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## FEATURE

### Banking on Carbon



Photo: Dan Cecil

***The World Bank became a “market maker” for reducing greenhouse gas emissions with the launch of its Prototype Carbon Fund in 2000.***

By Charles Peterson and Roberto Aiello

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Currently, nine carbon funds with contributions from public and private entities of more than \$1.8 billion are managed by the World Bank.

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The objectives of the bank's carbon finance activities are:

- Ensuring that carbon finance contributes to sustainable development, beyond its contribution to a reduction in greenhouse gas (GHG) emissions
- Assistance in building, sustaining, and expanding the international carbon market
- Further strengthening the capacity of developing countries to benefit from the emerging carbon market

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Solid waste management is one of the leading areas for carbon-finance activity. Two waste management areas in which the World Bank is active are landfill gas recovery and composting. Efforts are under way to develop new methodologies for projects concerned with recycling and transfer stations. The World Bank has nine signed emission reduction purchase agreements (ERPAs) for waste-management carbon-finance projects and has 37 others under development.

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This article addresses:

- Global warming, including developments leading up to and including the Kyoto Protocol
- Background on the World Bank and its involvement in the global carbon market

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- Process for development and completion of carbon-finance projects by the World Bank
- Examples of the World Bank's waste management projects that have received carbon-finance approval

### Global Warming

Global warming refers to an increase in Earth's temperature, which most scientists agree is caused by the human-induced emissions of carbon dioxide and other GHGs. As reported in 2005 (Flannery, T. 2005. *The Weather Makers: How Man Is Changing the Climate and What It Means for Life on Earth*. Atlantic Monthly Press: New York), global warming is a long-term trend.

Since the beginning of the Industrial Revolution, a global warming of 1.13°F has occurred on our planet, and its principal cause is an increase in atmospheric carbon dioxide from around three parts to just under four per 10,000. Most of the increase in the burning of fossil fuels has occurred over the past few decades, and nine of the 10 warmest years ever recorded have occurred since 1990.

Earth's average temperature is forecast to increase in the range of 2°F to 10°F by the end of the 21st century. Even at the low end of the projection, this will be larger than any century-long trend in the past 10,000 years, according to the United Nations Framework Convention on Climate Change (UNFCCC) Web site.

Anthropogenic (human-induced) non-carbon-dioxide GHGs accounted for more than 23% of global GHG emissions in 2000, according to the EPA. However, these emissions, although a smaller share of total GHGs, are important because of their significant global warming potential relative to carbon dioxide.

From a solid-waste-management landfill perspective, methane is the key GHG emitted. Total methane represented 15% of GHG emissions in 2000. Globally, landfilling accounted for 730 million tons of carbon dioxide equivalents, or more than 12% of global anthropogenic methane emissions, according to the EPA. Although seemingly small, landfilling is the fourth largest contributor of non-carbon-dioxide GHGs.

GHG emissions remain in the atmosphere for periods that range from decades to centuries, which means that the impact of these emissions is long-term.

Since scientists and others have focused on the gradual warming of Earth, a series of developments have taken place to address the issue of global warming.

### IPCC

One of the earlier efforts to address global warming was the formation in 1988 of the Inter-Governmental Panel on Climate Change (IPCC) by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP).

The IPCC compiles published scientific and technical literature on global warming, its potential impacts, and options for adaptation and mitigation.

Guidance on estimating a country's emissions from several sources of GHG emissions, including waste, is provided by the IPCC (1996). Among the values provided by the IPCC for estimating GHG emissions for waste management (disposal) are:

- **Methane correction factors**, which are used to adjust the methane emissions from various types of disposal sites. These include managed landfill, unmanaged landfill with waste depth greater than 5 meters, and unmanaged landfill with waste depth less than 5 meters
- **Degradable organic content (DOC)**, which is used to calculate the methane emission potential
- **Fraction of dissimilated DOC**

### UNFCCC

The first assessment report of the IPCC, published in 1990, led to the adaptation of the UNFCCC during the UN Conference on Environment and Development (1992), also known as the Rio Earth Summit.

The objective of this international treaty, which took effect in 1994, is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

Realizing that this voluntary approach would fail to achieve the objective of the treaty, the UNFCCC members initiated discussions on stronger commitments in 1995 at the first Conference of the Parties (COP-1), and they agreed to begin a negotiation process aimed at binding commitments. The focus of these discussions was on the industrialized countries, which are the primary emitters of GHGs.

#### **Kyoto Protocol**

The Kyoto Protocol was the culmination of discussions initiated at COP-1. It defines legally binding limits or reductions of GHGs in industrialized countries, known as Annex 1 countries. The Kyoto Protocol was adopted in December 1997 at COP-3 held in Kyoto, Japan, and was ratified in October 2004.

The Annex 1 countries that are parties to the Kyoto Protocol have committed, as a group, to: "... reducing their overall emissions of such gases by at least 5% below 1990 levels in the commitment period 2008 to 2012."

To expedite the goal of GHG emission reduction, the Kyoto Protocol allows countries that are not included in Annex 1 to sell their GHG reductions to Annex 1 countries: the Clean Development Mechanism (CDM) for developing countries, and Joint Implementation for countries with economies in transition.

The CDM is supervised by the CDM Executive Board under the authority and guidance of the Conference of the Parties/Meeting of the Parties (COP/MOP), which is responsible for overseeing the Kyoto Protocol. The CDM Executive Board is accountable to the COP/MOP.

Each approach, or methodology, for assessing the potential emission reductions by type of project, such as landfill gas recovery, is approved by the executive board. Among the conditions covered in a methodology are the following:

- **Baseline**—or the identification of the GHG emissions that would occur in the absence of the proposed project. In the case of landfill gas projects, a baseline assessment would need to account for effect of national/local regulations that require gas recovery and flaring/energy recovery or common practice. In addition, the baseline should address the level to which such regulations, if any, are enforced.
- **Additionality**—or emission reductions that would be additional to those that identified in the baseline

The applicable methodology for landfill gas projects is called ACM001 (version 03, dated May 19, 2006).

This consolidated methodology specifies the procedure for calculating ERs for both landfill gas recovery and the carbon-dioxide reduction from displaced energy if the recovered gas is used to produce energy that replaces a fossil fuel.

For composting and other projects designed to avoid methane emissions, such as sludge (biosolids) digestion, the executive board decided earlier this year that the baseline condition is that disposal and emission reductions are to be estimated using the first-order decay model. The applicable methodology is AM0025 (Version 3, dated March 3, 2006).

#### **Carbon Finance**

In an effort to promote development of carbon-finance projects as a means to reduce GHG emissions in developing countries and countries with economies in transition, the World Bank initiated its carbon-finance activities in 1999.

The World Bank's carbon-finance program started with the establishment of the \$180 million Prototype Carbon Fund.

Since then, the bank has also agreed to administer country carbon funds for the governments of Denmark, Italy, Netherlands, and Spain.

In addition to the country carbon funds, the World Bank established the Community Development Carbon Fund (small-scale projects) and the BioCarbon Fund (forestry and land-use projects) in 2003.

With the initiation of the Umbrella Carbon Facility (used to aggregate funds for very large projects), the carbon funds administered by the World Bank were estimated to be over \$1.8 billion, as of July 1, 2006.

This fund value is expected to continue to grow. As an example, a new fund, the Bank's-EIB Carbon Fund for Europe, was approved by the board of the World Bank in June 2006.

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