

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY**

HEARING CHARTER

The Future of Coal: Utilizing America's Abundant Energy Resources

Thursday, July 25, 2013
9:30 a.m. – 11:30 a.m.
2318 Rayburn House Office Building

PURPOSE

The Subcommittee on Energy will hold a hearing entitled *The Future of Coal: Utilizing America's Abundant Energy Resources* on Thursday, July 25, at 9:30 a.m. in Room 2318 of the Rayburn House Office Building. The purpose of the hearing is to examine coal-related technology challenges and opportunities, with an emphasis on enhancing the effectiveness and impact of Department of Energy research and development (R&D) activities,¹ including DOE's R&D priorities as well as Federal government and private industry investments.

WITNESS LIST

- **Mr. Chris Smith**, Acting Assistant Secretary for Fossil Energy, Department of Energy
- **Mr. Ben Yamagata**, Executive Director, Coal Utilization Research Council
- **Mr. Don Collins**, Chief Executive Officer, Western Research Institute
- **Ms. Judi Greenwald**, Vice President, Center for Climate and Energy Solutions

BACKGROUND

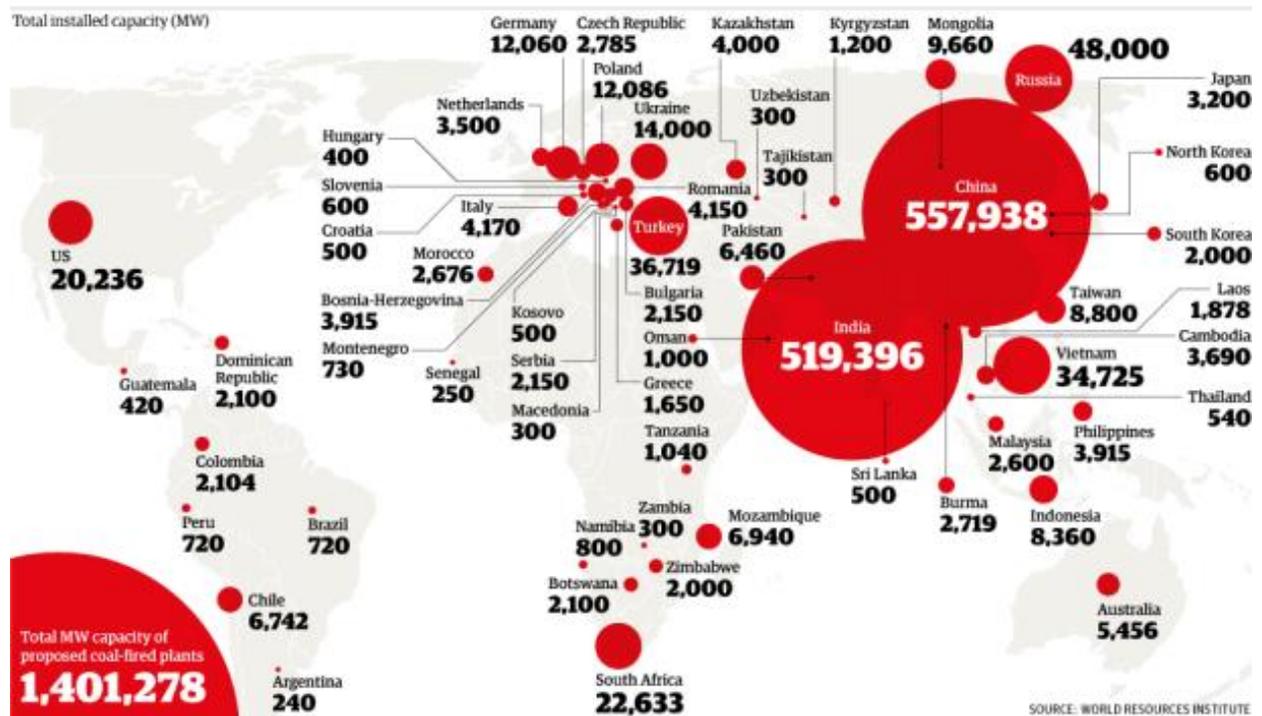
Coal currently generates approximately 40% of U.S. electricity, down from just under 50% in recent years.² The Energy Information Administration (EIA) projects nationwide demand for electricity will increase 28% through 2040, with coal's share of electric generation dropping to 35%. According to the World Resources Institute, total global proposed installation of coal-fired power plants is 1,401 gigawatts. The majority of these planned installations will be in India and China (Figure 1).

