



**Update on the Kemper TRIG™
IGCC Project**

**SOUTHERN
COMPANY** 

Southern Company Facts and Figures

- 46,000 MW capacity; 303 generating units
 - 2012 sources of electric generation
 - 32% coal
 - 47% gas
 - 16% nuclear
 - 5% renewables



- Regulated Utilities
 - Alabama Power
 - Georgia Power
 - Gulf Power
 - Mississippi Power
 - Southern Nuclear
- Competitive Power
 - Southern Power
 - Southern Generation
- Other
 - Southern LINC Wireless
 - Southern Telecom

Power Systems Development Facility (PSDF)

Government
Support



Operations & Management



**SOUTHERN
COMPANY**

Industry Sponsors

EPRI | ELECTRIC POWER RESEARCH INSTITUTE



Peabody

KBR

SIEMENS

BNSF
RAILWAY

U.S. Department of Energy
National Carbon Capture Center

at the Power Systems Development Facility

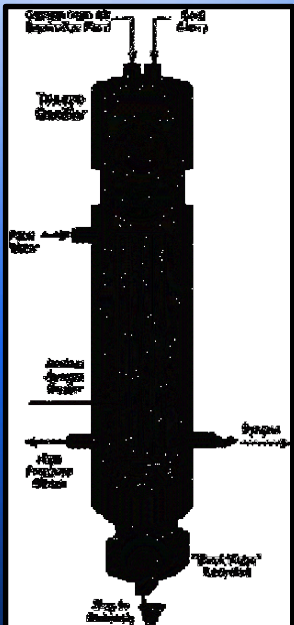
PARTICIPANTS:



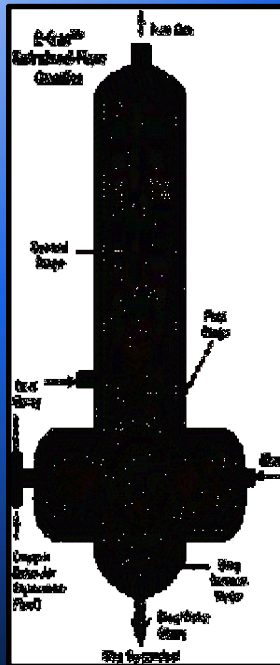
Managed by Southern Company Services, Inc.

TRIG™ uses a different approach compared to entrained flow or fluid bed gasifiers.

