



Department of Energy

Washington, DC 20585

November 13, 2013

The Honorable Fred Upton
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Chairman Upton:

Thank you for your October 15, letter regarding federal support for the development of carbon capture and storage (CCS) technologies.

On June 25, President Obama laid out a broad Climate Action Plan to cut carbon pollution in America, prepare the United States for the impacts of climate change, and lead international efforts to combat global climate change and prepare for its impacts. As the President has stated, fossil fuels – including coal – provide more than 80 percent of our energy today and they are projected to remain a large source of energy for decades. Therefore we must continue to support American leadership in technologies, such as CCS, that will reduce the greenhouse gas (“GHG”) emissions associated with the use of coal.

In addition to annual budget requests, the Administration’s support for CCS was made clear in the 2009 American Recovery and Reinvestment Act (ARRA), which provided \$3.4 billion for CCS. It was also evident in the formation of the Interagency Task Force on Carbon Capture and Storage, which the President charged in February 2010 to develop a plan for the deployment of CCS within ten years.

DOE continues to play a leadership role in the development of clean coal technologies, with a focus on CCS. Since 2005, as the Congressional Budget Office (CBO) has reported, over \$6.9 billion has been invested by DOE to develop the technologies, processes, and tools that will result in lower costs for CCS. Of that \$6.9 billion, \$4.45 billion has been invested to demonstrate first generation CCS technologies, and \$2.45 billion has been invested in second-generation CCS technologies. By fiscal year, Congress has appropriated the following funds:

FY2005	FY2006	FY2007	FY2008	FY2009 ¹	FY2010	FY2011	FY2012
\$351m	\$357m	\$414m	\$493m	\$4.142b	\$404m	\$400m	\$334m

¹ The FY2009 appropriation includes \$3.4 billion in ARRA Funds and \$50 million in funding by the Advanced Research Projects Agency-Energy (ARPA-E) for carbon capture.



These funds have both facilitated demonstration of these important CCS technologies and enabled the generation of significant amounts of valuable technical information, which can be used both by DOE and by the private sector to further spur progress.

To ensure proper stewardship of these funds the Coal Program continually monitors developments in the field and updates its plans to reflect the changing technical landscape of related R&D. The *DOE Carbon Capture and Storage Roadmap (2010)* and the *Carbon Sequestration Technology Program Plan 2011* provided in conjunction with this letter are two examples of the Coal Program's continual adjustment to the progress that is being made. In addition, DOE has generated detailed Program Plans for each subprogram element related to second-generation CCS demonstration (Gasification, Turbines, Fuel Cells, Advanced Combustion Systems, Carbon Capture, Carbon Storage, and Crosscutting Research). Each of these subprograms plays an important role in lowering the cost of integrated CCS systems. These Program Plans were completed in FY2013, and we provide them as attachments to this letter, for your review.

DOE-funded first generation CCS projects include the Kemper County project, which is currently under construction and expected to begin operation in 2014. This project is demonstrating a first-of-a-kind gasifier technology, and will capture, utilize, and store carbon dioxide (CO₂) in conjunction with enhanced oil recovery (EOR) operations. Another first generation CCS project funded by DOE is being performed by Air Products and Chemicals, Inc., and is capturing and utilizing CO₂ for EOR from a steam-methane reforming plant in Texas. This project demonstrates an innovative system to capture and separate CO₂ from hydrogen, and utilizes monitoring, verification and accounting (MVA) technologies to account for the CO₂ in the geologic formation. Several other first generation demonstration projects are either in the construction or design phase. The current status of the major demonstration projects can be found in the attached report, *Major Demonstration Programs: Program Update 2013*.

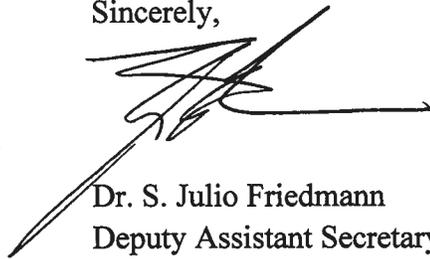
DOE-funded second generation technologies are currently transitioning from the laboratory- and bench-scale tests to pilot-scale testing under real-world conditions. For example, two advanced capture technologies, an advanced membrane by Membrane Technology and Research, Inc. and an advanced solid sorbent by ADA-ES, Inc. are currently being constructed and fabricated and will be ready for pilot-scale testing in 2014. These technologies show promise to reduce the energy penalty and cost of carbon capture compared to conventional technology, and successful pilot-scale testing under real-world conditions will help validate their progress. A current list of examples of second-generation CCS technologies, which describes those projects' current level of maturity, is included in the *2012 Technology Readiness Assessment of the FE Clean Coal Research Program*, which we also provide as an attachment to this letter. Furthermore, some of these projects are included in the reports entitled *DOE/NETL Advanced Carbon Dioxide Capture R&D Program Accomplishments – April 2012* and *Carbon Storage Program 2010-2011 Accomplishments – August 2012*, both of which are also attached here for your review.

While the 2010 Interagency Task Force Report on Carbon Capture and Storage (“Task Force Report”), to which you refer in your letter, stated that “early CCS projects face economic challenges related to climate policy uncertainty, first-of-a-kind technology risks, and the current high cost of CCS relative to other technologies,” the task force also concluded that “There are no insurmountable technological, legal, institutional, regulatory or other barriers that prevent CCS from playing a role in reducing GHG emissions.” The goals and recommendations of the task force were not focused on answering the basic question of whether CCS is a workable technology; as the report explains, the main components of the process (capture, transportation and storage) have been demonstrated in a number of projects worldwide, many of which are in commercial use. Instead, the goal of the task force was to make recommendations to enable the “widespread” deployment of CCS by the year 2020.

Since the release of the task force report, DOE has continued to implement its RD&D portfolio, focusing on demonstration of first generation technologies and laboratory, bench-, and pilot-scale development of second generation technologies. While challenges remain, and the legal and regulatory issues vary from site to site depending upon State and local law, the advancements that have been made in development and demonstration of CCS technologies are driving legal and regulatory measures that will ensure wider-scale deployment in future years. The seven DOE Best Practices Manuals regarding carbon storage (provided with this letter, for your review) provide insight into the steps required for implementation of a CCS project based on the current DOE project experience.

DOE welcomes your interest in its CCS programs, and we look forward to the opportunity to continue to provide the information the Committee requests.

Sincerely,

A handwritten signature in black ink, appearing to read 'S. Friedmann', with a long horizontal stroke extending to the right.

Dr. S. Julio Friedmann
Deputy Assistant Secretary
Office of Clean Coal
Office of Fossil Energy

cc: The Honorable Tim Murphy, Chairman
Subcommittee on Oversight and Investigations

The Honorable Joe Barton, Chairman Emeritus

The Honorable Ed Whitfield, Chairman
Subcommittee on Energy and Power

The Honorable Marsha Blackburn, Vice Chairman

The Honorable Michael C. Burgess, Vice Chairman
Subcommittee on Oversight and Investigations

The Honorable Henry A. Waxman, Ranking Member

The Honorable Diana DeGette, Ranking Member
Subcommittee on Oversight and Investigations

The Honorable Bobby Rush, Ranking Member
Subcommittee on Energy and Power