

Carbon Finance in Latin American & Caribbean Cities

Carbon Finance and Cities

Cities cover just 2% of the world's land surface, but they are home to 50% of the world's population and consume over 75% of the world's resources. Cities generate more than 70% of the world's greenhouse gases and the most severe impacts of climate change are being experienced within them.

The role that cities will assume in reducing carbon emissions is especially critical in Latin America. Latin America is the world's most urbanized region. In Brazil and Mexico for example, over 80% of the population lives in cities, and cities account for more than 90% of the economy. Four of the world's largest 20 cities, and some of the world's most polluted cities are located in the region. Cities in the region also often act as global trend-setters.

In June 2005, 54 of the world's mayors met in San Francisco and signed *Urban Environmental Accords* to improve the environment of their cities. This included measures aimed at a 25% greenhouse gas emissions reduction by 2030. Few countries have been as aggressive or as likely to meet those targets. Of the signatories, seven represented Latin American cities and more are expected to sign in the future.

Since cities include many sources of greenhouse gas emissions, they also have many opportunities to reduce emissions. These activities vary in their degree of difficulty to implement and finance. For example, changing solid waste activities at a landfill is a relatively simple task, whereas encouraging modifications to overall building design, or long term land-use planning within a city is more challenging. Through various activities, cities should be able to reduce greenhouse gas emissions by 1 to 20 tonnes per resident per year (see Table 1). At today's price of about \$5 per tonne of avoided CO2 equivalent, cities could generate considerable revenues by developing aggressive programs to reduce greenhouse gas emissions¹.

Reducing greenhouse gas emissions has global benefits and can provide revenues to a city from international sources (see Table 2). Arguably however, the largest benefits to reducing greenhouse gas emissions within a city are local. Urban air quality is a concern in almost all cities. Given that "sustainable cities" are often able to attract better educated and more economically attractive residents than their counterparts, reducing greenhouse gas emissions serves not only as the best way of improving local air quality, but as an important way of improving a city's overall competitiveness and quality of life.

The World Bank's Latin America & Caribbean Urban Group has started to work with the region's cities to develop integrated climate change programs. Maximizing possible carbon finance, reducing pollution, identifying adaptation* requirements, critical infrastructure and key policies, are all best addressed in an integrated manner. Carbon finance is becoming an effective tool in the World Bank's overall assistance program to cities, and with it, many Latin American cities will be able to provide the global leadership needed to quickly and effectively integrate these climate change programs.

See next page for Tables 1 and 2

*for definition, see last page of newsletter
¹These revenues will vary – international prices range from \$5 to as much as \$20 per tonne CO2e. Prices beyond 2012, and the market's ability to accommodate large volumes, are not certain, and there is a 'price premium' on emission reductions that could be registered now. However, cities in Part 2 countries that have ratified the Kyoto Accord, are eligible for significant carbon finance revenues.

Carbon Copy

Welcome to the first issue of *Carbon Copy*! This newsletter was created to discuss the carbon finance market and the critical role that Latin American and Caribbean cities will play within it. Carbon finance is new and quickly changing. *Carbon Copy* will provide readers with regular updates on how Latin American and Caribbean cities are adapting to climate change and international treaties. It will also inform readers about how cities can take advantage of carbon finance, both to address climate change and to improve service delivery. *Carbon Copy* will primarily serve World Bank Infrastructure staff within the LCR region interested in including carbon finance as an element of their projects. As climate change and the response of cities become increasingly important, *Carbon Copy* will also be relevant for anyone working within the region. The stories in this first issue include:

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We hope you enjoy *Carbon Copy* and look forward to providing future updates on carbon finance in Latin American & Caribbean cities.

