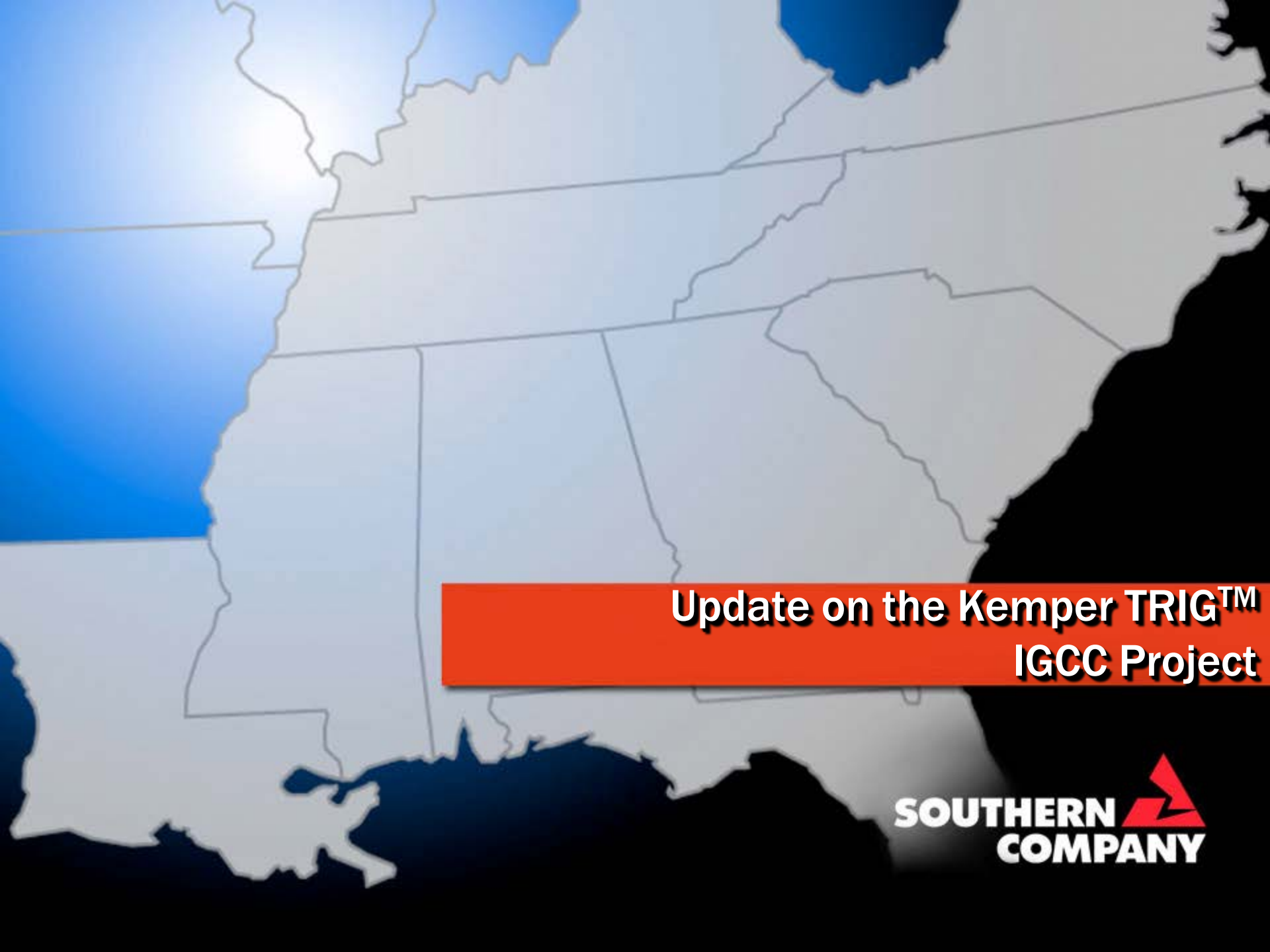
Update on the Kemper TRIG™
IGCC Project
SOUTHERN
COMPANY

Southern Company Facts and Figures

- **Regulated Utilities**
- Alabama Power
- Georgia Power
- Gulf Power
- Mississippi Power
- Southern Nuclear

