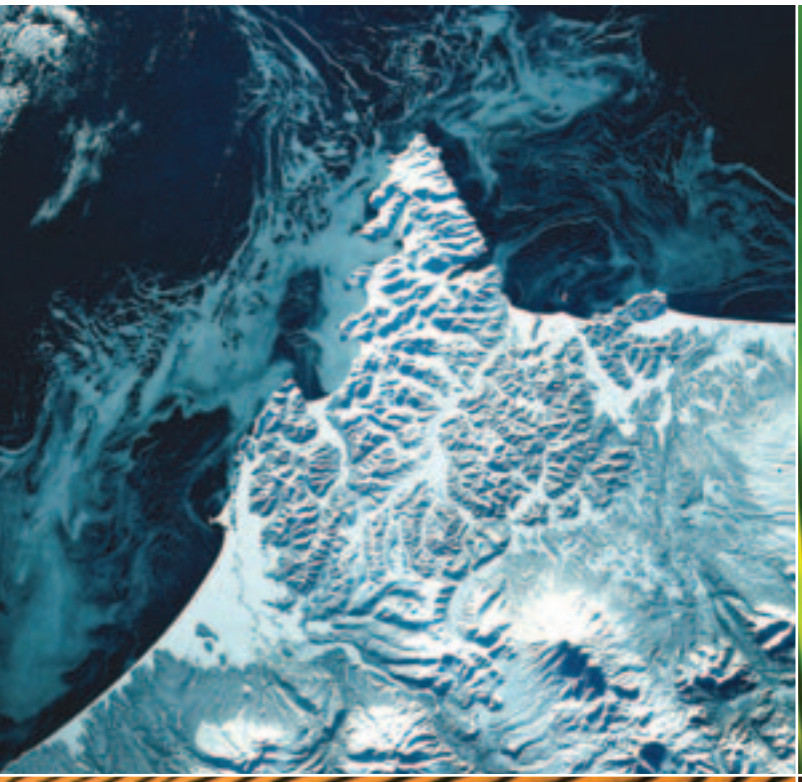
carbon finance for sustainable development



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Carbon Finance at the World Bank

Carbon Finance Mission Statement:

Our mission is to catalyze a global carbon market that supports sustainable development, reduces transaction costs and reaches and benefits the poorest communities of the developing world.

An online version of this report is available on the World Bank's carbon finance website: www.carbonfinance.org

Notes: All $ = U.S. dollars (unless otherwise indicated). The U.S. dollar/euro exchange rate used in this report = 1.35. One ton = 1000 kilograms (one metric tonne). All greenhouse gas emission reductions are measured in tons of carbon dioxide equivalent (tCO_2e). Data presented is up to August 31, 2007.

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Energy Efficiency

Energy efficiency could potentially account for more than half of energy-related greenhouse gas reductions achievable within the next 20 to 40 years.

Carbon Finance at the World Bank

Carbon Funds at a Glance

Prototype Carbon Fund (PCF)

The PCF has pioneered the market for project-based greenhouse gas emission reductions while promoting sustainable development.

Fund capital (US$ million)	180
Date operational	April 2000
Participants	23
Private % (by capital invested)	63.9
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	31

Community Development Carbon Fund (CDCF)

The CDCF provides carbon finance to projects in poorer areas of the developing world that combine community development with investment in clean energy.

Fund capital (US$ million)	128.6
Date operational	March 2003
Participants	25
Private % (by capital invested)	45.1
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	7.1

BioCarbon Fund (BioCF) Tranche 1

The BioCF focuses on projects that sequester or conserve carbon in forest and agro-ecosystems, while promoting biodiversity conservation and poverty reduction. It has piloted some projects on avoided deforestation.

Fund capital (US$ million)	53.8
Date operational	May 2004
Participants	14
Private % (by capital invested)	55.8
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	4.7

Danish Carbon Fund (DCF)

The DCF purchases emission reductions that generate potential credits under the CDM and JI mechanisms of the Kyoto Protocol.

Fund capital (US$ million)	75.4
Date operational	January 2005
Participants	6
Private % (by capital invested)	65.7
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	3.6

Spanish Carbon Fund (SCF)

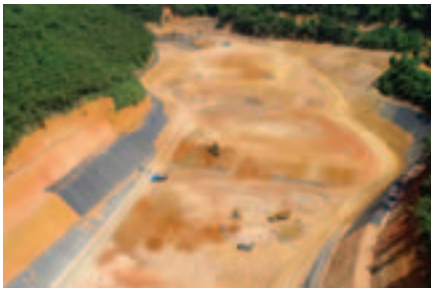
The SCF promotes projects that contribute significantly to the sustainable development of developing countries and countries with economies in transition.

Fund capital (€ million)	220.0
Date operational	March 2005
Participants	13
Private % (by capital invested)	22.7
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	15.0

Umbrella Carbon Facility (UCF) Tranche 1

The UCF is an aggregating facility that pools funds from World Bank-managed carbon funds and other participants to purchase emission reductions. Tranche 1 is purchasing emission reductions generated by two large projects in China (through thermal oxidation of HFC-23).

Fund capital (US$ million)	998.8*
Date operational	August 2006
Participants	16
Private % (by capital invested)	75.0
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	129.3



Netherlands CDM Facility (NCDMF)

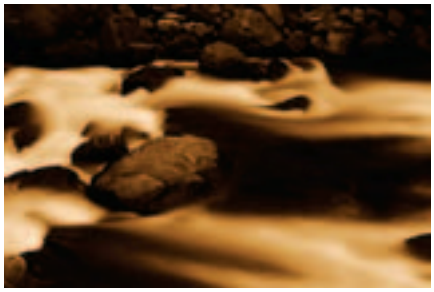
The NCDMF supports projects in developing countries that generate potential credits under the Clean Development Mechanism (CDM) of the Kyoto Protocol.

Fund capital (US$ million)	**
Date operational	May 2002
Participants	1
Private % (by capital invested)	0
$MtCO_2e$ under contract (with signed ERPAs)	**

Netherlands European Carbon Facility (NECF)

The NECF purchases emission reductions from Joint Implementation (JI) projects located in countries with economies in transition.

Fund capital (US$ million)	**
Date operational	August 2004
Participants	1
Private % (by capital invested)	0
$MtCO_2e$ under contract (with signed ERPAs)	**



Italian Carbon Fund (ICF)

The ICF facilitates opportunities for the private and public sectors in Italy to participate in projects that generate cost effective emission reductions and clean technology transfer.

Fund capital (US$ million)	155.6
Date operational	March 2004
Participants	7
Private % (by capital invested)	30.2
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	15.4

BioCarbon Fund (BioCF) Tranche 2

The BioCF Tranche 2 focuses on projects that sequester or conserve carbon in forest and agro-ecosystems, while promoting biodiversity conservation and poverty reduction. It will also pilot projects that conserve carbon in soils, as well as avoided deforestation.

Fund capital (US$ million) (still open for contributions)	36.1
Date operational	March 2007
Participants	6
Private % (by capital invested)	50%
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	0

Carbon Fund for Europe (CFE)

The CFE is jointly managed by the European Investment Bank (EIB) and the World Bank. The fund is designed to help European countries meet their commitments to the Kyoto Protocol and the European Union Emissions Trading Scheme (EU ETS).

Fund capital (€ million)	50
Date operational	March 2007
Participants	5
Private % (by capital invested)	20%
$MtCO_2e^{\dagger}$ under contract (ERPA†† signed)	0

* Includes €224.54 million total participation of PCF, NCDMF, ICF, DCF and SCF
** Not publicly available
† Million tons of carbon dioxide equivalent
†† Emission reductions purchase agreement

From the World Bank

Climate change presents an unprecedented challenge to the world, one that is already having disruptive and, in some places, devastating effects on the world's poor. At the same time, annual emissions from developing countries are rising markedly as their economic activities increase, energy access improves, and consumption patterns change. It is clear that all major emitting countries—in both the developed and developing world—need to move to a lower-carbon economy. But this must occur without growth and poverty reduction being compromised for the poor of the world.

By channeling new resources from OECD governments and private corporations into its client countries for low-carbon development projects, the World Bank has actively catalyzed the market for greenhouse gas emission reductions. With ten years of experience through its own carbon finance work, the World Bank is now preparing to fully integrate greenhouse gas abatement and the opportunities of the global carbon market into its operational programs.

The participants in the 10 funds and facilities covered in this report—government and private sector—have shown foresight and commitment. They are pioneers in demonstrating the global potential of the carbon market—supporting projects that reduce greenhouse gas emissions and bringing development benefits at the same time. For that market to continue to grow, however, and for it to have a significant impact on climate change and on clean energy development, we must see a stable long-term regulatory framework quickly put into place.

This report outlines what we and our development partners have achieved in tackling climate change and supporting economic development in the past year. Each reader is left to imagine what could be accomplished on a much larger scale as we work towards our goal of a world free of poverty.

Katherine Sierra
Vice President for Sustainable Development
The World Bank

From the Chair of the Host Country Committee

We are facing a dramatically changed and changing world: thinning and reduction of glaciers and ice sheets; threats to vital infrastructure, settlements and facilities due to sea-level rise in many small island states; increased impact on forests due to pests, disease and fire; more health-threatening heat waves, reduced rainfall, and increased water stress for 75 to 250 million people in Africa by 2020; extreme weather events in the Caribbean region increasing year by year causing economic, ecosystem and even worse—human losses. These are just some of the major changes that the whole world is facing right now and will face in the immediate future because of climate change. Are we really taking this threat seriously? Are those responsible trying to solve this problem? The reality is that day by day we have more carbon dioxide emissions delivered to the atmosphere. Day by day the developing world is becoming more vulnerable and the possibilities of even adapting to climate change are becoming more remote. These are the challenges that confront us all.

The Host Country Committee (HCC) is working on these challenges with the World Bank through its carbon finance operations by helping host country members take advantage of the opportunities to deal with climate change and benefit development through carbon finance.

As chair of the HCC—filled by Panama for the first time—I can clearly see the impact of the committee on decisions taken by the World Bank's Carbon Finance Unit to improve capacity building, transfer of technology, financing and mitigation activities in many of the countries that host carbon projects. My challenge as chair has been focused on how to build on that relationship with the Bank. The host countries are essential partners in climate change mitigation efforts. For that reason I encourage the World Bank to continue to strengthen the Host Country Committee. This will help build the capacity among its members to introduce better strategies to combat this cancer on the Earth—global warming.

Eduardo Reyes
Chair
Host Country Committee

Avoiding Dangerous Climate Change

> "Warming of the climate system is unequivocal, as is now evident from...increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level."
>
> Intergovernmental Panel on Climate Change (IPCC), 2007

What We Should Know

- The Intergovernmental Panel on Climate Change (IPCC) 2007 report states that warming of the climate system is unequivocal and mostly due to human activities.
- Eleven of the last 12 years are among the hottest on record.
- The world is entering a climate regime unprecedented in human history.
- Climate change is already having devastating effects on the world's poor.
- Global greenhouse gas emissions would have to peak by 2015—and then decrease—to keep global temperatures from rising more than 2° Celsius over pre-industrial levels.
- Whatever framework emerges for reducing greenhouse gas emissions, it should generate significant investment resources to help developing countries grow.
- Underlying the carbon market is a simple fact: no matter where on the planet you reduce greenhouse gases, it has the same global impact.
- The carbon market is emerging as a powerful tool to reduce greenhouse gas emissions and to transfer financial resources and clean technology to the developing world.
- The World Bank Group is building opportunities for developing countries to access carbon finance in support of low-carbon development goals.

The Challenge Ahead

Time is working against us. The IPCC 2007 report shows that global carbon dioxide emissions are growing faster than at any time since 1970. The majority of countries with the highest level of emissions in 2004 are high income developed countries, but all of the G8+5 countries—Brazil, China, India, Mexico and South Africa are also in the top twenty.

The European Union has called for a global and comprehensive post–2012 agreement. It would require all developed countries to take the lead by collectively reducing their greenhouse gas emissions by 30% by 2020 compared to 1990 emissions, with a view to collectively reducing emissions by 60 to 80% by 2050 compared to 1990.

A sense of urgency

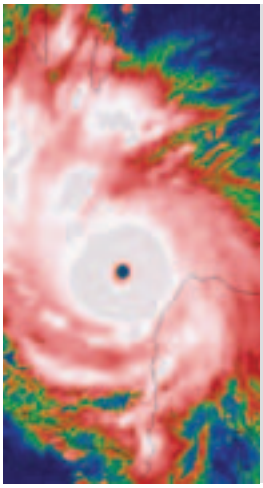
Sea level rise could displace tens of millions of people living in low-lying areas, such as the Ganges and Nile deltas, and could threaten the existence of small island states.

150 to 200 million people may become permanently displaced by the middle of the century and loss of global gross domestic product (GDP) could be $1 trillion.

Over 95% of Africa's agriculture is rain-fed. In some countries, yields from rain-fed agriculture could be reduced by up to 50% by 2020.

15 to 40% of species could face extinction with 2° Celsius of warming.

Sources: The Stern Review and IPCC



Current international agreement to tackle climate change

At the beginning of 2005, the Kyoto Protocol came into force, turning reduction targets by most industrialized countries into international commitments. Under the Kyoto Protocol, 38 industrialized countries have committed to reduce their greenhouse gas emissions by an average of 5.2% below their 1990 levels between 2008 and 2012. These countries can do so by reducing domestic emissions; exchanging emission permits among themselves via a cap-and-trade system; and purchasing emission reduction credits from projects in developing countries using the Clean Development Mechanism (CDM), or in economies in transition using Joint Implementation (JI).

In December 2007, parties to the United Nations Framework Convention on Climate Change (UNFCCC) will meet in Bali to begin to hammer out a post-2012 agreement that will limit greenhouse gases emitted into the atmosphere.

> "If we're not on the eve of a breakthrough in Bali, we can spend the next six years waiting for the next report from the IPCC, public interest will slip away and we will be in deep trouble. The Bali meeting must do four things: agree to launch negotiations, determine the areas of discussion, decide on a deadline, and create a mechanism for the negotiations. Bali doesn't have to deliver the perfect climate change regime; it doesn't have to answer all the questions; it doesn't have to solve all the problems; it just has to get the process going."
>
> Yvo de Boer
> Executive Secretary, UNFCCC

The Role of Carbon Finance

The IPCC concludes that an effective carbon price signal could realize significant mitigation potential in all sectors, by making many mitigation options financially attractive. Mitigation technologies with the largest economic potential exist in the areas of energy supply, transport, industry, buildings, agriculture, forestry and waste management. This report documents the move in that direction.

In its annual review of the state of the carbon market, World Bank research shows that in 2006 the global carbon market grew to an estimated $30 billion, tripling in value over the $10 billion registered in 2005.

These figures demonstrate that carbon markets are able to cost-effectively source emission reductions. Together with policies and measures for those sectors that are not easily reached by the carbon market, they could contribute to the enormous mitigation effort required to avoid dangerous climate change.

State of the carbon market 2007

- The European Union Emissions Trading Scheme continued to dominate the market with transactions nearing $25 billion.
- Project-based transactions, primarily through the CDM, doubled in value over 2005, to about $5 billion.
- Developing countries supplied nearly 450 million tons of carbon dioxide equivalent of CDM credits in 2006, with China still leading at 61% of transacted volumes.
- About 920 million tons of emission reduction credits were transacted under the CDM between 2002 and 2006, corresponding to a cumulative value of $7.8 billion, leveraging an estimated $21.6 billion in investment (74% for clean energy related projects).
- In 2006, JI projects from economies in transition saw increasing interest from buyers, with 16.3 million tons transacted—up 45% over 2005 levels. Russia, Ukraine and Bulgaria provided more than 60% of transacted volumes so far—for a value of $141 million.
- Beyond the Kyoto perimeter, important regulatory developments have occurred in North America and Australia in the last 12 months, with initiatives to manage greenhouse gas emissions at least at regional levels, and increasing activity in the voluntary market.

Carbon Finance, Development and the World Bank

"The world economy is likely to face carbon constraints for decades to come; many have concluded that major emitting countries need to move to a low-carbon economy. Whatever framework emerges for reducing carbon emissions, it should generate significant investment resources to help developing countries' growth while improving the environment and reducing greenhouse gas emissions by using energy and other resources more efficiently and reducing the rate of deforestation. The World Bank Group will continue to build opportunities for developing countries to access carbon finance in support of low-carbon development goals."

Warren Evans
Director of Environment
The World Bank

Documenting the Development Dividend

From Argentina to Kenya, from landfills to small hydro projects, all over the world through World Bank carbon finance projects, local communities are reaping benefits. This is the human face of carbon finance at the World Bank, the development dividend that is measured in improved working conditions, access to clean drinking water, health benefits where there were none, livelihoods that didn't exist—until the projects. These are the waste pickers at a landfill site in the Argentine city of Salta (CDCF Salta Landfill Gas Capture Project) who can now work in greater safety and earn more money from recovering more recyclables from the site; poverty-stricken indigenous Indians on a remote coast in Colombia in the vicinity of a wind power project (PCF Jepirachi Wind Power Project) who now have a desalination plant for drinking water and no longer have to use desert water holes; a community in Nigeria (CDCF Aba Cogeneration Project) that now has a health clinic thanks to the community benefits arranged through a cogeneration carbon finance project.

The Community Development Carbon Fund benefits the global environment and poor communities affiliated with the projects. Other World Bank-managed carbon funds also provide benefits at the community level. For example each of the BioCarbon Fund projects has a community social benefits component as part of the purchase agreement.

Finding profit in conservation

Teofilo Funez is a farmer in the Honduran village of Libertad. He used to support his family on income from illegal hunting and logging in the Pico Bonito National Park. However, he is now employed by the BioCarbon Fund's Pico Bonito Forestry project to reforest degraded land and can support his family without destroying the forest.

"They tell me that what I used to do was illegal, but I was only trying to feed my family. I used to cut down Redondo trees, which are worth a lot of money. I would get $240 for every tree I cut. But all that changed when the project came here.

Now I am being paid for Redondo seeds I sell for replanting trees. We still have our trees and I can still make money, even more than I did before. Before, when we cleared the land to plant beans, we also cleared away small Redondo trees because we didn't know what they were. Now, we leave them and let them grow. We even take care of the wild seedlings. Now I can let the forest stand and I can still look after my family."

Integrating Carbon Finance into the Development Work of the World Bank

While the World Bank's initial role was to catalyze the global market for carbon emission reductions, carbon finance is now emerging into the mainstream of the Bank's programs of assistance to its client countries. Climate change mitigation through carbon finance is becoming increasingly integrated into the World Bank's development work in its various regions.

East Asia and Pacific

"Carbon finance has served as a catalyst to mainstream climate issues into the design of projects in a range of development activities, including rural electrification, renewable energy, energy efficiency, industry, waste management and forestry. It has also enabled development of new policy instruments such as the China CDM Fund, and has supported development of a technical assistance program to enhance capacity and expertise of host countries to engage in the greenhouse gas market. In the last three fiscal years, the East Asia and Pacific region has hosted 16 signed purchase agreements for emission reductions, generating a portfolio of almost 150 million tons of emission reductions valued at $1.2 billion, making this the Bank's largest program."

James Adams
World Bank Vice President, East Asia and Pacific Region

Europe and Central Asia

"We are actively working with many of our shareholders in the region to support their engagement in the carbon market, to disseminate best practices and to develop innovative approaches to implement Green Investment Schemes—a mechanism to link the sale of surplus allowances under the Kyoto Protocol to projects and/or programs with environmental benefits. Our current portfolio, with 25 carbon projects including 16 signed emission reductions purchase agreements, is supporting sustainable development in the infrastructure and environment sectors across the region. Carbon credits have been used to leverage investments in hydropower rehabilitation in Ukraine and Georgia, a switch to biomass as a fuel source for projects in the public sector and in industry in Moldova and Bulgaria, and solid waste management in Latvia, to name a few."

Shigeo Katsu
World Bank Vice President, Europe and Central Asia Region

Indonesia: Pontianak Landfill Gas Recovery Project

The Pontianak landfill, a controlled landfill, serving the City of Pontianak, receives about 350 tons of waste per day and can continue to receive this volume of waste for 15 years. At present, no facilities exist in Indonesia to collect and combust methane and awareness of the technology and its development are limited. The project is constructing the first landfill gas facility in the country and will provide a demonstration of the technology that takes into consideration Indonesia's tropical environment and other local conditions. The project is expected to be registered later this year with gas recovery operations beginning immediately thereafter. Successful implementation of this project will encourage replication at other municipal landfills in Indonesia. Once in operation, the project is expected to displace approximately 250,000 tons of carbon dioxide equivalent by the end of 2012. The emission reductions will be purchased by the **Netherlands Clean Development Mechanism Facility**. The project sponsor will also support community development from the carbon revenues.

Africa

While the World Bank carbon finance operations have had some success in developing the carbon market in the Africa region—14 projects with signed emission reductions purchase agreements and 30 in the project pipeline—Africa's share of the carbon market remains small. In 2006 out of a total global carbon market of $30 billion, with the share of developing countries totaling $5 billion of that amount, Africa's share was only $200 million.

It is critical to help Africa develop new markets for carbon and help clients to package opportunities for markets. Five United Nations agencies, including the World Bank Group, have launched an initiative to help developing countries—especially in Africa—participate in the CDM (see Capacity Building, page 20). Worldwide, more than 95% of CDM projects are developed by private sponsors who are only looking for carbon credit purchasers. There are limited opportunities of this nature in Africa. Nevertheless, the World Bank's Africa carbon finance team is developing energy efficiency projects in the cement industry (Kenya) and in the private power sector (Nigeria), as well as carbon sequestration projects in Kenya and Niger.

There are many opportunities in Africa that would be well-suited to a broader and more programmatic approach to reducing emissions, as offered by the new World Bank carbon facilities (see page 82). These include reducing energy-related emissions, leveraging new resources for clean energy access and compensating reductions in the forest sector. The potential to reduce emissions from deforestation and degradation on a national scale opens up new opportunities.

South Africa Durban Municipal Solid Waste project (PCF)

South Asia

Carbon finance is proving to be a real boon for small business operations in the South Asia region. India has nearly three million small and medium enterprises which constitute more than 80% of the total number of industrial operations in the country and account for 60% of the country's gross domestic product. Many of these businesses for which energy costs represent a large portion of total production costs, can reap especially high benefits, including carbon finance, from improving efficiency of energy production and use.

Bundling projects in India

Because many Indian small and medium enterprises are grouped into clusters, and have formed associations for the betterment of their individual companies, they can be bundled for more effective implementation of energy efficiency investments and carbon emission reductions projects. One such cluster is the brick manufacturing sector, where the World Bank has signed agreements with two Indian companies to promote technologies that may help revolutionize the building material industry—one utilizes a more energy efficient kiln to produce burnt clay bricks (the CDCF Vertical Shaft Brick Kiln (VSBK) project: 126 plants), and the other replaces burnt clay brick with fly ash bricks which are manufactured without the use of thermal energy (the CDCF FaL-G project: 200 micro plants). Both projects will deliver community benefits (see page 29).

Nigeria: Aba Cogeneration Project

The Nigeria Aba Cogeneration project will introduce more efficient, gas-fired cogeneration to displace more carbon-intensive fuels from off-grid generation, as well as from the national power grid. The new plant will also supply carbon dioxide to a local brewery, which currently produces the gas from generators using diesel and provide its waste steam to other local businesses that will no longer have to burn diesel to generate steam. The **Community Development Carbon Fund** will purchase emission reductions of 1.1 million tons of carbon dioxide equivalent over a seven year crediting period. As we went to press, this project was short-listed under "Best Carbon Finance Initiative" by the Africa Investor Awards 2007.

Mr Enwereji is the legal representative of the Umuojima Ogbu village near the plant. Inhabitants of the village, including Mr. Enwereji's mother, will receive educational and health benefits from the project sponsor GPL and the CDCF community benefits incremental payments.

Latin America and Caribbean

"Carbon finance offers Latin America and Caribbean countries the opportunity to be in the forefront of the climate change mitigation agenda. The consequences of climate change will impose a heavy tax on the economies of the region, in particular on the poor. In the long term, the very ability of the region to develop in a sustainable manner will be put at risk. This is why climate change mitigation and adaptation is central to the World Bank agenda in the region."

Pamela Cox
World Bank Vice President, Latin America and the Caribbean Region

Middle East and North Africa

There are three World Bank carbon finance projects operating in the Middle East and North Africa region—in Egypt and Tunisia—and more are expected to come online in Jordan, Algeria, Morocco, and potentially across the whole region.

Without carbon finance, landfill projects that capture methane (a potent greenhouse gas) and improve often dangerous working conditions for young workers at landfills, would otherwise not be economically viable. Some projects produce electric power as a byproduct. The region was the first to blend World Bank loans with emission reduction revenues. Such blended loans, with revenues helping to offset interest payments, are in place in Tunisia and Egypt.