¹ For more information on coal-fired power plants, see Committee on Science Space and Technology hearing "*Advancing Coal research and Development for a Secure Energy Future*" October 13, 2011. Accessible at: <http://science.house.gov/hearing/energy-and-environment-subcommittee-hearing-advancing-coal-research-and-development-secure>

² Energy Information Administration, "*Annual Energy Outlook 2013*," April 2013. Accessible at: <http://www.eia.gov/forecasts/aeo/>

Figure 1: Proposed Coal-Fired Power Plants³

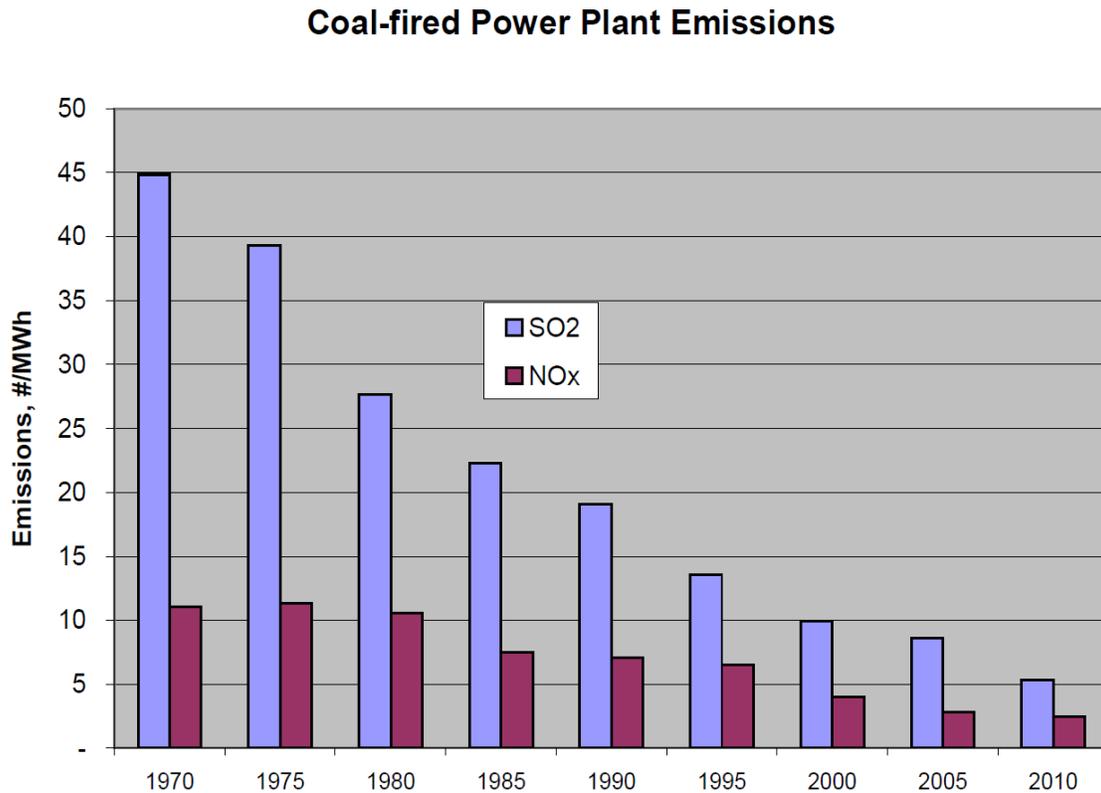
Proposed coal-fired plants



In recent decades, steady improvements to coal-related generation technologies have contributed significantly to increased efficiencies at power plants, a reduction of pollutant emissions (Figure 2), and reductions in water usage. For example, new power plants can handle higher temperature steam cycles, which increases efficiency to greater than 40% (up from approximately 30% for older plants). These improvements result in reduced environmental impacts per unit of electricity generated.