- **Competitive Power**
- Southern Power
- Southern Generation

- **Other**
- Southern LINC Wireless
- Southern Telecom

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

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Power Systems Development Facility (PSDF)

Government Support

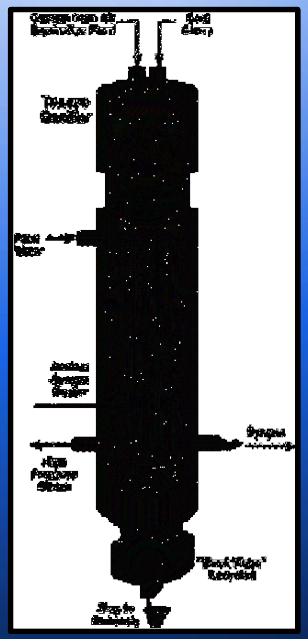
Operations & Management

Industry Sponsors

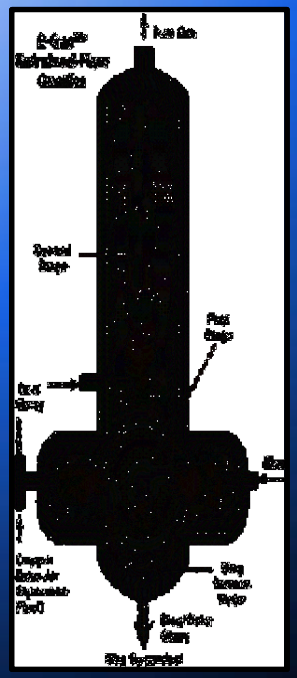
U.S. Department of Energy
National Carbon Capture Center
at the Power Systems Development Facility
PARTICIPANTS:
Managed by Southern Company Services, Inc.

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

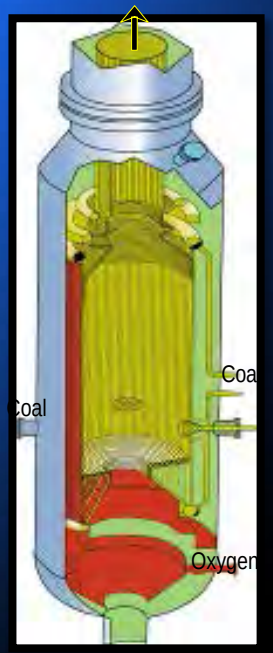
GE



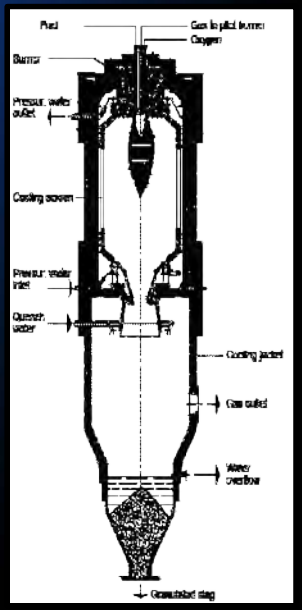
E-gas



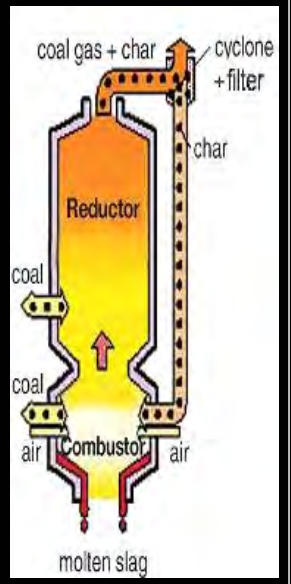
Shell



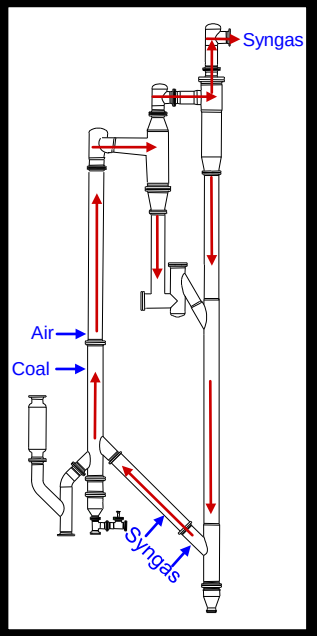
Siemens



MHI



TRIG™



Entrained Flow (Once Through)

