In Brief: What the Waxman-Markey Bill Does for Coal

Coal is an inexpensive and abundant domestic energy resource; the United States has larger coal reserves than any other country—likely enough to sustain current production levels for more than two centuries.[1] Coal prices are generally less volatile than those of either oil or natural gas, and coal-fueled power plants can reliably provide large amounts of baseload electricity generation. Unfortunately, coal is also the most greenhouse gas (GHG) intensive energy source. While half of all U.S. electricity comes from coal, coal is responsible for 80 percent of all GHG emissions from electricity generation, which means nearly thirty percent of all U.S. GHG emissions come from coal-fueled electric power plants (see Figure 1).[2,3] Globally, CO_2 emissions from coal use accounted for 41 percent of total fossil fuel CO_2 emissions in 2006, with the United States and China together accounting for nearly 60 percent of all CO_2 emissions from coal use.[4] Obviously, reductions in U.S. and global GHG emissions sufficient to address the threat of climate change require reducing emissions from coal use. Fortunately, a suite of technologies exists—known as carbon capture and storage—that can enable coal to play a significant role in a low-carbon energy future.[5]

Carbon Capture and Storage

Carbon capture and storage (CCS) works by separating carbon dioxide (CO_2) from other gases in the exhaust stream at power plants and industrial facilities, compressing the CO_2 to pressures suitable for pipeline transport, and injecting the CO_2 into deep geologic formations where it can be safely and indefinitely stored (or sequestered). While CCS could be deployed with many types of large stationary CO_2 emission sources, CCS likely has its greatest potential for emission reductions when coupled with coal-fueled electric power plants.[6]

Although components of the CCS suite of technologies have been deployed at industrial scale in a variety of situations (e.g., CO_2 capture at natural gas processing plants and CO_2 injection for enhanced oil recovery), an integrated CCS system has not yet been deployed at a commercial scale at any coal-fueled power plant. To date, CCS projects coupled with coal power plants have been limited to small scales.

Large-scale CCS deployment has not proceeded primarily due to the high costs of installing and operating CCS technologies and the absence of government policies that place a financial cost on GHG emissions or otherwise require GHG emission reductions. In addition, uncertainties remain concerning actual cost and performance of CCS technologies at commercial scale. Finally, CCS deployment requires an appropriate regulatory system for ensuring that CO_2 storage is safe and permanent.[7]

The Waxman-Markey American Clean Energy and Security Act (ACES Act), H.R.2454, includes provisions that will spur the widespread deployment of CCS at coal-fueled power plants.

Putting a Price on Carbon

The most important thing that the ACES Act does for advancing low-carbon energy technologies, like CCS, is to put a price on carbon via a GHG cap-and-trade program.[8] Putting a price on carbon sends the long-term price signal that markets need to invest in a variety of low-carbon technologies.

Resolving Regulatory Uncertainty

Companies considering investments in CCS face regulatory uncertainties, including the level of future GHG reduction requirements, the regulations that will govern geological CO_2 storage, and the level of CO_2 emissions that will be permitted from new coal power plants. The ACES Act lays out a clear path forward for the timing, level, and regulatory approach to GHG emission reduction requirements at coal plants. It also directs the U.S. Environmental Protection Agency (EPA) and the Department of Energy (DOE) to develop a national strategy for addressing legal and regulatory barriers to CCS and instructs the EPA to promulgate regulations for CO_2 geologic injection and storage sites. In addition, the ACES Act sets CO_2 emission performance standards for new coal power plants so that utilities and investors know what minimum level of environmental performance will be required in order to build new coal power plants.

Pioneering Low-Carbon Coal Technology

The ACES Act authorizes the fossil fuel electric generating industry, with the approval of state regulatory authorities, to create a Carbon Storage Research Corporation (CSRC) funded by a small surcharge on fossil fuel-generated electricity sales. The CSRC would collect $1 billion per year for ten years to provide financial support to at least 5 commercial-scale CCS projects. Funding from the CSRC would support initial commercial-scale CCS projects necessary to demonstrate the real-world cost, performance, reliability, and safety of coal power plants that capture and store their CO_2 emissions and of the geological CO_2 storage sites. These initial CCS projects will be the most expensive but will provide critical "learning-by-doing" technology and cost improvements.

