippian
- Ordovician
- Permian
- Tertiary - Green River
- Tertiary
- Triassic

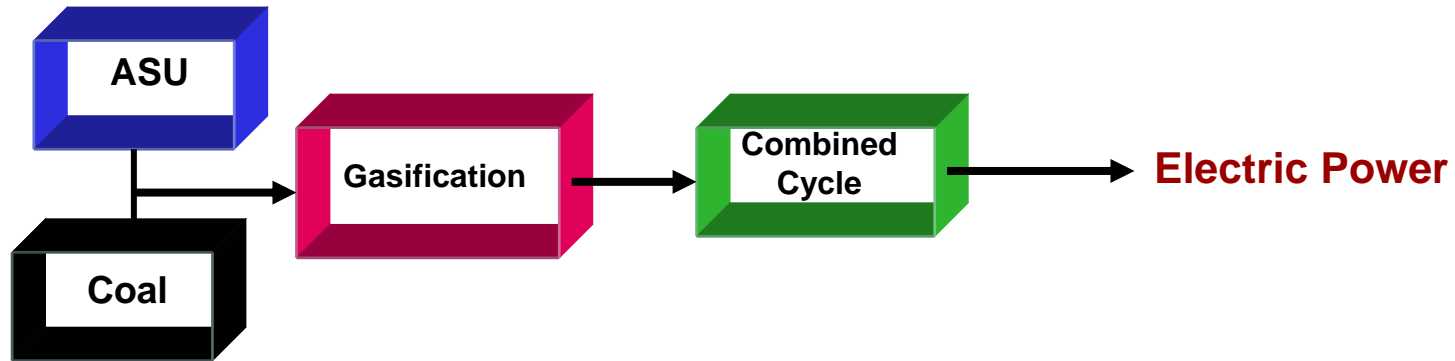
Source: US BoM and boI, ca 1970's
 R Welch 06042004

< 0.7 trillion barrels remain in the Middle East

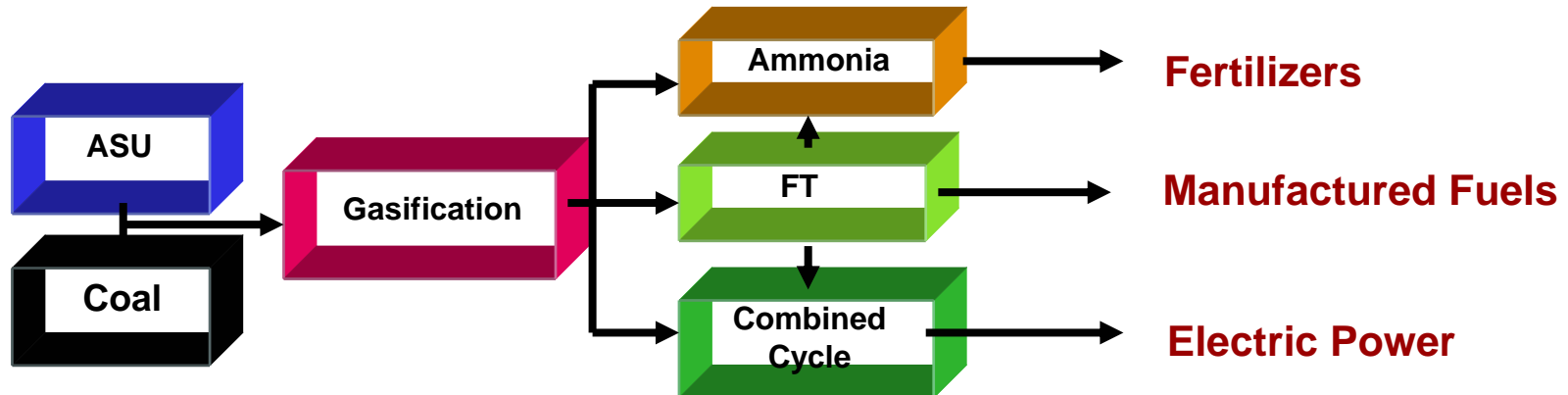
Optimal Process Description

A different Energy Utility

Traditional Integrated Gasification Combined Cycle (IGCC)