Argentina: Salta Landfill Gas Capture Project

The Municipality of the city of Salta and the World Bank signed an emission reductions purchase agreement in 2007. The project is expected to be registered early next year with gas recovery operations beginning by mid-2008. The Bank will purchase the first 60,000 tons of carbon dioxide equivalent emission reductions for the **Community Development Carbon Fund**. Although a small project, it will incorporate a Community Benefits Plan developed by the municipality in agreement with one of the main beneficiaries: the informal waste pickers at the landfill site. This plan will build a waste separation/recycling facility close to the landfill, and provide protective gear and training to the waste pickers, improving their working conditions. Leveraging on this CDM project, a grant program run locally by the United Nations Development Programme (UNDP) will provide additional funds to the municipality to ensure sustainability of the recycling plant through training and raising awareness.

Signing of Salta emission reductions purchase agreement

From the Manager of the Carbon Finance Unit

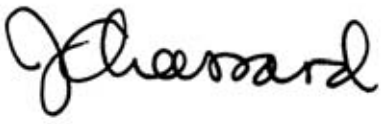
We are living in challenging times. The science has spoken on climate change. It is now up to governments, the private sector, institutions and individuals to take the measures that will avert disastrous global warming. The World Bank through its carbon finance operations has been working for the last decade to develop the carbon mitigation tools that could help make a dent in the enormous task of lowering emissions. Sixteen governments and 66 private sector companies were early visionaries of that prospect and early on partnered with the World Bank. Through their 10 carbon funds and facilities we have pioneered methodologies; reached into the poorest corners of the developing world to bring the benefits of the carbon market to those who had been bypassed; we have supported a fund that has found value in emission reductions from forests and agro-ecosystems. On their behalf the World Bank is set to deliver more than $2 billion in carbon finance projects.

This past year has seen the launch of the Carbon Fund for Europe, a partnership between the World Bank and the European Investment Bank. In addition, the BioCarbon Fund has opened Tranche 2 to expand its forestry work, including in projects that deal with issues such as avoided deforestation.

But we still face continuous challenges, key among them the need to ensure that Bank client countries can take advantage of the projected $100 billion from carbon finance to help them travel a low-carbon development pathway.

In September 2007, with two new carbon facilities—the Carbon Partnership Facility and the Forest Carbon Partnership Facility—approved by the Bank's Board of Executive Directors, the carbon finance business entered a new era. Through these facilities the Bank will work to raise carbon finance to a scale where the much needed larger impact of carbon markets on long-term greenhouse gas emissions becomes possible. Now there is the tantalizing possibility that carbon market forces could help shape a sustainable future.

A low-carbon development path which must respect the rights of developing countries' economies to catch up with their industrialized neighbors, can only be created through the collaboration of many. Just as in the early days of the carbon funds, we at the World Bank are ready again to bring together governments from both developed and developing countries and forward-looking private sector companies in a public-private partnership with a vision to making an important contribution to the resolution of the climate change crisis over the next decade.



Joëlle Chassard
Manager, Carbon Finance Unit
The World Bank

Carbon Finance Highlights 2007

The **Prototype Carbon Fund (PCF)** reached an important milestone in 2007: it closed its portfolio with the signing of 24 emission reductions purchase agreements for the reduction of over 30 million tons of carbon dioxide equivalent.

The **Community Development Carbon Fund (CDCF)** now has 20 emission reductions purchase agreements for a value of $60.2 million. Fifty-nine percent of this value is committed to projects in the poorest countries.

The **BioCarbon Fund (BioCF)** now has 15 emission reductions purchase agreements signed for Tranche 1, totaling over 80% of its value. Tranche 2 of the BioCF was opened for contributions in November 2006, and so far has capitalized over $36 million from governments and the private sector.

The **Netherlands Clean Development Mechanism Facility (NCDMF)** has a mature portfolio which includes the first project ever registered under the CDM. With a target volume of 38 million tons of carbon dioxide equivalent, the NCDMF portfolio includes a significant number of registered projects and others that are in the process of being registered.

The **Netherlands European Carbon Facility (NECF)** operated cooperatively with the International Finance Corporation (IFC), is a JI facility operating primarily in Ukraine, Russia and Poland. It is expected that the facility will close its portfolio by the end of 2007.

The capitalization of the **Italian Carbon Fund (ICF**) stands at $155.6 million. The ICF has signed five emission reductions purchase agreements and participated in the China HFC-23 investment for a total purchase of 15.4 million tons of carbon dioxide equivalent. The small remaining capital will likely be invested in JI projects to diversify its portfolio risk.

As of August 31, 2007 the **Danish Carbon Fund (DCF)** portfolio included 12 projects—with reductions of about 12 million tons of carbon dioxide equivalent—that have advanced to the carbon finance document stage. The DCF had signed emission reductions purchase agreements for three of these by the end of August (a fourth project was signed in September 2007).

The capitalization of the **Spanish Carbon Fund (SCF)** stands at €220 million. The SCF has approved carbon finance documents for a number of projects totaling about 15.8 million tons of carbon dioxide equivalent; 15 million tons have reached purchase agreement stage. The SCF has significantly improved the emission reductions volume to be delivered by 2012 by its recent decision to invest in JI projects.

Tranche 1 of the Umbrella Carbon Facility (UCF) was fully funded in August 2006. Its current participants include five carbon funds administered by the World Bank and 11 participants from the private sector. The total capital of the facility is $1 billion, of which about three-quarters comes from private sector entities.

In its first year of existence the capitalization of the **Carbon Fund for Europe (CFE)** stands at €50 million. Two projects at the carbon finance document stage are being negotiated for a value of €19.3 million.

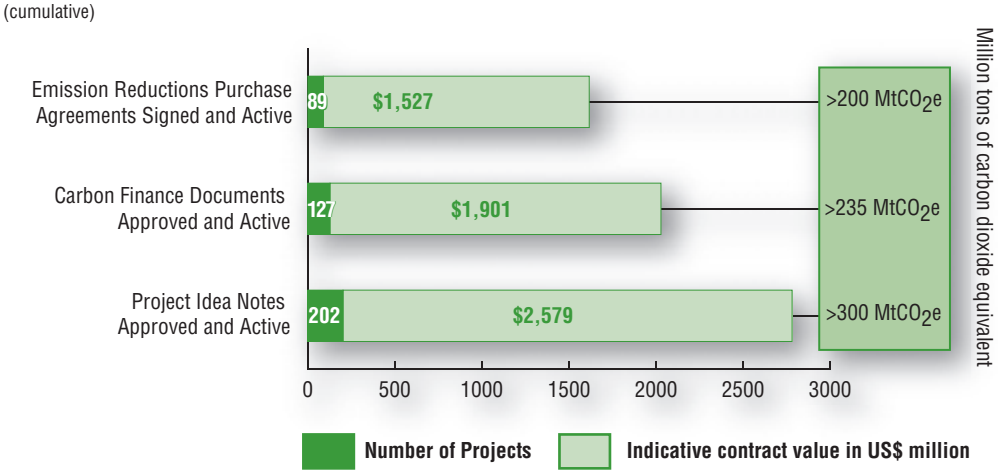
Report on Carbon Finance Operations

World Bank Carbon Finance Projects

The World Bank-managed carbon funds include over 200 projects with an estimated total emission reductions value of more than $2.5 billion as of August 31, 2007. Also, as of this date, emission reductions purchase agreements have been signed for 89 projects, totaling over $1.5 billion. Thirty-eight projects are at the advanced carbon finance document stage and have been approved by the participants of the relevant funds for inclusion in their respective portfolios.

World Bank Carbon Finance Project Status

(cumulative)



Note: The above figures exclude options purchases.

Bolivian community gets new sewage system from urban wastewater methane gas capture project

From left to right: Roberto G. Aiello, Deal Manager, World Bank; Ricardo Cadario SAGUAPAC executive; Warren Evans, Director of Environment, World Bank; Fernando Trigo, SAGUAPAC executive; and Gisella Ulloa, Coordinator Bolivia CDM Office

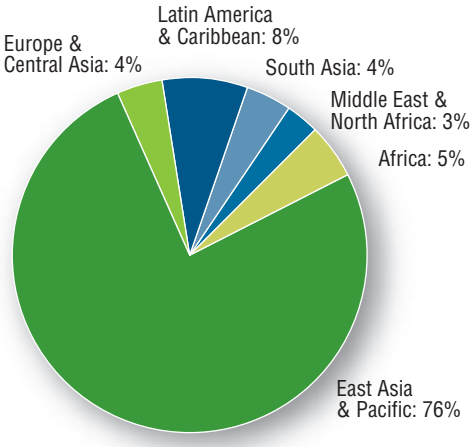
Residents of one of the poorer areas of the Bolivian City of Santa Cruz are seeing first hand what the carbon market can deliver for them. They are the recipients of community benefits that the **Community Development Carbon Fund** will pay in addition to purchasing some 200,000 tons of carbon dioxide equivalent by 2015 from a sanitation and wastewater project.

On May 3, 2007 at Carbon Expo in Cologne, Germany, the World Bank on behalf of the CDCF signed an emission reductions purchase agreement with SAGUAPAC, a Bolivian sanitation and wastewater treatment cooperative. According to the agreement, the first of its kind in developing countries under the CDM, the Community Development Carbon Fund will buy emission reductions from four wastewater treatment plants. The project will install a covering system on the existing anaerobic lagoons at the four wastewater treatment plants in Santa Cruz de la Sierra constructed and operated by SAGUAPAC. This system will allow for the capture and flaring of the methane generated by the anaerobic decomposition of organic matter.

SAGUAPAC will build a sewage system in the area, substantially improving public health and the overall standard of living of the community involved. The Santa Cruz experience could be replicated in other cities around Bolivia and the Latin American region.

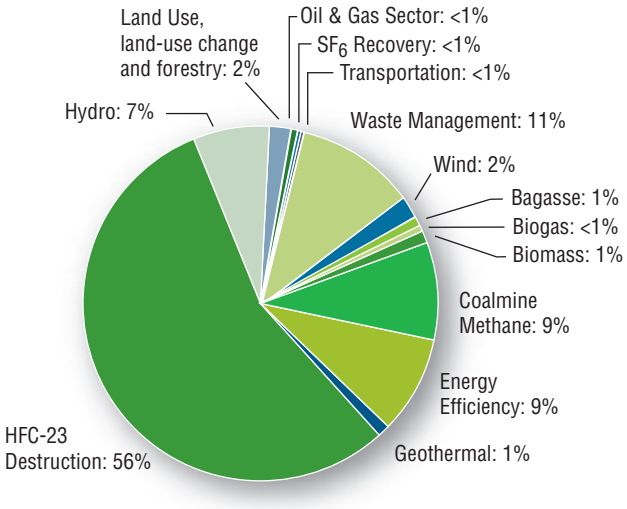
Geographic Distribution*

The East Asia and Pacific region—in particular China—retains the largest share of all the active projects, accounting for a total emission reduction value of over $1.4 billion. This is primarily due to the two HFC-23 contracts. Latin America had the second largest share as a result of several waste management, renewable energy and land use, land-use change projects. Besides these, there were nine purchase agreements signed in the Africa region in fiscal year 2007 for land use, land-use change and forestry and renewable energy projects that increased the Africa region's share in the carbon finance portfolio. This reflects the emphasis that has been placed on Africa by the World Bank to develop carbon finance.



Technology Distribution*

The World Bank's carbon funds strive for technological diversity. Even though the two HFC-23 projects account for the largest share (56%) of the portfolio value their share has been consistently decreasing with the subsequent signing of agreements in other sectors such as energy efficiency, waste management and renewable energy. The share of energy efficiency projects almost doubled from last year, marking efforts made in previous years to develop this under-represented sector of the CDM. Renewable energy projects represent the next largest share with $268 million in contract value. Almost 50% of the value of agreements signed last year were in the renewable energy sector and almost a quarter by value were in the waste management sector.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement and carbon finance document stage.

Strategic Contributions to the CDM Regulatory Process

Over the past year the World Bank made significant contributions to the approval of methodologies and regulatory guidance of the CDM Executive Board in thematic areas that had been left out of the regulatory process. Based in part on World Bank submissions, the CDM Executive Board approved methodologies for programmatic CDM and switch from non-renewable biomass in thermal applications in 2007. World Bank submissions also facilitated in the approval of methodologies and their revisions for afforestation and reforestation projects under different land use regimes and expanded opportunities for the least developed countries to participate in the CDM and to scale up investments in mitigation and sustainable development initiatives.

Programmatic CDM

The early phase of CDM methodology development focused on reducing emissions from large industrial facilities. This focus limited the regulatory process in addressing the needs of small-scale projects and initiatives implemented under specific policies and programs. The CDM's "bundling" rule to group activities under a common project was found to be inadequate for addressing the needs of small-scale initiatives, whose potential remains untapped. The World Bank proposed a "programmatic" approach and contributed to the development of guidelines. The regulatory approval for Program of Activities in July 2007 facilitates the implementation of activities over a large geographic region, over an extended period of time and without being constrained by the size limits of small-scale projects. The World Bank is supporting several initiatives including energy efficiency, renewable energy, and land-based sequestration initiatives.

Non-Renewable Biomass

The unsustainable harvesting of biomass for meeting fuelwood demand is a major factor contributing to the depletion of biomass. Several methodologies relating to non-renewable biomass had been rejected by the CDM Executive Board because they dealt with issues of avoided deforestation and land use change that are currently ineligible under the CDM. The World Bank submissions helped to clarify the technical issues, thus facilitating the approval of methodologies that promote the switch to renewable energy sources such as bio-digesters and solar cookers and improvements to combustion efficiency of stoves. These have the potential to reduce greenhouse gas emissions by about one ton of carbon dioxide equivalent per stove per year. These projects also have large side benefits in terms of the reduction in the time spent on fuel-wood collection and for alleviation of indoor air pollution, a major contributor to child mortality.

Afforestation and Reforestation

Afforestation and reforestation projects present greenhouse gas emission removal opportunities through sequestration of carbon in biomass and soils in land use and forestry projects and provide opportunities for local communities in developing countries to participate in the CDM. The BioCarbon Fund invested in these types of projects and contributed to the development of methodologies and regulatory guidance. This is evident from the overwhelming proportion of approved methodologies developed by the World Bank or derived from Bank-submitted methodologies. However, further regulatory improvements are needed as these projects face limitations under existing rules such as the size limits of small-scale projects and lack of eligibility of the CDM credits from these projects under the European Union Emissions Trading Scheme.

China: Reforestation of Guangxi Watershed in the Pearl River Basin

This World Bank project is the first afforestation and reforestation project registered under the CDM. It seeks to establish 4,000 hectares of multiple-use forests. The **BioCarbon Fund** project highlights community-level carbon sequestration, restoration of native biodiversity and soil and water conservation in the degraded lands of Guangxi Watershed. The sale of carbon credits supports income generation, poverty alleviation and reforestation of degraded lands and contributes to sustainable development objectives.

Financial Performance

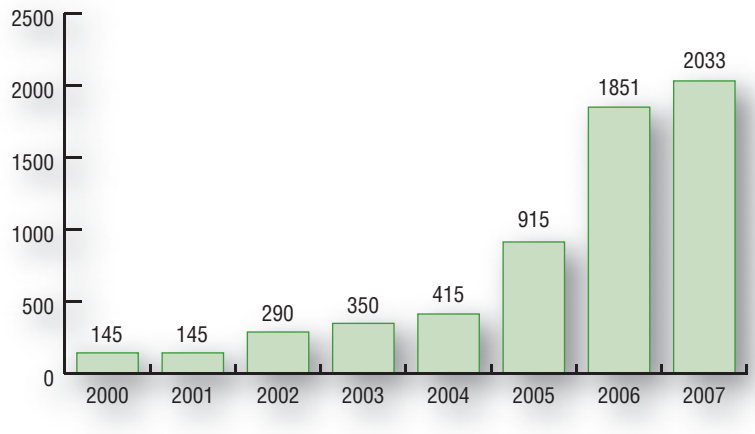
Overall funds contributed by participants in the World Bank's carbon funds rose to $2.03 billion as of August 31, 2007. During the year the first participants' meetings were held for the Carbon Fund for Europe (pledged capital €50 million) and the BioCarbon Fund's Tranche 2 (pledged capital $36.1 million). The BioCarbon Fund's Tranche 2 remains open to new participants.

The value of emission reductions purchase agreements signed by August 31, 2007 is $1.5 billion, with more than 200 million tons of carbon dioxide equivalent—in both certified and verified emission reductions—under contract for delivery. The Prototype Carbon Fund became the first fund in the portfolio to fully allocate its capital. Other carbon funds are close to doing the same.

The growth in the carbon market has resulted in higher prices paid per ton of carbon dioxide equivalent. The World Bank monitors prices closely and has implemented a pricing policy to maintain consistency across the portfolio.

A number of projects have now entered the delivery phase and during the 12 months to August 31 delivered 6.9 million tons of carbon dioxide equivalent in both certified and verified emission reductions. Total payments net of all recoveries amounted to $39.8 million. During the year the World Bank through its Carbon Finance Unit has been investing in its back office infrastructure and now has a dedicated team focused on emission reductions purchase agreement payments and carbon asset registry functions. In the next 12 months, the Carbon Finance Unit will be enhancing its contract management processes and centralizing more of the routine tasks.

Funds Under Management
(in US$ million)



Back office function: bringing carbon finance full circle

As more carbon funds in the fund portfolio move into the implementation and maintenance phase, the back office function becomes increasingly important for effective and efficient operations. Through its back office the World Bank Carbon Finance Unit has made significant progress in streamlining payment process, carbon asset management and participants' contributions management.

Emission Reductions Purchase Agreement Payments: A new payment process has been developed and is now fully operational. The new process standardizes documentation requirements and defines authorization procedures.

Carbon Asset Management: In an effort to find an efficient and cost-effective solution to manage carbon assets, the back office is working with a selected software vendor to implement a robust and comprehensive carbon asset registry system. A carbon asset database has been established and serves as an interim solution to record and track carbon assets.

Contributions Management: A World Bank system (STAR/SAP) has been utilized to manage the participants' contributions. The Multilateral Trustee Operations unit of the World Bank is providing services for the process, including call for funds, accounting of contributions and promissory notes.

Capacity Building

CF-Assist Expands its Scope of Activities

The Carbon Finance Assist program (CF-Assist), established as a multi-donor trust fund in the World Bank since 2005, works to facilitate the active participation of developing countries in the global carbon market through focused capacity building. CF-Assist's range of activities include: institutional strengthening at the country and regional levels; capacity building on carbon finance project development for multiple stakeholders; facilitating market development through global and regional events; and knowledge management and outreach.

Financial Progress

Funding for CF-Assist amounts to $13.5 million including contributions from Spain, Denmark, Switzerland, France and Australia. This includes a contribution of $1.8 million from Switzerland made in 2006-07. The program leveraged over $1 million during the year from the Japan Policy and Human Resource Development (PHRD) program, in addition to $5.5 million through past PHRD grants.

Program Progress

Country and Regional Programs

- Implemented capacity building activities in over 45 countries. Countries where new programs have been initiated during the year are: Albania, Bangladesh, Belarus, Ecuador, Jordan, Kyrgyzstan, Macedonia, Mongolia, Nepal, Paraguay, Uzbekistan and Yemen.
- Africa Assist was launched during the year in order to focus on market development in Africa. Programs have been launched in Benin, Botswana, Burkina Faso, Kenya and Mali. At the regional level, activities have begun in Southern Africa and West Africa.

Market Facilitation

- Carbon Expo, held annually in Cologne, Germany, has established itself as the premier carbon market event in the world.
- At the regional level, CF-Assist organized the highly successful Carbon Expo Asia in Beijing, China; Africa Carbon Finance Day in Nairobi, Kenya; North Africa Carbon Forum in Rabat, Morocco; and Latin America Carbon Forum in Lima, Peru. CF-Assist also collaborated with UNEP to organize a Banker's Carbon Investment Forum in Johannesburg, South Africa.
- CF-Assist launched a global initiative on developing new project methodologies in the transport sector.
- CF-Assist has represented the World Bank in the Nairobi Framework, an inter-agency mechanism (along with UNDP, UNEP, AfDB and UNFCCC) which promotes capacity building activities in Sub-Saharan Africa.

Program Results

- More than 1,200 people benefited from training programs and events over the year bringing the total beneficiaries under the program to over 5,200.
- A number of institutions including governmental focal points for CDM and JI (Designated National Authorities) in more than 10 countries received support in strengthening their infrastructure and procedures.
- CF-Assist facilitated the participation of 48 developing countries at Carbon Expo 2007.
- CF-Assist facilitated the development of innovative mechanisms like the Mexican Carbon Facility and the Brazil auctioning platform.

Carbon Expo 2007

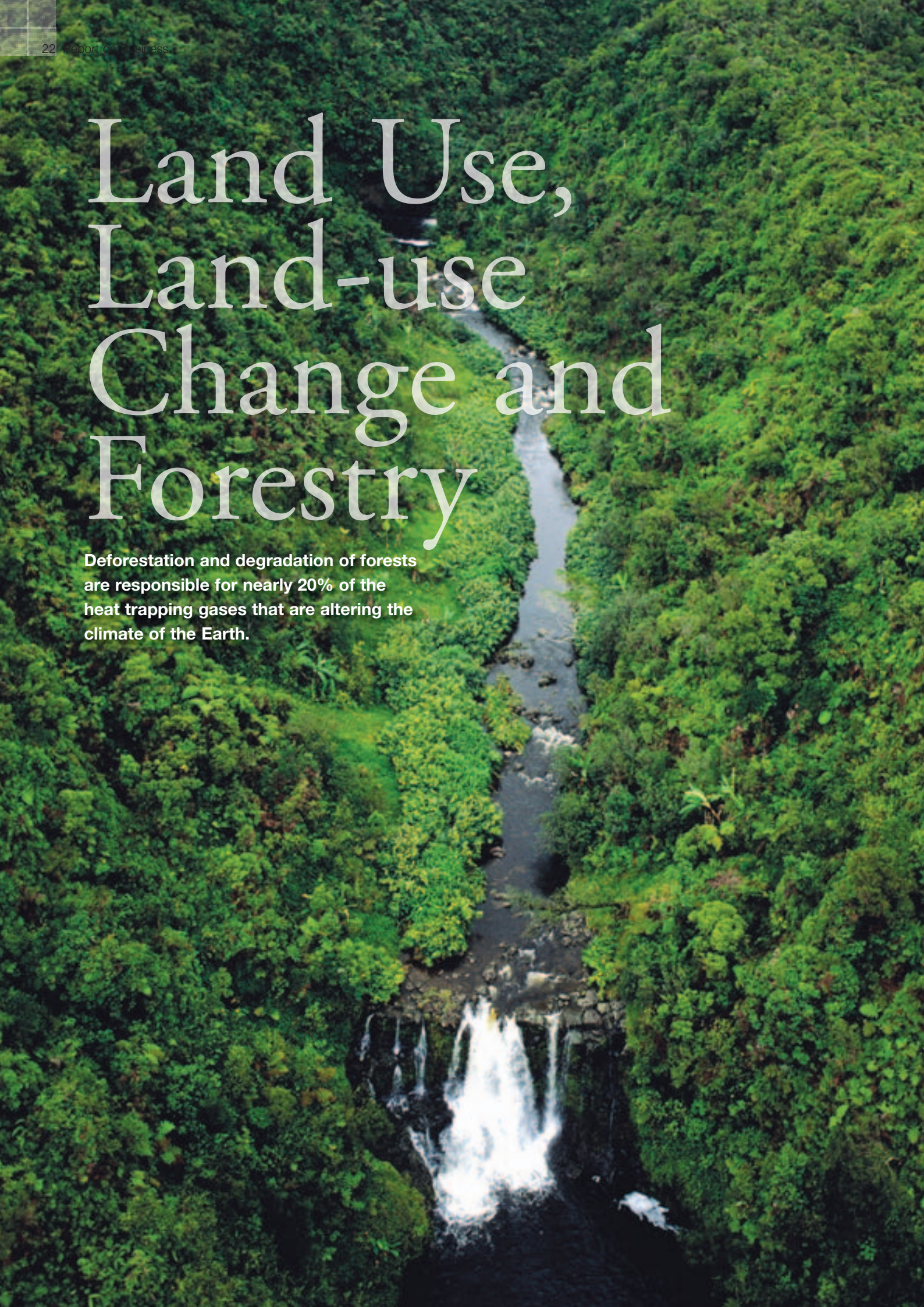
Carbon Expo 2007 speaker, Kristalina Georgieva, Director of Strategy and Operations, Sustainable Development Network, the World Bank

CARBON EXPO — For the 4th Expo in May 2007, co-sponsored by the International Emissions Trading Association (IETA), tradeshow organizer Koelnmesse and the World Bank, a record number of over 2,400 people (2006: 2,000 participants; 2004: 700) visited from 106 countries, and more than 220 exhibitors (2006: 185; 2004: 50) presented their products and services. In addition to contributing to the technical and logistical arrangements of the Expo, the World Bank's CF-Assist also facilitated the participation of high-level government representatives and technical missions from 48 developing countries and economies in transition at the Expo (2006: 25 CDM/JI host countries), including providing exhibition facilities for regional pavilions and national stands for more than 30 countries.

