

Clean Development Mechanism and Carbon Credits A Primer



Celebrating the 60th Year of Excellence



Professional Development Committee
The Institute of Chartered Accountants of India
(Set up by an Act of Parliament)
New Delhi

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FOREWORD

We have been witnessing changes in severe weather conditions and shift in rainfall patterns across the world. These changes in the climate are directly or indirectly attributed to human activities that alter the composition of the global atmosphere in addition to natural climate variability. Such impacts of climate change would have far-reaching and unpredictable environmental, social and economic consequences. Our fight towards climate change has so far been at a very low pace, but it has got impetus in the last few years with very significant participation from Governments, Scientists, Technologists, NGOs, Business Houses and common people.

Some decades ago, a debate started as to how to reduce the emission of harmful gases which contributes to the greenhouse effect that causes global warming. So, countries came together and signed an agreement named the Kyoto Protocol. The Kyoto Protocol has created a mechanism under which countries that have been emitting more carbon and other gases have voluntarily decided that they will bring down the level of carbon they are emitting to the levels of early 1990s.

Kyoto Protocol is one of the most important milestones to tackle this global challenge which provides for three innovative mitigation mechanisms. One of these mechanisms is the Clean Development Management (CDM). The CDM Project has various steps which invariably include the process of calculating emission reductions (CER). The net CER is later verified and certified by an independent entity to ensure compliance of specific criteria defined under the Kyoto Protocol. The CDM Projects also comprise of validation of project design and other associated documents. We believe that the chartered accountant, being a significant member in the national building, could contribute extensively in this process of mitigating climate change in terms of trading, accounting, verification and validation aspects.

It is a matter of great pleasure that Professional Development Committee of ICAI, considering the importance of the matter, has come out with the publication on “Clean Development Mechanism

& Carbon Credits – A Primer”. This publication speaks in detail of various opportunities for professional accountants in this newly emerging area of carbon credit.

I congratulate CA. Rajkumar Adukia, Chairman, Professional Development Committee and his secretariat for putting in their efforts in preparing such a knowledge disseminating publication on carbon credit.

I hope this publication would serve as a guideline and support to all professional accountants to take up their assignments effectively and efficiently in the area of carbon credits.

Ved Jain
President, ICAI

Date : January 01, 2009

PREFACE

In order to achieve faster economic growth, countries are going in for rapid but unorganized industrialization. This has led to emission of green house gases (GHG) in the atmosphere resulting in pollution of environment. To control pollution, the concept of Carbon Credit or mitigation of Climate change has been introduced. Mitigation of climate change refers to human intervention to maintain greenhouse gases to a level that is not harmful for the planet. In order to do this, we can adopt two strategies: either go in for reduction in the emission or increase removals by sink.

In early 1980s, climate change was recognized as a great danger. To counter this problem, Kyoto Protocol came into force on 16th February, 2005. Kyoto Protocol is one of the most important tools to implement mitigation mechanism. India accepted Kyoto in August 2002 itself. This protocol clearly states that developed countries have to reduce their GHG emission levels by at least 5% against the baseline levels of 1990 in five years' time from 2008 to 2012.

The above challenge has compelled developed countries to earn and trade emissions credits through projects implemented either in other developed countries or in developing countries which they can use towards meeting their commitments. Through Clean Development Mechanism (CDM), Certified Emission Reduction units are earned. These units are traded in the market.

India and China are likely to emerge as the biggest sellers and Europe is going to be the biggest buyers of carbon credits. India is one of the countries that have 'credits' for emitting less carbon and is therefore having surplus credit to offer to countries that have a deficit.

For being a certified project it is necessary to have the validation of the same. Validation is an assessment of the design of a greenhouse gas emission reduction project. It provides for analysis of the project design document and other associated documents and information which would include project design, baseline study, monitoring methodology and plan including a

verification schedule. The validation also includes background investigation of a mitigation project. Similarly, verification is a periodic review to determine actual emission reductions of the Clean Development Mechanism (CDM). This validation/verification needs to be carried out at regular intervals once a registered project of mitigation is implemented and is carried out by an independent operational entity.

Professional Accountants, being the active contributors to economy of our nation, could play a pivotal role in mitigating the climatic changes by effectively performing the functions of validation and verification of such mitigation projects to comply with the requirements of the Kyoto Protocol.

The Professional Development Committee has felt that there is a tremendous potential for our members in practice and industry in this field. Thus, the committee has come out with a publication "Clean development Mechanism & Carbon Credits – A Primer". We have tried to incorporate all the relevant information which is useful to gain an insight in the subject.

I am thankful to Shri Vinit Deo and CA. Vikas Kumar, partner, Alok Sharma & Co. for drafting the said publication. I am also thankful to Mr. Rahul Rai, Vice President, Finance & Control, Rabo Equity Advisors for providing an article on Professional Opportunities for Chartered Accountants in Carbon Trading.

I am also thankful to the following officials/professionals for their valuable contribution in developing an exhaustive publication.

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Pvt. Ltd., Dr. Srikanta K Panigrahi, Carbon Minus India (CMI) and Ms. Mohua Banerjee De from CantorCO2e India.

I am also thankful to the Members of Professional Development Committee for their contribution in developing the said publication; CA. Ved Jain, President ICAI, CA. Uttam Prakash Agarwal, Vice President ICAI, CA. Abhijit Bandyopadhyay, Vice Chairman, PDC, CA. Bhavana G. Doshi, CA. Jayant Gokhale, CA. Jaydeep Narendra Shah, CA. Shanti Lal Daga, CA. V. Murali, CA. K. Raghu, CA. James V.C, CA. K. P. Khandelwal, CA. Anuj Goyal, CA. Vijay Garg, CA. Vijay Kumar Gupta, CA. Shabbeer Pasha S, CA. Gandhi Gaurang Vinod Chandra, CA. Bansal Mukul, CA. Bansal Rattan, CA. Gupta Sunil Kumar, CA. K.K. Soni, CA. Amrit Lal Batra, CA. (Dr.) Suneel Maggo and CA. B. M. Sharma.

I am also thankful to the secretariat for its valuable contribution in developing the same.

I hope this material would prove very helpful for new entrants and existing experts in the field of carbon trading.

CA. Rajkumar Adukia

Chairman, Professional Development Committee

Date : January 01, 2009

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ABSTRACT

Carbon Credits are gaining momentum not only around the world but also in India. The Concept of Carbon Credits evolved as a step to mitigate the rising Global Warming on earth. The emission of greenhouse gases by industries and anthropogenic activities has caused irreparable damage to the atmosphere leading to rising global temperature, affecting human life and causing Global Warming. The Concept of Carbon Credits was therefore evolved by way of an agreement by different countries of the world when they met at the third Conference of Parties to the United Nations Framework Convention on Climate Change.

Carbon Credits serve the dual purpose of protection of nature and as a source of revenue generation for the developing and under developed countries. The developed countries who have ratified the Kyoto Protocol, which was an outcome of the Third Conference of Parties of the UNFCCC, have agreed to reduce their greenhouse gas emissions as per the individual norms set by the Kyoto Protocol. In case they fail to meet the emission targets they can buy the extra requirement by following the flexibility mechanism provided by Kyoto Protocol i.e. either purchasing Carbon Credits from the commodities market or by investing in Clean Development Mechanism projects.

The objective of this report is to analyze the potential opportunity for Indian Companies, as India being a developing country has no emission norms to be followed and can benefit in terms of technology, capital transfer and profits by way of selling Carbon Credits and at the same time contribute to the main cause for which this concept evolved i.e. to protect the environment.

This Study provides an analysis of Carbon Credits and looks into the potential benefits Indian companies can derive from it. Our analysis has been made from the point of view of a developing country and how it can benefit by entering into Clean Development Mechanism projects. It provides details of the Clean Development Mechanism, the procedure, steps for project registration, the risks and benefits and profit making opportunities. Also, covered are various aspects of Carbon Credits like accounting, taxability,

institutions providing financial support for project, and trading of Carbon Credits.

The highlights of this report are the Strategies which the companies can use to start a Clean Development Mechanism project. The strategies are the basic steps to start a project and hence are of immense importance. The report covers strategies which are applicable to different sectors followed by a study of existing Indian projects.

The report thus aims to study how the concept of Carbon Credits can be applied to India to reap the benefits there-from. It aims to provide an opportunity to Chartered Accountancy profession to find out the emerging opportunities in CDM and carbon trading field which will help them in providing consultation services to green business companies holistically. It will generate huge foreign exchange to India and will positively contribute to the economic development of this great country.

Chapter-1

Introduction

1.1 Purpose of the Study

India being a developing or “Non-Annex country” has no restrictions to be followed with regards to carbon emission i.e. there is no cap prescribed on how much carbon it can emit. However, it can trade in carbon credits. Various companies have already made a mark in this field by entering into Carbon Trade and Clean Development Mechanism Projects. They are deriving benefits in terms of better technological knowledge and carbon trade profits. These companies include Gujarat Flurochemicals Ltd, SRF Ltd. etc. to name a few.