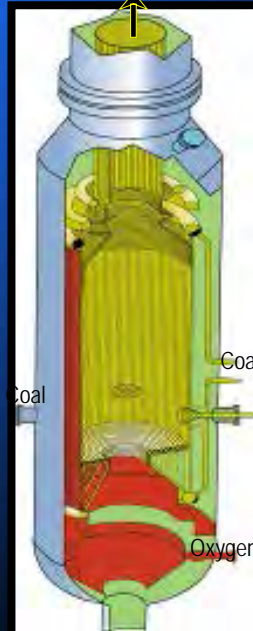
GE



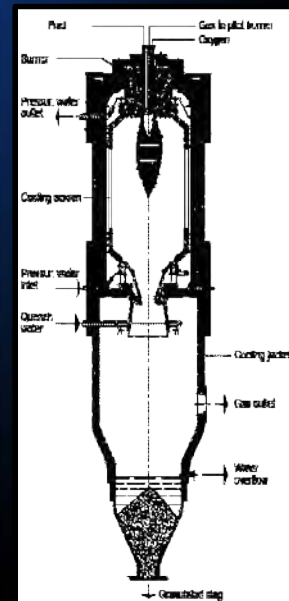
E-gas



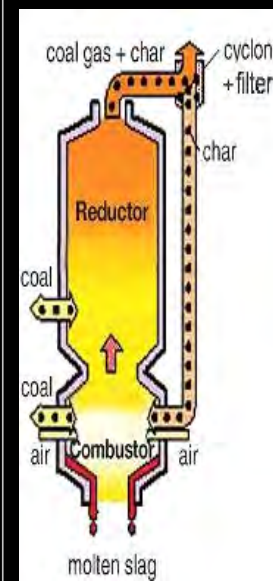
Shell



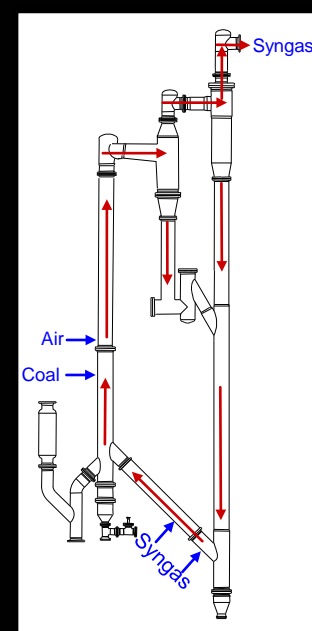
Siemens



MHI



TRIG™



Entrained Flow (Once Through)

Fluid Bed

Oxygen Blown

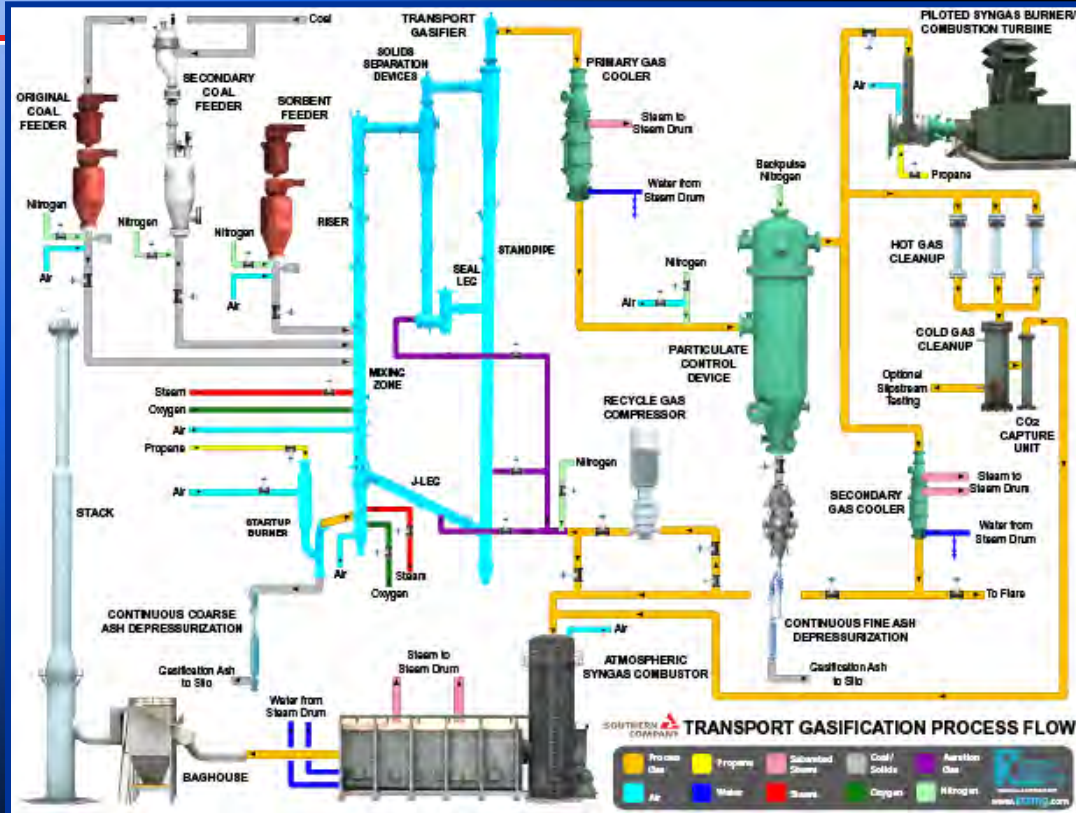
Air or O₂-Blown

Burner-type, Slagging

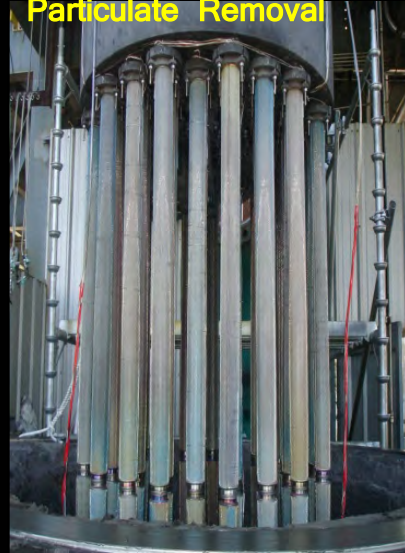
No Burner
Non-Slagging

(Not to Scale)

