



Southern Company CCS Overview

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SSEB Stakeholders Meeting
March 10, 2011



Presentation Outline

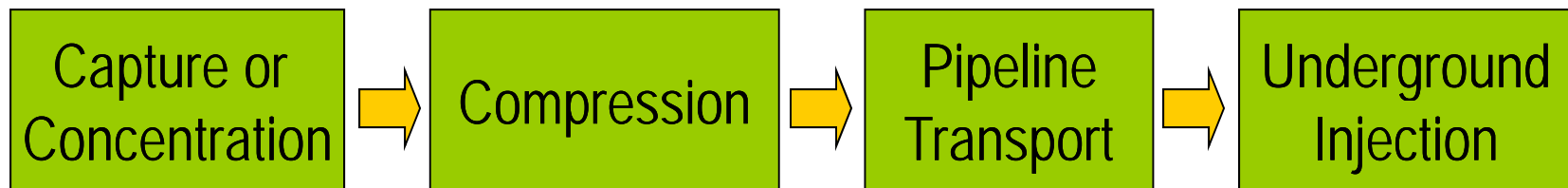


- CCS overview
- Southern Company's portfolio of CCS projects
- Barry 25 MW Demonstration Project
 - Background
 - Current Status and Update
 - Pictures

CO₂ Capture and Sequestration Technology



- **CCS is a four-step process**
 - Pure CO₂ captured or concentrated
 - Compressed to ~100-150 atm (~1500-2250 psi)
 - Transported to injection site
 - Injected deep underground into geological formations and sequestered safely for thousands of years