The purpose of this study on Analysis of Carbon Credits is to:

- Understand the meaning of Carbon Credits.
- Understand the working of Carbon Credits market.
- Identify the procedure needed to enter into the Clean Development Mechanism.
- Understand the Regulatory framework.
- Understand Accounting and Taxation aspects of Carbon Credit.
- Gain knowledge of how the Indian companies can gain these credits.
- Identify the various sectors/companies which can benefit from Carbon Credits
- Identify areas of opportunities for a Chartered Accountant in Carbon Credits

Hence, this study will help any organization to tap the sectors and

companies who can bank on carbon trade and make profits therefrom. It will help to gain overall knowledge of this concept and in turn it will help our company to provide consultancies for companies to identify their Carbon Credits earning source (strategy), help in development of project etc. It will help to develop business opportunities for the companies and there by boost their balance sheets.

1.2 Scope of the Study

Kyoto protocol has three types of Flexibility Mechanism. They are Joint Implementation, Emission Trading and Clean Development Mechanism. This study gives more importance to the Clean Development Mechanism. The various aspects related to Clean Development Mechanism are:

1. Procedure for setting up a Clean Development Mechanism Project
2. The methodologies and strategies
3. The Parties involved in the project
4. The accounting and taxation issues for the profits made from Carbon Trade
5. The risks and benefits associated with Clean Development Mechanism Projects
6. Strategies to gain Carbon Credits.
7. Study of existing Indian Companies and analyzing how they have gained credits through Carbon Trade, which include the strategies adopted by them, the methodologies, expected profit etc.

1.3 Greenhouse Gases

The amount of green house gases (GHG) in the atmosphere is increasing at an alarming rate. In the last century, the amount of carbon dioxide in the atmosphere has increased by 28 percent

(and analysts estimate that it could rise by more than 40 percent in the next hundred years) due to increased global emissions.

As a result of this, the ozone layer which protects us from the direct harmful rays of the sun is depleting giving way to Global Warming. Warming of this magnitude would alter climates around the world, affect crop production, and cause sea levels to rise significantly and this would adversely affect mankind.

Burning of fossil fuels is a major source of industrial GHG emissions, especially from power, cement, steel, textile, fertilizer industries etc. The major greenhouse gases emitted by these industries are carbon dioxide, methane, hydrofluorocarbons (HFCs), nitrous oxide etc, which increases the atmosphere's ability to trap infrared energy and thus affect the Climate.

The **United Nations Framework Convention on Climate Change (UNFCCC)** is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992. The treaty is aimed at reducing emissions of greenhouse gases in order to combat Global Warming. 154 nations signed the UNFCCC. India signed UNFCCC on 10th June 1992 and ratified it on 1st November 1993.

Studies on climate change have put forward two points:

- Earth's carbon absorbing capacity is finite and will be quite exhausted one day. The growth of GHG emissions, even at their present level poses a threat to humankind.
- It has been established that per capita GHG emission is strongly correlated with economic prosperity. It is recognized that without increase in GHG emissions or access to appropriate alternative technology options, developing countries would not be able to pursue their socio-economic goals.

1.4 Kyoto Protocol

The **Kyoto Protocol** (herein-after mentioned as the protocol) is a protocol to the international UNFCCC with the objective of

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reducing GHGs that cause Climate Change. The treaty was negotiated in Kyoto, Japan on 11th December 1997, at the Third Conference of Parties (COP 3), opened for signature from 16th March 1998 and closed on 15th March 1999. The Protocol came into force on 16th February 2005. Countries that ratify this protocol commit to reduce their emissions of carbon dioxide and five other GHGs targeted by the protocol, or engage in emission trading if they maintain or increase emissions of these gases. The first commitment period starts from calendar year 2008 and ends in calendar year 2012.

Protocol highlights:

- As of November 2007, 175 parties have ratified the protocol.
- India acceded to the Kyoto Protocol on 26th August 2002.
- As of December 2007, U.S. and Kazakhstan are the only signatory nations not to have ratified the protocol.

(US did not ratify the protocol because the developing countries were exempted from the emission norms even when China is the 3rd largest emitter of Carbon dioxide. Other economic analysis, however, prepared by the Congressional Budget Office and the Department of Energy Info Administration, demonstrated a potentially large loss to GDP from implementing the Protocol of up to 4.2% .)

The target covers emission of the six main greenhouse gases, namely:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs) and
- Sulphur hexafluoride (SF₆)

The intensity of the gases is measured by their Global Warming Potential.

(Refer Annexure No. 1 for the Global Warming Potential of the Kyoto identified Green House Gases)

- The Protocol divides the nations into two general categories as:
 - **Annex I countries:** They include Developed Countries and countries undergoing the process of transition to economy, which have accepted greenhouse gas emission reduction obligations and must submit an annual GHG inventory
 - **Non-Annex I countries:** These consist of Developing Countries who have no greenhouse gas emission reduction obligations but may participate in the Clean Development Mechanism (CDM)
- Kyoto is a 'cap and trade' system that imposes national caps on the emissions of Annex I countries. On average, this cap requires countries to reduce their emissions 5.2% below their 1990 baseline over the first commitment period of 2008 to 2012.
- In turn these countries set quotas on the emissions of installations run by local business and other organizations, generally termed as 'operators'. Countries manage this through their own national 'registries', which are required to be validated and monitored for compliance by the UNFCCC.
- Each operator has an allowance of credits, where each unit gives the owner the right to emit one tonne of CO₂ or other equivalent GHGs.
- Operators that have not used up their quotas can sell their unused allowances as carbon credits, while businesses that are about to exceed their quotas can

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buy the extra allowances as credits, privately or in the open market.

- By permitting allowances to be bought and sold, an operator can seek out the most cost-effective way of reducing its emissions, either by investing in 'cleaner' machinery and practices or by purchasing emissions from another operator who already has excess 'capacity'.
- Any Annex I country that fails to meet its Kyoto obligation will be penalized by having to submit 1.3 emission allowances in a second commitment period for every tonne of greenhouse gas emissions they exceed their cap in the first commitment period (i.e. between the years 2008-2012)
- The maximum amount of emissions (measured as the equivalent in carbon dioxide) that a party may emit over the commitment period in order to comply with its emissions target is known as a Party's Assigned Amount Units (AAUs)
- Each government can allocate parts of their Assigned Amount Units (AAUs) to individual companies or sectors; these are termed Emissions Rights, Emissions Quota or Emission Allowances
- The individual targets for Annex I Parties are listed in the Kyoto Protocol's Annex B. (Refer Annexure No 2. for the emission targets of different Annex I countries)
- Developing countries have no immediate restrictions under the UNFCCC. The reason being:
- Pollution is strongly linked to industrial growth and developing economies can potentially grow very fast.
- They get money and technological know-how from the developed countries.

1.5 Kyoto's Flexibility Mechanisms

The protocol provided three Co-Operative Implementation Mechanisms to improve flexibility and to develop cost effective means of achieving the emission targets. These mechanisms are:

1. Joint Implementation – between Annex I countries.
2. Emission Trading-between Annex I countries.
3. Clean Development Mechanism- between Annex I countries and Non Annex I countries.

Joint Implementation (JI):

- In Joint Implementation a developed country with relatively high costs of domestic greenhouse reduction would set up a project in another developed country.
- They produce Emission Reduction Units (ERUs) just like CERs in Clean Development Mechanism.

Clean Development Mechanism (CDM):

- In Clean Development Mechanism (CDM), a developed country can 'sponsor' a greenhouse gas reduction project in a developing country where the cost of greenhouse gas reduction project activities is usually much lower, but the atmospheric effect is globally equivalent.
- The developed country would be given credits for meeting its emission reduction targets, while the developing country would receive the capital investment and clean technology or beneficial change in land use.

International Emission Trading:

- Here, the Annex I countries can trade in the international carbon credit market to cover their shortfall in allowances. Countries with surplus credits can sell them to countries with capped emission commitments under the Kyoto Protocol.

Joint Implementation and CDM programs are driven by the understanding that climate change is a global problem, and therefore it does not matter where the emissions reductions are physically achieved. The key consideration is that they occur and are achieved in the most cost- effective way.

Clean Development Mechanism Projects are of importance to us amongst the rest as only Clean Development Mechanism Projects are applicable to India and has potential opportunity for India in terms of transfer of technology, investment, Carbon Trading, profits and most of all environmental benefits.

1.6 Emission Trading Schemes Provided By Kyoto Protocol

Kyoto Protocol provides various projects which can be undertaken and the credits generated through these projects are different from each other and have different importance. Provided below are the various trading schemes under the protocol.

- Certified Emission Reduction (CER)

As mentioned earlier, the companies in developed countries can set up a Clean Development Mechanism in developing country, the amount of greenhouse gas emission reduced by way of Clean Development Mechanism Projects are called as Certified Emission Reduction or CERs, also known as Carbon Credits.

- Emission Reduction Units (ERUs)

Jl is a project-based mechanism developed under the Kyoto Protocol, designed to assist developed countries in meeting their emission reduction targets through joint projects with other developed countries, meaning that JI projects can only be implemented between capped industrialized countries. These projects generate Emission Reduction Units just as CERs under Clean Development.

- Removal Units (RMUs)

These are emissions stored in forest projects and can be generated and traded under CDM or JI. The European Union Emissions Trading Scheme (EU ETS) applies a total restriction or bar on any RMUs, ERUs or CERs generated by projects based on Land Use, Land Use Change & Forestry (LULUCF) activities at least for the 2005-2007 periods.

