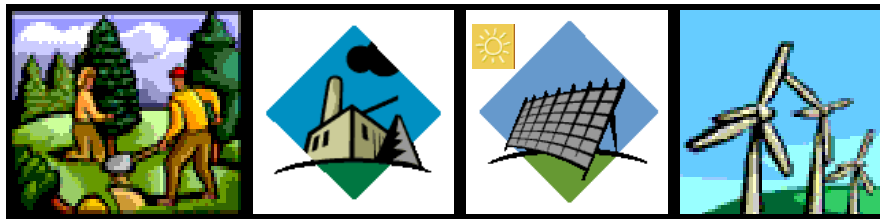


# Climate Change and Opportunities for RC&D Councils in North Carolina

A Report to the North Carolina Association of RC&D Councils



September 25<sup>th</sup>, 2008

## Committee Members

**Kipling Godwin, Cape Fear RC&D, Whiteville, NC**  
**Marilyn Meares, Cape Fear RC&D, Wilmington, NC**  
**Dan McClure, Carolina Land & Lakes RC&D, Newton, NC**  
**Ann Coughlin, Albemarle RC&D, Manteo, NC**  
**Al Engler, Pilot View RC&D, Winston-Salem, NC**  
**Mark Powell, Chair, Albemarle RC&D, Edenton, NC**

North Carolina Association of  
Resource Conservation & Development Councils, Inc.

Albemarle RC&D • Environmental Impact RC&D • Mountain Valleys RC&D • Blue Ridge RC&D • Mid East RC&D  
Piedmont Conservation Council • Southwestern NC RC&D • Pilot View RC&D • Cape Fear RC&D • Carolina Land & Lakes RC&D

## **A Report to the North Carolina Association of RC&D Councils**

### **Executive Summary**

In February 2008, the North Carolina Association of RC&D Councils tasked a committee of council members and coordinators with identifying opportunities for RC&D Councils to participate in markets related to climate change. The following report attempts to move beyond the politics of climate change by answering key questions, and by identifying how RC&D Councils in the state can participate in existing and emerging markets for carbon offsets or credits.

With extensive grass-roots networks and local political support, RC&D Councils are uniquely qualified to participate in markets for carbon offsets or credits. The report includes examples of RC&D Councils participating in these markets, including two methane-capture projects in North Carolina, and forestry carbon-offset projects in Arkansas, New York and Montana. These examples demonstrate how RC&D Councils are serving as brokers, facilitators and/or managers to effectively conceptualize, design and implement projects related to climate change.

After an extensive review of the issues surrounding climate change and the rapidly changing market for carbon offsets or credits, the committee has identified a few key activities for helping position RC&D Councils in N.C. to take advantage of existing and emerging markets:

- Increase RC&D credibility in carbon offset or credit markets by increasing council members' knowledge of key issues and opportunities. This effort must move beyond the politics of climate change in order to be successful.
  - Each council should review and discuss the climate change report at one or more formal meeting (s).
  - Each council also should task a committee with developing a strategy for increasing the council's presence and credibility in existing and/or emerging local markets for carbon offsets or credits.
- The State Association should pursue grants for workshops across the state to educate council members, local stakeholders, government officials and others about existing and emerging carbon offset or credit markets. For example, methane capture from landfills would build on experience from two projects in N.C., and provide new opportunities for other RC&D Councils. Energy efficiency and renewable energy are two important markets across the state. Such workshops also would help establish RC&D Councils' credibility in carbon offset or credit markets.
- The State Association should establish partnerships with key non-profit groups, universities, and businesses that have extensive experience and good reputations in carbon offset or credit markets. Some of these groups are mentioned in the report. For non-profit groups, universities and businesses that have state wide coverage, a Memorandum of Understanding (MOU) should be considered for establishing and developing partnerships.
- The State Association should establish an association web site with a front-page section highlighting RC&D Councils' achievements in carbon offset and credit markets. The web site also would serve as a central location for RC&D Councils to share information on other projects across the state.

## **Why should RC&D Councils be concerned with Climate Change?**

There is broad scientific consensus that global warming is happening as a result of emissions of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases from human activities including industrial processes, fossil fuel combustion, and changes in land use, such as deforestation<sup>1</sup>. However, some scientists disagree. They believe that global warming is occurring because of non-human related activities. The debate over whether or not climate change is occurring due to human activities will become less important if the federal government begins regulating CO<sub>2</sub> and other greenhouse gases at the federal level. Federal regulation would bring stability to trading markets for greenhouse gases, which in turn, would lead to substantial new investments in carbon offset projects. This would lead to more investments, both public and private, in projects that conserve and enhance natural resources.

In the absence of federal regulation, many states are moving to regulate CO<sub>2</sub> and other greenhouse gases at state and regional levels. Some of these programs are summarized beginning on page 12 of the report. To capture some of these investments, **RC&D Councils in North Carolina** need to be aware of existing market opportunities, and how market opportunities may change as a result of state or federal regulation.

1. Union of Concerned Scientists [www.ucsusa.org/](http://www.ucsusa.org/)

## **How will Climate Change Affect Agriculture, Land Resources, Water Resources and Biodiversity?**

The U.S. Climate Change Science Program (CCSP) recently released "Synthesis and Assessment Product 4.3 (SAP 4.3): The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States." The CCSP integrates the federal research efforts of 13 agencies on climate and global change.

The report was written by 38 authors from universities, national laboratories, non-governmental organizations, and federal service. The report underwent expert peer review by 14 scientists through a Federal Advisory Committee formed by the USDA. The National Center for Atmospheric Research also coordinated in the production of the report. It is posted on the CCSP Web site at [www.climatechange.gov/Library/sap/sap4-3/default.php](http://www.climatechange.gov/Library/sap/sap4-3/default.php).

The report finds that climate change is already affecting U.S. water resources, agriculture, land resources, and biodiversity, and will continue to do so. Specific findings include:

- Grain and oilseed crops will mature more rapidly, but increasing temperatures will increase the risk of crop failures, particularly if precipitation decreases or becomes more variable.
- Higher temperatures will negatively affect livestock. Warmer winters will reduce mortality but this will be more than offset by greater mortality in hotter summers. Hotter temperatures will also result in reduced productivity of livestock and dairy animals.

- Forests in the interior West, the Southwest, and Alaska are already being affected by climate change with increases in the size and frequency of forest fires, insect outbreaks and tree mortality. These changes are expected to continue.
- Much of the United States has experienced higher precipitation and streamflow, with decreased drought severity and duration, over the 20th century. The West and Southwest, however, are notable exceptions, and increased drought conditions have occurred in these regions.
- Weeds grow more rapidly under elevated atmospheric CO<sub>2</sub>. Under projections reported in the assessment, weeds migrate northward and are less sensitive to herbicide applications.
- There is a trend toward reduced mountain snowpack and earlier spring snowmelt runoff in the Western United States.
- Horticultural crops (such as tomato, onion, and fruit) are more sensitive to climate change than grains and oilseed crops.
- Young forests on fertile soils will achieve higher productivity from elevated atmospheric CO<sub>2</sub> concentrations. Nitrogen deposition and warmer temperatures will increase productivity in other types of forests where water is available.
- Invasion by exotic grass species into arid lands will result from climate change, causing an increased fire frequency. Rivers and riparian systems in arid lands will be negatively impacted.
- A continuation of the trend toward increased water use efficiency could help mitigate the impacts of climate change on water resources.
- The growing season has increased by 10 to 14 days over the last 19 years across the temperate latitudes. Species' distributions have also shifted.
- The rapid rates of warming in the Arctic observed in recent decades, and projected for at least the next century, are dramatically reducing the snow and ice covers that provide denning and foraging habitat for polar bears.

