

An Overview of the Global Carbon Market and CDM Opportunities for the Pulp & Paper Sector in India

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Concern about rising atmospheric concentrations of greenhouse gases and their deleterious impacts on global climate has prompted the search for methods for reducing greenhouse gas emissions in cost effective ways. In this context, the deployment of [clean energy technologies] in order to displace the use of fossil fuel energy sources has great potential. This paper provides an overview of the role that the Clean Development Mechanism and carbon trading can play in raising capital for greenhouse gas emission reductions projects from Paper & Pulp Industries.

INTRODUCTION

During the last fifteen years, carbon trading has evolved from a theoretical idea towards being a fully-functioning market-based instrument for accomplishing the global environmental objectives of the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC). The main instruments currently used for achieving these objectives are the so-called Flexibility Mechanisms, market based cap-and-trade schemes established by the Kyoto Protocol. Of particular relevance to developing countries is the Clean Development Mechanism (CDM), but current market dynamics are strongly influenced by trading under the EU Emissions Trading Scheme (EU ETS), which has been operational since January 2005 and has significantly increased market activity.

According to the World Bank², the demand for carbon emission reduction credits is estimated to be between 30 and 40 billion during the 2008-2012 periods. A sizeable proportion of this investment could flow to developing countries through the Clean Development Mechanism

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(CDM), fostering the use of many emission reduction technologies, including those in the [clean energy generation] sector.

This paper describes the policy background of the Climate Convention and carbon trading, the current market status of the CDM and the ETS, the financial impacts of carbon trading on emission reduction projects, and the process of creating projects for participating in the international carbon market.

POLICY BACKGROUND: THE KYOTO PROTOCOL

In December 1997, 170 countries drafted the Kyoto Protocol during a meeting of the UNFCCC. The most important aspect of the Kyoto Protocol is the adoption of binding commitments by 37 developed countries and economies in transition (collectively called the Annex 1 countries) to reduce their greenhouse gas (GHG) emissions by an average of 5.2% below the year 1990 by the period 2008-2012 (Kyoto Protocol, 1997; web site <http://www.unfccc.int>). These commitments are differentiated by countries, with some required to reduce up to 8%, while others can even increase their emissions. It is worth mentioning that, since the

negotiation of the Kyoto Protocol, both the USA and Australia have refused to ratify the Protocol and are currently not subjected to the emission reduction targets set up by the scheme.

At the same time that the Protocol established binding commitments, it also approved the use of 3 “flexibility mechanisms” for facilitating the achievement of these GHG emission reduction targets. These are:

- a) Emissions Trading, allowing the international transfer of national allotments of emission rights, between different Annex 1 countries;
- b) Joint Implementation, the creation of emissions reduction credits undertaken through transnational investment between countries and/or companies of the Annex 1 (industrialized countries); and,
- c) The Clean Development Mechanism (CDM), a new mechanism resembling JI, which allows for the creation of Certified Emission Reduction (CER) credits in developing countries, regulated by the CDM Executive Board.

THE CLEAN DEVELOPMENT MECHANISM

The CDM is the only Kyoto Protocol

flexibility mechanism that specifically includes developing countries. As defined by the Protocol, the CDM's purpose is twofold: firstly, to assist developing countries (non-Annex I Parties) in making progress towards sustainable development and contributing to the UNFCCC's objectives; and secondly, to assist developed countries and economies in transition (Annex I Parties) in achieving their emission reduction targets. Non-Annex I Parties are supposed to gain the economic, developmental and environmental benefits from implemented projects that generate Certified Emission Reductions (CERs) for export.

An important facet of the CDM is that these CERs are designed to be bankable from the inception of the CDM, in 2000. Other features of the CDM include:

- ◆ Project activities must be additional to what would have happened in a 'business as usual' scenario;
- ◆ The CDM is open to participation by either private or public entities, or combinations of the two;
- ◆ Projects must have the approval of the host government;
- ◆ CDM projects must be independently certified by Operational Entities accredited by the CDM Executive Board;
- ◆ The CDM has a mandate to use a portion of its proceeds to assist those countries which are particularly vulnerable to climate change to adapt to those changes.

