Bioenergy and Agriculture: Promises and Challenges

Potential of Carbon Payments for Bioenergy

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2020 VISION FOR FOOD, AGRICULTURE, AND THE ENVIRONMENT

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Agriculture around the world is already mitigating climate change through the increased growing of crops and trees. But much more can be done to bring agriculture into the center of climate change mitigation and to encourage a greater role for sustainable bioenergy production. The result could be not only a better global environment, but increased revenues for farmers, more energy self-sufficiency for rural communities, and preservation of natural forests and biodiversity. Through the Kyoto Protocol, the world community moved toward realizing the potential of agriculture for mitigating climate change, but not enough to gain the full benefits.

If the world community can rally around the potential of agriculture and forest management in combating climate change and provide an international regulatory structure that permits this potential to be realized, the benefits to the world's climate and poverty reduction in developing countries could be enormous, perhaps even exceeding the benefits of trade in agricultural products and development aid. These steps would also enable carbon payments to be harnessed for the development of sustainable bioenergy production.

AGRICULTURE'S POTENTIAL CONTRIBUTION TO MITIGATING CLIMATE CHANGE

Agriculture is a potential instrument for reducing carbon and other greenhouse gases (GHGs) in the atmosphere. Crops naturally sequester carbon as part of the plant's growth cycle. This carbon can become an energy source for humans and animals or can be converted into bioenergy, which can substitute for fossil fuels. Residuals from agriculture left on the fields can reduce erosion and contribute to soil fertility, or much of this biomass can be collected and turned into energy. Manure can also be used as a fuel instead of being left to decay and release the potent greenhouse gas methane, with an atmospheric impact 21 times that of carbon dioxide (the other significant greenhouse gas from agriculture is nitrous dioxide, with an impact more than 300 times that of carbon dioxide).

Agricultural practices can also determine how agriculture contributes to climate change. For instance, leaving soil mostly undisturbed in cultivation means that carbon largely remains in the soil. If agriculture is combined with reforestation or afforestation, the growing of these trees becomes a long-term means of sequestration. Shorter-rotation forestry on degraded or deforested land can also be a means of sequestering carbon and may be more economical for landowners.

Agriculture can grow fuel crops such as sugarcane, maize, and switchgrass that can be converted into ethanol. The biomass from residuals such as rice husks can also be a source of fuel and a substitute for fossil fuels. Other crops can be converted into diesel fuels. The size of the greenhouse gas reduction depends on the net energy and carbon balance that the production of these crops yields.

These external benefits to the environment from agriculture are currently largely free to the world. Whereas projects to improve energy efficiency, capture landfill methane, or incinerate industrial gases earn emissions reduction credits under the Kyoto Protocol and generate payments to project developers, farmers in developing countries go largely unpaid for their contribution to mitigating climate change.

The near exclusion of developing-country agriculture from the Kyoto Protocol affects Africa most severely. Africa, which is heavily agricultural and has great potential in agroforestry, is largely missing out in the fast-growing trade of carbon assets under the Kyoto Protocol. In the agricultural areas that the protocol addresses, such as biomass production for bioenergy, the methodologies for accounting for emissions reductions are highly complex and closely related to energy use from the power grid. In rural areas, where access to specialized knowledge is limited and the power grid is sparse, farmers' prospects for capturing income from the Kyoto Protocol through bioenergy are highly limited. The only realistic prospect for African farmers is through carbon sequestration via agroforestry or reforestation, but again the accounting mechanisms for emissions reductions are some of the most complex of the protocol. In addition, the largest and most profitable market for emissions reductions from developing countries—the European Union's Emissions Trading System (ETS)—excludes reforestation and agroforestry activities in developing countries.

Yet Africa and most developing countries are highly vulnerable to climate change and are little able to adapt to such change. It is expected that climate change will destroy many farmers' livelihoods in developing countries through more frequent and intense droughts, floods, and other extreme climate events, and climate models forecast that African farmers are likely to be the primary victims of climate change.

Why were developing-country farmers excluded from compensation schemes? In the complex negotiations for the Kyoto Protocol and the ETS, the multiple goals of diverse constituents worked against spreading the benefits of climate change mitigation to agriculture in developing countries. Many parties viewed the protocol as a mechanism to improve energy efficiency in industrial countries and to reduce emissions of pollutants like sulfur dioxide. They did not want these objectives to be diluted by land-use and agricultural approaches that could reduce the focus on energy efficiency.