³ The Guardian, *Which countries are planning the most coal-fired power plants?* November, 20, 2012. Accessible at: <http://www.guardian.co.uk/environment/picture/2012/nov/20/which-countries-most-coal-power>

Figure 2: Historical Coal Plant Emissions⁴



Department of Energy Coal Research and Development Activities

The Department of Energy funds a variety of coal research, development, and demonstration (RD&D) activities. DOE’s Office of Fossil Energy (FE) is the primary office supporting coal RD&D. DOE FE’s coal program mission is to “support secure, affordable, and environmentally acceptable near-zero emissions fossil energy technologies.”⁵

In fiscal year 2013, DOE is supporting \$495 million in fossil energy research and development activities, of which \$370 million is directed to coal research, development and demonstration activities (Table 1). This funding is distributed between carbon capture (\$69 million), carbon storage (\$116 million), advanced energy systems (\$100 million), and cross-cutting research activities (\$49 million).

⁴ The CURC-EPRI Coal Technology Roadmap, August 2012: Update, p. 9. Accessible at: [http://www.coal.org/userfiles/file/FINAL%20Roadmap%20Report%20Update%20-%20August%202012%20\(graphics%20and%20links\).pdf](http://www.coal.org/userfiles/file/FINAL%20Roadmap%20Report%20Update%20-%20August%202012%20(graphics%20and%20links).pdf)

⁵ Department of Energy, “Department of Energy Budget Request Fiscal Year 2014, Volume 3” p. FE-13, April 2013. Accessible at: http://energy.gov/sites/prod/files/2013/04/f0/Volume3_1.pdf

Table 1. Department of Energy (DOE) Fossil Energy Research and Development Spending
(dollars in millions)

Program	FY 2012 Current	FY 2013 Annualized CR	FY 2014 Request	FY 2014 House Energy & Water Bill	FY 2014 Senate Energy & Water Bill	FY 2014 Request versus FY 2012 Enacted	
						\$	%
Coal							
CCS and power systems							
<i>Carbon capture</i>	67.0	69.3	112.0	68.9	N/A	+45.0	+67.2%
<i>Carbon storage</i>	112.2	116.1	61.1	79.3	N/A	-51.1	-45.6%
<i>Advance energy systems</i>	97.2	100.6	48.0	91.7	40.0	-49.2	-50.6%
<i>Cross cutting research</i>	47.9	49.4	20.5	30.9	N/A	-27.4	-57.2%
<i>NETL coal research and development</i>	35.0	35.2	35.0	45.0	N/A	0	N/A
Total, CCS and power systems	359.3	370.7	276.6	315.9	268.6	-82.7	-23.0%
Total, Fossil Energy R&D*	337.1	495.0	420.6	450.0	420.6	+83.5	+24.8%

* Total includes natural gas technologies, unconventional fossil energy technologies, program direction and use and rescission of prior year balances.

DOE also maintains a portfolio of major Carbon Capture and Sequestration (CCS) demonstration projects originally funded through the American Recovery and Reinvestment Act (Appendix A). Additionally, the Clean Coal Power Initiative (CCPI)—initiated in 2002 as a “cost-shared partnership between the Government and industry to develop and demonstrate advanced coal-based power generation technologies at the commercial scale”—has funded 18 projects, four of which remain currently active.⁶

DOE Advanced Fossil Energy Loan Guarantees

On July 2nd, the Department of Energy (DOE) announced a draft loan guarantee solicitation for advanced fossil energy projects and facilities.⁷ The solicitation includes \$8 billion in loan guarantees, authorized through section 1703 of the Energy Policy Act of 2005. The loan guarantees are intended to reduce greenhouse gas emissions and other air pollutants by financing the construction of advanced technology fossil energy projects and facilities. These include projects in areas such as advanced resource development, carbon capture, low-carbon power systems, and efficiency improvements with the goal to reduce emissions of carbon dioxide, methane, and other greenhouse gases.