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Carbon Finance and Cities (Con't)

Table 1: Possible Carbon Finance Activities for Cities

Solid Waste	*landfill gas recovery *recycling *collection vehicle conversions	*composting *transfer stations *collection changes, e.g. twice a week collection versus daily
Water Supply	*reduced energy consumption for production and conveyance	
Waste Water	*reduced energy consumption for treatment and conveyance *sludge management (reducing methane emissions)	
Transportation	*reduced automobile use, e.g. toll charges such as in London or as in Copenhagen, where one-third of the population cycles to work *encouraging the use of public transit: Mexico City plans to replace 80,000 taxis with low-emissions vehicles by 2006 *land use planning changes to reduce transportation requirements	
Buildings	*design modifications for energy efficiency, e.g. Berlin, where 75% of new buildings have to include solar panels in their design *collective heating and cooling programs, e.g. Toronto deep-lake cooling and heating	
Miscellaneous	*greening programs, e.g. planting trees for shade, e.g. Chicago, which is encouraging the use of rooftop gardens to keep buildings cool *reduced fertilizer use and the use of compost in parks	

Table 2: How Much Money Can Cities Earn From Carbon Finance?

Cities can earn substantial amounts of money by selling their emission reductions (ERs) on the global carbon market. Table 1 showed that a reduction in greenhouse gases can be accomplished by implementing cleaner technologies as well as by modifying existing activities. But what's the payoff for cities that make these changes? The following illustrates the potential revenues that could result from those climate-friendly options.

Solid Waste

Landfill gas recovery – About 1.72 t CO₂e/tonne of waste landfilled; at 600,000 tonnes of waste landfilled per 1 million people per year, and a 50% recovery rate: \$2,580,000 per year.

Composting – At 10% of total waste stream composted (approximately 75,000 tonnes per year composted) and 3.54 t CO₂e/tonne of waste composted: \$1,327,000 per year.

Recycling – Approximately \$20 per tonne for paper and \$50 per tonne for metals based on energy savings of materials production (glass and plastics negligible). Doubling a city's recycling rate from 20% to 40% would increase paper recycling by 100,000 tonnes per year and metal recycling by 30,000 tonnes per year: \$3,500,000 per year.

Transfer Stations – A well located transfer station should reduce collection vehicle travel by 30% (with about 500 vehicles per 1 million people – therefore a fuel savings of 25,000 litres per day): \$115,000 per year plus the fuel savings.

Water Supply

A typical water supply facility could achieve a 'ballpark' efficiency gain of 14 MWh/day per 1 million people (about 35,000 t/yr CO₂e): \$175,000/year per facility, plus the energy savings.

Waste Water

Similar to water supply facilities a typical wastewater treatment facility could achieve a 'ballpark' efficiency gain of 28 MWh/ day per 1 million people (about 70,000 t/yr CO₂e – wastewater treatment uses at least twice as much energy as water conveyance): \$350,000/year per facility, plus the energy savings.

Anaerobic digestion of sewage sludge would yield about 0.5 tonnes CO₂e per tonne of raw sludge: \$900,000 per year.

Buildings, Street Lighting and Miscellaneous

Typical "GREEN" buildings provide at least a 15% energy savings or at least \$100,000 per year for large buildings.

Through the use of energy efficient lighting a 10% to 20% savings could be expected. 1 kWh saved yields 0.75 kg of CO₂e.

Other programs such as tree planting (increased shade), reduced fertilizer use in parks, distribution of compost (to reduce fertilizer use), decreased use of chemicals (e.g. swimming pools, air conditioning), encouraging the use of public transit, better land use planning (to reduce transportation requirements), could be reviewed on a case-by-case basis.

Note: The revenues are based on \$5 ERs and are per 1,000,000 people. Direct scale-up may not be possible, but these 'order of magnitude' costs should be practical, with the caveat that projects are in place before 2012 and are accepted by the Clean Development Mechanism (see last page for definition).

Why is the World Bank Involved in Carbon Finance?

In April, 2000, with the launch of its Prototype Carbon Fund, the World Bank became a 'market-maker' for reducing carbon emissions. Nearly six years later, this pioneer of the carbon market has become just one of the many players interested in purchasing carbon emission reductions from developing countries.

