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 September 2023.

Project At A Glance

- **Project Total:** $17,163,453*
- **OCED Award Amount:** $8,192,430
- **Total Potential Carbon Savings:** 3.6 million tons of CO_2 per year
- **Project Synopsis:** Conduct an integrated FEED study for a carbon capture and storage project at Duke Energy's Edwardsport Integrated Gasification Combined Cycle plant
- **Awardee:** Duke Energy Indiana, LLC (Duke Energy), operates a 618 MW coal-based integrated gasification combined cycle power plant in Edwardsport, Indiana
- **Project Locations:** Duke Energy; Edwardsport, Indiana
- **Project Start Date:** October 2023

*For FEED study only.

About This Project

Through this FEED study, OCED is working with Duke Energy to demonstrate the company's CCS technology design. The study seeks to evaluate the feasibility of capturing and storing carbon dioxide (CO_2) from the flue gases of the two heat recovery steam generators at the Edwardsport Integrated Gasification Combined Cycle (IGCC) power generation plant in Knox County, Indiana. The study will evaluate use of Honeywell Advanced Solvent Carbon Capture process, which has a Technology Readiness Level of 7. The project aims to capture, compress and store onsite 3.6 million tons of CO_2 per year, achieving a carbon capture efficiency of more than 95%.

A key advantage of the Edwardsport IGCC plant site is the availability of ample pore space for storage of carbon dioxide (CO_2). The host site has an estimated 400 million metric tons of pore space. An initial 9 month validation budget period will be conducted first, and then the FEED study will be delivered in a second budget period of 24 months. The project will also include development of a robust Community Benefits Plan (described below) along with both preliminary and final design engineering packages, cost estimates, an Environmental Health & Safety Assessment Report, and a final FEED 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.

Duke CCS FEED Study
Project Fact Sheet

Project Site

The Edwardsport IGCC plant is located in southwestern Edwardsport, Indiana, in Knox County. The FEED study will explore the possibility of achieving deeper reductions in criteria pollutant emissions at this facility.

Community Benefits Plan

A key deliverable for this project includes a Community Benefits Plan (CBP), informed and developed in consultation with the project community. Designed in conjunction with the FEED study, the CBP will promote equity and inclusion through detailed plans to:

- Engage with a wide range of local stakeholders – such as labor unions, local governments, and community-based organizations that support or work with disadvantaged communities – throughout the project's conception.
- Advance Diversity, Equity, Inclusion, and Accessibility (DEIA), as well as engagement, job and job quality impacts, and Justice40.

Replicability

Coal is the largest domestically produced source of energy, with roughly 200 GW of coal-fired generation capacity in the United States, representing approximately 18% of the nation's electricity generation. Successful demonstration of carbon capture technology in coal-powered generation can help to drive decarbonization in this sector while supporting stable and affordable power generation and workers during a clean energy transition. CCS has the potential to drive 20% of the global emissions reductions needed by 2050. Broad deployment of this technology will contribute to greenhouse gas reduction goals, helping 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. 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.

Contact

Program Email: ccdemoprojectsprogram@hq.doe.gov

Site-Specific Email: Efficient_feed@hq.doe.gov

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/