- Verified Emission Reduction (VER)

Voluntary markets for emissions reductions that are not compliant with the Kyoto Protocol are available for sale to corporations and individuals who want to offset their emissions for non-regulatory purposes. Emission offsets in this latter category are verified by independent agents, but are not certified by a regulatory authority for use as a compliance instrument, and are commonly referred to as Verified Emission Reductions (VERs).

Chapter-2

Carbon Credits

2.1 About Carbon Credits

What are carbon credits?

Carbon credits are a key component of national and international emission trading schemes that have been implemented to mitigate global warming. Credits can be exchanged between businesses or bought and sold in international markets at the prevailing market price. Credits can be used to finance carbon reduction schemes between trading partners and around the world.

- The “currency” for this trade is called Carbon Emission Reduction (CER) commonly called as Carbon Credits.
- One unit of CER is equivalent to the reduction of one metric tonne of CO₂ or its equivalent.

Symbolically: 1 CER= 1 tonne of CO₂ (or equivalent gases)

Carbon Credits have been given the recognition of an intangible commodity and can be traded on the commodities market. Trading of carbon credits happens in the form of CERs or Certified Emissions Reductions. CERs are in the form of certificates, just like a stock. A CER is given by the CDM Executive Board to projects in developing countries to certify that they have reduced greenhouse gas emissions by one tonne of carbon dioxide per year.

For example: If a project generates energy using wind power instead of burning coal, and in the process saves, say 25 tonnes of carbon dioxide per year, it can claim 25 CERs (One CER is equivalent to one tonne of carbon dioxide reduced).

2.2 Approaches To Emission Reduction

A company in a developed country has two ways to reduce emissions:

- a) It can reduce the GHG (greenhouse gases) by adopting new technology or improving upon the existing technology to attain the new norms for emission of gases, or
- b) It can tie up with developing nations and help them set up new technology that is eco-friendly, thereby helping developing country and its companies in earning credits.

This is possible through the **Clean Development Mechanism (CDM) Projects**.

A company in developed country may prefer option 'b' to option 'a'. The reason can be explained by the following illustration:

ILLUSTRATION I: A company in a developed country which emits 1,00,000 tonnes of carbon dioxide has to, being an Annex I country follow the emission norms which sets a target of 80,000 tonnes(say). The two things that the company can do are:

- To either invest in cleaner machinery and technology or
- It can buy Carbon Credits to meet its target.

After evaluating the costs of the alternatives the company may decide to invest in Clean Development Mechanism projects rather than setting up new machinery and technology because setting up new machinery may be more costly in developed country than buying Carbon Credits and investing in Clean Development Projects.

The illustration will explain how this works for a company in developing country:

ILLUSTRATION II: A company in India (developing country) switches from coal power to wind energy, an activity which definitely reduces carbon emission. The CDM board then certifies

that by doing this the company has reduced Carbon dioxide emissions by 1,00,000 tonnes per year. It is then issued with 100,000 Certified Emission Reduction (or CERs commonly known as Carbon Credits). These CER/Carbon Credits can be sold to the companies unable to meet their targets in developed countries. Currently, the price of 1 CER is around 15-18 Euros.

2.3 Facts and Figures on Carbon Credits

According to World Bank estimates,

- India could emerge as one of the largest beneficiaries accounting for **25 per cent** of the total world carbon trade.
- India is considered one of the largest beneficiaries in carbon credit trade accounting for about **\$5bn**
- Annually **27 billion tonnes** of GHG are being produced.
- 175 countries that account for 60% of the global emission are now cutting their green house gas emission.
- U.S. has not ratified the protocol despite being the single largest emitter, accounting for 30.3% of global emissions.*

*Source: Economic Times dated 22nd April 2008

Further,

- The no. of approved project from India stands at 753+*
- The total number of CDM projects registered with CDM-EB has reached 1056 with Indian CDM Projects leading and CERs issued are 143,760,593[#]
- India is the largest supplier of CERs after China.

* Source: IDBI-Carbon Development March 2008 Issue-SSD 016 as of

[#] February 2008

(Refer Annexure No. 3 and 4 for the number of projects registered with host parties and expected average annual CERs by host parties respectively)

2.4 Verified Emission Reduction (VER)

Verified Emission Reductions (VER)

VER is just like CERs, only that they are generated by small scale projects, which are assessed and verified by third party organizations rather than through the UNFCCC. Verified Emission Reductions (VERs) are units of greenhouse gas reductions generated from Clean Development Mechanism (CDM) projects under the Kyoto Protocol, in developing countries and verified by external, UN-accredited third party verifiers.

The VERs do not have to undergo the various steps for setting up a Clean Development Mechanism projects, like registration, verification, certification, issuance of CERs as in case of CDM or ERUs. Buyers therefore tend to pay a discounted price for VERs, which takes the inherent regulatory risks into account.

A VER is a reduction of one metric tonne of greenhouse gas emissions (expressed as a CO₂ equivalent) below a baseline or business-as-usual level. 1 VER corresponds to one metric tonne of CO₂ equivalent.

Voluntary markets for emissions reductions cover those buyers and sellers of Verified Emission Reductions (VERs), which seek to manage their emission exposure for non-regulatory purposes.

2.5 Programme for the Standardization of VERs

As, mentioned earlier, VERs are traded in Voluntary Markets. The VERs are less standardized than CERs because of which their price is less. Following are the measures for standardization of VERs:

- **The Voluntary Carbon Standard (VCS)**

The Voluntary Carbon Standard (VCS), a standard for measurement and recognition of VERs was established by The Climate Group (TCG), the International Emissions Trading Association (IETA) and the World Economic Forum Global Greenhouse Register (WEF) in 2006. The group is striving to set a global benchmark standard that creates a credible VER credit.

The purpose is to provide a detailed description of the minimum quality level that any voluntary emission reduction project needs to satisfy in order for its reductions to meet the Voluntary Carbon Standard, to be recognized as a source of Voluntary Carbon Units (VCU) and to become eligible for registration into a VCU Registry.

Once registered in a VCU Registry, the VCUs become fundable and tradable instruments between market participants. In addition, they provide a guide for certification entities on how to verify compliance of voluntary emission reduction projects with the Voluntary Carbon Standard. The VCS will initially reference current CDM accounting and verification standards.

- **The Gold Standard**

Founded by the World Wildlife Foundation (WWF), SSN and Helio International, the Gold Standard is a non-profit foundation under Swiss Law and funded by public and private donors. A methodology for voluntary offset projects was launched in May 2006. The Gold Standard Foundation offers labeling for voluntary offset projects.

The Gold Standard VER builds on the criteria applied for Gold Standard CDM projects. The main differences include simplified guidelines for "micro"—projects that deliver less than 5,000 tonnes of emission reductions annually (normally a project that wouldn't qualify for CDM CER program), greater flexibility for countries without host approval and host country eligibility. Validation and registration to the Gold Standard and verification follow the general principles of CDM. However, credits issued upon verification of emission reductions are directly issued by the Gold Standard. Currently, a registry mechanism is being developed that

will allow unambiguous identification of credits used to back offsets.

- **GHG Registry by Environmental Resources Trust (ERT)**

ERT is developing the GHG Registry, SM_[v2] and associated services to support the key infrastructure requirements needed for a robust GHG emissions reductions trading market. The GHG Registry provides the following: transparent recordation and tracking of qualified emissions reductions; credible third-party review, and quality assurance, of reductions recorded in the GHG Registry; establishment of reductions claimed for early action and other public programs; and a mechanism for the retirement of GHG emissions reductions.

- **VER+ Standard by TÜV SÜD**

Verified emission reductions are commonly understood as tradable emission reductions that have been generated according to defined standards and requirements other than the Kyoto Protocol. TÜV SÜD is one of the leading companies providing validation and verification services for CDM and JI projects according to the Kyoto Protocol.

Audits have been carried out for hundreds of emission reduction projects worldwide within all relevant project categories (scopes). TÜV SÜD offers validation and verification services also for projects that do not intend to get registered under the Kyoto scheme (CDM/JI) or any other governmental system. In principle the criteria for VER+ are in line with those for the Kyoto Protocol project based mechanisms (JI and CDM), including the requirement on project additionality proving that the project is not a business as usual scenario.

The main difference to regular JI and CDM activities comprises that VER+ projects are not brought to registration with UNFCCC and therefore will not be accounted on any Annex-I-country's Kyoto balance. For projects in developing countries larger flexibility is provided on the choice of the applied methodologies, which may be composed according to the guidelines applied for JI projects.

2.6 Calculation of CER

CERs are awarded based on the global warming potential of the gas. Green house gases affect global warming with varying intensities. This intensity is measured by the "global warming potential" of the gas.

ILLUSTRATION-III: The global warming potential of Methane is 13 and the Global Warming Potential of Carbon Dioxide is one. Therefore, one tonne of Methane has 13 times more the green house affect than Carbon Dioxide. (Refer Annexure No 1 for the Global Warming Potential of the Kyoto identified Green House Gases)

CERs awarded = Tonnes of green house gas reduced multiplied by Global Warming Potential of the Gas.

(Refer Annexure No. 5 and 6 for CERs issued by host party and CER issued v/s CERs requested respectively)

Chapter-3

Clean Development Mechanism

3.1 Understanding the Clean Development Mechanism (CDM)

Clean Development Mechanism (here after mentioned as CDM) is provided under Article 12 of the Kyoto protocol.