The World Bank was particularly concerned with the threat climate change poses to long-term development and the ability of the poor to escape from poverty. The Carbon Finance Unit of the World Bank is a natural extension of the Bank's mission to reduce poverty. The Bank leverages public and private investment into projects that generate greenhouse gas* (GHG) emission reductions (ER) and developing countries benefit from those projects by selling the GHG reductions on the carbon market.

The Bank makes every effort to ensure that poor countries can benefit from international responses to climate change, and through carbon finance, the Bank has served dual needs of its clients. While it is proving to be a powerful tool to improve the viability of clean technology investments, money generated from carbon sales can provide a long-term stream of hard-currency revenues to projects that mitigate or sequester greenhouse gas emissions; this is particularly true in the renewable energy, energy efficiency and waste to energy sectors. In most cases, these revenue streams strengthen the financial sustainability of underlying projects and help to expand the scale of renewable energy operations.

The Carbon Finance Unit of the World Bank

Since it helped pioneer the carbon finance market with its innovative \$180 million Prototype Carbon Fund (PCF) in 2000, the Carbon Finance Business of the World Bank now has eight carbon funds under its management, as public-private partnerships, namely: the two Netherlands Facilities (Joint Implementation/JI and Clean Development Mechanism*/CDM); country funds with Italy, Spain and Denmark; the Community Development Carbon Fund, and the BioCarbon Fund. It also has a ninth under preparation together with the European Investment Bank, the WB/EIB Carbon Fund for Europe. In total the World Bank has more than \$850 million under management for the various funds.*

Results of World Bank Involvement

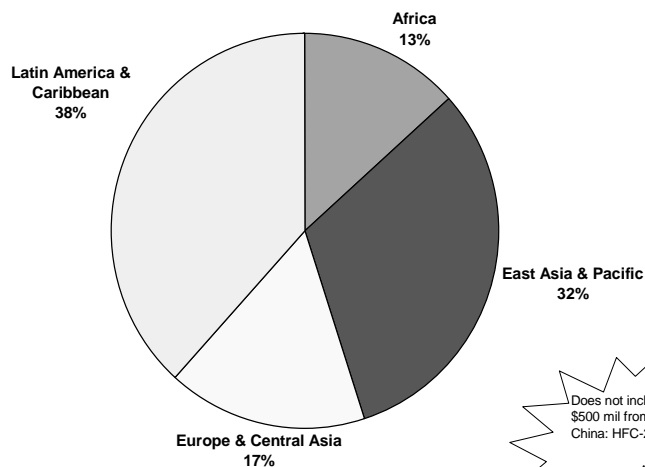
The World Bank has been purchasing greenhouse gas reductions from projects in LCR on behalf of the carbon funds it manages. Through its Carbon Finance Unit, the World Bank has worked to lower transaction costs for greenhouse gas emission reduction purchases in developing countries and the economies in transition. By creating confidence in the market, developing sound business practices at the frontiers of the market, and building capacity on the ground to enable developing countries and emerging economies to fully participate in the market, such projects have become more attractive to the private sector. Greater involvement by the private sector has extended the World Bank's mission of fighting climate change to a broader market.

The annual State of the Carbon Market Report (2005) published by the World Bank shows that the total volume exchanged (all buyers and sellers) through project-based transactions in 2004 was 107 million tonnes of carbon dioxide equivalent* (tCO₂e), a 38% increase relative to 2003. And the data shows that about 43 million tCO₂e were exchanged in the first four months of 2005, suggesting that the market for project-based transactions continues to grow.

In the Bank's experience, at current carbon prices, carbon finance can have both a quantitative and a qualitative impact on projects. For projects capturing methane from landfills, for example, carbon finance can turn marginal projects into bankable ones and create a substantial opportunity to revolutionize waste management practices in developing countries. For traditional renewable energy projects, carbon finance can boost returns by 0.5-2.5%.

The World Bank was the first to get involved with carbon financing because it saw an opportunity to develop and expand a market that would benefit developing countries in a substantial way. Client countries can now implement cleaner technologies while improving the overall financial sustainability of their projects. As a result of its willingness to explore and define the once unknown carbon frontier, the World Bank's Millennium Development Goal #7- Ensuring Environmental Sustainability- has now become a feasible global priority.