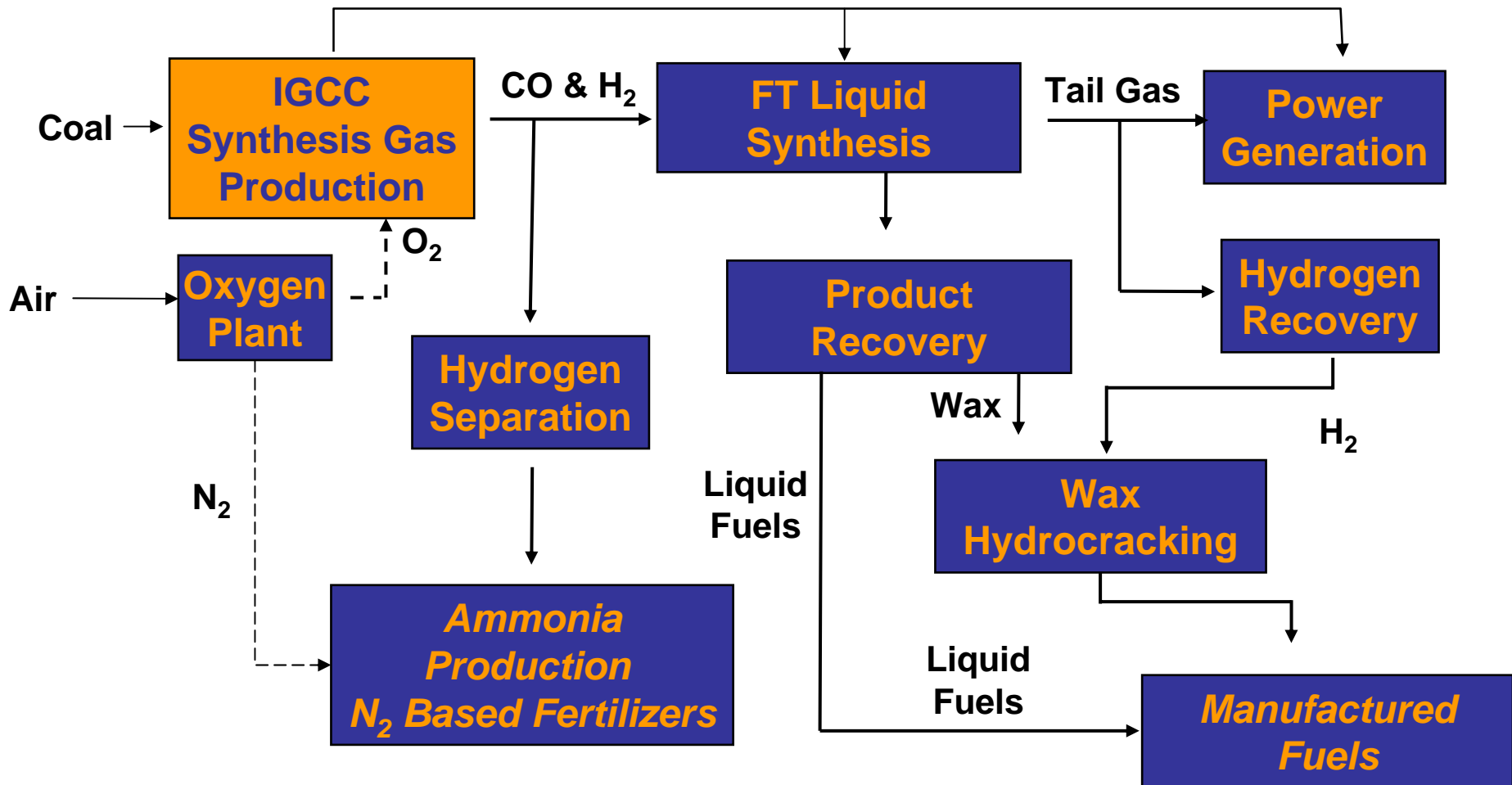


Hydrocarbon Optimization Strategy



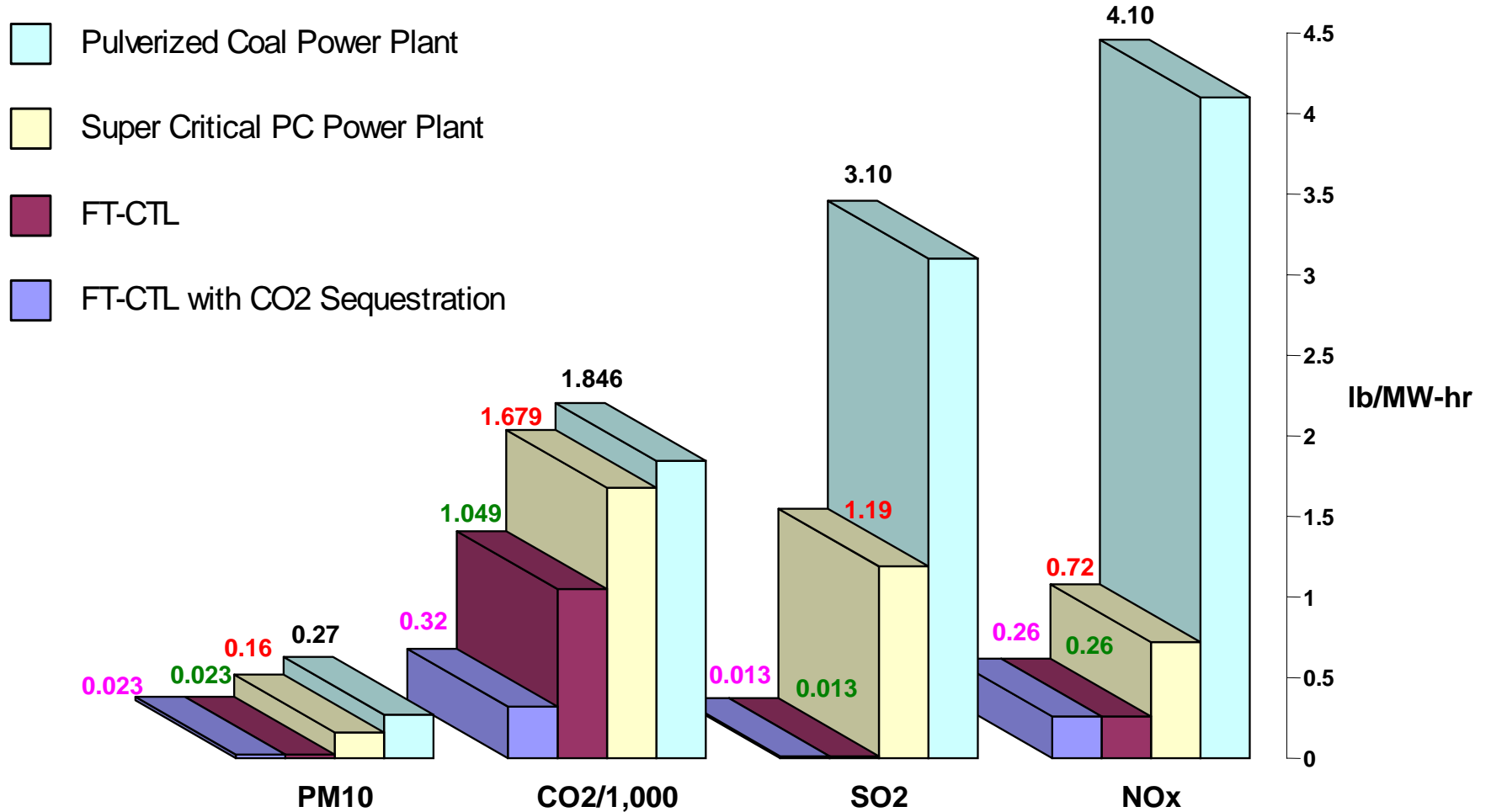
Optimal Process Description

IGCC and Polygeneration for Strategic Fuels & Fertilizers



Emissions Comparison

