SECARB Anthropogenic Test Overview: Integrated CO_2 capture, transport and storage

Robert C. Trautz
Sr. Project Manager

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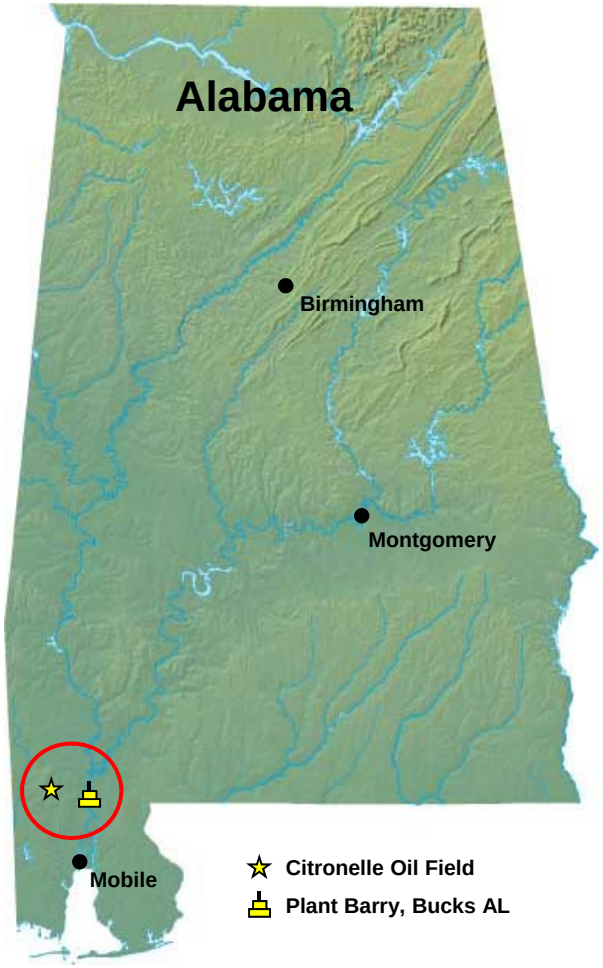
Anthropogenic Test — Overview

- Fully integrated CO_2 capture, transport and storage project
- Construct and operate a 25 MW equivalent CO_2 capture unit at Alabama Power's (Southern Co.) Plant Barry
- Construct and operate a 12 mile CO_2 pipeline that will transport CO_2 from Plant Barry to the Citronelle Dome
- Inject 100,000–300,000 metric tons of CO_2 into the Paluxy Formation (saline) over 2 to 3 years
- Conduct 3 years of monitoring after CO_2 injection and then close the site



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CO_2 Source: James M. Barry Electric Generating Plant

- Owner/Operator
  - Alabama Power Company (A Southern Company)
- Located along the Mobile River in Bucks, AL
- Total nameplate generating capacity
  - 2,657,200 kW
- Generating units - 7
- Type of fuel
  - Coal and natural gas

Plant Barry, Bucks, AL

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Always on.℠

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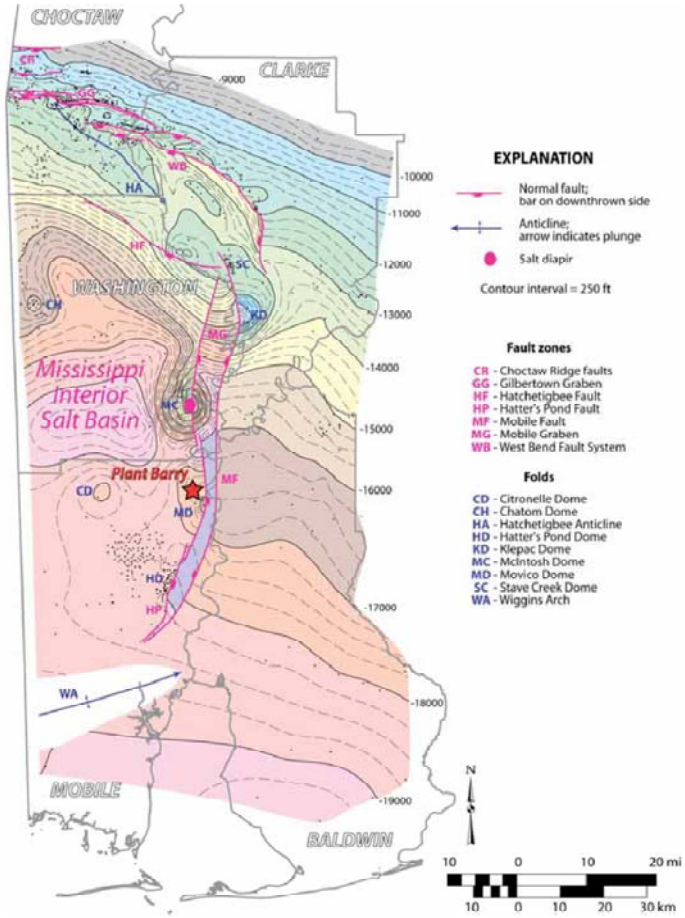
CO_2 Sink: Citronelle Oil Field



