

CRS Report for Congress

Environmental Services Markets in the 2008 Farm Bill

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Summary

Environmental goods and services are the benefits society obtains from the environment and ecosystems, both natural and managed, such as water filtration, flood control, provision of habitat, carbon storage, and many others. Farmer participation in providing these types of goods and services began in earnest in the 1990s with the development of watershed approaches incorporating nutrient credit trading and wetlands mitigation banking, as well as the more recent development of voluntary carbon credit markets. These efforts have triggered further interest in the possibility of developing market and trading opportunities for farmers and landowners as a source of environmental offsets. These services would be in addition to the food and fiber services traditionally supplied by the agriculture and forestry sectors. Congress is expressing growing interest in developing such market-based approaches to complement existing federally supported programs that promote conservation in the farm and forestry sectors, as well as to complement existing and/or emerging environmental regulations or natural resource requirements that may affect the agriculture and forestry sectors.

The enacted 2008 farm bill (P.L. 110-234, the Food, Conservation, and Energy Act of 2008) contains a new conservation provision that seeks to facilitate the participation of farmers and landowners in environmental services markets by directing USDA to develop technical guidelines for measuring farm- and forestry-based environmental services. This provision focuses first on carbon storage and indirectly references various agriculture and forestry provisions in some legislative initiatives that are being considered as part of the broader climate change debate, which have highlighted the perceived need for uniform standards and ways of measuring emissions reduction and increases in carbon storage in the agriculture and forestry sectors. These types of provisions could expand the scope of existing land-based conservation programs and facilitate the development of private-sector markets for a range of environmental goods and services from farmers and landowners.

Among the possible questions that may emerge as these agriculture and forestry provisions are either implemented as part of U.S. farm conservation policy, or considered as part of a broader climate change initiative, are the following: Can agricultural interests effectively provide environmental services along with traditional food and forestry services? How would uniform standards address differences within different production areas, types of resources, and ecosystems? What is the role of USDA as the lead federal agency in establishing technical guidelines for the agriculture and forestry sectors? How would collaboration work between other participating federal agencies? How would the agreed-upon decisions and standards work within existing regulatory authorities? How would the agreed-upon decisions and standards work within possible forthcoming regulatory authorities, such as in proposed climate change options currently being debated in Congress? What role should federal agencies play in establishing environmental services markets?

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Environmental Services Markets in the 2008 Farm Bill

The enacted 2008 farm bill (Food, Conservation, and Energy Act of 2008, P.L. 110-234) includes a new conservation provision that seeks to facilitate the participation of farmers and landowners in environmental services markets, covering a range of farm and forestry services, including improved water and air quality, increased carbon storage, and habitat protection. The inclusion of this provision could expand the scope of existing farmland conservation programs and facilitate the development of private-sector markets for agriculture- and forestry-based environmental goods and services.

In part, congressional interest in this area has developed in response to increased attention to the agriculture and forestry sectors' contributions to some remaining environmental pollution and resource degradation concerns. For example, the U.S. Environmental Protection Agency (EPA) reports that agriculture is the leading source of water pollution in U.S. lakes and rivers, and a major contributor of pollution in U.S. estuaries. EPA also reports that agriculture contributes to an estimated 6% of all greenhouse gas emissions in the United States. At the same time, some in Congress are suggesting that U.S. farm support programs should do a better job promoting environmental benefits and also complying with domestic support constraints called for by the World Trade Organization. The agriculture and forestry sectors are also being regarded as a possible source of carbon capture and storage within the broader climate change debate in the 110th Congress.

The development of market-based approaches to farm conservation and land management might complement existing and/or emerging environmental regulations or natural resource requirements affecting the agriculture and forestry sectors, as well as complement existing federally supported programs that promote conservation in the farm and forestry sectors. Environmental goods and services from the agriculture and forestry sectors might also provide for environmental improvements and mitigation at a relatively lower cost, compared to mitigation in other sectors of the economy. Environmental services markets may also offer additional financial opportunities to farmers and landowners.

What Are Environmental Services Markets?