Syngas equivalent to 535 MW Power plant



FT Diesel is an Ultra Clean Transport Fuel

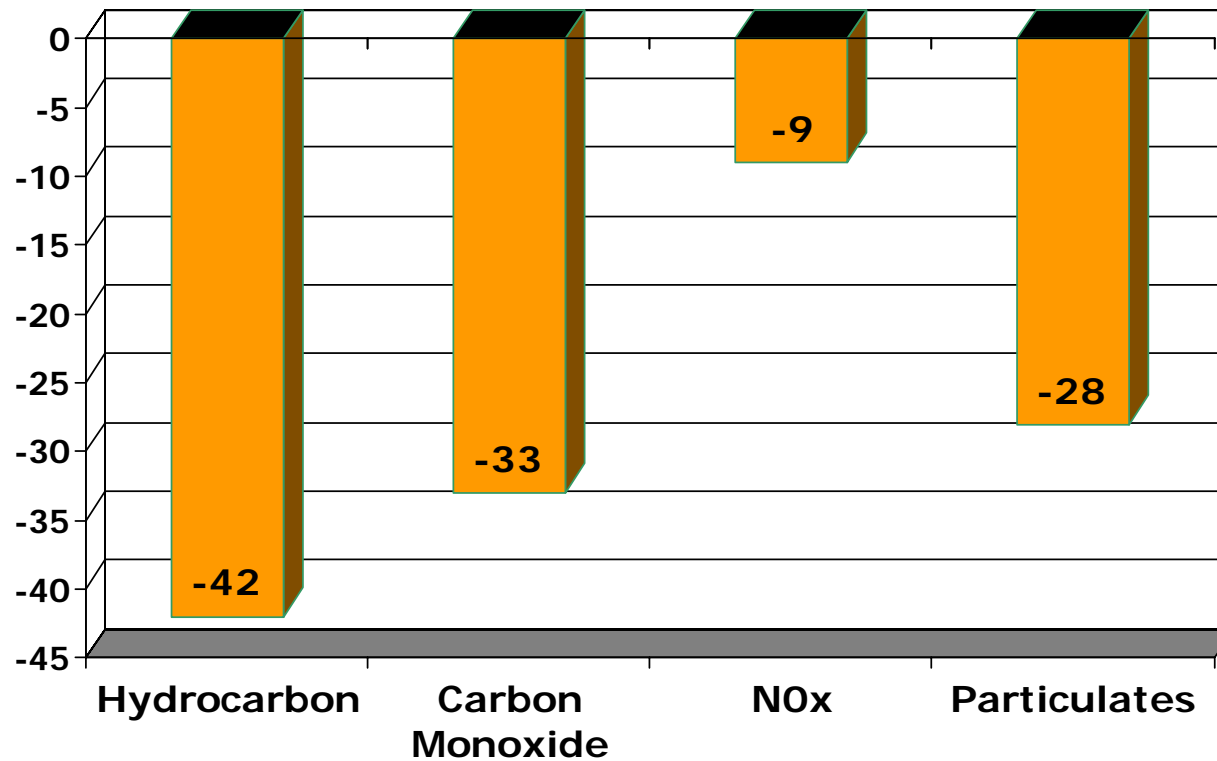
	Low Sulfur D-975	California CARB		EU (2005)	EPA (2006)
Cetane Index	>40	>48		>50	>40
Aromatics (vol %)	<35	<10		<10	<35
Sulfur (ppm)	<500	<500†		<10	<15
Biodegradable	NO	NO		NO	NO

† Note: In 2006, US regulations will require <15 ppm sulfur

Emissions Reductions with FT Diesel

Courtesy of Rentech Development Corporation

Emissions Relative to a Typical Diesel Fuel (Percentage)