The **Kyoto Protocol** (Article 12) states:

"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"

The key features of CDM projects are following:

1. CDM project has to follow a specific CMD Project Cycle.
2. The CDM is supervised by Executive Board which comprises, 10 members elected by the Conference of Parties (COP).
3. The basic rules for the functioning of the CDM is contained in Marrakesh Accords which was agreed at seventh Conference of Parties (COP 7) to the UNFCCC held at Marrakech, Morocco.
4. Marrakesh Accords cover significant principles for technology transfer, accounting, flexible mechanisms implementation etc.

The CDM has a two-fold purpose:

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- (a) To assist companies in the developing countries in achieving sustainable development.
- (b) To assist companies in the developed countries in achieving compliance with part of their quantified emission limitation and reduction commitments.

Each CDM project activity should meet the above two-fold purposes.

Eligibility for the CDM Project:

- 1. Projects are eligible to earn credits if they lead to 'real measurable and long term' reduction of green house gases in order to mitigate climate change effects.
- 2. They should contribute to the sustainable development of the host country.
- 3. There should be voluntary participation by each party involved
- 4. The activity must ensure access to environmentally sound technology needed by the developing country.

3.2 Clean Development Mechanism Project Cycle

Outline of the CDM Project registration process:

An industrialized country that desires to get credits from a CDM project must obtain the permission of the developing country hosting the project that it will contribute to their sustainable development. Then, using methodologies approved by the CDM Executive Board (EB), the applicant (the industrialized country) must make the case that the Carbon Project would not have happened anyway (i.e. establishing *additionality*), and must establish a *baseline* estimating the future emissions in absence of the registered project.

The case is then validated by a third party agency called a Designated Operational Entity (DOE) to ensure the project results

Clean Development Mechanism

in real, measurable, and long-term emission reductions. The EB then decides whether or not to register (approve) the project. If a project is registered and implemented, the Executive Board issues Carbon Credits to the project participants based on the monitored difference between the baseline and the actual emissions as verified by the Designated Operational Entity (DOE).

CDM Statistics:

	Annual Average CERs*	Expected CERs until end of 2012**
CDM project pipeline: > 3000 of which:	N/A	> 2,700,000,000
--- 1056 are registered	214,482,027	> 1,270,000,000
-- 54 are requesting registration	9,937,897	> 40,000,000

* Assumption: All activities deliver simultaneously their expected annual average emission reductions

** Assumption: No renewal of crediting periods

Source: www.unfccc.in

CDM Project Activity:

- Develop a project idea
- Propose a New Baseline and/or Monitoring Methodology
- Use the Approved Baseline and/or Monitoring Methodology
- Validate the CDM project activity
- Register the CDM project
- Certify/Verify the emission reductions of a CDM project
- Request issuance of CERs related to a CDM project

Steps In CDM Process

Stage I: Project Design Document (PDD) and Monitoring Plan preparation

The first step in CDM projects starts with identification of an idea in order to develop a project. The initial step requires the project proponent to examine the emission reduction resulting from the project and to ascertain if it contributes to the development priorities of the nation.

The Project Sponsor has to develop a CDM Project Design Document (PDD) for the identified opportunity in the PDD format approved by CDM Executive Board. The Project Design Document Form can be obtained from the UNFCCC website. www.unfccc.or

Specific PDDs exist for different project types:

- I. Standard CDM project activities (CDM-PDD)
- II. Small-scale project activities (CDM-SSC-PDD)
- III. Afforestation and reforestation project activities (CDM-AR-PDD)
- IV. Small-Scale afforestation and reforestation project activities (CDM-SSC-AR-PDD)
- V. Programme of Activities (POA-DD) and CDM Programme Activities (POA-CPA-DD)

The Broad Categories of areas in which the CDM projects can be developed are discussed further in General and Sector specific strategies to earn carbon credits.

The Project Design Document should contain:

- a. General description about the project.
- b. It should portray the project boundary and identifying of leakages

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- c. Selection of Baseline and methodology. The company can also scan the existing projects for their baseline and methodology and adopt the same for their projects.
- d. It can develop a new baseline methodology in case none of the existing approved/proposed baseline methodologies are found appropriate for the project.
- e. Application of the selected/developed baseline methodology to the project
- f. Demonstration of various additionalities for the project.
- g. Assessment of various monitoring and verification (M&V) methodologies and selection of the most appropriate one. This would also include a scan of approved projects or approved methodologies to ascertain if there are approved methodologies which may be applied to this project;
- h. Development of a new M&V methodology, on the occasion none of the existing approved/proposed methodologies are found appropriate for the project.
- i. Estimation of potential streams of CERs.
- j. Environmental Impact Assessment for the project;
- k. Sustainability assessment of the project

Stage II: Host country approval

Once the project promoter is convinced that the project is relevant under CDM, a project idea note is prepared and submitted for endorsement to the Designated National Authority (DNA) of the host country. For India, the Designated National Authority (DNA) is the Ministry of Environment and Forests (MoEF), GoI. Project Sponsor is required to secure a Host Country Approval from the Designated National Authority (DNA). This involves completion of a Project Information Note in the MoEF format and its submission together with the PDD to MoEF. The Project sponsor would be required to make a presentation to the DNA on an appointed date. In India, National CDM authority clears sustainable development criteria for projects, usually within 60 days.

Stage III: Validation

To establish the 'additionality' of a project, it is necessary to first define a Baseline against which project emissions can be measured. This baseline study is carried out in accordance with provisions in the Kyoto Protocol and Marrakesh Accord, and estimates the quantum of GHG reductions in terms of tonnes of carbon dioxide equivalents. The project idea note, the baseline study, and other relevant details are submitted for validation to an independent agency identified by the CDM Executive Board as a DOE (designated operational entity). The DOE checks whether the proposed project activity meets all the requirements of the CDM and submits its validation report to the Executive Board.

Validation is the process of independent evaluation of a project activity against the requirements of the CDM on the basis of the project design document by a Designated Operational Entity (DOE).

The Project sponsor is required to appoint an independent third party for validation of the project. CDM-EB has approved certain entities e.g. DNV, TUV, SGS etc. as Designated Operating Entity (DOE) for undertaking validation. The Validation process also involves a Public Disclosure of the project for 30 days at the UNFCCC website. This is also organized by the validator.

Stage IV: Approval of Baseline Methodology by CDM – EB/Methodology Panel

Project participants willing to register a CDM project activity shall:

- Use a methodology previously approved by the Executive Board or
- Propose a new methodology to the Executive Board for consideration and approval.

If the project is a first of its kind then it will probably have to propose a new methodology. In case a new baseline methodology is developed, it is reviewed by a panel of experts constituted by the Executive board called the "Methodologies Panel" before final

board approval, and on its recommendation, it is approved by CDM -EB.

The new baseline methodology should be submitted by the designated operational entity to the Executive Board for review, prior to a validation and submission for registration of this project activity, with the draft project design document (CDM-PDD), including a description of the project and identification of the project participants.

Proposing a new methodology is a time consuming process as this process can take 12-18 months to get approved. Also, consultants charge a lot more for projects that require a new methodology.

Stage V: Project Registration

A validated project is required to be registered with CDM-EB of UNFCCC. This is usually the responsibility of the Designated Operating Entity. The Project sponsor is required to pay a registration fee.

Registration is the formal acceptance by the CDM-Executive Board of a validated project as a CDM project activity. Registration is a prerequisite for verification, certification and issuance of CERs related to that project activity.

Stage VI: Monitoring and verification

Verification is a periodic independent review and ex post determination by the designated operational entity of the monitored reductions in anthropogenic emissions by sources of greenhouse gases that have occurred as a result of a registered CDM project activity during the verification period. Certification is the written assurance by the designated operational entity that, during a specified time period, a project activity achieved the reductions in anthropogenic emissions by sources of greenhouse gases as verified.

On registration of the project, the Project sponsor is required to appoint one of the Designated Operational Entities (DOE) as a verifier. The verifier conducts an audit of the project activity after its commissioning and its becoming operational, as per the

approved monitoring and verification protocol (included in the PDD registered with CDM-EB), to estimate and certify the actual volume of CERs generated on account of the project activity. The sponsor may appropriately select a verification cycle i.e. Annual, Half Yearly, Quarterly etc.

Stage VII: Certification

Certification is written assurance by the designated operational entity that, during a specified time period, a project activity achieved the GHG emissions reductions as verified.

Stage VIII: Issuance of CERs

The certification report, submitted by the DOE to CDM-EB/Registrar, shall constitute a request for issuance to the Executive Board of CERs equal to the verified amount of reductions of anthropogenic emissions by sources of greenhouse gases. The monitoring and verification entity, after completing the process, submits its report to CDM EB, which constitutes a request for issuance of Certified Emission Reduction (CERs).

A project can continue to earn CERs for a maximum of either 10 years (with no change of the baseline) or 7 years with at most two renewals (i.e. up to 21 years). 2% of the share of proceeds from the CERs must be forwarded towards the adaptation fund of the Kyoto Protocol.

(Refer Annexure No 7 for the CDM Project Cycle)

What Is Additionality?