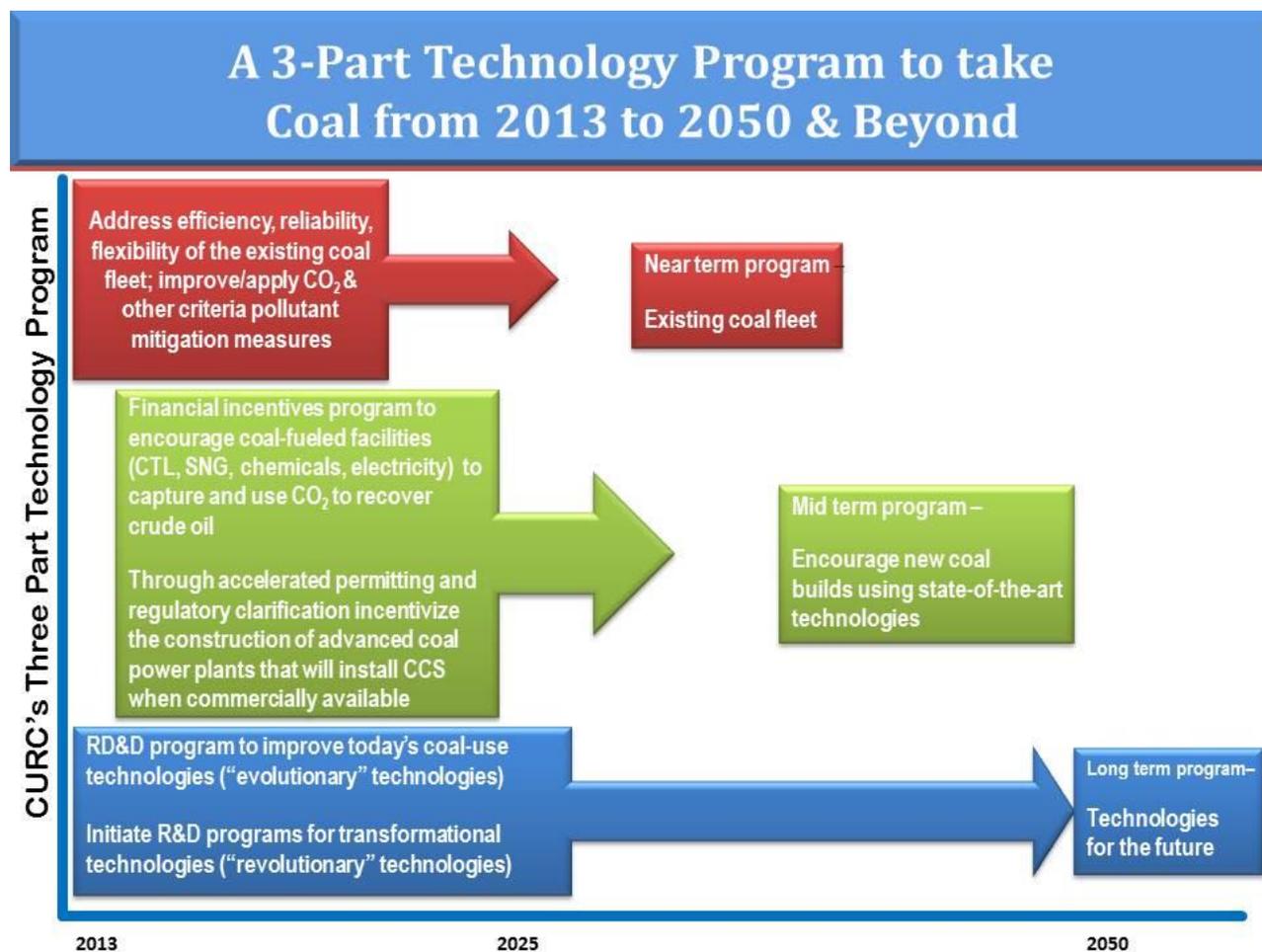
⁶ Department of Energy, “Major Demonstrations: Clean Coal Power Initiative” Accessible at: <http://www.netl.doe.gov/technologies/coalpower/cctc/ccpi/#>

⁷ Department of Energy, “Energy Department Releases Draft Advanced Fossil Energy Solicitation to Support Reductions in Greenhouse Gas Pollution,” July 2, 2013. Accessible at: <http://energy.gov/articles/energy-department-releases-draft-advanced-fossil-energy-solicitation-support-reductions>

Coal Technology Roadmap

In August 2012, the Coal Utilization Research Council (CURC) and Electric Power Research Institute (EPRI) updated their “Coal Technology Roadmap,”⁸ originally drafted in 2000 and updated in 2008. The Roadmap “describes technologies needed to acquire a set of benefits from coal that each organization views as important and achievable through advancements in technology.” The Roadmap identifies research, development and demonstration activities in various timeframes to reduce criteria pollutant emission, improve power plant efficiency, reduce water demand and discharge, and identify transformational technologies to reduce greenhouse gas emissions (Figure 3).