THE KYOTO PROTOCOL AND THE CLEAN DEVELOPMENT MECHANISM

Under the Kyoto Protocol, three mechanisms were established for trading carbon emission reductions: (1) International Emissions Trading among countries with compliance obligations, (2) Joint Implementation (JI) allowing trading from economies in transition, and (3) the Clean Development Mechanism (CDM) for developing countries. It is the CDM where the potential benefits for developing countries and agriculture primarily reside.

The CDM seeks to create support for sustainable development and lower the costs of emissions reductions by allowing developing countries to sell credits for their emissions reductions to those countries with Kyoto targets (Canada, the European Union 15, and Japan) through a market mechanism. These credits—or certified emissions reductions (CERs)—are generated through projects that reduce emissions from a baseline scenario or from the level of emissions that would have occurred in the absence of the CDM project.

Although the Kyoto Protocol came into effect in February 2005, the CDM is still a nascent instrument that suffers from a number of weaknesses: (1) its initial operations were guaranteed until only 2012, which is too short a time given the long lead times required for proj-

ect preparation and the long-term nature of capital stock turnover; (2) when established, few of the rules and methodologies for effective regulation of the system were in place, delaying early action; and (3) the oversight and functioning of the regulatory system were conducted largely by individuals inexperienced with market-based regulatory systems.

These issues are gradually being resolved, and the CDM is becoming an increasing force for meeting the compliance of industrial countries in a lower-cost manner. Current estimates suggest that US$10 billion to US$30 billion in emissions reduction payments will be made to the host developing countries by 2012. The bulk of these payments will be made for projects that reduce industrial GHGs and landfill methane. Other projects include energy efficiency, biomass energy, wind energy, and some small- or medium-scale hydropower.

Agricultural land-use change—the improved management of croplands and grazing land—is not eligible for the CDM. The mechanism does include afforestation and reforestation, but given the long gestation of these forestry activities and the short time frame of the protocol, these activities have not attracted much flow of CDM money. Improved forest management and forest preservation are not included. Thus no incentives were created to preserve forests rich in biodiversity and important for watersheds and erosion control, despite the fact that deforestation contributes to about a third of global GHG emissions. What remains for agriculture in developing countries is primarily the production of biomass to offset the use of fossil fuels. Even in this area, benefits are limited by the complex methodology and requirements to be met for a biomass energy project to gain credits under the CDM.

THE POST-2012 NEGOTIATIONS AND AGRICULTURE IN DEVELOPING COUNTRIES

It is unlikely that the poor of developing countries will benefit much from the current CDM and the Kyoto Protocol, and time has largely run out for making changes that could bear fruit by 2012, when the Kyoto Protocol expires. Reform of the CDM will be left to negotiations for the post-2012 period, when a new regime will, it is hoped, come into play.

Negotiations on post-Kyoto regulations will have to tackle many issues, including expanding the role of industrial countries and attracting other important signatories, like Australia and the United States. But no future climate agreement can be effective without the compliance of developing countries. Not only will developing countries need to reduce emissions from their own rapidly growing fossil-fuel industries, but they can also offer a more cost-effective means of achieving global goals. This next regime of climate change rules must be targeted toward reducing GHGs as cheaply and quickly as possible. Developing countries and their farmers are key to meeting this objective.

First, land-use changes and practices in developing countries must be included in mechanisms for reducing carbon emissions. The new regime must make carbon sinks, or the sequestering of carbon, a major focus. Carbon sinks based on land-use practices could offset a large share of carbon emissions from Europe and Japan at a lower cost than CO_2 emission mitigation in industrial countries.

Second, reforestation and afforestation must remain eligible categories, but forest preservation must also be part of the new regime. Forests are key not only to avoiding new emissions, but also to reducing the severity of climate change.

Third, methodologies for assessing bioenergy need to be simplified so that more projects can quickly be included. Biomass technologies should become eligible automatically without proof of additionality.

Fourth, small household- and community-level activities that reduce GHGs should be given more emphasis through more flexible interpretation of rules on bundling and displacement of unsustainable use of biomass.

Fifth, sectorwide and programmatic projects should receive eligibility under simplified procedures so that large volumes of emissions reductions and GHG sequestering can take place. A project-by-project approach is too costly in many situations and clogs the regulatory system.

These five reforms would go a long way toward making a future mechanism for carbon emissions trading more effective and more pro-development. They would allow farmers in developing countries to benefit substantially from the post-2012 system and would permit small communities and the poor to participate through simpler mechanisms. Finally, they would permit the world to achieve reduced GHGs in the atmosphere at a lower cost and with more benefits to sustainable development and an increasing reliance on sustainable bioenergy sources. ■

For further reading visit the website of the United Nations Framework Convention on Climate Change (UNFCCC) at http://unfccc.int, and the World Bank's Carbon Finance Unit website at http://carbonfinance.org/.

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