PSDF Gasification Systems Development



Particulate Removal



Flexible Fuel Feeding



Ash Removal



Sensors and Controls

Kemper County TRIG™ 3-D Perspective



Kemper County TRIG™ IGCC Overview

- 2x1 Integrated Gasification Combined Cycle (IGCC)
 - 2 Transport Gasifiers
 - 2 Siemens SGT6 - 5000F CTs
 - 1 Toshiba Steam Turbine
 - 582 MW peak and 524 MW on syngas
 - Heat Rate: 12,150 Btu/kWh
 - 28.1% HHV Efficiency w/ CO₂ control and >40% moisture coal
 - UOP's Selexol Process for H₂S and CO₂ removal
 - Haldor Topsøe's Wet Sulfuric Acid for H₂SO₄ production.
 - 65% CO₂ capture (~800 lb/MWh emission rate)
 - Mine Mouth Lignite

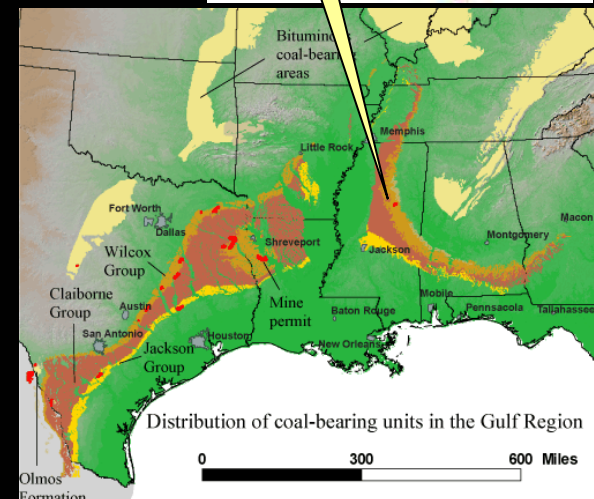
• Owner & Operator: Mississippi Power

• By-Products (TPY)

- ~3,000,000 - Carbon dioxide used for EOR
- ~135,000 - Sulfuric acid
- ~20,000 - Ammonia



Plant Site



Kemper Lignite Composition		Average	Min	Max
Heat Content	btu/lb	5,290	4,765	5,870
Moisture	%	45.5	42	50
Ash	%	12.0	8.6	17
Sulfur	%	1.0	0.35	1.7

Kemper County IGCC Infrastructure

~70 miles transmission.

✓ Station energized

~60 miles CO₂ pipeline (for EOR).

✓ 100% Complete

~5 miles natural gas pipeline.

