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Multi-Pollutant Power Plant Legislation and the Opportunities for the Agricultural Sector

The electric generating sector contributes a significant share of the airborne pollutants that are released to the atmosphere each year in the United States and several proposals have been made for regulating these emissions. The alternative proposals include the Administration's Clear Skies Initiative, the Clean Power Act of 2003 (S. 366) introduced by Senator Jeffords, and the Clean Air Planning Act (S. 3135) introduced by Senators Carper, Chafee, Breaux and Baucus in 2002.

The discussion that follows provides an analysis of the Clean Air Planning Act and the economic opportunities that it affords to the agricultural sector. The Clean Air Planning Act would establish a cap-and-trade system for CO_2, including provisions that would allow the creation of greenhouse gas offsets from sectors outside of the electric generating industry. This offers a unique opportunity for the agricultural sector. Farmers throughout the country would have an opportunity to undertake projects that remove carbon from the atmosphere (e.g., by adopting low-till agricultural methods), generating emission reduction credits which in turn can be sold to companies in the electric generating sector.

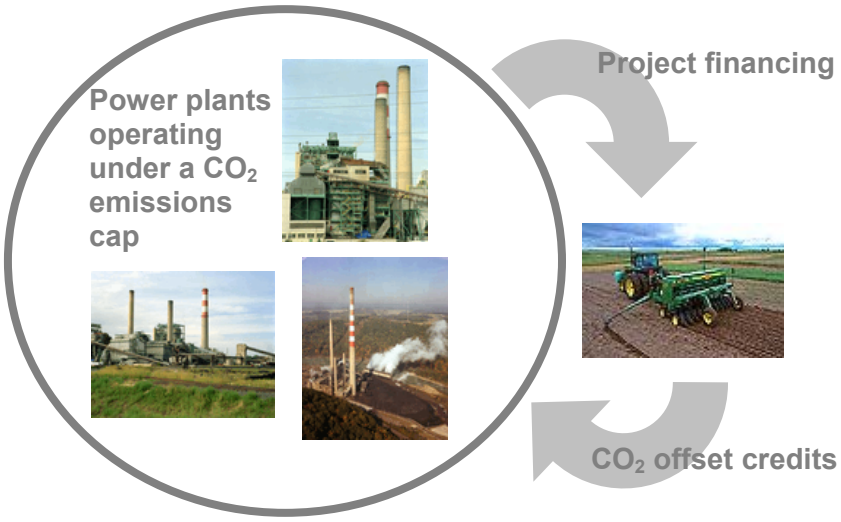
Analysts project that the agricultural sector could potentially earn between $200 million and $600 million per year in additional revenues from carbon sequestration projects if Congress were to adopt a cap-and-trade program for CO_2 like that proposed by the Clean Air Planning Act. Additional opportunities are also available for the agricultural sector to participate in a carbon reduction program. For example, farmers can provide biomass crops as well as plant and animal waste for energy production, displacing fossil energy and reducing greenhouse gas emissions.

How the system would work

The Clean Air Planning Act would establish an overall limit or "cap" on the quantity of CO_2 that the electric generating sector can release to the air. A cap-and-trade program does not specify the quantity of emissions that an individual facility can emit; rather, it distributes allowances to affected

sources in a quantity equivalent to the cap. Companies are allowed to trade allowances or bank them for future use, but at the end of each year they must hold a quantity of allowances that is equal to or greater than their actual emissions.

In general, facilities facing lower costs to control their emissions will invest in pollution control equipment or facility upgrades and sell a portion of their excess allowance holdings. Facilities facing higher costs to control their emissions will tend to purchase allowances from these facilities (or cease operations) in lieu of installing controls or otherwise upgrading their systems. In this way, emissions trading directs capital to the least-cost control opportunities and minimizes the total costs of control across all regulated sources.



Cap-and-trade system….with…offset credits

The Clean Air Planning Act is also designed to allow electric generating companies to acquire credit for greenhouse gas reductions from outside of the sector (i.e., from uncapped sources like the agricultural sector); thereby facilitating the implementation of cost-effective control measures. For example, a farm operator might undertake a project that enhances the storage of carbon within the soil. After measurement and verification of these reductions, they would be credited to the farmer and could be sold to a company that faces a compliance obligation under the cap.

Carbon sequestration in the agricultural sector

Agricultural land, grazing land and forests contain massive stores of carbon that cycle through these systems. Trees and other plants extract CO_2 from the atmosphere incorporating the molecules of carbon into plant tissue and the soils beneath. In some cases, carbon stored in terrestrial systems is returned to the atmosphere after a short time, e.g., if consumed by animals or burned. In other cases, however, the carbon will remain sequestered for very long periods of time, e.g., when contained in undisturbed soils. The objective of carbon sequestration is to increase the net storage of carbon in terrestrial systems, thereby delaying or preventing its return to the atmosphere.

Much of the carbon that is stored in grasslands and croplands is actually held in the soil and opportunities are available to enhance this storage capacity. Scientists at the U.S. Department of Agriculture estimate that the soils of U.S. farms and rangelands have the potential to store a sizeable fraction of total U.S. carbon emissions (12-14 percent) or roughly 20 million metric tons of carbon through the adoption of improved management practices.[1] This large storage potential has spurred

[1] U.S. Department of Agriculture, Agricultural Research Service, "Depositing Carbon in the Bank," http://www.ars.usda.gov/is/AR/archive/feb01/bank0201.htm

significant interest in developing methods for enhancing soil carbon storage. Some of the options for enhancing soil carbon sequestration include:

1. *Conservation Tillage*. The process of plowing drives the release of carbon to the atmosphere. However, no-till or low-till agricultural methods have been developed to slow the decomposition of organic matter in the soil and the resultant release of carbon to the atmosphere, while at the same time reducing labor and equipment costs.