Environmental goods and services are the benefits society obtains from the environment and ecosystems, both natural and managed, such as water filtration, flood control, provision of habitat, carbon storage, and many others (**Table 1**).¹ In

¹ These may also be referred to as ecosystems services. See, for example, World Resources (continued...)

most cases, these constitute “free services” since landowners and managers are not compensated in the marketplace. However, as many such services have become degraded over time, there is growing recognition that they should be sustained or substituted by market capital, similar to investing in water treatment plants and engineered flood control systems. One solution would be to create markets, often developed through regulation, so that providers of environmental services can be compensated in private markets for the services they provide. This could offer a potential business opportunity to the farm and forest sectors, which may be able to provide for such services and participate in the market, for example, by creating, restoring, preserving function and value in a natural resources area, or by capturing and storing carbon before gases that contribute to global climate change are released into the atmosphere. These services would be in addition to the food and fiber services traditionally supplied by the agriculture and forestry sectors.

The market for environmental goods and services involving the agricultural and forestry sectors began mostly through various pilot programs starting in the 1990s. The development of voluntary carbon credit markets and watershed approaches incorporating nutrient credit trading, along with wetlands mitigation banking, have involved the farm and forestry sectors. These programs provide a market for farmers to sell carbon or nutrient farm-based offsets to emitters/dischargers that are looking to buy offsets to mitigate their own emissions/discharges. These efforts have triggered interest in other types of tradeable permits and credits, including habitat credit trading and other types of conservation banking. USDA identifies environmental markets with relevance to the agriculture and forestry sectors to include water quality, air quality, wetlands, endangered species, greenhouse gases, and developmental rights.² Often the impetus for these efforts may be linked to a “regulatory driver” specific to an actual or anticipated environmental regulation or natural resource requirement, such as requirements in the Clean Water Act (CWA), Endangered Species Act (ESA), or other state or local regulation (see **Table 1**). Other incentives may include market drivers that make trading environmental services financially attractive, or the desire to cultivate community goodwill.

Farmer participation in voluntary carbon credit trading programs has been growing rapidly, and currently involves an estimated 4,000 farmers across 25-30 states covering more than 4 million acres.³ The two largest programs providing for farm-based offsets are programs operated by the Iowa Farm Bureau and the North Dakota Farmers Union; other similar programs are operated by the Illinois Conservation and Climate Initiative, the Environmental Credit Corporation (based in Indiana), the Upper Columbia Resource Conservation and Development Council (Northwest), and Terrapass (based in California).⁴ These programs cover some or all

¹ (...continued)

Institute, *Millennium Ecosystem Assessment, Ecosystems and Human Well-being*, 2005.

² USDA, *2007 Farm Bill, Conservation and Environment Theme Paper*, June 2006, at [<http://www.usda.gov/documents/FarmBill07consenv.pdf>].

³ CRS estimate based on information from the Iowa Farm Bureau (January 17, 2008).

⁴ See, for example, Iowa Farm Bureau [<http://www.iowafarmbureau.com/special/carbon/>]; (continued...)

aspects of the following types of carbon capture and storage activities: sustainable agriculture practices (such as conservation tillage, grass seedlings); planting of unharvested grasslands; tree-plantings; methane capture/biogas production with manure digesters; wind, solar, or other renewable energy use; controlled grasslands or pasture management; and forest restoration.

Table 1. Possible Range of Services and Regulatory Drivers

Tradeable Resource/Credit (Type of Service)	Regulatory Driver
Wetland, stream, aquifer recharge, forests, buffers, stormwater controls, habitat/biodiversity (e.g., habitat creation/preservation; water filtration; flood control and protection; water/air pollution controls; runoff reduction)	Federal and/or state
Nutrients (e.g., runoff reduction; water pollution controls)	State
Carbon/greenhouse gas (e.g., capture, storage/sequestration, methane destruction; air pollution controls)	State (and possibly federal)
Renewable energy (e.g., biofuel generation; fuel substitution)	State
Water and development rights (e.g., alternative land and natural resource preservation; habitat creation/preservation; aesthetic value; recreational use)	State, county, or local

Source: CRS, information from American Farmland Trust and World Resources Institute.

