Agriculture, Climate Change & New Markets
Questions & Answers

How can agriculture be a part of the solution to climate change?

With the adoption of a cap-and-trade market that includes agricultural offsets, it has been estimated that 30% of greenhouse gas (GHG) offsets could be met with agricultural offsets annually over the next 50 years.[1] Currently, agriculture emits about 6% of the annual total of US greenhouse gases.[2] Reductions could come from the use of methane capture, precision fertilizer application, and other agricultural practices such as carbon sequestration.

Are new GHG markets for agriculture guaranteed?

No. Congress must adopt a policy that caps greenhouse gas emissions and allows agricultural offsets to be purchased (cap and trade). Agriculture could sell "credits" and generate additional revenue from emissions "offsets" which would be purchased by industry required to reduce their emission levels. One carbon credit would equal one metric ton of carbon dioxide, and the cost of such a credit would be determined by the market. These credits would be created by sequestering and reducing carbon or other GHG emissions.

Currently, the American Clean Energy and Security Act (ACES) which recently passed the House of Representatives would allow for the creation of a robust GHG market that would permit the sale of agricultural offsets. Other policies such as a carbon tax would not generate any markets for agriculture.

Will agriculture be regulated by the "cap"?

No, under the ACES bill manufacturing, transportation and utilities are "capped" entities, not agriculture. Agriculture, however, has the potential to be involved in the "trade" portion of the market.

How much are these markets worth?

Recently updated analysis from EPA and others indicates ACES could create a domestic offset market valued at $2.7 billion to $3.4 billion or more annually within five years of the legislation's implementation.[3] Recent USDA analysis indicate **domestic agricultural and forestry offset revenues of $2 billion per year in the near-term rising to $28 billion per year in the long-term.**[4] USDA analysis found that under ACES, "***the agricultural sector will have modest costs in the short term and net benefits – perhaps significant net benefits – over the longterm***."[5]

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[1] US Environmental Protection Agency, 2005, *Greenhouse Gas Mitigation Potential in U.S. Forestry and Agriculture*, *EPA* 430-R-05-006.
[2] Ibid.
[3] Calculations based on 2009 EPA analysis of domestic offsets usage under the domestic and international offset market scenarios.
Data from: U.S EPA. 2009. *EPA Analysis of the American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress*. Retrieved online from: http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf
[4] Values in real 2005 dollars. Office of the Chief Economist, Economic Research Service, USDA. 22 July 2009. *A Preliminary Analysis of the Effects of HR2454 on US Agriculture.*
[5] Office of the Chief Economist, Economic Research Service, USDA. 22 July 2009. *A Preliminary Analysis of the Effects of HR2454 on US Agriculture.*

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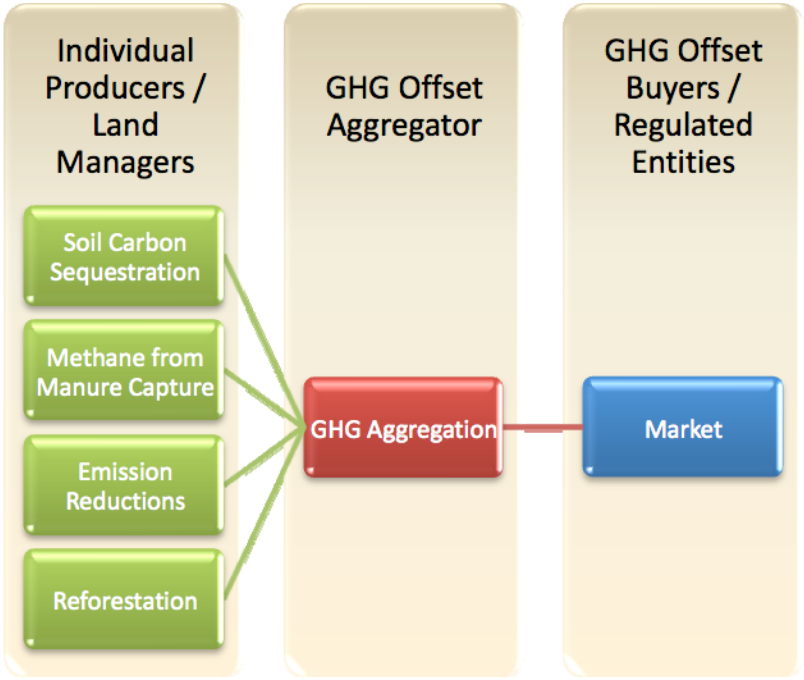
How could offset markets work?

