

The role of agricultural and forest offsets in a cap-and-trade policy

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*Testimony for the House Subcommittee on Conservation, Credit, Energy and Research
December 3, 2009*

Thank you, Mr. Chairman, for inviting me to address the subcommittee today. I have worked on the economics of land use and environmental policy for more than twenty years, and on various aspects of offsets policy for the last ten years with colleagues on this panel and others. During that time, offsets have received much attention both positive and negative, as a policy option to address greenhouse gases and climate change. The agricultural community understandably wants to learn more about offsets, how such a system could work, what it could mean for producers, and how concerns about system integrity can be addressed. I will touch on each of those points briefly.

Defining offsets

An offset is an agreement where one party agrees to reduce its emissions (or increase carbon storage in agricultural soils or forests) in exchange for a payment from another party. The paying party may be an electric power plant or other source obligated to reduce emissions either by law or as part of a voluntary program. For our discussion, the selling party is a farmer or forest owner who has no such obligation. Any action the farmer/forest owner takes to reduce emissions or increase sequestration can be viewed as a potentially creditable *offset*. The power plant can use the generated offset credits to help meet its compliance obligation rather than rely solely on cutting its own emissions. The underlying premise is that the farmer can cut emissions cheaper than the power plant can and will do so if paid more than the action costs.

All recent cap-and-trade proposals in the U.S. Congress have included offset provisions, drawing from examples elsewhere in the world, including the Clean Development Mechanism (CDM) of the Kyoto Protocol, the Regional Greenhouse Gas Initiative regulatory market in the Northeast U.S. states, and the Chicago Climate Exchange voluntary market. There have also been offset provisions in other environmental policies, such as wetlands mitigation.

The Rationale for Offsets

A unique characteristic of greenhouse gases (GHGs) is that they disperse uniformly about the earth's atmosphere, in contrast to other pollutants that are found in higher concentrations near their sources. As a result, an emission reduction delivers the same benefit no matter where it takes place, whether it is from an electric power plant in the Ohio Valley, a cement plant in India, a soybean farm in Mississippi, or a forest in the Amazon. This uniformity enables emission trading as an approach to control greenhouse gases.

The argument in favor of emissions trading in general and offsets in particular is an economic one. Rather than designate which parties must undertake which reductions to achieve a collective target, it is more efficient to allow parties to contract among themselves to find who can achieve these reductions at the lowest cost, even if those less expensive reductions occur at sources (sectors, countries) not directly capped and thereby participate as offsets. Economic evidence supports this view. A recently published study by EPA of the Waxman-Markey cap-and-trade bill that passed in the House of Representatives this summer found that allowing offsets even subject to quantitative limits on their use reduces marginal compliance costs by about half. Other studies of different cap-and-trade proposals conducted by government agencies and other organizations consistently find large cost reduction from allowing offsets.

In addition to cost containment, offsets are seen as a potential source of economic stimulus for sectors such as agriculture not subject to a cap. Offsets can also produce environmental co-benefits through the deployment of less-polluting technologies and protecting soils, forests and grasslands, though care should be taken to ensure that offsets do not inadvertently damage other ecosystem values. An offset program can also put institutions in place to more effectively include all emission sources into a comprehensive economywide reduction program.

Agriculture and forest offsets

Agriculture currently accounts for about 6 percent of all greenhouse gas emissions in the United States. However, none of the cap-and-trade proposals now under consideration include placing a cap on those emissions. This means that any reductions in those sectors can, in principle, be included as offsets. Prominent offset opportunities in agriculture include

- Soil carbon management (e.g., tillage change to sequester carbon dioxide (CO₂))
- Nutrient management (to reduce nitrous oxide (N₂O) emissions)
- Manure management (to reduce methane (CH₄) emissions)
- Grazing/herd management (sequester carbon, reduce CH₄)

Our nation's forests are a net carbon sink, meaning they absorb more CO₂ from the atmosphere through forest growth than they emit to the atmosphere through forest clearing and other disturbances. Today this sink offsets about 14-15 percent of our country's greenhouse gas emissions, but this situation could be further improved through offset projects in such forestry activities as

- Afforestation
- Forest management
- Reduced deforestation

There is also tremendous potential for agriculture and forestry as a source of biofuels induced by existing energy policies and climate proposals.

Research studies I have been involved in with colleagues at universities and government agencies show that a properly designed agricultural and forestry offsets program could produce emission reductions that counter as much as one billion tons of U.S. emissions (about 15% of

today's totals) and thereby provide significant revenue potential for producers in those sectors. I believe Dr. McCarl will speak more about this work in his testimony.