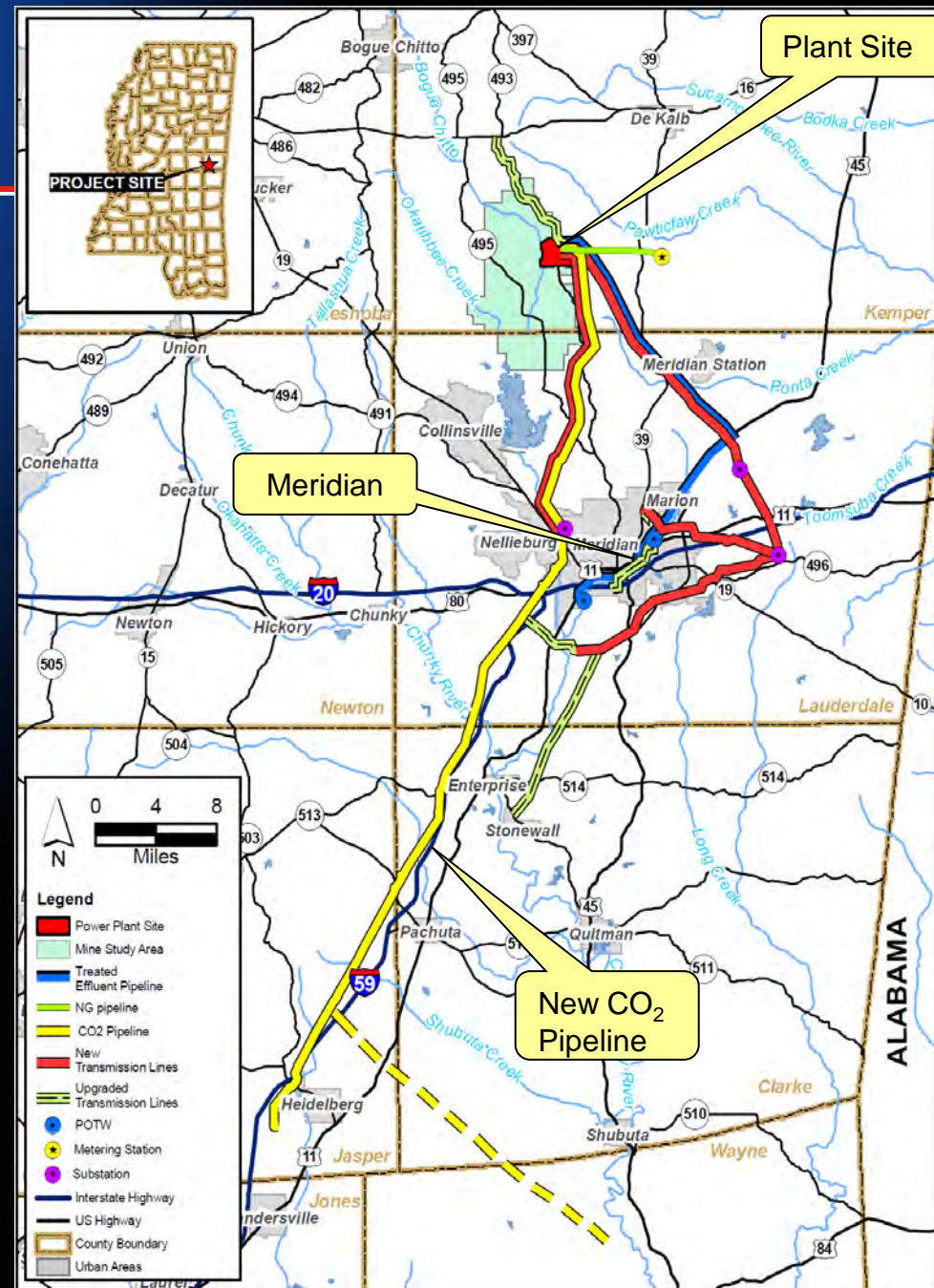
✓ 100% Complete

~31,000 acre mine site.

✓ Placed in Service in June 2013.

