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Energy agriculture - carbon farming

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Sixth in a series

During the past year, scientific evidence has been piling up supporting the concerns about global warming. Melting glaciers, rising ocean levels and volatile weather are all signs of things to come. In response to this evidence, the focus in coming years will be on ways of slowing or actually reversing this trend.

Greenhouse gases have been identified as the major culprit of global warming. Sunlight reaching the earth's surface is reflected back into space as heat. Greenhouse gases act to capture this heat and trap it in the atmosphere.

Many gases have the greenhouse effect. Probably the most common is water vapor. Gases from human activity are shown in Table 1. Carbon dioxide is by far the most prevalent. Methane and nitrous oxide exist in much smaller amounts. However, all greenhouse gasses are not equal. Methane is 25 times more powerful as a greenhouse gas than carbon dioxide. Small amounts of man-made gases act as greenhouse gases also.

Table 1. Greenhouse Gas Emissions from Human Activity by Type, 2001*

Gas	Percent
Carbon Dioxide	84
Methane	9
Nitrous Oxide	5
All Others	2
Total	100

* Energy Information Administration, Emissions of Greenhouse Gases in the United States 2001, Washington, D.C. 2002.

The build-up of carbon dioxide in the atmosphere has been substantial. The atmospheric concentration of carbon dioxide has increased greatly in the last 50 years. This corresponds to the increase in carbon dioxide emissions from human activity (anthropogenic) starting in 1850, and climbing rapidly after 1950.

Most of the exchange of carbon dioxide between the earth and the atmosphere is a natural cycle. When plants grow they take in carbon dioxide in the process of

photosynthesis. When plants die and decay or are processed, they release carbon dioxide back into the atmosphere. The same type of cycle occurs between the oceans and the atmosphere. *continued on page 2*

Handbook updates

For those of you subscribing to the handbook, the following update is included.

Lease Termination and Other Legal Considerations for Lease Contracts – C2-06

Computing a Cropland Cash Rental Rate – C2-20 (4 pages)

Test Weights and Conversions – C6-82 (2 pages)

Please add these files to your handbook and remove the out-of-date material.

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Carbon dioxide buildup occurs when new carbon dioxide is added to the atmosphere. Burning fossil fuels (oil, coal, natural gas) takes carbon that was stored deep in the ground and releases it as carbon dioxide into the atmosphere. The same thing occurs with the release of carbon from the soil through farming practices.

The soil is a huge storehouse of carbon. Organic carbon (humus as we know it) is what makes soil nice and black. This organic carbon comes from thousands of years of prairie grasses growing, dying, decomposing and entering Midwestern soils. To learn more on the carbon cycle, visit the National Energy Information Center web site on greenhouse gases at: <http://www.eia.doe.gov/oiaf/1605/ggcebro/chapter1.html>.

Tillage or tearing up the soil stimulates the activities of microorganisms and exposes the humus to oxygen and the sun. These forces act to destroy the organic carbon and release carbon dioxide into the atmosphere. This change can be seen by comparing native or virgin sod to land that has been farmed for 100 years. The virgin sod is black while the farmed land has a shade of gray to it. According to scientists, the organic carbon content of Iowa soils has gone from 5 percent to about 3 percent over the last century.

On a world-wide basis, from the time agriculture began, almost 80 million tons of carbon have been released from the soil (Rattan Lal, soil scientist, Ohio State University). Up until the late 1950s, tillage (plowing) released more carbon dioxide into the atmosphere than all the burning of oil and coal in history.

However, that's all in the past and we can't do anything about it. But what this does tell us is the potential for once again using the soil as a great storehouse of carbon. Theoretically, American soils could soak up more than 100 million tons of carbon annually. That's enough to offset the emissions from half of the cars in the country (Rattan Lal).

Carbon Credit Programs

If tilling the soil releases carbon dioxide into the atmosphere, not tilling the soil stops the release of carbon dioxide. In fact, not tilling the soil begins to build up the carbon content of the soil. You might call this "carbon farming". Examples include no-till farming and planting cropland to permanent grass or trees.

Some large U.S. companies want to voluntarily reduce their greenhouse gas emissions. However, instead of reducing their own carbon emissions they have the option of paying someone else to reduce their carbon emissions.