Widely Deploying Carbon Capture and Storage with Coal Power Plants

In addition to financial support for the first commercial-scale CCS demonstration projects, the ACES Act awards bonus GHG cap-and-trade allowances to subsidize the cost of deploying CCS (cumulatively, 4 percent of cap-and-trade allowances are allocated for this purpose through 2050).[9,10] For the initial phase of support for first-mover CCS projects—i.e., the first six gigawatts (GW) of coal-fueled electric generating capacity coupled with CCS (new builds or retrofits of existing coal power plants)— the ACES Act defines a formula for awarding bonus allowances on a first-come, first-served basis equivalent to fixed cash payments for each ton of CO_2 emissions avoided via CCS for ten years . The formula for these bonus allowances provides certainty to utilities and investors in terms of the value of the incentive and

is sufficient incentive to cover the incremental cost of deploying CCS (equivalent to up to $100 per ton of CO_2 avoided). Moreover, the formula rewards coal plants that deploy higher levels of CO_2 capture (e.g., capturing up to 90 percent of CO_2 from the smokestack) and the earliest adopters of CCS. In a second phase of commercial deployment incentives, the ACES Act includes additional bonus GHG allowances for up to another 66 GW of coal-fueled generating capacity with CCS. In this phase, EPA will hold reverse auctions to award bonus GHG allowances to the most cost-effective CCS projects in different project categories to ensure support for multiple CO_2 capture technology options, different coal types, storage in various geologic formations, and both new plants and retrofits of existing coal power plants.[11] According to EPA's projections for cap-and-trade allowance prices, the CSRC and the CCS commercial deployment provisions in the ACES Act provide an estimated $75 billion in incentives for coal use with CCS through 2030 and about $177 billion through 2050 (see Figure 2).

The Role for Coal with Carbon Capture and Storage

The U.S. Energy Information Administration (EIA) recently modeled the effects of the ACES Act and projected that CO_2 emission reductions from the electric power sector would comprise more than 80 percent of cumulative GHG emission reductions from sources covered under cap and trade through 2030.[12] In 2030, EIA projected that CCS would provide more than a quarter of all emission reductions in the electric power sector. According to EIA, under "business-as-usual," from 2012 to 2030 new coal power plants would make up just 11 percent of new generating capacity (16 GW of new coal). By contrast, during the same time period under the ACES Act, EIA projected that new coal power plants coupled with CCS would make up 28 percent of new generating capacity (69 GW) such that by 2030 coal power plants with CCS would provide 11 percent of U.S. electricity (see Figure 3).

Conclusion

The United States and the rest of the world cannot avoid dangerous climate change without reducing GHG emissions from coal use. The ACES Act establishes a regulatory framework to enable investments in coal power plants coupled with CCS and provides significant financial incentives for demonstration and widespread deployment of CCS. The deployment of CCS under the ACES Act will spur increased investment in new coal-fueled power generation, maintain a significant role for coal in the U.S. energy supply, and allow the U.S. to dramatically reduce its power sector GHG emissions while leading the rest of the world in developing and deploying a critical low-carbon technology. While China and other major coal-reliant nations are also taking steps to develop CCS, the major advances the ACES Act would make in deploying CCS in the United States would greatly facilitate the widespread global adoption of CCS and thus achievement of global GHG emission reduction goals.

Figure 1: Total U.S. Greenhouse Gas Emissions (2007)[13]