Report on Business:

Land Use, Land-use Change and Forestry

Deforestation and degradation of forests are responsible for nearly 20% of the heat trapping gases that are altering the climate of the Earth.



Prototype Carbon Fund

From the Chair of the PCF Participants' Committee

Closing the PCF portfolio after more than seven years of pioneering work was a very important milestone in 2007. Hundreds of project proposals have been assessed and numerous methodologies developed from scratch in order to allocate the available funds to 24 selected CDM and JI projects making up the PCF portfolio. The end of the allocation phase was delayed by several years due to the difficulty in signing the last emission reductions purchase agreements. We now hope that the implementation phase which will last until all the projects of the portfolio have achieved their verification and certification will show the results that we had expected.

Hans Georg Adam

Hans-Georg Adam
RWE

The Prototype Carbon Fund—A Watershed Year

The PCF was conceived in the late 1990s and established in 2000 with the mission of pioneering the market for project-based greenhouse gas emission reductions within the framework of the Kyoto Protocol and contributing to sustainable development. The allocation phase of the PCF—the period covering the beginning of operation of the fund until all the fund resources allocated to carbon purchases are committed to projects through the signature of purchase agreements—took longer than originally anticipated. But after seven years, the PCF can say that the primary part of its mission is accomplished—the allocation phase of the PCF is over.

The PCF is a public-private partnership made up of six governments and 17 companies, all from industrialized countries. From the beginning, the PCF was intended to be a "learning-by-doing" instrument. Both inside and outside the World Bank, the PCF demonstrated that carbon finance can be a powerful new tool for financing sustainable development in developing countries and in countries with economies in transition, and an important asset to help reduce greenhouse gas emissions that are responsible for climate change.

The learning experience of the PCF has been very rich for its 23 participants and a critical, and rewarding, step was reached by the PCF in 2007. However, more remains to be done, as the PCF now focuses on its implementation phase through the verification and certification of each of the 24 projects in its portfolio. Half of the PCF projects have already been registered by the CDM Executive Board. The PCF will continue to break new ground and gain new insights into project-based mechanisms through the implementation of its projects and the fulfillment of its emission reduction contracts which will require adaptive management to deal with future risks and events. The PCF looks forward to it!

Prototype Carbon Fund Participants

GOVERNMENT OF CANADA
www.cdm-ji.ca

THE CHUGOKU ELECTRIC POWER CO., INC.
www.energia.co.jp/e/index.html

NORSK HYDRO
www.hydro.no/en

GOVERNMENT OF FINLAND
www.ymparisto.fi/default.asp?node=18782&lan=en

DEUTSCHE BANK
www.db.com

RABOBANK
www.rabobank.nl/particulieren

JAPAN BANK FOR INTERNATIONAL COOPERATION
www.jbic.go.jp

ELECTRABEL
www.electrabel.com

RWE
www.rwe.com

GOVERNMENT OF THE NETHERLANDS

FORTUM
www.fortum.com/sustainability

SHIKOKU ELECTRIC POWER CO., INC
www.yonden.co.jp/index_e.htm

GOVERNMENT OF NORWAY
www.carbonneutralnorway.no

GAZ DE FRANCE
www.gazdefrance.com/EN

STATOILHYDRO ASA
www.statoilhydro.com

GOVERNMENT OF SWEDEN
www.environment.ministry.se

KYUSHU ELECTRIC POWER CO., INC
www1.kyuden.co.jp/en_index

TOHOKU ELECTRIC POWER CO., INC.
www.tohoku-epco.co.jp/index-e.htm

BP P.L.C.
www.bp.com

MITSUBISHI CORPORATION
www.mitsubishicorp.com/en/index.html

TOKYO ELECTRIC POWER COMPANY (TEPCO)
www.tepco.co.jp/en/index-e.html

CHUBU ELECTRIC POWER CO., INC.
www.chuden.co.jp/english/index.html

MITSUI & CO., LTD.
www.mitsui.co.jp/en/index.html

Prototype Carbon Fund Status

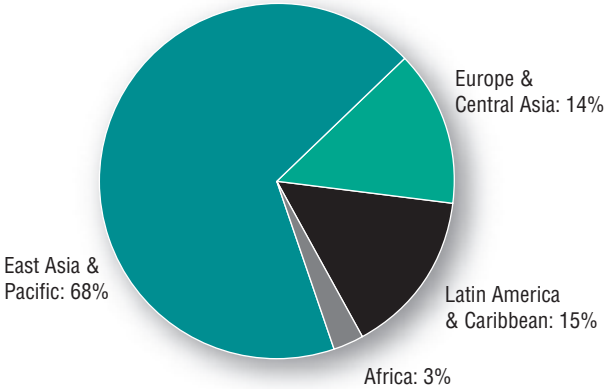
	Country/Project Name	Project Description	PCF Contract _
Emission Reductions Purchase Agreements Signed			
1	Brazil: Alta Mogiana	Increase efficiency in manufacturing processes and install new facilities to generate surplus	110,000
2	Brazil: Lages Cogen	Installed capacity of 28 megawatt electricity plus 25 tons per hour of steam, fueled by wood	750,000
3	Brazil: Plantar Sequestration and	Charcoal produced from sustainably harvested plantation, replacing coke for pig iron manufacture	1,514,286
4	Bulgaria: Pernik District	District heating system upgrades for the city of Pernik	157,000
5	Bulgaria: Sofia District	District heating system upgrades for the city of Sofia	1,084,000
6	Bulgaria: Svilosa Biomass	11 megawatt biomass-based boiler to utilize wood waste produced at the Svilosa pulp and	450,000
7	Chile: Chacabuquito	26 megawatt run-of-river hydro to replace coal or gas in the grid	1,000,000
8	China: HFC-23	Installation of an incineration facility to decompose HFC–23 generated by the existing HCFC22	5,000,000
9	China: Huitengxile Wind Farm	Construct and operate a 100 megawatt wind farm in Inner Mongolia in China. The project consists of around 50 to 100 wind turbines of one to two megawatt capacity with a net annual	1,600,000
10	China: Jincheng CMM	Capture of coal mine methane (CMM) associated with coal mining operation and utilization of	5,050,000
11	China: Xiaogushan	98 megawatt run-of-river hydroelectric plant located on the Heihe River in the Sunan Yugur	3,000,000
12	Colombia: Jepirachi Wind	19.5 megawatt wind farm in the northern part of Colombia to displace a mix of coal- and gas-	433,694
13	Costa Rica: Cote Hydro	6.8 megawatt hydro to be supplied to the national grid	172,112
14	Czech Republic: CEA	Energy efficiency measures and renewables through the Czech Energy Agency. 18 sub-projects	500,000
15	Guatemala: El Canada	43 megawatt run-of-river hydroelectric plant in the west coast of Guatemala to displace energy	1,724,407
16	Hungary: Pannonpower	Conversion of Pécs Power plant's existing coal-fired boilers to biomass	1,193,000
17	Indonesia: Indocement Sustainable Cement	Energy efficiency measures in Indocement plants by reducing clinker contents in the produced cement; burning alternative fuels for clinker formation; utilizing heat power power generation in	3,000,000
18	Latvia: Liepaja Solid	Methane capture and utilization from waste management providing electricity to the national grid	387,933
19	Moldova: Soil	Afforestation of 20,000 hectares of degraded and eroded state-owned and communal	1,300,001
20	Philippines: NorthWind	25 megawatt capacity wind farm on a strip of land on the foreshore of Bangui Bay in Ilocos	356,000
21	Poland: Stargard	District heating system to utilize geothermal energy to replace coal in the city of Stargard	240,000
22	Romania: Afforestation	Afforestation of 6,852 hectares of public land	854,985
23	South Africa: Durban	Collection and generation of electricity at two landfill sites. Initial electricity generation of one	700,000
24	Uganda: West Nile	Two 1.75 megawatt hydro to replace a number of diesel generator sets in the West Nile region.	509,946

Prototype Carbon Fund Status

The PCF portfolio consists of 24 transactions worth approximately $181.4 million. The PCF closed its portfolio by signing its last emission reductions purchase agreement for the Brazil Lages Cogen Facility project in January 2007. The project will use wood waste from wood industry activities to generate electricity and steam.

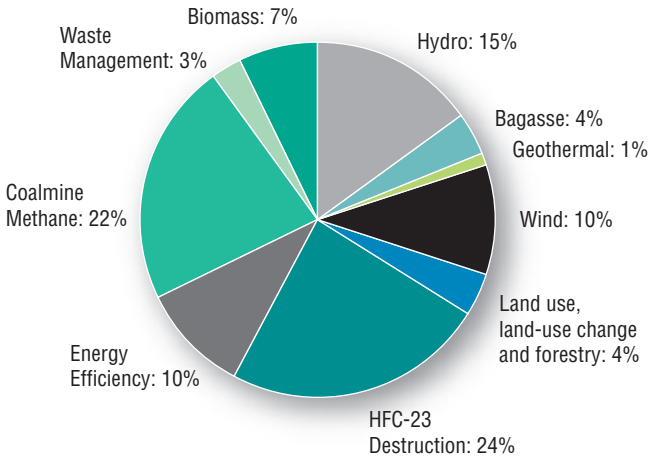
PCF Geographic Distribution*

The PCF sought to diversify its portfolio and succeeded in having projects in the different regions of the developing world and in countries with economies in transition. In terms of value, the East Asia and Pacific region takes the lion's share of the portfolio, accounting for 68% of total portfolio value (as shown in figure below), ahead of the Latin America and the Caribbean region, followed by Europe and Central Asia. Africa represents a smaller share of the PCF portfolio. The picture is different when considering the total number of projects in the portfolio, with the largest share of projects located in the Europe and Central Asia region.



PCF Technology Distribution*

In terms of technology distribution, renewable energy projects—including wind, hydro, geothermal, bagasse and biomass—dominate the portfolio, representing 37% of the PCF's emission reduction purchases. HFC-23 destruction is a substantial source of emission reductions with 24% of the portfolio. Land use, land-use change and forestry (LULUCF) make up about 4% of the portfolio.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement stage.

Community Development Carbon Fund

From the Chair of the CDCF Participants' Committee

The Community Development Carbon Fund, which has been operational since 2003, is a very special fund. Carbon with a human face characterizes the CDCF best. The feature that differentiates it from other funds is the generation of community benefits by the projects from which emission reductions are purchased. The projects are mainly located in small communities in poorer countries. CDCF projects contribute to poverty reduction and help to improve quality of life, for example through clean water or improved health conditions. The CDCF is often the pioneer in countries which have not had access to the international carbon market until now, with the result that additional efforts are often required to set up the projects.

Alexandra Armerstorfer
Austrian Environmental Ministry

The Community Development Carbon Fund: commitment to the poorest

The Community Development Carbon Fund is committed to tackling the CDM related investment gap for smaller projects in poorer countries, particularly in Africa. Indeed, these countries are likely to be bypassed as they lack supportive national CDM approval systems and have significantly higher business costs and risks. Such countries also suffer from an overall lack of investment in the energy, industrial and waste sectors with the result that even the lowest cost carbon mitigation projects have difficulty raising underlying financing.

The CDCF has committed 59% of its funds to buy emission reductions from small-scale projects located in least developed countries and International Development Association (IDA) borrowing countries, the majority of which are located in Sub-Saharan Africa. Four of the most recent emission reductions purchase agreements signed are located in Uganda and Kenya.

More is Better

One of the characteristic features of CDCF is its work on building capacity in communities in order to involve them in the process of bundling small-scale projects that would otherwise not be cost-effective. For example the Biogas Program in Nepal will carry out the installation of 200,000 household biogas plants.

Community Development Carbon Fund Participants

GOVERNMENT OF AUSTRIA
www.ji-cdm-austria.at

REGIONAL GOVERNMENT OF BRUSSELS-CAPITAL
http://www.bruxelles.irisnet.be

GOVERNMENT OF THE WALLOON REGION (BELGIUM)
www.wallonie.be

GOVERNMENT OF CANADA
www.cdm-ji.ca

GOVERNMENT OF DENMARK
www.um.dk

GOVERNMENT OF ITALY
www.minambiente.it

GOVERNMENT OF LUXEMBOURG
www.environnement.public.lu/air_bruit/dossiers

GOVERNMENT OF THE NETHERLANDS
www.cdminfo.nl

GOVERNMENT OF SPAIN
Ministry of Environment:
www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/flexibilidad
Ministry of Economy and Finance:
www.meh.es/Portal/Areas+Tematicas

BASF
www.basf.com

DAIWA SECURITIES SMBC PRINCIPAL INVESTMENTS CO., LTD.
http://www.daiwasmbc.co.jp/english/
http://www.daiwasmbcpi.co.jp/english/index.html

ELECTRICIDADE DE PORTUGAL (EDP)
www.edp.pt

ENDESA
www.endesa.es

FUJIFILM CORPORATION
www.fujifilm.com

GAS NATURAL SDG, SA
www.gasnatural.com

GOTEBORG ENERGI AB
www.goteborgenergi.se

HC ENERGIA
www.hcenergia.com

IDEMITSU KOSAN CO., LTD.
www.idemitsu.co.jp/e/index.html

KFW FÖRDERBANK
www.kfw.de/carbonfund

NIPPON OIL CORPORATION (NOC)
www.eneos.co.jp/english

THE OKINAWA ELECTRIC POWER COMPANY, INC. (OEPC)
www.okiden.co.jp

RAUTARUUKKI OYJ
www.ruukki.com

STATKRAFT CARBON INVEST AS
www.Statkraft.com

STATOILHYDRO ASA
www.statoilhydro.com

SWISS RE
www.swissre.com

Community Development Carbon Fund Status

	Country/ Project Name	Project Description	Community Benefits	CDCF Contract ERs (tCO_2e)
Emission Reductions Purchase Agreements Signed				
1	Argentina: Olavarría Landfill Gas Recovery	Capture methane and carbon dioxide generated at Olavarría municipal landfill and use the methane as a renewable source for supplying electricity to rural villages in the region	A potable water distribution network to connect 80% of the homes and a pilot solar water heating system at the municipal hospital, in Espigas—a rural community located 80 kilometers from Olavarría. Now 80% complete, these projects, will help reduce gastrointestinal disease—a major problem in the community—and will also reduce	the current high energy cost. Initial verification is currently
under way.	131,000	2	Argentina: Salta Landfill Gas Capture	Install gas collection and flaring system for
the landfill site in	the municipality of Salta	Improve the infrastructure and working conditions for separating, classifying, storing and recycling inorganic components of municipal waste before it is land filled.	Currently this work is being done by approximately 100 people working in an informal fashion with no infrastructure or proper equipment.	60,000
3	Bolivia: Urban Wastewater Gas Capture	Cover the anaerobic lagoons of a wastewater treatment facility in Santa Cruz; collect and flare the captured methane gas	The project entity, Cooperativa de Servicios Publicos de Santa Cruz Ltda. (SAGUAPAC), will implement a sewage system in the area in the north of Santa Cruz, home to about 5,000 people. This will substantially improve the public health and therefore the overall standard of living of the community involved.	200,000
4	Colombia: Furatena Energy Efficiency and Rural	Development	Energy efficiency improvements in the collection and processing of "panela" (brown sugar panels) at 120 small, family owned panela manufacturing facilities	(i) Increase the income of small family owned farms
through increases in land productivity and the proceeds from their participation		in the molasses processing plant; (ii) train at least 300 farmers on improved sugar cane production practices; (iii) basic managerial training to 120 small	rural farms; (iv) use of 300 hectares to pilot organic production, (v) implement a land use environmental plan; (vi) plant additional biomass as the plant's main fuel to reach zero emissions in the third year.	60,000
5	Colombia: Rio Frio Waste Water Treatment	Collect methane and nitrous oxide from waste water treatment plant of Rio Frio	Improve biogas capture and effluent treatment. Improve quality of the receiving waters (Rio Frio and Rio Oro Rivers) with positive impacts on the aquatic biota. Social program will address overall	health conditions (including sexually
transmitted diseases and HIV/AIDS), and youth employment.		250,000	6	China: Guangrun Hydropower Development
Construct and operate three hydropower plants with total		capacity of 28 megawatts (10, 10, and eight megawatts) on the Guangrun River	20% of carbon revenue will be earmarked for a county government poverty alleviation fund which will provide increased water supply, upgraded flood control, and water for 1,000	hectares of irrigated farmland.
485,000	7	Georgia: Small Hydro Rehabilitation	15 megawatts additional power through rehabilitation and construction of small hydropower stations	(i) A potable water supply system that will benefit 45 house-

Community Development Carbon Fund Status

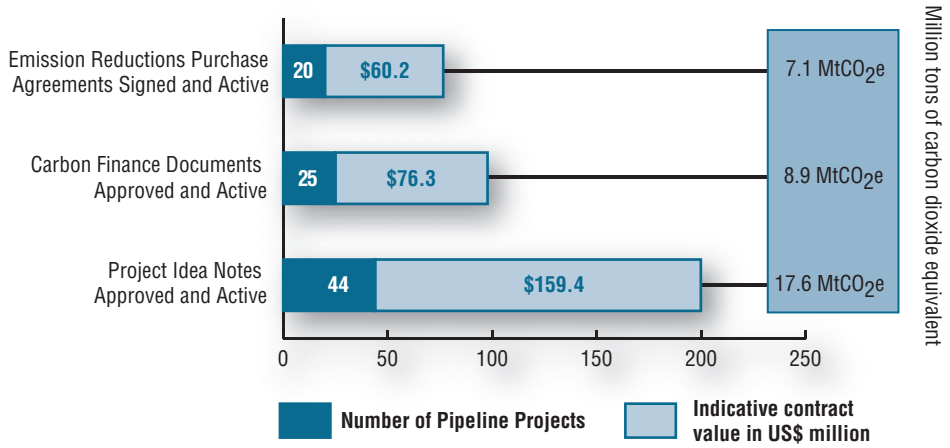
	Country/ Project Name	Project Description	Community Benefits	CDCF Contract ERs (tCO_2e)
Emission Reductions Purchase Agreements Signed				
11	Kenya: Olkaira II Geothermal	Expansion of geothermal plant from 70 megawatts to 105 megawatts by constructing a new unit	Clean water (construction of water lines and storage tanks); educational benefits (construction and equipping of classrooms, administration blocks, and boarding facilities); health benefits (construction and equipping of health centers); livestock improvements (rehabilitation and construction of cattle dips); and improved access to markets and educational and health facilities	(upgrading of rural roads).
90 0,0 00		12	Kenya: Optimization of Kiambere Hydro	Expansion of a hydropow- er station by
up gra din	g the turbines, which would increase the out-	put by 20 megawatts	The community benefit plan is intertwined with the Kenya Olkaria II Geothermal project and the Redevelopment of Tana Power Station through an overarching community benefits scheme.	215,000
13	Kenya: Redevelopment of Tana Power Station	Expansion of a hydropower station by constructing 2 x 4.3 megawatt and 2 x 5.5 megawatt run of river dam	The community benefit plan is intertwined with the Kenya Olkaria II Geothermal and the optimization of Kiambere Hydro through a overarching community benefits scheme.	226,000
14	Moldova: Biomass Heating and Energy Conservation	Improve quality and efficiency in the supply and distribution of heat in almost 150 public buildings in 33 districts	Improved heating service, increased number of days buildings are heated, and a decrease in the per unit cost of heat production. This will have a positive impact on Moldovan forests, which currently supply the fuelwood.	348,502
15	Nepal: Biogas Program	Commercial dissemination of 200,000 additional household biogas plants using animal and human waste in rural Nepal between 2004 and 2009	Improved health conditions by reducing kitchen smoke; reduced drudgery of women and children, and reduced incidence of smoke related diseases. Better sanitation due to construction and connection of latrines to biogas plants; increased enrollment in schools. Creation of about 12,000 jobs for the rural poor.	Reduced firewood consumption saving roughly
2,6 00 kilo gra ms of	firewood per household annu- ally.	1,000,000	16	Nepal: Village Micro-hydro
De vel- op me nt	and installation of micro-hydro power plants ranging from 5 to 500 kilowatts	with a cumulative capacity up to 15 megawatts	Reduction in diesel consumption by replacing diesel power with electric agro-processing mills (the schemes to be financed will largely reduce the drudgery by replacing manual milling by machine grinding, reduce cereal losses and increase yield in the case of oil expellers) and household lighting (142,00 households would benefit).	191,000
17	Nigeria: Aba Cogeneration	Install gas-fired cogeneration system to supply electricity and heat to industrial, commercial and residential customers in Aba. Project will also	capture carbon dioxide from the system and sell it to nearby breweries	Reliable elec- tricity includ- ing installa- tion of street
ligh ting .	Construction of a new one kilome- ter asphalt	access road starting from the State Government Housing Estate to the local community road behind the	power plant. Construction of a Clinic/Health Centre that will be staffed with one medical doctor and one senior nurse on the GPAL payroll. A Nursery and Primary School for up to 200 stu-	dents will be constructed.

Community Development Carbon Fund Status

During the past year CDCF continued to place its emphasis on small projects in poor countries and the poor areas of developing countries. With almost 50% of its initial capitalization of $128.6 million committed, CDCF has been able to focus on supporting projects with an emission reductions production range that goes from 40,000 tons of carbon dioxide equivalent, up to more than one million tons. Twenty emission reductions purchase agreements have been signed so far, with an additional 24 projects in the CDCF pipeline, out of which five are at the carbon finance document stage.

CDCF Project Status

(cumulative)

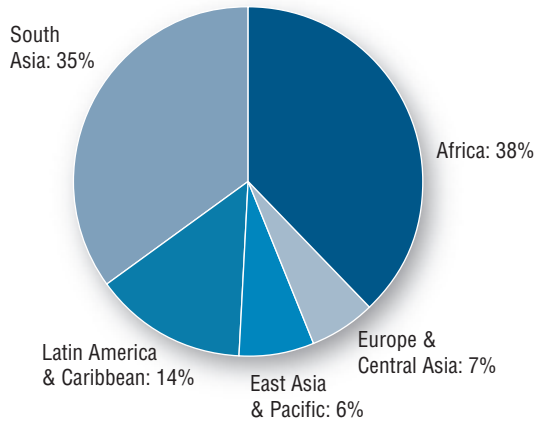


Note: The above figures exclude options purchases.

Community Development Carbon Fund Status

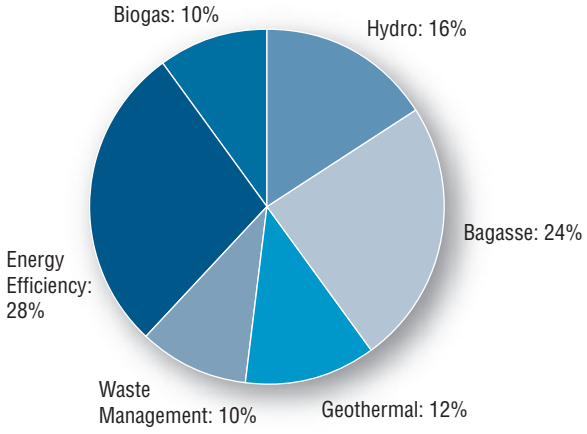
CDCF Geographic Distribution*

CDCF has proved to be very successful in fulfilling one of its key mandates, to commit a minimum of 25% of value of emission reductions purchase agreements in priority countries. These are defined as International Development Association (IDA) and IDA blend countries, as well as countries designated as least developed countries by the United Nations. Currently, 59% of the value of the emission reductions purchase agreements is committed to projects located in priority countries, out of which almost half are in Sub-Saharan Africa priority countries. In addition, it is worthwhile to mention that in the current CDCF portfolio, which covers five regions of the World Bank, Africa is in the lead. This is a stark difference from the worldwide average of 1.5% of certified emission reductions going to low and lower-middle income African countries.



CDCF Technology Distribution*

The range of technologies on which CDCF has focused its attention is bringing important social benefits to communities all around the world. One of the most interesting examples is the Biogas Program in Nepal, which aims to develop biogas as a commercially viable, market-oriented industry in Nepal by bringing fuel for cooking and lighting to rural households. In the same manner, energy efficiency projects, such as the VSBK and the FaL-G projects in India have introduced innovative technologies that reduce energy consumption in the production of bricks—in some cases even fully replacing the use of coal and firewood.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement and carbon finance document stage.

BioCarbon Fund

From the Chair of the BioCF Participants' Committee

The BioCarbon Fund may represent a small market volume of carbon dioxide equivalent but its role is a determinant in paving the way towards growing portfolios of project-based bio-carbon sequestration. The BioCF has been particularly instrumental in developing new carbon-measuring methodologies and making them relatively easy to use. It has also opened new frontiers for carbon assets which are not yet recognized under the Kyoto Protocol, particularly soil carbon sequestration and avoided deforestation. Thanks to public and private investors, the BioCF now has a new tranche to pursue and to expand its pioneering role.

