FutureGen 2.0
The Global Leadership Project

- **A bold technology response** to energy and environmental concerns related coal-fueled electricity production

- **Validate the cost & performance** of commercial-scale, near-zero emissions coal-fueled power generation with CCS

- **Successfully meet the institutional and business challenges** of near-zero emission power

- **Build global technology acceptance**
FutureGen 2.0
Commercial-scale, Leading Edge

- 202-MWe (gross) Oxy-combustion repowering
- >90% capture
- >1 million tons/year CO₂ captured
- Pipeline transport to CO₂ storage
- Saline geologic formation
- Near-zero NOx, SOx, PM, Hg, and HAPs emissions
- Visitor, research, and training facilities
- Stakeholder involvement
Oxy-combustion Repowering
Host Site

Meredosia Plant

- Location - Meredosia, IL
- Operated by Ameren Energy Resources
- 4 existing units, 3-coal fired (2 idle), 1-oil-fired (idle)
- Truck & barge unloading facilities for coal
- Unit 4 is an excellent plant to repower with Oxy-Combustion technology:
  - Built in 1975
  - Currently idle
  - Appropriate scale; 200 MWe, 2400psig, 1000F, 1000F
  - Turbine/generator have low operating hours and can be placed in service as part of repowered plant

Performance Overview

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Output (MWe)</td>
<td>202</td>
</tr>
<tr>
<td>Net Output (MWe)</td>
<td>139</td>
</tr>
<tr>
<td>CO₂ Generated (TPY)</td>
<td>1.45M</td>
</tr>
<tr>
<td>CO₂ Captured (TPY)</td>
<td>1.31M</td>
</tr>
<tr>
<td>CO₂ Captured (%)</td>
<td>90</td>
</tr>
</tbody>
</table>
**Pipeline and Storage Site**

**Morgan County Pipeline**

- **Design Basis**
  - 28.9 miles
  - 12” Pipe
  - Minimum four feet burial
  - Two Meter stations
  - Gas Chromatograph
  - Four Main Line Block Valves
  - Sender and Receiver Stations for Pigging
  - Three 750 hp booster pumps
Pipeline and Storage Site
Morgan County Geology
Non-Technical Factors

Power Purchase Agreement

• DOE and Industry funding support the CAPEX

• OPEX must be supported by the power purchase agreement (PPA)

• State Government will facilitate the PPA
  – Special legislation to support CCS projects
  – “Cost-of-service” higher than average market prices is permitted
Non-Technical Factors

Stakeholder Involvement

• Major communications effort
  – Newspaper educational inserts
  – Radio spots
  – Community event sponsorship
  – “Community Corner” updates
  – Community leader updates
  – Open house

• Major engagement effort
  – Established a citizen’s board
  – Public hearings
  – One-on-one landowner visits
  – Union outreach
Non-Technical Factors

Injection Regulations

• National regulations for CO₂ injection became effective in January 2011

• Govern well field design including monitoring requirements
  – Many implementation issues to be resolved in early projects

• Established financial responsibility requirements for protecting groundwater including:
  – Funding for remediation
  – Funding for post-injection site care
Non-Technical Factors

Liability Management Framework

- Project Resources: $1 to 10 million
- Project-Secured Insurance: $25 to $100 million
- Project-Funded Trust Fund: $50 to $100 million
- State of Illinois: Backstop
Summary
U.S. Government Commitment

“FutureGen is a priority”
President Obama
January 2009

The Administration’s commitment is backed by $1 billion in funding

“FutureGen reflects [the Obama] Administration’s commitment to rapidly developing carbon capture and sequestration technology”
Secretary of Energy Chu
Summary

Global Leadership Project

• FutureGen 2.0 represents one of the world’s best prospects for a fully integrated near-zero emission project
  • Oxy-combustion
  • Minimum 90% capture on the entire plant
  • CO₂ pipeline network
  • CO₂ storage in deep saline formation

• Positioned for success
  • >$1 billion in funding firmly allocated
  • Right partners with the right expertise
  • Strong community support
  • Liability management framework
Summary

DOE Acknowledgement

- **DOE Acknowledgment:**
  "This material is based upon work supported by the Department of Energy under Award Number DE-FE0001882."

- **DOE Disclaimer:**
  "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."
Summary

Alliance Acknowledgement

Alpha Natural Resources
AngloAmerican
Caterpillar
Consol Energy
Exelon
Joy Mining Systems
LG&E & KU
Peabody
Rio Tinto
Xstrata