

# Knowledge Sharing in CCS Demonstration Projects

May 16-17, 2012; Mobile, Alabama

A graphic consisting of a red circle with a black border, containing the text "One GREAT Team" in white. The circle is set against a blue background with a faint, circular, circuit-like pattern. A large yellow arrow points from the right side of the circle towards the right edge of the slide.

One  
**GREAT**  
Team

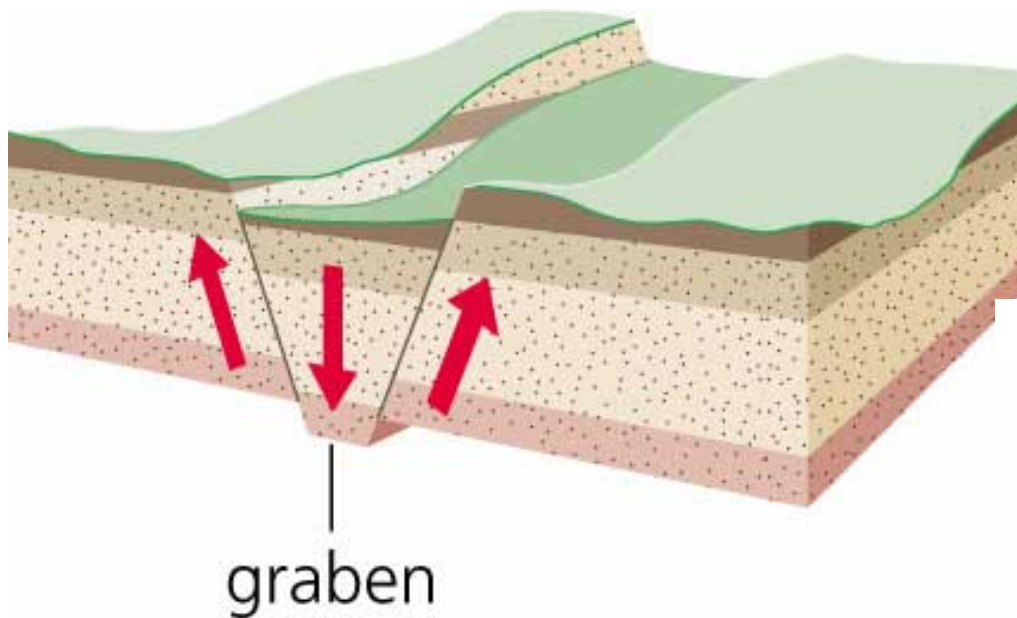
Southern Company Generation

Clean Coal Technology Development  
Southern Company, Research & Technology Management  
*Richard A. Esposito, PhD*

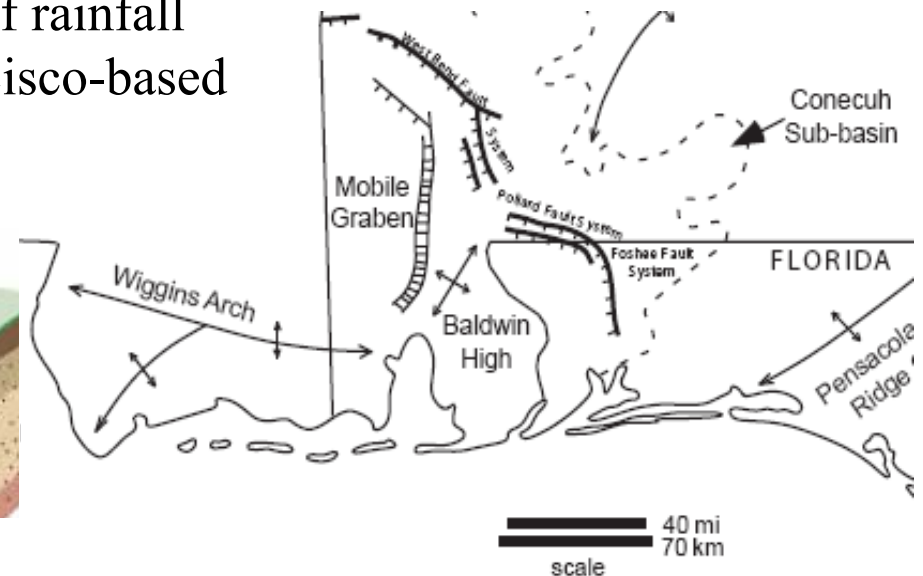
# Fun Fact About Mobile, Alabama



Did you think Seattle is the rainiest city in the United States? Well, think again. Mobile, Alabama, actually topped a new list of soggiest cities in the 48 contiguous states, with more than 5 feet of rainfall annually, according to a study by San Francisco-based Weather Bill, Inc.