Further detail on the process of creating a CDM project is shown in section below.

THE EU ETS

The emission reduction objectives established by the Climate Convention have, in turn, to be translated into national rules, regulations and legislation. In this context, the European Union created

the EU Emissions Trading Scheme (EU ETS) that began operations in January 2005. The EU ETS is a cap-and-trade system based on the allocation of limited amounts of emission rights (European Union Allowances - EUAs) and the associated flexibility to buy or sell surplus allowances from other parties. The main elements of the system are:

- ◆ The system started operating in January 2005, with the participation of the 15 EU Member States, and will gradually incorporate the accession countries. The first phase of the EU ETS runs from 2005 to 2007, while the second phase coincides with the first commitment period under Kyoto, 2008-2012.

- ◆ The system covers five main sectors of the economies of the EU, namely power and heat generation, iron and steel, mineral oil refineries, mineral industry (cement, glass, ceramics), and the pulp and paper sectors. More than 12,000 plants or installations are covered by the EU ETS.

- ◆ These sectors account for approximately 46% of the emissions of the EU, or over 2 billion tonnes of CO₂ emissions per year. The allocation of EUAs, has been done with a view that installations will need to effectively reduce their CO₂ emissions.

- ◆ In order to allow companies to explore fully their comparative advantages, the EU ETS allows companies to trade surplus EUAs between themselves. In this way, companies that are successful in reducing their GHG emissions beyond their target generate a surplus allowances and can sell them to companies that do not meet their targets. In addition, companies will be able to purchase CERs from CDM projects.

- ◆ Companies that do not meet their targets will be subjected to penalties for non-compliance. These will start at €40/t CO₂ during 2005-2007,

reaching €100 from 2008 onwards.

The main relevance of the EU ETS to developing countries is that it has created a substantial demand for emission reduction credits, such as CERs from the CDM and JI credits, within European countries.

MARKET STATUS

Investment in emission reduction projects began in the early 1990s, following the signing of the Climate Convention (UNFCCC) at the Rio Summit in 1992. These investments were initially voluntary, since Parties did not have binding emission reduction commitments yet.

Since 2000, CDM projects have been authorized to create carbon credits that can be used for compliance with the emission reduction targets set up by the Kyoto Protocol. Market activity had been slow in the early years of this decade but accelerated significantly in early 2005, for two main reasons. Firstly, the Kyoto Protocol finally entered into force in February 2005, setting in motion the process of reducing emissions to create carbon credits that will be used to meet the Kyoto targets during its First Commitment Period, which runs from 2008 and 2012. Secondly, the EU ETS started operating in January 2005, involving more than 12,000 buyers in the carbon market.

Since the EU ETS entered into force, trading activity has raised significantly, from some 10,000 t CO₂ per day, up to 3 million tonnes a day. Prices have also been very volatile, ranging from an initial € 8 per EUA to more than € 30. In May 2006, prices in the EU collapsed from more than € 30 to approximately € 8 in a few days, following an announcement by the EU that the European emissions in 2005 were lower than originally expected (and consequently that the market had a larger than desired amount of allowances in circulation).

It is important to note that while CERs will eventually be allowed to be imported into the EU ETS, these are different instruments, subject to

different risks and commanding different prices than the EUAs referred to above. In general, CER prices are significantly lower than EUAs, for a variety of reasons. The main factor contributing to the lower CER prices is risk. The process of production of CERs is subject to a series of project, policy, country and regulatory risks that may prevent or delay delivery of the contracted amounts of credits to a final compliance buyer. As an example, for CERs to flow to the EU, these are subjected to 'import quotas' set up by the various European countries and are also dependent on the creation of an International Transaction Log to be operated by the CDM Executive Board (this is not in place yet). Furthermore, most carbon transactions are based on forward delivery contracts, and subject to a series of risks. In general, project developers are not willing to assume any penalties for underperformance (or do not have the credit rating required for assuming these risks) and consequently most of the risks tend to be assumed by the buyer. The combination of these factors contribute to the price formation of CERs, and the fact that they are lower than the risk-free EUAs that can be readily used for compliance in Europe.