2. *Conservation Buffers*. The U.S. Conservation Reserve Program provides payment to farmers to set aside highly erodible land. These areas can be planted with trees or grasses that maximize soil carbon storage.

3. *Rangeland Management*. Over grazing and poor management has left large tracts of rangeland in the western United States in poor condition. By altering the timing, duration and intensity of livestock grazing, ranchers can increase the carbon storage potential of rangelands.

Economic analysis of alternative compliance options

In order to estimate the costs of implementing the Clean Air Planning Act and to predict the types of activities that companies will undertake to comply with the proposed CO_2 reduction targets, detailed economic modeling was performed by ICF Consulting using the Integrated Planning Model (IPM). IPM is a dispatch model that can simulate the operations of the electric generating sector under a range of assumptions. There are a multitude of options available for reducing greenhouse gas emissions, including fuel switching (e.g., from coal to natural gas), renewable energy projects, combined heat and power projects, agricultural carbon sequestration, as well as a host of other measures. The model will select projects to the extent that they offer cost-effective, low risk options for mitigating greenhouse gas emissions. To capture this diversity of project opportunities, IPM uses cost curves that reflect the costs and availability of alternative reduction projects. The cost curves for agriculture and forestry projects were derived from data compiled by researchers at Texas A&M University and reflect the costs of brokerage fees and other transactions costs.[2]

The modeling of the Clean Air Planning Act results in projected allowance prices ranging from $3.11 per ton of CO_2 in 2012 to $5.70 per ton of CO_2 in 2020. In this price range, the agricultural sector has the potential to generate between 64 million and 105 million tons of CO_2 offsets from soil carbon sequestration.[3]

These results suggest that the agricultural sector has the potential to generate between $200 million and $600 million per year in additional revenue if Congress were to adopt a cap-and-trade program for CO_2 like that proposed by the Clean Air Planning Act. In addition to these carbon revenues, additional benefits are predicted for farmers adopting soil conservation practices by improving soil quality, reducing soil erosion, and reducing labor and material costs.

[2] http://agecon.tamu.edu/faculty/mccarl/mitigate.html

[3] Additional offsets could be economically generated from adopting alternative manure management practices (reducing methane emissions) and other measures that are not reflected in these figures.

Emissions trading in practice

Despite the absence of a mandatory federal program requiring greenhouse gas emissions reductions from the electric generating sector, individual companies have committed to reduce their emissions on a voluntary basis. For example, in May 2001, Entergy, one of the largest electric power companies in the country, pledged to stabilize CO_2 emissions from its U.S. power plants at year-2000 levels. To achieve this goal, the company has begun to implement a variety of greenhouse gas reduction projects, including agricultural carbon sequestration.

Entergy will be purchasing CO_2 offset credits that will be generated by farmers who have agreed to use direct seed agriculture methods for a specified period of time. Direct seed cultivation (a variant of no-till planting systems) avoids soil carbon losses, while at the same time reducing the growers' fuel use and soil erosion. By purchasing these reductions, Entergy is diversifying its portfolio of greenhouse gas reduction measures. Some of the others measures that the company is undertaking include efficiency upgrades at its facilities, tree planting, and investment in renewable energy projects.

In another trade involving the agricultural sector, a consortium of Canadian energy companies purchased 2.8 million tons of carbon offsets from farmers in the United States. The reductions are reported to have been generated from changes in farm soil management techniques, improved animal waste management, reductions in chemical fertilizer use, and the reduction of farm fuel use.[4]

Additional opportunities for the agricultural sector

This discussion has focused on the opportunities for the agricultural sector to sequester carbon and earn CO_2 offset credits. However, this is only one of several opportunities for the agricultural sector to participate in a carbon reduction program. For example, farmers can also provide biomass crops as well as plant and animal waste for energy production, displacing fossil energy and reducing greenhouse gas emissions. Switchgrass has been successfully tested in coal-fired power plants. Livestock producers are using systems to trap methane emissions from waste lagoons, using the gas to power electricity generators at the farm.[5] Farmers are being compensated for hosting wind farms on their land, while continuing to graze livestock and otherwise making use of the land around the wind turbines. Additional examples are available and new innovations are likely to emerge as electric generating companies pursue cost-effective options for reducing greenhouse gas emissions.

Resources

The following resources are suggested to learn more about agricultural carbon sequestration and other opportunities available to farmers for generating greenhouse gas reductions.

The U.S. Department of Agriculture's Agricultural Research Service has a team of scientists devoted to advancing various aspects of agricultural carbon storage: http://www.nps.ars.usda.gov.

[4] http://www.agjournal.com/story.cfm?story_id=527

[5] Methane has twenty times the global warming potential of CO_2 and therefore offers a particularly cost-effective option for reducing greenhouse gas emissions.

The Consortium for Agricultural Soils Mitigation of Greenhouse Gases (CASMGS) is a consortium of nine universities and one National Laboratory assembled to investigate the potential of agricultural soils to mitigate greenhouse gases; http://www.casmgs.colostate.edu.

The Pacific Northwest Direct Seed Association seeks to promote direct seed cropping systems through research coordination, funding and information exchange; http://www.directseed.org.

The U.S. Department of Energy has a research program devoted to carbon sequestration; http://www.fe.doe.gov/coal_power/sequestration.

The Center for Integrated Agricultural Systems at the University of Wisconsin-Madison has been involved in testing switchgrass for electricity production. See Research Brief #51, available on-line at http://www.wisc.edu/cias/index.html.