Internationally, the potential is even larger for agriculture and forest offsets. Agriculture accounts for 14% of global greenhouse gas emissions and is the main emissions source in many developing countries. Deforestation alone accounts for about 15% of global emissions, or about the same as the global transport sector, and occurs mostly in the developing country tropics. Reducing emissions from agriculture and forests in developing countries is even less expensive than reducing them in the United States, but there are several factors that must be overcome and capacity-building to bring these reductions to market. I believe Dr. Sohngen will have more to say about these international opportunities in his testimony.

Potential Challenges

One common criticism of offsets is that they deflect effort from abatement in the capped sectors. In my view, this criticism is misdirected. Deflecting abatement from the capped sectors is exactly how offsets work to reduce costs. It should be the overall reductions we are interested in, not where they occur.

However, if offset credits are being given for reductions that do not actually occur, the transaction and the cap are illusory, which would be a very real problem. The validity of offset reductions is sometimes called into question because they are generated from sources that do not face an emissions mandate. This makes it difficult to determine how to give credits for emissions reductions—reductions compared to what? The answer typically comes in the form of a baseline that captures what the emissions level would be under a “business as usual” scenario. Reducing emissions below this baseline can be considered additional to reductions that would have occurred anyway.

“Additionality” is a necessary condition for the reductions to be real. Additionality may be more apparent in some cases such as methane capture from livestock manure management or afforestation of cropland because these are not prevalent practices for farmers under business as usual. But in practice it can be difficult to determine additionality because once a project starts, the baseline itself is unobservable. This can become a matter of guesswork that varies in sophistication—from complex data analysis to simply asking the party to provide evidence the project is additional. If a party has too much freedom to set its own baseline, there is legitimate concern about its validity and whether the reductions are therefore truly additional. This is why rules are important to ensure offset validity as I will discuss more below.

Another potential problem with offset transactions is “leakage,” which occurs when emissions reductions generated by a project in one location simply lead to emissions being shifted to some ungoverned source elsewhere. An example might be if cropland in one location were retired into permanent grassland or forests, but this simply causes other grassland or forests to be cleared to help fill the supply gap.

A third problem, “permanence,” comes specifically from offsets generated by biological sequestration of carbon in forests and agricultural soils. These projects create value by

removing CO₂ from the atmosphere and storing it in biomass and soils. The stored carbon, however, can be re-emitted by natural disturbances, such as fire, or intentional management actions. If this occurs, the original benefits of the project have been negated and the offset accounting shortfall needs to be addressed. This so-called *reversal risk* can be addressed with monitoring and clear, enforceable rules designating liability, but this comes with a cost. Another way to deal with liability is through private insurance or a public insurance pool or “buffer” requirement.

Possible Solutions

Offset policy has focused on addressing additionality, leakage, and permanence in two ways.

(1) Quality standards

Each of the problems identified here can be dealt with by imposing offset quality standards. The Kyoto Protocol’s Clean Development Mechanism follows this approach by restricting the activities eligible for offsets and requiring an Executive Board to approve all projects. All CDM projects must meet standards for additionality, address leakage, and address impermanence. This was deemed necessary to get political buy-in from parties who were skeptical of offset integrity. The results have been mixed. Indeed, it has been challenging to get many CDM projects approved, thereby restricting supply. But the logjam is loosening and some projects that have been approved have been criticized for generating questionable reductions despite quality standards being in place. Refinement of standards is an ongoing process.

In the current legislative proposals in Congress, the need for offset quality standards is well-recognized. The lead agency, whether it is USDA or EPA will be responsible for establishing offset rules that address additionality, leakage and permanence and the use of any early offset credits will rely on pre-existing protocols from the voluntary markets that address these issues as well.

(2) Quantitative restrictions

Policymakers have tended to couple quality standards with quantitative restrictions on the use of offsets for compliance. For example, the EU limits the share of compliance commitments that can be met with offset credits to approximately 10 percent (with some variation across countries within the EU). The U.S. House bill would have similarly placed compliance limits on offsets, 2 billion tons per year, which is much larger than 10 percent of U.S. compliance. These restrictions implicitly suggest that policymakers are lured by the appeal of offsets, but they only trust them so far.

Summary

Offsets are neither a panacea nor a pox. Agriculture and forests together have a large impact on the global balance of greenhouse gases; solving the climate problem would be much more difficult without involving these sectors. Absent including these sectors under a cap, using them as offsets is an alternate solution. Done well, offsets expand emissions reduction opportunities and lower the cost of achieving reduction targets, and provide income

opportunities for farmers, forest owners and other uncapped entities. But offsets can create a number of accounting problems for a cap-and-trade program. Rigorous standards for their inclusion are essential if the system is to have environmental and economic integrity. Nonetheless, some flexibility is necessary to ensure that high-quality offsets are not left out of the system because of overly burdensome requirements. This tradeoff is as much art as science. Quantitatively limiting offsets for compliance is not an ideal solution, but it may be necessary, at least at first when offset quality is highly uncertain. The CDM, warts and all, has shown that offsets can be generated at scale of hundreds of millions of tons globally, but more would be needed if offsets are to remain a critical element of a post-Kyoto global agreement and U.S. climate and energy legislation.