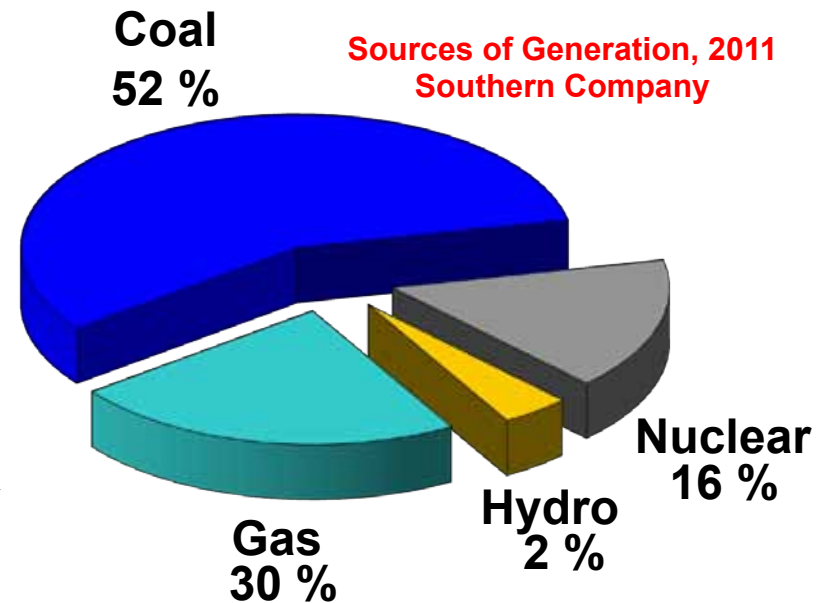
Precision Graphics



# Southern Company (NYSE:SO)

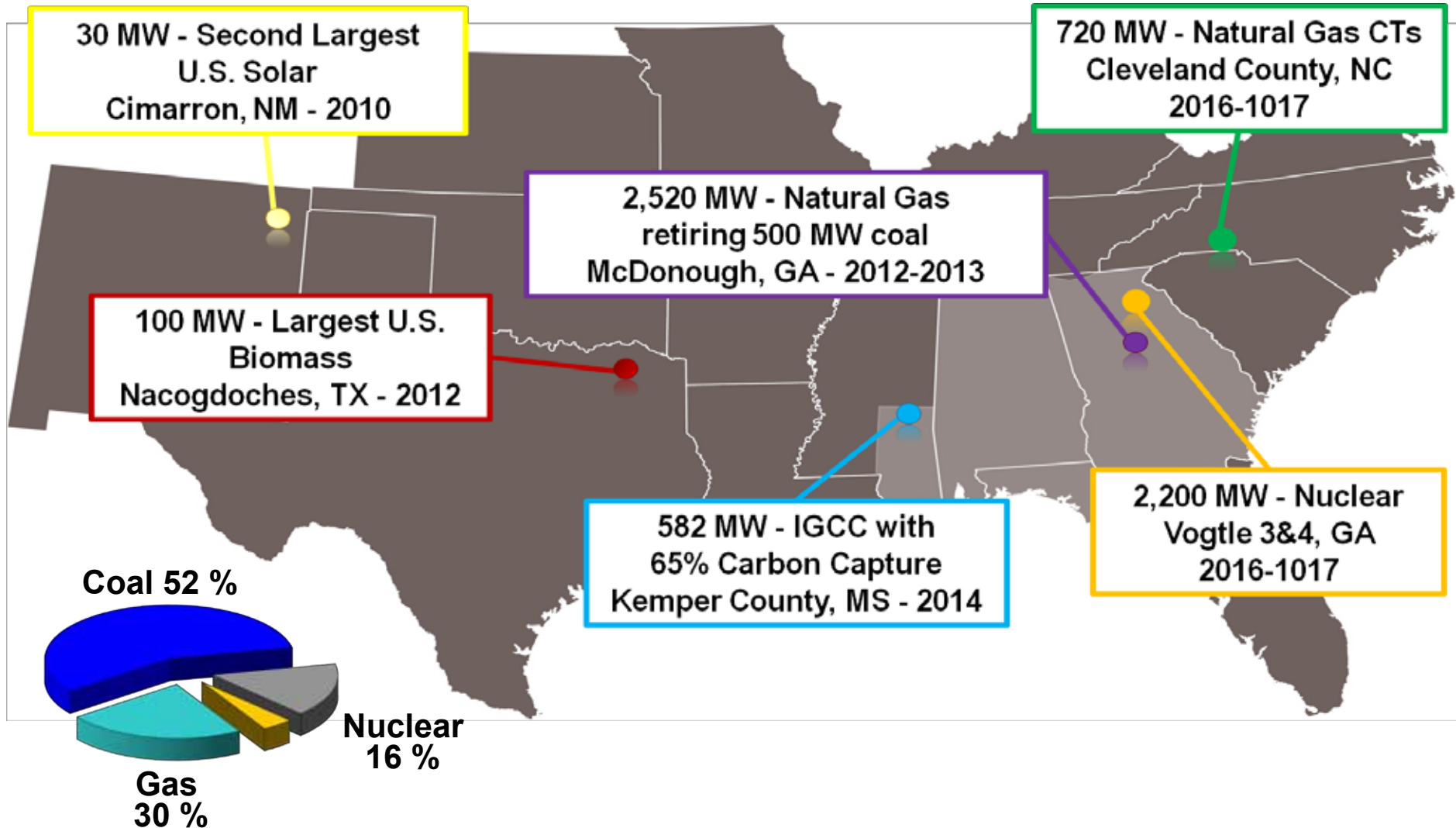


- Regional Southeast, USA energy company
  - Alabama, Georgia, Gulf, Mississippi, and Southern Nuclear
  - Southern Power is the largest wholesale power producer in the Southeast, USA
  - More than 43,000 MW of electric generating capacity (79 plants)
  - Southern Company Services is an in-house engineering design, construction, and research organization
- Core service area
  - 120,000 square miles in four southeastern states; 4.4 million customers and 26,000 employees
- One of the largest producers of electricity in the USA and one of the largest users of coal



From 2011 Southern Company Form 10-K.

# Sothern's Fleet in Transition





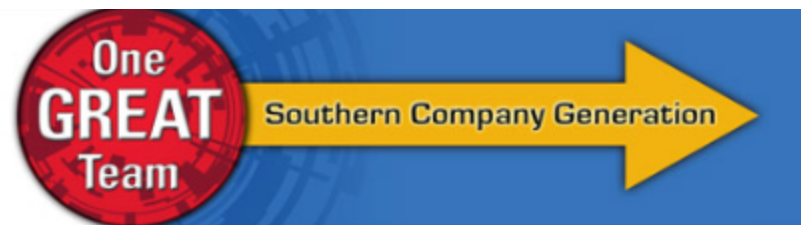
# Research Culture/Beliefs



- Maintain a corporate focus on R&D
- Learn by doing internally but collaborate externally to leverage resources
- New technologies will address future environmental challenges
- Maintain a centralized R&D organization
- Adopt intellectual property positions that do not impede technology development and deployment
- In-house expertise allows flexibility in future commercial business models



