



Carbon Capture Demonstration Projects Program Front-End Engineering Design (FEED) Studies

The Carbon Capture Demonstration Projects Program, managed by the U.S. Department of Energy's (DOE) Office of Clean Energy Demonstrations (OCED), aims to de-risk integrated carbon capture and storage (CCS) demonstrations and catalyze significant follow-on investments from the private sector for commercial-scale, integrated CCS demonstrations on carbon emissions sources across industries in the United States. To advance CCS demonstrations, OCED sought applications to execute and complete front-end engineering design (FEED) studies for prospective integrated carbon capture, transport (if required) and storage systems projects. OCED awarded this FEED study in December 2023.

CCS FEED Study Awardee

Southern States Energy Board: Foreman Cement Plant Integrated CO₂ Capture

Project At A Glance

- » **Project Total:** \$15,181,354*
- » **OCED Award Amount:** \$7,581,354
- » **Total Potential Carbon Savings:** 1.4 million metric tons of CO₂ per year
- » **Project Synopsis:** Develop a carbon capture and storage integrated solution to support reduction of CO₂ emissions associated with cement manufacturing
- » **Awardee:** Southern States Energy Board is an interstate compact composed of governors, state legislators, and a presidential appointee from 16 southern states and 2 territories
- » **Project Locations:** Ash Grove Cement Foreman Plant; Foreman, Arkansas
- » **Project Start Date:** TBD

*For FEED study only.

About This Project

OCED is working with Southern States Energy Board to evaluate the cost and performance of retrofitting a cement plant with a cryogenic-based carbon capture technology, and identify benefits to the community from the technology retrofit. The study will evaluate the use of Air Liquide's Cryocap™ technology, which represents an alternative to solvent-based carbon capture approaches. The study will also examine carbon dioxide (CO₂) storage opportunities by working with a commercial off-taker and drilling a stratigraphic test well to support an EPA UIC Class VI permit application.

A future project at this site could capture 95% of the carbon dioxide emissions from the plant, or roughly 1.4 million metric tons of CO₂ per year. This would support the reduction of CO₂ emissions associated with cement manufacturing and improve the sustainability of the Ash Grove Cement Foreman Plant, a major employer in the region. The FEED study will include the development of a robust Community Benefits Plan (CBP), engineering designs, a preliminary engineering design plan, critical design review, final design engineering package, final FEED report, preliminary pipeline route, final pipeline FEED study, and Environmental Health & Safety Assessment Report.

The U.S. Department of Energy established OCED to help scale the emerging technologies needed to tackle our most pressing climate challenges and achieve net-zero emissions by 2050. OCED's mission is to deliver clean energy demonstration projects at scale in partnership with the private sector to accelerate deployment, market adoption, and the equitable transition to a decarbonized energy system.

Southern States Energy Board CCS FEED Study

Project Fact Sheet

Project Site

The Ash Grove Cement Foreman Plant is located in Little River County in southwest Arkansas. The plant has been in operation since 1958, currently producing more than 1.5 million tons of Portland cement each year. The study will identify and evaluate a favorable CO₂ storage field to support the permanent storage of carbon.

Community Benefits Plan

The Foreman Cement Plant Carbon Capture and Storage FEED study CBP aims to create local benefits, such as a reduction in atmospheric pollution, that will flow directly to nearby communities. To mitigate potential impacts of this project and maximize its benefits, the CBP will promote equity and inclusion through detailed plans to:

- Engage with local stakeholders to discuss the project and to address potential community concerns.
- Create and retain good-paying jobs in the region.
- Establish a network of participating universities, including minority-serving institutions.
- Deploy an educational and employment program focused on increasing access to clean energy information and career opportunities.

Replicability

Decarbonizing the cement sector is critical to help the U.S. become a net-zero economy by 2050 and reach a 50% reduction in economy-wide net greenhouse gas pollution from 2005 levels by 2030. Cement production accounts for approximately 8% of global carbon emissions and roughly 70 million tons of carbon emissions per year. The chemical process behind cement production is highly carbon intensive and cannot be replaced with other methods, making carbon capture a key tool for decarbonizing this industry. The U.S. has 98 total cement plants, 96 in 34 states and two in Puerto Rico, that must be decarbonized over the next 20 years to achieve net-zero greenhouse gas goals in the sector.

The project evaluated in the selected FEED study would use a carbon capture technology that represents a more environmentally benign alternative to solvent-based approaches. The Cryocap™ technology only requires electricity and water, can manage impurities such as NO_x, SO_x, mercury, and particulate matter, and does not require any chemicals or flammables for the capture process. This study will help to advance the use of this technology in multiple industrial applications, in addition to the deployment of carbon capture technologies in the critical cement sector.

To learn more about Carbon Management you can access DOE's [Pathways to Commercial Liftoff](#) report or visit the [Carbon Management](#) section on the OCED website.



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More Resources

Website: energy.gov/oced/CCFEEDs

Office of Clean Energy Demonstrations:
energy.gov/oced

Carbon Management Interactive Graphic:
edx.netl.doe.gov/carbonstorage/interactive-graphic/