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Summary of Professional Experience

Dr. Murray is Director for Economic Analysis at the Nicholas Institute for Environmental Policy Solutions and Research Professor at the Nicholas School of the Environment at Duke University. He is widely recognized for his work on the economics of climate change policy, including the design of cap-and-trade policy elements to address cost containment and inclusion of offsets from traditionally uncapped sectors such as forestry and agriculture. Dr. Murray has been invited as a co-author of several national and international assessments of forest resources, especially related to climate change. Of particular note, he was a convening lead author of the Intergovernmental Panel on Climate Change's Special Report on Land Use, Land Use Change, and Forestry. His work has been published widely in professional journals, books, and edited volumes.

Education

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Related Professional Experience

2006 to date Duke University, Nicholas Institute for Environmental Policy Solutions, Durham, NC Director for Economic Analysis
2007 to date Duke University, Nicholas School of the Environment, Durham, NC Research Professor
1992 to 2006 RTI International, Center for Regulatory Economics and Policy Research, Research Triangle Park, NC Senior Economist and Director (since 2004)
1999 to date North Carolina State University, College of Forest Resources, Raleigh, NC Adjunct Assistant Professor
1994 to 2002 Duke University, Nicholas School of the Environment, Durham, NC Adjunct Associate Professor
1986 to 1992 U.S. Department of Agriculture, Forest Service Research Economist

Selected Relevant Publications (from 100+)

Jenkins, W.A., B.C. Murray, R.A. Kramer, and S.P. Faulkner. Forthcoming (2010). "Valuing Ecosystem Services from Wetlands Restoration in the Lower Mississippi Alluvial Valley." *Ecological Economics*.

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Committee on Agriculture
U.S. House of Representatives
Information Required From Non-governmental Witnesses

House rules require non-governmental witnesses to provide their resume or biographical sketch prior to testifying. If you do not have a resume or biographical sketch available, please complete this form.

1. Name: BRIAN C. MURRAY
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DUKE UNIVERSITY
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3. Business Phone Number: 919-613-8725
4. Organization you represent: NICHOLAS INSTITUTE FOR ENVIR. POLICY SOLUTIONS
5. Please list any occupational, employment, or work-related experience you have which add to your qualification to provide testimony before the Committee:
20+ YEARS EXPERIENCE - ECONOMICS OF LAND USE, AG, FORESTRY
50+ PEEER REVIEW PUBLICATIONS ON TOPIC
FREQUENT COUNSEL TO LEGISLATIVE AND AGENCY STAFF
6. Please list any special training, education, or professional experience you have which add to your qualifications to provide testimony before the Committee:

7. If you are appearing on behalf of an organization, please list the capacity in which you are representing that organization, including any offices or elected positions you hold:
DIRECTOR FOR ECONOMIC ANALYSIS

PLEASE ATTACH THIS FORM OR YOUR BIOGRAPHY TO EACH COPY OF TESTIMONY.

Committee on Agriculture
U.S. House of Representatives
Required Witness Disclosure Form

House Rules* require nongovernmental witnesses to disclose the amount and source of Federal grants received since October 1, 2006.

Name: BRIAN C MURPHY
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Organization you represent (if any): NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS DUKE UNIVERSITY

1. Please list any federal grants or contracts (including subgrants and subcontracts) you have received since October 1, 2006, as well as the source and the amount of each grant or contract. House Rules do NOT require disclosure of federal payments to individuals, such as Social Security or Medicare benefits, farm program payments, or assistance to agricultural producers:

Source: See Attached Amount: _____

Source: _____ Amount: _____

2. If you are appearing on behalf of an organization, please list any federal grants or contracts (including subgrants and subcontracts) the organization has received since October 1, 2006, as well as the source and the amount of each grant or contract:

Source: See Attached Amount: _____

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Please check here if this form is NOT applicable to you: _____

Signature: Brian C Murphy

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PLEASE ATTACH DISCLOSURE FORM TO EACH COPY OF TESTIMONY.

Committee on Agriculture
Witness Disclosure Documentation
Brian Murray, PhD

Question 1

Source	Amount
Not Applicable	N/A

Question 2

Source	Amount
Stratus Consulting - Subcontract # X000-6S-1084 for U.S. EPA Contract # 68-W-02-027	\$30,747
Stratus Consulting - Subcontract # X000-6S-1084 for U.S. EPA Contract # 68-W-02-027	\$71,021
Research Triangle Institute - Subcontract # 2-312-0208702 for U.S. EPA	\$20,771
U.S.D. A. - Forest Service	\$86,820