The CDM Project has to generally state as to what would have happened without the project. The basic idea of additionality is that those project activities that would also occur without the CDM, i.e. that are business as usual, should not be certified under the CDM.

Additionality can be:

- 1) Environmental additionality: It looks as to what would happen without the project. This includes a dialogue of impact of the

project activity on resource sustainability, reduction of the level of pollution by the project etc.

- 2) Technological additionality: The CDM project activities should lead to transfer of environmentally safe and sound technologies and knowledge.
- 3) Financial Additionality: The project should bring in additional investment consistent with the needs of the people.
- 4) Emission Additionality: The project should lead to real, measurable and long term GHG mitigation. The additional GHG reductions are to be calculated with reference to a baseline.

What Is A Baseline?

A baseline for a CDM project gives the greenhouse gases emissions that would have occurred in the absence of the proposed CDM project activity. If a project gets 20,000 CERs it means that its emissions are 20,000 tonnes of carbon dioxide less than a reference point called a baseline.

The amount of emission reduction of the green house gases is the difference between the emissions that would have occurred without the project minus the emissions of the project. The construction of such an imaginary scenario is known as the baseline of the project. The baseline may be estimated through reference to emissions from similar activities and technologies in the same country or other countries, or to actual emissions prior to project implementation.

3.3 CDM Project Cost Estimation

The cost for CDM project registration can come to around 30,000 to 1,20,000 Euros. The Table below provides the Cost Estimation of a CDM project:

Steps of CDM project	Estimated Cost (in Euros)
Filling in a project design document (PDD)	15,000 Euro (with approved methodology) 45,000 Euro (new methodology)
Applying for Government(DNA) approval	NIL
Selecting of a baseline/methodology or propose a new one.	30,000 Euro(for new baseline) Nil(for existing baseline)
Hiring of a Designated Operation Entity for Validation	7000-15,000 Euro
Approval from the Executive Board for registration	4,000-25,000 Euro
Hiring a Designated Operational Entity for Verification	Not known

3.4 Methodologies of Projects

The UNFCCC provides approved methodologies which a company can adopt for the CDM Projects. The methodologies are divided on the basis of the projects as under:

- a) Methodologies for CDM project activities
- b) Methodologies for afforestation and reforestation CDM project activities:

- c) **Methodologies for Small Scale Projects:** This provides information on simplified baseline and monitoring methodologies for small scale CDM project activities.

The classification of CDM methodologies distinguishes between several types of methodologies:

- **AM:** Approved methodologies for CDM projects
- **AR-AM:** Approved afforestation and reforestation methodologies (not applicable to

Cogeneration projects)

- **ACM:** Approved consolidated methodologies
- **AMS:** Approved small-scale methodologies

(Refer Annexure No. 8 for example of Common Methodologies adopted by Small Scale projects)

3.5 Authorities Involved in the CDM Project Cycle

- I. Clean Development Mechanism-Executive Board (CDM-EB)
- ii. Designated Operational Entity (DOE)
- iii. Designated National Authority (DNA)

Clean Development Mechanism-Executive Board (CDM-EB):

The CDM projects are supervised by Executive Board of the UNFCCC which is, elected by the Conference of Parties (COP). The Executive Board supervises the operation of CDM. The Board has the final say on whether a project is to be approved or not and lays out procedures and guidelines for CDM. The CDM executive board is the highest international body under the Kyoto Protocol to register projects and issue credits.

The Board comprises 10 experts drawn from the parties to the Kyoto Protocol as follows:

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One representative from each of the five UN regions (Africa, Asia, Latin America and the Caribbean, Central Eastern Europe and OECD), two representatives from Annex I and Non-Annex I countries respectively and one representative from the small island developing states.

Designated Operational Entity (DOE):

A Designated Operational Entity (DOE) is a company accredited by the CDM Executive Boards that checks whether projects are fulfilling CDM criteria. A CDM project must be checked by two processes – *Validation* and *Verification*. Validation is done once before initial project approval. Verification is done periodically after the project has been approved or registered. They act as an intermediary between the project developer and the Executive Board. A large scale project cannot have same Designated Operational Entity for validation and verification.

Designated Operational Entities in India are :

- a. TUV Suddeutschland India
- b. Det Norske Veritas
- c. SGS United Kingdom Limited
- d. TÜV Rheinland India
- e. BVQI(Bureau Veritas Quality International)

Designated National Authority (DNA):

Designated National Authorities are authorities to manage the Kyoto process and specifically the "CDM process" whereby these host government entities decide which Greenhouse Gas Projects they do or do not wish to support for authorization by the CDM Executive Board. For India the designated national Authority is the Ministry of Environment and Forests (MoEF).

3.6 Projects Under Clean Development Mechanism

The CDM Projects can be:

- Large scale projects and
- Small scale projects: They include:
 - Type I- Renewable energy project activities with a maximum output capacity equivalent of up to 15 megawatts (or an appropriate equivalent)
 - Type II- Energy efficiency improvement project activities which reduce energy usage by up to 15 gigawatthours per year
 - Type III- Project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

(Refer Annexure No. 9 & 10 for Graphical view of Type II and Type III Small Scale Projects respectively)

What are the procedures for small scale projects?

Small Scale Projects have simple procedures which aim to reduce the cost of applying for CDM approval. The simplified modalities, mainly aim at reducing the transaction cost.

The simplified modalities for these projects include:

- a) Bundling of project activities during the following stages of project activity: preparing the project design document, validation, registration, monitoring, verification and certification
- b) Simplification of baseline methodologies; for example, fuel switch projects are exempted from accounting for leakages

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(for instance, greenhouse gases being emitted from other activities of the projects) while formulating their baselines.

- c) Simplification of monitoring plans, including simplified monitoring requirements, to reduce monitoring costs
- d) Use of the same operational entity for validation, verification and certification.

Annexure A of the Kyoto Protocol has categorized 5 sectors for CDM project Eligibility:

- i. Energy
- ii. Industrial Processing
- iii. Solvent and Other Products
- iv. Agriculture
- v. Waste

The Projects covered under CDM are:

- i. Renewable energy
- ii. Fuel Switching
- iii. Co-generation and waste heat based power generation
- iv. Waste management
- v. Energy efficiency
- vi. Transportation
- vii. Afforestation/reforestation

(Refer Annexure No. 11 & 12 for Registered Projects under Large and Small Projects and Distribution of Registered project activity by scope respectively)

Chapter-4

CDM Related Issues

4.1 Stakeholders in CDM Projects

All the parties mentioned below are the stakeholders of a CDM project as the project performance is dependent or affects them directly or indirectly.

- a) **CDM Project Sponsors:** Project sponsor means the developed country which undertakes to sponsor a Clean Development Mechanism project in a developing country. The sponsor country ties up with the company and provides them technological and financial support for setting up a project and in turn these companies transfer the CERs generated to the sponsor to help them meet their emission target.
- b) **Host Country:** The host country being the developing country takes into consideration the benefits likely to arise out of the project before permitting a sponsor to set up such a project because being a host country it has to see to it that the project is beneficial to the country.
- c) **Contractors:** They include the contractors who undertake project implementation like consultancies, installation of machinery, renovation of plant or other method adopted to undertake the project.
- d) **Public/Private Financial Institutions:** Setting up of a project requires huge cost. There are various financial institutions which now provide financial as well as technical assistance to the companies in order to initiate a project.

4.2 Benefits of Carbon Credits

BUYERS	SELLERS
Cost effective way to meet emission targets	Can gain from better machinery and technology
Helps to accomplish Corporate Social Responsibility	Helps to make profits from Carbon Trade.
	Helps to accomplish their Corporate Social Responsibility and act as responsible organizations.

4.3 CDM Related Risks

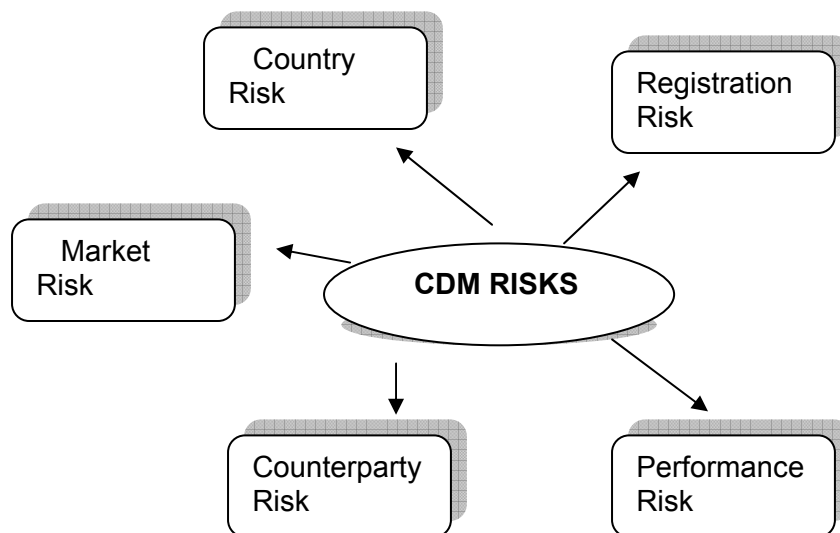
CDM projects have risk attached to them. The several different types of risks involved in CDM projects are:

- Registration risk: Registration risks can occur from the possibility that the DOE does not validate the project and that it is not registered by the Clean Development Mechanism- Executive Board. The most significant component of regulatory risk is additionality risk, which relates to whether the project will be deemed additional by the CDM Executive Board

This can be because of :

- non approval of a new methodology
- unsuccessful validation of a methodology for calculating emissions reduction
- non-approval by the host country
- request for review by the CDM EB at either the registration or CER issuance step.

