the ENERGY lab

PROJECT FACTS

Industrial Carbon Capture and Sequestration (ICCS)

Air Products and Chemicals, Inc.: Demonstration of CO_2 Capture and Sequestration of Steam Methane Reforming Process Gas Used for Large-Scale Hydrogen Production

Background

Carbon dioxide (CO_2) emissions from industrial processes are linked to global climate change. Advancing development of technologies that capture and store or beneficially reuse CO_2 that would otherwise reside in the atmosphere for extended periods is of great importance. Carbon capture and storage (CCS) technologies offer significant potential for reducing CO_2 emissions and mitigating global climate change, while minimizing the economic impacts of the solution.

Under the Carbon Capture and Sequestration from Industrial Sources and Innovative Concepts for Beneficial CO_2 Use (ICCS) program, the U.S. Department of Energy (DOE) is collaborating with industry in cost sharing arrangements to demonstrate the next generation of technologies that will capture CO_2 emissions from industrial sources and either sequester those emissions or beneficially reuse them. The technologies included in the ICCS program have progressed beyond the research and development stage to a scale that can be readily replicated and deployed into commercial practice within the industry.

Project Description

The DOE selected Air Products and Chemicals, Inc. (Air Products) to receive ICCS program funding through the American Recovery and Reinvestment Act (ARRA) of 2009, for its Demonstration of CO_2 Capture and Sequestration of Steam Methane Reforming Process Gas Used for Large-Scale Hydrogen Production project. For this project, Air Products will design and demonstrate a state-of-the-art system to concentrate CO_2 from two steam methane reformer (SMR) hydrogen production plants, and purify the CO_2 to make it suitable for delivery via pipeline for sequestration by injection into an oil reservoir for an enhanced oil recovery (EOR) project. Air Products plans to retrofit its two Port Arthur SMRs with a vacuum swing adsorption (VSA) system to separate the CO_2 from the process gas stream, followed by compression and drying processes. This process will convert the initial stream containing more

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PARTNERS

Denbury Onshore, LLC

PROJECT DURATION

Start Date	End Date
11/16/2009	09/30/2015

COST

Total Project Value
$430648,802

DOE/Non-DOE Share
$284,012,496 / $146,636,306

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

than 10 percent CO_2 to greater than 98 percent CO_2 purity for delivery to the pipeline, with negligible impact on the efficiency of hydrogen production. The technology will remove more than 90 percent of the CO_2 from the process gas stream used in a world-class scale hydrogen production facility.

Project activities include engineering and design, construction, commissioning and startup, and the operation of all components of the project. A monitoring, verification and accounting (MVA) program to monitor the injected CO_2 will be designed and implemented.

Port Arthur 1 & 2 plants

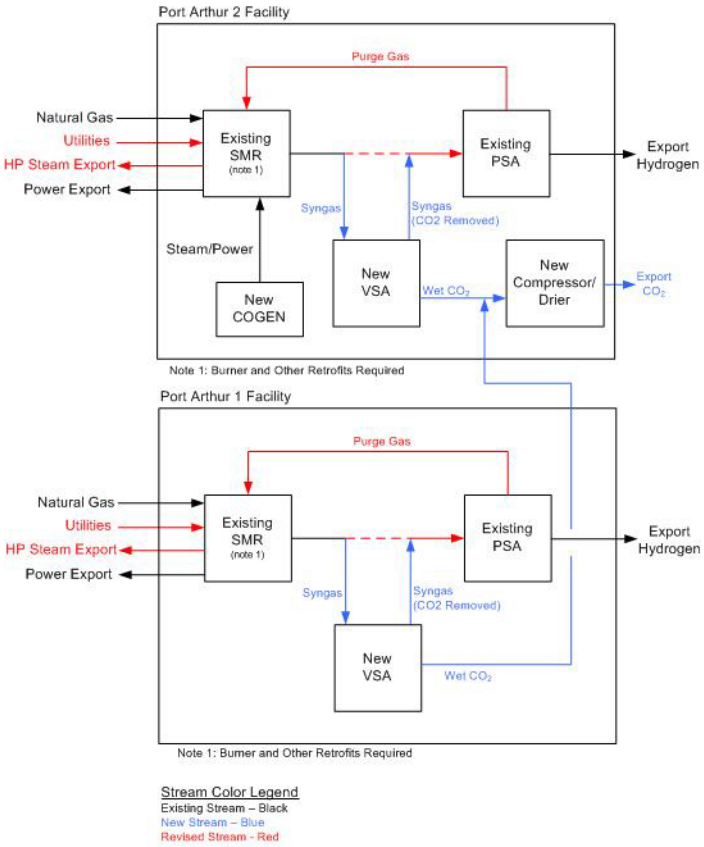
Goals/Objectives

The project goal is to advance CCS technologies from the demonstration stage to commercial viability. The project objective is to capture CO_2 from two SMR hydrogen production plants and sequester it in an oil reservoir for EOR in order to successfully demonstrate the technology and maximize the economic viability of commercial-scale CCS.

Benefits

Overall the project will address climate change concerns, enhance U.S. economic and energy security, and boost domestic oil production. Specific project advantages and benefits include:

- Capturing approximately 1 million metric tons per year of CO2, that would otherwise be emitted to the atmosphere, for permanent sequestration in geologic formations for EOR applications.
- The CO_2 to be used for EOR will result in approximately 1.6 to 3.1 million barrels of additional domestic oil production.



CO_2 System Sketch