Structural contour map of the top of the Smackover Formation (Upper Jurassic) in southwest Alabama (GSA 2008)

- Located near the crest of a giant salt-cored anticline
- Discovered in 1955; Unitized beginning in 1961 for waterfloods
- Produced > 68 MMbbl of 42-46° gravity oil
- ~ 37% of the original oil in place has been recovered; CO_2-EOR potential up to 20%
- Unit Operator: Denbury Resources
- CO_2 project in SE Unit of field
- Paluxy Formation at 9,400 ft

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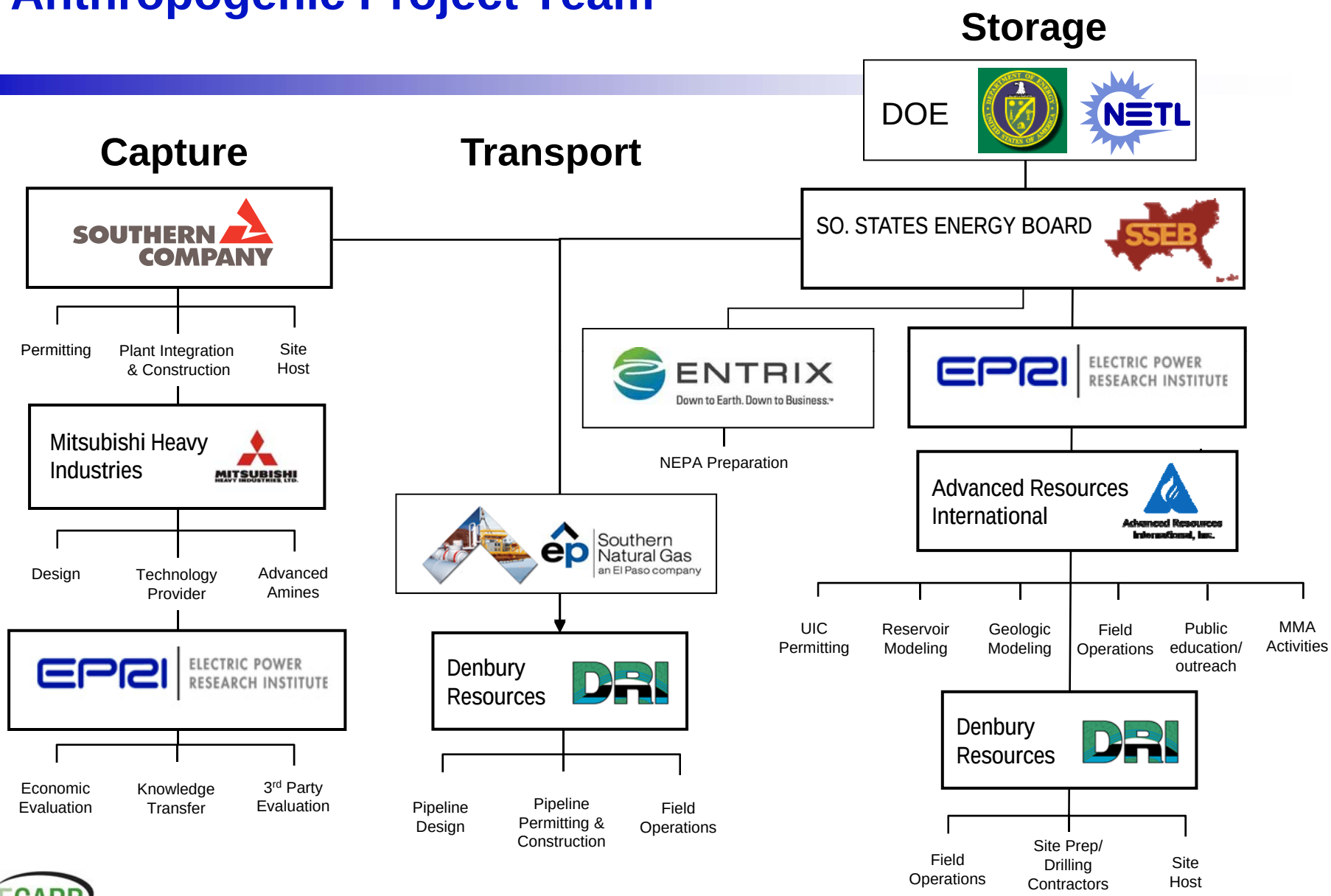
Anthropogenic Project Team