- Performance risk: The project developed must be able to meet the targeted emission in order to gain credits, else the amount invested will not get the expected benefit.
- Counterparty risk: As CER is sold through futures contract, there is always the risk that one of the parties defaults on its contractual obligation.
- Market/ Pricing risk: This risk relates to the expected market price of CERs on delivery. CERs are purchased in a forward contract (in most cases) at a fixed price, which may be different from the market price of CERs at the time of delivery. When contracting for CERs at a fixed price, the buyer assumes the risk that prices may drop in the future (and the seller, the risk that market prices will increase). The price of CERs is highly speculative. Market risk is directly linked to the fluctuations in the price of CERs.
- Country risk: Country risk relates to the risk that the host country may not ratify and subsequently comply with its obligations under the Kyoto Protocol.



4.4 Sources of Financing Clean Development Mechanism Projects

The funds to start a CDM project can be raised from financial markets or from banks. However, in developing countries it is better to take a loan from the banks.

- Internal sources of Financing : The Company can use retained profits to finance its CDM related projects. However, the company should have made profits for the same.
- External Sources of Financing : External financing is raised through borrowings from financial institutions and issue of shares.

4.5 MODES OF TRANSFERRING CERs

Once the CERs are generated through the project undertaken, they have to be sold/transferred. The mode of transfer of CERs will depend on the nature of agreement between the contracting parties.

Some of the methods of transfer of CERs are:

- a. Investment by an entity from one of the Annex I country directly in a CDM project in Non-Annex country in exchange of the CERs that are expected to accrue from the project.
- b. The companies enter into agreement to purchase CERs from a developing country entity or access the open market, as and when they are required to meet certain commitments.
- c. Many Annex I governments are floating tenders for procurement of CERs.
- d. There are multilateral institutions like the World Bank and IFC, who have been engaged by Annex I country governments and private sector corporations to purchase carbon credits (CERs) on their behalf.

- e. CDM provides for banking of CERs, wherein the emission reductions prior to 2008 may be banked for use in the commitment period in 2008-12.
- f. Credits can be bought and sold in the commodity exchanges.
- g. The European Climate Exchange, Chicago Climate Exchange, Multi Commodity Exchange, National Commodity and Derivative Exchange provide a platform for Carbon Trade.

(Refer Annexure No. 13 for international buyers of CER)

4.6 Pricing of CERs

Prices of CERs generated by CDM projects are influenced by several factors. The main factors are:

- Price of European allowances traded under the European Emissions Trading Scheme
- Demand from other Annex I countries (e.g. Japan)
- Delivery stage of the CER credits (e.g. registered project with delivery guarantee/without guarantee, CER futures from project not yet registered...).

The price range for CERs are around 7-14 Euros, with variations in prices depending on the host countries. China, for example, has set a floor price for CERs issued for projects on its territory at 8 USD per CER.

The price of Carbon Credits is a function of demand and supply situation as is the case with any other asset. As the developed countries who have signed the protocol have norms fixed, the demand for carbon credits depends to what extent they meet these targets between 2008 and 2012. The demand for carbon credits depends on the actual levels of GHG emissions of various countries in relation to their targeted emission reductions. If the countries achieve higher level of emission reductions than their targets, then the companies in those countries need not buy

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additional carbon credits. But, if they are unable to meet their demand internally, the demand for carbon credits is likely to be higher. Thus, the price of Carbon Credits is subject to fluctuations based on the demand for it. The demand for carbon credits depends on the actual levels of GHG emissions of various countries in comparison with their targeted emission reductions.

(Refer Annexure No 14 for Price of CER on the European Climate Exchange)

The Unknown side of CER :

As the developed countries who have signed the protocol have fixed norms, the demand for carbon credits depends on the extent to which they meet these targets between December 2008 and 2012. The point of concern is how much credit will be available in market at that time and, to what extent would norms be met by European companies. If these norms are changed, prices can under go correction.

But, as of now, there is a very transparent mechanism in which the norms for the next five years have been fixed. Also as mentioned in the Market risk, CERs are purchased in a forward contract (in most cases) at a fixed price, which may be different from the market price of CERs at the time of delivery.

When contracting for CERs at a fixed price, the buyer assumes the risk that prices may drop in the future (and the seller, the risk that market prices will increase). The price of CERs is highly speculative. Market risk is directly linked to the fluctuations in the price of CERs.

Chapter-5

Accounting and Taxability of Income From CERs

The Clean Development Mechanism has brought a new source of revenue generation for the companies in the developing countries. As the concept of Carbon Trading is new, there are as yet quite a few issues which have to be settled at both National and International Level. The issue on income generation from CERs and taxability of such income is yet to be addressed in India. The issue is delayed as a reason of absence of any specific provisions in the Income-tax Act; 1961.

Accounting of Carbon Credits:

As this is a new concept, it has given rise to interesting financial accounting dimensions.

Issues involved are:

- How to account for expenditure on CDM projects
- Whether or not to account for self-generated CERs held with registry
- If credits are to be accounted, at what point of time should these be recognized in books of accounts and at what value
- How to account for sale consideration of CERs and their disclosure in accounts and notes.

As of now, there is no separate Indian Accounting Standard to measure income and expenditure from carbon credits projects and profit made from them. A CDM project cannot be a profit centre or cost centre in itself. In a multi-segment industry, any CDM project can be identified with its parent segment.

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There are currently no International Accounting Standards for the accounting of profits made from Carbon Trade. The Institute of Chartered Accountants of India (ICAI) is soon going to constitute an expert group to formulate a draft to establish accounting standards on emissions.

Taxability of Income from CER:

As for taxability of Carbon Credits, the controversy is mainly regarding the income head under which the income from sale of carbon credits should be taxed.

- One view is that it is an **incidental business income** since CERs are earned / generated from machinery/technology employed in the process of undertaking a business venture/project. In this case, the income would be treated as a Profits & Gains of Business or Profession (PGBP) or Income from Other Sources (IOS) and taxed at the normal rate of tax like any other sources of income.
- The other view is that sale of CERs is a **transfer of capital asset liable to capital gains tax**. This view proceeds on the premise that carbon credit is an intangible property being a commercial right granted under the Kyoto Protocol.

The first thing what needs to be seen is whether it falls under the definition of capital assets. Assuming it is a capital asset, there could be issues in ascertaining its real cost of acquisition and there could be doubt regarding the date from which the holding period should be recognized, i.e., at the time of verification, certification or sale of CERs. All of the above is relevant in determining whether the resultant capital gains should be taxed at 20% (being long-term capital gain) or at 30% (being short-term capital gain).

These issues are yet to be addressed.

Chapter-6

India and Carbon Credits

6.1 Analyzing Indian Scenario

India being a developing country has no emission targets to be followed. However, she can enter into CDM projects. As mentioned earlier, industries like cement, steel, power, textile, fertilizer etc. emit green houses gases in their use of fossil fuels.

Companies investing in Windmill, Bio-gas, Bio-diesel, and Co-generation are the ones that will generate Carbon Credits for selling to developed nations. Polluting industries, which are trying to reduce emissions and in turn earn carbon credits and make money include steel, power generation, cement, fertilizers, waste disposal units, plantation companies, sugar companies, chemical plants and municipal corporations.

Delhi Metro Rail Corporation (DMRC):

A must-mention project is the Delhi Metro Rail Corporation (DMRC): It has become the first rail project in the world to earn carbon credits because of its use of **regenerative braking system** in its rolling stock. DMRC has earned the carbon credits by using regenerative braking system in its trains that reduces 30% electricity consumption.

Whenever a train applies regenerative braking system, the released kinetic energy starts a machine known as converter-inverter that acts as an electricity generator, which supplies electrical energy back to the Over Head Electricity (OHE) lines. This regenerated electrical energy that is supplied back to the OHE is used by other accelerating trains in the same service line. DMRC can now claim 400,000 CERs for a 10-year crediting period beginning December 2007 when the project was registered by the UNFCCC. This translates to Rs 1.2 crore per year for 10 years. (Also, other Case Studies are included in the Case Study).

India has the highest number of CDM projects registered and supplies the second highest number of Certified Emission Reduction units. Hence, -India is already a strong supplier of Carbon Credits and can improve on it. (Refer Annexure No. 3 & 4 for projects registered and expected average annual CERs generated respectively)

6.2 Benefits for India

By, switching to Clean Development Mechanism Projects, India has a lot to gain from Carbon Credits:

- a. It will gain in terms of **advanced technological improvements** and related foreign investments.
- b. It will contribute to the underlying theme of **green house gas reduction** by adopting alternative sources of energy
- c. Indian companies can make **profits** by selling the CERs to the developed countries to meet their emission targets.

6.3 Trading of CERs

Trading Platform for CERs in India:

As a welcome scenario, India now has two Commodity exchanges trading in Carbon Credits. This means that Indian Companies can now get a better trading platform and price for CERs generated.