Fluid Bed

Oxygen Blown

Air or O_2-Blown

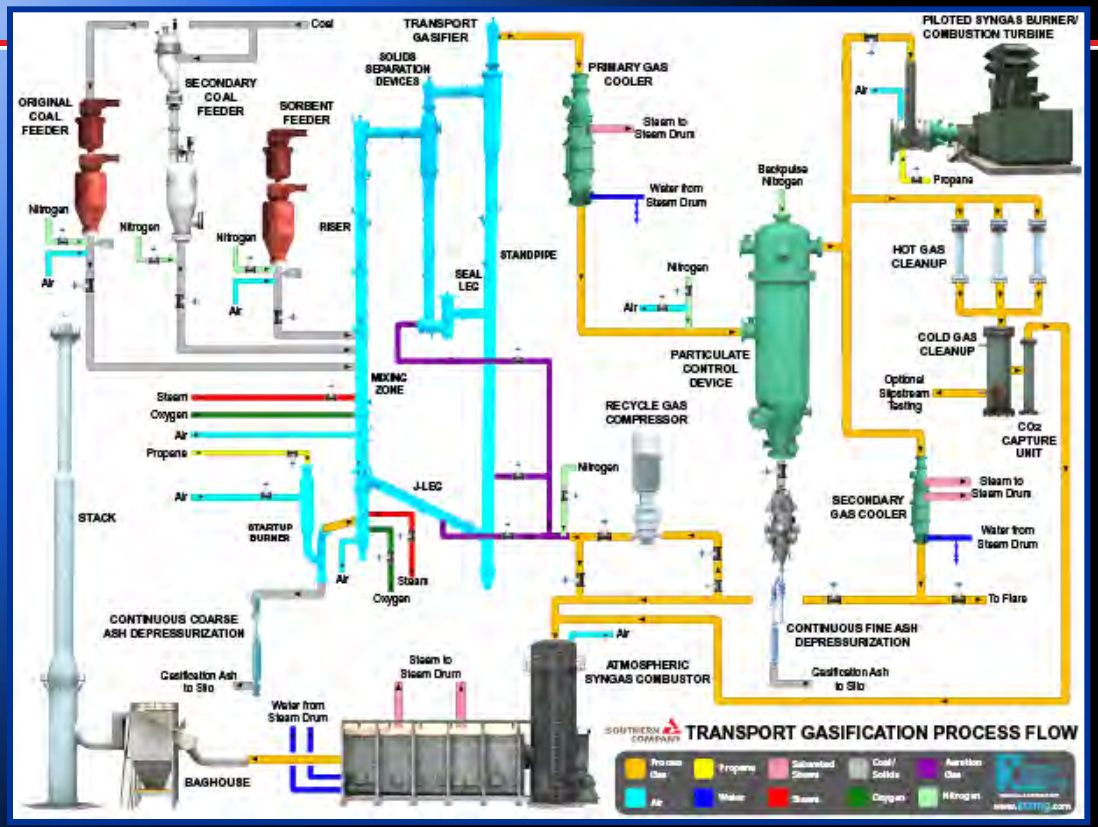
Burner-type, Slagging

No Burner
Non-Slagging

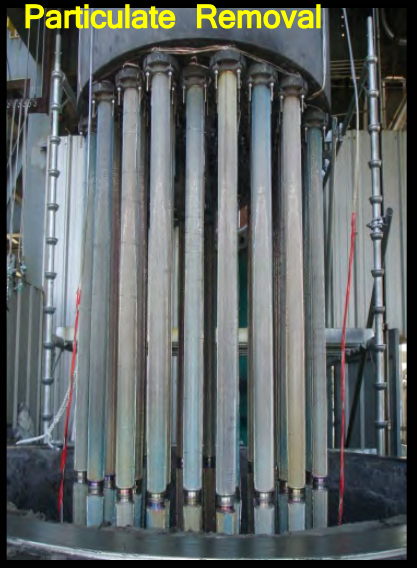
(Not to Scale)