Regional Distribution for Projects with Signed Emission Reduction Purchase Agreement (ERPA) (\$142.13 million)



What is Carbon Finance?

The residents of Olivarria and neighboring villages in Argentina may not be familiar with the intricacies of the Kyoto Protocol but they do know that their communities are benefiting from the greenhouse gas emission reductions from a sanitary landfill project. Approximately 20,000 kilometers away, in the Sihe coalmine of northwestern China's Shanxi province, coal miners may not realize that they are helping to cut greenhouse gas emissions but they do know that their lives are being made safer through a project that is trapping and extracting methane in coal mines. Carbon finance, the general term applied to financing that seeks to purchase greenhouse gas emission reductions ("carbon" for short) to offset carbon emissions in the industrialized economies, is benefiting people throughout the developing world.

Carbon finance came into existence as a result of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, an international treaty on climate change which opened for signature on March 16, 1998 and entered into full force on February 16, 2005, following the 55th signatory ratification. The Protocol's flexible mechanisms (Clean Development Mechanism/CDM, Joint Implementation/JI, and International Emissions Trading/IET*) allow industrialized countries with obligations to lower their carbon emissions before 2012, to buy a portion of those emission reductions at a lower cost in developing countries or from economies in transition. What makes this possible are two simple facts: the first is that it doesn't matter where in the world you reduce greenhouse gas emissions, you are reducing it for the whole globe; and the second is that it is cheaper to reduce carbon emissions in developing and transition economies than in rich countries.

Many industrialized governments that have ratified the Kyoto Protocol have already begun implementing domestic policies and regulations that will require emitters to reduce greenhouse gas emissions. They have also begun buying a portion of their required reductions from developing countries. Reductions occur when a project uses an energy source that is less greenhouse gas intensive than it would be under "business as usual" ... for example biomass, or wind power, or some other form of renewable energy instead of carbon dioxide emitting coal or oil. The carbon that is not pumped into the atmosphere becomes the carbon emission reduction that can be sold (at a price per ton) to companies and countries with obligations under the Kyoto Protocol or other climate regimes. So far, experience has shown that the cost of reducing one ton of carbon dioxide (a greenhouse gas) can cost from \$15 to \$100 in the energy-efficient economies of industrialized countries. By contrast, there are many opportunities to reduce greenhouse gases in developing countries at a cost of \$1 to \$5 per ton of carbon dioxide. Hence, an emission reduction that was achieved at a lower cost has value to a public or private entity in an industrialized country that is required by regulation to reduce its emissions.

Meeting the Kyoto targets will require public and private investments on the order of a few billion dollars per year at the global scale. Thanks to carbon finance and the links it has created between industrialized and developing countries, parties seeking to buy or sell carbon reductions can now go beyond their domestic borders, step into the global market and maximize the overall global reduction of greenhouse gases.

Integrating Carbon Finance with World Bank Operations

There is still considerable uncertainty for LCR cities on how to include carbon finance in their ongoing operations. Methodologies and baselines are being developed and the difference between private sector and municipal project proponents is still being clarified. This is especially important in municipal infrastructure projects since they typically require significant investment but also provide significant carbon finance once implemented.

One of LCR's biggest challenges in infrastructure investment is the difficulty of focusing on service operations, rather than facility construction. The World Bank is well placed to finance capital costs such as wastewater treatment or water production and distribution systems, however, the ongoing operational aspects are more difficult to incorporate within standard investment projects. Projects usually have no more than five years implementation. Recognizing the need for an operational focus, many innovative modifications to Bank-supported projects have occurred, trying to focus on the more intractable aspects of service operations.

One such innovation is carbon finance, a type of "Output Based Aid" where project proponents only receive funds once their emission reductions are produced and verified through independent third party audits. Combining World Bank infrastructure projects with carbon finance is very practical and should lead to better projects – both investment projects and carbon finance projects.