USDA agencies are responding to the risks of climate change. For example, the **Forest Service** is incorporating climate change risks into National Forest Management Plans and is providing guidance to forest managers on how to respond and adapt to climate change. The **Natural Resources Conservation Service** and **Farm Services Agency** are encouraging actions to reduce greenhouse gas emissions and increase carbon sequestration through conservation programs. **USDA's Risk Management Agency** has prepared tools to manage drought risks and is conducting an assessment of the risks of climate change on the crop insurance program.

For more information:

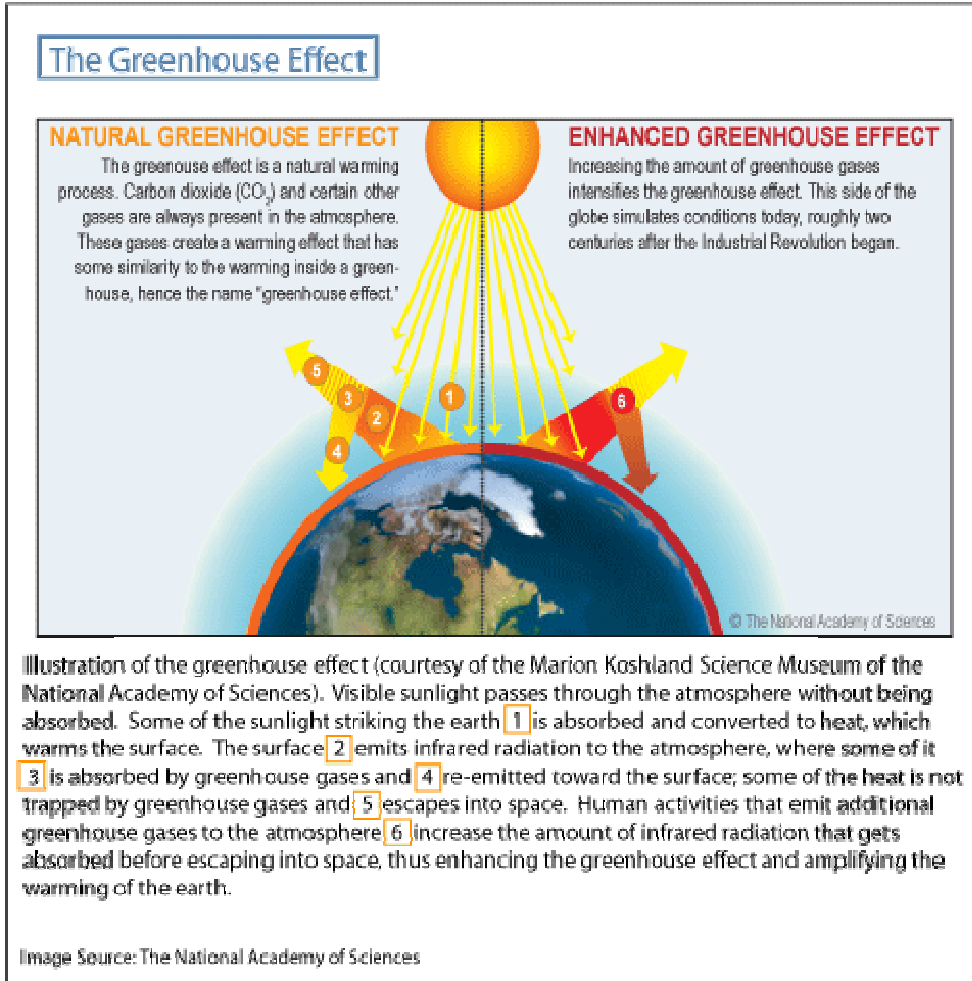
[www.usda.gov/oce/global\\_change/](http://www.usda.gov/oce/global_change/)

[www.climatescience.gov/Library/sap/sap4-3/default.php](http://www.climatescience.gov/Library/sap/sap4-3/default.php)

[www.sap43.ucar.edu/](http://www.sap43.ucar.edu/)

## What is the Greenhouse Effect and how is it related to Climate Change?

The greenhouse effect keeps the earth warm and habitable; without it, the earth's surface would be about 60 degrees Fahrenheit colder on average. Since the average temperature of the earth is about 45 degrees Fahrenheit, the natural greenhouse effect is clearly a good thing. But the enhanced greenhouse effect means even more of the sun's heat is trapped, causing global temperatures to rise.<sup>1</sup>



Scientists refer to what has been happening in the earth's atmosphere over the past century as the "enhanced greenhouse effect." By pumping man-made greenhouse gases into the atmosphere, humans are altering the process by which naturally occurring greenhouse gases trap the sun's heat before it can be released back into space.<sup>1</sup>

The atmosphere around us is made up of gases. Some of these gases function like the panes of a greenhouse: they let some radiation from the sun in but also retain heat in the atmosphere, that is: they don't let all radiation back out. As a result of this natural effect, it is warmer on Earth than it would be without these

heat-trapping gases. Human contributions of certain gases to the atmosphere have increased this greenhouse effect.<sup>1</sup>

Carbon dioxide (CO<sub>2</sub>) is one of those heat-trapping (greenhouse) gases that have increased significantly in atmospheric concentration since pre-industrial times and thus has raised the greatest concern. But several others contribute significantly to the warming of the lower part of the atmosphere, such as methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), ozone (O<sub>3</sub>), and halocarbons.<sup>2</sup>