Currently, about 300 farmers are participating in water quality trading programs across six states.⁵ These include initiatives such as those by the Southern Minnesota Beet Sugar Cooperative, the Grassland Areas Farmers (California), the Rahr Malting Company (Minnesota), the Great Miami River Watershed (Ohio), and the Red Cedar River (Wisconsin), among others. These programs cover some or all of the following types of nutrient runoff reduction activities: cover cropping; reduced fertilizer use; conservation tillage; tree-plantings; buffers; drainage management; and wetlands mitigation trading.⁶ Most water quality trading programs were initiated at the local or state level, often involving EPA. In 2006, EPA and USDA's Natural Resources

⁴ (...continued)

North Dakota Farmers Union [<http://www.ndfu.org>]; Illinois Conservation and Climate Initiative [<http://www.illinoisclimate.org>]; Terrapass [<http://www.terrapass.com/projects>]; and Environmental Credit Corporation [<http://www.envcc.com>]. See also CRS Report RL33898, *Climate Change: The Role of the U.S. Agriculture Sector*, by Renée Johnson.

⁵ Information from EPA. Does not include the Tar-Pamlico in North Carolina since not enforceable through a CWA permit.

⁶ H. L. Breetz et al., *Water Quality Trading and Offset Initiatives in the U.S.: A Comprehensive Study*, Dartmouth College, at [<http://www.dartmouth.edu/~kfv/waterqualitytradingdatabase.pdf>]; and EPA's website at [<http://www.epa.gov/owow/watershed/trading.htm>]. Also see CRS Report RS21403, *EPA's Water Quality Trading Policy*, by Claudia Copeland.

Conservation Service (NRCS) signed a partnership agreement to establish uniform trading standards, along with supporting other collaborative efforts.⁷

The U.S. Fish and Wildlife Service, USDA's NRCS, and the Association of Fish and Wildlife Agencies signed a partnership agreement in April 2007 to promote habitat credits that could offer incentives to landowners who preserve and enhance the habitat of endangered or at-risk species. Among the stated objectives of this agreement is to develop and adopt common definitions, standards, and measurement protocols.⁸ Habitat credits or "conservation banking" act like a savings account, where credits are earned for land preservation of habitat and credits can then be sold to land use industries or others who are required to mitigate the loss of habitat under the ESA and other laws that restrict or prohibit development. This is conceptually similar to wetlands and stream mitigation banking, which allows for compensation of adverse impacts of development activities ("compensatory mitigation") to wetlands, streams, wildlife refuges, or other aquatic resources. Such allowances, whether through wetlands or conservation banking, typically involve creating, restoring, enhancing, or preserving function and value in a natural resources area, often within the context of meeting a federal, state, or local regulatory requirement.

The participation of agriculture and forestry in emerging environmental services markets is gaining wide support within the farm community and its supporting organizations and agencies, as well as among the regulatory agencies and some environmental groups.⁹ As part of its recommendations for the 2007 farm bill, the U.S. Department of Agriculture (USDA) has proposed to further facilitate the development of environmental services markets in ways that would more effectively involve the farm and forestry sectors. Both the House- and the Senate-passed versions of the farm bill (H.R. 2419) included similar provisions as part of the conservation title in their respective bills.

What Are the Benefits and Barriers?

The development of market-based approaches has been widely touted as a possible source of additional farm income, whether through the sale of tradeable credits or from other types of payments, such as recreational use or hunting fees. This could offset or partially offset the costs of pollution abatement incurred by farmers who make environmental improvements on their farmlands. In some cases, adopting alternative production practices could also result in on-farm cost savings,

⁷ The agreement text can be found at [<http://www.epa.gov/owow/watershed/trading/mou061013.pdf>].

⁸ The agreement text can be found at [http://www.fws.gov/endangered/pdfs/Credit_Trading_MOU.pdf].

⁹ See, for example, Ann Sorensen, "Ecosystem Service Markets in Agriculture," May 2007, at [<http://www.aftresearch.org/aaas/>]; presentations at USDA's Ag Outlook forum by Ginny Kibler, "Water Quality Trading Basics," and Carl Lucero, "USDA Farm Bill Conservation - Supply Side of Trading," March 2007 [<http://www.usda.gov/oce/forum/2007%20Speeches/index.htm>]; and presentation material distributed by staff at the Environmental Defense.

such as the use of renewable fuel generated on-farm. Market-based approaches are also often viewed as encompassing broader societal benefits by complementing existing farm conservation programs and evolving regulatory approaches intended to address environmental improvements in the farm and forestry sectors.