PSDF Gasification Systems Development

Flexible Fuel Feeding



Particulate Removal



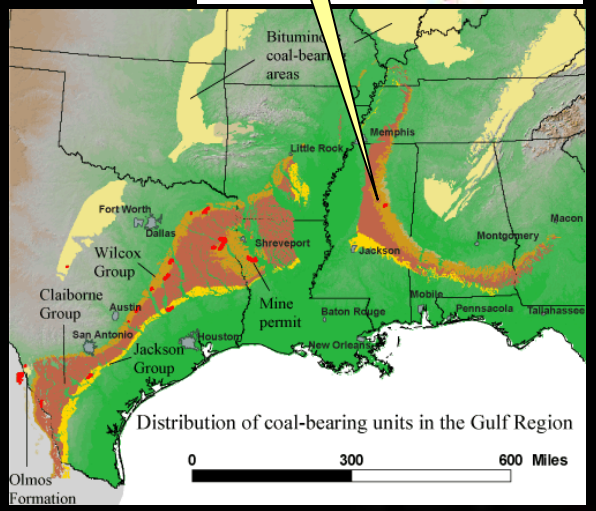
Ash Removal

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/ CO_2 control and >40% moisture coal
  - UOP's Selexol Process for H_2S and CO_2 removal
  - Haldor Topsøe's Wet Sulfuric Acid for H_2SO_4 production.
  - 65% CO_2 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



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

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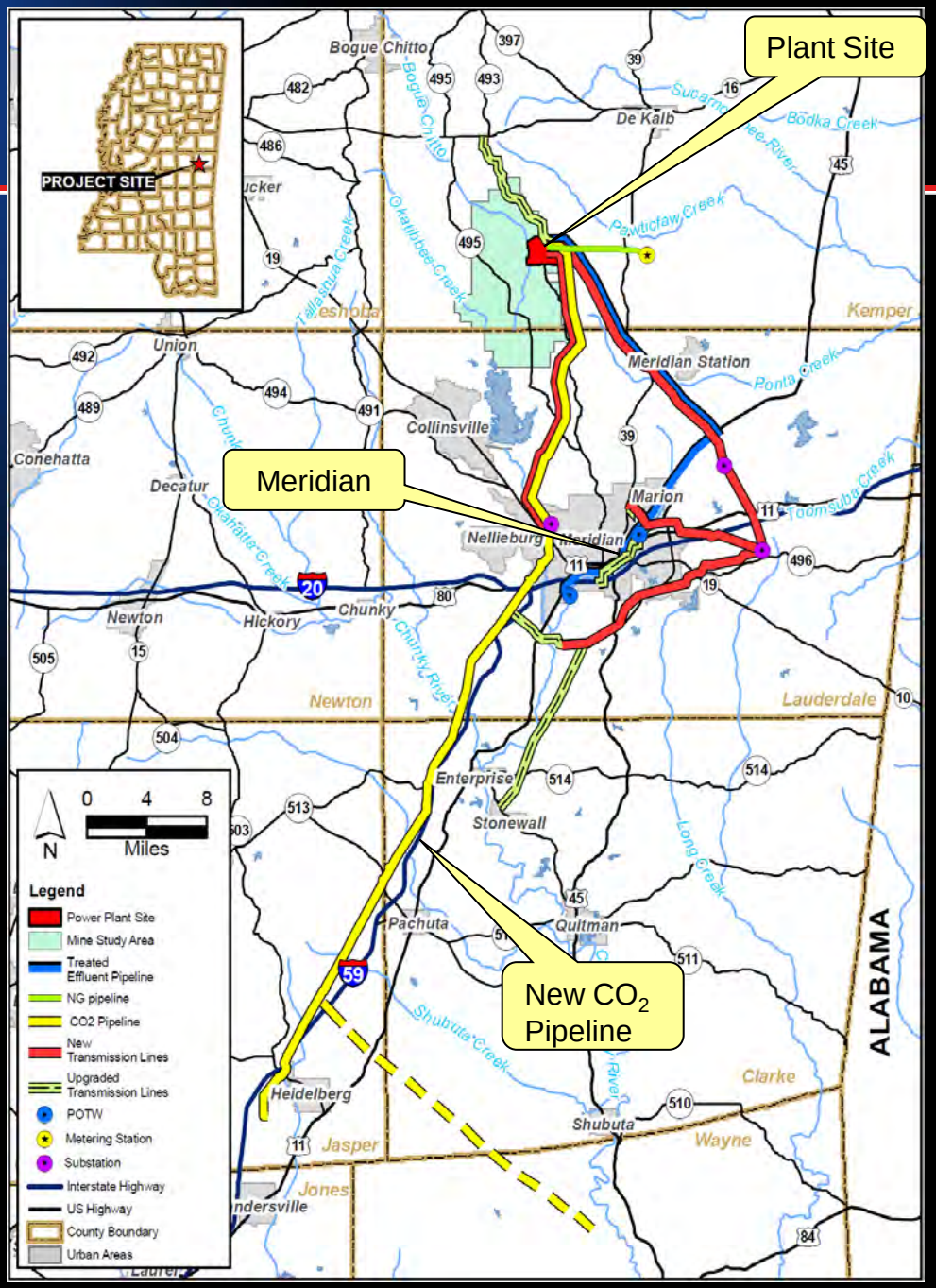
Kemper County IGCC Infrastructure