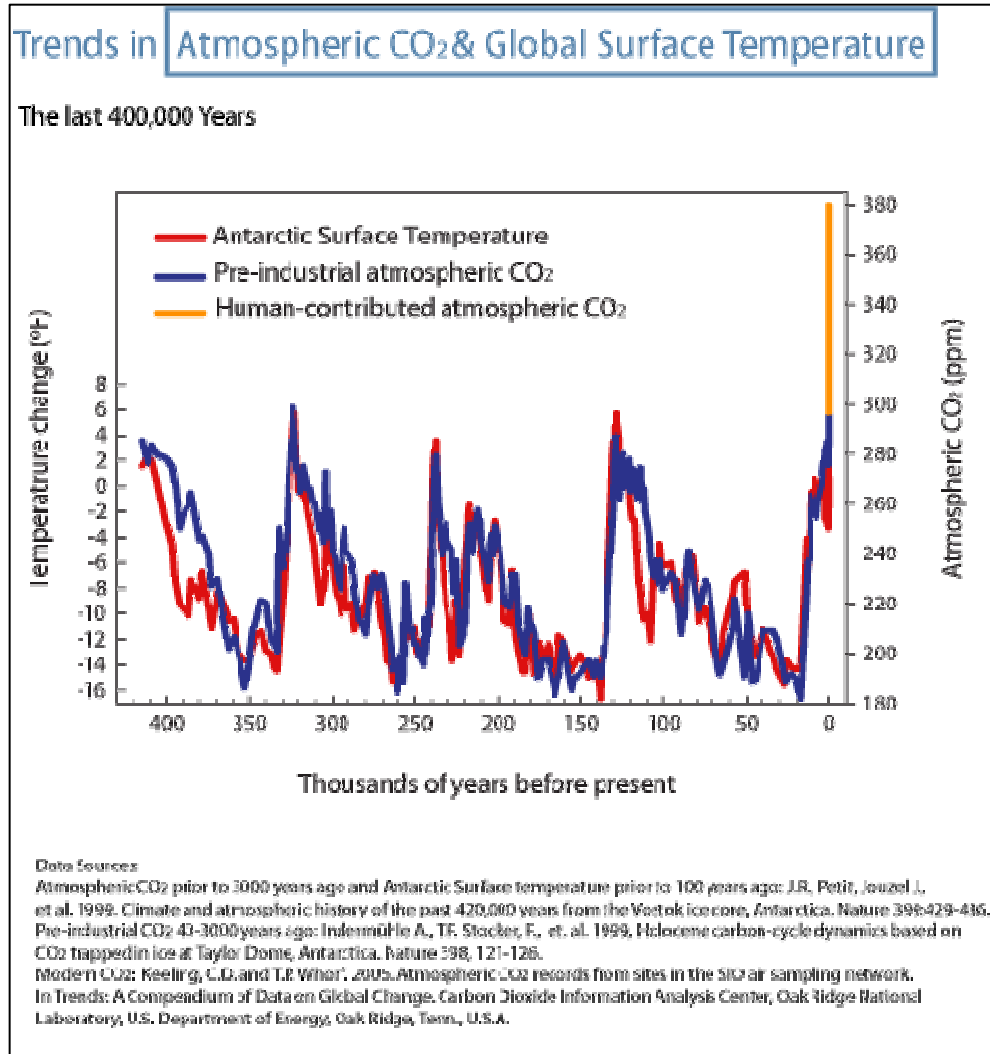
1. Pew Center on Global Climate Change [www.pewclimate.org/global-warming-basics/facts\\_and\\_figures](http://www.pewclimate.org/global-warming-basics/facts_and_figures)

2. Union of Concerned Scientists [www.ucsusa.org/](http://www.ucsusa.org/)

## Is Climate Change or Global Warming, really happening?

There is broad scientific consensus that global warming is happening as a result of emissions of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases from human activities including industrial processes, fossil fuel combustion, and changes in land use, such as deforestation. The graph at right shows atmospheric CO<sub>2</sub> and Antarctic temperature for the last 400,000 years. The industrial revolution and burning of fossil fuels has caused a significant increase in CO<sub>2</sub> in the atmosphere, which as history indicates, will lead to increases in temperature.<sup>1</sup>

Some scientists disagree. They believe that global warming is occurring because of non-human related activities. The debate will continue, but it will become less important once the U.S. government begins regulating emissions of CO<sub>2</sub> and other greenhouse gases. The presidential candidates have promised to regulate CO<sub>2</sub> at the federal level, and there is some bipartisan support for this action in congress. Federal regulation would create a stable environment for trading carbon in U.S. and international markets, which in turn, would increase public and private investment.



1. Pew Center on Global Climate Change [www.pewclimate.org/global-warming](http://www.pewclimate.org/global-warming)

## What is Carbon Sequestration?

Scientists have identified several ways to reduce atmospheric levels of greenhouse gasses. They include:

- Reducing fossil fuel consumption;
- Increasing the efficiency of fuels;
- Increasing the use of renewable fuels and energy, and;
- Using sequestration.

Terrestrial carbon sequestration is the process through which carbon dioxide (CO<sub>2</sub>) from the atmosphere is absorbed by trees, plants and crops through photosynthesis, and stored as carbon in biomass (tree trunks, branches, foliage and roots) and soils. The term "sinks" is also used to refer to forests, croplands, and grazing lands, and their ability to sequester carbon. Agriculture and forestry activities can also release CO<sub>2</sub> to the atmosphere. Therefore, a carbon sink occurs when carbon sequestration is greater than carbon releases over some time period.<sup>1</sup>

1. <http://www.epa.gov/sequestration/faq.html>

## What are Carbon Offsets and Carbon Credits?

As mentioned above, when forests, croplands, and grazing lands accumulate or sequester more carbon than they release over some period of time, then this "additional" carbon can be measured and marketed as carbon offsets or carbon credits.

In renewable energy projects, carbon offsets or carbon credits may be generated by "offsetting" the use of fossil fuels to produce the same amount of energy.

Landfill projects that capture methane (a long lasting greenhouse gas) may also generate carbon offsets or carbon credits by burning off the methane or by using it produce energy.

**Renewable energy.** Renewable energy offsets commonly include wind power, solar power, hydroelectric power and biofuel. Some of these offsets are used to reduce the cost differential between renewable and conventional energy production, increasing the commercial viability of a choice to use renewable energy sources.

Renewable Energy Credits (RECs) (also known as green tags or tradable renewable certificates) are also sometimes treated as carbon offsets, although the concepts are distinct. Whereas a carbon offset represents a reduction in greenhouse gas emissions, a REC represents a quantity of energy produced from renewable sources. To convert RECs into offsets, the clean energy must be translated into carbon reductions, typically by assuming that the clean energy is displacing an equivalent amount of conventionally produced electricity from the local grid. This is known as an indirect offset because the reduction doesn't take place at the project site itself, but rather at an external site. However, some controversy surrounds the question of whether they truly lead to "additional" emission reductions and who should get credit for any reductions that may occur.<sup>1</sup>

**Energy efficiency.** While carbon offsets, which fund renewable energy projects, help lower the carbon intensity of energy supply, energy conservation projects seek to reduce the overall demand for energy. Carbon offsets in this category fund projects of several types:

- Cogeneration plants generate both electricity and heat from the same power source, thus improving upon the energy efficiency of most power plants which waste the energy generated as heat.
- Fuel efficiency projects replace a combustion device with one which uses less fuel per unit of energy provided. Assuming energy demand does not change, this reduces the carbon dioxide emitted.
- Energy-efficient buildings reduce the amount of energy wasted in buildings through efficient heating, cooling or lighting systems. In particular, the replacement of incandescent light bulbs with compact fluorescent lamps can have a drastic effect on energy consumption. New buildings can also be constructed using less carbon-intensive input materials.

**What is biomass?** Biomass is any organic material made from plants or animals. Domestic biomass resources include agricultural and forestry residues, municipal solid wastes, industrial wastes, and terrestrial and aquatic crops grown solely for energy purposes. Biomass can be converted to other usable forms of energy and is an attractive petroleum alternative for a number of reasons. First, it is a renewable resource that is more evenly distributed over the Earth's surface than are finite energy sources, and may be exploited using more environmentally friendly technologies.<sup>3</sup>

Agriculture and forestry residues, and in particular residues from paper mills, are the most common biomass resources used for generating electricity and power, including industrial process heat and steam, as well as for a variety of biobased products. Use of liquid transportation fuels such as ethanol and biodiesel, however, currently derived primarily from agricultural crops, is increasing dramatically.<sup>3</sup>

For more information:

Office of the Biomass Program <http://www1.eere.energy.gov/biomass/index.html>

**What are biofuels?** Biofuels are any fuel derived from biomass. Agricultural products specifically grown for conversion to biofuels include corn and soybeans. R&D is currently being conducted to improve the conversion of non-grain crops, such as switchgrass and a variety of woody crops, to biofuels.<sup>3</sup>

The energy in biomass can be accessed by turning the raw materials of the feedstock, such as starch and cellulose, into a usable form. Transportation fuels are made from biomass through biochemical or thermochemical processes. Known as biofuels, these include ethanol, methanol, biodiesel, biocrude, and methane.<sup>3</sup>