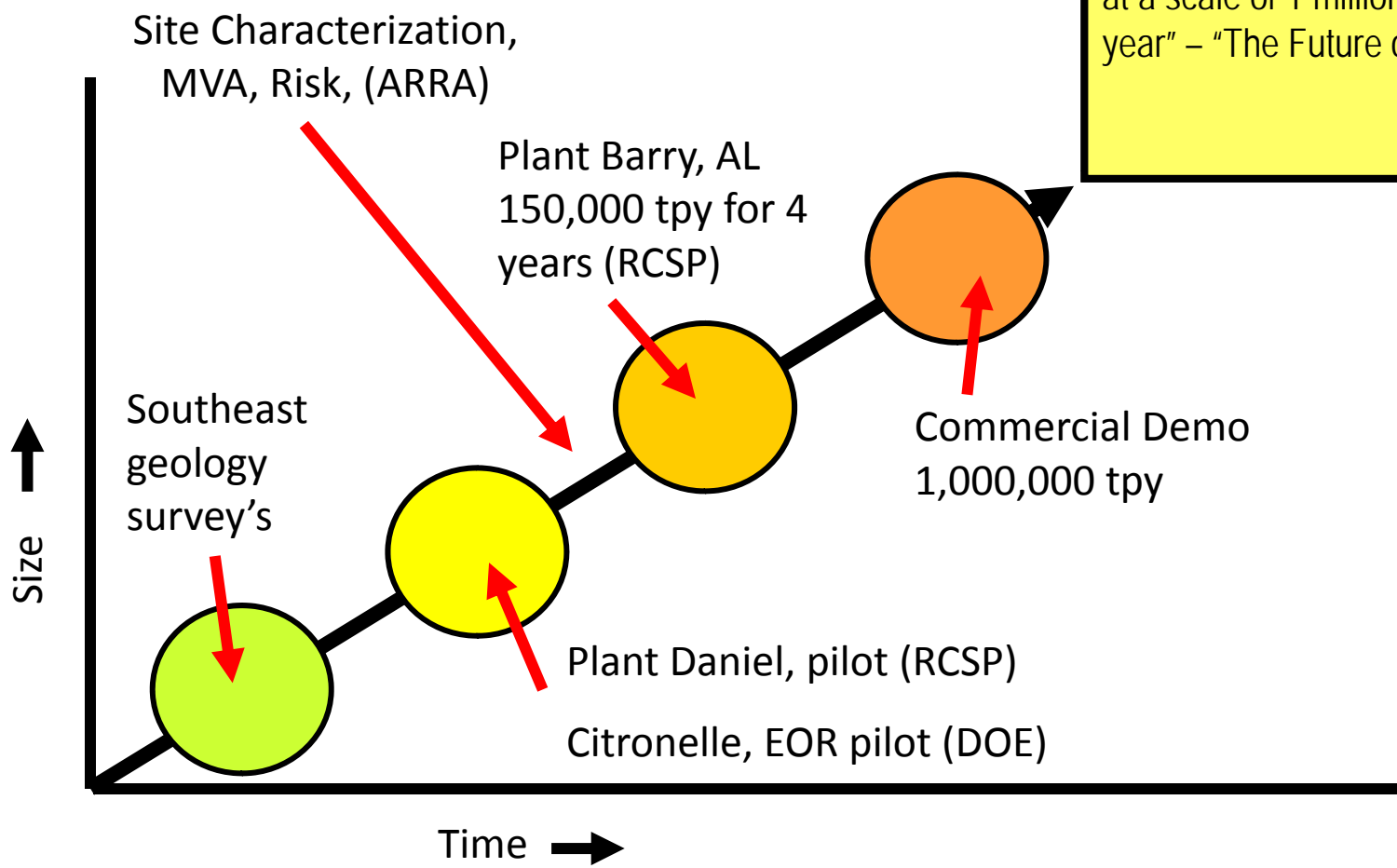


Phased Approach to Technology Deployment

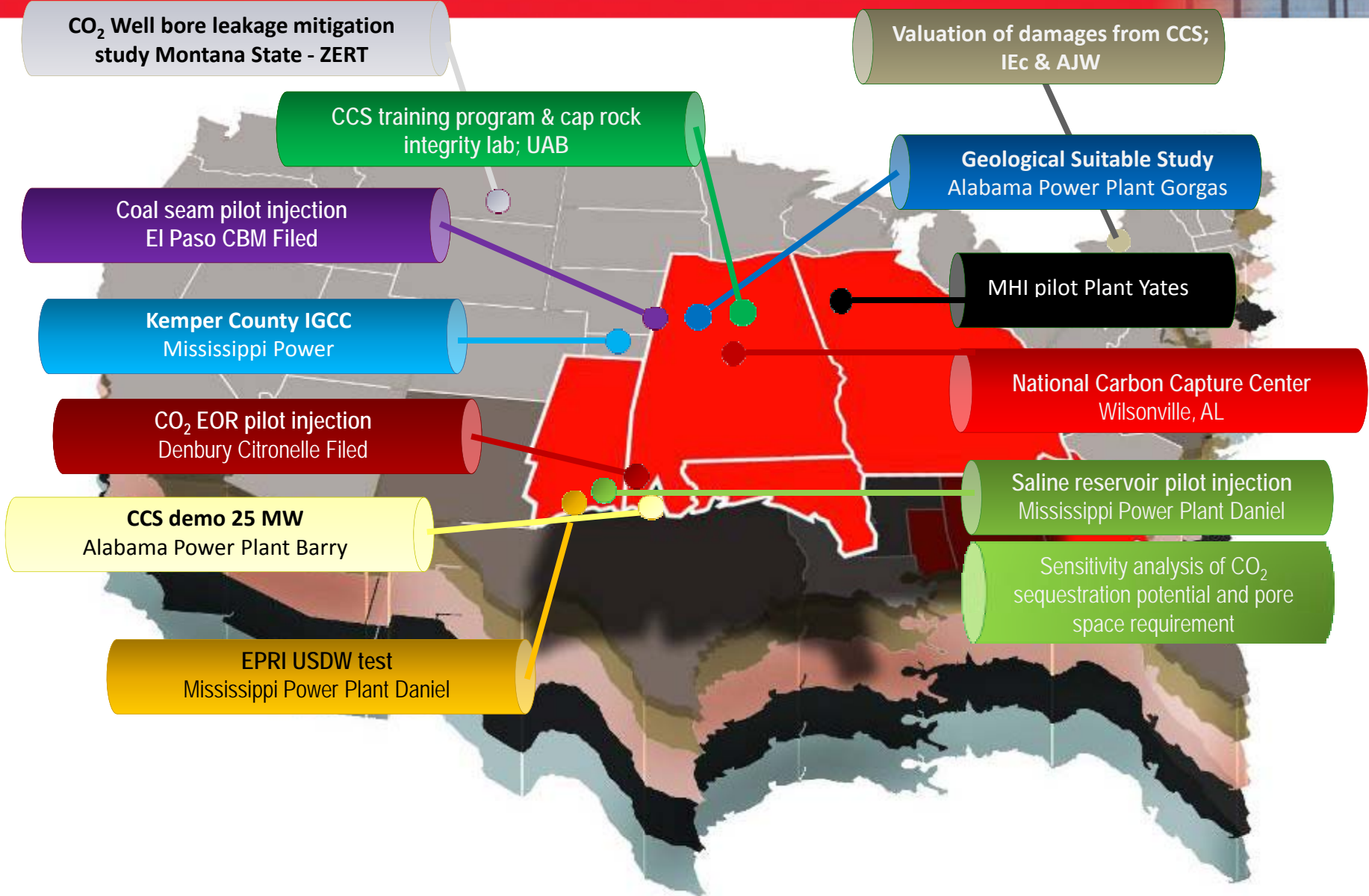


Goal = commercial CCS decision by 2020

"we believe high priority should be given to a program that will demonstrate CO₂ sequestration at a scale of 1 million tons per year" – "The Future of Coal," MIT



Southern Company CCS Research



CCS Commercialization Program



- Goals and timeline
 - Deploy integrated capture and sequestration demos to understand integration of capture plant and injection field
 - Demonstrate capture at multiple scales to drive down costs
 - Sequestration of at least 1MMTPY for 5 years by 2020 in southeast geology with anthropogenic CO₂
 - Advance capture technology performance to preserve the new and retrofit PC coal option
 - “Learn by doing” to create competitive advantage and maintain leadership position in technology development
 - *25 MW demo is key step to support this process*

Southern Company CO₂ Capture and Storage Project - 25 MW Integrated CCS Demo



Successful demonstration of the 500 tpd demonstration plant will lead to the provision of **COMMERCIAL CO₂** recovery plant for coal fired power stations

Commercialization Schedule

YEAR	09	10	11	12	13
Demo. Plant (500 t/d) US	EPC		Operation		
Commercial Plant (>3,000 t/d) US/EU		EPC	■	■	■