Integrating LCR operations and carbon finance can yield better projects that have access to long term funding to support operational requirements. This is especially useful in landfills, water and wastewater facilities, hydropower, and urban transportation projects. Since carbon finance is paid only upon the successful (and independently verified) delivery of emission reductions the project sponsor is required to properly operate the facility on a long term basis. Carbon Finance projects can provide operating funds for up to 14 years.

The need to combine LCR municipal operations with carbon finance and other climate change activities will grow. LCR-FPSI will continue to assist cities in developing integrated programs that maximize pollution reduction and carbon finance, while minimizing project development costs.

Dominican Republic: A Possible Model

The Puerto Plata region of the Dominican Republic needs a new regional landfill. This was recognized over 5 years ago when the World Bank assisted in the preparation of a Learning and Innovation Loan. However there was little progress until now because each municipality wanted their own landfill and long-term operating costs threatened sustainable operations. Recently a new proposal for a regional facility has been tentatively accepted by local and national governments. One regional facility would be developed and carbon finance revenues would help offset ongoing operating costs. Carbon finance would be conditional on the establishment of one regional facility.



Talking Trash:

Why Carbon Finance is Important in Waste Management

The easiest way for cities to take advantage of carbon finance and respond to climate change is to improve their solid waste operations. This is because most garbage is organic and produces methane during decomposition. If that methane is collected and burned, the result is a large reduction in the amount of carbon emissions being released into the atmosphere.

Leaves and grass, food scraps, spoiled produce, and all the other ‘yucky’ stuff in the garbage make up as much as 60% of what we throw out. All of this organic material decomposes quickly, sometimes with a big stink. Paper and wood is also organic and in a landfill this material also decomposes.

Garbage degrades either aerobically (with oxygen) or anaerobically (without oxygen). In addition to giving off odor, anaerobic decomposition also generates methane. Methane is a very powerful greenhouse gas so garbage that degrades anaerobically contributes 22 times more greenhouse gases than if it degraded aerobically. Methane is produced through anaerobic decomposition, whereas only carbon dioxide is generated through aerobic decomposition. Methane from garbage is one of the largest sources of anthropocentric greenhouse gases. Methane can often be collected and burned since it is highly combustible. When methane is burned it generates carbon dioxide and energy thereby significantly reducing total greenhouse gas contributions.

When managing wastes, municipalities have three options to reduce greenhouse gas contributions. They can compost the organic fraction of the waste (composting is the aerobic degradation of waste – and hence no methane is generated); they can degrade the waste in anaerobic ‘digestors’ (where they collect and burn the methane); or they can landfill the waste and try to collect, and burn, the methane. The last two options can often generate large amounts of usable energy.

Compared to the ‘do nothing’, or baseline alternative, the following amounts of CO₂e, or ‘carbon dioxide equivalent’, which is a tonne of carbon dioxide avoided, can be generated by better waste management practices.

Landfilling waste and collecting and burning methane (landfill gas is about 50% methane) – 1.72 tonne CO₂e per tonne of waste (1 tonne = 1,000 Kg)

Landfilling waste, collecting the methane and using it to generate energy, e.g. electricity production – 1.78 tonne CO₂e/tonne of waste.

Composting – 3.54 tonne CO₂e/tonne of waste.

Anaerobic Digestion – 3.6 tonne CO₂e/tonne of waste.

Managing waste is energy-intensive; especially the fuel requirements of collection vehicles. Therefore management changes, such as well-located transfer stations, or improved collection routes and frequencies, saves energy and are also eligible for carbon finance. Recycling also saves energy, often lots of it. Municipalities that encourage more recycling should also be eligible for carbon finance.

Collecting and flaring landfill gas, composting, recycling, and improving waste collection are relatively easy programs for a city to adopt. For cities, the solid waste sector will most likely provide the best place to begin taking advantage of carbon finance opportunities and easing into the market.

