NRG Energy’s Petra Nova Project

NRG Energy’s Petra Nova project utilizes post-combustion \( \text{CO}_2 \) 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 \( \text{CO}_2 \), 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 \( \text{CO}_2 \) storage and EOR. As of August 2019, Petra Nova has captured and sent over 3.27 million short (U.S.) tons of \( \text{CO}_2 \) 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 \( \text{CO}_2 \) contained in the product streams of two steam methane reformers for hydrogen production. This project captures approximately 1 million metric tons of \( \text{CO}_2 \) 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 \( \text{CO}_2 \) 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 \( \text{CO}_2 \) from a biofuel ethanol production facility and geologically sequestering the captured \( \text{CO}_2 \) 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 \( \text{CO}_2 \) sequestration. The implementation and validation of deep subsurface and near-surface monitoring, verification, and accounting of \( \text{CO}_2 \) is an important part of this project. That ensures secure storage of the \( \text{CO}_2 \).
The ADM project started commercial operations on April 7, 2017 and has already achieved its full injection rate of 925,000 metric tons of CO\textsubscript{2} per year. As of August 2019, 1.32 million metric tons of CO\textsubscript{2} have been injected into the Mount Simon Sandstone saline reservoir.