Air Products Celebrates Texas Carbon Capture Demonstration Project Achievement

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Captured CO2 Increases U.S. Natural Resource Output At Enhanced Oil Recovery Operation

LEHIGH VALLEY, Pa., May 10, 2013 /PRNewswire/ -- Air Products (NYSE: APD) today celebrated the successful operation of a United States Department of Energy (DOE) Demonstration Project that will capture approximately one million tons of carbon dioxide (CO_2) in an enhanced oil recovery project in which DOE anticipates an additional estimated 1.6-3.1 million barrels of oil to be produced annually from the CO_2 injection. This unprecedented achievement comes by way of an Air Products innovative technology, is the first-of-its-kind operating at such a large scale, and has not been accomplished anywhere else in the United States.

Described by the DOE as a milestone in its Industrial Carbon Capture and Storage (ICCS) program, Air Products' carbon capture project in Port Arthur, Texas recovers and purifies the CO_2, all of which is then transported in its gaseous state by Air Products via a pipeline owned by Denbury Green Pipeline-Texas, LLC for injection into the Denbury Onshore operated West Hastings Unit, an enhanced oil recovery project in Texas.

"Air Products is very proud to celebrate this Demonstration Project's success. When you define projects that could be a model of sustainability, it doesn't get much better than this effort in taking a vented greenhouse gas and capturing it, cleaning it up, and sequestering it in the process of increasing the output of a valuable domestic natural resource like crude oil," said Jeff Byrne, vice president and general manager – Tonnage Gases at Air Products.

"We have worked hard to build our reputation for successfully executing large scale industrial projects and bringing them onstream, on time and budget. We did just that, here at Port Arthur, using a new patent-protected technology that we developed. At the same time, this novel and technology-leading Demonstration Project would not have been achievable without the support and involvement of DOE," he said.

Air Products designed, constructed, and is now operating the state-of-the-art system to capture CO_2 from its steam methane reformers (SMR) located within the Valero Port Arthur Refinery. The CO_2 removal technology was retrofitted to the SMRs, which produce hydrogen to assist in the making of cleaner burning transportation fuels by refinery customers on Air Products' Gulf Coast hydrogen pipeline network. Hydrogen is widely used in petroleum refining processes to remove impurities found in crude oil such as sulfur, olefins and aromatics to meet product fuels specifications.

Incidentally, Air Products' Gulf Coast hydrogen plant and pipeline supply network is the world's largest system of its kind. The pipeline stretches from the Houston Ship Channel in Texas to New Orleans, Louisiana. The 600-mile pipeline span is fed by over 20 Air Products' hydrogen production facilities and provides over 1.2 billion cubic feet of hydrogen per day to refinery and petrochemical customers.

DOE had previously stated that, "This event marks a milestone in DOE's ICCS program: progressing beyond research and development to a demonstration scale that can be readily replicated and deployed into commercial practice within the industry. Goals of the ICCS program are to mitigate climate change through carbon capture, utilization and storage; create jobs; and position the United States as a world leader in carbon-capture technologies."

DOE provided a significant portion of the funding (66%) for the over $400 million project. In June 2010, Air Products was selected to receive $253 million in funding from DOE through the National Energy Technology Laboratory under the ICCS Program, which is funded by the American Recovery and Reinvestment Act (ARRA) for this project. It later received an additional $30 million from DOE through the ARRA for final engineering, design, construction, and project operation through September 2015. Air Products' project was the only industrial gas company led undertaking selected by DOE, and one of only three projects receiving additional funding towards a commercial demonstration project.

The DOE has estimated that Air Products' Port Arthur Project will assist in the recovery of 1.6-3.1 million additional barrels of domestic oil annually. DOE has stated that when an oil well begins "playing out," not enough oil is pumped to make it worthwhile to continue using the well, and the well is closed or "shut-in," even though much of the original oil in the field remains in the formation. Several methods of enhanced oil recovery have been developed to recover this remaining oil, including pumping CO_2 down to the oil reservoir. A primary purpose of the DOE project is, however, the monitoring, verification, and accounting program to ensure that the injected CO_2 remains underground, safely and permanently trapped in the same geologic formation that confined the oil brought to the surface in the demonstration.

Air Products has also worked on several carbon capture and sequestration (CCS) projects around the world for the power market. These projects include:

- The world's first full demonstration of oxyfuel CCS with Vattenfall AB, one of Europe's leading energy companies. Air Products installed its proprietary CO_2 capture, purification, and compression system at Vattenfall's facility in Schwarze Pumpe, Germany, viewed globally as the preeminent CO_2 oxyfuel project.
- In collaboration with the Alberta Energy Research Institute, a study focused on advanced CO_2 capture technology for use with gasification.
- In cooperation with DOE, Air Products designed and constructed a CO_2 purification system in support of oxyfuel technology development at a boiler-simulation facility in Connecticut.
- Air Products demonstrated oxyfuel sour compression technology in work by Imperial College London with flue gas from a 160 kilowatt coal-fired combustion installation at Doosan Babcock's facility in Scotland, as part of the Oxycoal-UK Project.

Details on Air Products' CO_2 purification technologies can be found at www.airproducts.com/microsite/carbon_capture/index.asp.

Additional details on Air Products' expertise in hydrogen production and supply can be found at www.airproducts.com/microsite/h2-pipeline/.

About Air Products
Air Products (NYSE:APD) provides atmospheric, process and specialty gases; performance materials; equipment; and technology. For over 70 years, the company has enabled customers to become more productive, energy efficient and sustainable. More than 20,000 employees in over 50 countries supply innovative solutions to the energy, environment and emerging markets. These include semiconductor materials, refinery hydrogen, coal gasification, natural gas liquefaction, and advanced coatings and adhesives. In fiscal 2012, Air Products had sales approaching $10 billion. For more information, visit www.airproducts.com.

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