For more information:

Office of the Biomass Program <http://www1.eere.energy.gov/biomass/index.html>,

National Renewable Energy Laboratory <http://www.nrel.gov/docs/fy00osti/25876.pdf#search='biofuels>

Alternative Fuels Data Center <http://www.eere.energy.gov/afdc/fuels/index.html>

**What is ethanol?** Ethanol is the most widely used biofuel today. Also known as ethyl alcohol or grain alcohol, it can be used either as an alternative fuel or as an octane-boosting, pollution-reducing additive to gasoline. It is an alcohol fuel made from sugars and starch found in plants. In the U.S., ethanol is primarily produced from the starch contained in grains such as corn, grain sorghum, and wheat through a fermentation and distillation process that converts starch to sugar and then to alcohol.<sup>3</sup>

Currently, a majority of ethanol is made from corn, but new technologies are being developed to make ethanol from other agricultural and forestry resources such as:

- corn stover (stalks and residues left over after harvest);
- grain straw;
- switchgrass;
- quick growing tree varieties, such as poplar or willow; and
- municipal wastes.

Ethanol can be blended with gasoline in varying quantities to reduce the consumption of petroleum fuels, as well as to reduce air pollution. It is increasingly used as an oxygenate additive for standard gasoline, as a replacement for methyl t-butyl ether (MTBE), which is responsible for groundwater and soil contamination.<sup>3</sup>

For more information:

Alternative Fuels Data Center <http://www.eere.energy.gov/afdc/fuels/index.html>

**What is biodiesel?** Biodiesel is a clean burning alternative fuel produced from domestic, renewable resources such as new and used vegetable oils and animal fats. Biodiesel is primarily produced through base catalyzed transesterification. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics. Biodiesel can be blended at any level with petroleum diesel.<sup>3</sup>

For more information:

U.S. Department of Energy Alternative Fuel Data Center

<http://www.eere.energy.gov/afdc/fuels/biodiesel.html>

National Biodiesel Board <http://www.biodiesel.org>

**What are biobased products?** Today, petroleum is refined to make chemical feedstocks used in thousands of products. Many of these petroleum-based feedstocks could be replaced with value-added chemicals produced from biomass to then manufacture clothing, plastics, lubricants, and other products.<sup>3</sup>

Biobased chemicals and materials are commercial or industrial products, other than food and feed, derived from biomass feedstocks. Biobased products include green chemicals, renewable plastics, natural fibers and natural structural materials. Many of these products can replace products and materials traditionally derived from petrochemicals, but new and improved processing technologies will be required.<sup>3</sup>

For more information:

Office of the Biomass Program <http://www1.eere.energy.gov/biomass/index.html>

**What is biopower?** Biopower, or biomass power, is the use of biomass to generate electricity, or heat and steam required for the operation of a refinery. Biopower system technologies include direct-firing, cofiring, gasification, pyrolysis, and anaerobic digestion.<sup>3</sup>

Most biopower plants use direct-fired systems. They burn biomass feedstocks directly to produce steam. This steam drives a turbine, which turns a generator that converts the power into electricity. In some biomass industries, the spent steam from the power plant is also used for manufacturing processes or to heat buildings. Such combined heat and power systems greatly increase overall energy efficiency. Paper mills, the largest current producers of biomass power, generate electricity or process heat as part of the process for recovering pulping chemicals.<sup>3</sup>

**Methane collection and combustion.** Some offset projects consist of the combustion or containment of methane generated by farm animals, landfills or other industrial waste. Methane has a Global warming potential (GWP) 23 times that of CO<sub>2</sub>; when combusted, each molecule of methane is converted to one molecule of CO<sub>2</sub>, thus reducing the global warming effect by 96%. Methane can also be processed using an anaerobic digester which generates electricity or heat.<sup>2</sup>

1. Gillenwater, Michael (2008). "[Redefining RECs—Part 1: Untangling attributes and offsets](#)". Energy Policy.

1. Gillenwater, Michael (2008). "[Redefining RECs \(Part 2\): Untangling certificates and emission markets](#)". Energy Policy.

2. The Minnesota Project <http://www.mnproject.org>

3. US Department of Energy, Energy Efficiency and Renewable Energy, Biomass Program: Biomass FAQs [http://www1.eere.energy.gov/biomass/biomass\\_basics\\_faqs.html](http://www1.eere.energy.gov/biomass/biomass_basics_faqs.html)

## **What are the key issues for developing carbon offset projects?**

Carbon offset projects must address the following issues in order to establish the value of offsets:

- Additionality
- Permanence
- Leakage
- Measurement and monitoring
- Verification and certification.

**Additionality** refers to the amount of carbon dioxide captured, stored or prevented from reaching the atmosphere compared to what would happen without the project. In other words, is this something that would have happened anyway?

**Permanence** is the life of the project. The most desirable carbon offset projects are those where the carbon is likely to remain sequestered indefinitely. This issue is particularly relevant for forestry offset projects since there is always a risk of natural disasters.

**Leakage** occurs when emissions avoided within a site are not eliminated, but rather shifted to another location, or when sequestration at a site leads to land clearing elsewhere.

**Measurement and monitoring** involves regular measurements of carbon sequestered over the life of a project. These regular measurements are used to calculate net carbon offsets over baseline measurements taken in the first year of the project.

**Verification and Certification** must be done by independent third parties throughout the life of a project to ensure that goals are met for carbon sequestration, additionality, measurement, leakage and permanence. Projects should follow formal standards such as the Voluntary Carbon Standard<sup>1</sup> and the Gold Standard.<sup>2</sup>

1. Voluntary Carbon Standard <http://www.v-c-s.org/>
2. Gold Standard <http://www.cdmgoldstandard.org/index.php>

## **How will Carbon be Traded in the U.S.?**

**Proposed Cap-and-Trade Programs.** Several bipartisan climate policies in both the House and the Senate have been proposed in the 110<sup>th</sup> Congress. The Safe Climate Act (H.R. 1590) and the Global Warming Pollution Reduction Act (S. 309) would set the most aggressive caps, calling for emissions reductions of 80 percent below 1990 levels by 2050. Both bills would establish additional performance standards for the electric, fuel and transportation sectors, while leaving the details of a cap-and-trade program to the Environmental Protection Agency.<sup>1</sup>

In the Senate, Joseph Lieberman (D-Conn.) and John Warner (R-Va.) introduced a cap-and-trade bill, while House Energy and Commerce Committee Chairman John Dingell (D-Mich.) and Rep. Rick Boucher (D-Va.) have issued the first in a series of white papers exploring the principles of a cap-and-trade policy before introducing a bill.<sup>1</sup>

**How a Basic ‘Cap-and-Trade’ Program Works.** Under a cap-and-trade program, the federal government would establish an economy-wide cap on emissions, measured in metric tons of CO<sub>2</sub> equivalent, and tighten that cap over time. It then would issue “emissions allowances” that correspond to a specific number of metric tons of carbon. The total number of allowances would match the cap.<sup>1</sup>

The program would require electric utilities, refineries and other sources of global warming pollution to have an allowance for each ton of their emissions. Polluters would acquire allowances during the initial distribution or by trading for them in an “allowance market.” This market would enable polluters that are able to reduce their emissions relatively cheaply to sell allowances to those that are unable to do so, thereby establishing a market price for carbon. The program would create an incentive for polluting facilities to implement the most cost-effective emissions reduction options and, by putting a price on global warming pollution, encourage investments in new low-carbon technologies.<sup>1</sup>