François Falloux
Eco-Carbone

What is the BioCarbon Fund?

The BioCarbon Fund fosters the role of land use, land-use change and forestry (LULUCF) in the carbon market and CDM to extend the benefits of the carbon market to the rural, poorest areas, and to the local environment. The first tranche closed in August 2005, but the demand by participants and project developers has been such that a second tranche of the BioCarbon Fund became operational in March 2007.

The BioCarbon Fund targets projects that conserve or sequester greenhouse gases in forests and agro-ecosystems to mitigate climate change. These projects also represent an opportunity for the BioCarbon Fund to develop clear and robust methodologies for carbon sequestration calculations and to address outstanding issues regarding permanence of the project providing the carbon emission reductions and the crediting of biological carbon. It focuses on learning-by-doing, to build up substantial experience as the rules regarding eligibility of land-use activities are further developed.

Both tranches of the BioCF offer participants the opportunity to purchase emission reductions in either the voluntary carbon market or to purchase Kyoto compliant emission reductions.

BioCarbon Fund Tranche 1 Participants

GOVERNMENT OF CANADA
www.cdm-ji.ca

GOVERNMENT OF ITALY
www.minambiente.it

GOVERNMENT OF LUXEMBOURG
www.environnement.public.lu/air_bruit/dossiers

GOVERNMENT OF SPAIN
Ministry of Environment:
www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/flexibilidad
Ministry of Economy and Finance:
www.meh.es/Portal/Areas+Tematicas

AGENCE FRANCAISE DE DEVELOPPEMENT
www.afd.fr

ECO-CARBONE
www.eco-carbone.com

IDEMITSU KOSAN CO., LTD.
www.idemitsu.co.jp/e/index.html

JAPAN IRON & STEEL FEDERATION (JISF)
www.jisf.or.jp/en/index.html

JAPAN PETROLEUM EXPLORATION CO., LTD.
www.japex.co.jp/english/index.html

THE OKINAWA ELECTRONIC POWER COMPANY, INC. (OEPC)
www.okiden.co.jp

SUMITOMO CHEMICALS CO., LTD.
www.sumitomo-chem.co.jp/english/index.html

SUMITOMO JOINT ELECTRIC POWER CO., LTD.
www.sumikyo.co.jp

SUNTORY
www.suntory.com

TOKYO ELECTRIC POWER COMPANY (TEPCO)
www.tepco.co.jp/en/index-e.html

BioCarbon Fund Tranche 1 Status

	Country/	Project Name	Project Description	Main Environmental Benefits	BioCF Contract ERs (thousand tCO_2e) Main	Social
Emission Reductions Purchase Agreements Signed (Tranche One)						
	1	Albania: Assisted Natural Regeneration	Afforest/Reforest about 5,700 hectares of highly degraded communal forest and pastureland and develop a multi-functional broadleaf and mixed broadleaf high forest of	native species	Creation of habitat for native flora	and fauna; enrichment of species diversity;
reduced soi	l erosion; and reduced siltation of watercourses, increasing	water quality.	Provision of short- and mid-term employment; stimulation of the local industry; reduced maintenance costs of irrigation and drainage infrastructure; and	creation of a sustainable source of timber and non-timber products.	230	
2	China: Pearl River Watershed Management	Reforest around 4,000 hectares of shrub/grassland in the Guangxi Zhuang Region, also act as a demonstration of watershed management	Creation of biodiversity corridors; reduced soil erosion; and improved regulation of hydrological flows leading to reduced flooding and drought	risks.	Provision of employment to local	farmers and communities; creation
of a source of	timber and non-timber products; and increased sustainability of the sources of	livelihood.	460		3	Colombia: San Nicolás Agroforestry
Afforest and refor	est 2,500 hectares of abandoned pasture and avoid deforestation and induce	regeneration of 7,300 hectares in the department of Antioquia	Creation of natural habitat and corridors for the conservation of biodiversity; and sustainable watershed management.	Creation of direct employment for the local communities; increased food supply and safety; and training of the communities in sustainable silvopastoral systems management.	120	80
4	Colombia: Caribbean Savannah	Pilot carbon sinks through silvopastoral and reforestation systems, to arrest land degradation in 2,200 hectares in the coastal plains of Colombia	Enhance the productivity and natural resource base of degraded lands; increased habitat for biodiversity; rehabilitated local ecosystems; reduced soil erosion; and improved moisture retention.	Employment to local populations; creation of additional sustainable sources of income from wood harvesting; improved productivity of cattle raising activities; and training of farmers in sustainable silvopastoral systems management.	250	
5	Costa Rica: Coopeagri Forestry	Extend the scope of national Program of Payments for Environmental Services through agroforestry, reforestation through natural	regeneration, and commercial reforestation in 4,140 hectares of degraded land	Creation of natural habitat for biodiversity protection; increased water retention and regulation of hydrological flows; and reduced land erosion.	Creation of direct employment for local	communities; directly increased
income from	Payment for Environmental Services; creation of additional sources of	income from forest production activities and agroforestry; and training of farmers in sustainable practices.	560		6	Honduras: Pico Bonito Forestry

BioCarbon Fund Tranche 1 Status

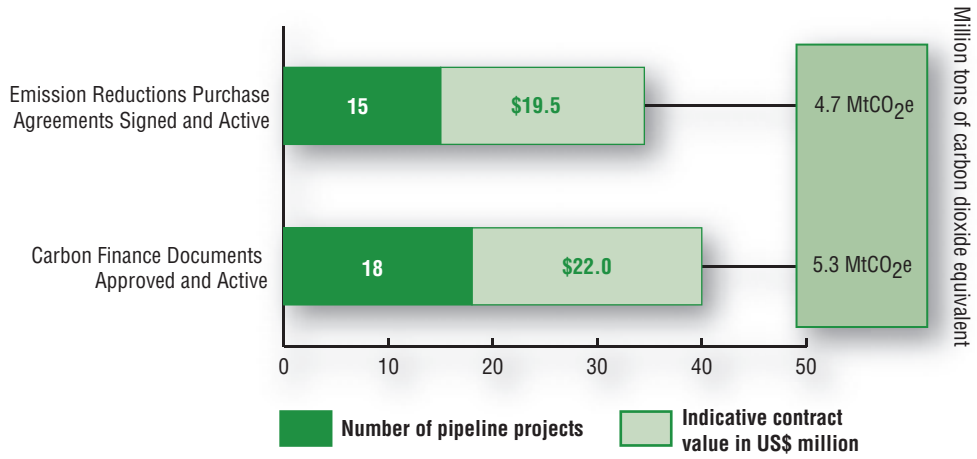
	Country/	Project Name	Project Description	Main Environmental Benefits	BioCF Contract ERs (thousand tCO_2e) Main	Social
Emission Reductions Purchase Agreements Signed (Tranche One)						
	9	Madagascar: Andasibe-Mantadia Biodiversity Corridor	Restoring forest corridors linking fragmented habitats between conservation units in east-central Madagascar. The project will also establish sustainable forest and fruit gardens and pilot avoided deforestation activities	Creation of biodiversity corridors; increased viability of native species; restoration of degraded soils and lands, and stabilized hydrological flows.	Creation of employ ment for agrofore stry manage	ment and other project activities ; creation
of ad diti on	al sources of income from sale of timber and non-timber	products; and increased ecotourism from landscape rehabilitation.	200	600	10	Mali: Acacia Plantatio n
De vel op 10 ,0	00 hectares of degraded natural dry forest into Acacia	plantations, intercropped with cultivated species, for agro-forestry	Increased natural habitat; restored ecosystems; soil regeneration and fertilization; raised water table; reduced erosion; and wind and sun protection.	Creation of employment for the project implementation; training of employees on job-specific subjects and social subjects, and additional revenues generated by Arabic gum, grains and forage.	190	
11	Moldova: Soil Conservation	Afforest/Reforest around 20,000 hectares of degraded and eroded state-owned and communal agricultural lands spread over throughout the country	Restoration of habitats to increase native biodiversity; reduction of water and wind; improved hydrological regime.	Creation of local employment for the project implementation; creation of additional sources of income from sale of timber and non-timber products; and prevention of future land degradation.	600	
12	Nicaragua: Precious Woods	This small-scale project consists of reforestation in 1,500 hectares of degraded pasture land of two former cattle ranches in Southwestern Nicaragua with teak and valuable native wood species	Restoration of ecological forest functions such as prevention of erosion, groundwater protection, soil regeneration, improvement of the microclimate and water balance.	The project will provide some employment for seasonal tasks such as planting, weeding, pruning and thinning, and harvesting.	170	
13	Niger: Acacia Community Plantations	Develop up to 17,700 hectares of Acacia plantations on degraded land, mostly managed by local communities, to promote sustainable agroforestry. The project will also re-introduce	agricultural activities through intercropping with groundnuts and cowpeas	Soil regeneration and erosion control; increased natural habitat for native species; water table raise; dune fixing; wind and sun protection; rehabilitation of degraded land, and increase in soil fertility through nitrogen fixing.	Creation of employ ment for the establis hment	of plantatio ns and Arabic gum producti on;
inc re as ed inc o	me from Arabic gum sale; production of fuelwood and animal forage; and training of	communities in sustainable intercropping and plantation management.	500		14	Philippin es: Watersh ed Rehabilit ation

BioCarbon Fund Tranche 1 Status

Tranche 1 Project Status

Tranche 1 closed with contributions of $53.8 million from 14 governments and companies. The first tranche consists of 18 afforestation/reforestation transactions at an advanced stage of preparation, 15 of which have a signed emission reductions purchase agreement. Carbon finance for these projects totals around $22 million, generating 5.3 million tons of carbon dioxide equivalent in emission reductions. Three of these projects are piloting avoided deforestation activities in Colombia, Honduras and Madagascar.

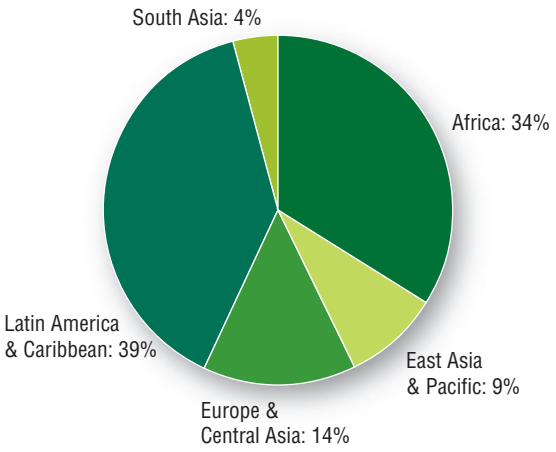
BioCF Project Status
(cumulative)



Note: The above figures exclude options purchases.

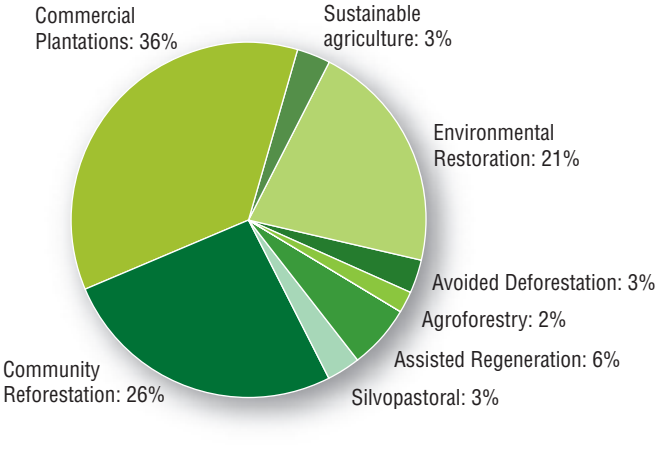
BioCF Geographic Distribution (Tranche 1)*

The BioCF portfolio is distributed throughout the world. An important feature is that about 34% of assets support projects in Sub-Saharan Africa. This region represents two percent of the global carbon market, thus the BioCF is helping to extend the benefits of the carbon market to rural, less affluent communities. Latin America and the Caribbean together occupy another 39% of the portfolio.



BioCF Technology Distribution (Tranche 1)*

Most BioCF projects deal with afforestation and reforestation, which make up roughly 97% of the portfolio. These activities increase habitat size through forest regeneration and promote sustainable use of forest resources through agro-forestry, such as intercropping trees with traditional crops, commercial plantations and community reforestation. The remainder of the portfolio (3%) is dedicated to avoided deforestation.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement and carbon finance document stage.

BioCarbon Fund Tranche 2 Status

Tranche 2 Project Status

Given the enormous interest on the part of developing countries to restore ecosystems and produce a global environmental service, namely climate change mitigation, the World Bank, acting as Trustee, opened Tranche 2 of the BioCarbon Fund to mobilize additional resources for approximately 15 to 20 more projects. Both private and public sector organizations are participants in Tranche 2.

Tranche 2 will support ecosystem restoration projects that sequester or conserve carbon in forest and agro-ecosystems and have a strong emphasis on poverty reduction and socio-economic development (improvements in rural livelihoods). Just as in Tranche 1, projects will have to be designed so that local communities benefit directly and/or indirectly, and payments for carbon sequestration will be subject to independent verification and certification of the community benefits.

Tranche 2 offers a menu of opportunities for participants to gain emission reduction certificates from forest and land management activities.

The emission reduction certificates will be either Kyoto-compatible or in the case of non-Kyoto eligible activities, will result in verified emission reductions.

Tranche 2 will pioneer avoided deforestation activities and carbon sequestration in soil.

BioCarbon Fund Tranche 2 Participants

DEPARTMENT OF THE ENVIRONMENT, HERITAGE AND LOCAL GOVERNMENT, IRELAND
www.environ.ie/en/Environment/Atmosphere/ClimateChange

GOVERNMENT OF SPAIN
Ministry of Environment:
www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/flexibilidad
Ministry of Economy and Finance:
www.meh.es/Portal/Areas+Tematicas

CONSENSUS BUSINESS GROUP
www.consensusbusiness.com

NATSOURCE ASSET MANAGEMENT LLC
www.natsource.com

SYNGENTA FOUNDATION FOR SUSTAINABLE AGRICULTURE
www.syngentafoundation.org

ZEROEMISSIONS
www.zeroemissions.com

Netherlands CDM Facility (NCDMF)

From the Ministry of Housing, Spatial Planning and the Environment (VROM)

The Netherlands has been constructively active in climate change negotiations for more than 20 years. It is the first country to have earmarked public funding for the purchase of carbon dioxide reductions. The Netherlands is committed to reducing its greenhouse gas emissions.

An important part (38 million tons) will be arranged by the International Bank for Reconstruction and Development (IBRD, the World Bank), through the Netherlands CDM Facility, established in 2002, and extended several times since then. CDM projects are supposed to deliver credits, but—equally important—also contribute to sustainable development in the countries concerned.

The main reasons for cooperation with the World Bank are its effective approach towards the carbon market and its access to and experience in developing countries. The CDM market is maturing with increasing influence by the private sector. The challenge for the World Bank is to continue to stay in the front row. We are confident that the World Bank will succeed.

Lex de Jonge
Head of CDM Division
Ministry of Housing, Spatial Planning
and the Environment (VROM)

Netherlands CDM Facility Participant

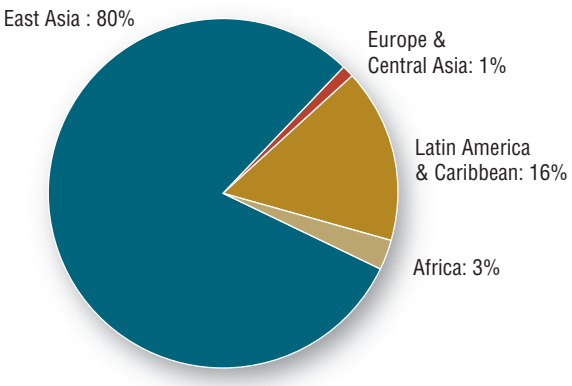
MINISTRY OF HOUSING, SPATIAL PLANNING
AND THE ENVIRONMENT (VROM)
www.cdminfo.nl

Netherlands CDM Facility Status

The NCDMF portfolio is spread across several regions, including Africa, Asia, Europe and Central Asia and Latin America. The facility has purchased emission reductions both from heavy greenhouse gas mitigation projects (including HFC-23 destruction, coal mine methane capture and landfill gas capture) as well as from projects improving energy efficiency and renewable energy generation (wind and hydropower). In volume terms, both the geographic and technological distributions are skewed by large projects, which tend to be in China and in industrial gases. However, in terms of the number of projects, renewable energy and projects in Latin America and South East Asia dominate. This portfolio diversity helps to promote the full potential of the CDM, while ensuring delivery of emission reductions to VROM.

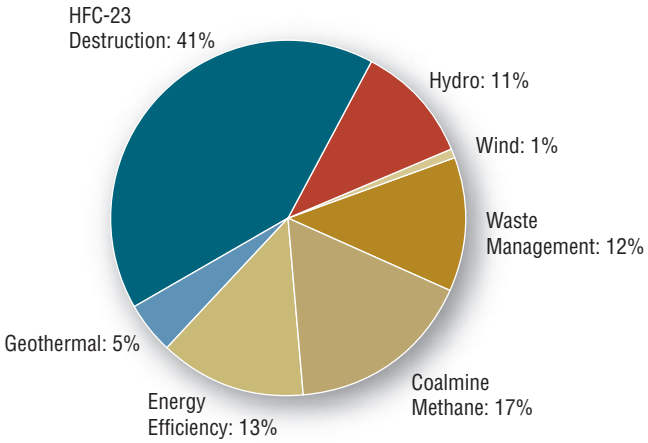
NCDMF Geographic Distribution*

In volume terms, the portfolio is skewed towards the East Asia and Pacific region (80%) due to a few larger projects in China. Indonesia and the Philippines together make up 9%. Latin America has a large number of relatively small projects, which together make up 16% of the portfolio. Africa has 3% and Europe and Central Asia 1%. This geographic distribution should become further diversified as the additional pipeline projects are added to the portfolio.



NCDMF Technology Distribution*

The requirement to purchase emission reductions only through 2012 has impacted the technical composition of the NCDMF portfolio, with a greater emphasis than originally planned on mitigation of heavy greenhouse gases—industrial gases (41%), coal mine methane capture (17%) and landfill gas capture (12%). A large number of smaller renewable energy projects (hydropower, wind and geothermal) together make up 16%, while energy efficiency projects collectively amount to 13% of the total active portfolio.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement and carbon finance document stage.

Netherlands European Carbon Facility

NECF

From The Ministry Of Economic Affairs

The Dutch Government has played a pioneering role in the creation of an international market for carbon credits. Since 2000, the Ministry of Economic Affairs has been active in implementing Joint Implementation in Eastern European countries. Together with the World Bank, the Netherlands has developed procedures and guidelines for Joint Implementation, and has been involved in institution building in Eastern European countries.

In August 2004, the Ministry of Economic Affairs agreed with the World Bank Group to develop JI projects for the Netherlands. The Ministry of Economic Affairs is confident that with the assistance of the World Bank Group it will be able to fulfill its commitment towards Joint Implementation with the Eastern European countries.

Pieter Boot
Deputy Director General of Energy
Ministry of Economic Affairs, the Netherlands

Netherlands European Carbon Facility Participant

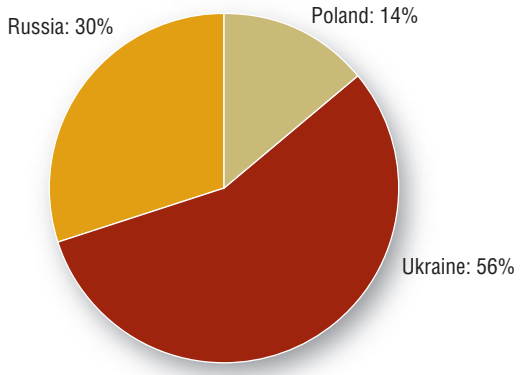
MINISTRY OF ECONOMIC AFFAIRS,
THE NETHERLANDS
www.ez.nl

Netherlands European Carbon Facility Status

The Netherlands European Carbon Facility is managed under one agreement by both the World Bank and the International Finance Corporation (IFC). In this report, only the World Bank component of the portfolio is shown.

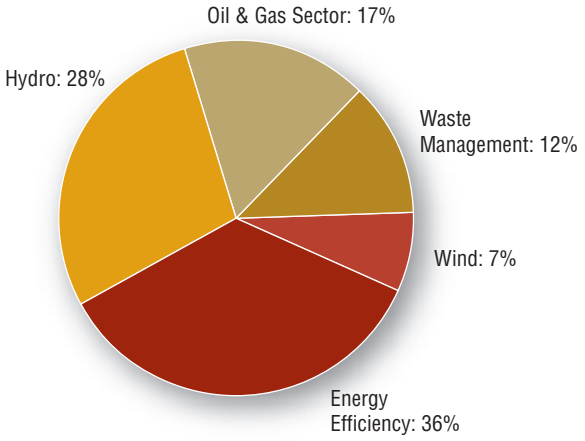
NECF Geographic Distribution*

As Joint Implementation projects are in practice located in countries with economies in transition, all projects are located in Eastern Europe. The active portfolio of the NECF is mostly in Ukraine (56%), followed by Russia (30%) and Poland (14%).



NECF Technology Distribution*

From a technological perspective, the composition of the NECF portfolio is more diversified than previous years. Renewable energy projects and industrial (supply-side) energy efficiency projects now dominate, followed by associated gas for electricity generation and waste management.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement and carbon finance document stage.

Ukraine UkrHydroEnergo Hydro Rehabilitation project

Italian Carbon Fund

From the Italian Government

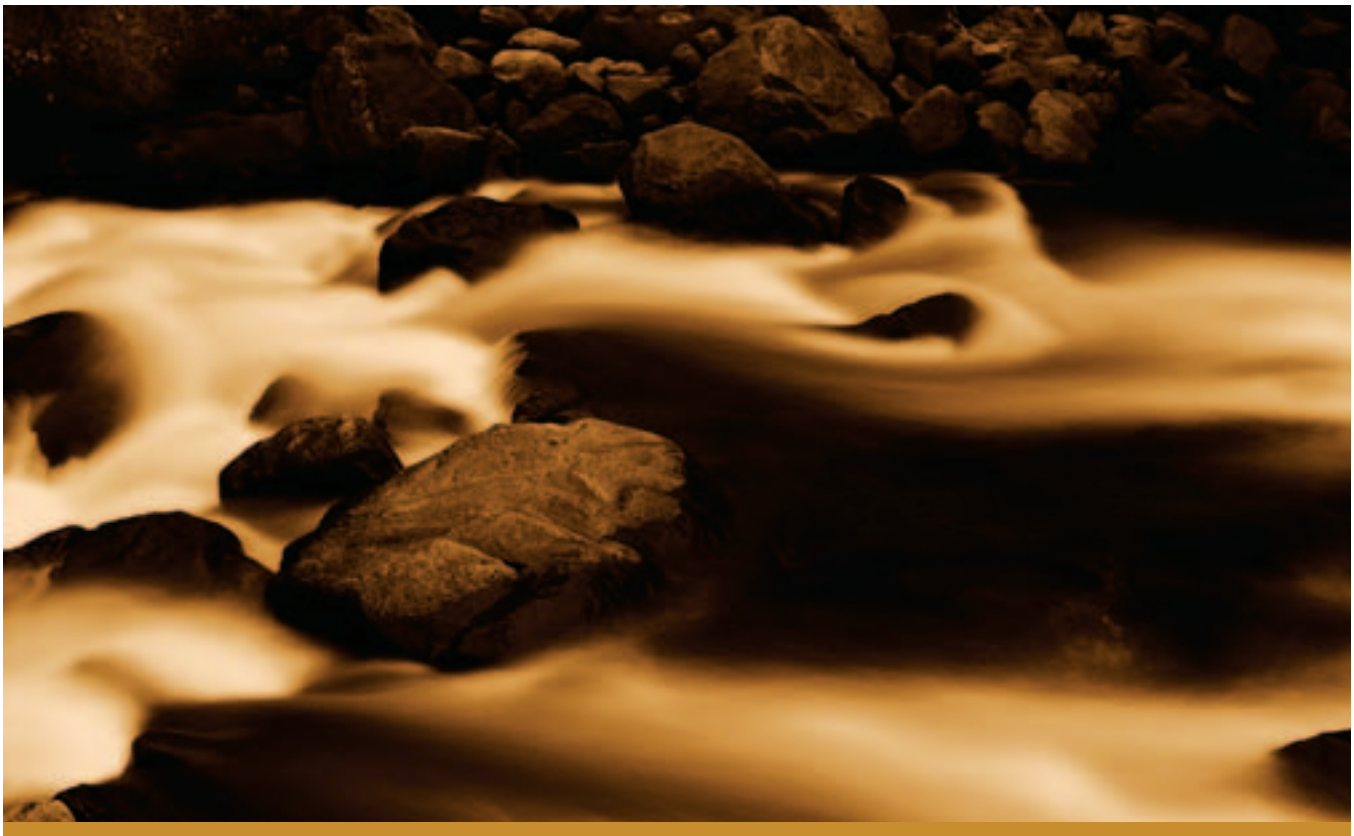
The sustainable management of natural and energy resources should be the goal and aspiration of international and European communities in the coming decades at the local, national and international level.