- ~70 miles transmission.
  - ✓ Station energized
- ~ 60 miles CO_2 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

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Construction Progress -- Fall, 2012

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Construction Progress -- Spring, 2013

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Construction Progress -- September, 2013

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Plant and Mine Aerial View

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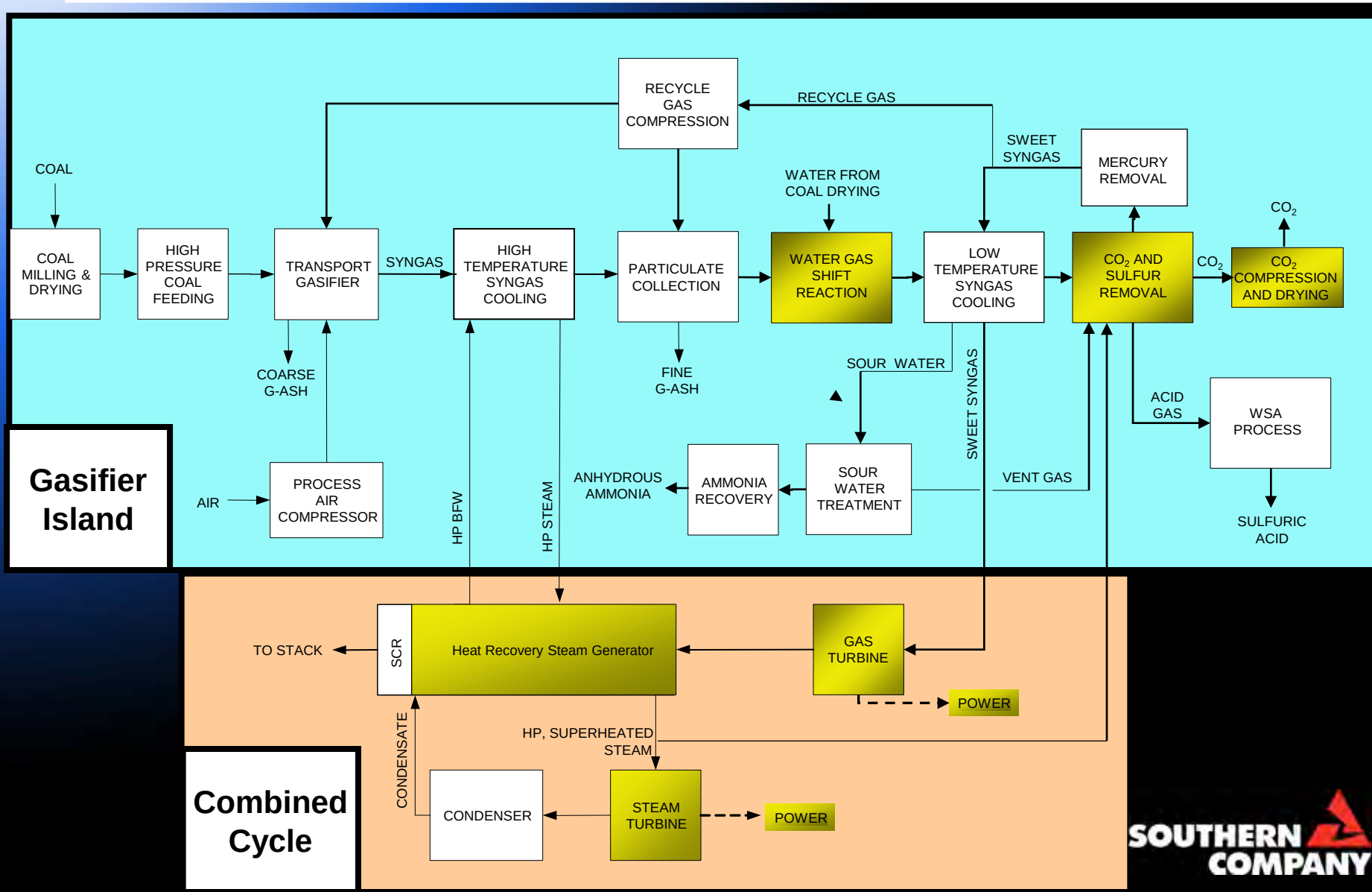
TRIG™ with Carbon Capture