FT Diesel

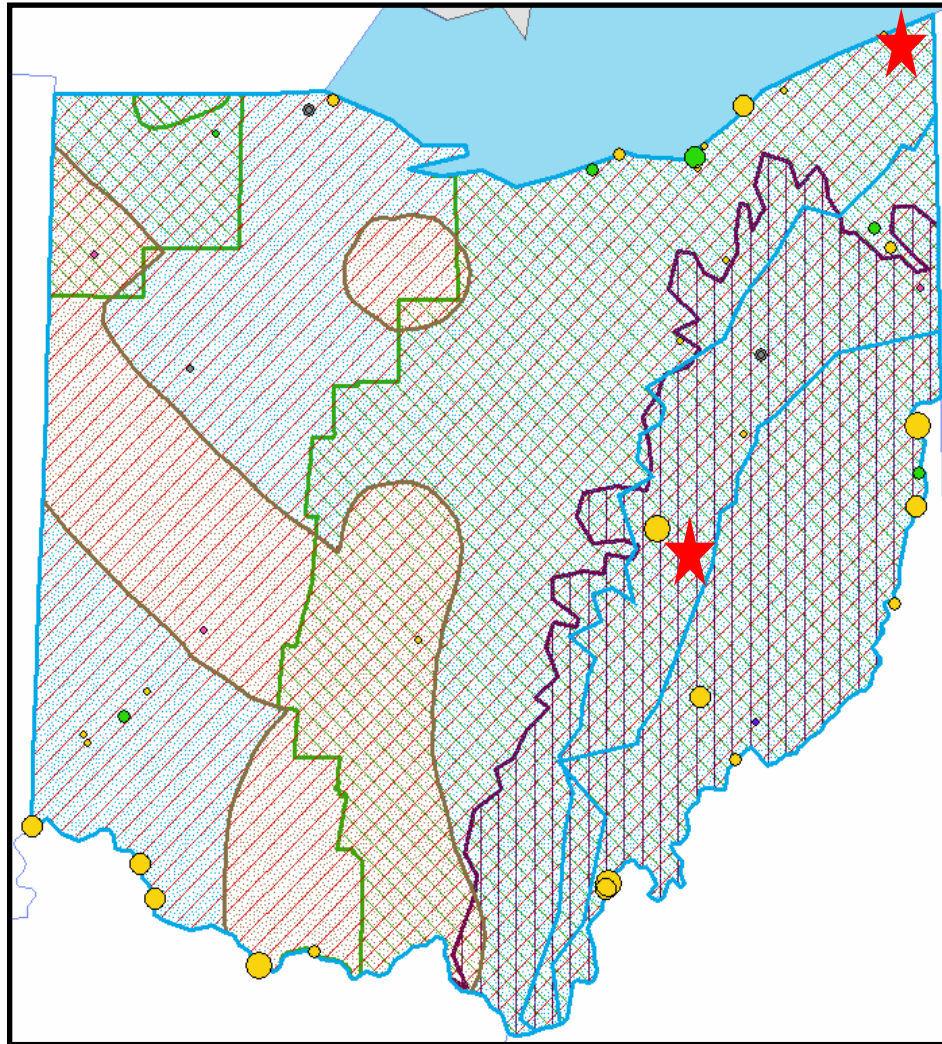


Conventional Diesel

Baard Developments in Ohio

Target: Carbon Sequestration Deployment

Ashtabula and Coshocton Strategically Located for CO₂ Sequestration



All CO₂ sources >100kt/y

Annual Emissions

- 100 - 1,000 ktCO₂/y
- ◊ 1,001 - 5,000 ktCO₂/y
- 5,001 - 10,000 ktCO₂/y
- 10,001 - 20,000 ktCO₂/y
- 20,001 - 30,000 ktCO₂/y

- Potential Storage Reservoirs: Basalts
- Potential Storage Reservoirs: Deep Saline Formations
- Potential Storage Reservoirs: Coal Basins
- Potential Storage Reservoirs: Gas Basins
- Potential Storage Reservoirs: Oil Plays

Source Type

- Cement
- Gas processing
- Hydrogen
- Iron & steel
- Power
- Refineries

Courtesy of Dave Ball, Project Manager, Midwest Region Carbon Sequestration Partnership, Battelle-Columbus

Project Enablers

✓ Markets

- Need for Regional Baseload Generation
- Need for Alternative Transportation fuels
- Carbon Sequestration plays

✓ Raw Materials – Ohio Coal

- Ohio has abundant coal and shale resources

✓ Ohio Support:

- Ohio Power Siting procedures are clearly established and time-sensitive.
- Ohio Air Quality Development Authority provides funding, guidance and assistance in project financing
- Ohio Department of Development assists in siting evaluations, community involvement.
- Enthusiastic community support and experienced labor force.

Catalyzing a New Industry in Ohio

Clean Coal, Liquid Fuels and Food Security for America

Product	Daily	Annually
Coal Tons	17,000	6.0 million
FT Diesel Barrels	9,000	3.0 million
FT Jet Barrels	19,000	6.2 million
Ammonia for Fertilizers Tons	750	246,000
Naphtha * Barrels	7,000	2.3 million
Baseload Generation	350 MWhr	2760 GWhr
Plant Employment	200 Direct Full Time Employees	

What's at Stake for Ohio

- Deployment of advanced *clean-coal technology*
- Dynamic growth for Ohio coal: *12 million tons per year*
- *Jobs Creation*
 - Over 400 full time plant employees
 - Over 700 coal mining employees
 - Over 1500 construction jobs over four-year period
- Add baseload power generation to address *grid stability*
- Creation of a new industry: *Ultra-clean “Manufactured” Transportation Fuels*
- *CO₂ Sequestration* for products as well as Enhanced Oil Recovery and Methane extraction

The Modern Energy Provider Model: Managing Hydrocarbons

Business Contacts

John A. Baardson
CEO
Baard Energy, L.L.C.
15800 NW 31st Court
Vancouver,, WA 98685

Office: 360-546-2342 ext 304
Email: jbaardson@baardenergy.com

Stephan M. Dopuch
Vice President, Business Development
Baard Generation, L.L.C.
2010 Hogback Road, Suite 4
Ann Arbor, Michigan 48105

Ohio Office: 440-257-0054
Mobile: 734-904-2471
Email: sdopuch@baardenergy.com

