

the **ENERGY** lab

PROJECT FACTS

Clean Coal Power Initiative (CCPI 3)

American Electric Power (AEP): Mountaineer Carbon Dioxide Capture and Storage Demonstration

Background

A need exists to further develop carbon management technologies that capture and store or beneficially reuse carbon dioxide (CO₂) that would otherwise be emitted into the atmosphere from coal-based electric power generating facilities. Carbon capture and storage (CCS) technologies offer great potential for reducing CO₂ emissions and mitigating global climate change, while minimizing the economic impacts of the solution.

Under the second closing of the Clean Coal Power Initiative (CCPI) Round 3 program, the U.S. Department of Energy (DOE) is providing financial assistance, including funding under the American Recovery and Reinvestment Act (ARRA) of 2009, to industry to demonstrate the commercial viability of next generation technologies that will capture CO₂ emissions and either sequester those emissions, or beneficially reuse them. Once demonstrated, the technologies can be readily considered in the commercial marketplace by the electric power industry.

Project Description

The DOE selected American Electric Power (AEP) to receive funding from the American Recovery and Reinvestment Act (ARRA) of 2009, in addition to private capital cost sharing, through the CCPI Round 3 program for its Mountaineer Carbon Dioxide Capture and Storage Demonstration Project. The Mountaineer project will capture and sequester approximately 1.5 million tons per year of CO₂ that would otherwise be emitted into the atmosphere. The project is comprised of members from government, industry, and academia. American Electric Power (AEP) will lead the design, construction, and operation of a CCS system using the Alstom Chilled Ammonia Process (CAP), which is expected to effectively capture at least 90% of the carbon dioxide from a 235 megawatt electric (MWe) slipstream of the 1300 MWe Mountaineer coal-fired power plant located near New Haven, West Virginia. The CO₂ will be captured, compressed, and transported by pipeline to injection sites located on AEP property near the capture facility. The target storage reservoirs are the Rose Run sandstone and the Copper Ridge formations which are capped by multiple extensive containment layers.

The project represents the culmination of a systematic process of scaling up carbon capture technology from pilot and validation to commercial-scale demonstration. The CAP technology was first tested at 1.7 MWe equivalent size at the We Energies Pleasant Prairie plant and then at a 20 MWe validation scale facility

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ADDITIONAL PARTNERS

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Potomac Hudson



PROJECT DURATION

Start Date

02/01/2010

End Date

06/30/19

COST

Total Project Value

\$668,000,000

DOE/Non-DOE Share

\$334,000,000 / \$334,000,000



Government funding for this project is provided in whole or in part through the American Recovery and Reinvestment Act.



Figure 1. Chilled Ammonia CO₂ Capture Process Validation Facility

(shown in Figure 1 above) at the Mountaineer plant. Successful demonstration of the CAP system coupled with sequestration will reduce CCS technology risks. This will enable subsequent commercial deployment by significantly reducing overall capture costs compared to existing conventional carbon dioxide post combustion capture systems and by demonstrating the viability of sequestration in regional deep saline reservoirs.

The project consists of four phases: Project Definition (Phase I), Design and Permitting (Phase II), Construction and Startup (Phase III), and Operations/Demonstration (Phase IV). Sequestration of 1.5 million tons per year of CO₂ will begin by the end of 2015.

Goals/Objectives

The goal of the project is to advance CCS technologies from the demonstration stage to commercial viability. Project objectives include:

- Utilizing Alstom Power's CAP to capture at least 90 % of CO₂ from a flue gas slipstream.
- Compressing and transporting CO₂ by pipeline to injection sites.
- Permanently storing CO₂ in two separate saline formations located approximately 1.5 miles below the surface.

Benefits

The CAP system is expected to reduce overall costs compared to existing conventional CO₂ post combustion capture systems. Based on the cost savings, AEP will consider the application of CAP to both existing and new pulverized coal-based units in the AEP system. This same technology could be applied to many additional gigawatts of coal-based electric capacity in the United States and throughout the world.

The AEP project presents unique advantages:

- It will achieve approximately 90% CO₂ capture efficiency and sequester approximately 1,500,000 tons of CO₂ per year.
- It will demonstrate commercial scale CO₂ storage in deep saline aquifers which would be a likely sequestration target for most coal-fired power plants in the U.S. and the world.
- It will demonstrate a capture technology that could potentially reduce post-combustion CO₂ capture costs over that of conventional amine based systems by over 50%.
- The new plant is anticipated to boost the local economy by creating approximately 800 local construction jobs.



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