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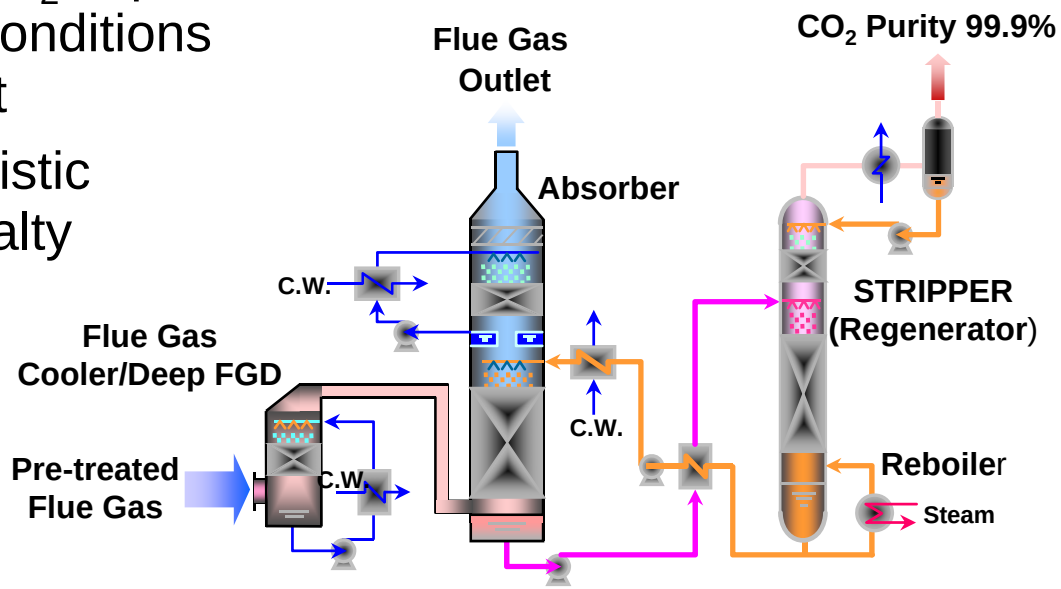
Capture Project Scope and Objectives

- Scope:
  - Demonstrate post-combustion capture of CO_2 from Plant Barry flue gas using MHI's advanced amine process
- Objectives:
  - Demonstrate integrated CO_2 capture under realistic operating conditions typical of a coal-fired plant
  - Economics: Establish realistic values for the energy penalty and implementation costs
  - Test reliability of solvent-based capture



Simplified schematic post-combustion solvent process

CO_2 Capture System Update

2010

2011

Photos Courtesy of Southern Company

Capture plant & compressor will be operational by early July 2011

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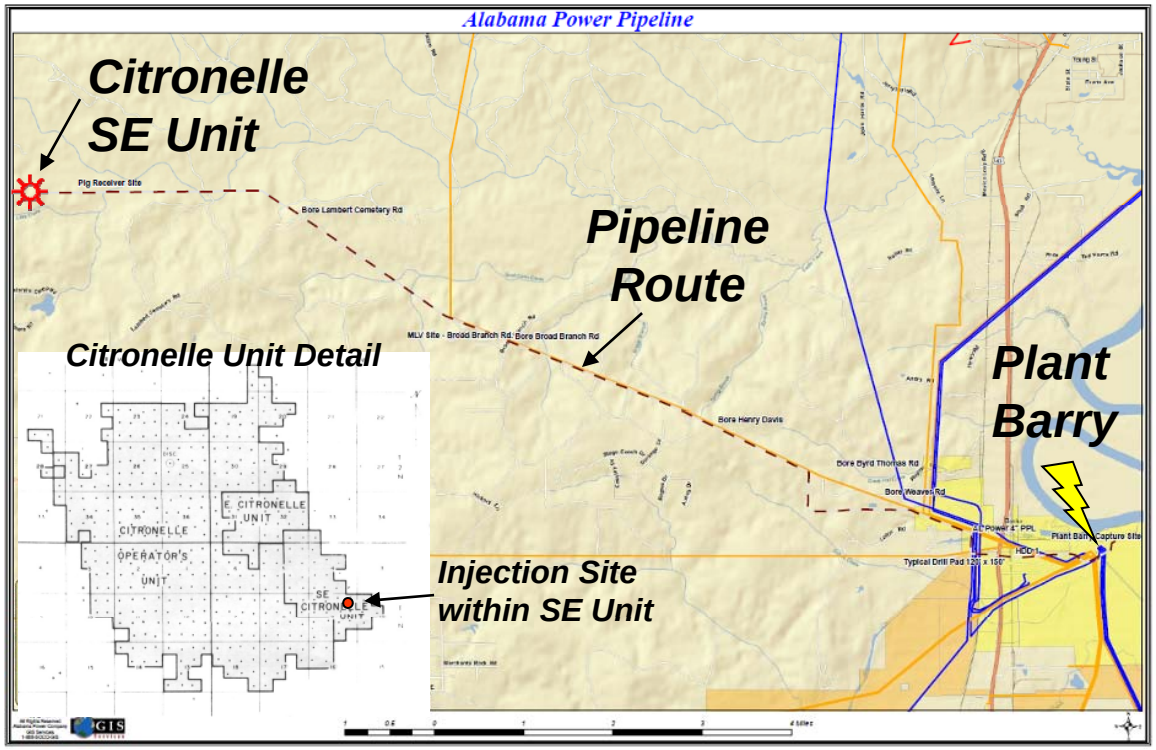
CO_2 Pipeline Overview