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Syngas Clean-up – H_2S absorber tower installation

A sense of scale -- H_2S 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	

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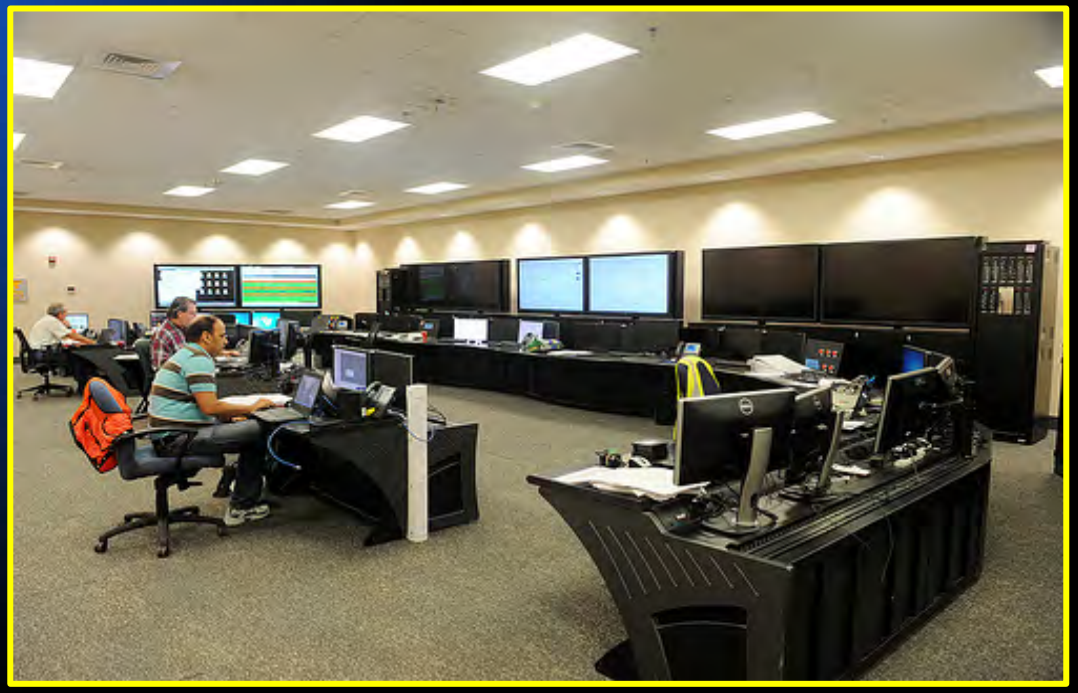
System Integration

- *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.*



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Summary

Construction focusing on piping, instruments and electrical. EPC was 74% complete through August, 2

Commissioning / startup progressing as systems are completed by construction. Startup was 46% comp
hrough August, 2013.

ntegration issues are being addressed with a simulator in advance of integrated plant operation.

Thank you!

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