The Italian Carbon Fund (ICF) has achieved the goals of its mission by creating a diversified project pipeline that pays attention to greenhouse gas emission reductions, as well as to sustainable development and poverty eradication worldwide.

Italy and other countries in the European Union, will have to bear high costs to further upgrade energy efficiency. Therefore, carbon finance will play an important role in the effective achievement of the Italian targets up to and beyond 2012. We see the ICF becoming a role model for how to develop a strategic partnership with the private sector for financing and investment mechanisms that integrate environmental considerations.

Regardless of the fast growing and challenging carbon market, we are grateful to the World Bank and the ICF members and believe that there are clear benefits in taking forward the ICF work in such a collaborative and fruitful manner.

Corrado Clini
Director General
Italian Ministry for the Environment, Land and Sea



Italian Carbon Fund Participants

ITALIAN MINISTRY FOR THE ENVIRONMENT LAND AND SEA
www.minambiente.it

ERG S.P.A.
www.erg.it

CEMENTERIE ALDO BARBETTI S.P.A.
www.barbetti.it

IRIDE MERCATO S.P.A.
www.iride-mercato.it

ENDESA ITALIA S.P.A.
www.endesa.it

ITALCEMENTI GROUP
www.italcementigroup.com

ENEL TRADE S.P.A.
www.enel.it

Italian Carbon Fund Status

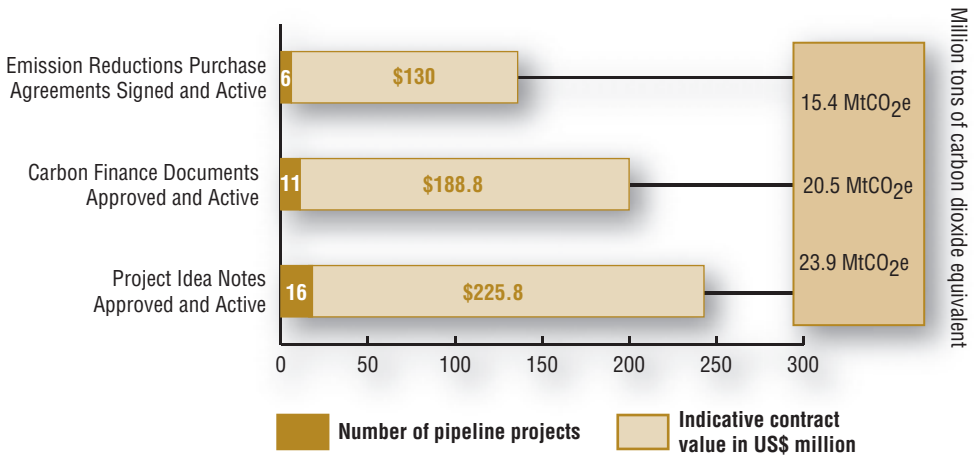
	Country/Project Name	Project Description	ICF Contract ERs
Emission Reductions Purchase Agreements			
1	China: HFC-23 Destruction (co-purchase)	Installation of an incineration facility to decompose HFC-23 generated by the existing HCFC22 manufacturing facility into carbon dioxide and hydrogen fluoride	6,000,000
2	China: Nanjing Steel Converter Gas Recovery	Recover the converter gas produced by the converters of the Nanjing Iron & Steel Co., Ltd. (NISCO) in the steel production process and utilize the gas for electricity generation. This will partially meet the company's power needs for its daily production, replacing some grid electricity and reducing carbon dioxide emissions	1,293,495
3	China: Yunnan Whitewaters Hydropower Development	Build three run-of-river hydro power stations on the Baishuijiang River with an installed capacity of 78 megawatts	2,200,000
4	India: Allain Duhangan Hydro 192 megawatts	192 megawatt run-of-river hydro power plant in the lower reaches of Allain and Duhangan rivers	2,820,250
5	Tunisia: Gas Recovery and Flaring for Nine Landfills	Install gas recovery and flaring systems in Cell 1 of nine landfills distributed throughout Tunisia	1,120,000
6	Tunisia: Jebel Chakir Landfill Gas Recovery and Flaring	Install gas recovery and flaring systems in Cell 1-5 of the Jebel Chakir Landfill, which receives all of the waste from the capital, Tunis	1,930,000

Italian Carbon Fund Status

As of the end of August 2007, the Italian Carbon Fund had signed five emission reductions purchase agreements and participated in the China HFC-23 investment for a total of 15.4 million tons of carbon dioxide equivalent. Five additional projects have an active carbon finance document representing a further 5.1 million tons of carbon dioxide equivalent. Five projects have already signed letters of intent, which is the step prior to negotiating the terms of the emission reductions purchase agreement. These are the Shandong Waste & Wastewater Umbrella Project, the Shanghai Laogang Landfill Gas Project and the Shanghai Bailonggang Sludge Treatment Project, all in China, the Loma de Los Cocos Landfill Gas Project in Colombia and the CTSAV Bagasse Cogeneration Project in Mauritius. The ICF has 16 project idea notes representing an emission reduction potential of 23.9 million tons of carbon dioxide equivalent. The ICF, as a means to increase diversification, has included a project from JI in the portfolio.

Italian Carbon Fund Project Status

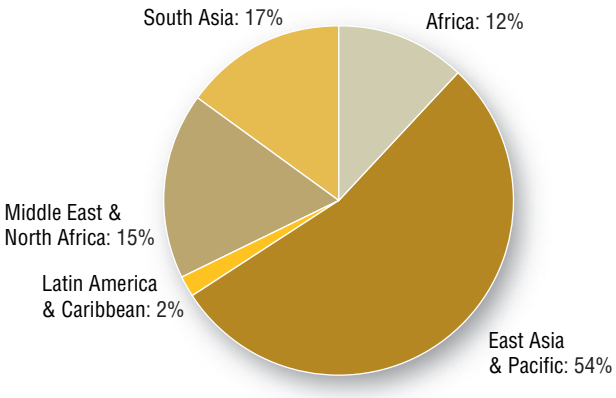
(cumulative)



Note: The above figures exclude options purchases.

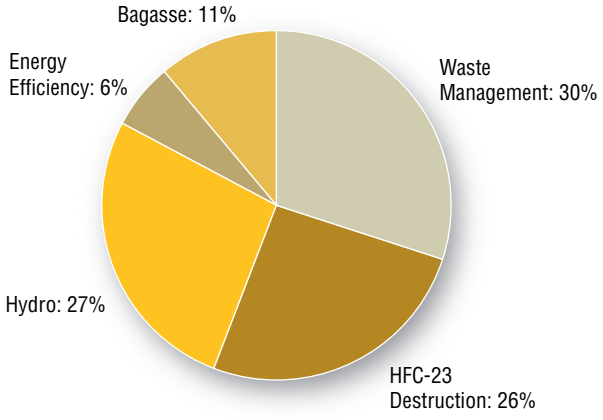
ICF Geographic Distribution*

The ICF portfolio, which includes the projects at purchase agreement or carbon finance document stage, is mainly dominated by the East Asia and Pacific region (54%), followed by the South Asia region (17%) and the Middle East and North Africa region (15%). Africa and Latin America and the Caribbean regions represent a further 14% of the portfolio.



ICF Technological Distribution*

The ICF portfolio covers a wide range of technologies including HFC-23 destruction, waste management, energy efficiency and hydropower. The ICF portfolio is relatively well balanced. Waste management holds the lead (30%) followed by hydropower (27%) and HFC-23 (26%). Energy efficiency and bagasse represent a further 17% of the portfolio.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement and carbon finance document stage.

Waste Management

There are currently 498 waste management projects in the carbon market that are expected to deliver about 297 million tons of certified emission reductions by 2012.

Danish Carbon Fund

From the DCF Chair

The Danish Carbon Fund was formed in 2005 and consists of representatives of Danish industry together with the Ministry of Environment and the Ministry of Foreign Affairs. The DCF is an important effort to reach Denmark's emission reduction targets. I am pleased that the DCF portfolio is progressing and hopefully all funds will be committed during 2007.

Frank Rasmussen
Dong Energy

A Public-Private Partnership

Two public sector participants, the Ministry of Foreign Affairs of Denmark and the Ministry of the Environment of Denmark, and DONG Energy, a private sector participant, established an agreement with the World Bank in 2005 to create the Danish Carbon Fund. Later, three additional private sector participants (Aalborg Portland, Nordjysk Elhandel, and Maersk Olie og Gas) joined. The present value of the Fund is $75.4 million.

Danish Carbon Participants

MINISTRY OF FOREIGN AFFAIRS
www.um.dk

MINISTRY OF THE ENVIRONMENT OF DENMARK
www.danishcarbon.dk

AALBORG PORTLAND A/S
www.aalborg-portland.dk

DONG ENERGY
www.dongenergy.com

MAERSK OLIE OG GAS A/S
www.maerskoil.com

NORDJYSK ELHANDEL A/S
www.nordjysk-elhandel.dk

Danish Carbon Fund Status

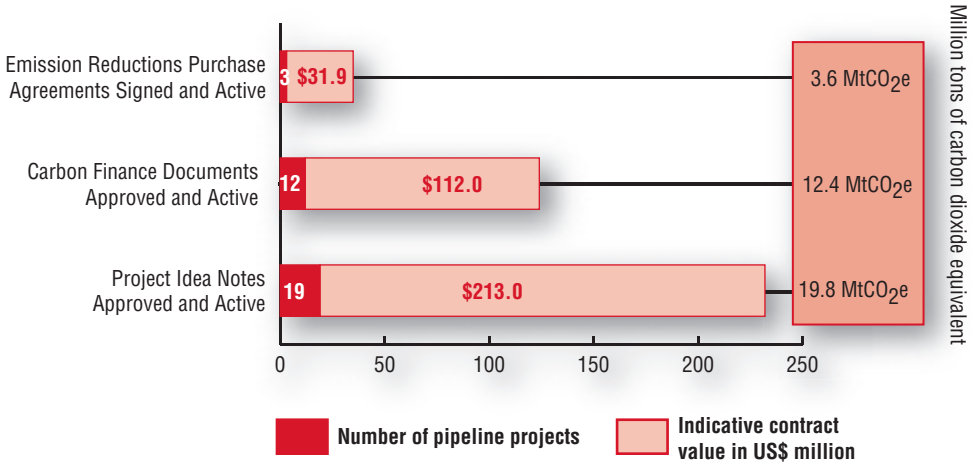
	Country/Project Name	Project Description
		Emission Reductions Purchase Agreements
1	China: HFC-23 Destruction	Installation of an incineration facility to decompose HFC-23 generated by the existing HCFC 22 manufacturing facility into carbon dioxide and hydrogen fluoride
2	Mexico: Umbrella Waste Management	Captured landfill gas will be flared and used in power generation, thereby reducing methane emissions
3		Nigeria: Reducing SF_6 Emissions in High-Voltage Transmission Systems

The Danish Carbon Fund became operational in January 2005, and is well on its way to meet its target of committing all its capital in 2007. As of August 31, 2007, the DCF portfolio consisted of three projects for which emission reductions purchase agreements had been signed, including the DCF's participation in the World Bank's Umbrella Carbon Facility. A fourth purchase agreement was signed in September, after the cut-off date for this report. Taking into account the risks involved in developing and delivering carbon finance projects, the DCF has a large and healthy pipeline compared to what is needed to fill the portfolio, with another nine projects at carbon finance document stage and seven more at the early development project idea note stage.

Danish Carbon Fund Status

Danish Carbon Fund Project Status

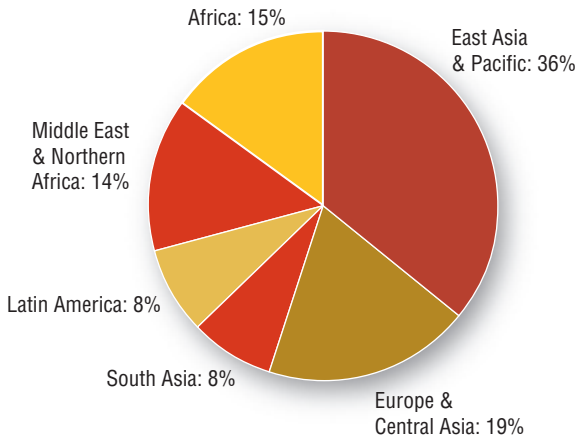
(cumulative)



Note: The above figures exclude options purchases.

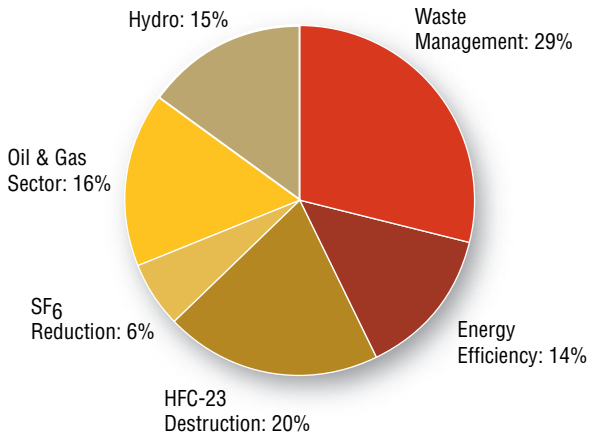
DCF Geographic Distribution*

The Danish Carbon Fund is positively contributing to broadening the coverage of the CDM and complementing the private market by having two of its four signed emission reductions purchase agreements from Africa and the remaining two in China and Mexico. At least one agreement will be signed in Eastern Europe or Central Asia, to comply with the minimum requirement of 11.4% being sourced from that region. The chart below covers emission reductions purchase agreement and carbon finance document stage projects.



DCF Technology Distribution*

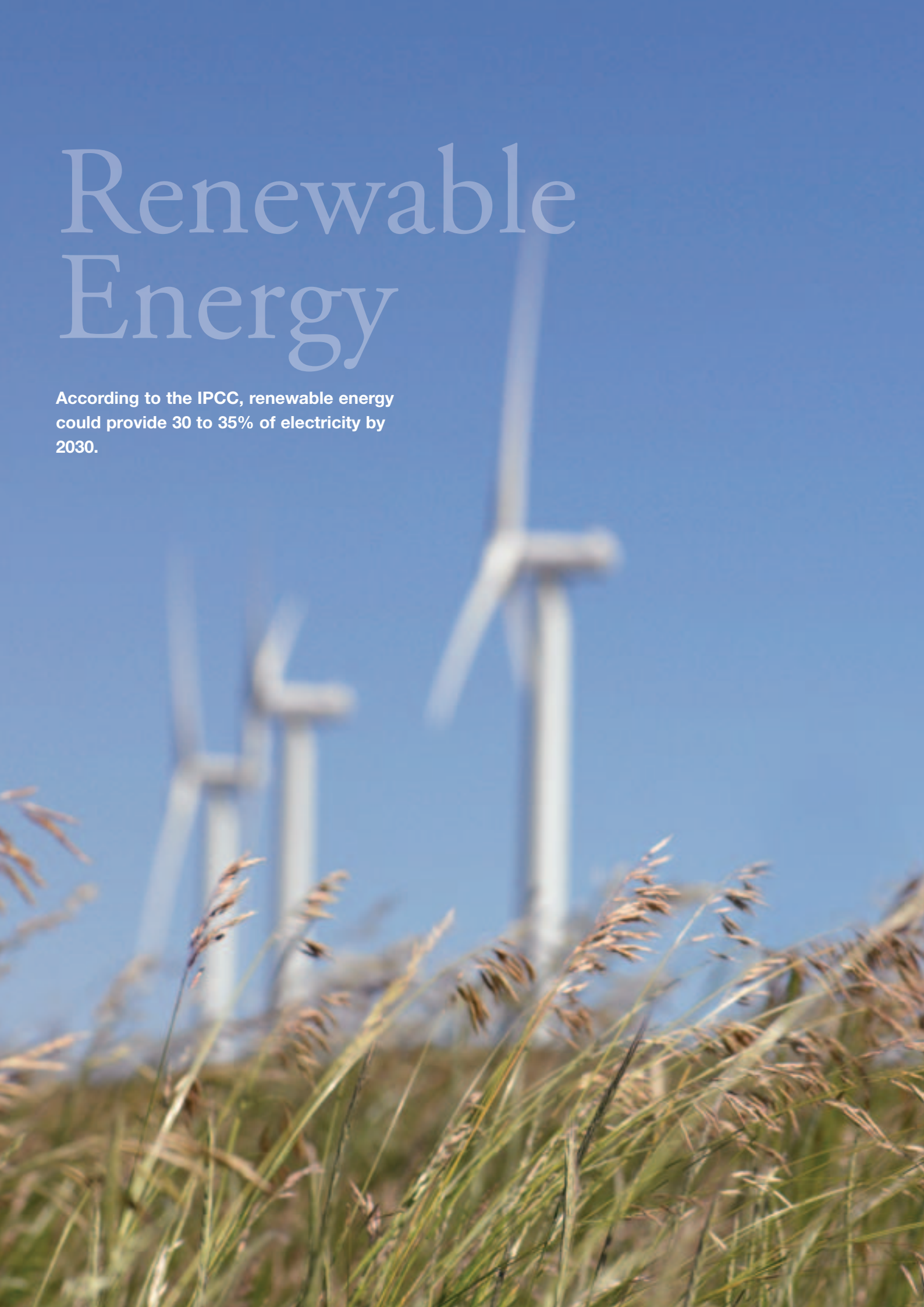
The DCF is also seeking technological diversification in its portfolio. Of the most advanced projects in the portfolio, waste management has the largest share with nearly a third, followed by supply-side energy efficiency, oil and gas sector, HFC-23 destruction, renewable energy and SF_6 reduction.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement and carbon finance document stage.

Renewable Energy

According to the IPCC, renewable energy could provide 30 to 35% of electricity by 2030.



Spanish Carbon Fund

From the Government of Spain

The Spanish Carbon Fund (SCF) represents, up to now, the most ambitious initiative carried out by the Spanish Government to promote low-carbon development through the Kyoto Protocol's project-based mechanisms.

Since it was launched, the SCF has successfully fulfilled its task of encouraging the development of projects that promote energy efficiency and renewable energies, and of those paying special attention to the Latin American region.

This last year has meant, without a doubt, the consolidation of the Spanish Carbon Fund. The Fund has reinforced its presence in the carbon markets, channeling the Spanish participation in a wide range of projects. From a geographical point of view, although the Latin American region is still the most represented in the SCF portfolio, the fund has also expanded its activities to other regions such as northern Africa and Asia.

Furthermore, in 2007 the Spanish Carbon Fund included several Joint Implementation projects in its portfolio.

In 2007 participants have shown their interest to jointly explore the possibilities of a scaled-up CDM. In this regard, the Spanish Carbon Fund could be an important tool to promote programmatic CDM activities in the coming years.

Teresa Ribera Rodriguez
General Director, Bureau for Climate Change
Ministry of Environment

Spanish Carbon Fund Participants

GOVERNMENT OF SPAIN
Ministry of Environment:
www.mma.es/portal/secciones/cambio_climatico/areas_tematicas/flexibilidad
Ministry of Economy and Finance:
www.meh.es/Portal/Areas+Tematicas

ABENGOA
www.abengoa.com

AZULIBER 1, S.L.
www.azuliber.com

CEMENTOS PORTLAND VALDERRIVAS
www.valderrivas.es

CEPSA
www.cepsa.com

ENDESA
www.endesa.es

ENEL VIESGO
www.viesgo.es

GAS NATURAL SDG, SA
www.gasnatural.com

HC ENERGIA
www.hcenergia.com

IBERDROLA
www.iberdrola.es

OFICEMEN
www.oficemen.com

REPSOL YPF
www.repsolypf.com

UNION FENOSA
www.unionfenosa.es

The Uruguay Montevideo Landfill Gas Recovery Project will capture methane generated through organic matter disposed of in the landfill. The Spanish Carbon Fund purchased one million tons of carbon dioxide equivalent from the project.

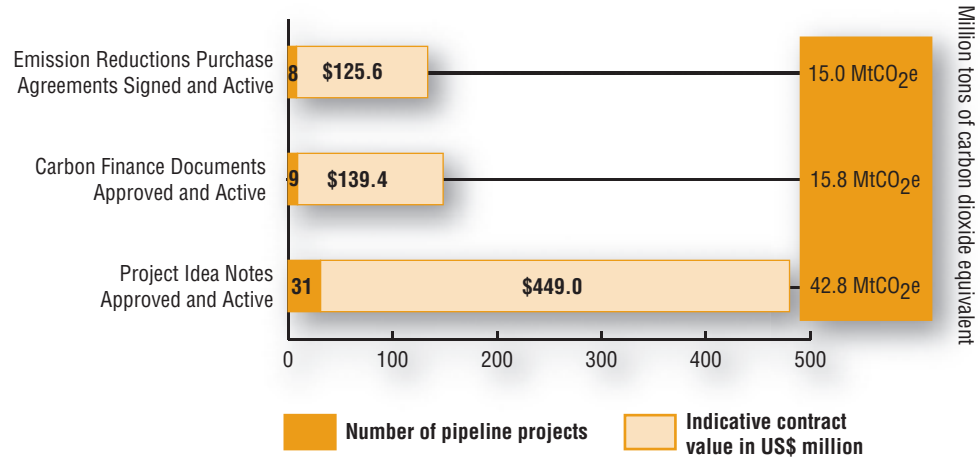
Spanish Carbon Fund Status

	Country/Project Name	Project Description	SCF Contract ERs (tCO_2e)
		Emission Reductions Purchase Agreements	
1	Chile: Santiago Composting Plant	Build and operate a composting plant for biodegradable waste and sludge from water treatment plants	1,542,240
2	China: HFC-23 Destruction	Installation of an incineration facility to decompose HFC-23 generated by the existing HCFC22 manufacturing facility into carbon dioxide and hydrogen fluoride	8,333,529
3	China: Tianjin Landfill Gas Recovery and Utilization	Construct a landfill gas utilization system to generate electricity for landfill operations and to feed to the power grid of Tianjin City. The project will be implemented on the Shuangkou municipal landfill. The Shuangkou landfill is a sanitary landfill that was partially financed by the Bank under the Tianjin Urban Development and Environment Project. It started operation in 2001	635,000
4	Egypt: Alexandria Onyx Landfill Gas Capture & Flaring	Install new landfill gas collection systems and collect gas emissions from the Borg el Arab and El Hammam landfill sites in Alexandria. The project will collect residual emission gas, which Onyx does not currently have an obligation to treat	1,100,000
5	Mexico: La Venta II	85 megawatt wind power project in the south region of the Isthmus of Tehuantepec, in the Mexican state of Oaxaca	1,800,000
6	Mexico: Mexico City Transport	Promote a shift towards low-polluting modes of transportation (primarily articulated buses) via the development of surface mass transport corridors and traffic management measures that integrate with the existing metro infrastructure. Scrapping of high-polluting buses	354,606
7	Mali/Mauritania/Senegal: OMVS* Félou Hydroelectric *Organisasion pour la mise en	valeur du fleuve Sénégal" To construct and operate a run-of-the-river hydroelectric installation on the Senegal River. The project will deliver electricity to national power utilities in the sub-region (Mali, Mauritania and Senegal) through the creation of an additional 59 to 62 megawatts of installed hydropower generation	capacity at an existing weir
8	280,000	Uruguay: Montevideo Landfill Gas Recovery	The Montevideo Landfill Gas Recovery Project consists of the

As of the end of August 2007, the Spanish Carbon Fund had signed seven emission reductions purchase agreements and participated in the China HFC-23 investment for a total of 15 million tons of carbon dioxide equivalent. One additional project has an active carbon finance document representing a further 0.8 million tons of carbon dioxide equivalent. The SCF has 31 project idea notes representing 42.8 million tons of carbon dioxide equivalent. The SCF has recently included in its portfolio five JI projects, totaling 8.3 million tons of carbon dioxide equivalent.

Spanish Carbon Fund Status

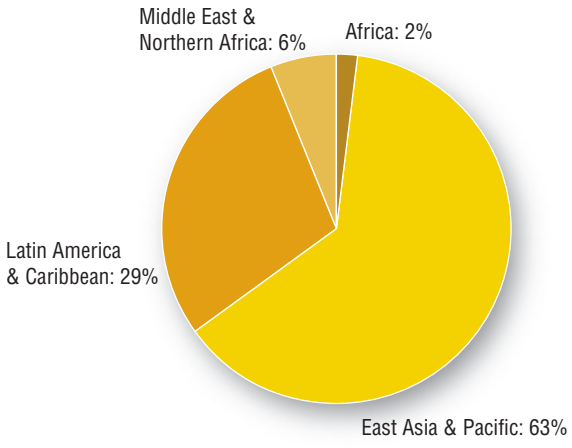
Spanish Carbon Fund Project Status
(cumulative)



Note: The above figures exclude options purchases.