**A Carbon Tax.** A carbon tax, like a cap-and-trade program, would use the power of the market to achieve cost-effective emissions reductions, and both would generate revenues that could be used for the public benefit. It may be possible for the two policies to co-exist and complement one another. For example, a cap-and-trade program could cover most economic sectors where emissions can be capped at centralized sources, such as power plants. A carbon tax could provide incentives for emissions

reductions in sectors where it is more difficult to establish a cap, such as transportation, where emissions are more dispersed through the stages of fuel production and consumption.<sup>1</sup>

A well-designed cap-and-trade program has an important advantage over a carbon tax. The former would require the specific emissions reductions necessary to avoid dangerous climate change, while a carbon tax by itself cannot guarantee any particular level of emissions reductions. Moreover, a cap-and-trade program would more easily dovetail with similar existing and proposed regimes in other countries and regions. For example, allowing developing countries to sell carbon credits in a cap-and-trade program from tropical deforestation emissions reductions would provide a powerful incentive to address the source of some 20 percent of global warming pollution emissions.<sup>1</sup>

1. Union of Concerned Scientists <http://www.chicagoclimatex.com/>

## **Can carbon really be traded, or is it just a wild and crazy idea?**

Carbon is being trading in legally binding and voluntary markets in the U.S and overseas.

The [Kyoto Protocol](#), which came into effect in 2005, is a legally-binding agreement under which 169 industrialized countries have agreed to reduce by 2012 their collective greenhouse gas emissions (GHG) to a level that is 5.4% below their 1990 emission levels. The world's largest GHG market has evolved under this trading regime.<sup>1</sup>

The United States did not ratify Kyoto, and the federal government does not currently regulate carbon dioxide. However, several states have initiated their own regulatory processes, alone or in conjunction with others. Currently, GHG emissions markets exist or may soon exist under the following regimes:

- In 1997, Oregon enacted the Oregon Standard, the first regulation of CO<sub>2</sub> in the United States. The Oregon Standard requires that new power plants built in Oregon reduce their CO<sub>2</sub> emissions to a level 17% below those of the most efficient combined cycle plant, either through direct reduction or offsets. Plants may propose specific offset projects or pay mitigation funds to [The Climate Trust](#), a non-profit created by law to implement projects that avoid, sequester or displace CO<sub>2</sub> emissions.<sup>1</sup>
- [Chicago Climate Exchange \(CCX\)](#), launched in 2003, is the world's first and North America's only active voluntary, legally binding integrated trading system to reduce emissions of all six major greenhouse gases (GHGs), with offset projects worldwide. CCX Members are leaders in greenhouse gas (GHG) management and represent all sectors of the global economy, as well as public sector innovators. Reductions achieved through CCX are the only reductions made in North America through a legally binding compliance regime, providing independent, third party verification. CCX emitting Members make a voluntary but legally binding commitment to meet annual GHG emission reduction targets.<sup>2</sup>
- On the East Coast, ten states (Connecticut, Delaware, Maryland, Massachusetts, Maine, New Hampshire, New Jersey, New York, Rhode Island, and Vermont) are developing the [Regional Greenhouse Gas Initiative \(RGGI\)](#), a regional strategy to reduce CO<sub>2</sub> emissions utilizing a cap-and-trade system. Although RGGI will not officially launch until January 2009, the first

auction of emission permits is set for September 2008 and brokers report that forward transactions are already taking place on this market.<sup>1</sup>

- California's Global Warming Solutions Act is the first US state-wide program to cap all GHG emissions from major industries that includes penalties for non-compliance. Under the Act, the California's State Air Resources Board (CARB) is required to create, monitor and enforce a GHG emissions reporting and reductions program.
  - The [Western Climate Initiative \(WCI\)](#) includes California and five other states (New Mexico, Oregon, Washington, Arizona, and Utah) as well as three Canadian provinces (British Columbia, Manitoba, and Quebec). It was formed in February 2007, and member states have committed to a 15% GHG emissions reduction goal below a 2005 baseline by 2020.<sup>1</sup>
  - A third regional cap-and-trade program is also in the making -- the Midwestern Regional GHG Reduction Program (MRP). This program consists of the following members: Iowa, Illinois, Kansas, Minnesota, Wisconsin, Michigan, and Manitoba (Canada). The Midwestern Greenhouse Gas Accord was signed in November 2007, and aims to incorporate an approximate emissions target of 16% below 2005 levels. The program is scheduled to start in 2012 and will incorporate a regional cap-and-trade system covering most sectors of the economy.<sup>1</sup>
  - By March 2008, thirty-nine US states, the District of Columbia, three Native American tribal nations, six Mexican states, and six Canadian provinces signed onto [The Climate Registry](#). Like the California Climate Action Registry, this multi-state-and-tribe registry was created to facilitate regulatory or voluntary reporting and to provide an accurate, complete, consistent, transparent and verified set of greenhouse gas emissions data from reporting entities, supported by a robust accounting and verification infrastructure.<sup>1</sup>
1. Katoomba Group. Forging a Frontier--State of Voluntary Carbon Markets 2008 [http://ecosystemmarketplace.com/documents/cms\\_documents/2008\\_StateofVoluntaryCarbonMarket2.pdf](http://ecosystemmarketplace.com/documents/cms_documents/2008_StateofVoluntaryCarbonMarket2.pdf)
  2. Chicago Climate Exchange <http://www.chicagoclimatex.com/>

## **How is the State of North Carolina responding to Climate Change?**

The Climate Action Plan Advisory Group (CAPAG) was established in 2006 with the objective of developing proposals for dealing with global climate change in North Carolina. Its final report and recommendations were released at a public meeting on October 16, 2007, in Raleigh.<sup>1</sup>

CAPAG's efforts complemented those of the Legislative Commission on Global Climate Change (LCGCC) that the N.C. General Assembly established in 2005. The Commission, which held its first meeting on February 3, 2006, focused mainly on broader issues, such as whether North Carolina should set goals for reducing greenhouse gas emissions. In contrast, CAPAG's purpose was to develop recommendations for specific actions to help reduce or prevent climate change. The recommendations included measures for reducing greenhouse gas emissions and sequestering or removing such gases from the atmosphere. The group did not discuss or debate the science of climate change. CAPAG worked closely with the legislative commission, with frequent updates on its progress and recommendations. The two groups also shared some common members.<sup>1</sup>

The Division of Air Quality, within the Department of Environment and Natural Resources (DENR), managed the CAPAG, which had about 40 members representing a broad range of stakeholders from industry, environmental groups, government agencies, academic institutions, agriculture, forestry, coastal interests, real estate, tourism, banking, insurance, and other businesses. CAPAG was assisted by the Center for Climate Strategies ([www.climatestrategies.us](http://www.climatestrategies.us)), a nonprofit organization providing facilitation and technical support.<sup>1</sup>

After the CAPAG completed its recommendations on GHG mitigation options, North Carolina joined The Climate Registry as a step toward developing a nationally uniform GHG reporting and registry capability for North Carolina sources.<sup>2</sup> The Climate Registry ([www.theclimateregistry.org/](http://www.theclimateregistry.org/)) is a nonprofit partnership developing an accurate, complete, consistent and transparent greenhouse gas emissions measurement protocol that is capable of supporting voluntary and mandatory greenhouse gas emission reporting policies for its Members and Reporters. It will provide a verified set of greenhouse gas emissions data from its Reporters supported by a robust accounting and verification infrastructure.

