



The U.S. Department of Energy's (DOE) Carbon Capture, Utilization, and Storage (CCUS) research and development (R&D) program advances safe, cost-effective capture and use or permanent storage of carbon dioxide (CO₂).

Three of DOE's major CCUS demonstration projects are detailed below.

NRG Energy's Petra Nova Project

NRG Energy's Petra Nova project utilizes post-combustion CO₂ capture at a retrofitted coal-fired power plant, the W.A. Parish Electric Generating Station near Houston, TX. This 240 MWe project is designed to capture 1.4 million metric tons of CO₂, which is used for enhanced oil recovery (EOR) at a depleted oil field approximately 80 miles away. The project is part of DOE's Clean Coal Power Initiative program.



Petra Nova, the largest post-combustion carbon capture system on a coal-fired power plant in the world successfully began commercial operations on January 10, 2017. The Petra Nova project continues to make progress in CO₂ storage and EOR. As of August 2019, Petra Nova has captured and sent over 3.27 million short (U.S.)

tons of CO₂ into associated storage. Thanks to Petra Nova, the depleted West Ranch Oil Field has produced over 3.3 million barrels of oil through EOR.

Petra Nova was declared a 2017 Plant of the Year by *Power Magazine* and a 2017 Coal Project of the Year by *Power Engineering Magazine*.

Air Products and Chemicals Project

The Air Products and Chemicals project at a petroleum refining facility in Port Arthur, TX is a part of DOE's Industrial Carbon Capture Storage (ICCS) initiative. This project uses vacuum swing adsorption technology to capture CO₂ contained in the product streams of two steam methane reformers for hydrogen production. This project captures approximately 1 million metric tons of CO₂ per year that is used for EOR.

Executed on time and under budget, the Air Products and Chemicals project attained full commercial operation in March, 2013. It has operated at more than 100% of its design capacity when necessary. The Air Products and Chemicals project has successfully captured and stored over 5 million metric tons of CO₂ for EOR.

Archer Daniels Midland Company Project

The Archer Daniels Midland Company (ADM) project is a part of DOE's ICCS initiative as well. Located near Decatur, IL, this project demonstrates an integrated system for capturing CO₂ from a biofuel ethanol production facility and geologically sequestering the captured CO₂ in the Mt. Simon Sandstone Reservoir in the expansive Illinois Basin, one of the largest and best saline aquifers in the world.



The ADM project was the first to commercially utilize the new EPA Class VI Underground Injection Control permit designed for CO₂ sequestration. The implementation and validation of deep subsurface and near-surface monitoring, verification, and accounting of CO₂ is an important part of this project. That ensures secure storage of the CO₂.



The ADM project started commercial operations on April 7, 2017 and has already achieved its full injection rate of 925,000 metric tons of CO₂ per year. As of August 2019, 1.32 million metric tons of CO₂ have been injected into the Mount Simon Sandstone saline reservoir.