- **Multi Commodity Exchange (MCX)**, India's largest commodity exchange, has launched futures trading in carbon credits. The initiative makes it Asia's first-ever commodity exchange and among the select few along with the Chicago Climate Exchange (CCE) and the European Climate Exchange to offer trades in carbon credits. The Indian exchange also expects its tie-up with CCX which will enable Indian firms to get better prices for their carbon credits and help integrate the Indian market better with the global markets to foster best practices in emissions trading.

- On 11th April 2008, National Commodity and Derivatives Exchange (NCDEX) also started futures contract in Carbon Trading for delivery in December 2008.

Thus, India has an advantage as it can get better price for the Carbon Credits generated.

MCX is the futures exchange. People here are getting price signals for the carbon for the delivery in next five years. The exchange is only for Indians and Indian companies. Every year, in the month of December, the contract expires and at that time people who have bought or sold carbon will have to give or take delivery. They can fulfill the deal prior to December too, but most people will wait until December because that is the time to meet the norms in Europe.

If the Indian buyer thinks that the current price is low for him he will wait before selling his credits. The Indian government has not fixed any norms nor has it made it compulsory to reduce carbon emissions to a certain level. So, people who are coming to buy from Indians are actually financial investors. They reckon that if the Europeans are unable to meet their target of reducing the emission levels by 2009, 2010 or 2012, then the demand for the carbon will increase and then they may make more money.

So investors are willing to buy now to sell later. There is a huge requirement of carbon credits in Europe before 2012. Only those Indian companies that meet the UNFCCC norms and take up new technologies will be entitled to sell carbon credits. There are parameters set and detailed audit is done before you get the entitlement to sell the credit.

6.4 Financing Support in India

Carbon Credits projects requires huge capital investment. Realizing the importance of carbon credits in India

- The World Bank has entered into an agreement with Infrastructure Development Finance Company (IDFC), wherein IDFC will handle carbon finance operations in the country for various carbon finance facilities.

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- The agreement initially earmarks a \$10-million aid in World Bank-managed carbon finance to IDFC-financed projects that meet all the required eligibility and due diligence standards.

Also,

- IDBI has set up a dedicated Carbon Credit desk, which provides all the services in the area of Clean Development Mechanism/Carbon Credit (CDM).
- In order to achieve this objective, IDBI has entered into formal arrangements with multi-lateral agencies and buyers of carbon credits like IFC, Washington, KFW, Germany and Sumitomo Corporation, Japan and reputed domestic technical experts like MITCON.
- HDFC Bank has signed an agreement with Cantor CO2E India Pvt Ltd and MITCON Consultancy Services Limited (MITCON) for providing carbon credit services. As part of the agreement, HDFC Bank will work with the two companies on awareness building, identifying and registering Clean Development Mechanism (CDM) and facilitating the buying or selling of carbon credits in the global market.

These provide a great backing to Indian Companies to develop the project and to finance it.

Chapter-7

Strategies To Gain Carbon Credits

General Strategies to gain Credits

The table below provides a snapshot of the projects that can be taken up for Clean Development Mechanism.

PROJECT TYPE	STRATEGY
Renewable Energy Projects	Wind Power Solar Biomass Hydel
Fuel Switching	from fossil fuel to green fuel like biomass, rice husk, etc.
Cogeneration in industries having both steam and power requirement	
Energy Efficiency Measures	Boiler and Steam Efficiency Efficient Cooling System Back Pressure Turbines Installation of Variable Speed Drives Pump and Pumping System Improved Co-gen Efficiency

Induction of new technologies in power sector	
Waste Management	<p>Methane recovery from municipal solid wastes, biomethanation for power generation,</p> <p>Utilisation of waste and waste water emissions for generation of energy</p>
Transport	<p>Fuel switch from gasoline/diesel to natural gas</p> <p>Replacement of shipment of certain raw material through roads to pipeline</p>

Emerging Sectors of CDM for Chartered Accountants

The nature of CDM projects can vary widely. Since its inception, the global market for CDM portfolio has diversified significantly. The UNFCCC distinguishes the CDM categories detailed below, and a number of possible examples of CDM projects are provided for each category. At the time of writing, approved methodologies are available for some, but not all of these categories. It should be noted, however, that as the market develops further, the number of differing project types and methodologies under each category is likely to continue to grow.

1. **Energy industries (Renewable and Non-renewable sources):** CDM projects in the generation of zero-emission energy (electricity or heat) from renewable sources such as wind, wave/tidal, solar, hydro, biomass or geothermal energy. In such projects, emission reductions occur if the zero-emission energy would otherwise have been provided by fossil fuels.

The energy industry can also mitigate emissions through fossil fuel switching or supply-side energy efficiency. Fuel switch projects involve the substitution of one fossil fuel with another which has lower emissions through its lifecycle, e.g. a switch from coal to gas-fired power generation;- supply-side energy efficiency projects involve strategy to increase the efficiency of a power or heat generation plant, for example changing from open cycle to combined cycle gas turbines.

2. **Energy distribution:** There is potential for emission mitigation in the distribution of energy. This category includes projects which improve energy efficiency in the transmission and distribution of electricity. Such energy efficiency results in a reduced need for fossil fuel generated

electricity. At the time of writing only one methodology was available for this category.

3. **Energy Demand:** Reductions in energy demand have the potential to reduce direct consumption of fossil fuels such as coal or gas or the indirect consumption of fossil fuel generated electricity. Examples of such projects include increasing the efficiency of steam production or energy efficiency of specific technologies, buildings or agricultural facilities.
4. **Manufacturing industries:** Manufacturing industries can reduce emissions in a number of ways. An example from the cement industry would be the substitution of clinker with an alternative project such as volcanic ash. Emissions are reduced due to avoided production of clinker, which is highly energy intensive and based on the use of fossil fuels.
5. **Chemical industries:** One example of reducing emissions in a chemical industry can be found in the nitric acid production process. By destroying the N₂O waste gas of the facility the GHG potential of the gas is significantly reduced. Given the high GHG potency of the gas, N₂O projects yield a high volume of emission reductions.
6. **Construction:** At the time of writing, there were no examples of CDM projects in this category, or approved methodologies available. However, it is likely that a number of options to reduce GHG emissions in the construction sector exist and may eventually be developed under the CDM.
7. **Transport:** CDM projects in the transport sector may include projects that aid the improvement of public transport services and thus reduce emission from cars. Projects may also focus on the use of energy efficient vehicles, and use of lower emission fuels, such as bioethanol or biodiesel. As the consumption of petrol and diesel for transport decreases so will the related GHG emissions. At the time of writing only one large-scale methodology was available for this category.

8. **Mining and mineral production:** This project category includes methane emissions from coal beds and mines. The methane which is captured as part of a CDM project may be flared or used for electricity generation. Emission reductions are achieved by stopping methane leakage into the atmosphere, and (for electricity generation projects) the substitution of electricity generated by other fossil fuel sources. At the time of writing only one large-scale methodology was available for this category.
9. **Metal Production:** PFCs produced as a result of the 'anode effect' at an aluminum smelting facility can be reduced through various control measures. This is one example of a CDM project in this category.
10. **Fugitive emissions from fuels (solid, oil and gas):** Examples of projects in this category include the recovery and utilization of gas flared from oil wells or reductions in fugitive emissions from leaking gas pipelines. Projects to reduce fugitive emissions arising from coal mining and from various agro industrial activities are also included in this category.
11. **Fugitive emissions from production and consumption of halocarbons and sculpture hexafluoride:** This includes the destruction of HFCs where they occur as waste stream in production. Given the high GHG potency of HFCs, these projects yield high emission reductions.
12. **Solvent use:** At the time of writing, there were no examples of CDM projects in this category, or approved methodologies available. However, it is likely that a number of options to reduce GHG emissions in the sector or solvent use exist and may eventually be developed under the CDM.
13. **Waste handling and disposal:** This category includes liquid industrial waste such as wastewater from palm oil or starch producers or animal farms. Methane is extracted from the waste streams and used as a biogas to supply heat and/or electricity on-or off-site, or simply burned (i.e. flared) in order to reduce its gross waste product (GWP).

Furthermore, the management of solid municipal waste is also included. When municipal solid waste is deposited in landfills, methane is generated due to the anaerobic decomposition of the waste. CDM projects in this category involve the capture of this gas in order to flare it or use it for the generation of electricity and/or heat.

14. **Afforestation and reforestation:** The Marrakesh Accords stipulate that afforestation and reforestation are the only LULUCF categories that are eligible under the CDM. Afforestation involves planting trees on land which was not previously forested, whereas reforestation refers to planting trees on land which was recently cleared (prior to 1990). For example, degraded land may be restored/reforested as part of a CDM project resulting in the sequestration of carbon from the atmosphere.
15. **Agriculture:** Examples of projects in this category include the avoidance or recovery of methane emissions from agricultural waste processes, be it through controlled combustion of biomass, recovery of gas from wastewater streams or the substitution of an anaerobic waste treatment process with an aerobic process. If methane is recovered it may be flared, used to generate electricity and/or heat, or desulphurised and piped into the gas distribution network.

Financing CDM Projects

9.1 CER Demand

CER demand can be divided into two main categories;

- a. Demand from sovereign states,
- b. Demand from non-state entities.