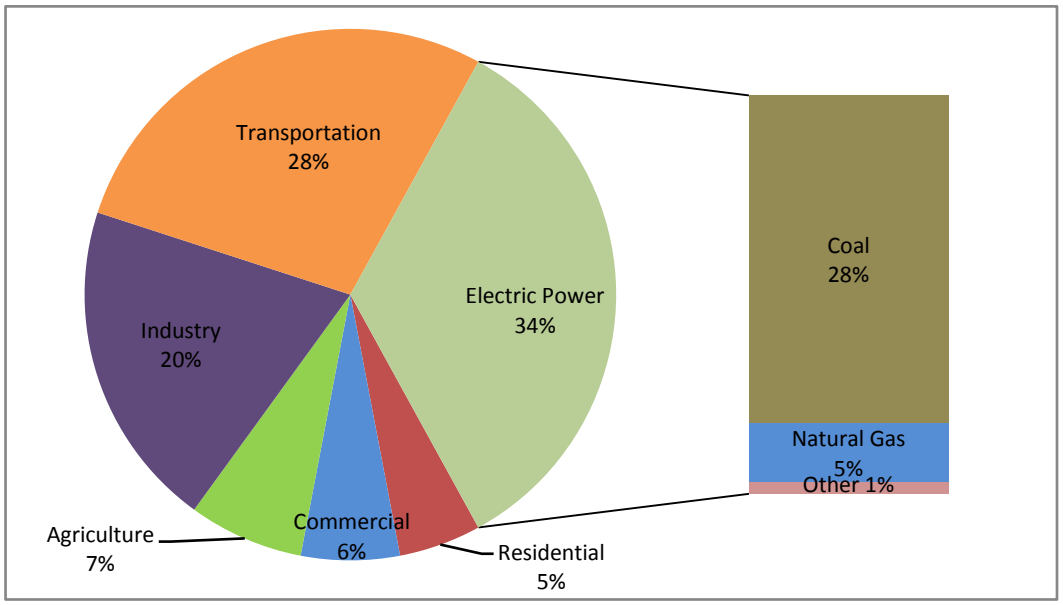
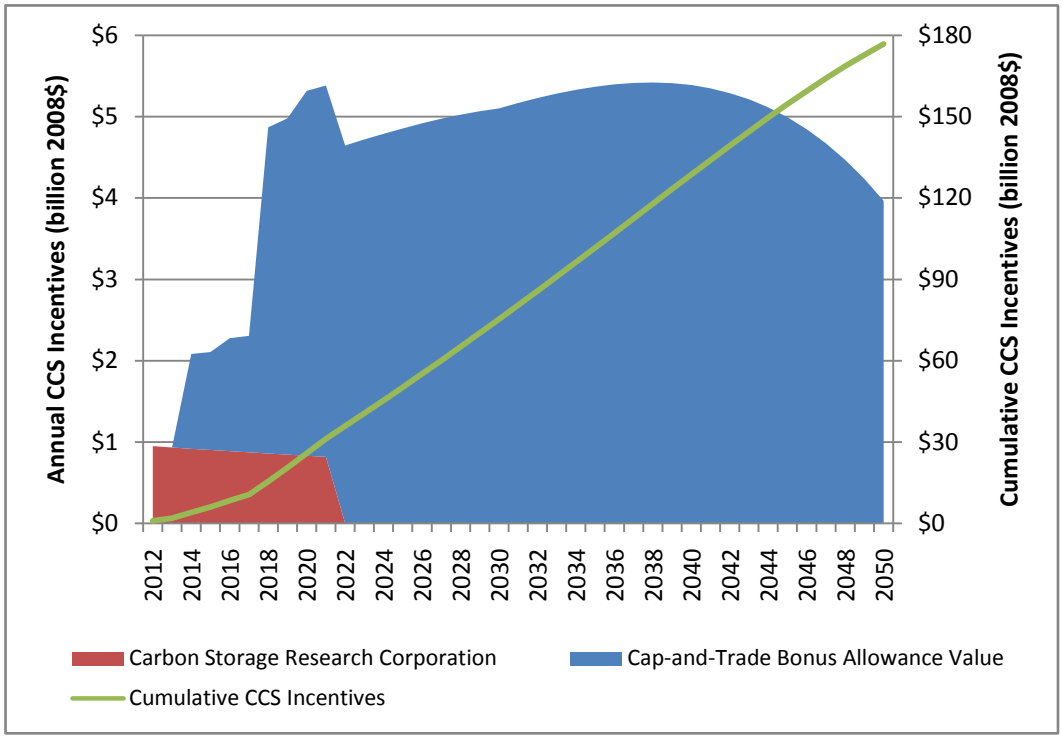
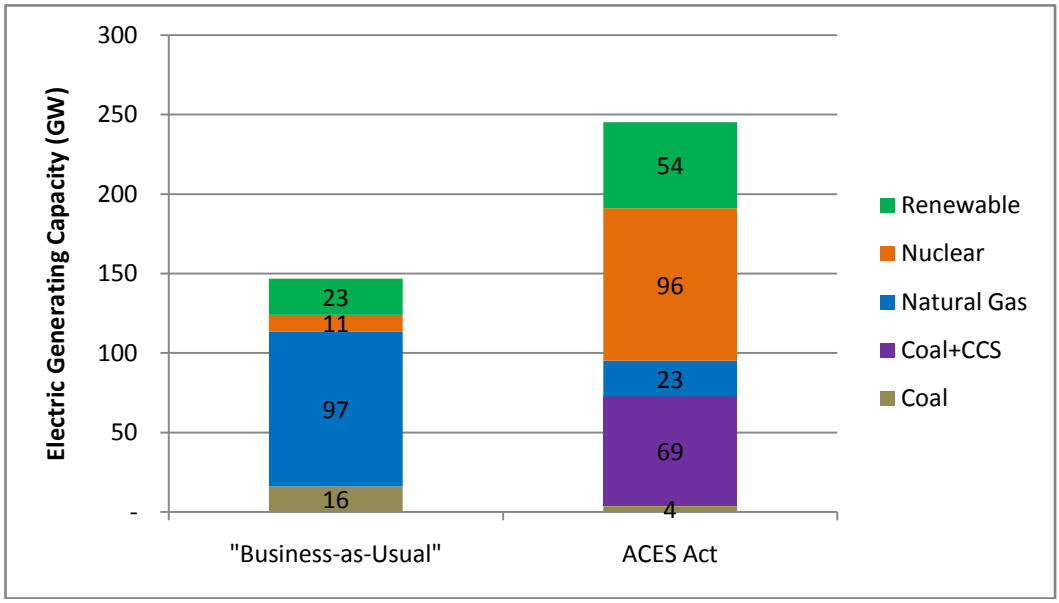