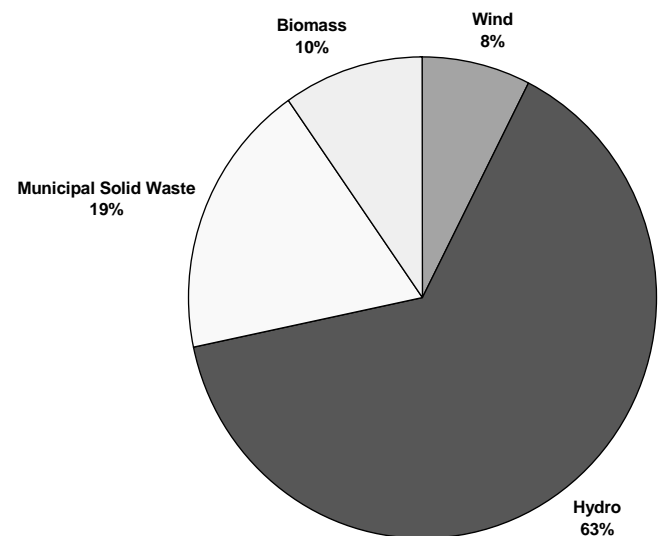
There Can Be Money in Trash

Based on a conservative value of \$5 per tonne of CO₂e, municipalities could expect the following revenues from carbon finance. These are rough approximations and are per 1,000,000 inhabitants.

Transfer Stations:	\$115,000 per year ¹
Solid Waste Recycling:	\$3,500,000 per year ¹
Composting:	\$1,327,000 per year
Landfill Gas Recovery:	\$2,580,000 per year

¹ Methodologies not yet developed.

Distribution of Signed Carbon Finance Contracts in LCR (\$54.62 million - 2005)





What's In The Pipeline?

Since 1999, the LCR region of the World Bank completed 10 carbon finance (CF) projects and at least 37 are under preparation. So far, 43% of the Emission Reduction Purchase Agreements (ERPA)* signed by the World Bank's Carbon Fund Group have come from the LCR region. Most CF activity is now occurring within the private sector, but the World Bank is shifting these activities towards government driven projects. The main impediments for greater involvement of governments, at a municipal level for example, are difficulties with public sector financing, the length of time it can take for project development, and uncertainty within government agencies on how carbon finance can be accessed.

The benefits of private sector lead CF projects include the ability to test different methodologies and the encouragement of best practices. However, private sector driven projects are not without their own unique challenges. Getting projects to 'closure' and ERPA signing is often difficult, and problems can arise late in the process when expected financing for the infrastructure of the project, for example, may not be forthcoming. Price competition is also becoming a challenge as other buyers such as multi-lateral and private institutions enter the market and offer higher prices. The Bank's strategy of maximizing the quantity of CF projects results in a lower purchase price per emission reduction. However, embedded in this price is the active role the Bank plays, both in the development of its CF projects as well as in the integration of CF within the city's overall service delivery program.

The following is a list of carbon finance projects in the LCR pipeline. The projects cover a wide array of Latin American and Caribbean countries and activities.

COUNTRY	PROJECT	COUNTRY	PROJECT
Argentina	Solid Waste Recycling	Dominican Republic	Landfills
Argentina	LFG	Ecuador	Regional Landfills
Bolivia	Solar Home Systems	Ecuador	Hydro Projects (2)
Brazil	Wood Waste Cogen (3)	Guyana	Bagasse Cogeneration
Brazil	Landfill Gas (2)	Honduras	Hydropower
Brazil	Swine Manure Project	Jamaica	Landfills
Brazil	Natal Waste Management Project	Mexico	Energy Efficiency
Brazil	Wind Mill	Mexico	Hydro Umbrella Projects
Brazil	Water Utilities Management	Mexico	Wind Power
Chile	Santiago Composting Project	Mexico	LFG-to-Energy Umbrella
Chile	Hydropower (3)	Mexico	Refinery Cogeneration
Chile	Urban Transport	Mexico	Seawater Agroforestry
Colombia	Wind	Mexico	Transport
Colombia	Hydro	Nicaragua	Precious Woods
Colombia	Methane Capture in Wastewater Treatment	Peru	LFG Capture
Colombia	Energy Efficiency	Peru	Hydro (4)
Costa Rica	Hydroelectric Project	Uruguay	LFG Capture
Costa Rica	Umbrella Projects for Renewable Energy		