USDA reports that there are several existing barriers that may prevent the development of environmental goods and services markets involving the farm and forestry sectors.¹⁰ These include but may not be limited to:

- uncertainty quantifying, measuring, and valuing credits;
- low demand for or discounted value of credits from agricultural sources because of uncertainty about the measurement and value of these credits;
- low participation in the farm and forestry sectors due to uncertainty over the value of environmental credits compared to the cost of pollution abatement;
- reluctance by farmers and landowners to participate in a regulatory-based program;
- small quantity of benefits that can be provided by individual farmers or landowners;
- high transaction costs;
- performance risks and liability;
- lack of information about program benefits and how to participate;
- lack of monitoring and enforcement; and
- uncertainty about whether conservation and environmental improvements that were initially funded through other publicly funded programs, such as cost-share programs administered by USDA, will be allowed to be traded.

What Is the Recent Congressional Action?

The enacted 2008 farm bill contains a new conservation provision that seeks to facilitate the participation of farmers and landowners in environmental services markets by directing USDA to develop technical guidelines for measuring farm- and forestry-based environmental services. This provision focuses first on carbon storage and indirectly references various agriculture and forestry provisions in some legislative initiatives that are being considered as part of the broader climate change debate, which have highlighted the perceived need for uniform standards and ways of measuring emissions reduction and increases in carbon storage in the agriculture and forestry sectors.

¹⁰ For more information, see USDA, *2007 Farm Bill, Conservation and Environment Theme Paper*, June 2006, at [<http://www.usda.gov/documents/FarmBill07consenv.pdf>]; and M. Ribaud and C. Jones, "Environmental Credit Trading: Can Farming Benefit," *Amber Waves*, USDA's Economic Research Service, Feb. 2006.

Farm Bill Legislation

In the managers report on the 2008 farm bill (P.L. 110-234, the Food, Conservation, and Energy Act of 2008),¹¹ the conferees state that “the largest barrier to participation [in emerging environmental services markets] is the lack of standards and accounting procedures that make transparent the benefits that are being produced and marketed.” To address this concern, the enacted bill contains a new provision in the bill’s conservation title that seeks to “establish technical guidelines that outline science-based methods to measure the environmental services benefits from conservation and land management activities in order to facilitate the participation of farmers, ranchers, and forest landowners in emerging environmental services markets” (Sec. 2709, Environmental Services Markets).

The intended purpose of these technical guidelines is to develop (1) a procedure to measure environmental services benefits; (2) a protocol to report environmental services benefits; and (3) a registry to collect, record, and maintain data on the benefits measured. The provision also requires that USDA provide guidelines for establishing a verification process as part of the protocol for reporting environmental services, but it allows USDA to consider the role of third parties in conducting independent verification. In carrying out this directive, USDA is directed to work in consultation with other federal¹² and state government agencies, nongovernmental interests,¹³ and other interested persons as determined by USDA.

The inclusion of this provision could expand the scope of existing farmland conservation programs by facilitating the development of private-sector markets for a range of environmental goods and services from farmers and landowners. Although the provision covers a range of farm and forestry services, including improved water and air quality, increased carbon storage, and habitat protection, among other types of environmental services, it explicitly gives priority to first establishing guidelines related to participation in carbon markets.

Both the House- and Senate-passed farm bills (H.R. 2419) proposed versions of this provision in their respective bills. Although the two versions differed in scope and in overall approach, both were similar in their intent to establish a framework to develop consistent standards and processes for quantifying farm- and forestry-based environmental services. The House-passed provision (Sec. 2407) proposed to establish a USDA-led Environmental Services Standards Board, which would

¹¹ The law was enacted on May 22, 2008, following a House and Senate vote to override the Administration’s veto of the bill on May 21. However, an enrolling error resulted in one title of the bill (Title III, Trade) being omitted from the version that was sent to the White House, and the enacted law contains 14 of 15 farm bill titles. Congress is considering a range of options on how to resolve this issue.

¹² In the House- and Senate-passed versions of this provision, other federal agencies were identified as including the Departments of Interior, Energy, Commerce, and Transportation; the Environmental Protection Agency; and the Army Corps of Engineers.