In its final report, the CAPAG recommended that the State of North Carolina set an overall voluntary goal to bring statewide emissions back to a baseline, such as year 2000. The goal should be set over a long time horizon of 10–15 years to meet the baseline. It should be expressed as an interim goal on the longer path toward ultimate climate stabilization. There would be no mandates to any specific party. However, all sectors of the state’s economy would have the opportunity to contribute toward meeting the state’s goal. The adoption of such a goal should first be considered by the NC LCGCC. If recommended by the LCGCC, such a goal could be established by the General Assembly or by an executive order of the Governor.<sup>2</sup>

The CAPAG identified the following benefits associated with setting a goal to reduce statewide emissions:

**Addressing Potential Global Warming Impacts.** The direct economic toll of global warming on North Carolina may be enormous and would likely include increasing crop loss due to drought, episodic water shortages, coastal flooding and erosion, and building cooling costs. A state goal will draw attention to regional warming trends and associated effects and help business and government prepare for the future.<sup>2</sup>

**Economic Development.** As the state plans its economic development activities, a state carbon reduction goal can help promote expansion and recruitment of renewable energy technologies that are less GHG intensive. Additionally, these activities will seek to generate jobs in North Carolina to replace the non-native coal and gas sources that currently dominate North Carolina’s energy supply.<sup>2</sup>

**State Leadership.** By establishing a state goal, North Carolina will join the numerous states across the country that are already rising to the challenge of addressing GHG emissions associated with global warming.<sup>2</sup>

**Business Responsibility.** A state goal will be to provide the motivation and opportunity for companies to examine their options for cost-effective reductions in their GHG emissions. Many companies in North Carolina are already considering the need to reduce carbon

dioxide in their long-term planning. A reduction goal will foster the broader business community to consider their ability to also reduce GHG emissions.<sup>2</sup>

**Preparing for the Emerging Carbon Marketplace.** North Carolina business can potentially sell tens or even hundreds of millions of dollars worth of carbon equivalence credits into the carbon marketplace that national climate legislation will eventually generate. A state goal would help companies that could potentially be suppliers of carbon credits in the coming national marketplace prepare to take advantage of these economic opportunities as soon as they arise.<sup>2</sup>

**North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard (REPS),** enacted by Senate Bill 3 in August 2007, requires all investor-owned utilities in the state to supply 12.5% of 2020 retail electricity sales (in North Carolina) from eligible energy resources by 2021. Municipal utilities and electric cooperatives must meet a target of 10% renewables by 2018 and are subject to slightly different rules. In February 2008, the North Carolina Utilities Commission (NCUC) adopted final rules implementing the REPS.<sup>3</sup>

Eligible energy resources include solar-electric (photovoltaics), solar thermal, wind, hydropower up to 10 megawatts (MW), ocean current or wave energy, biomass that uses Best Available Control Technology (BACT) for air emissions, landfill gas, waste heat from renewables, and hydrogen derived from renewables. Up to 25% of the requirements may be met through energy efficiency technologies, including combined heat-and-power (CHP) systems powered by non-renewable fuels. After 2018, up to 40% of the standard may be met through energy efficiency.<sup>3</sup>

The overall target for renewable energy includes technology-specific targets of 0.2% solar by 2018 (which includes photovoltaics, solar water heating, solar absorption cooling, solar dehumidification, solar thermally driven refrigeration, and solar industrial process heat), 0.2% energy recovery from swine waste by 2018, and 900,000 megawatt-hours (MWh) of electricity derived from poultry waste by 2014. The NCUC has required that each electric power supplier submit its first annual REPS compliance plan by September 1, 2008. Beginning in 2009, each power supplier will be required to file a compliance report, detailing the actions it has taken to fulfill the requirements of the REPS.<sup>3</sup>

1. North Carolina Climate Action Plan Advisory Group [www.ncclimatechange.us/](http://www.ncclimatechange.us/)
2. The Final Report of the North Carolina Climate Action Plan Advisory Group (CAPAG), Chapter 7, Cross Cutting Issues [www.ncclimatechange.us/capag.cfm](http://www.ncclimatechange.us/capag.cfm)
3. Database of State Incentives for Renewables and Efficiency <http://www.dsireusa.org>

## **What have RC&D Councils in the US and NC been doing in Climate Change?**

### **In the US**

#### **RC&D Climate Change Projects in the USA (2001 publication from NARCCDC)**

The National Association of RC&D Councils published in 2001 a summary of RC&D participation in Climate Change projects including ethanol production, wind energy, methane capture, forestry and

agriculture. Many RC&D Councils have been actively involved in setting up trading programs for carbon offsets.

[www.rcdnet.org/Documents/ghg.pdf](http://www.rcdnet.org/Documents/ghg.pdf)

The National Association of RC&D Councils also published **RC&D Councils and Energy Projects in the USA** [www.rcdnet.org/Documents/energysuccess.pdf](http://www.rcdnet.org/Documents/energysuccess.pdf)

### **Central Arkansas RC&D Forestry Carbon Offset Project**

The Central Arkansas RC&D partnered with Entergy Corporation, NRCS, a local non-profit group, and a private landowner to restore 500 acres of bottomland hardwood forests on marginal farmland in Independence County, Arkansas. Entergy committed \$500,000 for the project. The RC&D Council planted the trees and is monitoring the property easement and carbon lease agreement.

[www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/08-09-2002/0001780547&EDATE=](http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/08-09-2002/0001780547&EDATE=)

[www.powertreecarboncompany.com/projects.htm](http://www.powertreecarboncompany.com/projects.htm)

### **Central NY RC&D Carbon Offset Project**

Environmental Defense has contracted with Central NY RC&D to assist them in developing a protocol to allow landowners and farmers in the Northeast to sell carbon credits to interested buyers. CNY RC&D is designing a procedure that would include landowners, Soil & Water Conservation Districts, USDA-NRCS, and aggregator and buyers to allow for the buying and selling of these environmental credits.

[www.cnyrcd.org/Carbon%20Project.htm](http://www.cnyrcd.org/Carbon%20Project.htm)

### **Montana RC&Ds & National Carbon Offset Coalition**

In 1996, several Montana conservation, and economic development organizations (RC&Ds and a non-profit) became interested in the potential environmental and economic opportunities presented by addressing global climate change through a market based carbon sequestration initiative. The groups ultimately organized an incorporated coalition known as the National Carbon Offset Coalition.

The NCOC is designed to assist landowners in planning carbon sequestration activities and documenting the resulting Carbon Sequestration Unit (CSU) in a manner that adheres to national standards and protocols, and meets the needs of potential buyers. The term “Carbon Sequestration Unit” is used to represent an amount of organic carbon sequestered in the wood or soil that is equivalent to the removal of one metric ton of CO<sub>2</sub> from the atmosphere.

[www.ncoc.us/index.php?option=com\\_content&task=view&id=21&Itemid=35](http://www.ncoc.us/index.php?option=com_content&task=view&id=21&Itemid=35)

## **In North Carolina**

### **Columbus County Landfill Gas Utilization Project**

The Appalachian State University CommunityTIES (Trash Into Energy Savings) Project works with counties statewide evaluating the energy potential of the local landfill, identifying ways for

landfill gas to support local economic development priorities, and providing assistance with project funding and development. During the past two years, nearly \$800,000 in grant funding has been awarded to the project's eight local partner groups for landfill-gas-to-energy project development. The project's tailored approach is designed to meet local needs and has resulted in a variety of potential uses, including manufacturing, agriculture and education.