- Approx. 12 mi to the SE operators unit in Citronelle Field
- Right-of-Way
  - Utility corridor for 80%; 9 land owners
- Pipe specifications
  - 4-in pipe dia.
  - X70 carbon steel
  - DOT 29 CFR 195 liquid pipeline; buried 3 feet with surface vegetation and maintenance
  - Purity is 97% dry CO_2 at 115ºF, 1,500 psig (< 20 ppm H_2S)



- Right-of-way habitat (pine forest in the Mobile River watershed; some wetlands)

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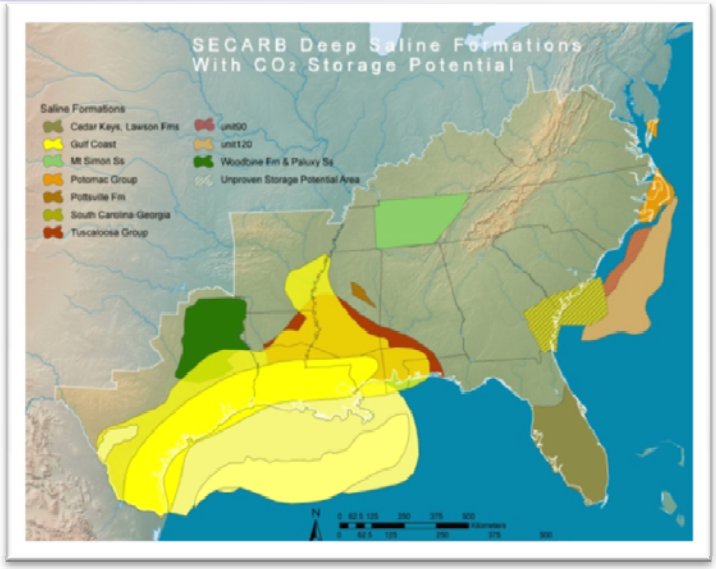
Geologic Project Scope and Objectives



- Scope:
  - Demonstrate safe, secure CO_2 injection and storage in regionally significant saline reservoirs in the SECARB region
- Objectives:
  - Identify and mitigate potential leakage risk
  - Evaluate local storage capacity, injectivity and trapping mechanisms for the Paluxy Formation
  - Demonstrate how a saline reservoir's architecture can be used to maximize CO_2 storage and minimize the areal extent of the CO_2 plume
  - Test the adaptation of commercially available oil field tools and techniques for monitoring CO_2 storage

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Geologic Storage Update

- Characterization Well D9-8#2 started 31-Dec-2010
  - 32 days to drill and install well
  - Total depth 11,817 ft (3,602 m)
  - 98 feet (30 m) of whole core
  - 45 percussion sidewall cores
  - Well logs (Triple Combo, MRI, Mineralogy, Dipole Sonic, CBL)
- Two injection wells to be installed upon receiving UIC permit (Q4 FY11)

Rig on location at well D9-8#2

Characterization well successfully completed January 31, 2011

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NEPA/Permitting Update

- UIC permit application
  - Submitted to Alabama Dept. of Env. Quality
  - Updated with new data
- Environmental Assessment (EA)
  - Mitigation
    - 3 mi of wetlands (wetland mitigation planned)
    - 23 gopher tortoise burrows
  - Permitting/consultation
    - Fish & wildlife service for the tortoise
    - Corp of Eng. for wetlands
    - SHPO (State cultural/archeological assets)
    - Storm-water construction (BMPs)

Gopher tortoise: Photo courtesy of Southern Company

Finding of No Significant Impact (FONSI) anticipated within days

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Transport and Storage Project Costs

Phase III Anthropogenic Test		
	Dollars	Percent
Storage		
DOE Share	$28,691,330	76.14%
Non-DOE Share	$8,990,057	23.86%
Total Value	$37,681,387*	
Expenditures (12/31/2010)	$2,274,513	
Transport	$8,000,000	

Project expenditures to date are within Budget

BP4 funding pending DOE approval

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