CER prices vary widely as well, with an average of US\$ 7.51/tCO₂ during the first months of 2006 (World Bank, IETA State and Trends of the Carbon Market 2006). Differences in prices are mostly dependent on the quality of the underlying project, the credit rating and track record of the project developer, the country risk, the perception of technology risk, the expectation of whether the project may be successful in securing CDM registration status, and most importantly, allocation of risks and responsibilities between buyer and seller. These prices, however, can significantly increase the Internal Rates of Return of emission reduction

Table 1. Impact of carbon sales on Internal Rate of Return (IRR) of emission reduction projects.

Country	Project Type	% IRR without ERs	% IRR +ERs	IRR Increase (% points)	% IRR Increase
Romania	District heating	10.5	11.4	0.9	9
Costa Rica	Wind	9.7	10.6	0.9	9
Jamaica	Wind	17.0	18.0	1.0	6
Morocco	Wind	12.7	14.0	1.3	10
Chile	Hydro	9.2	10.4	1.2	13
Costa Rica	Hydro	7.1	9.7	2.6	37
Guyana	Bagasse	7.2	7.7	0.5	7
Nicaragua	Bagasse	14.6	18.2	3.6	25
Brazil	Biomass	8.3	13.5	5.2	63
Latvia	Methane	11.4	18.8	7.4	65
India	Methane	13.8	18.7	4.9	36

Source: The World Bank 2001.

projects, as shown in the Table 1 above.

To a certain extent, CER prices are a function of the EUA prices, which, as seen above, have been very volatile since the entry into force of the Kyoto Protocol in January 2005. Given the volatility in both CER and EUA prices, project developers often seek to lock in prices at the outset of the project development process, thus sheltering developers from long term price fluctuations. This can be accomplished by entering into forward selling of CER streams through long term Emission Reduction Purchase Agreements (ERPAs) at fixed prices. This is equivalent to (and reduces the need for) long term 'Power Purchase Agreements', which are often one of the key factors to be considered when trying to close the financial arrangements required for electricity generation projects. According to a recent study by the World Bank and IETA (World Bank, IETA State and Trends of the Carbon Market 2006), 374 million tCO₂e, mainly of Certified Emissions Reductions (CERs), were transacted at a value of US\$2.7 billion

in 2005. The majority of CDM projects to date have transacted their credits using long term ERPAs.

CARBON TRADING AND PROFITABILITY OF EMISSION REDUCTION INVESTMENTS

A fundamental benefit of carbon finance is that certain investment opportunities will gain a premium value, because of their capacity to supply CERs in addition to their existing cash flows. Sectors poised to make gains are renewable energy, energy efficiency, waste management, industrial efficiency, and sustainable forestry, to name a few. For any given investment, there are now two possible revenue streams. Put graphically, consider the outputs of a commercial-sized renewable energy project investment (this model is equally valid for all other sectors):

The market value of a conventional project financing reflects future cash flows from the upper box exclusively. If the emission reduction impacts of these projects are monetized through carbon trading, the overall economic utility of these GHG-friendly investments will increase.

It is important to recognize that the amount of carbon credits generated by a given technology can be higher or lower depending on the location of the project. This is because the amount of credits generated by a project is defined as the difference between the emissions of the project and the emissions that would take place otherwise, i.e., its baseline. Consequently, the higher the carbon intensity of the baseline (e.g., an energy matrix comprised of coal and oil), the higher the amount of emission reductions generated by the introduction of a cleaner energy source.