The closed Columbus County Landfill, located in the New Hope community south of Whiteville, was identified by the ASU Energy Center as a high-priority target for development of a community-based landfill gas utilization because of its considerable amount of methane gas.

The methane gas created by waste decomposing in a landfill is similar to natural gas and can be used to reduce demand for fossil fuels. Using landfill gas as an energy resource not only increases energy security and local economic competitiveness, it also provides environmental benefits by reducing emissions of harmful pollutants, including greenhouse gases.

The Columbus County Landfill, which opened in 1973 and closed in 1996, has approximately 1.25 million metric tons of waste in place generating an estimated 694 cubic feet per minute of energy-rich landfill gas. During 2008, the landfill will produce the energy equivalent to more than \$600,000 worth of natural gas. In addition to its energy content, the landfill emits greenhouse gases equal to almost 50,000 metric tons of carbon dioxide. Burning the landfill gas as a fuel prevents more than \$100,000 per year in greenhouse gas emissions at the current U.S. market price.

For more information about the Columbus County Landfill Gas Project, please contact Kip Godwin at (910) 840-6743 or at [kip@kiplingodwin.com](mailto:kip@kiplingodwin.com).

### **Mt. Herman Landfill Gas Project**

Carolina Land & Lakes RC&D is and has been coordinating and facilitating a project with Caldwell County, Republic/GDS, and other partners to ascertain the best use of methane gas in a small, closed landfill that the county owns.

The Mt. Herman Landfill is located in Caldwell County, North Carolina, and is part of the Unifour Early Action Compact (EAC) along with Alexander, Burke, and Catawba counties. The Early Action Compact (EAC) is focused on helping the region meet the 8-hour ozone standard by controlling emissions from local sources earlier than the Clean Air Act would otherwise require.

The purpose of this project is to enhance efforts already begun which are designed to capture and use methane produced by the landfill for positive environmental purposes including, but not limited to, heating horticulture greenhouses for plant propagation and teaching, and production of alternative fuels.

In 2006, the County installed four (4) methane extraction wells and more than 2,000 feet of high-density polyethylene (HDPE) pipe to create the initial gas collection system. Currently, the captured gas is burned through low temperature open (LTO) combustion – a “candle” flare. The proposal for

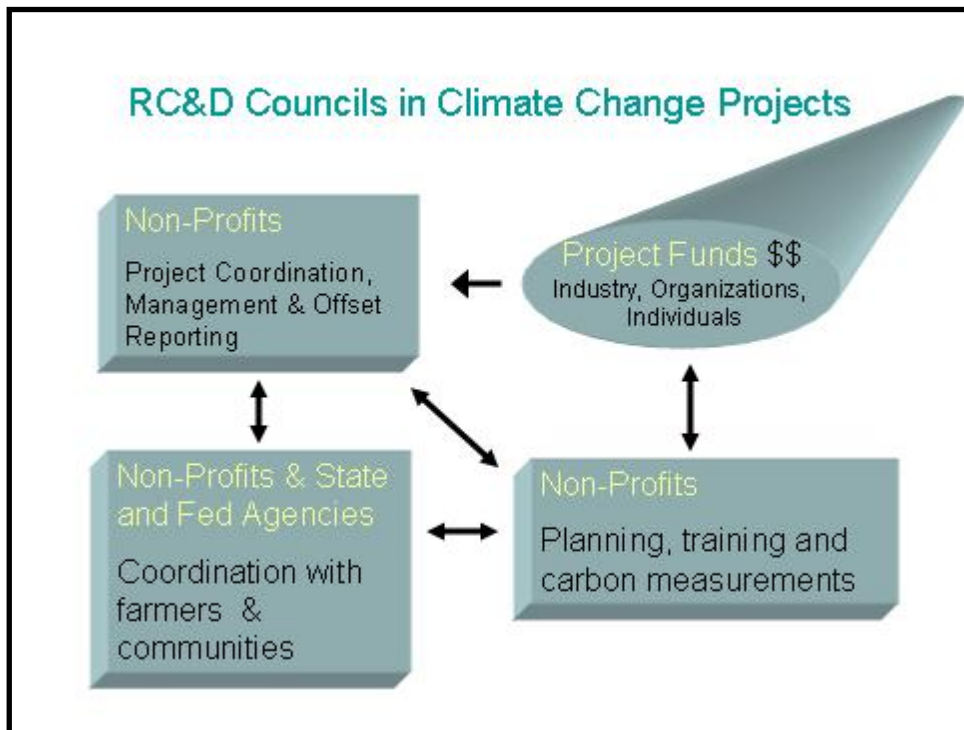
additional extraction wells and pipe to the collection system will help to further reduce emissions. The combustion volume is being recorded for possible future trade on the carbon credit market. In an effort to explore other possible uses for the methane gas, the project has purchased a small, 50-gallon bio-diesel processor, a 5-gallon ethanol processor, two solar panels, and a natural gas, tankless water heater.

Caldwell County is currently working with the Internet Company Google (who is in the process of constructing a state-of-the-art switching station in the county), Greenhouse Gas Services (a venture of General Electric), and SCS Engineers to determine if the collection and marketing of carbon credits is a viable option for the use of the methane gas in Mt. Herman.

For more information contact Dan McClure, Coordinator, Carolina Land & Lakes RC&D, Inc.  
Tel: 828-464-5559 ext. 5, email: dan.mcclure@nc.usda.gov

### **How can RC&D Councils in NC develop and/or participate in Climate Change (carbon offset) projects?**

Many RC&D Councils have been participating in a variety of Climate Change projects since the mid 1990's. And with federal regulation of CO<sub>2</sub> as a greenhouse gas, opportunities should increase for Councils to become involved in such projects. As the figure below indicates, these opportunities may include direct project management or facilitation as a project partner. The projects described in the previous sections are examples of how RC&D Councils are participating in Climate Change projects. Included below are examples of how RC&D Councils can participate in other areas related to Climate Change.



### **RC&D Councils and Farm Energy Conservation**

A few RC&Ds in the southeast are assisting with farm energy conservation through on-farm energy audits and the Rural Development (RD) Energy Efficiency and Renewable Energy Grant and Loan program. One audit program is EnSave ([www.ensave.com](http://www.ensave.com)), a company in Vermont that is dedicated to efficient farm energy. EnSave trains councils or staff to perform the data collection needed for the energy audit. The RC&D does the collection and provides the data to EnSave who processes an audit report via their highly developed software. With this report the farmer is then aware of the inefficiencies and is given information as to the cost effectiveness of correcting these. Once it is known what on-farm changes can and should be made, the RD Energy Efficiency and Renewable Energy Grant and Loan program, which is in section 9006 of the Farm Bill, can provide funding to the farmer for the work.

RC&Ds can assist the farmer with the audit data collection and writing the 9006 grants. Some Councils are charging to do the collection (\$150 - \$200), but the better money maker is in charging for preparing the grant application – either flat fee or a percentage of the project cost. There is some cost in getting trained to do the data collection and some states have done this using NRCS CIG. Unfortunately NC NRCS did not offer CIG grants this year and the national deadline was February 20<sup>th</sup>. Getting lined up for 2009 might be just the right amount of time, however.

