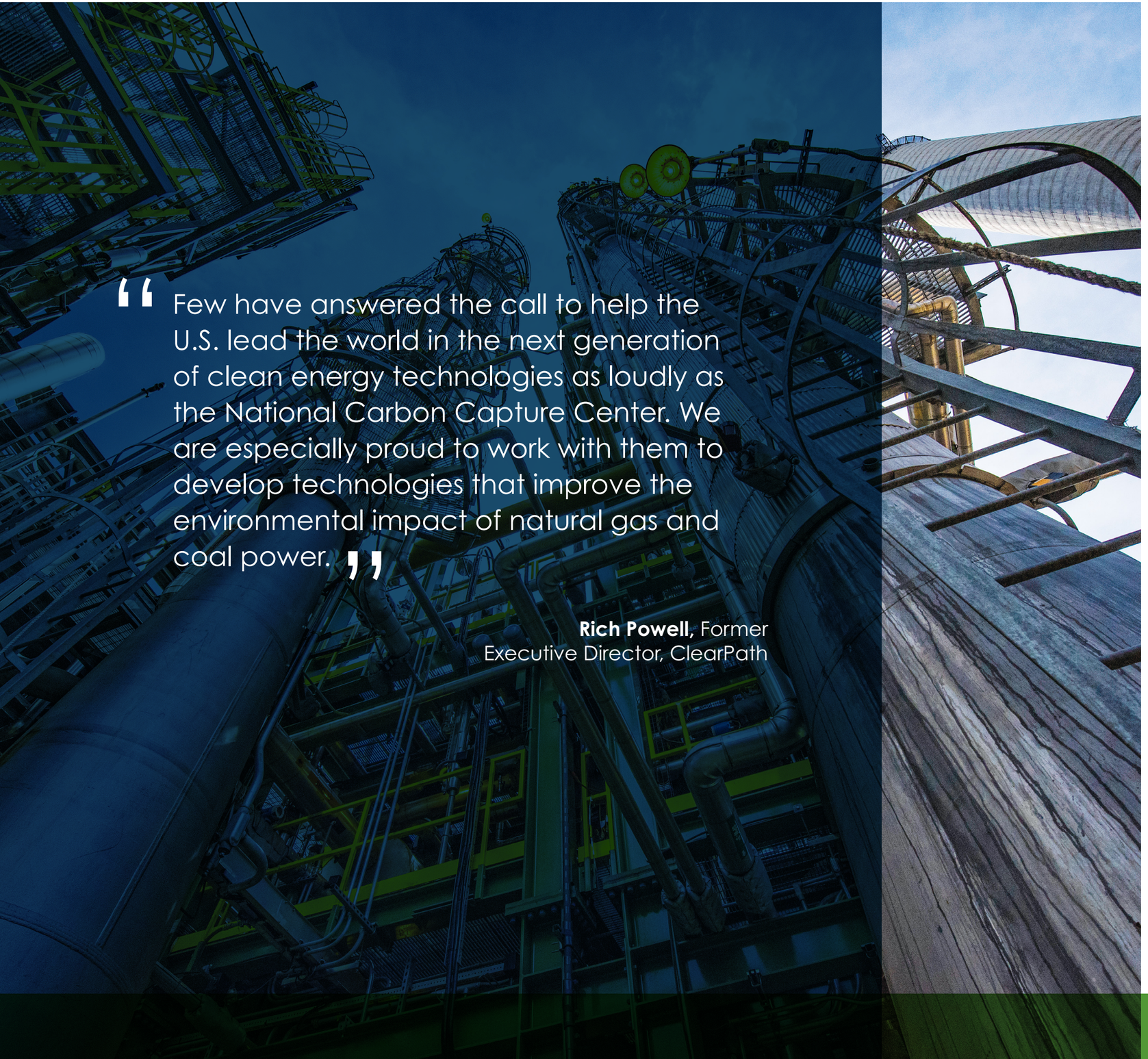
NATIONAL CARBON CAPTURE CENTER

Driving innovation for a clean energy future

Quickly **advancing technology solutions** toward deployment

Completing more than **150,000 testing hours**



> “Few have answered the call to help the U.S. lead the world in the next generation of clean energy technologies as loudly as the National Carbon Capture Center. We are especially proud to work with them to develop technologies that improve the environmental impact of natural gas and coal power.”
>
> **Rich Powell**, Former Executive Director, ClearPath

Advancing Technology Solutions

The National Carbon Capture Center (NCCC), a globally recognized and respected facility, plays a pivotal role in accelerating the commercial deployment of cost-effective carbon management technologies to help reduce greenhouse gas emissions.