Figure 3: CURC/EPRI Coal Technology Roadmap Summary



⁸ CURC/EPRI Coal Roadmap

Pending Regulatory Issues

On June 25, President Obama issued a Presidential memorandum directing the Environmental Protection Agency (EPA) to regulate greenhouse gas emissions from new and existing power plants.⁹ Prior to this directive, the EPA had already taken steps to regulate greenhouse gas emissions from power plants. Last year, the EPA issued greenhouse gas New Source Performance Standards for new Electric Generating Units, which established carbon dioxide emissions standards for new fossil-fired power plants. These regulations would effectively limit the operation of existing or construction of new coal-fired power plants that do not have CCS technology. The following excerpt from Congressional Research Service report, *Carbon Capture and Sequestration: Research, Development, and Demonstration at the U.S. Department of Energy*, describes the connection between the proposed EPA regulations from new power plants and development of CCS technology:¹⁰

“In 2012 the U.S. Environmental Protection Agency (EPA) proposed a new rule that would limit emissions of carbon dioxide (CO₂) to no more than 1,000 pounds per megawatt-hour of production from new fossil-fuel power plants with a capacity of 25 megawatts or larger. EPA proposed the rule under Section 111 of the Clean Air Act. According to EPA, new natural gas-fired combined-cycle power plants should be able to meet the proposed standards without additional cost. However, new coal-fired plants would only be able to meet the standards by installing carbon capture and sequestration (CCS) technology. EPA missed its original deadline for issuing a final rule and has not indicated when it will publish the final rule.

The proposed rule sparked increased scrutiny of the future of CCS as a viable technology for reducing CO₂ emissions from coal-fired power plants. It also placed a new focus on whether the U.S. Department of Energy’s (DOE’s) CCS research, development, and demonstration (RD&D) program will achieve its vision of developing an advanced CCS technology portfolio ready by 2020 for large-scale CCS deployment.

Congress appropriated \$3.4 billion from the American Recovery and Reinvestment Act (Recovery Act) for CCS RD&D at DOE’s Office of Fossil Energy in addition to annual appropriations for CCS. The large influx of funding for industrial-scale CCS projects may accelerate development and deployment of CCS in the United States. Since enactment of the Recovery Act, DOE has shifted its RD&D emphasis to the demonstration phase of carbon capture technology. However, the future deployment of CCS may take a different course if the major components of the DOE program follow a path similar to DOE’s flagship CCS demonstration project, FutureGen, which has experienced delays and multiple changes of scope and design since its inception in 2003.

⁹ The White House, “*The President’s Climate Action Plan*,” June 2013. Accessible at: <http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>

¹⁰ Congressional Research Service, “*Carbon Capture and Sequestration: Research, Development, and Demonstration at the U.S. Department of Energy*,” June 10, 2013. Accessible at: <http://www.crs.gov/pages/Reports.aspx?PRODCODE=R42496>

To date, there are no commercial ventures in the United States that capture, transport, and inject industrial-scale quantities of CO₂ solely for the purposes of carbon sequestration. However, CCS RD&D has embarked on commercial-scale demonstration projects for CO₂ capture, injection, and storage. The success of these projects will likely influence the future outlook for widespread deployment of CCS technologies as a strategy for preventing large quantities of CO₂ from reaching the atmosphere while U.S. power plants continue to burn fossil fuels, mainly coal. Given the pending EPA rule, congressional interest in the future of coal as a domestic energy source appears directly linked to the future of CCS...