In Maryland there is a partnership among EnSave, Eastern Shore RC&D, the Maryland Energy Administration, Maryland NRCS and the Maryland Department of Agriculture. The RC&D was trained to do the data collection. EnSave is completing the Audits and there are incentives for producers who install the practices or equipment that the audit recommends.

### **RC&D Councils as Offset Aggregators?**

Offset Aggregators are entities that serve as the administrative representative, on behalf of offset project owners, of multiple offset-generating projects. Offset projects involving less than 10,000 metric tons of CO<sub>2</sub> equivalent per year should be registered and sold through an Offset Aggregator.<sup>1</sup>

The aggregator acts as the broker between the offset project owner and the purchasing entity—they manage registration, compliance, sales and are also the conduit for monitoring and verification. The aggregator works directly with both the market broker (such as the Chicago Climate Exchange) or purchasing entity and the offset provider. The following aggregators are registered on the Chicago Climate Exchange <http://www.chicagoclimatex.com/>.

### **Kentucky Corn Growers Association---Kentucky Soil Carbon Credit Initiative:**

<http://www.kycorn.org/ccx/index.htm>

The Kentucky Corn Growers Association and Kentucky Small Grain Growers Association have partnered with the Chicago Climate Exchange to offer new revenue opportunities for farmland and forestland. The KyCGA/KySGGA Carbon Trading Program seeks to simplify the process of earning and selling carbon credits for farming operations and forestry landowners. Projects comprising millions of acres have already proved to add profit to farms throughout the country. Since 2006, over 100 farms in Kentucky have been enrolled through KyCGA/KySGGA.

**North Dakota Farmers Union**---North Dakota Farmers Union Carbon Credit

<http://carboncredit.ndfu.org/>

The North Dakota Farmers Union is an aggregator for various conservation practices on farms or ranches. Offset types include No-Till, Alfalfa / Seeded Grass, Native Rangeland, Methane, and Forestry.

**Mountain Association for Community and Economic Development**

<http://www.maced.org/foi/carbon.htm>

Enrollment is open to private forest landowners in the Appalachian region of Kentucky. Forestland outside this region is considered on a case by case basis. Forest landowners owning 40 acres or more are encouraged to apply.

For every forest property enrolled in its program, MACED will:

- measure its change in wood volume over time;
- convert its wood volume to volume of carbon credits;
- and sell the credits based on their value in the marketplace.

Based on the June 2007 Chicago Climate Exchange (CCX) market price, a forest landowner could expect to receive \$4.00 – \$5.00 per acre per year dependent on the average age of their trees and the overall condition of their property.

**AgraGate** <http://www.agragate.com/>

AgraGate Climate Credits Corp. was created to expand the Iowa Farm Bureau Federation (IFBF) Carbon Credit Aggregation Program, which began in 2003. With more than 1,000,000 acres aggregated from American farmers, ranchers and private forest owners in 16 states, AgraGate is the nation's leading supplier of carbon credit aggregation services to agriculture.

The emerging market is a new revenue opportunity for farmers with continuously no-tilled fields and newly established grasslands, reforestation or new plantings on afforested land and on-farm methane digesters.

AgraGate will:

- Provide essential services that educate farmers, ranchers and forest owners about the financial opportunities available to them through carbon credits.
- Provide a means for participants to easily register their credits.
- Manage the trading program in a way that will provide superior results for participants.
- Manage a credit database system that provides highly reliable credit tracking, reporting and certification.

**Becoming an Aggregator**

There is an enrollment fee to become an aggregator on the Chicago Climate Exchange. There also is an annual fee, which depends on baseline level of emissions. The Iowa Farm Bureau Federation helped set up AgraGate, which required \$1 million net worth, with \$10 million in assets to become an aggregator. The program has enrolled more than 1,000,000 acres in 16 states.

## Potential Partners on Climate Change Projects

### **Southern Alliance for Clean Energy** [www.cleanenergy.org/](http://www.cleanenergy.org/)

Southern Alliance for Clean Energy (SACE) is a nonprofit, nonpartisan organization that promotes responsible energy choices that solve global warming problems and ensure clean, safe and healthy communities throughout the Southeast. Since 1985 SACE has been working on behalf of citizens in the Southeast to provide independent analysis of the energy supply system in the region, help state utility commissions evaluate proposed energy projects, work with state and local governments to develop new programs to improve the energy efficiency of government facilities and vehicles, and support the siting and development of clean, renewable energy sources in our region.

### **EnSave** ([www.ensave.com](http://www.ensave.com))

Since 1991, EnSave has supported the American agricultural sector with innovative energy efficiency and resource conservation solutions. EnSave provides agricultural producers and food processors with cost-effective ways to reduce operating costs while saving energy and conserving our nation's natural resources.

EnSave's clients include state and federal energy and environmental agencies, investor-owned utilities, and rural electric cooperatives. EnSave implements its programs by developing relationships with equipment manufacturers, local equipment dealers and the local agricultural community. Ultimately, these programs promote economic investment in the rural economy and improve the quality of America's land, air, and water.

## Additional Sources of Information

There are many web sites on climate change and carbon sequestration. Here are a few science-based sites:

Pew Climate Trust [www.pewclimate.org/](http://www.pewclimate.org/)

[www.epa.gov/climatechange/](http://www.epa.gov/climatechange/)

[www.ucsusa.org/global\\_warming/](http://www.ucsusa.org/global_warming/)

<http://earthobservatory.nasa.gov/Library/GlobalWarmingUpdate/>

United Nations Framework on Climate Change <http://unfccc.int/2860.php>

### **Other Sites:**

Chicago Climate Exchange [www.chicagoclimatex.com/](http://www.chicagoclimatex.com/)

EcoMarketplace (Excellent site for info on carbon and other environmental credits. NRCS is a co-sponsor of this site) [www.ecosystemmarketplace.com/](http://www.ecosystemmarketplace.com/)

Kyoto Protocol [Kyoto Protocol](#)

**Wind energy projects and publications:**

[www.climatetrust.org/offset\\_nativeE.php](http://www.climatetrust.org/offset_nativeE.php)

[www.climatetrust.org/offset\\_wind.php](http://www.climatetrust.org/offset_wind.php)

[www.nrel.gov/wind/pubs\\_issues.html#rural](http://www.nrel.gov/wind/pubs_issues.html#rural)

Wind Energy Guide for County Managers [www.nrel.gov/wind/pdfs/40403.pdf](http://www.nrel.gov/wind/pdfs/40403.pdf)

U.S. Department of Energy [Wind and Hydropower Technologies Program: Wind Powering America](#)

**Solar Energy**

North Carolina Solar Center [www.ncsc.ncsu.edu](http://www.ncsc.ncsu.edu)

**Methane Information:**

Environmental Protection Agency [www.epa.gov/lmop/overview.htm](http://www.epa.gov/lmop/overview.htm)

**Renewable Energy:**

Database of North Carolina Incentives for Renewables and Efficiency <http://www.dsireusa.org/>

**Carbon Project Developers and Carbon Offset Providers:**

Environmental Credit Corporation [www.envcc.com](http://www.envcc.com)

Carbon Offset Providers [www.carbonoffsetproviders.org](http://www.carbonoffsetproviders.org)

Carbon Green [www.carbongreenllc.com](http://www.carbongreenllc.com)