Funded by the U.S. Department of Energy (DOE) and industry-leading sponsors, the NCCC leads the way in pioneering innovations in next-generation decarbonization processes. The NCCC's overall scope of carbon management technology development includes point-source carbon capture for fossil-based power plants and various industrial processes, carbon dioxide (CO_2) conversion and CO_2 removal.

Pilot-tested 80+ unique technologies from 50+ technology developers

Since its establishment in 2009, the NCCC, managed and operated by Southern Company, has been a hub of success. The center has hosted over 50 technology developers, both national and international, and tested more than 80 emerging technologies. This impressive track record is a testament to the NCCC's unwavering commitment to delivering results and its potential for future carbon management breakthroughs.

The NCCC believes in the power of collaboration. The center's highly specialized and experienced research engineers and project managers work directly with third-party technology developers to test a broad range of CO_2 management processes.

Advancing the commercialization of new materials and processes to remove CO_2 from industrial processes and the atmosphere is a key part of the NCCC's commitment to meeting future greenhouse gas emissions goals. This commitment is crucial for the environment, customers and communities, and helps limit the increased cost of energy, ensuring a sustainable future for all.

Leveraging Your Sponsorship

Joining a prestigious group of forward-thinking energy industry leaders and industrial participants has many advantages.

Our carbon management insights provide unequaled value to oil and gas companies, electric utilities, cement production, chemical manufacturing and other industrial and technology organizations assessing the future of carbon capture, conversion and negative-emission technologies.

Becoming a sponsor of the NCCC connects you with a collaborative team strongly aligned with DOE and other governmental entities. You also gain the prestige of being associated with other industry leaders and the reputational boost of supporting an organization dedicated to propelling decarbonization solutions to deployment. Your sponsorship will directly contribute to helping industry leaders implement their clean energy strategies.

The NCCC operates as a cost-shared collaborative venture. The DOE and its Office of Fossil Energy and Carbon Management and National Energy Technology Laboratory provide significant funding to support testing and scale-up technologies with commercial potential. The remaining funding requires research and development (R&D) investment through private-sector sponsorships, including energy-industry leaders, industrial and technology participants and prominent policy advocates.

Your sponsorship includes:

- Access to DOE's fossil energy and carbon management R&D program
- Confidential R&D results for technology testing
- Quarterly and annual technical reports/economic analyses (via case studies and reports)
- Technology evaluation summaries and performance results
- Access to biannual technology review meetings
- Balance-of-plant systems performance information
- NCCC-hosted meetings and tours (by request)

Sponsors also share a unique opportunity to participate firsthand in test plan development and technology performance awareness through observing operations. These valuable insights inform sponsors about technology scale-up, which typically involves specific steps in the scale-up process and the commercial potential of advanced carbon management technologies.

Timely information detailing technology development progress is shared with sponsors, enabling them to evaluate the suitability of the technologies for deployment in their commercial interests. For future collaboration, valuable relationships will be built with technology developers, funders and technology users.

Additionally, NCCC sponsors benefit from the center's leadership of organizations such as the International Test Center Network, a global carbon capture, utilization and storage coalition.

"We are excited about our National Carbon Capture Center sponsorship and look forward to collaborating with such a prestigious team of energy experts as we begin sharing critical test data, which is essential in realizing the full potential of carbon capture."

Chris Powers, VP, CCUS,
Chevron New Energies

Innovator Advantages

Technology development is the primary function of the NCCC. Testing at the site offers a significant economic advantage to technology developers due to the NCCC's co-funding arrangement with DOE and other sponsors. Developers incur no costs for using the existing infrastructure and staff services unless their test requires additional infrastructure that does not broadly benefit future NCCC testing.

Expanded scope includes CO_2 capture for natural gas power generation, CO_2 conversion and utilization, and direct air capture technologies

Third-party technology developers from the public and private sectors leverage the testing experience at the facility to refine and confidently scale up their technologies. Data generated at the site has proved reliable and accurate.