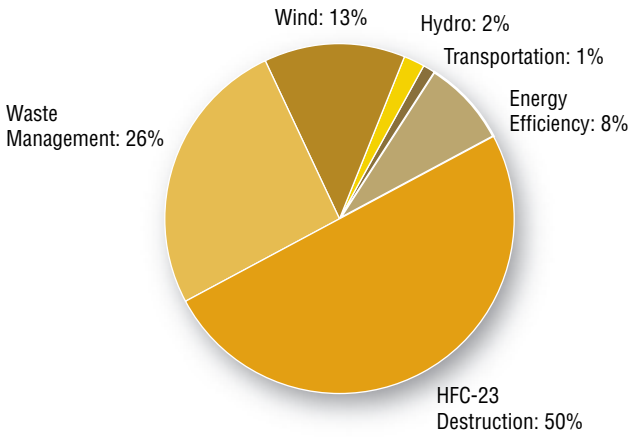
SCF Geographic Distribution*

The SCF portfolio, which includes eight projects with emission reductions purchase agreements signed and one project with an active carbon finance document, is dominated by the East Asia and Pacific region (63%), followed by the Latin America and Caribbean region (29%). The Africa and Middle East and North Africa regions, each holding one project in the portfolio, represent a further 8% of the total value. The Latin America and Caribbean region holds, though, the lead in terms of project numbers with four projects. If we take into account the entire pipeline, which includes the 31 projects that already have an approved project idea note, the Latin America and the Caribbean region, by number of projects, would still hold the lead with 12 projects.



SCF Technology Distribution*

The SCF portfolio covers a wide range of technologies, including HFC-23 destruction, waste management, wind, hydropower and transportation. The portfolio is dominated by HFC-23 (50% of the portfolio), followed by waste management (26%) and wind (13%). Hydropower, transportation and energy efficiency account for a further 11% of the portfolio.



*Charts are based on total emission reductions $ value of projects at emission reductions purchase agreement and carbon finance document stage.

Carbon Fund for Europe

From the Chair of the CFE Participants' Committee

The Carbon Fund for Europe is yet more concrete evidence of the power of using market mechanisms in reaching truly global policy objectives on climate change. With the recent decision by the European Council of a 20% reduction in emissions from greenhouse gases from 1990 to 2020, we see a clear path beyond the current Kyoto agreements. Just as the establishment of the European Union Emissions Trading Scheme made the Clean Development Mechanism come to life, the new European Union targets not only give additional political support but, in essence, also a financial security for market-based climate action after 2012.

We feel confident that the Carbon Fund for Europe, with strong partners and a clear strategy, will make an important contribution in reducing greenhouse gases, through investments in countries, people and projects that will make a real difference.

Einar Hoffart

Einar Hoffart
Statkraft Carbon Invest AS

The Carbon Fund for Europe: linking carbon finance mechanisms

The Carbon Fund for Europe (CFE) is established as a trust fund administered by the World Bank, in cooperation with the European Investment Bank (EIB). The CFE is directed towards the European Union Member States and the European private sector. Carbon credits will be purchased from projects eligible under the CDM and JI.

While the World Bank brings its expertise and experience of the carbon market to the CFE, the EIB brings its intimate knowledge of the European economy and a large project pipeline in developing countries.

Through the CFE, the two institutions will help developing countries achieve sustainable development by fostering investment in clean technology projects, complement private sector development in the emerging carbon market, and seek ways to support essential private carbon market development.

The fund gives preference to projects with relatively short lead times in order to maximize the generation of credits that could be used for the second phase of the European Union Emissions Trading Scheme. The fund may purchase carbon credits generated by a project beyond 2012, up to a limit of 40%.

Carbon Fund for Europe Participants

FONDO PORTUGUES DE CARBONO

FONDO PORTUGUES DE CARBONO,
PORTUGAL

STATKRAFT CARBON INVEST AS
www.Statkraft.com

DEPARTMENT OF THE ENVIRONMENT,
HERITAGE AND LOCAL GOVERNMENT,
IRELAND
http://www.environ.ie/en/Environment/Atmosphere/ClimateChange

GOVERNMENT OF LUXEMBOURG
www.mf.public.lu

FLEMISH GOVERNMENT
www.vlaanderen.be

"Partnerships are necessary to make real progress on the path to a low-carbon economy, involving the development and financing of new ideas, innovative solutions and associated technologies, to mitigate climate change. Designed to help European countries meet their commitments to the Kyoto Protocol and the European Union's Emissions Trading Scheme, the Carbon Fund for Europe has proven to be an excellent example of how two major international financial institutions can effectively combine their forces to complement private sector development in the emerging carbon market and seek ways to support essential private carbon market development."

Matthias Zöllner
EIB Coordinator - Carbon Fund for Europe
European Investment Bank

Making an Impact Sectorwide

Making an Impact Sectorwide

At the dawn of the first Kyoto commitment period, the CDM is beginning to demonstrate the impact that market-based instruments can have on greenhouse gas emissions, and more: the carbon market is starting to transform the way products and services are produced and delivered around the world.

Since the PCF started in 2000 with its first project, a service industry has sprung up to assist companies and countries with the preparation of CDM and JI projects and the trading of emission reductions from these projects, and an elaborate regulatory system has been developed to ensure the value and credibility of the emission reductions. The market discovered quickly which sectors were the most promising for short-term success and which types of projects were manageable in terms of risks, while offering financial rewards. These "low-hanging fruit" types of projects, for example in the waste management sector, in industrial gases and, to some extent, in renewable energy, first drove the carbon business. These sectors produced the early success stories and were essential for market development.

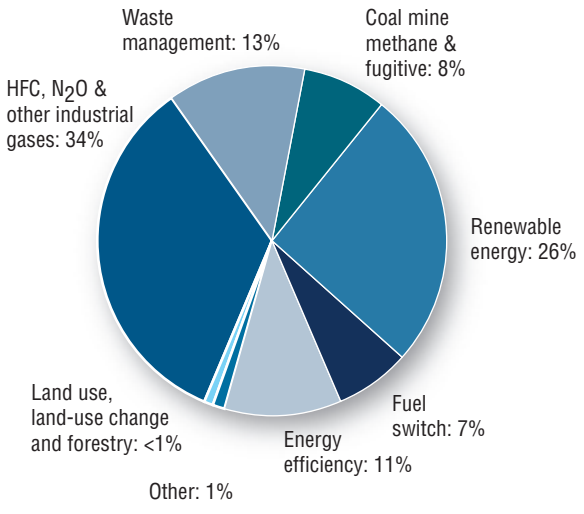
The Prototype Carbon Fund's Latvia Liepaja Solid Waste Management project was the PCF's first project.

Seven years later, the carbon market has taken off: the global size of carbon procurement operations currently exceeds $13 billion and more capital is being lined up to pour into cutting greenhouse gases.

Asset Classes of CDM projects

in the CDM pipeline†

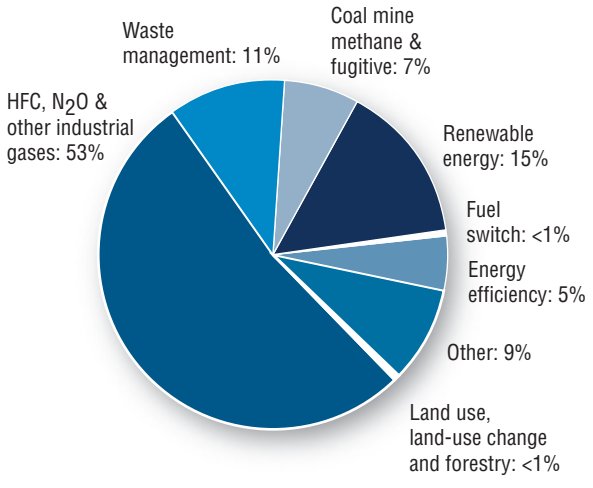
†: as a share of cumulative expected certified emission reductions (up to end of Sept 2007)



UNEP Risoe CDM/JI Pipeline Analysis and Database as of Oct 1, 2007

in the Carbon Market‡

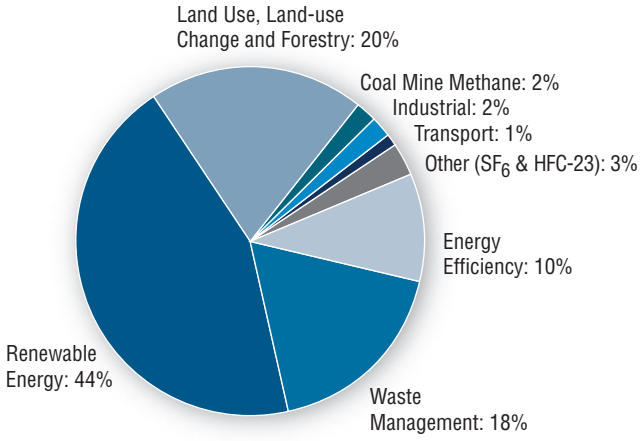
‡: as a share of volumes transacted (2002-2006)



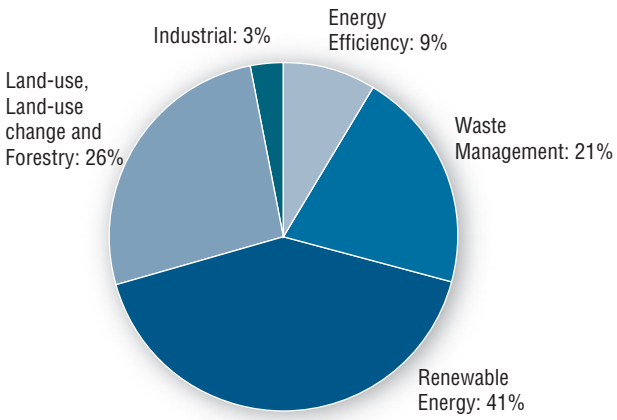
State and Trends of the Carbon Market World Bank, May 2007

World Bank Carbon Finance by Sector

2001 to September 2007: All Emission Reductions Purchase Agreements by Sector



2006-2007: Emission Reductions Purchase Agreements by Sector



The cumulative volume of carbon funds and facilities managed by the World Bank has risen to over $2 billion. These investments in the global environment are not by-passing developing countries, but are contributing to more sustainable development. The co-benefits from better waste management practices, from improved electricity services in Africa, from reduced health risk to coal miners, from reforestation and reduced soil degradation, to name but a few, are significant. In an increasingly interdependent world, the investments which the carbon market facilitates are also investments in the future of the global economy.

While the opportunities are numerous, the transformative capacity of the CDM will only become fully effective if the regulatory framework supports carbon finance for the long term. Preliminary CDM data for 2007 already appear to tell a story of a slowing market for new projects. Projects that need years of development, in particular large scale energy and infrastructure projects, are finding little interest in the Kyoto Protocol's first commitment period.

Fortunately, the accelerating carbon market has also created some confidence in its future—and some capital is becoming available for investment in post-2012 projects. But this will not be enough for the scale that is necessary to create and continue the transformation of emission intensive sectors towards a lower-carbon development path that will be needed to stop the greenhouse gas concentration in the atmosphere from rising. For developing countries to contribute to this goal requires a strategic approach and a programming of carbon finance interventions that can generate critical mass in a sector—in terms of technology and skills that become available, better business practices that recognize and use opportunities to reduce emissions, a regulatory environment that supports low-emission projects, and a development plan that fosters lower-carbon growth. For this to happen will require a long-term regulatory framework for the post-2012 period that supports the scaling-up of carbon finance between developed and developing countries.

The World Bank, with its experience in development and carbon finance, is preparing to explore how scaling-up through a program approach can work and how the impact of carbon finance can transform sectors to reduce carbon emissions and deliver co-benefits to the world's poorer countries. The Bank is preparing to demonstrate the possibilities that a strategic approach to carbon finance could offer. The sectors that follow will offer some of the best opportunities.

Tackling Climate Change Through Energy Efficiency

Energy efficiency could potentially account for more than half of energy-related greenhouse gas emission reductions achievable within the next 20 to 40 years.

IPCC FAR (2007), IEA World Energy Outlook 2006

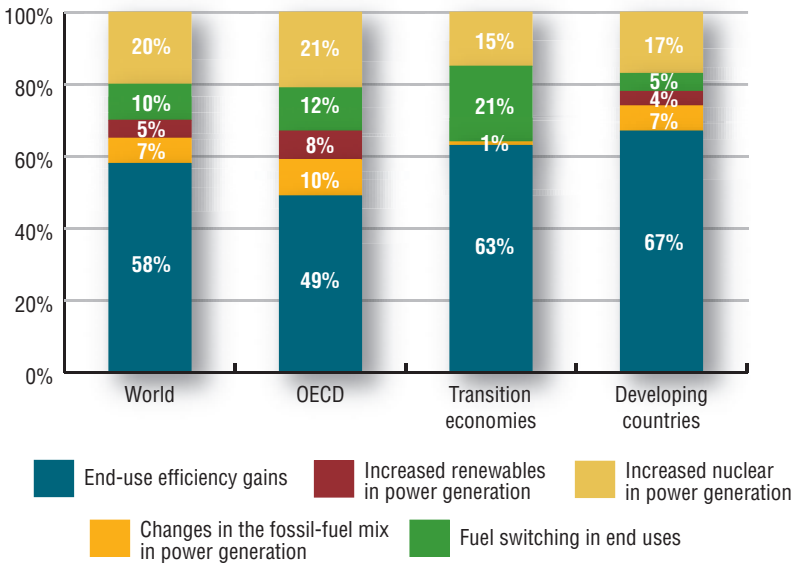
The potential is extraordinary. The reality is something else. Energy efficiency is widely recognized as one of the lowest-cost options for greenhouse gas mitigation in developing countries, and indeed throughout the world. Investment in energy efficiency improvements can often be more cost-effective, particularly on the end-use or demand side, than increasing energy supply to meet the growing demand for energy services. However, if one looks for example at the current numbers in the carbon market, the share for energy efficiency projects is less than 10%. The question is, what will it take for energy efficiency to fulfill its potential as a source of energy and for reducing emissions?

The World Bank Group—Targeting Energy Efficiency for Development

Energy efficiency opportunities exist across the entire chain of modern energy production, distribution and consumption. This energy chain goes beyond the energy industry and spans across sectors including infrastructure, industry, transport and individual homes. During fiscal year 2007 the World Bank Group provided $262 million for energy efficiency financing, addressing the full range of end-use and supply-side opportunities and also aiming to remove institutional, regulatory, financial and technical barriers. These projects have a strong potential for replication and scaling-up through carbon finance.

Energy Efficiency in the CDM

Although some CDM methodologies for large and small energy efficiency projects have been developed, the share of emission reductions from energy efficiency projects is, as mentioned, small, currently less than 10%. Of the 395 energy efficiency projects generating 259 million tons of carbon dioxide equivalent emission reductions expected by 2012, 89% are projects in industrial facilities, accounting for 92% of the emission reductions.



IEA WEO 2006

Demand-side management energy efficiency projects constitute less than 11% of projects and 8% of emission reductions from the sector. This low share is widely attributed to implementation-related barriers including complex CDM methodologies, high first-cost of equipment, and technological uncertainty. In addition, many demand-side energy efficiency projects are generally small-sized and dispersed and require an intermediary that can bundle many small activities, as each individual piece of equipment would not result in sufficient emission reductions to justify a CDM transaction.

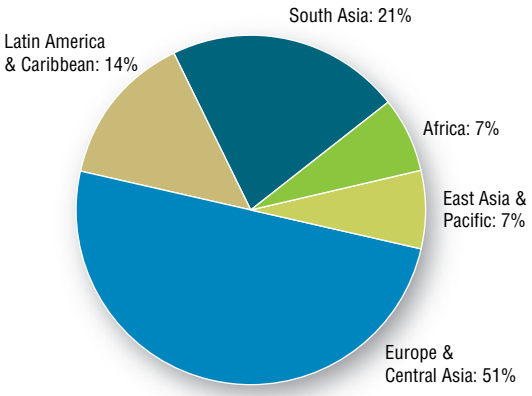
The carbon finance operations of the World Bank has considered this problem in many technical papers and submissions, prompting the Parties to the Kyoto Protocol in 2005 (COP11) to define CDM programs and the CDM Executive Board more recently to provide procedures and methodological guidance for "CDM Program of Activities".

Carbon Finance Opportunities in the World Bank for Energy Efficiency

The World Bank's is continually exploring opportunities to utilize carbon finance for energy efficiency projects as outlined below:

Sector	Energy Efficiency Improvement Opportunities
Buildings	Integrated building design and measures such as better insulation, energy efficient lighting, space
conditioning, water heating and	refrigeration **Industry**
Industrial processes, cogeneration, waste heat recovery, pre-heating,	efficient drives (motor, pump, compressors) and bricks
Cities and Municipalities	District heating systems, combined heat and power, efficient street lighting, efficient water supply,
pumping and sewage removal systems. **Agriculture**	Efficient irrigation pumping and efficient water use, such as drip irrigation **Power Supply**
New thermal power plants:	Combined cycle and supercritical boilers
Existing generation facilities: Re-	powering and improved efficiency

World Bank Carbon Finance
Energy Efficiency Projects by Region
(Based on all emission reductions purchase agreements to September 2007)



- More than half the energy efficiency projects are in the Europe and Central Asia region essentially JI district heating projects
- The South Asia region accounts for the second largest share with construction material projects in India

Going forward—potential for the future

The CDM approach to programs of activities has opened the door to the scaling-up of energy efficiency investments that will be needed to bring down emission trajectories in the sectors, where energy efficiency opportunities exist, both on the demand and supply side. The programmatic approach allows project proponents to define a program and a typical project activity that the program will implement. The project proponent is typically an entity, for example a bank or a government agency that provides an organizational and methodological framework and incentives for the implementation of the targeted activities. These can then be registered as CDM program activities individually and at any time during the program duration.

The World Bank Group, in partnership with the International Energy Agency (IEA), the United Nations Development Programme (UNDP) and other organizations, is now in the process of creating an International Carbon Finance Energy Efficiency Network, which will seek to further develop the CDM approach to energy efficiency projects. The network plans to identify project opportunities and develop methodologies for projects in a wide range of applications.

Czech Republic: CEA Energy Efficiency (Umbrella) Project

District heating is common in Czech cities, dating back to an era of central planning. Most district heating systems are in need of substantial modernization of heat sources and heat transmission and distribution networks. Moreover, the power and district heating sub-sectors contribute about 70% of total carbon emissions in the energy sector, the largest source in the country. Many major energy efficiency improvements, however, are not undertaken because of either lack of knowledge and know-how, or lack of financing resources, or both. The **Prototype Carbon Fund** is purchasing 500,000 tons of carbon dioxide equivalent emission reductions from the project over a seven-year period. This project will function as an umbrella to facilitate the implementation of at least 16 mini-hydro and two district heating sub-projects.

Some examples of the potential exist in:

- **Higher efficiency technologies:** The potential for energy efficiency improvements in technologies like motors for example is estimated to be 20 to 25%. The World Bank is working with its clients and partners to develop and implement programs that promote efficient equipment including, motors, chillers and power transmission systems.
- **Residential and service sectors:** Electricity use in buildings accounts for 53% of total world electricity demand in the residential and service sectors. Household energy consumption is expected to steeply increase in many developing countries. The use of higher efficiency appliances, including heating, space-conditioning and ventilation, could account for as much as 31% of the total savings in this sector.
- **Lighting** accounts for an estimated 19% of global electricity demand. Three-quarters of all electric light is consumed in the residential sectors, resulting in almost 1.9 gigatons of carbon dioxide emissions. The International Energy Agency estimates that the installation of only efficient lighting equipment could reduce global electricity demand for lighting to 2618 TWh in 2030 (almost the 2005 levels). The Bank is working with its partners to examine various approaches to apply existing, approved small-scale CDM methodologies and develop new large-scale programmatic CDM methodologies with the aim to facilitate efficient lighting programs based on compact fluorescent lamps and LEDs in many developing countries.

Existing project-by-project methodologies can be used for the activities under a CDM program. But as emission reduction programs can target an entire sector, the development of sectoral methodologies may be useful. A sectoral methodology could set a conservative baseline in the form of a benchmark or standard for energy consumption or greenhouse gas emissions for an entire sector, thus obviating the need for the current project-by-project approach. Maybe then we could realize the true potential of energy efficiency to dramatically reduce greenhouse gas emissions over the next 20 to 40 years.

Moldova: Biomass Heating and Energy Conservation Program

Moldova is one of the poorest countries in the Central European region. The country relies entirely on imported energy resources, with natural gas accounting for approximately 80% of energy. As in many transition countries, most of the existing municipal district-heating enterprises provide insufficient heating services to local populations and public buildings. Large potential gains in energy efficiency and greenhouse gas emission reductions exist in the country's heating sector. This **Community Development Carbon Fund** project includes improvements in the production and distribution of heat in roughly 150 public buildings. This includes schools, kindergartens, orphanages, community halls, health centers—affecting more than 15,000 pupils and approximately 25 hospitals and clinics with more than 4,000 beds in rural communities throughout the country. Most of these buildings are presently supplied with heat from technologically outdated boilers through a deteriorated heat distribution network, which operate at only 40 to 60% efficiency. This project will increase the overall efficiency of the system to run at 80 to 90% of its capacity and simultaneously reduce greenhouse gas emissions, by implementing energy efficiency and fuel switching measures. The CDCF will purchase almost 350,000 tons of emission reductions up to 2017.

Carbon Finance in Waste Management

Waste Statistics that Tell the Story

In developing countries, it is common for municipalities to spend 20 to 50% of their available recurrent budget on solid waste management. Yet, it is also common that 30 to 60% of all the urban solid waste in developing countries is uncollected and less than 50% of the population is served. In some cases, as much as 80% of the collection and transport equipment is out of service, in need of repair or maintenance. In most developing countries, open dumping with open burning is the norm.

Background

Waste. ***Garbage, trash, solid waste***—these are terms that refer to the discards of daily life. Uneaten food, the leftovers from preparing meals (peels, pits, bones), old newspapers, packaging, pieces of wood, and a variety of other items comprise the contents of residential and commercial discards, generally known as municipal solid waste.

Proper handling of wastes—collection, recycling, composting, and disposal—is important to protect public health and the environment. The biomass organics in waste (food waste) provide food for disease-carrying vectors such as rodents and insects. From an environmental standpoint, improper disposal can lead to water pollution—groundwater or surface water—from leachate, or air pollution from fires that are common at open dumps. The smoke from burning waste pollutes the air in residential areas that often neighbor dumps in developing countries. These public health and environmental risks present real threats to the waste pickers, who sort through waste for saleable materials. Waste pickers are common at many dumps in developing countries.

Emissions from waste currently account for about 4% of global greenhouse gas emissions.

Globally, out of 2551 projects in the CDM pipeline, 177 are landfill gas projects in 32 countries. These projects introduce municipalities to better waste management practices, and help create the human skills and the interest in those countries that is essential for transforming the sector.

© Jason Steele

Waste pickers working in an open dump with fires and smoldering waste.

Mexico: Umbrella Waste Management Project

While Mexico has made significant progress in the provision of collection services for solid waste management, there remain significant gaps in the appropriate and safe containment of solid waste. A major contributing factor is the fact that most municipalities and landfill operators do not have the financial and technical resources to improve containment and make use of the landfill gas option, even if it represents a financially attractive option. The objective of this project is to reduce the greenhouse gas emissions caused by methane released during land-filling of solid waste in Mexico and to replace fossil fuel with renewable energy generation from the biogas. The **Danish Carbon Fund** has contracted to purchase emission reductions of one million tons of carbon dioxide equivalent until 2012. The project will also be an example by providing off-grid renewable energy supply using carbon revenues for a poor community in Nuevo Leon.

Globally municipal waste disposal sites are the fourth largest contributor of non-carbon dioxide greenhouse gases. For example methane emissions from municipal waste disposal sites account for an estimated 730 million tons of carbon dioxide equivalent, more than 12% of global methane emissions (methane is 21 times as potent as a greenhouse gas than carbon dioxide). With these numbers, there exists tremendous potential for carbon finance to leverage capital for projects with immediate tangible benefits.

Many of these projects use the methane for energy (often to generate electricity), although some smaller projects and those that lack suitable markets simply flare the methane. Landfill gas is pumped from wells drilled in a disposal site through a series of pipes to the energy recovery unit and/or flares. Flares are also used with energy recovery systems as backup for periods when excess gas is recovered. The combustion of methane results in the production of carbon dioxide, but it has a much lower global warming potential than methane.

Composting of the biomass in waste, such as discarded food and paper, avoids the formation of methane, as composting is done with oxygen. The compost can be sold to horticultural and/or agricultural customers.

