

National Carbon Capture Center: Building a Successful Test Collaboration

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National Carbon Capture Center

- **Funding:** U.S. Department of Energy and its National Energy Technology Laboratory
 - DOE's primary carbon capture research facility since 2009
- **Sponsors:** Electric Power Research Institute, power/energy industry leaders
- **Managed/operated by:** Southern Company
- **Location:** Wilsonville, Alabama
- **Infrastructure:** Real-world industrial operating conditions, coal and natural gas flue gas, CO2 utilization and DAC
- **Expertise:** Technical staff for design, installation, testing support and analysis
- **International collaboration:** Co-founder of International Test Center Network



Major Accomplishments and Scope



- 129,000+ hours of testing since 2009
- 70+ technologies / developers from 7 countries
- Continuous expansion – alternative regeneration, gas injection, analytical support
- Flexibility for testing at multiple scales & on-site scale-ups
- Accelerated technology development
 - 16+ technologies in queue to test
 - Multiple technologies progressed to FEED studies
 - 8 technologies scaled up (or ready) to 10+ MW
 - CO₂ concrete technology announced commercialization

Reduced cost of CO₂ capture from fossil generation by 40%

Oct. 1, 2020 – 5-Year Agreement Renewal / \$140 Million
Expanding scope to CO₂ capture for **natural gas power**,
CO₂ utilization, **direct air capture**

Test Areas

Pilot-Scale



Slipstream Solvent Test Unit



Bench-Scale and Lab-Scale Areas



Project Implementation

Project Planning

- Screening
- NDA/TCA
- Onboarding

Project Scope

- Process
- Modification
- Integration

Design

- Mechanical
- Instrument
- Control
- Electrical
- Civil

Construction / O&M

- Foundation
- Flue Gas
- Utilities
- Installation
- Interconnection

Test Execution

- Operate
- Test Support
- Gas Analysis
- Troubleshoot
- Interpret Results



NCCC International Collaboration



Co-founder of International Test Center Network

Share knowledge (safety, test execution, technology screening, funding, analytical techniques, data analysis, construction, operation) among member facilities

- Support DOE's goal of international cooperation
- Broad effort in China, India, Middle East, Korea, Japan, EU, Great Britain, Australia, Canada, Norway
- Multiple levels of involvement
 - Host developers, sponsors, network members, consulting services, workshops, conferences, general knowledge sharing
- NCCC Collaboration with Japan
 - Chiyoda – post combustion solvent capture process
 - RITE - ITCN, technology screening, building a test facility
 - MHI – 25 MW demo with Southern Co, water gas shift catalyst
 - NEDO/METI – utilization program
 - Univ of Tokyo – knowledge sharing, membrane
 - Japan and US gov't knowledge sharing programs