WABASH RIVER ENERGY LTD.
2002 PROJECT UPDATE

Operating Experience at the
Wabash River Repowering Project

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PRODUCTION MANAGER, WABASH RIVER ENERGY, LTD.
GLOBAL ENERGY INC.
Wabash River Energy Ltd. Project Update

- 2002 Operating Statistics & Highlights
- 2003 Fuel Cell Installation
- Wabash in Perspective
- Expectations for E-Gas™ Today
Wabash Plant Configuration / Rating

- 2,500 tons/day coal or 2,100 tons/day petcoke; all 2002 operation was on petcoke

- Single train gasification Unit

- Rated Capacity is 1,780 mmbtu/hr or 200 mmscf/day (22% moisture)

- Spare gasifier but not on-line
2002* Gasification Unit Operating Statistics

- On Stream: 57.1%
- Planned: 6.0%
- Unplanned: 6.5%
- Product Not Required: 30.4%

*Data through October 18, 2002
### 2002 Gasification Downtime Causes

<table>
<thead>
<tr>
<th>Downtime Cause</th>
<th>% of Year</th>
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<tbody>
<tr>
<td>Syngas cooler tube leaks</td>
<td>2.55%</td>
</tr>
<tr>
<td>Slag quench plug</td>
<td>1.04%</td>
</tr>
<tr>
<td>Cracked instrument nozzle</td>
<td>0.63%</td>
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<tr>
<td>Erratic slurry pump flow</td>
<td>0.53%</td>
</tr>
<tr>
<td>Slurry mixer replacement</td>
<td>0.48%</td>
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<tr>
<td>Faulty vibration probe on MAC</td>
<td>0.31%</td>
</tr>
<tr>
<td>Low LIN levels prevents start-up</td>
<td>0.22%</td>
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<tr>
<td>Remaining 8 average &lt; 7 hrs each</td>
<td>0.73%</td>
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<tr>
<td><strong>Total of all downtime</strong></td>
<td><strong>6.49%</strong></td>
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*October 28, 2002*
Wabash River Energy Ltd. Project Update

Syngas Interruptions by Outage Length

- Number of Trips
- Outage Length:
  - < 6 hrs
  - 6-24 hrs
  - 1-2 days
  - 3-4 days
  - > 4 days

October 28, 2002
2002 Gasification Unit Performance

- **Availability = 84.4%**
  
  Availability = On-stream % + Product not required% * [1-(Forced outage rate/100%)]

- **Forced outage rate = 10.2%**
  
  Forced Outage Rate = \( \frac{\text{Unplanned outage hours}}{\text{Unplanned outage hours} + \text{on-stream hours}} \) \times 100%

- **Annual Loading Factor = 58.1%** (Product not required for 30.4% of year)
  
  Loading Factor = Yearly production / rated capacity

- **YTD* Production = 7,224,561 mmbtu or 33,823 mmscf**

*Data through October 18, 2002*
2002 Operational and Project Highlights

• Utilize Wabash employees for maintenance
  – Take ownership
  – More productive

• Installed Mechanical Vapor Recompressor
  – Required due to trace amounts of arsenic and selenium in process blowdown
  – Produces condensate quality water

• Improved performance of char filter elements
  – Now capable of annual outages
More 2002 Highlights

• Did not “Vessel Enter” the gasifier or dry char from May 2001 to April of 2002

• Current mixers at 2,156 coke hrs and plan to re-use for our winter campaign

• Record 3rd quarter production
  – 94.3 % availability
2 MW Fuel Cell Test Installation

Slide courtesy of FuelCell Energy
Wabash IGCC Fuel Cell Demonstration Schedule

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<td>POWER PLANT DISPOSITION</td>
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Environmental Impact Comparison