World Bank Activities in Waste Management

The World Bank has taken an active role in providing solid waste management assistance to numerous countries in the past few years. The Bank currently has 48 solid waste management projects in its pipeline —landfill gas (35), composting (11) and recycling (2)—in various stages of development. In a related waste management area—wastewater (sludge digestion)—there are four projects under development.

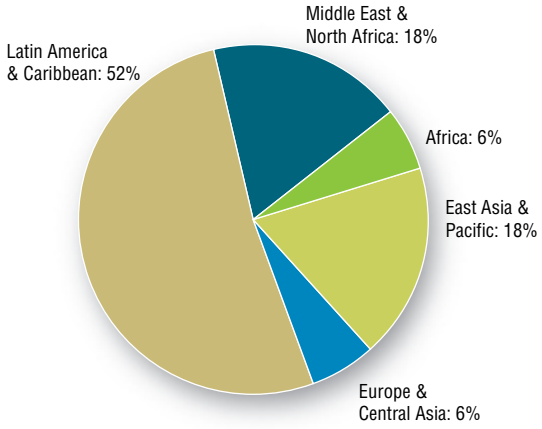
China: Tianjin Landfill Gas Recovery and Electricity Generation Project

The Tianjin Clean Energy and Environment Limited Company (TCEEE) and the World Bank signed an emission reductions purchase agreement in June 2007. The project is expected to be registered later this year with gas recovery operations beginning in early 2008. The **Spanish Carbon Fund** will purchase the first 635,000 tons of carbon dioxide equivalent emission reductions. The Shuangkou landfill, the first engineered disposal site in Tianjin, receives about 1,300 tons of waste per day and can continue to receive this volume of waste for 15 years. The landfill was developed as part of a loan from the World Bank to Tianjin. While this is the first World Bank carbon finance project in China that involves landfill gas, there are six other such projects in the country. The potential for additional landfill gas projects in China, which has 87 cities with a population of one million or more, is substantial. The residents of these and other large cities discard significant quantities of waste that will emit methane in a disposal site.

Role of Carbon Finance

So far there are 177 landfill gas carbon finance projects in the carbon market and 321 other projects collecting methane from animal wastes or water treatment installations (eventually generating power), located in 41 countries—with Mexico an uncontested leader. While there are few in Africa, they account for a significant share of all CDM projects in that region. Together, these 498 projects are expected to deliver some 297 million tons of certified emission reductions by 2012.

World Bank Carbon Finance
Waste Management Projects by Region
(Based on all emission reductions purchase agreements to September 2007)



Waste projects comprise 21.5% of the projects in the World Bank's carbon finance development portfolio. A majority of the purchase agreements signed for this sector are from landfill gas capture and utilization projects. More than half of the emission reductions purchase agreements come from the Latin America region. More than 25% of Spanish Carbon Fund purchase agreements signed so far are in waste management. All the carbon funds' agreements in the Middle East and North Africa region of the Bank are from landfill gas capture and utilization projects

Challenges and Potential for the Sector

Waste management projects were among the first asset classes to enter the CDM pipeline and to be transacted, because of the expected big deliveries (due to the large global warming potential of methane), relatively short lead times and limited upfront investments. But numerous landfills have delivered actual emission reductions that are less, in some cases substantially less, than originally expected. As a result, considerable attention has been focused on the reasons for the disappointing performance of landfill gas recovery systems in developing countries. Among the possible causes are problems with the estimation model (too high an estimate of gas collection efficiency), site conditions (leachate accumulation, fires that burn the organic waste that would contribute to methane generation), and gas collection system design (unrealistic collection system expansion phasing).

Egypt: Alexandria Onyx Landfill Gas Capture and Flaring Project

The project developer Onyx Alexandria was selected by the Governorate of Alexandria for a multi-service project with a 15-year contract period. The project was registered on December 15, 2006. The **Spanish Carbon Fund** will purchase 1.1 million tons of carbon dioxide equivalent emission reductions over a 10-year crediting period. Total project emission reductions during the 10-year crediting period are estimated to amount to more than 3.7 million tons of certified emission reductions.

Gas flaring system for the project

This is the World Bank's first carbon finance project in Egypt that involves landfill gas and the project will involve a technology transfer component. Most domestic waste discarded in Egypt goes to disposal sites with minimal environmental safeguards so that the methane generated in decomposition goes to the atmosphere. This project results in improved environmental protection at these disposal sites and the additional collection and combustion of landfill gas.

Renewable Energy—the CDM as Catalyst

Renewable energy, in particular hydropower, biomass and wind power—together 54% of all projects—is another sector that is being greatly supported by the CDM. More and more countries are looking at the kind of changes necessary to encourage renewable energy while benefiting from carbon markets.

Hitting a Wall with Fossil Fuels

The carbon dioxide emissions for meeting today's energy demand using mainly fossil fuels account for roughly 80% of total global emissions. According to the Fourth IPCC Assessment Report, primary energy demands are likely to experience a 40 to 150% increase, with emissions rising to between 48 and 55 gigatons of carbon dioxide equivalent a year (GtCO2/year). Electricity is expected to grow even more rapidly than primary energy by between 110 and 260% up to 2050. Business-as-usual fossil fuel use to meet future growth in energy demand will produce irreparable damage to the environment and future living standards. Without effective mitigation, total energy-related carbon emissions will rise from 26.1 gigatons in 2004 to as much as 37 to 40 gigatons in 2030, even with modest energy-efficiency improvements.

In terms of electricity generation, the IPCC envisages that renewable energy can provide 30 to 35% of electricity by 2030—up from 18% in 2005.

Power to the People

Increasing energy supply and services are critical for economic development in all developing countries, as well as for improving the livelihoods and economic opportunities of about 1.6 billion poor people still living with no electricity and 2.3 billion people who rely on traditional biomass, such as firewood and crop or animal residue, for their basic energy needs for cooking and heating. Providing modern energy to these households means a significant challenge from both the economic and environmental perspective. The technology choice is of the utmost importance for global emissions and contribution to sustainable development. Carbon finance is starting to play a significant role in how these investments are decided and implemented.

Kenya: Olkaria II Geothermal Expansion Project

In the past two decades, the quality of delivery of energy and other infrastructure services in Kenya has declined. Only about 15% of the population has access to electricity supply. The use of household commercial fuels to substitute for fuel wood and biomass use, which is causing acute depletion of the country's forest resource, is among the lowest in Sub-Sahara Africa on per capita consumption basis.

The Olkaria II Geothermal Expansion Project consists of expanding a geothermal power plant, from 70 megawatts to 105 megawatts by constructing a new unit (incremental addition of 276 gigawatt hours per year). It will displace the electricity that would be generated by fossil fuel thermal power plants in the Kenyan grid, reducing 171,000 tons of carbon dioxide per year. The **Community Development Carbon Fund** is purchasing 900,000 tons of carbon dioxide equivalent emission reductions from the project. The community benefits to be delivered under this project include the provision of clean water (through the construction of water lines and storage tanks); the provision of educational benefits (through the construction and equipping of classrooms, administration blocks, and boarding facilities); provision of health benefits (through the construction and equipping of health centers); livestock improvements (through the rehabilitation and construction of cattle dips); and improved access to markets and educational and health facilities (through the upgrading of rural roads).

Access to renewable energy helps improve the lives of the poor by:
- providing electricity for schools, hospitals, homes and businesses
- reducing the time needed to collect traditional fuel sources (mostly firewood), thus freeing up a household's time for other productive uses
- reducing exposure to daily indoor air pollution

The World Bank Group—Working for a Clean Energy Future

The share of renewable energy and energy efficiency lending by the World Bank Group—$1.4 billion—rose to 40% of total energy sector lending in 2007. At the Bonn Conference on Renewable Energies in 2004 the World Bank Group committed to a target of a 20% average annual growth in energy efficiency and new renewable energy commitments between fiscal years 2005 and 2009. The Bank Group has gone well beyond that target in each year since. Overall, the Bank Group has committed more than $11 billion to renewable energy and energy efficiency in developing countries since 1990.

In fiscal year 2007, support for hydropower was the highest since 1996, with the approval of nine projects for $751 million in new World Bank Group lending and guarantees, including $66 million in carbon finance.

The Bangladesh Rural Electrification and Renewable Energy Development Project is one example of how the World Bank is trying to meet its clean energy commitment and increase access to modern energy. The program connects rural households at the unprecedented rate of 8,000 households every month. The success of the connection rate is especially important in a country where 70% of the population lacks access to the central grid.

Carbon Finance—Making an Impact in the Sector

The whole field of clean energy—renewable energy, methane capture for electricity generation, fuel switching and energy efficiency—is growing tremendously in market share. There are in total 458 registered CDM projects in the energy sector.

By some estimates, carbon finance—in 2006 alone—leveraged approximately $10 billion in clean technology investments in developing countries, about 45% of their total investments in clean technologies. More generally, from 2002 to 2006, $2.7 billion in value of emission reductions from clean energy investment—renewable energy and energy efficiency—were contracted, leveraging

Poland: Puck Wind Power Plant Project

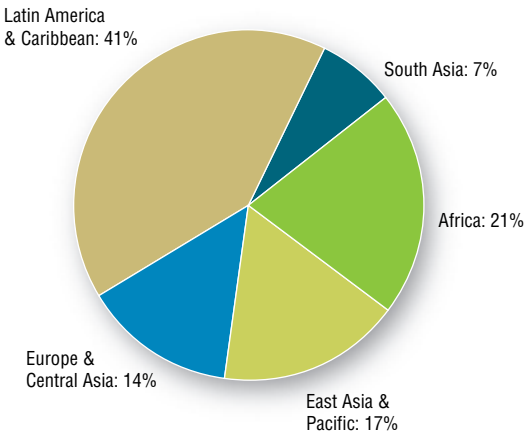
Many of the plants in the Polish power sector, the largest in Central Europe, are very old and in significant need of refurbishment or complete replacement. Moreover, over 90% of the capacity is coal- or lignite-fired. The power and district heating sub-sectors contribute about 70% of total carbon emissions in the energy sector, the largest source in Poland. The primary development objective of the Puck Wind Power Plant Project, located in northwestern Poland, is the generation of renewable energy and reduction of emissions of carbon dioxide through displacement of coal-based grid generation. The project is expected to generate around 255,000 tons of carbon dioxide equivalent emission reductions by 2012, which will be purchased by the **Netherlands European Carbon Facility (NECF)**.

an estimated $16 billion in investment in those areas.

World Bank Carbon Finance—Giving an Edge to Clean Energy

Since the launch of the Prototype Carbon Fund in 2000, carbon finance operations at the World Bank have supported 39 projects in the energy sector, totaling approximately 31 million tons of carbon dioxide equivalent. The World Bank's commitment to renewable energy spans the areas of geothermal heat and power, hydropower, wind, solar, biogas and biomass. In fiscal year 2007, the World Bank contracted 13.5 million tons of carbon dioxide equivalent emission reductions in the energy sector, for Bank-managed carbon funds.

World Bank Carbon Finance
Renewable Energy Projects by Region
(Based on all emission reductions purchase agreements to September 2007)



Colombia: Jepirachi Wind Farm Project

The Jepirachi Wind Farm project, consisting of 15 wind turbines on the northeast coast of Colombia, is contributing to improving the welfare of the Wayuu people of the Guajira region which is one of the poorest regions on the South American continent. The **Prototype Carbon Fund** is purchasing 434,000 tons of greenhouse gas emission reductions from the utility company Empresas Publicas de Medelin from the 19.5 megawatt wind farm. Among many other benefits the Jepirachi project is contributing to the development of the host indigenous Wayuu community by financing a series of community-driven projects including a desalination plant for clean drinking water.

Possibilities for the Future

Renewable energy will be a growing part of the future energy mix in developed and developing countries. Many developing country governments already have policies in place that promote renewable energy development, which often fills a generation gap that would otherwise be filled by coal or other fossil fuels and which would generate emissions for a long time to come. With oil prices exceeding $90/barrel and the observed volatility in prices, the economic competitiveness of renewable energy is even greater today.

The CDM has the potential to greatly support this renewable energy policy trend, in particular if countries systematically develop renewables as part of a CDM-supported energy strategy. This requires looking at the CDM as an integral part of a sectorwide strategy and creating a regulatory and institutional environment that enables and supports renewable power investments, often by the private sector. For example, a country that faces a growing demand for electricity may decide to embark on a clean energy path and design and implement a clean energy program that includes a series of renewable energy projects, which in turn will contribute to better environmental practices, lower emissions, and improved energy security.

The World Bank is working with its client countries on energy sector strategies and related regulation. Energy sector strategies typically take a long-term perspective, requiring more predictable methodologies to support the role of the CDM in strategic power sector planning. The World Bank is assisting its client countries in formulating low carbon energy development strategies and the support of CDM programs will be essential in creating the incentives to move towards low carbon economies. This will enable countries and companies to include carbon market opportunities into their long-term investment planning and decision making, more consistently and with greater confidence.

India: Allain Duhangan Hydropower Project

The 192 megawatt Allain Duhangan run-of-river hydropower project is located in the Himalayas in the State of Himachal in North West India. This is the largest run-of-river hydropower project to be registered by the CDM Executive Board. Consistent with hydrological requirements, the project utilizes a portion of river flows from a combination of glacial snow and from monsoon rains to supply a peaking reservoir via tunnels from the Allain and Duhangan rivers. The diverted waters are then used to drive 2 x 96 megawatt turbines with the water which is then returned downstream to the Allain River. The project is fully consistent with the Government of India's policy to meet demands for electrification in order to grow the economy and reduce poverty while at the same time reducing greenhouse gas emissions. The project is expected to be commissioned in June 2008. The **Italian Carbon Fund** has contracted to purchase no less than 400,000 tons of certified emission reductions a year for a period of seven years from the project sponsor A.D Hydro Power Limited.

Land Use, Land-use Change and Forestry (LULUCF)

Globally, the greatest proportion of finance for CDM-based emission reductions has gone to a small number of large developing countries that can offer large volumes of emission reductions from projects. Many smaller countries and least developed countries are at a significant disadvantage when competing for carbon finance. For a number of these countries, sequestering carbon in trees and soils as part of improved forest and land management is the only significant opportunity they have to benefit from the global carbon market.

A Critical Time for Forests

The forests of the planet are under siege. In many places in the world people are clearing and degrading natural forests at a rate unprecedented in human history. It adds up to 12 million hectares a year—year in and year out—an area the size of Greece or Nicaragua. Logging is threatening temperate forests; and tropical forests that are found in some 60 countries are facing relentless pressure to meet human needs for food, timber, energy and minerals. Most deforestation is due to conversion of forests to agricultural land. In Africa it is estimated that nearly half of forest loss is due to removal of wood fuel. Global removal of wood for timber and fuel amounted to 3.1 billion cubic meters in 2005.

Ironically even as they disappear, forests are today more critical than ever to the survival of the whole planet. On the negative side, deforestation and degradation of forests are responsible for nearly 20% of the heat trapping gases that are going into the atmosphere, altering the climate of the Earth. Those emissions result from changes in land-use—namely, converting forests into agricultural land, expanding settlements, building infrastructure, and unsustainable logging practices—making deforestation and forest degradation the second leading cause of greenhouse gas emissions after energy use.

On the positive side, forests—afforested, reforested and left standing—would help mitigate climate change, as vast reservoirs of carbon. Trees absorb carbon dioxide and are vital carbon sinks. It is estimated that the world's forests store 283 gigatons of carbon in their biomass alone, and that carbon stored in forest biomass, deadwood, litter and soil together is roughly 50% more than the carbon in the atmosphere.

Niger: Acacia Senegal Plantation Project

This **BioCarbon Fund** project will reforest over 17,700 hectares of *Acacia senegal*, a species endemic to the whole African Sahel, over a five-year period. The project should allow the sequestration of around one million tons of carbon dioxide equivalent emission reductions by 2017. Also, the project should annually produce about 4,000 tons of gum as well as groundnut, cowpea and other crop production resulting from intercropping. About 10,000 farming families are expected to receive social benefits from the project through additional revenues generated by Arabic gum, grains and forage, combined with certified emission reductions.

Importance to the Developing World

Forests play a crucial role in the lives of many of the poor on the planet. About 350 million of the world's rural poor are dependent on forests for their livelihoods and in many cases for their survival. Tropical forests cover only 6% of the Earth's surface yet are home to more than half the species on Earth. One quarter of pharmaceutical drugs come from rainforest plants. Yet all around the world, forest dependent people are under threat as forests disappear. The greatest loss of forests is in South America, Southeast Asia, and Africa, where the poorest people rely on their environmental services most. According to the Millennium Ecosystem Assessment, forest area in the developing world will decrease by 200 to 490 million hectares by 2050. In Africa, where the bulk of the continent is tropical or sub-tropical, the rain forests of West Africa are disappearing at a rate of 5% a year.

Although difficult to quantify, the economic value of the ecosystem services of the world's forests is vast. Stopping deforestation and forest degradation and supporting sustainable forest management conserves water resources and prevents flooding, reduces run-off, controls soil erosion, reduces river siltation, protects fisheries and investments in hydroelectric power facilities, preserves biodiversity and contributes to avoided emissions.

Work of the World Bank

Sustainable management of forests is critical to the World Bank's mission, because of forests' contribution to the livelihoods of the poor, the potential they offer for economic development, and the essential global environmental services they provide. The World Bank's forest portfolio has grown from $149 million in fiscal year 2001 to $540 million in fiscal year 2007.

Local community involvement in sustainable forest management is a central element of forest projects. Through forest projects, the Bank has supported the establishment of forest owner associations in 184 of the 214 regions in Mexico; the creation of employment for over

Albania: Assisted Natural Regeneration Project

The Assisted Natural Regeneration project aims to afforest and reforest highly degraded land and develop a multi-functional broadleaf and mixed broadleaf forest of native species. The project will cover about 5,729 hectares spread over 24 communes and five regions, and would use the following species mix: two-thirds broadleaf and coniferous natives (oak, chestnut, maple, birch, walnut, pines) and one-third Robinia (from local seeds and planted with other species). The areas to be included in the project are all communal forest lands for which user-rights are transferred to the communes.

This **BioCarbon Fund** project is expected to sequester around 0.14 million tons of carbon dioxide equivalent by 2012 and around 0.25 million tons by 2017. Environmental benefits include halting the ongoing degradation of forest lands, loss of vegetative cover and soil erosion, improved water quality, watershed capacity and lessening of siltation of waterways and reservoirs. Over 80,000 people will benefit from this project through direct revenues from carbon sales, employment, reduction of maintenance costs on irrigation and drainage infrastructure, reduction of the cost of water treatment and reduction of flood risk. The developed forest will further serve as a sustainable source of firewood, poles, timber, fruits, fodder and other products for the local communities.

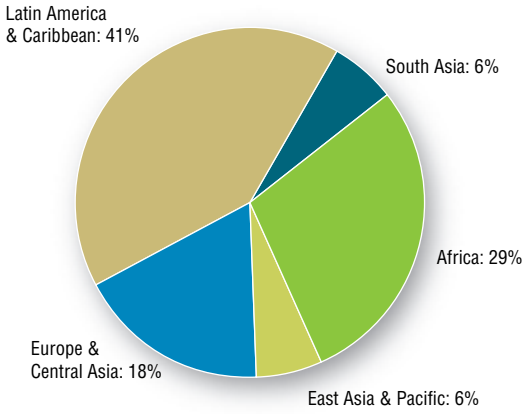
70,000 forest-dependent poor in Honduras, 2.75 million in China and 100,000 in Lao PDR; and the equitable sharing of benefits in Albania, by facilitating the transfer of management and use rights to about 280 out of 345 communities with about 400,000 people involved.

Carbon Finance and Sinks Enhancement

According to the IPCC Third Assessment report, the forest sector has a biophysical mitigation potential of 5,380 million tons of carbon dioxide equivalent a year ($MtCO_2$/year) until 2050. Unfortunately, eligible land use, land-use change and forestry (LULUCF) projects under the CDM are limited to afforestation and reforestation activities.

Carbon assets from the projects remain at less than 1% of volumes transacted so far and even less in the CDM pipeline. Their regulatory complexity and absence of market access to the European Union Emissions Trading Scheme limits demand—at least from private compliance buyers and their intermediaries. It is not sufficient to rely on proven community benefits and competitive costs, which results in some demand from the voluntary market and public buyers, including European governments. Voluntary markets may prefer less complex and costly ways to manage permanence risk than the current approach of temporary credits under the CDM. Large classes of LULUCF assets including possibly soil sequestration, fire management and avoided deforestation, among others, remain attractive opportunities to promote sustainable development in Africa and in other natural resource-based economies, but are still systematically excluded from the CDM and other regulatory markets.

World Bank Carbon Finance Land Use, Land-Use Change and Forestry Projects by Region
(Based on all emission reductions purchase agreements to September 2007)



- 41% of LULUCF emission reductions purchase agreements are in the Latin America region
- The Africa region accounts for 29% thus re-emphasizing the growing importance of the region from the Bank's perspective
- Europe and Central Asia accounts for 18% of signed agreements especially in afforestation/ reforestation of degraded land projects

Making Forests a Priority

The World Bank's BioCarbon Fund, which commenced operations in 2004, fosters the role of LULUCF in the carbon market and the CDM. LULUCF projects create social benefits for local communities, including employment. They can provide new sources of revenue, in cash or in kind, from greenhouse gas reduction sales and from the project's activities.

These projects represent an opportunity for the World Bank to develop clear and robust methodologies for carbon sequestration calculations and to address outstanding issues such as the permanence of the project providing the carbon emission reductions and the crediting of biological carbon. As of August 2007, LULUCF projects at the World Bank made up 14% of the overall carbon finance portfolio, or 20 projects—6.3 million tons of carbon dioxide equivalent. Afforestation and agroforestry projects in Africa accounted for 34% of the BioCarbon Fund's portfolio.

The BioCarbon Fund has emerged as a leader in developing credible protocols and methodologies for LULUCF projects, which not only support the considerable mitigation potential of tropical forests, but also serve as a catalyst to promote growth and opportunity in developing countries. The fund has led the way with prototype avoided deforestation projects that are demonstrating the value of standing forests.

The fund opened a second tranche in March 2007. In addition to supporting forest sequestration, Tranche 2 will target CDM-eligible programs for conserving soil carbon in agricultural areas and rangelands.

Into the Future: Redefining the Role of Forests

The World Bank, with the support of several developing and industrial countries, will take a big step forward with the creation of the Forest Carbon Partnership Facility (see page 83), which will recognize the value of the standing forest.

The long term impact of carbon finance in the forest sector is significant. The Fourth IPCC Assessment report suggests that carbon markets could radically reduce deforestation and lead to a cumulative gain of 422 million additional hectares of forest, with the largest gains in carbon occurring in the tropics of Southeast Asia and South America. But for that to happen, policy makers will have to ratchet up the importance of the role of standing forests in any post-2012 climate regime.

Other Sector Possibilities

There are other sectors that are important for reducing climate altering greenhouse gas emissions and may hold great potential for carbon finance-driven emission reductions. These include the oil & gas and coal mining sectors, the industrial sector and transport. But for various reasons including difficulty in developing methodologies, their huge mitigation potential has not been exploited.

OIL & GAS AND COAL MINING SECTORS

The reduction of gas flaring during oil production and treatment would bring to consumers previously wasted valuable energy resources. That lost energy adds up to about 20% of the current natural gas consumption in developing countries.

The oil and gas sector, as well as coal mining, provide multiple opportunities for greenhouse gas emission reductions in terms of energy-related carbon dioxide as well as methane emissions from upstream operations, processing, and transmission and distribution networks.

Methane emissions from the oil and gas sectors in the top 20 emitting countries and regions are estimated at above one gigaton of carbon dioxide emission reductions equivalent.* The Global Gas Flaring Reduction partnership (GGFR) estimates that about 150 billion cubic meters of gas is flared every year, releasing about 400 million tons of carbon dioxide equivalent into the atmosphere. The methane emissions from coal mining activities add another 370 million tons of carbon dioxide equivalent that could be reduced, with significant benefits in terms of safety of coal mining operations around the world.

These sectors will remain major suppliers of energy sources over the coming decades. Improvements made in these sectors could bring the energy that is currently lost directly to consumers, thus helping to address energy-poverty issues and energy security concerns, in particular in developing countries. The reduction of gas flaring during oil production and treatment would bring to consumers previously wasted valuable energy resources. That lost energy adds up to about 20% of the current natural gas consumption in developing countries.

Oil & Gas and Coal Mining in the Global Carbon Market

Carbon finance to reduce energy-related carbon dioxide and methane emissions could be an additional positive driver for implementing the energy saving, energy efficiency and emission reduction potential of these sectors. Carbon assets could significantly increase the revenue stream for project developers.

