

SECARB 7th Annual Stakeholders' Briefing  
March 7, 2012, Mobile, Alabama



One  
**GREAT**  
Team

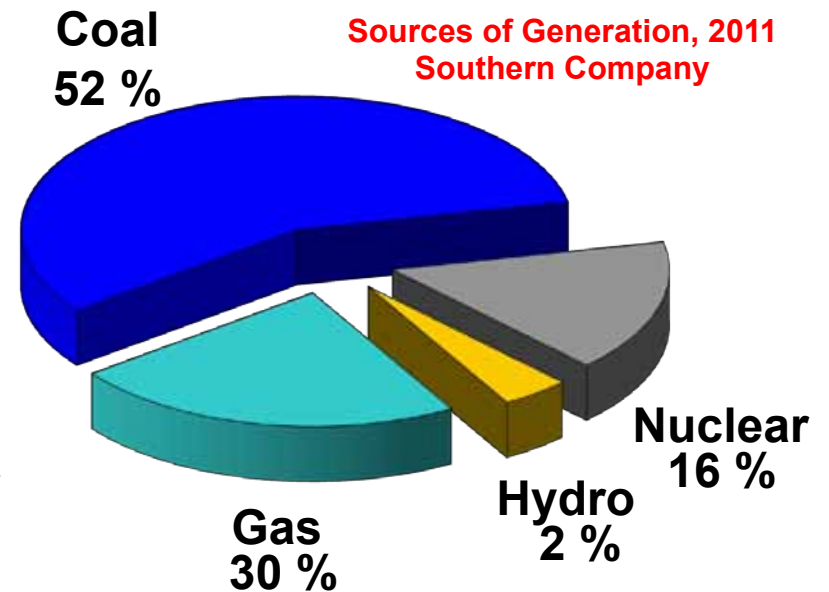
Southern Company Generation

Clean Coal Technology Development  
Southern Company Generation, Research & Technology Management  
*Richard A. Esposito, P.G.*

# Southern Company (NYSE:SO)



- Regional energy company
  - Alabama, Georgia, Gulf, Mississippi, and Southern Nuclear
  - Southern Power is the largest wholesale power producer in the Southeast
  - **Southern Company Services is an in-house engineering design, construction, and research organization**
  - More than 43,000 MW of electric generating capacity (79 plants)
- 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 U.S. and one of the largest users of coal



From 2011 Southern Company Form 10-K.

# Research Culture/Beliefs



- Maintain a corporate focus on R&D
- Learn by doing but collaborate externally to leverage resources and develop commercial partners
- Stay focused on the most strategic issues
- New technologies will address environmental challenges ahead
- Use a centralized R&D organization with top talent
- A successful technology portfolio brings multiple options to key business decisions
- Adopt intellectual property positions that do not impede technology deployment
- In-house expertise allows flexibility in commercial business models for technology deployment



