National Carbon Capture Center: Pre-Combustion

John Socha
Project Facts

U.S. DEPARTMENT OF ENERGY

10/08 to 9/14
Project Value $251M

6/14 to 5/19
Project Value $188M

Industry Partners

SOUTHERN COMPANY

EPRI | ELECTRIC POWER RESEARCH INSTITUTE

CLOUD PEAK ENERGY®

AMERICAN ELECTRIC POWER

DUKE ENERGY®

ArchCoal

Luminant
Offering a **world-class neutral** test facility and a highly specialized staff, to **accelerate the commercialization** of advanced technologies and enable coal based power plants to achieve **near-zero emissions** (low cost CO₂).
Lab to Pilot
The Importance of Industrial Best Practices

Conceptual
Detailed Design
Operation

“Real” Gas Conditions
Scope
Integrate
Design Codes
Scale

SAFETY
Process Safety Management

- Process Safety Information
- Process Hazard Analysis
- Operating Procedures
- Training
- Contractors
- Mechanical Integrity
- Hot Work
- Management of Change
- Incident Investigation
- Compliance Audits
- Trade Secrets
- Pre-startup Safety Review
- Emergency Planning and Response
Example
Facilities Expansion

- **Transport Gasifier**
  - Syngas Cooler and Particulate Control Device
  - 6 MWe 100 tpd CO₂ 20,000 lb/hr Syngas

- **Stack**
  - Atmospheric Syngas Combustor

- **Future Upgrade**
  - 1.5 MWe 25 tpd CO₂ 5,000 lb/hr Syngas
  - 0.15 MWe 2.5 tpd CO₂ 500 lb/hr Syngas

- **Bench Scale Test Units**
  - Pilot Test Unit #1
  - Pilot Test Unit #2
  - Pilot Test Unit #3

- **Pilot Test**
  - Unit #1
  - Unit #2
  - Unit #3
## Pre Combustion/Gasification Results

### Technologies Tested

<table>
<thead>
<tr>
<th>Component</th>
<th>Solvent</th>
<th>Sorbents Catalyst</th>
<th>Membrane</th>
<th>Chemical Looping</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bench</strong></td>
<td>NETL</td>
<td>WGS, COS, SR F-T, JM Hg, TDA, AP</td>
<td>H₂/CO₂, WPI, MTR, MPT, Eltron</td>
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<td><strong>Pilot</strong></td>
<td>SRI Int.</td>
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### Accumulated Hours

- **14 gasification runs** – **10,920 hours**
- **More than 30,000 hours** combined testing of technologies

### Graph

- **Technology Testing**
- **Gasifier OP**

Accumulated Run Hours (Feb-09 to Feb-15)

- **Feb-09**: 0 hours
- **Feb-10**: 1,000 hours
- **Feb-11**: 5,000 hours
- **Feb-12**: 10,000 hours
- **Feb-13**: 15,000 hours
- **Feb-14**: 20,000 hours
- **Feb-15**: 25,000 hours
- **Feb-16**: 30,000 hours
- **Feb-17**: 35,000 hours
Tests Planned: Pre Combustion

Solvents:  
Sorbents/Catalysts:  
Membranes:  
Chemical Looping:

Stars = Presenter at this conf.
Acknowledgements

[Logos of various energy companies and organizations]