Since greenhouse gases accumulate in the atmosphere from emissions worldwide, greenhouse gas reductions can come from anywhere with equal impact on climate change. Offset markets are a way for companies to meet their GHG reduction obligations through reductions outside their facilities and operations. A company might do this for a period of time to avoid replacing equipment before the end of its useful life or because it is the most cost effective way to meet their reduction obligations.

For example, if a utility is required to reduce their emissions by 100 tons over the next year, an offset market allows them maximum flexibility to meet that goal while keep prices stable for consumers. The utility could reduce its direct emissions to reach part of the goal, increase its efficiency to meet part, and it could choose to purchase GHG reductions from farmers for part – or its entire target depending on which choices make the most economic sense. In this way, offset markets make it possible to take action to reduce greenhouse gases without significantly affecting the economy.



As the chart above shows, there are many different ways in which agriculture practices can offset or avoid GHG emissions. The key will be that companies, under a cap and trade policy, will likely want to buy a bulk amount of GHG tons and will not want to make several hundred contracts with individual farmers. This means there will be a new market for what might be called carbon aggregators. These entities – which could be a service of your local farm association or cooperative – would be responsible for bundling the carbon and verifying that the reductions are actually occurring.

How can agricultural practices reduce or offset greenhouse gases and climate change?

Plants naturally take up carbon dioxide (a primary greenhouse gas) and give off oxygen. In this process, they also store or "sequester" carbon in the soil through their roots; however, most of that carbon is

released when farmers plow up the field to plant a crop. If farmers were to use direct seeding or no-till practices to plant crops, they would keep all that stored carbon in the soil. Practices like this, which have the ability to literally take CO_2 out of the atmosphere and sink it into soils –also create better soil fertility, water quality, water retention and greater wildlife habitat.

Other farming practices could also qualify for GHG emission reduction credits under the bill now before Congress. ACES allows for 2 billion annual offset credits to be traded on the market. Currently, the bill allows for emissions to be offset by:[6]

- Soil Carbon Sequestration
- Animal Waste Methane Capture
- Nitrous Oxide Reductions from Fertilizer Application
- Afforestation Carbon Sequestration
- Forest Management Carbon Sequestration

USDA forecasts the amount of carbon sequestered by US agriculture will nearly double from current levels in the next five years.[7] This additional uptake is expected through improved soil management (~60%), improved manure and nutrient management (~30%), and additional land-retirement (~10%).[8]

I'm a livestock producer and I'm worried about methane, which is a very potent greenhouse gas.

Because methane is potent, it will have significant market value for producers, rather than a liability. Livestock producers will be in a position to develop waste strategies to generate carbon offset and electricity income from biogas facilities, for example, or even just flare methane from covered lagoons.

How do offsets impact the cost of emissions reductions for the US economy?

Agricultural carbon offsets are a lowest cost option they can significantly reduce the overall cost of a cap-and-trade system while still achieving the desired level of emissions reductions. Additionally, offsets may act as a price "safety valve" for cap-and-trade if an unlimited number of offsets are allowed. As the price of a carbon allowance or credit rises, because the cost of abatement is often lower for agriculture than for other sectors, new entrants will arrive at an earlier price-point than other participants.

I've heard energy costs will go through the roof.

Here's what the National Energy Modeling System used by the Department of Energy and Congress says:

- **No fuel switching to natural gas**
- Stable residential and commercial natural gas bills
- Almost imperceptible macro-economic impacts
- A future for coal in carbon constrained world
- Robust future for nuclear energy & low to zero carbon renewables

[6] U.S. EPA. 2009. *EPA Analysis of the American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress*. Retrieved online from: http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf
[7] Congressional Research Service. 6 Mar 2007. *Climate Change: The Role of the U.S. Agriculture Sector*.
[8] Ibid.

- Large dispersion of funds to accelerate technology deployment and help affected communities

What about fertilizer prices?