# Research & Development

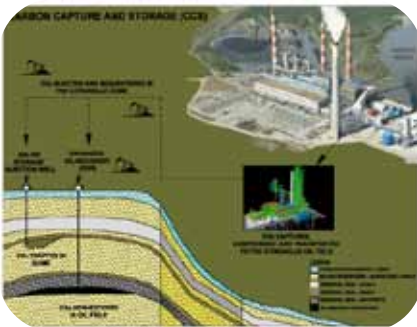


## Efforts that are key to our long-term CCS success

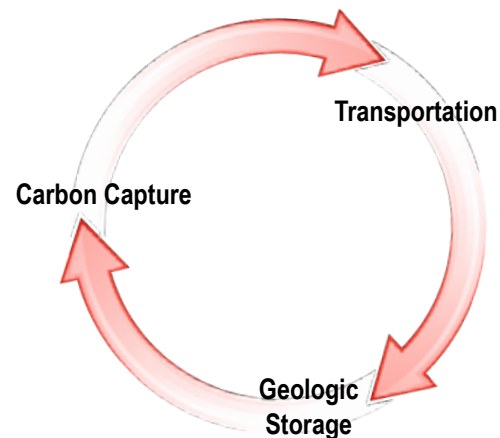
**Plant Ratcliffe IGCC**



**Plant Barry CCS Demo**



**Carbon Capture  
Utilization Storage**



**Applied Science and  
Laboratory Testing**

**Carbon Capture Center**



**Site Characterization**

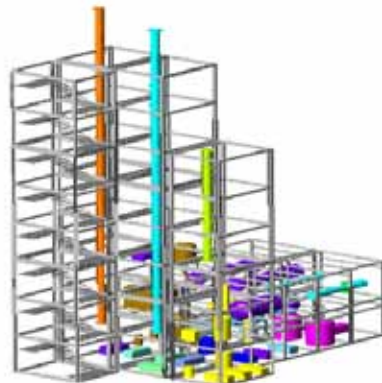




# National Carbon Capture Center



- Unique **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.**



# Geology/Site Characterization



## *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

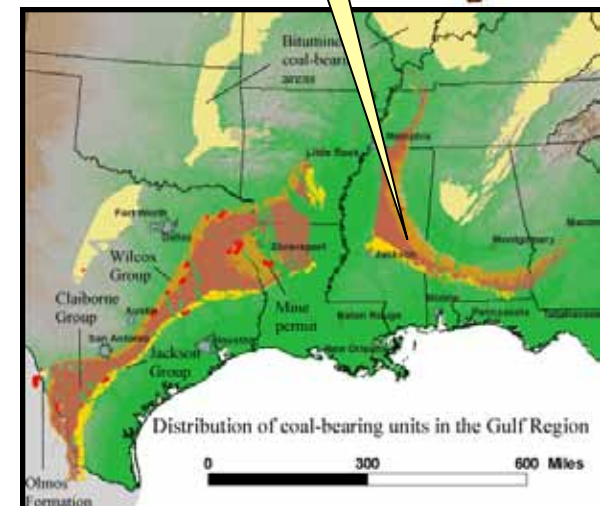


# Plant Ratcliffe - R&D to Reality



## Industry Leading R&D & Construction Expertise

- 15 years of development/demonstration in TRIG™ Technology
- Certified by the MPSC on June 3, 2010
- 582MW IGCC – COD May 2014
- 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







Switchyard

Architectural  
Buildings

Gasifier

HRSG

Combined Cycle

Gasification Cleanup

Construction – February 20, 2012



# 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 300,000 metric tons of CO<sub>2</sub> into a saline formation
- Outreach & education, stakeholder acceptance, contracting, liability, pore space, etc.