~30 miles treated effluent line

✓ 100% Complete



Construction Progress -- Fall, 2011



Construction Progress -- Fall, 2012



Construction Progress -- Spring, 2013



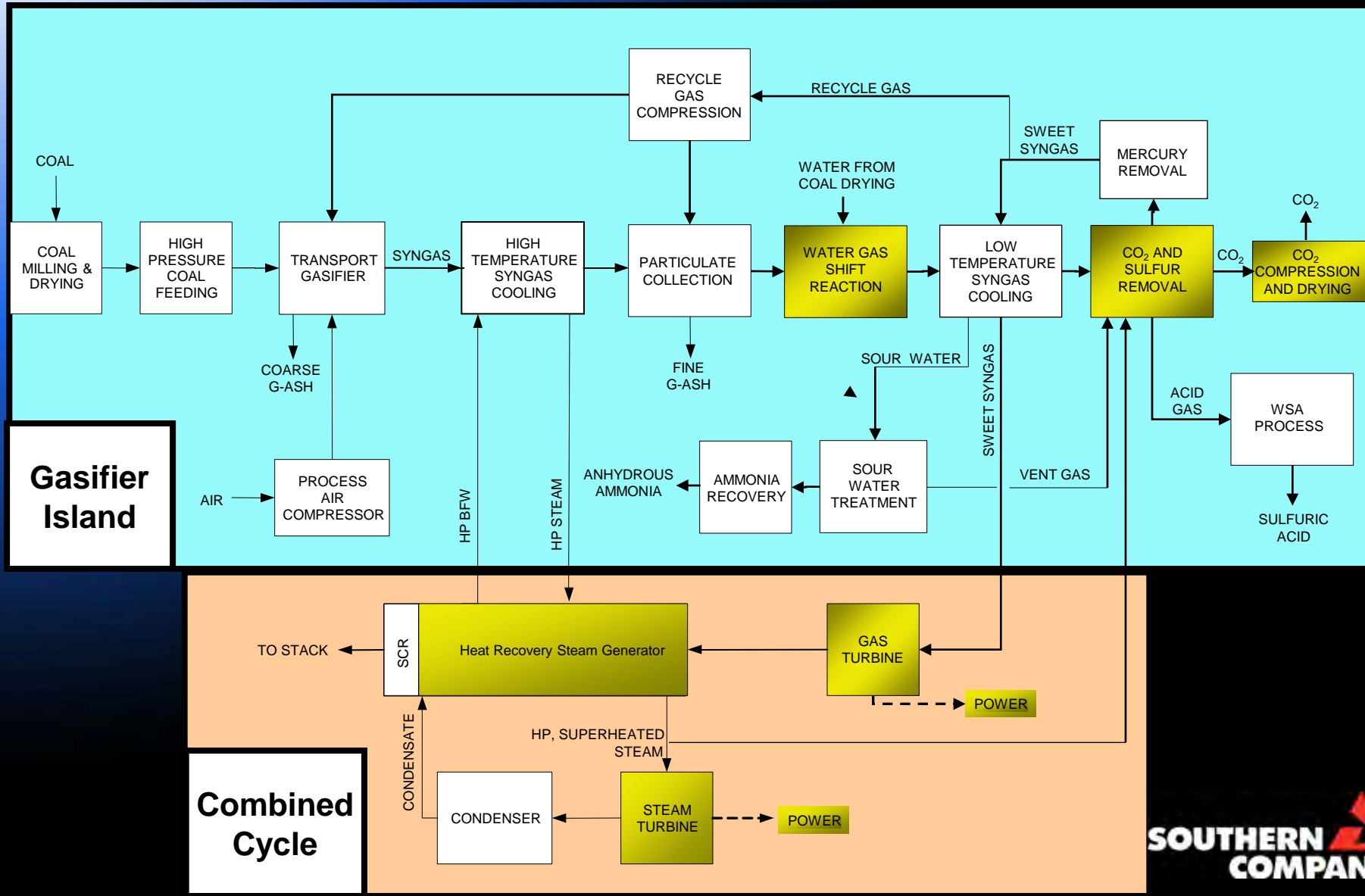
Construction Progress -- September, 2013



Plant and Mine Aerial View



TRIG™ with Carbon Capture



Syngas Clean-up – H₂S absorber tower installation



A sense of scale -- H₂S Absorbers



Syngas Clean-Up Equipment



Key Startup Milestones Completed

Key Milestones	Completion Date
✓ Admin/Control Building - DCS Control System Functional	21-Sep-12
✓ Start Filling Treated Effluent Reservoir	15-Oct-12
✓ Station Service Energized	8-Nov-12
✓ Water Treatment Plant Commissioning Completion	30-Mar-13
✓ Cooling Tower Completion	10-Apr-13
✓ Fire Auxiliary Boiler	5-Aug-13
✓ First Fire Combustion Turbine - A	28-Aug-13
✓ First Fire Combustion Turbine - B	4-Sep-13
✓ Steam Turbine - Sync To Grid	5-Oct-13
• First Gasifier Heatup	
• Reliable Syngas To Combustion Turbine A	
• Reliable Syngas To Combustion Turbine B	



System Integration

- *Extensive control logic verification prior to plant operation.*
- *Integration issues are being evaluated and addressed through use of a process simulator in advance of integrated plant operation.*



Summary

Construction focusing on piping, instruments and electrical. EPC was 74% complete through August, 2013.
Commissioning / startup progressing as systems are completed by construction. Startup was 46% complete through August, 2013.
Integration issues are being addressed with a simulator in advance of integrated plant operation.



Thank you!