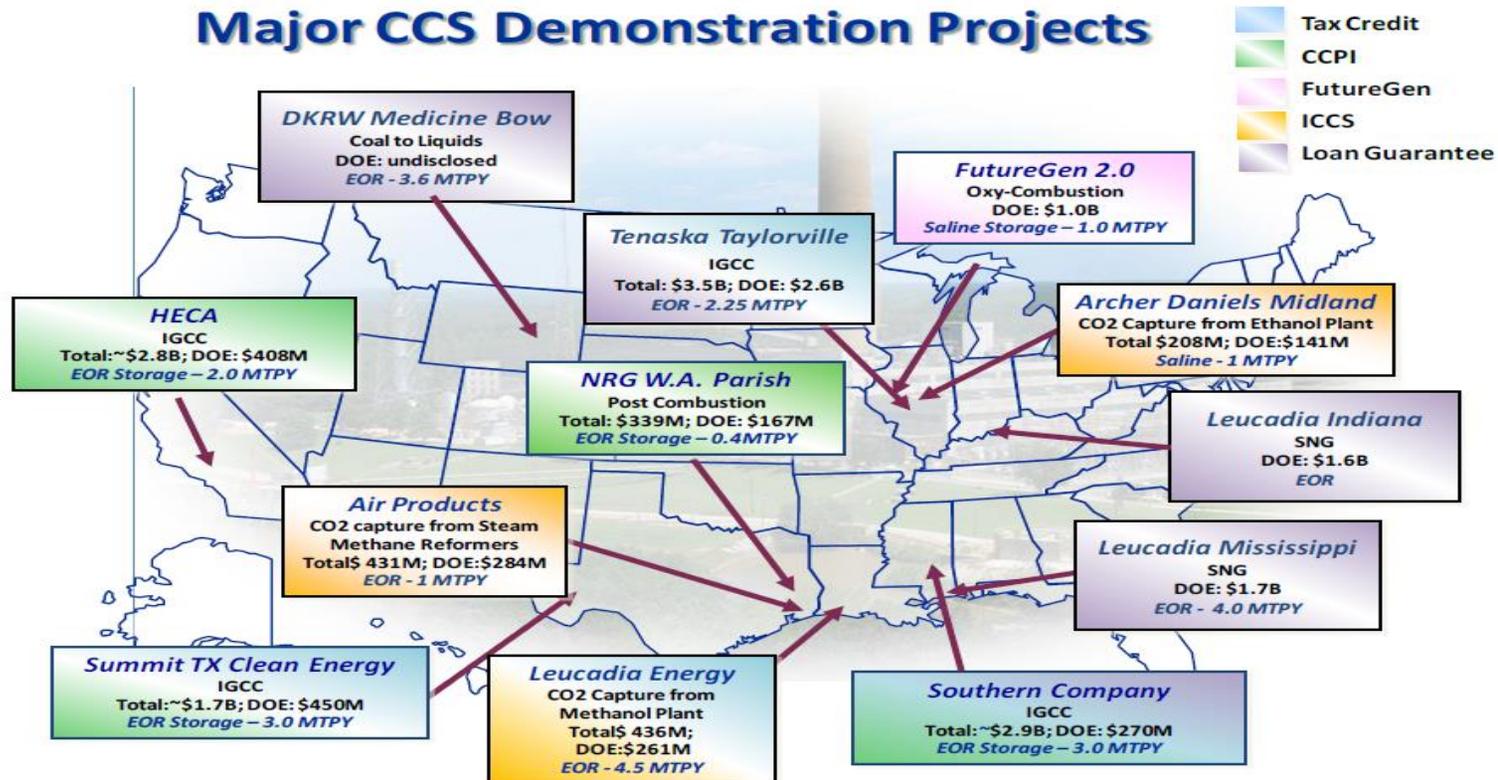
...Alternatively, congressional oversight of the CCS RD&D program could help inform decisions about the level of support for the program and help Congress gauge whether it is on track to meet its goals. A DOE Inspector General audit report identified several weaknesses in the DOE management of awards made under the Industrial Carbon Capture and Storage (ICCS) program funded by the Recovery Act. The audit report noted that addressing these management issues would be important to future management of the program, given that DOE had only obligated about \$623 million of the \$1.5 billion appropriated for the ICCS program under the Recovery Act as of February 2013.”

ADDITIONAL READING

- Congressional Research Service, *Carbon Capture and Sequestration (CCS): A Primer*. July 16, 2013. <http://www.crs.gov/pdfloader/R42532>
- Coal Utilization Research Council: *The CURC-EPRI Coal Technology Roadmap*, August 2012. [http://www.coal.org/userfiles/file/FINAL%20Roadmap%20Report%20Update%20-%20August%202012%20\(graphics%20and%20links\).pdf](http://www.coal.org/userfiles/file/FINAL%20Roadmap%20Report%20Update%20-%20August%202012%20(graphics%20and%20links).pdf)

Appendix A¹¹

Attachment 2. Federally Supported CCS Demonstration Projects Currently Under Development



*Additional Advances Coal Demonstration Projects include Duke Edwardsport IGCC (no CO2 capture component) and Tenaska Trailblazer Energy Center (no public funds received)

¹¹ CURC-EPRI Roadmap.