¹³ Identified as including farm, ranch, and forestry producers; financial institutions involved in environmental services trading; and institutions, nongovernmental organizations, and private sector representatives with relevant expertise or experience.

provide contracts, cooperative agreements, and grants to develop consistent standards and processes for quantifying environmental benefits from the farm and forestry sectors, thus establishing a framework to develop such standards and processes.¹⁴ The Senate-passed version (Sec. 2406) also directed USDA to establish a framework to develop consistent standards and processes that would facilitate the marketability of farm- and forestry-based environmental services, but differed in that it directed USDA to “give priority” to providing assistance to farmers and landowners participating in carbon markets. The Senate version differed also in that it called for a “collaborative” process involving governmental and nongovernmental representatives. It also required a series of progress reports to Congress, which were subsequently not included in the enacted bill.

The House, Senate and conference versions of this provision differed in terms of funding. For FY2008-FY2012, the House bill authorized \$50 million to be appropriated for this provision, whereas the Senate bill authorized such sums as are necessary annually. However, the enacted bill does not specifically address funding; instead, the manager’s report states that USDA is expected to “fulfill the intent of this section with resources available to the Department.” In contrast, USDA’s farm bill recommendations requested authorization of \$50 million in mandatory funds to cover the types of tasks addressed in this provision.

Climate Change Legislation

Aside from the 2008 farm bill debate, there are other legislative initiatives that might also facilitate the development of environmental services markets involving the farm and forestry sectors — particularly in the area of carbon storage and emissions reduction — as part of the ongoing climate change debate. During the 110th Congress, several proposals have been introduced that would either mandate or authorize a cap-and-trade program to reduce greenhouse gas (GHG) emissions. A cap-and-trade program provides a market-based policy tool for reducing emissions by setting a cap or maximum emissions limit for certain industries. Sources covered by the cap can choose to reduce their own emissions, or can choose to buy emission credits that are generated from reductions made by other sources.

In general, the current legislative proposals would not require emission reductions in the agriculture and forestry sectors as a covered industry. However, several of the cap-and-trade proposals do incorporate the agriculture and forestry sectors either as a source of carbon offsets or as a recipient of set-aside allowances.¹⁵

¹⁴ The House provision is similar to that proposed by USDA as part of its farm bill recommendations. See USDA, *USDA’s 2007 Farm Bill Proposals*, Jan. 31, 2007, at [<http://www.usda.gov/documents/07finalfbp.pdf>]; USDA, *2007 Farm Bill, Conservation and Environment Theme Paper*, June 2006, at [<http://www.usda.gov/documents/FarmBill07consenv.pdf>].

¹⁵ In the context of these legislative proposals, a carbon offset is a measurable avoidance, reduction, or sequestration of carbon dioxide (CO₂) or other GHG emissions, expressed in carbon-equivalent terms. A set-aside allowance refers to a set percentage of available allowances under the overall emissions cap that is allocated to non-regulated entities, in this (continued...)

The inclusion of these provisions as part of a cap-and-trade framework could provide additional financial incentives to encourage additional land-based conservation activities involving the agriculture and forestry sectors. For example, these provisions could allow farmers and landowners to participate in this emerging market by allowing them to generate (and sell) carbon offsets and credits associated with carbon capture and storage, emissions reductions, and/or other implemented environmental improvements on their farm or forested lands.¹⁶ These allowances and credits could be sold to regulated facilities (e.g., power plants) covered by a cap-and-trade program to meet their emission reduction obligations. Under some cap-and-trade proposals the agriculture and forestry sectors also would receive proceeds from the sale of these allowances, credits, and auctions to further promote and support activities in these sectors that reduce, avoid, or sequester emissions. These bills and issues continue to be debated in Congress.

In most cases, these bills contain language highlighting the perceived need for uniform standards and ways of measuring emissions reduction and increases in carbon storage in the agriculture and forestry sectors. The initiatives generally stipulate that measurements of emissions reductions and carbon uptake should be real, verifiable, additional, permanent, and enforceable. This requirement indirectly ties back to the new conservation provision in the 2008 farm bill (see previous section) that seeks to establish technical standards and accounting procedures for environmental services generated in the agriculture and forestry sectors.

For more information about the farm and forestry provisions within a leading Senate cap-and-trade initiative, see CRS Report RS22834, *Agriculture and Forestry Provisions in Climate Change Legislation (S. 3036)*. For other general information on the current GHG policy debate and legislative proposals, see CRS Report RL33846, *Greenhouse Gas Reduction: Cap-and-Trade Bills in the 110th Congress*, by Larry Parker and Brent D. Yacobucci; and CRS Report RL34067, *Climate Change Legislation in the 110th Congress*, by Jonathan L. Ramseur and Brent D. Yacobucci.