The emission reduction potential is significant. If flared associated gas were used locally (for example for power generation), an additional development benefit would be created. However, many barriers have so far restricted the potential of carbon finance to improve the economic viability of gas-flaring reduction projects, such as relatively high investment requirements, the lack of accessible local markets, the lack of an appropriate regulatory framework, difficulty in bringing together various concerned stakeholders and the site specificity of each project (for example, the amount of associated gas extracted).

Oil and gas related projects in the overall CDM pipeline are expected to deliver about 54 million tons of emission reductions by 2012. These projects are essentially reducing the gas flaring at oil wells and refineries. The currently registered CDM oil and gas projects are expected to deliver about 32 million certified emission reductions by 2012. The JI overall project pipeline also includes gas flaring reduction projects, as well as projects reducing methane leaks from gas distribution networks. If approved, these JI projects could deliver about 58 million tons of carbon dioxide equivalent emission reduction units by 2012.

As for coal mining globally, five CDM projects, from more than 60 in the overall CDM pipeline, are currently registered and are expected to reduce about 35 million tons of carbon dioxide equivalent of coal mine methane per year. The coal

* Global anthropogenic emissions of non-carbon dioxide greenhouse gases 1990-2020, U.S. Environmental Protection Agency (EPA), June 2006.

mining project from the overall JI pipeline could generate another 3.3 million tons of coal mine methane reductions.

Future Opportunities for Carbon Finance

The World Bank is actively exploring opportunities in the mining and oil and gas sectors, such as gas flaring reduction (in coordination with GGFR) in Russia and Central Asia, and coal mine methane capture and utilization in Russia and Ukraine.

Through the Global Gas Flaring Reduction partnership, the World Bank is helping oil producing countries and companies to increase the utilization of associated petroleum gas, which will otherwise be flared or burned and thus will harm the environment. In today's context of sustainable development and energy efficiency, the flaring of gas is a waste, and gas flaring reduction efforts will not only make an important contribution to carbon dioxide mitigation, but they are also viable and desirable from environmental and development perspectives.

Given the magnitude of the challenges involved, significant global flaring reduction has not yet been achieved. The Carbon Finance Unit of the World Bank is working with the GGFR to use the CDM in an attempt to boost flaring reductions. This requires a dedicated collaboration between the oil and gas companies and the host country, which in many cases would benefit from flaring reductions if it were able to create the capacity for local markets to utilize this wasted resource. This requires a concerted programmatic effort to bring together development aspects with oil and gas production imperatives. The World Bank is planning to facilitate this effort through the GGFR Partnership, its carbon finance and its development assistance in collaboration with its client countries.

THE INDUSTRIAL SECTOR

The industrial growth in emerging economies is focusing attention on the sector when it comes to tackle climate change. The industrial sector covers a large number of activities including energy-intensive activities, such as the iron and steel industry. This is a growing sector in developing countries including China, the world's largest producer of steel—34% of the total production in 2006 (IISI, 2006). Projects are being developed by the World Bank with Chinese steel companies in order to maximize emission reductions by combining several measures at a single facility, such as energy efficiency and process modifications.

The cement industry is also a growing industry with important opportunities for emission reductions, which include energy-related measures as well as process and product changes. In fact, the cement production industry

China: Jincheng Coal Mine Methane Project

The majority of China's energy needs are met by power generated in coal-fired power stations. The Jincheng Coal Mine Methane project will capture coal mine methane and utilize it for power generation at the Sihe coal mine in Jincheng City, Shanxi Province. The project will upgrade the Sihe mine with several new technologies to improve mine safety and efficiency during gas drainage. The project will recover methane from the mine and process it into energy at a nearby power plant. The energy will be delivered to the local power grid, thus improving the capacity of the Jincheng power network. The **Prototype Carbon Fund** will purchase about five million tons of carbon dioxide equivalent emission reductions from the project. The **Netherlands CDM Facility** will also purchase emission reductions from the project.

represents about 5% of total carbon dioxide emissions (IPCC, 2007) and the majority of this industry's carbon emissions come from the chemical process in the manufacture of cement of clinker. There are currently 28 projects in the cement industry in the overall CDM pipeline, expected to produce some 29 million certified emission reductions by 2012 (UNEP RISOE, 10/2007).

The World Bank is also developing projects in the cement industry with the same approach as with the steel industry: by combining measures at a single site. The Indocement project in Indonesia is an example of such a project, combining a reduction of clinker in the blended cement through the use of additives and energy efficiency measures.

On the Horizon

The scaling-up of emission reductions in the industrial sector could be effective through a programmatic and sector approach. Carbon finance programs could dramatically increase the grip on mitigating emissions from industrial processes. For instance, measures could be applied to many industries but focus on specific components of a process, such as boilers or engines. The development of sectoral methodologies including the adoption of a conservative baseline as a standard, or benchmark for an entire sector could enhance the use of available mitigation options in the industrial sector.

As an example, a sectoral methodology could be developed for the cement industry setting a credible and conservative baseline as a standard for the entire industry in respect to cement type, so that emission reductions would be calculated for all operations against this standard, such that a project-by-project approach for the demonstration of emission reductions would not be necessary.

The cement industry is a good example for a benchmarking approach, given the relatively homogeneous set of production processes and the availability of mitigation potential—energy efficiency improvements, fuel substitutions and substitution of clinker by mineral waste and other by-products—that altogether could cut in half emissions from the industry.

Footnotes:
IPCC, 2007, Working Group III Report "Mitigation of Climate Change", Chapter 7: Industry
IISI (International Iron and Steel Institute), 2007, World Steel in Figures 2007 http://www.worldsteel.org

Indonesia: Indocement Sustainable Cement Production Project

Developing Asian countries account for nearly 70% of total global cement production. Total carbon dioxide emissions by the cement industry in Indonesia was estimated to be 30 million tons in 2002. The Sustainable Cement Production Project by Indonesia's second largest cement producer PT Indocement Tunggal Prakasa Tbk was the first cement sector project for reducing greenhouse gas emissions under the **Prototype Carbon Fund**. The fund will purchase 3 million tons of emission reductions from the project. The activity involves two projects, the first reduces the quantity of energy-intensive clinker in blended cement and the second increases the use of alternative fuels, such as rice husk, coconut waste, car tires and waste oils in the factory. The projects provide environmentally friendly high-quality cement, an alternative solution to Indonesia's waste disposal problem, and employment opportunities for an alternative fuel supply chain. The Indonesia Alternative Fuel Project and the Indonesia Blended Cement Project were successfully registered with the CDM Executive Board in September and October 2006, respectively. The two projects have achieved greenhouse gas emission reductions of more than 390,000 tons of carbon dioxide equivalent between January 2005 and July 2007.

THE TRANSPORTATION SECTOR

Transport is a major contributor to greenhouse gas emissions, accounting for about 14% of the global total, and is the only sector of the world economy in which carbon emissions have risen consistently since 1990.

Carbon Finance and the Transportation Sector

Of the six transport projects in the overall CDM pipeline—evenly distributed between Colombia and India—only one is registered. Expected deliveries amount to 3.5 million tons of certified emission reductions by 2012.

The only methodology approved for the transport sector has set complex requirements which restrict the development of CDM projects. TransMilenio, the Bus Rapid Transit project in Bogota/Colombia is the first and only approved CDM project using that methodology. As such projects could have a high development impact in many large urban areas in many developing countries and since their operation could greatly benefit from carbon finance if appropriately applied, the World Bank is seeking ways not only to simplify the methodology, but also to develop guidance for transport projects on data requirements, survey methods and information management. The Bank is also developing methodologies for other types of transport projects, such as improved road maintenance to improve fuel efficiency and demand.

Moving from Problem to Solution

The transport sector has the potential to produce significant volumes of emission reductions. But this sector has so far had little success in applying carbon finance through the CDM or JI, given the significant methodological challenges involved and the relatively limited annual flow of emission reductions to be expected from isolated projects. Accessing carbon finance for transport projects at a significant scale would require moving from single projects to building carbon finance into investment programs, which would have to be integrated with the transport sector development strategy of the host country.

A World Bank program of highway improvements in one of the Bank's client countries could, for instance, be supported by carbon finance, if certain energy saving features were introduced into the program. Depending on the exact interventions and the baseline, emission reductions from road improvements could be in the range of 1.5 to 2 million tons of carbon dioxide equivalent per 1,000 kilometers of road, amounting to a total potential of between 80 and 120 million tons of carbon dioxide equivalent over 10 years. However, major methodological challenges need to be overcome before carbon finance can support a climate friendly transport infrastructure in any significant way.

The role of transport in greenhouse gas emissions

Transport is a major contributor to greenhouse gas emissions, accounting for about 14% of the global total, and is the only sector of the world economy in which carbon emissions have consistently risen since 1990 (WRI 2005). In fact, transport sector emissions grew by 1.4 billion tons (31%) worldwide between 1990 and 2003 (EMCT 2007). This has resulted in an increase in transport's share of carbon dioxide emissions in all regions of the world: from 22% in 1990 to 24% in 2003. Transport's share is highest in OECD countries (30% in 2003).

More specifically, over 70% of emissions from the transport sector and 10% of global greenhouse gas emissions are linked to surface (road) transport, and most of these come from industrial nations and China. When counted together, the U.S., the European Union, Japan and China account for two-thirds of global transport greenhouse gas emissions. On a regional level, transport emissions are the highest in industrial North America, with the U.S. alone contributing 30% (IEA 2007).

Projections made by the IEA (2004) anticipate that emissions in the U.S. will steadily grow and be at an additional 30% over current levels by 2020 under a business-as usual scenario. The same report anticipates an increase of close to 150% for transport emissions from China.

Vergara and Haeussling, Transport and Climate, SDWP Paper 30, World Bank, 2007

Industrial

The cement production industry alone represents about 5% of total carbon dioxide emissions.

The Next Chapter...

Larger Scale and Longer Term

The first 10 years of the World Bank's work in the carbon market were about institution building; the next 10 years must be about making good on our current commitments and about addressing the need to mitigate emissions more aggressively. It is one thing to purchase tons of carbon, it is quite different and a much more challenging task to change global development pathways, to change technologies and behaviors that have existed and were successful for a century or more but now jeopardize the human future. Meeting this challenge will require scaling up and broadening the scope of carbon markets in order to phase out emission-intensive long term investments and phase in new cleaner technologies in order to ultimately lower the emission trajectories that most countries around the world would otherwise follow.

In order to make a significant difference, the carbon market will need to go to a larger scale, broaden the scope and extend the duration of carbon finance.

Today, the World Bank is managing over $2 billion across 10 carbon funds and facilities of which $1.5 billion has already been committed. In September 2007, the World Bank Board of Executive Directors approved two new carbon facilities which are designed to support developing countries in their move towards lower carbon development paths. Both facilities will pilot ways to ratchet up the fight against climate change by adopting a larger-scale, longer-term approach to greenhouse gas emission reductions, and by testing the use of carbon finance in new fields such as avoided deforestation. This is indeed the next chapter…

The Carbon Partnership Facility (CPF)

Much of the infrastructure for the 21st century is currently being planned or built. Tackling carbon emissions through a project-by-project approach to emission reductions, however, is unlikely to deliver the large-scale, long-term investments necessary to lower emission trajectories. New approaches are therefore needed to achieve the scale and impact that are commensurate with the challenge. The **Carbon Partnership Facility (CPF)** aims to promote greenhouse gas emission reductions through larger scale, longer-term carbon finance investments in programmatic and sectoral initiatives that would help catalyze a change in the way developing countries approach greenhouse gas mitigation.

The CPF is expected to be used in areas such as power sector development, energy efficiency, gas flaring, transport, integrated waste management systems and urban development. Instead of purchasing greenhouse gas emission reductions from one project at a time, the facility will be able to work strategically on numerous projects simultaneously across a country or a region.

The CPF will help to scale up—in reach, scope, and effectiveness—carbon finance operations and integrate them more closely into development strategies and policies.

Examples of potential CPF programs

Power sector development: installation of new renewable energy plants (wind and/or hydropower) that would generate several million tons carbon dioxide equivalent over a period of five years from hundreds of megawatts of power in a given country.

Energy efficiency: develop carbon assets from demand- and supply-side management of electric power by establishing energy management centers for the manufacturing sector.

Urban development: work with municipalities to support emission reductions from a series of urban greenhouse gas sources, such as solid waste management including power generation from landfill gas, urban transport and energy efficiency in buildings.

The Forest Carbon Partnership Facility (FCPF)

Forest loss and degradation has been on the international community's agenda for over three decades. However, little progress has been made in reversing deforestation trends in most tropical and subtropical countries. FAO estimates that an average of 10.4 million hectares of tropical forest was permanently destroyed each year in the period 2000-2005.[1] Deforestation and land-use change are the second leading cause of global warming. They account for about 20% of global greenhouse gas emissions, and over a third of emissions from developing countries.[2] Moreover, many forest-rich countries are also among the poorest in the world.

Although currently no regulatory instrument exists under the UNFCCC to compensate for reductions in emissions from deforestation and degradation in the form of carbon payments, some Parties to the UNFCCC are discussing the possibility of creating such an instrument in the future.

It is in this context that the World Bank, prompted by a range of stakeholders, proposed the creation of a Forest Carbon Partnership Facility (FCPF). The innovative FCPF will reduce deforestation and degradation by compensating developing countries for carbon dioxide reductions realized by maintaining their forests. The FCPF will support programs targeting the real drivers of deforestation and develop concrete activities to reach out to people who depend on forests to improve their livelihoods. It will also help developing countries build the technical, regulatory and sustainable forestry capacity to reduce emissions from

1. FAO, State of the World's Forests (2007)
2. Gullison RE, Frumhoff PC, Canadell JG, Field CB, Nepstad DC, Hayhoe K, Avissar R, Curran LM, Friedlingstein, Jones CD, Nobre C (2007) Tropical forests and climate change. Science 316: 985-986.

Transportation

Transport is responsible for 14% of greenhouse gas emissions. It is the only sector of the world economy in which carbon emissions have risen consistently since 1990.

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Glossary and Acronyms

Adaptation
Actions taken to help communities and ecosystems cope with changing climate conditions, such as the construction of flood walls to protect property from stronger storms and heavier precipitation, or the planting of agricultural crops and trees more suited to warmer temperatures and drier soil conditions.

Additionality
According to the Kyoto Protocol, greenhouse gas emission reductions generated by CDM and JI project activities must be additional to those that would otherwise occur. Additionality is established when there is a positive difference between the emissions that occur in the baseline scenario (business as usual) and the emissions that occur in the proposed project.

Afforestation
Planting of new forests on lands that historically have not contained forests.

Annex I Parties
The countries listed in Annex I of the UNFCCC and in Annex B of the Kyoto Protocol.

Avoided Deforestation
Preventing deforestation by compensating countries for carbon dioxide reductions realized by maintaining their forests.

Bagasse
The fibrous residue left after crushing sugarcane.

Bali
Bali, Indonesia, the venue for COP 13

Baseline
The emission of greenhouse gases that would occur without the contemplated policy intervention or project activity.

Biomass Fuel
Energy sources that are renewable as long as the vegetation producing them is maintained or replanted, such as firewood, alcohol fermented from sugar, and combustible oils extracted from soy beans. Their use in place of fossil fuels cuts greenhouse gas emissions because the plants that are their sources recapture carbon dioxide from the atmosphere.

Cap-and-Trade System
An approach used to control pollution by providing economic incentives for achieving reductions in the emissions of pollutants.

Carbon Asset
The potential of greenhouse gas emission reductions that a project is able to generate and sell.

Carbon Finance
Resources provided to projects generating (or expected to generate) greenhouse gas (carbon dioxide equivalent) emission reductions in the form of the purchase of such emission reductions.

Carbon Finance Documents
A project document, which contains a more advanced project description than the project idea note, including financials, is submitted by the project sponsor and reviewed by the Carbon Finance Unit, which submits it for clearance to the Fund Management Committee (in the case of the PCF) and the respective carbon fund Participants' Committees.

Carbon Market
A popular term for a trading system through which countries may buy or sell units of greenhouse gas emissions in an effort to meet their national limits on emissions, either under the Kyoto Protocol or under other agreements. The term comes from the fact that carbon dioxide is the predominant greenhouse gas and other gases are measures in a unit called "carbon dioxide equivalent".

CDM Executive Board
A 10-member panel elected at Conference of Parties 7, which supervises the CDM.

Certified Emission Reduction (CER)
A unit equal to one metric ton of carbon dioxide equivalent, which may be used by Annex I parties towards meeting their binding emission reduction commitments under the Kyoto Protocol.

Clean Development Mechanism (CDM)
The mechanism provided by Article 12 of the Kyoto Protocol, designed to assist developing countries in achieving sustainable development by permitting industrialized countries to finance projects for reducing greenhouse gas emissions in

developing countries and receive credit for doing so.

Clean Energy or Clean Technology

Although there appears to be no strict definition, clean energy is any energy that causes little or no harm to the environment. Wind energy, solar energy (in all its forms -- photovoltaic, geothermal, solar thermal, etc.), hydrogen and fuel cells, wave and tidal energy, and biomass are all examples of clean energy.

Community Benefits

Community benefits are identifiable and quantifiable improvements in the quality of life of a local group of people who are identified by the trustee and the project entity as in the vicinity of or affected by a project.

Conference of Parties (COP)

The supreme body of the UNFCCC. It meets once a year to review the Convention's progress.

Designated National Authority

An office, ministry, or other official entity appointed by a Party to the Kyoto Protocol to review and give national approval to projects proposed under the CDM.

Emission Reductions (ER)

The measurable reduction of release of greenhouse gases into the atmosphere from a specified activity or over a specified area and a specified period of time.

Emission Reductions Purchase Agreement (ERPA)

Agreement which governs the purchase and sale of emissions reductions.

Energy Efficiency Network

A process created by the World Bank Group, in partnership with the IEA, UNDP, and others, which seeks to further develop the CDM approach to energy efficiency projects.

European Union Emissions Trading Scheme (EU ETS)

In January 2005, the European Union Emissions Trading Scheme commenced operation as the largest multi-country, multi-sector greenhouse gas emission trading scheme world-wide. The scheme is based on Directive 2003/87/EC, which entered into force on 25 October 2003.

Flexible Mechanisms

Three procedures established under the Kyoto Protocol to increase the flexibility and reduce the costs of making greenhouse gas emissions cuts; they are the Clean Development Mechanism, International Emissions Trading, and Joint Implementation.

G8+5 countries

An international forum for the governments of Canada, France, Germany, Italy, Japan, Russia, United Kingdom, and the United States plus, Brazil, China, India, Mexico, and South Africa.

G-8 Gleneagles Dialogue

The G-8 Summit at Gleneaglles that took place in the summer of 2005 focused among other issues on the problem of climate change. The World Bank was asked to take a leading role to work with partners in the creation of a new, long-term oriented investment framework for clean energy and sustainable development.

Global Gas Flaring Reduction Partnerships (GGFR)

A partnership among governments, companies, and the World Bank aimed to help oil producers to increase the utilization of associated petroleum gas, which would otherwise be flared or burned and thus would harm the environment.

Greenhouse Gases (GHGs)

These are the gases released by human activity that are responsible for climate change and global warming. The six gases listed in Annex A of the Kyoto Protocol are carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF6)

Green Investment Scheme

A financing mechanism in which the proceeds from emissions trading under the Kyoto Protocol are reinvested in projects in the host country's economy with the objective of further reducing emissions.

Hectare (ha)

A metric unit of measure equivalent to unit of area equal to 10,000 square meters, or 2.5 acres

HFC-23 (triofluoromethane)

Greenhouse gas that has 11,700 times the global warming potential of carbon dioxide and is a by-product in the manufacturing process of HCFC22, used in air conditioning and refrigeration.

Host Country

The country where an emission reductions project is physically located

Host Country Committee (HCC)
The committee known as the Carbon Finance Host Country Committee established by the World Bank for the purposes of facilitating interaction between the host countries and the Bank in relation to the development and operation of CDM projects.

Intergovernmental Panel on Climate Change (IPCC)
Established to 1988 to assess scientific, technical, and socioeconomic information relevant for the understanding of climate change, its potential impacts, and options for adaptation and mitigation.

Intermediaries
Entities active in the carbon market who broker between project developers and carbon credit buyers.

International Development Association
One of the five institutions comprising the World Bank Group, which focuses exclusively on the world's poorest countries.

Joint Implementation (JI)
Mechanism provided by Article 6 of the Kyoto Protocol, whereby Annex I parties may acquire emission reductions when they help to finance projects that reduce net emissions in another industrialized country (including countries with economies in transition).

Kyoto Protocol
An international and legally binding agreement to reduce greenhouse gas emissions that entered into force on February 16, 2005

Land Use, Land-Use Change, and Forestry (LULUCF)
Refers to the impact of land use by humans—and changes in such land use—on greenhouse gas emissions: expanding forests reduce atmospheric carbon dioxide; deforestation releases additional carbon dioxide; various agricultural activities may add to atmospheric levels of methane and nitrous oxide.

Least Developed Countries (LDCs)
Least developed countries are countries (i) listed in the World Bank's IDA list of countries; (ii) countries commonly referred to as "IDA blend", with a population of less than 75 million; or (iii) countries designated as least developed countries by the United Nations.

Letters of Intent
Document required prior to negotiating the terms of the emission reductions purchase agreement.

Mitigation
Actions to cut net emissions of greenhouse gases and so reduce global warming potential. Examples are using fossil fuels more efficiently for industrial processes or electricity generation, switching to solar energy or wind power, improving the insulation of buildings and expanding forests and other "sinks" to remove amounts of carbon dioxide from the atmosphere.

Payment for Environmental Services
The valuable environmental services provided by natural ecosystems are too often lost as a result of mismanagement and lack of incentives to preserve them. Payment for Environmental Services systems create a market mechanism by which those benefiting from the services 'pay' those controlling the use of the natural ecosystems to keep generating the benefit, thus providing an incentive for conservation.

Program of Activities
A program of activities (PoA) is a voluntary coordinated action by a private or public entity which coordinates and implements any policy/measure or stated goal (i.e. incentive schemes and voluntary programs), which leads to anthropogenic greenhouse gas emission reductions or net anthropogenic greenhouse gas removals by sinks that are additional to any that would occur in the absence of the PoA.

Project Idea Note
A document prepared by a project proponent regarding a project proposed for the World Bank's carbon funds. The note is set forth in a format provided on the World Bank's carbon finance website http://carbonfinance.org.

Reforestation
Replanting of forests on land that was previously forested but subsequently converted to other use.

Sequestration
The process of capturing carbon dioxide in a manner that prevents it from being released into the atmosphere for a specific period of time.

Small-scale projects
Projects that are compatible with the definition of "Small-Scale CDM Project Activities" set out in decision 17/CP.7 by the Conference of Parties to the UNFCCC.

Sustainable Development
Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

Thermal Oxidation
In microfabrication, a process to produce a thin layer of oxide (usually silicon dioxide) on the surface of a wafer (semiconductor).

Ton of Carbon Dioxide Equivalent (tCO_2e)
The universal unit of measurement used to indicate the global warming potential of each of the six greenhouse gases. Carbon dioxide – a naturally occurring gas that is a byproduct of burning fossil fuels and biomass, land-use changes, and other industrial processes – is the reference gas against which the other greenhouse gases are measured.

United Nations Framework Convention on Climate Change (UNFCCC)
The international legal framework adopted in June 1992 at the Rio Earth Summit to address climate change. It commits the Parties to the UNFCCC to stabilize human-induced greenhouse gas emissions at levels that would prevent dangerous man-made interference with the climate system. In December 1997, the Parties to the UNFCCC adopted the Kyoto Protocol. In February 2005, the Kyoto Protocol entered into force thus becoming a legally binding instrument.

Verified Emission Reductions (VERs)
A unit of greenhouse gas emission reductions generated from either CDM or JI projects and verified by the Designated Operational Entity and measured in metric tons of carbon dioxide equivalent.

Voluntary Market
The unregulated market which allows individuals, companies, and organizations purchase emission reductions to offset the emissions they produce.

Waste Pickers
Poor people who sort through waste for saleable materials. They are common at many landfill dumps in developing countries.

Acronyms

AfDB	Africa Development Bank
CDM	Clean Development Mechanism
COP	Conference of the Parties
EIB	European Investment Bank
ERPA	Emission reductions purchase agreement
EU	European Union
EU ETS	European Union Emissions Trading Scheme
FaL-G	Fly ash-lime-gypsum
GGFR	Global Gas Flaring (Partnership)
HFC-23	Trifluoromethane
HCFC22	Chlorodifluoromethane
IBRD	International Bank of Reconstruction and Development
IDA	International Development Association
IEA	International Energy Agency
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
LULUCF	Land use, land use change, and forestry
$MtCO_2e$	Million tons carbon dioxide equivalent
N_2O	Nitrous Oxide
OECD	Organization for Economic Cooperation and Development
PHRD	Japan Policy and Human Resources Development Fund
SF_6	Sulfur hexafluoride
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VSBK	Vertical shaft brick kiln
WRI	World Resources Institute

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