The Carbon Market: A Closing Time Window

Growth of the carbon market as measured by the total volume of emission reductions exchanged through project-based transactions has been quite significant. Unfortunately, because the first compliance period of the Kyoto Protocol ends in 2012, time to enter the market may be running out. The World Bank is once again setting the trend and pioneering past this 2012 frontier.

Under the Kyoto Protocol, industrialized country signatories are required to reduce their greenhouse gas emissions by 5.2 % of 1990 levels by 2012. World Bank research shows that if half the emission reductions are achieved by OECD countries domestically, the “compliance gap” to be met through trade with developing countries and transition economies through 2012 would be 2.5 billion tonnes—10 times current contracted volumes.

However, unlike other markets, the greenhouse gas market is particularly impacted by international policy. Time is of essence in this market. The Kyoto Protocol is operationally designed only until 2012; the lack of a regulatory framework thereafter makes it difficult to put a value to carbon credits generated after 2012, thus greatly affecting carbon finance transactions and confidence in the long-term viability of the greenhouse gas market.

Implementing a climate-friendly project such as a wind or geothermal power generation that would take the place of a coal or oil fired power plant takes time: to get the environmental clearances, agreements for the electricity purchases, secure financing, CDM regulatory approval, build it and finally make it operational. Typically, this is a three to five-year process. Given the long lead time involved in implementing projects and were they to become operational by the end of 2006/early 2007 to maximize on trading opportunities in the 2008 -2012 window, projects have to be implemented today.

The World Bank's Unique Role in Market Development

In an endeavor to create market continuity, the World Bank purchases beyond 2012. What differentiates the World Bank from other buyers in the market place is its unique role in market development and subsequent appetite for risk. Unlike most other buyers, the World Bank is prepared to take regulatory risk by offering project sponsors the choice on whether to sell Verified Emission Reductions* (VERs) versus Kyoto-compliant Certified Emission Reductions* (CERs) from CDM projects or Emission Reduction Units (ERUs) from JI projects. When purchasing VERs, the Bank seeks to maximize the share of VERs that become CERs/ERUs through its due diligence and its thorough work on methodology¹ development, and by reserving all rights to communicate with the CDM Executive Board (and ultimately the JI Supervisory Committee) to effect the maximum feasible conversion of VERs to CERs for distribution to Fund participants. As a result, Fund Participants assume the risk that the VERs are not converted to CERs, and incur possible unanticipated time delays with the conversion.



Unlike other buyers, Bank-managed carbon funds² typically buy beyond 2012 with the expectation that only 60-70% of the VERs can be delivered by 2012 (less as time passes); the vast majority of other buyers only buy up to 2012 vintages.

Further, the Bank develops and manages programs and large projects in return for only a small proportion of the total emission reductions generated by the project (say 30-40%). This allows the sharing of high-quality, risk free assets that sellers may then benefit from assuming market upsides, i.e. obtaining potentially higher prices from other buyers on the best available terms.

A strategic goal of the World Bank is to contribute to the knowledge of carbon asset creation. In line with this, the Bank invests heavily in exploring new markets, new technologies and processes where carbon finance can drive sustainable development and poverty alleviation. It funds upstream project and methodology development, and accompanies project sponsors in this effort in order to build capacity. In order to increase the number of different kinds of projects that the CDM can support, the Bank is prepared to advance funds for project preparation, including for preparation and defense of new methodologies at its own risk.

To create a vibrant market that can truly incentivise climate-friendly investment and provide a cost-effective means to address climate change, it is imperative that there be certainty. It is thus crucial that the viability of the underlying trading system be extended beyond 2012.