The most recent USDA analysis of ACES clearly outlines the steps taken to ensure affordable fertilizer prices for all farmers:

"While most of the direct energy price increases would be felt immediately by the agricultural sector, ***fertilizer costs would likely be unaffected until 2025*** *due to provisions in HR 2454 that would distribute specific quantities of emissions allowances to "energy- intensive, trade exposed entities" (EITE). Nitrogenous fertilizer manufacturing is included on a list that EPA has assembled of presumptively eligible EITE sectors. Additionally, EPA analysis indicates that the allocation formula would provide enough allowances to cover the increased energy costs of all presumptively eligible EITE industries. Based on these considerations, the USDA analysis assumes HR* ***2454 imposes no uncompensated costs on nitrogen fertilizer manufacturers related to increases in the price of natural gas through 2024****."*

What will happen to farming income?

Projections on increased costs from cap-and-trade to agriculture vary widely. Analysis by Iowa State University economist Bruce Babcock indicates "relatively small" production costs of roughly $4.52 per acre for corn and soy farmers in Iowa, on the order of 1-2%.[9] To put this potential cost increase into perspective, the variable cost of producing corn and soybeans in Iowa in 2009 is somewhere around $300 per acre.[10] Babcock also cites that the amount of soil carbon that can be increased from adoption of no-till farming is typically on the order of one ton of CO_2 per hectare, or about 0.4 tons per acre annually.[11] At a $20-per-ton carbon price, this amounts to $8.00 per acre.

USDA analysis of ACES also indicates only marginal production cost increases. **In fact, USDA found the near-term impact of ACES on net farm income is less than a 1% decrease.**[12] While USDA predicts the cost of fertilizer and production will increase over the medium and longer term, these increases are still predicted to be less than 10%.[13]

Depending on the carbon pricing scheme, farmers could increase their net profits under a cap and trade system (*after* taking costs into account). **Recent USDA analysis "strongly suggests that revenue from**

[9] Babcock, Bruce. Center for Agricultural and Rural Development, Iowa State University. 13 July 2009. "Economist: Climate bill's farm impact 'relatively small'." Retrieved online from: http://blogs.desmoinesregister.com/dmr/index.php/2009/07/13/economist-climate-bills-farm-impact-relatively-small/.

[10] Babcock, Bruce. Center for Agricultural and Rural Development, Iowa State University. 2009. Costs and Benefits to Agriculture from Climate Change Policy. Iowa Ag Review. Summer, Vol. 15, No. 3. Retrieved online from: http://www.card.iastate.edu/iowa_ag_review/summer_09/article1.aspx.

[11] Ibid.

[12] Office of the Chief Economist, Economic Research Service, USDA. 22 July 2009. *A Preliminary Analysis of the Effects of HR2454 on US Agriculture.*

[13] Ibid.

agricultural offsets (afforestation, soil carbon, methane reduction, nitrous oxide reductions) rise faster than costs to agriculture from cap and trade legislation."[14]

Key Offset Terms

To have value in the market, offsets represent an actual reduction in greenhouse gas emissions. Offsets meet some basic guidelines to ensure quality. Pending federal cap-and-trade climate legislation would begin the creation of universal standards. However, generally, offsets that are Permanent, Additional, Verifiable, and Real emissions reductions will have value:

1. **Permanence.** The most desirable carbon sequestration projects are those where the emissions reductions are likely to remain intact indefinitely. However, some types of projects may be reversible; these projects may enter into a contract lease, potentially as short as a handful of years. A project of this variety could qualify for offsets, particularly if the purchaser agrees to make up the lost emission reductions through other means after the lease expires.
2. **Additionality.** An offset project needs to be an activity that would not have taken place normally, therefore keeping more carbon dioxide from reaching the atmosphere than would have otherwise happened. That is, the project needs to be a net reduction beyond the baseline for operations or behavior.
3. **Leakage.** When a carbon offset project in one location results in a net increase of emission elsewhere, this is referred to as leakage. For example, if keeping part of a field fallow to sequester carbon at a site leads to land clearing elsewhere, the emissions is said to have "leaked". Quality offsets must account for and minimize leakage.
4. **Verification.** Reductions must be measured and monitored for accuracy. Moreover, periodic third party measuring and monitoring is important to ensure honesty and transparency.

[14] Office of the Chief Economist, Economic Research Service, USDA. 22 July 2009. *A Preliminary Analysis of the Effects of HR2454 on US Agriculture.*