~ 30% - 40% Less Water Usage with IGCC

WATER CONSUMPTION ESTIMATE - IGCC VERSUS PC AND FBC PLANTS

<table>
<thead>
<tr>
<th>Water Consumption, gallons/MWh</th>
<th>CONVENTIONAL PC-FIRED PLANT WITH ADVANCED POLLUTION CONTROLS</th>
<th>FBC PLANT</th>
<th>IGCC PLANT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>600 - 660</td>
<td>570 - 625</td>
<td>360 - 540</td>
</tr>
</tbody>
</table>

DOE Report "Major Environmental Aspects of Gasification-Based Power Generation Technologies", December 2002
COMMERCIAL OPERATING IGCC PLANTS
BP’s Proposed 500 MW IGCC Plant in Carson, CA to Produce Hydrogen for Electric Generation and Carbon Dioxide for Enhanced Oil Recovery
Availability & Reliability – Solids Gasification in China

GE Technology in China
Four Coal Plants

Availability = (1 - (unplanned outage + planned outage)) / 8760) * 100%

Reliability = (1 - (unplanned outage)) / 8760) * 100%

ConocoPhillips offers fuel flexible E-Gas Technology options to our clients.

Even after 10 years at Wabash River, half of the tonnage ever processed with the E-Gas Technology is Powder River Basin sub-bituminous coal.

Almost half of the coal gasified for power in the United States has been sub-bituminous coal.

Sequestration Capacity: In Right Places? Adequate Capacity in U.S.

2,082 Large Sources (100+ ktCO₂/yr) with Total Annual Emissions = 3.8 GtCO₂/yr
- 1,185 electric power plants
- 447 natural gas processing facilities
- 154 petroleum refineries
- 53 iron & steel foundries
- 124 cement kilns
- 43 ethylene plants
- 9 oil sands production areas
- 40 hydrogen production
- 25 ammonia refineries
- 47 ethanol production plants
- 8 ethylene oxide plants

3,800+ GtCO₂ Capacity within 330 US and Canadian Candidate Geologic CO₂ Storage Reservoirs
- 3,730 GtCO₂ in deep saline formations (DSF)
- 65 GtCO₂ in deep unmineable coal seams with potential for enhanced coalbed methane (ECBM) recovery
- 40 GtCO₂ in depleted gas fields
- 13 GtCO₂ in depleted oil fields with potential for enhanced oil recovery (EOR)

Inventory of Sinks with Economic Offset (EOR)

Source: Gulf Coast Carbon Center

new CO₂ pipeline ~340 mi
new NG pipeline ~50 mi
New H₂ pipeline ~180 mi

AMERICAN ELECTRIC POWER’S IGCC PLANS

COAL: AEP CEO Michael Morris previews company's plans for Ohio clean coal facility

Last year, American Electric Power Corp. announced that it would build a 1,000 megawatt coal-fired power plant, equipped with state-of-the-art gasification technology to remove pollutants. During a speech before the National Coal Council in Washington, D.C., Morris explains the progress his company has made with the integrated gasification combined cycle (IGCC) facility it wants to build in Ohio. He also talks about the factors driving AEP's decision, including new interest in the utility sector from General Electric Co., plus the belief that the federal government will someday limit carbon dioxide emissions.

Transcript  December 13, 2005

Michael Morris:

“...So when we looked at coal and said what is it that will allow coal to be built going forward? It had to be a project that would address itself to be ever changing, ever increasing in stringent control that is, environmental requirements that are going to face coal going forward. When we look at a plant that's going to have a 40 year physical life we are absolutely convinced that gasification technology is the right way to use coal in a base load model. A couple of very important and interesting things happened along the way, as we got to that decision that helped us make that decision, probably the singularly most important issue was that General Electric Corporation bought the technology from ChevronTexaco that allowed for someone with engineering technique, with construction management and project management and most importantly the corporate ability to stand behind what they built. I think that made the gasification technology available to us as an industry ... So the decision with GE in the loop made it considerably easier for us to go forward with we know we have a base load need. We know that coal is the fuel. We believe that gasification technology is the best ... We know the environmental rules are going to continue to get more stringent, not less. We know that this plant is going to have a 40 year life. And during that period of time greenhouse gas, carbon capture control, will become a worldwide reality. We're convinced of that. Coal itself, the low sulfur varieties, are going to continue to see price pressure as each of us chase after that unique ton of coal. And if you can't buy that unique ton of coal you're going to have to buy NOX, SOX and/or someday mercury credit. And with all of that in front of us, believing that all of those prices were going to go up, that led to what we think is a very rational decision....”

(Source: E & E TV – 12/13/05)
Thank you for your attention!

SNG to Gas Pipeline
CO₂ for Enhanced Oil Recovery

DGC, Beulah, North Dakota, USA
APPENDIX
E-Gas™ Gasification Feedstock Experience and Gasifier Scale-up

1979
Proto 1 - 400 TPD

1983
Proto 2 - 1600 TPD

LGTI 1987–1995
2,400 TPD

Wabash
1995 - 2006
2,600 TPD

Bituminous IL #6 coal
Petcoke – Multiple refineries.

Slide 5

For 2010 Start-up
E-Gas™
Technology
Commercial
Offerings

Bituminous
Sub-Bituminous
Petcoke

Shell Oil Gasification vs. Shell Coal Gasification

- **SGP**
  - liquid refinery residues, natural gas
  - non-slagging condition
  - refractory lined gasifier
  - liquid/gas feed system
  - fired tube boiler
  - soot water handling

- **SCGP**
  - coal, lignite, petroleum coke
  - slagging condition
  - membrane wall gasifier
  - dry feed system
  - water tube boiler
  - solid slag handling

**Differences:**

- Source: Shell Coal Gasification Process: Technical Overview by Pete Parker, Shell Global Solutions, Presented at GTC, Oct. 4, 2006
Reference Plant ... Enhanced Coal Envelope Program Initiated

Leveraging from initial Reference Plant product
  - Gasification & heat recovery technology
  - Process & power island designs
  - Integrated plant models & cycle optimization
  - RAM modeling
Economically optimizing for PRB
Working with potential launch customer