Construction Photograph - Pipe Rack Modules

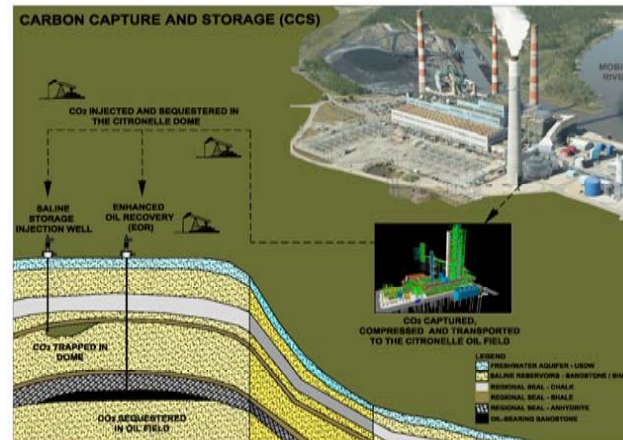


Plant Area 30 m x 90 m

Plant Barry Power Station

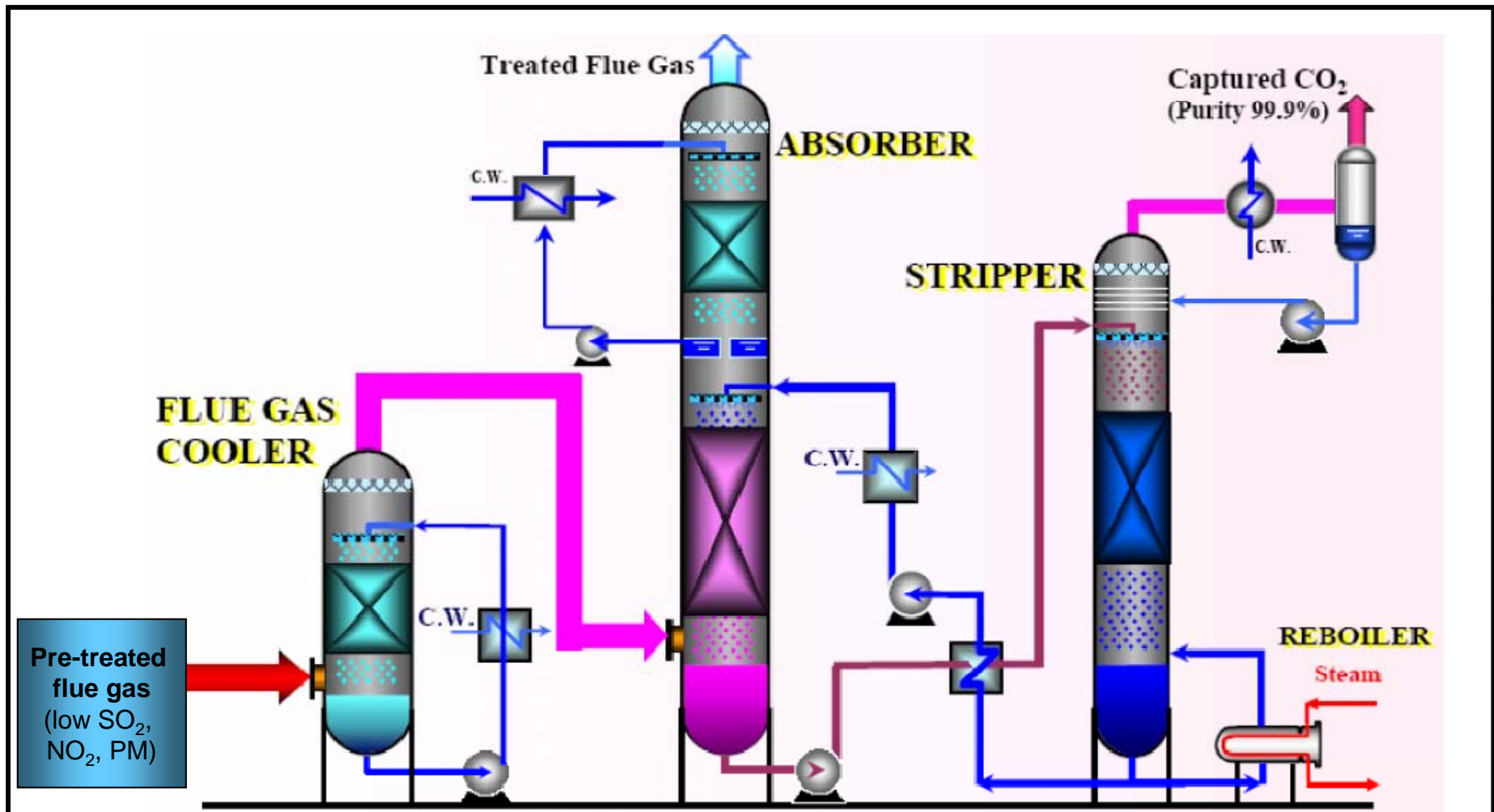


Project Scope Schematic



Simplified CO₂ Scrubbing Process (Amine)