REQUIREMENTS FOR PARTICIPATION IN THE CDM

Not all projects that result in the reduction of GHG emissions qualify for participation in the Clean Development Mechanism. For projects to qualify as valid mitigation activities in the context of the Kyoto Protocol, they have to fulfill a series of eligibility criteria. The principal criteria are described below:

- ◆ Host country approval - a GHG mitigation project has to be acceptable and approved by the host country government under its own evaluation criteria. Imbedded in these criteria are their respective sustainable development objectives (social, economic, environmental) and other developmental criteria. Ultimately, under the CDM there is a specific aim to assist developing countries in achieving their sustainable development objectives.
- ◆ Additionality - carbon credits

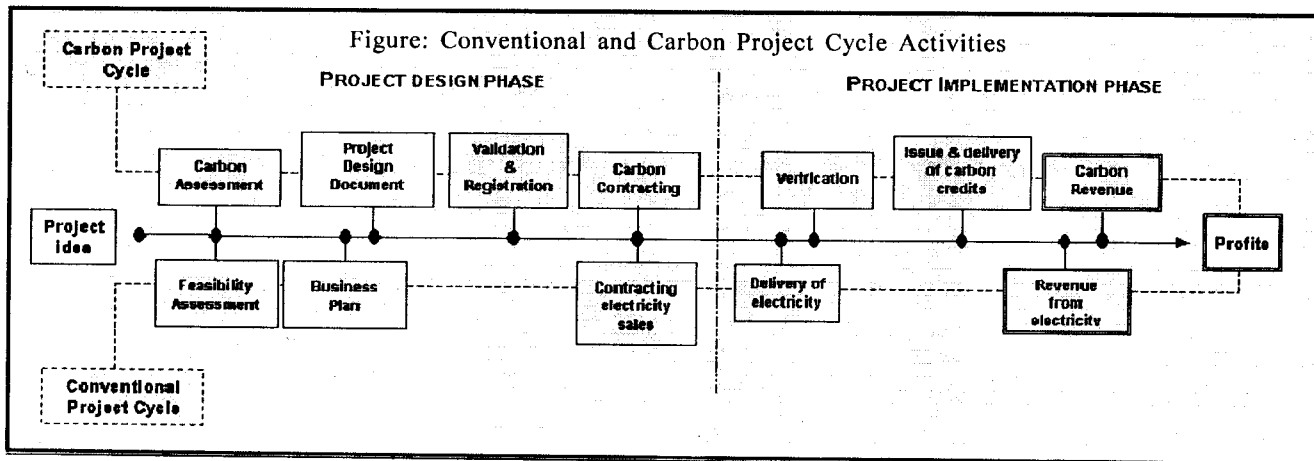
are based on the difference in GHG emissions occurring as a consequence of business-as-usual practices (known as the "baseline" scenario) and the reduced level of emissions occurring after the implementation of project activities. Additionality is designed to ensure that carbon credit projects result in real reductions in the current rate of GHG accumulation in the atmosphere. Not all projects that might appear to have positive GHG effects are additional. For carbon credits to be acceptable under the terms of the Kyoto Protocol, no project can claim GHG emission reductions unless project proponents can reasonably demonstrate that the project's practices are 'additional' to the 'business-as-usual' or baseline scenario. The baseline scenario is broadly described as the collective set of economic, financial, regulatory and political circumstances within which a particular project is implemented and will operate. The validity of any particular project rests upon the case made that environmental performance -- in terms of achieving GHG reductions - exceeds historical precedents, legal requirements, likely future developments, or a combination of all three. Establishing the baseline scenario thus requires knowledge of long term trends in markets, the local socio-economic context, macro-economic trends that may affect the conventional outputs of a project, and other relevant policy parameters. Consequently, baseline determination is based on a range of

assumptions and requires significant policy, sector and country knowledge.