# Capture Plant Update



2010



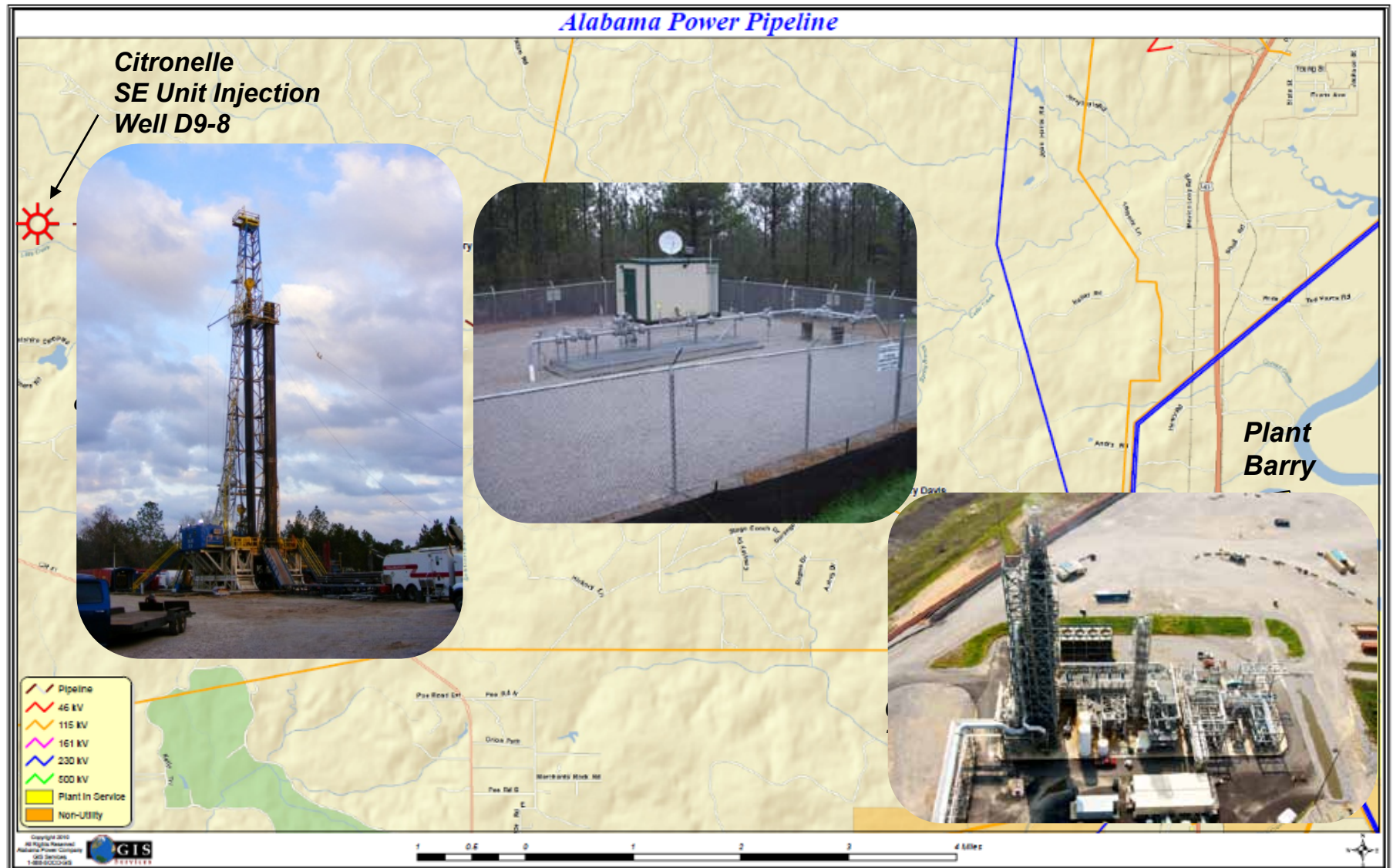
2012



**Capture plant & compressor started operations on June 4, 2011 with  
42,730 metric tons CO<sub>2</sub> captured to date.**



# SECARB Tour Overview



# 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 Southern Company 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.





# Other Supported Projects



- Citronelle Oil Field CO<sub>2</sub>-EOR/Storage Capacity Pilot Injection (UAB/Denbury/Geologic Survey of Alabama), 2008-2013.
- Plant Daniel CO<sub>2</sub> Impacts on Shallow Groundwater Study (EPRI/LBNL), 2010-2012.
- Valuation of Human Health and Ecological Risks and Damage Assessment Arising From CCS (Industrial Economics Inc.) (Phase I & Phase II), 2010-2012.
- Development of Standards for Geologic Storage of CO<sub>2</sub> (CSA), 2011-2012.
- CCS Technology and Pipeline Infrastructure Study (LANL), 2012.
- Florida Panhandle Pipeline Infrastructure Model (University of North Florida), 2011.
- Carbon Sequestration Simulation Center (UAB), 2012-2013.
- Transformation Reactions of Clay Mineralogy in CO<sub>2</sub> Storage Formations (Georgia State University), 2012.
- CO<sub>2</sub>-EOR Initiative, Center for Climate and Energy Solutions (C2ES), 2011-2012
- MIT Carbon Sequestration Initiative, 2009-2012.

# Anthropogenic Project Team