The NCCC offers a wealth of exceptional benefits to our technology developers—most notably, a highly trained and experienced staff who collaborate with governments, technology companies, universities, industrial companies and startups to quickly advance their technologies toward commercial deployment. Our NCCC team includes:

- Design engineers with R&D experience in technology scale-up
- Research engineers who collect and evaluate data for in-depth technology understanding
- Project managers with R&D expertise to plan and execute the full project life cycle
- Experienced operations and maintenance staff
- Support staff to develop contracts and enact measures required for intellectual property protection

Technology developers and the NCCC's roughly 125 experienced team members have successfully pilot-tested more than 80 unique technologies.

"Carbon America was excited to test our new FrostCC™ technology at the National Carbon Capture Center. With an in-depth understanding of technology, the facility's highly specialized engineers and project managers enabled us to demonstrate carbon capture on natural gas flue gas successfully. Our FrostCC technology allows us to drive down capital costs of carbon capture projects to half what they are today."

Miles Abarr, Chief Technology Officer, Carbon America

"Testing at the National Carbon Capture Center allowed our Proteus and Polaris membranes to optimize and scale up in a real-world environment. Lessons learned showed us the importance of testing with real gases. The successful NCCC tests have provided us the confidence to pursue industrial pilots."

Tim Merkel, R&D Director, Membrane Technology & Research

Carbon Management Innovations

Due to the growing demand for carbon management options, the NCCC added significant infrastructure upgrades to support carbon capture testing for natural gas power plants and industrial facilities. A dedicated natural gas-fired boiler supplies flue gas containing 4% to 10% CO_2, depending on the amount of dilution air added. Moisture content is controlled through flue gas cooling on the boiler outlet.

NCCC testing also supports CO_2 conversion, which entails efficiently, economically and cleanly transforming CO_2 into value-added products. Applications for CO_2 conversion include fuels, plastics, chemicals, food and feeds, building materials, enhanced oil recovery, energy storage and wastewater treatment.

Tests of enzymes, membranes, sorbents, solvents and hybrid and cryogenic systems have been conducted at the NCCC with over 12 technologies scaled up (or ready) to be demonstrated at 10 megawatts (MW) or greater.

More than 12 technologies ready for 10 MW+ demonstration

The NCCC provides testing and evaluation of new technologies at Alabama Power's Plant Gaston, utilizing flue gas from a natural gas testing system and Gaston Unit 5, a commercial, 880-MW supercritical pulverized coal-fueled unit. The center offers multiple test bays that allow simultaneous pilot-, bench- and lab-scale operation.

Finally, the NCCC's scale allows technology maintenance, safety and reliability issues to be thoroughly investigated at far lower costs than those incurred at alternative commercial-scale demonstrations.

> "ION's journey is a very special story thanks to the National Carbon Capture Center and the DOE. Successful testing of our lead solvent, ICE-31, allowed us to identify an early adopter like Calpine, which made CCUS a major priority, resulting in the Office of Clean Energy Demonstrations Major Demonstration Project award. Looking back over the past 10 years, ION would not be where we are today without the support of the National Carbon Capture Center."
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> **Buz Brown**, Founder and Chairman, ION Clean Energy

Making a Lasting Impact

The NCCC has collaborated with more than 60 government, university and research organizations from seven countries. Through these collaborations, they have achieved more than 150,000 hours of technology testing for carbon management innovators—leading to significant scale-ups, process enhancements and technological breakthroughs. Based on pilot testing and development of more than 80 technologies, the center has already reduced the projected cost of carbon capture from fossil-based power generation by more than 40%.

Utilizing Our Facilities

The NCCC's mission is to provide a world-class infrastructure and flexible testing with the guidance and support of its skilled technical team.

Reduced projected cost of CO_2 capture 40%+

The center accomplishes its mission by offering third-party technology developers real-world operating conditions, critical infrastructure (to evaluate promising technologies for scale-up and future commercial deployment) and high-quality data acquisition. Additionally, the site is frequently modified to expand testing opportunities.

Our facility collaborates with energy innovators worldwide to accelerate the development and deployment of carbon management technologies to reduce greenhouse gas emissions from natural gas and coal power plants and industrial sources and to promote carbon conversion, negative-emission and direct air capture solutions.

Our Location

Located at Alabama Power's Plant Gaston in Wilsonville, Alabama, the NCCC offers world-class infrastructure, real-world operating conditions, flexible testing, a highly skilled technical team and an ever-evolving scope. We assist technology developers in testing and evaluating a wide range of cost-competitive carbon management technologies and processes that will result in diverse uses in power generation and industrial applications.

Southern Company

NATIONAL CARBON CAPTURE CENTER

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