Figure 2: Financial Incentives for CCS in the ACES Act



Notes: The figure above assumes the CSRC collects and disperses $1 billion per year for ten years as authorized. The cap-and-trade bonus allowance value is the product of the number of allowances allocated to CCS incentives in the ACES Act and the projected cap-and-trade allowance prices from EPA's June 2009 modeling analysis (ADAGE model, Scenario 2), with dollar amounts converted to 2008$ using the GDP deflator from the FY2010 budget.

Figure 3: Projected Cumulative New Electric Generating Capacity (2012-2030)



Notes: The figure above is based on the EIA ACES Act modeling analysis's reference and "Basic" policy cases.

[1] BP, *Statistical Review of World Energy 2009*.

[2] U.S. Energy Information Administration (EIA), *Annual Energy Review 2008*, Table 8.2a.

[3] U.S. Environmental Protection Agency (EPA), *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007*.

[4] EIA, *International Energy Annual 2006*.

[5] Carbon capture and storage is also commonly referred to as carbon capture and sequestration.

[6] For more information on CCS, see the Pew Center's Climate TechBook CCS factsheet, available at http://www.pewclimate.org/technology/factsheet/ccs.

[7] For further discussion of these issues, see the Pew Center's Congressional policy brief, *Addressing Emissions from Coal Use in Power Generation*, available at http://www.pewclimate.org/policy-brief/Coal.

[8] For explanation of how cap and trade works, see the Pew Center's *Cap and Trade 101*, available at http://www.pewclimate.org/global-warming-basics/climate_change_101.

[9] Under cap and trade, the scarcity of emission allowances (i.e., the permission to emit 1 metric ton of CO_2 or its equivalent of another GHG) makes them valuable. Since cap-and-trade allowances will be tradable on an emissions market, free allocation of bonus cap-and-trade allowances to coal power plants that deploy CCS is equivalent to a cash incentive for CCS where the value of the incentive is the product of the quantity of bonus allowances and their market price.

[10] Up to 15 percent of the cap-and-trade allowances allocated to CCS deployment can be used for industrial CCS projects other than coal-fueled electricity generation with CCS.

[11] EPA can distribute allowances on a first-come, first-served basis in this second phase if it determines that reverse auctions will not be effective.

[12] EIA, Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009, August 2009. Unless otherwise noted, this document refers to EIA's "Basic" core policy case. EIA's analysis only models outputs through 2030. Abatement refers to the difference between covered emissions under climate policy and under "business-as-usual."

[13] EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007*.