What Are Some Possible Considerations?

Among the principal questions regarding the inclusion of these types of provisions as part of any major legislative initiative is whether the agriculture and forestry sectors can effectively provide environmental goods and services along with the more traditional food, fiber, and other services these sectors already provide. The inclusion of these provisions could also raise certain procedural or implementation questions as Congress debates future farm policy or as it continues to consider the role of the agriculture and forestry sectors in climate change legislation.

¹⁵ (...continued)

case domestic agriculture and forestry entities.

¹⁶ Some legislative proposals would allow relatively broad use of agricultural and land use offset types, while others would allow for a more narrow use of offsets, such as emission reductions from animal waste. Some bills would not allow for offsets, but would set aside a percentage of allowances for various purposes, including biological sequestration.

- **Standards-setting process/implementation.** How will USDA implement its new farm bill directive for establishing uniform standards, accounting procedures, protocols, and registries for quantifying farm- and forestry-based environmental services? Can USDA accomplish its task using available agency resources?
- **Jurisdictional issues.** What are the advantages of establishing USDA as the lead role? What lead role will USDA play, given the mostly regulatory authority and statutory obligations of other likely participating federal agencies? Might putting USDA as the lead create conflict of interest as both the regulator and promoter of standards? Are there other jurisdictional issues, such that this provision needs to be referred to other authorizing congressional committees? How might existing state and local programs implemented by other agencies be affected? How will the collaborative effort between USDA and the other participating federal agencies be put into practice? How will disagreements be addressed and resolved among all federal partners?
- **Consistency with existing regulatory authorities.** Will the agreed-upon decisions and standards resulting from such an effort be binding among all federal agencies? What assurances are there that these decisions will not override the authorizing legislation regulating water and air quality, and wildlife habitat? Will regulatory agencies with authorizing legislation have the flexibility to not adopt the standards authorized by the board or other collaborative process, if they violate the individual agencies' authorizing statutes, or contain regulations, such as measurement protocols? What are the possible implications if these decisions and standards are inconsistent with other existing regulatory guidelines and authorities?
- **Consistency with possible future authorities and initiatives.** Will such a standard-setting framework and the agreed-upon standards be consistent with, or readily adapted to, other possible future regulatory initiatives, such as those involving climate change? If possible future climate change initiatives do not provide for carbon offsets and credits from the agriculture and forestry sector, will the agreed-upon standards be enforceable within the existing voluntary carbon market? What are the potential implications if these decisions and standards are inconsistent with other possible forthcoming regulatory guidelines and authorities?
- **Standards.** Will uniform standards be national, regional, local, or site-specific in scope? How will uniform standards address differences within different production areas, types of resources, and ecosystems? Will established protocols and management practices take into account these differences? Will these standards consist of an assigned value? Given the wide range in the types of environmental services, how will outcomes or benefits be measured

and expressed as standards? Will there be penalties for non-compliance?

- **Federal versus marketplace functions.** What roles should government agencies play in actually establishing environmental services markets involving agriculture and forestry? What roles will be strictly within the purview of the private-sector and independent credit markets? Is there a federal role beyond developing the reporting and credit registries that would require the board to act as intermediary between sellers and buyers? Who will be responsible for oversight of third party verification and certification, and for assigning market value to tradeable credits within an environmental services market? Will the federal agencies play a role in market oversight, enforcement, risk management, and capital investment? What other types of federal assistance may be needed to further facilitate the development of environmental services markets involving agriculture and forestry?
- **Congressional reporting/timeline.** How and when will the agencies involved in setting standards be expected to report their accomplishments to Congress? Should reporting requirements be included as part of these provisions?
- **Market barriers.** How effectively do the current proposals address the types of barriers that have been identified by USDA and others that may prevent the development of environmental goods and services markets involving the farm and forestry sectors?
- **Possible unintended consequences.** Might establishing a market-based approach shift governmental and/or industry priorities away from addressing more serious environmental problems by allowing some industrial facilities to buy relatively lower-cost farm-based carbon credits rather than pay for on-site pollution abatement at the facility? Might a market-based program shift USDA resources away from established farm conservation programs?