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Key Points: needs >99% SO₂ removal; consumes process steam

CO₂ Capture - Key Concerns



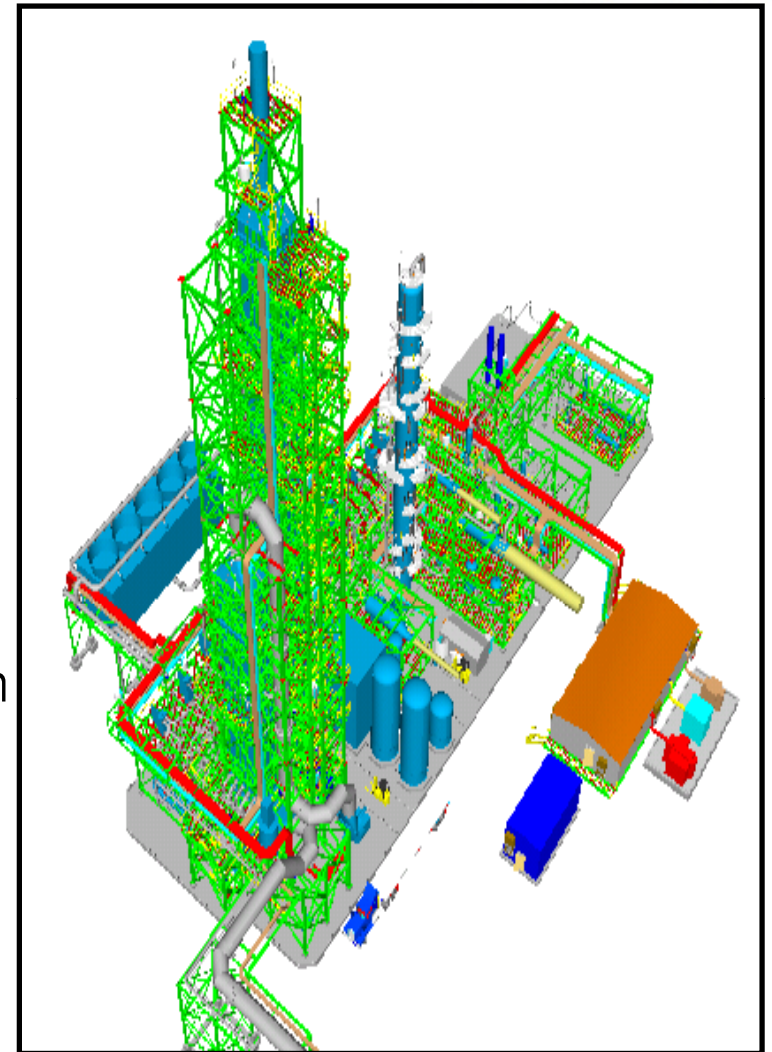
- Not commercially proven on large utility boilers; R&D and scale-up efforts ongoing
- Very high capital cost estimates (75% increase over no capture case)
- Large footprint required for equipment
- Operational concerns
 - High energy penalty for CO₂ stripping and regeneration of solvent (up to 30%)
 - Solvent degradation (from SO₂, NO₂)
 - Reliability (corrosion and foaming)



25 MW Integrated CCS Demo – APC Plant Barry

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- CO₂ Capture and Compression
 - SCS/MHI collaboration with partners
 - KM-CDR capture technology (500 TPD)
- Transportation and Sequestration
 - DOE SECARB Phase III “Anthropogenic Test”
 - 150k tpy for up to 4 years into saline geology
 - ~15 mile CO₂ pipeline to Citronelle Field
- Objectives/Goals
 - Advance saline sequestration technology through large field test
 - Characterize operations to support full scale deployment
 - Continue outreach and education to insure seamless deployment