¹Each CDM project is described in a “Project Design Document”, and the method used to determine the baseline against which reductions are calculated, is described in a “methodology”. Each methodology represents— and is specific to— a certain type of project; with the exception of a few methodologies that have been consolidated to be applicable to several types of projects in a given sector.

²With the exception of the Danish Carbon Fund and the Netherlands Clean Development Facility.

Final Comments

The first edition of *Carbon Copy* is intended to introduce carbon finance from the perspective of LCR cities. Carbon finance and similar climate change programs are changing quickly and in upcoming issues more details will be provided and experiences presented.

Cities are critical for our response to climate change. They consume about 75% of global energy production, and produce over 80% of the world's garbage. Most resources extracted from the ocean, the forests, an oil well, or a remote mine, go to a city.

Over the next decade there will be enormous change in the way cities impact, and respond to, global climate change. Carbon Finance is just one tool that cities have to bring about needed changes. Experience with carbon finance is still limited and most cities are just entering the 'learning by doing' phase. The first round of carbon finance is somewhat constrained by the 2012 Kyoto Protocol 'deadline', however emissions trading, carbon finance, and design for climate change, are now permanent considerations for all cities.

Cities drive the economy, much of which will be needed to pay for adaptation to climate change and the reduction of Greenhouse gas emissions. Cities also shape the culture of a country because most innovations start within them – imagination and leadership in response to climate change are now needed from cities.

Definitions

Adaptation- The manner in which a city or country will adapt to climate change e.g. rising sea levels, more severe climactic events.

Annex I Country: Most provisions of the Kyoto Protocol apply to developed countries, listed in Annex I to the United Nations Framework Convention on Climate Change (UNFCCC).

Carbon Dioxide Equivalent (CO₂e): A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "million metric tons of carbon dioxide equivalents (MMTCDE)." The carbon dioxide equivalent for a gas is derived by multiplying the tonnes of the gas by the associated GWP.

Certified Emission Reductions (CERs): Those emission reductions certified through the Kyoto Protocol's Clean Development Mechanism projects.

Clean Development Mechanism (CDM): A proposition in which industrialized countries or their companies could earn emissions credits, while developing countries acquire technology and capital and earn emissions credits that could be banked or sold. The CDM grants emissions credits for investments in emissions-reducing projects located in *developing countries*. According to Article 12 of the Kyoto Protocol, the "purpose of the Clean Development Mechanism shall be to assist Parties not included in Annex I in achieving sustainable development, and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3."

Emission Reduction Purchase Agreement (ERPA): Purchase contract between a World Bank carbon fund and the project sponsor.

Emission Reduction Units (ERUs): Those emission reductions certified through the Kyoto Protocol's Joint Implementation projects

Greenhouse Gas: Any gas that absorbs infra-red radiation in the atmosphere. Greenhouse gases include water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), halogenated fluorocarbons (HCFCs), ozone (O₃), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs).

International Emissions Trading (IET): Each Annex I country has agreed to limit emissions to the levels described in the Protocol, but many countries have limits that are set above their current production. These "extra amounts" can be purchased by other countries on the open market. IET allows countries that have adopted national emissions limitation to trade a portion of their allowed emissions to other countries that face national emissions limitations.

Joint Implementation (JI): JI grants emissions credits for investment in emissions-reducing projects located in countries with national emissions limitation, mostly OECD countries. The Kyoto Protocol establishes a mechanism whereby a developed country can receive "emissions reductions units" when it helps to finance projects that reduce net emissions in *another developed country* (including countries with economies in transition).

Verified Emission Reductions (VERs): Those emission reductions that extend beyond the 2012 Kyoto Protocol Framework and therefore are not certified by either the Protocol's CDM or JI projects. Currently these uncertified emissions are being purchased by the World Bank, which absorbs the market risk of no regulatory framework coming into place beyond 2012, and therefore no conversion of the VERs into CERs.

If you have reactions, comments or want to submit an item for the next issue of *Carbon Copy* please forward any ideas or comments to Dan Hoornweg, Editor, at dhoornweg@worldbank.org.

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