fuel streamers group

Indiana Center for Coal Technology Research

Advisory Panel Meeting

IUPUI Campus Center

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Recovering Coal Fines for Use in Stoker Boilers

FUEL STREAMERS

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FUEL STREAMERS

1. Two Biodiesel Plants
2. Largest Exporter of Ethanol in North America
3. Solid Fuel/Power Generation Background
   - Clean Coal Technologies
   - Waste Coal Deposits
   - Creating Innovative Solutions to Meet Regulatory Compliance

POWER GENERATION

Wholesale Electricity – Low by Historic Standards

Fuel accounts for 70 - 80% of Operating Costs

Probable that 30% of Coal Units Retired in 5 – 10 years without Solutions

WHY COAL ?

COMPARISON OF FUEL PRICING

$ per mmBTU

Fuel Oil	$ 21.95
Natural Gas	$ 4.78
Coal	$ 2.01
Wood	$ 8.33

Source: EIA

WHY COAL ?

45% Electrical Generation in US

90% in Indiana

Manufacturing Base

WHY COAL ?

Cost of Electricity

Fuel = 70 - 80%

Hypothetical Household Electrical Bill - $300 per Month

Fuel Oil	$3,276
Natural Gas	$713
Wood	$1,243

WHY COAL ?

Imported vs. Exported

Quadrillion BTU

Domestic Production	74.934	77.7%
(By Coal)	(33.645)	(34.9%)
Net Imports	21.572	22.3%

US EIA / Monthly Energy Review March 2011

WHY COAL ?

Waste Coal Deposits

- More than 1 Billion Tons in US
- Cleaning up Tillable Land
- Mitigating Potential Water Table Contamination
- Displaces Need to Mine Equivalent BTU’s in Other Fuels

WHY COAL ?

STOKER BOILERS

Price of Stoker Fuel : $50 - $100 / ton

Synthetic Stoker Coal

WHY COAL ?

WASTE COAL

Problems

1. High Sulfur
2. High Moisture
3. Low BTU
4. Compliance Issues

WHY COAL ?

WASTE COAL

1. Front End – Pre-Combustion

   Improve Plant Performance

2. Back End – Pollution Control Equipment

   Parasitic Load

WHY COAL ?

	Air-fired plant	IGCC plant with CCSb	Oxy-fuel plant with CCS	Air-fired plant	Oxy-fuel plant with CCS
Fuel type	Bituminous	Bituminous	Bituminous	Subbituminous	Subbituminous
Steam conditions (psi/F/F)	3,600 /1,100/1,100	NA	3,600/1,100/ 1,100	3,600/ 1,100/1,100	3,600/1,100/ 1,100
Plant performance					
Power (gross MW)	598	745	733	604	733
Power (net MW)	550	556	550	550	550
Heat rate (net Btu/kWh)	8,662	10,505	10,143	9,250	10,831
Capacity factor (%)	85	80	85	85	85
Expected emissions					
NO_x (lb/MBtu)	0.060	0.048	Note a	0.060	Note a
SO_x (lb/MBtu)	0.040	0.010	Note a	0.080	Note a
Particulate (lb/MBtu)	0.015	0.007	Note a	0.012	Note a
Hg (lb/TBtu)[c]	0.784	0.571	Note a	0.820	Note a
Expected CO_2 emissions					
CO_2 removal efficiency (%)	0	90	92.5	0	92.5
CO_2 produced (mmt/yr)	3.26	3.64	3.82	3.68	4.31
CO_2 captured (mmt/yr)	0	3.28	3.53	0	3.99
CO_2 released (mmt/yr)	3.26	0.36	0.29	3.68	0.32

Notes: CCS = carbon capture and sequestration, MBtu = thousand Btu, mmt = million metric tons, NA = not applicable.
a. Below practical measurement limits.
b. Integrated gasification combined cycle (IGCC) is based on the General Electric IGCC system with CO_2 capture per DOE/NETL-2007/1281 Report, Case 2.
c. Air-fired emissions based on 90% removal expected.

Source : Babcock & Wilcox Power Generation Group and Air Liquide
Power Magazine, January 1, 2011

WHY COAL ?

WASTE COAL

Clean Up Coal

- Fines by Nature – Fire

Stoker Units

- ¾” to 1 ¼” in size
- (Estimated 500 – 1000 Stoker Units in Operation)

Briquette Post Clean Up

- Use in Stoker Units
- Ship Safely for Pulverized Coal Units

WHY COAL ?

WASTE COAL

In order to Briquette, a Binder is required

Fuel Streamers / State of Indiana

Jointly Engaged Purdue University

To Develop a Binder