MHI Process



- Improved economics over traditional amine
- MHI has proven, conservative approach to process deployment
- KM-CDR process development
 - Coal fired 10 tpd - J Power, 2005
 - Natural gas fired 160 tpd – Malaysia, 1999
 - Natural gas fired 285 tpd – Japan, 2005
 - Natural gas fired 400 tpd – UAE, 2008
 - *Coal fired 500 tpd (25 MW) – SoCo, 2010*

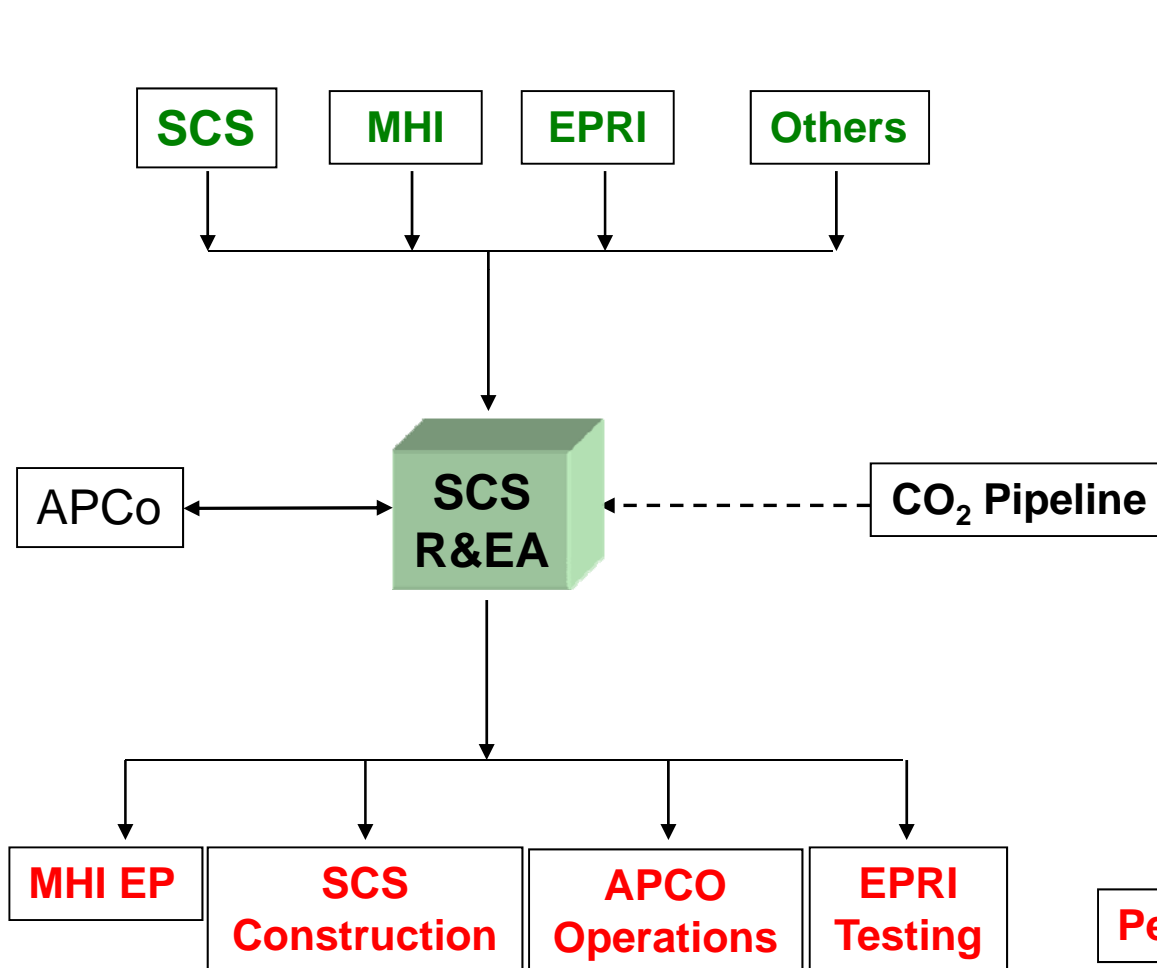


CO₂ Scrubber, Japan

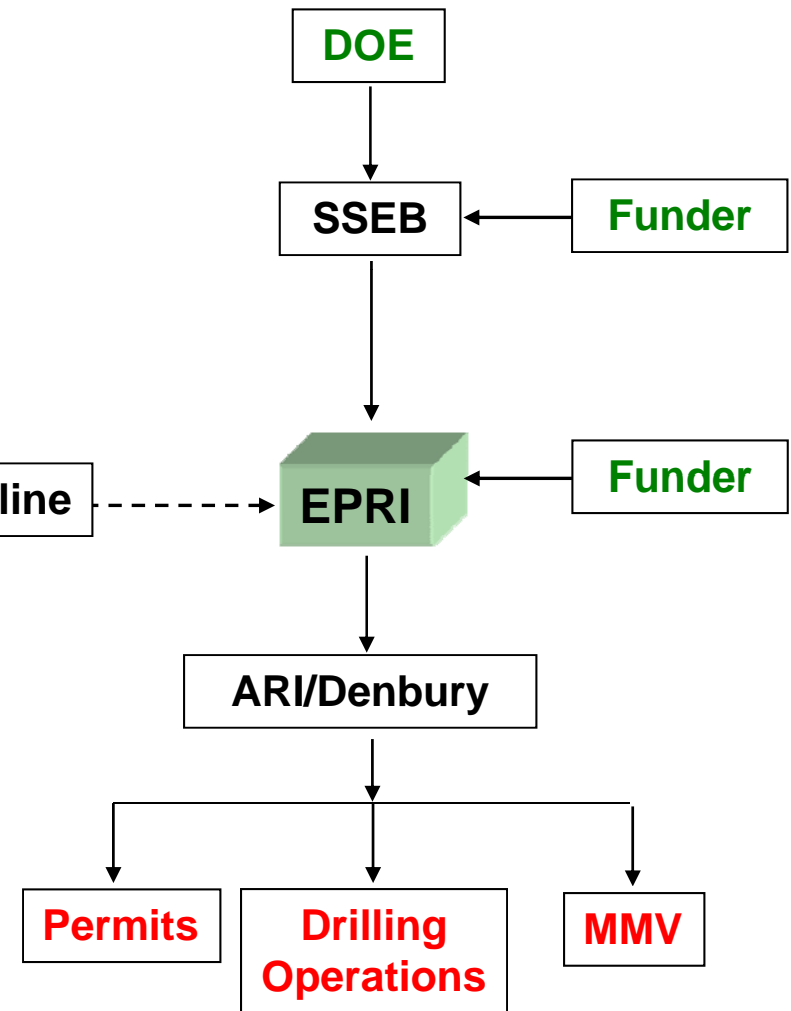
Project Structure



Capture Project



SECARB Phase III



Integrated CCS Demo – Current Status

- Capture Plant
 - Design: complete
 - Construction: 90% complete
 - Start up and commissioning: underway
 - Gas In: June 2011
 - Compressed Gas: July 2011
- Transportation and Sequestration
 - Characterization well complete
 - Denbury beginning initial pipeline and surface facility work
 - Procurement underway



25 MW Integrated CCS Demo – Progress Photos

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Integrated CCS Demo – Progress Photos

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25 MW Integrated CCS Demo – Progress Photos



25 MW Integrated CCS Demo – Progress Photos



25 MW Integrated CCS Demo – Progress Photos



25 MW Integrated CCS Demo – Progress Photos (5-7-10)

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25 MW Integrated CCS Demo – Progress Photos (10-8-10)

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25 MW Integrated CCS Demo – Progress Photos (1-17-11)

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CO2 Capture Facility – Process Island



Thanks for your attention!

Questions?