# Learn by doing!

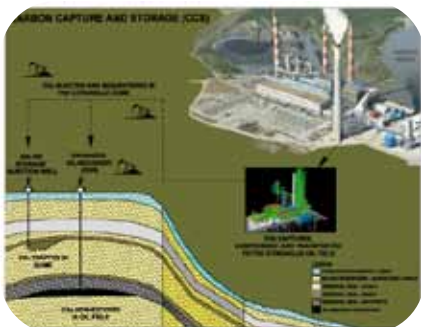


Efforts that are key to our long-term clean coal program

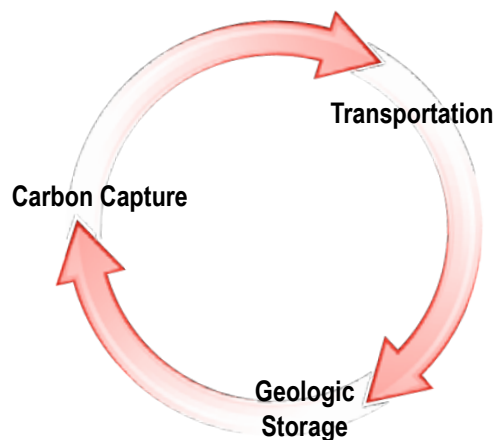
**Plant Ratcliffe IGCC**



**Plant Barry CCS Demo**



**Carbon Capture  
Utilization Storage**



**Carbon Capture Center**



**Site Characterization**

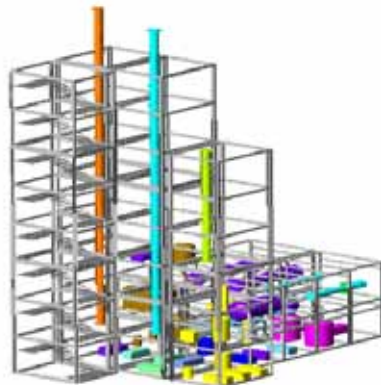


**Applied Science and  
Laboratory Testing**

# National Carbon Capture Center



- **Flexible testing facility** where new processes can be tested **on both coal derived syngas and flue gas** at various scales.
- A technology development facilitator by providing facilities for **scale-up from bench-top to engineering-scale**.
- Include a **wide variety of participants and partners**. Develop “best-in-class” technology.
- Deliver innovation via a collaborative project portfolio that provides an **accelerated pathway to cost-effective CO<sub>2</sub> capture technology**.

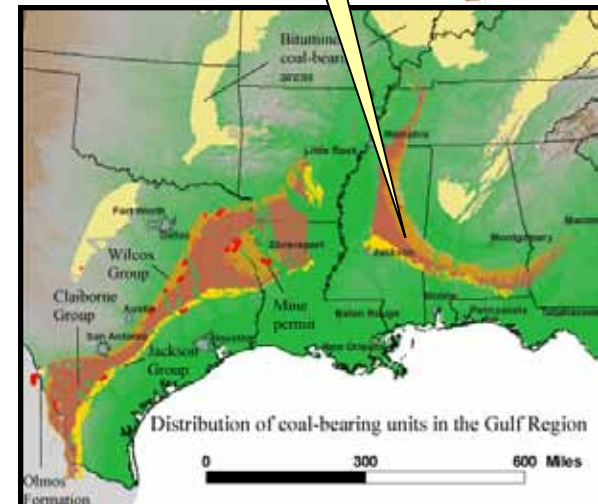


# Plant Ratcliffe - R&D to Reality



## Commercial IGCC + CCUS

- 15 years of development/demonstration in TRIG™ Technology
- **Certified by the Mississippi PSC** on June 3, 2010
- 582MW IGCC – COD May 2014
- Zero Liquid Discharge (ZLD) facility
- **65% CO<sub>2</sub> Capture – 3.4 MMt CO<sub>2</sub>/yr**
- \$2.4 Billion Capital Investment
  - \$700M in federal incentives
  - CWIP rates will begin in 2012
  - Advanced due diligence discussion for federal loan guarantees
- TRIG™ Technology being deployed in China





# Geology/SiteC haracterization



## **Alabama Power William Crawford Gorgas Electric Generating Plant (Parrish, AL)**

- University of Alabama
- Geological Survey of Alabama
- Schlumberger Carbon Services



## **Mississippi Power Victor J. Daniel Electric Generating Plant (Escatawpa, MS)**

- Southern States Energy Board (SECARB)
- Electric Power Research Institute
- Advanced Resources International



# Plant Barry CCS Demo



## Fully integrated CO<sub>2</sub> capture, transport and storage project

- Construct and operate a 25 MW equivalent CO<sub>2</sub> capture unit at Alabama Power Plant Barry
- Construct and integrate/operate an 11 mile pipeline that will transport captured CO<sub>2</sub> to Citronelle Dome
- Site characterization, permit, inject, and monitor/model 200,000 metric tons of CO<sub>2</sub> into a saline formation
- Outreach & education, risk, stakeholder acceptance, contracting, permitting, pore space









