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Committee on Science, Space and Technology

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Field Hearing on the "The Future of Advanced Carbon Capture Research and Development"

Testimony of
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Mr. Chairman, Ranking Member and members of the Committee, I appreciate the opportunity to testify before you today. My name is Roger A. Dewing, Director of Technology, CCUS, at Air Products and Chemicals, Inc.

First, I want to commend the leadership of this Committee for exploring the promise of carbon capture technology and its importance to global energy.

I'd like to start by outlining how Air Products believes Carbon Capture and Storage, or CCS, projects may develop over the next few years. I'll highlight how important these projects could be in reducing carbon dioxide emissions to the atmosphere whilst maintaining global energy supplies.

Many of the current proposed CCS projects revolve around the production and utilisation of hydrogen. Hydrogen may be the enabler for many CCS projects. If current hydrocarbon fuels, from natural gas to coal, are converted to hydrogen and carbon dioxide, or CO_2, and if the carbon dioxide is captured and stored, then the produced hydrogen can be considered to have been produced emission-free. This is being referred to as “Blue Hydrogen.”

Using hydrogen to distribute and store energy has some significant benefits. It can be used as the fuel for power generation in turbines. It can be used for transportation using fuel cells. It can be distributed to industry clusters to decarbonise energy intensive industries.

Excess hydrogen can be stored for use when demand is high. It can therefore be complementary to green energy projects such as solar or wind, providing a backup supply of energy when needed.

However, CCS projects will only become a reality if you can you answer two fundamental questions. Where will the CO_2 go, and who will pay for it to be captured and stored. I will explore these questions again in a moment.

Within Air Products I'm currently setting up a group to further develop our CCS technology, recruiting scientists and engineers into our U.S. head office in Pennsylvania and elsewhere. This is to meet the need for greater sustainability in global industrial projects.

Air Products' initial interest in CCS started in 2005 when these types of projects were being led by large power generation companies. However, global interest diminished with the recession of 2008. Interest is returning, but with a different focus. Current proposals are for a group of multiple projects feeding a separate single CO_2 storage solution. The US, Canada, EU, and China are leading this renewed interest.

The U.S. is the market leader for CCS projects and associated technology. Currently, over half the operating CCS projects around the world are in the U.S. There are already hundreds of miles of supercritical CO_2 pipelines moving large quantities of CO_2 for enhanced oil recovery known as EOR, and the federal 45Q tax credits provide financial incentives to capture CO_2. I would argue that this credit may not be enough on its own, but it is ahead of other countries who have yet to put this important funding in place.

Among the current CCS projects operating is Air Products' Port Arthur facility, here in Texas. It originally produced hydrogen and steam for refinery customers, but since a retrofit completed in 2013, it also captures 1 million metric tonnes per year of CO_2. The project was partially funded by the DOE which allowed us to develop our CO_2 Vacuum Swing Adsorption technology that can flexibly capture CO_2 from the process gas. Air Products also installed equipment for the compression and drying of the CO_2 so that it could be delivered to a local Denbury-owned CO_2 pipeline for EOR. We were also able to reconfigure the facility such that it still provides the same industrial gas products to our customers.

This capture project is still operating and is a success because it answers those two fundamental questions I posed earlier, where will the CO_2 go and who will pay for it to be captured and stored. First, the Denbury CO_2 pipeline, used to supply CO_2 for EOR, was only 13 miles away, so there was a home for the CO_2. Secondly, the DOE funding for the project, the 45Q tax credits, and fact that CO_2 has a value for EOR meant the project made financial sense.

Looking to the future, Air Products is actively seeking more projects like Port Arthur. That experience gives us a proven reference of designing and operating CCS projects. It is likely that many of the next projects may be of similar scope. Retrofits of existing hydrogen facilities lend themselves to capturing significant CO_2 at modest capital cost.

Air Products' recent acquisition of Shell and GE gasification technologies should offer another opportunity to develop CCS projects. Gasification technology converts a broad range of hydrocarbon feedstock into hydrogen rich synthesis gas. It is then possible to capture the CO_2 from this gas for storage. This means fuels such as coal can be used for energy supplies, with theoretically no CO_2 emissions to the atmosphere.

We also plan to extend the proven technology deployed at Port Arthur to increase capacity and improve its efficiency and reliability.

Some final thoughts. The use of fossil fuels will continue for many years to come and CCS will allow this to continue whilst still meeting CO_2 emission targets. CCS means the heavier carbon rich fuels may still be used to provide energy without the associated heavy burden of atmospheric CO_2 emissions.

CCS projects are in operation today, so the technology to capture and store CO_2 already exists and is reliable. There are no technology barriers to projects, but further research will be essential to reduce costs and improve efficiency. This will make more projects feasible when the two fundamental questions are asked and answered.

Thank you for the opportunity to present Air Products' perspective on CCS issues and I hope that with the continued support of the DOE that many more CCS projects like our Port Arthur facility will become reality.