SO$_2$ + NO$_x$, lb/MWh

SOLID WASTE, lb/MWh

CGFC  IGCC  AFBC  PC/FGD

0  100  200  300  400  500

16  14  12  10  8  6  4  2  0

Slide courtesy of FuelCell Energy
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Forced Outage Rate for the Last 3 Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Outage Rate</th>
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<tbody>
<tr>
<td>2000</td>
<td>20%</td>
</tr>
<tr>
<td>2001</td>
<td>20%</td>
</tr>
<tr>
<td>2002</td>
<td>10%</td>
</tr>
</tbody>
</table>
Wabash Availability for the Last 3 Years

- 2000: 55%
- 2001: 60%
- 2002: 85%
## 3 Year Reliability by Sub-System

Reliability = \( 1 - \frac{\text{ Forced Outage Hours }}{\text{ Period Hours}} \) x 100%

<table>
<thead>
<tr>
<th>Sub-System</th>
<th>Reliability</th>
<th>Sub-System</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syngas Moisturization</td>
<td>100.00%</td>
<td>Sour Water Treatment</td>
<td>99.92%</td>
</tr>
<tr>
<td>Raw Syngas Conditioning</td>
<td>100.00%</td>
<td>Particulate Removal</td>
<td>99.89%</td>
</tr>
<tr>
<td>Rod Mill &amp; Hopper</td>
<td>100.00%</td>
<td>Low Temp Heat Recovery</td>
<td>99.44%</td>
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<tr>
<td>COS Hydrolysis</td>
<td>100.00%</td>
<td>Slurry System</td>
<td>99.34%</td>
</tr>
<tr>
<td>Chloride Scrubbing</td>
<td>100.00%</td>
<td>Sulfur Recovery</td>
<td>99.06%</td>
</tr>
<tr>
<td>Syngas recycle compressor</td>
<td>100.00%</td>
<td>Slag Removal System</td>
<td>99.06%</td>
</tr>
<tr>
<td>2nd Stage Gasifier</td>
<td>100.00%</td>
<td>1st Stage Gasifier</td>
<td>99.02%</td>
</tr>
<tr>
<td>Cooling Tower System</td>
<td>100.00%</td>
<td>Air Separation</td>
<td>98.48%</td>
</tr>
<tr>
<td>Acid Gas Removal</td>
<td>99.96%</td>
<td>Primary Boiler</td>
<td>97.46%</td>
</tr>
</tbody>
</table>
Wabash O&M Costs for the Last 7 Years
Other Wabash Achievements

- Less than 0.1 lb of SO$_2$ emissions/mmbtu of feed.
  - Over 300,000,000 lbs of equivalent SO$_2$ captured

- Developed operating experience and cost effective maintenance
  - 32 operators $\rightarrow$ 24 operators
  - Outages: Quarterly $\rightarrow$ 3 per year $\rightarrow$ 17-day semiannual.

- 1,649 documented improvements implemented at Wabash since 1996.
Industry - Government Partnership

Wabash 1995
$1,600/kWh
8,910 btu/kWh
100+ People
O&M Cost: 6% of CAPEX
Results of Partnership

- Competitive Utility Demonstration
- DOE Char Filter Slipstream Testing
- Bechtel/Nexant/Global IGCC Optimization
- Switch to Market-Based Syngas Sales
- Continuous Improvement Process
- Demonstrated fuel flexibility

A mature Wabash that can stand on its own
Mature E-Gas™ Technology Today

1995
• $1,600/KWh
• 8,910 Btu/KWh
• 100+ People
• O&M: 6% of CAPEX

2002
• $1,100 – $1,200/KWh
• 8,400 Btu/KWh
• 45 People
• O&M: 4% of CAPEX
In Summary

• 2002: most reliable year ever for Wabash
  – 84.4% availability

• Fuel Cell will demonstrate the next level

• E-Gas™ has reached Maturity at Wabash
  – Competitive with new coal power technology
  – Gasification is environmentally superior to all other coal-based power technologies
Wabash River Energy, Ltd.

Clean
Competitive
Mature