- ◆ Approved methodology - for a project to participate in the CDM, it must follow a methodology that is to be previously approved by the CDM Methodology Panel. Such methodologies must include instructions as to the determination of the project baseline, the quantification of emission reductions generated by the project, and monitoring plans. If a methodology is not available for a new proposed project activity, the project developer can write and propose a new methodology that is analyzed by the Methodology Panel before it can be approved. The process of developing new methodologies is, perhaps, the most specialized step in the CDM Project Cycle (see below), and can take more than one year to be concluded.

In addition to fulfilling the eligibility criteria described above, the development of a CDM project necessarily has to follow a certain order and a series of activities that form the CDM Project Cycle, as shown below (the bottom line shows the conventional project cycle). Because of the multiple steps involved, the effectiveness of dealing with each step will affect the transaction costs required for development of the project.

CDM potential in the paper industry: Paper production is an energy intensive process requiring



mechanical and thermal energy to transform raw materials into finished products. The sector is therefore a significant global user of fossil fuels and electricity. A significant amount of biomass wastes (in solid and sludge or liquid forms) is also produced and requires disposal. Consequently, the industry is a large emitter of Greenhouse gases (GHG) in many parts of the world.

The emissions associated with pulp and paper materials differ based on a number of factors:

1. The pulping process (mechanical of chemical);
2. The type of paper produced;
3. The type of fuel used for onsite electricity generation;
4. The energy efficiency of the mill

For a project to be eligible for carbon credits, it must fall into the limits of certain "methodologies" approved by the UNFCCC. There are applicable methodologies for the following projects.

- ◆ Fuel switch projects : from fossil fuel to natural gas
- ◆ Energy Efficiency and fuel switching measures for industrialized facilities
- ◆ Methane recovery and avoidance from waste residues of pulping process
- ◆ Biomass-based co-generating systems
- ◆ Forestry projects- Reforestation of Degraded land

Although paper market prices are slowly improving the industry is still plagued by structural global overcapacity. Therefore, margins are still under pressure and companies are seeking ways to reduce costs and improve revenue. Carbon trading is a valuable tool that can assist in cost reduction and revenue improvement activities.

One example of the impact carbon trading can make is the example presented here of a 'fuel switch CDM project' where a boiler providing steam into the papermaking process is retrofitted to allow utilization of bark wastes (or to increase the proportion of such material in the fuel mix) instead of coal. Such a retrofit reduces GHG emissions in two ways. First, it reduces emissions that would arise from the burning of coal. Second, it 'avoids' emissions of methane that would occur were the bark biomass to be disposed of in a landfill.

NEXT STEPS YOU CAN TAKE

This emerging market provides a financial incentive to investigate the commercial opportunities from activities in paper and pulp industry in CDM countries (e.g., Latin America, Asia/Pacific, Africa). If you are developing a project, it is advisable to evaluate the emission reduction potential of your project and begin contacting buyers and intermediaries at an early stage. It is important to include consideration of CDM at an early stage as possible, in order to show that CDM revenues

did help in the decision to go ahead. The sooner CDM is considered the better - don't miss the boat!

CONCLUSIONS

The international market for carbon emission reductions is growing at a fast pace. The size of the primary market (i.e., that based on the origination of carbon credits) is expected to reach € 30 to €40 billion during the 2008-2012 period. Estimates for the secondary market (i.e., subsequent transactions involving the same credits) are orders of magnitude higher. It can be expected that many emission reduction projects will now be financed using a combination of debt, equity and carbon finance. It can be expected, therefore, that the total investment leveraged by the sales of carbon credits should be much larger than the estimated size of the primary market for credits, and that the amount of capital invested in developing countries because of carbon finance will be significant.

India's CO₂ emissions are among the lowest in the world relative to the population and GDP. This situation is changing, however and emissions have been growing in the last years, with a tendency to accelerate in the future. In India, there is also a tendency for energy demand to increase more rapidly than the economy. In this context, it can be inferred that there are large opportunities for carbon finance to leverage a faster deployment of clean energy technologies in India.