Programs have been developed that facilitate the buying and selling of carbon credits between farmers and large companies. Farmers receive carbon credits for storing carbon in the soil. The credits are then aggregated and sold to companies wanting to reduce emissions. Examples include programs by Iowa Farm Bureau and North Dakota Farmers Union.

Typically, the program aggregates or pools the credits from many farmers and manages and administers these pools. Specific steps involve:

- 1) Registering the individual farm projects
- 2) Maintaining the database of ag-based credits.
- 3) Managing the sales of the credits to the Chicago Climate Exchange (CCX)
- 4) Distributing proceeds back to participants
- 5) Collecting a fee for services provided (e.g. 10 percent of net proceeds).

Chicago Climate Exchange (CCX)

The Chicago Climate Exchange (www.chicagoclimatex.com) is a global marketplace for trading greenhouse gases. It provides a marketplace where companies and other entities can purchase carbon credits to offset their greenhouse gas emissions. Members make voluntary but legally binding contracts to reduce emissions. Well-known member companies include Ford, DuPont and IBM.

The chart on the next page shows the price of carbon traded on the CCX since January of 2004. The price is shown in dollars per metric ton (2,204 pounds). Since April of 2006, the price has traded in the \$3 to \$5 range. During 2007, the volume of trading increased.

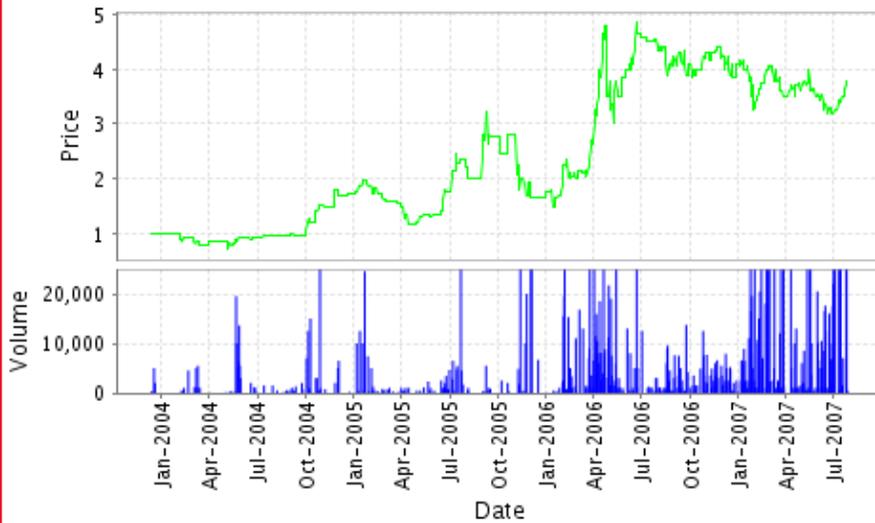
To be eligible the land must be capable of being cropped. Producing an acre of crop using the no-till practice provides a credit of .6 of a ton of carbon dioxide in Iowa and the Corn Belt in general. The size of the credit is different for other parts of the country.

In addition to no-till farming, other acceptable methods of storing carbon include:

- Converting cropland to permanent grassland or trees.

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CCX Carbon Financial Instrument (CFI) Contracts Daily Report



Source: Chicago Climate Exchange (CCX)

- Restoring wetlands
- Rangeland improvement
- Cover crops
- Planting conservation buffers
- On-farm methane digesters

Methane digesting of manure and other feed-stocks is of special interest because one ton of methane converts to 18.25 tons of carbon dioxide credits on the Chicago Climate Exchange.

Obviously, these programs are currently not big money-makers for farmers. With carbon selling between \$3 and \$4 per ton and a carbon credit of .6 ton, the return per acre is pretty small. However, be patient, with increasing concerns about the devastating effects of global warming nationally and globally, the price of carbon will increase and increase substantially. The benefits of no-till farming include reduced production costs and less soil erosion. Now there is an additional benefit of no-till which is to rebuild the organic carbon content of our soils – and get paid for it.

More information

For more information on these projects, contact the following:

Iowa Farm Bureau Federation
 515-225-5431
<http://www.iowafarmbureau.com/carbon>

North Dakota Farmers Union
 1-800-366-8331 ext. 116
<http://carboncredit.ndfu.org/>

There are other public and private sector Carbon Credit Programs that are not included in this listing.

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