# Capture Plant Update



2010



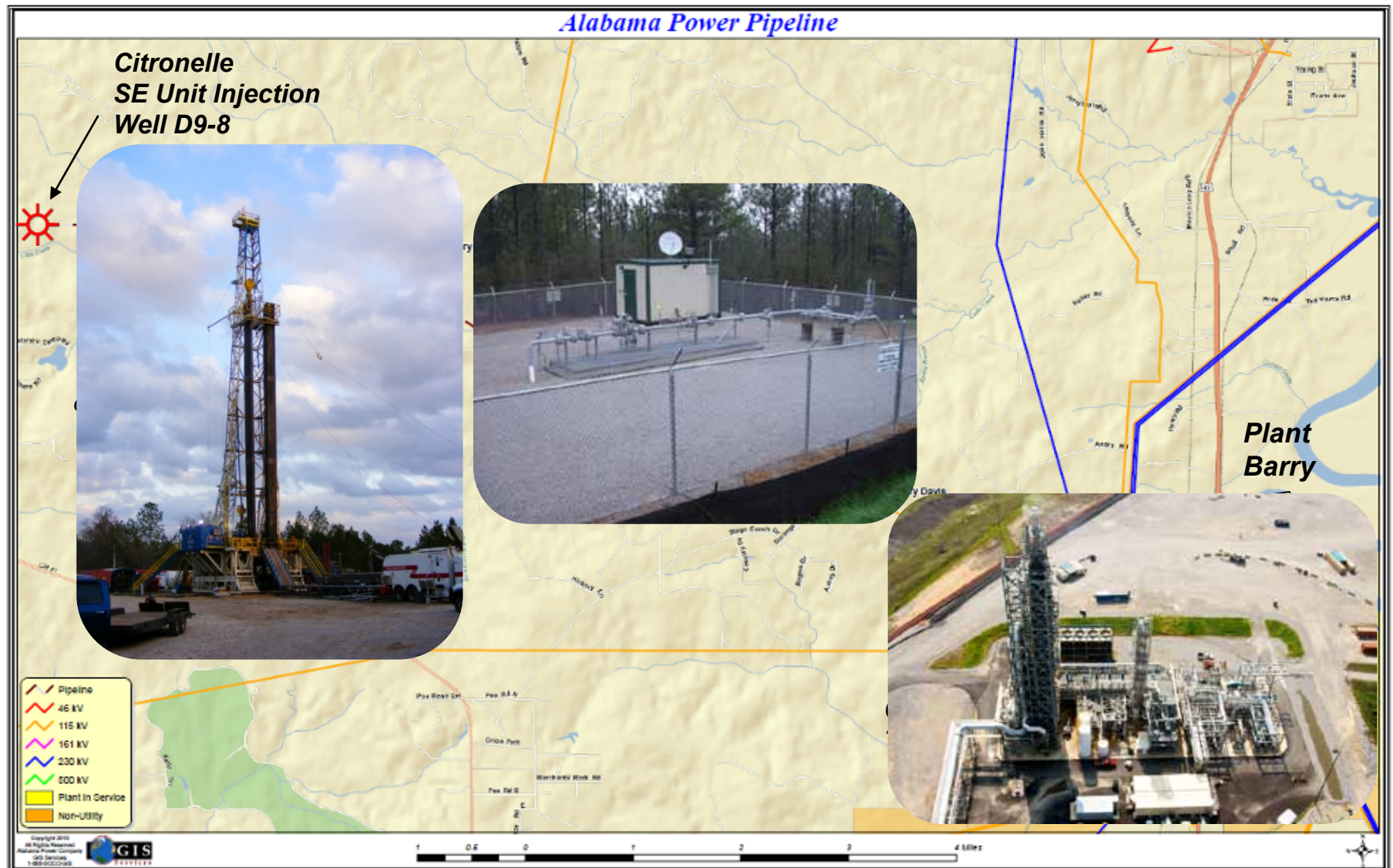
2012



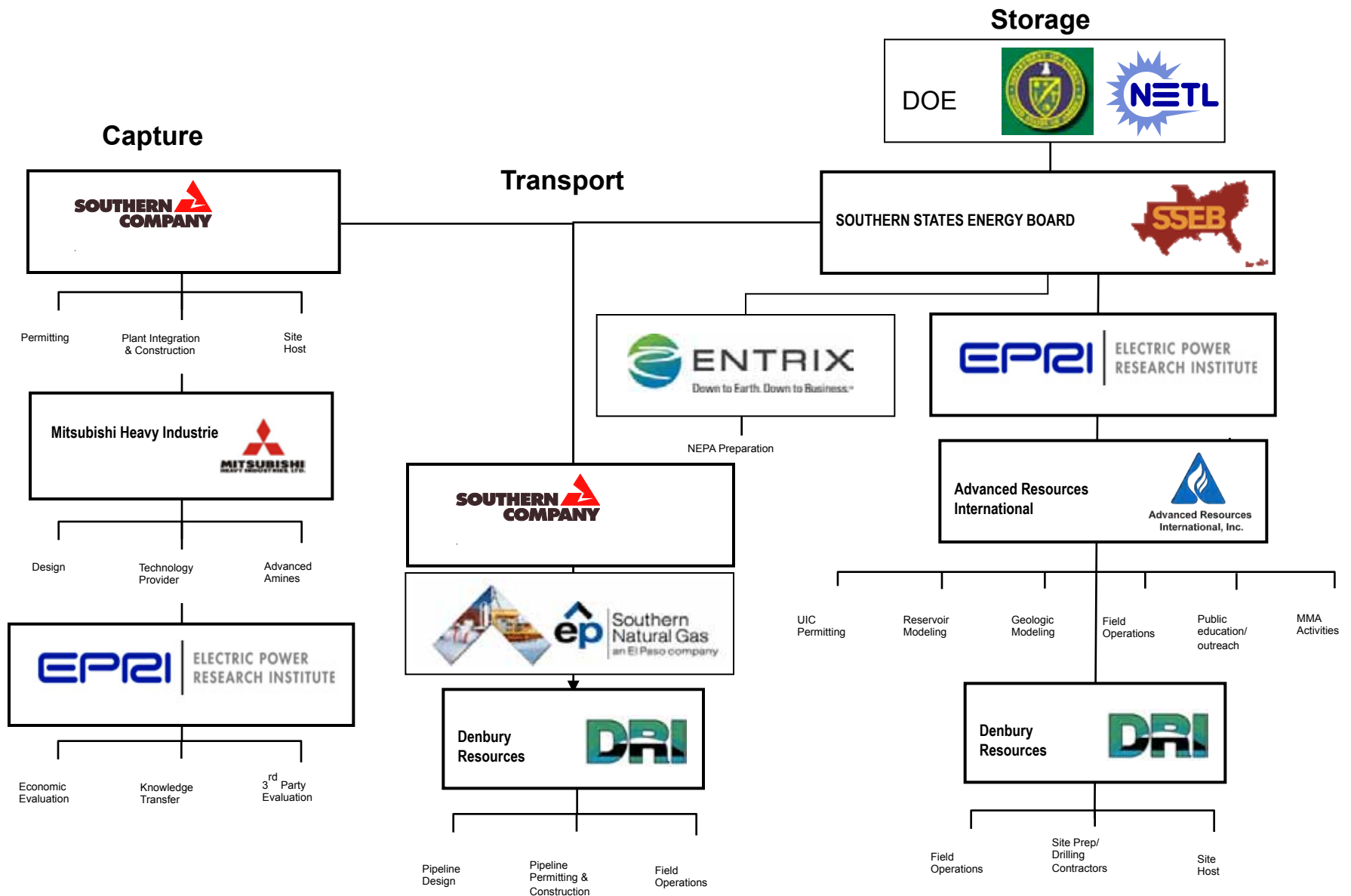
**Capture plant & compressor started operations on June 4, 2011 with  
50,025 metric tons CO<sub>2</sub> captured to date.**



# Field Tour Overview



# CCS Demo Project Team



# Basic Science and Lab Experimentation



## Montana State Biofilm Lab

- Biological control of permeability
- Sealing leaking boreholes
- Sealing fractures and cap rocks



## UAB Cap Rock Integrity Lab

- Long-term storage integrity
- Regulation of injection pressure
- Reassure stakeholders that geologic sequestration is safe and secure





# Research Experience in Carbon Sequestration



**The RECS program is heading to Alabama in 2012**

Thirty students selected to participate in a two week workshop where they learned about CCS from experts in industry, the research community, NGOs and the government; along with participating in group exercises, workshops, and field trips.