Demand from sovereign states arises from their commitments under the Kyoto protocol, whereas demand from non-state actors may arise from either voluntary or legislative commitments to reduce their GHG emissions, speculation, or a combination of the above.

CER supply

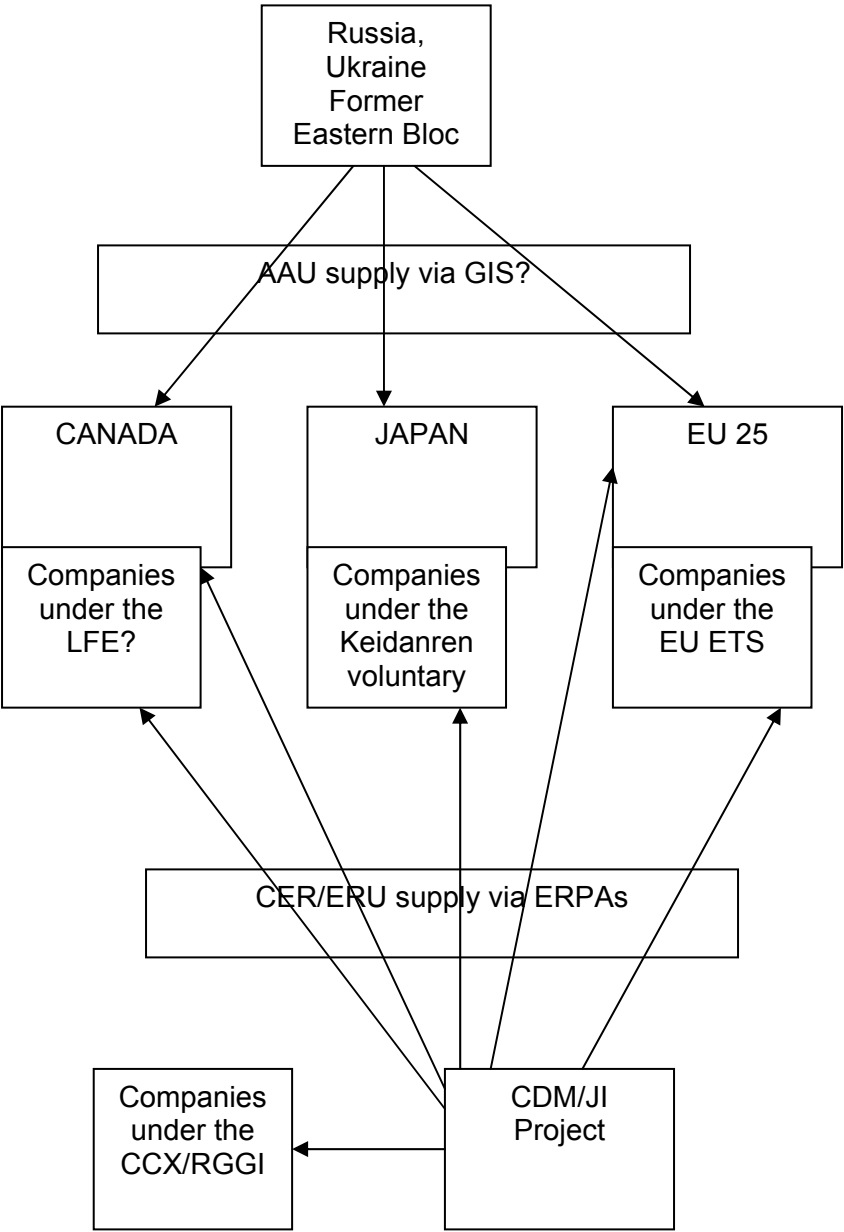
At the time of writing, the CDM is primarily an 'Over The Counter' (OTC) market, mainly consisting of primary trades between project developers on the one hand and buyers on the other. Such deals are typically conducted by the project developer selling CERs to a client using a contract format referred to as an Emission Reduction Purchase Agreement (ERPA).

A secondary market is slowly emerging and is expected to grow as the infrastructure for transactions develops and a sufficient amount of CERs is issued. An example of secondary CER trading is, for instance, the Carbon Credit Note (CCN or Promissory note) issued by South African asset manager Sterling Waterford, which is listed on the Johannesburg Stock Exchange (JSE), South Africa. Private as well as institutional investors can invest directly in carbon by buying these notes on the exchange.

The projected volume of CERs generated has grown significantly since the inception of the carbon market. With a large number of PDDs under development and in the pipeline, the amount of CERs

is forecast to grow significantly to cater to demand from Kyoto compliance buyers between 2008 and 2012.

Figure: 1 Overview of the carbon market during the first Kyoto Protocol commitment period



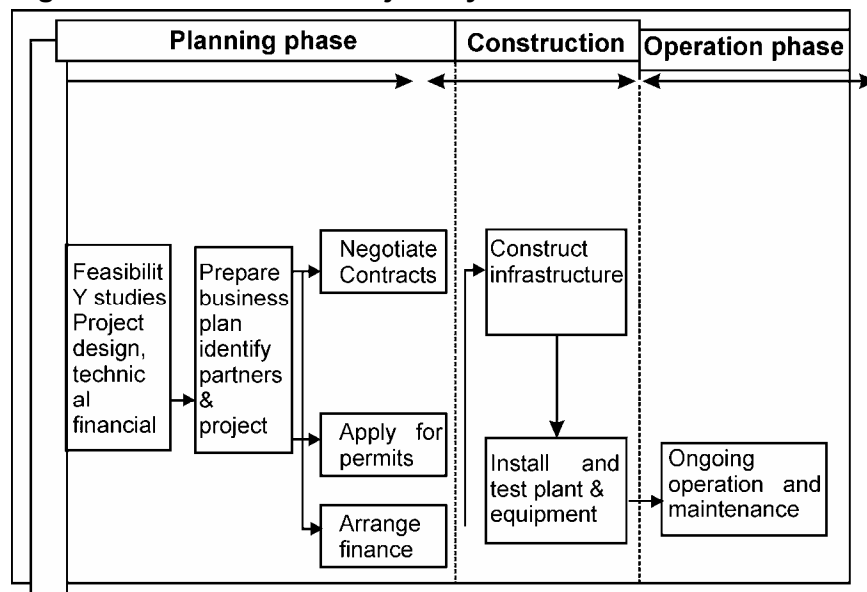
9.2 Key Terms

1. **Project:** The planning, development and implementation of any 'significant' engineering works.
2. **Financing a project:** The task of obtaining the necessary funds to carry out the project. Usually the largest expenditure is incurred during the construction phase of a project, but it is also relevant to consider how other stages of the project cycle may be financed.
3. **Project Financing:** Has come to have a specific meaning, associated with financing structures wherein the lender has recourse only to the assets of the project and looks primarily to the cash flows of the project as the source of funds for repayment.

9.3 The Conventional Project Cycle

The Conventional project cycle can be broken down into three phases, with different forms of finance associated with each phase.

Figure: 2 Conventional Project Cycle



Planning Phase:

- 1) Feasibility studies:
 - a) Project design
 - b) Technical feasibility
 - c) Financial feasibility
- 2) Business plan
- 3) Identify partners and project vehicle
- 4) Contracts (fuel/technology supply, construction, operation, sales or other performance contracts.)
- 5) Permits (planning permission, health & safety, emission permits and/or other environmental licences, subject to environmental impact assessment, if applicable)
- 6) Finance (identify sources of finance, carry out risk assessment, management and mitigation)

Construction Phase

- Construction associated infrastructure, installation and testing of plant & equipment.

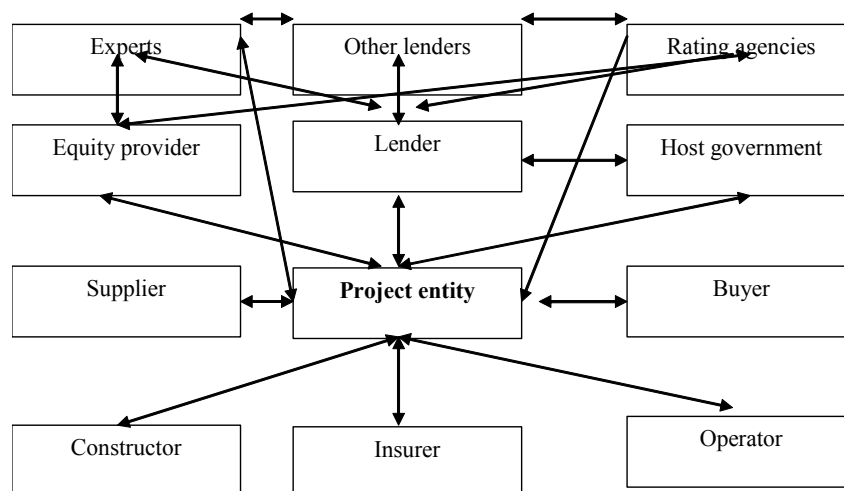
Operation phase

- Ongoing operation maintenance

9.4 Parties Involved in Financing a Project

The key parties involved in a project are shown diagrammatically in the Figure below. The diagram is highly simplified, and illustrates just one possible financing structure (project financing). Key relationships common to the financing arrangements for most projects are shown with solid lines, with some additional options indicating some of the possibilities with more complex financing arrangements shown with dotted lines. The parties are explained in further detail below

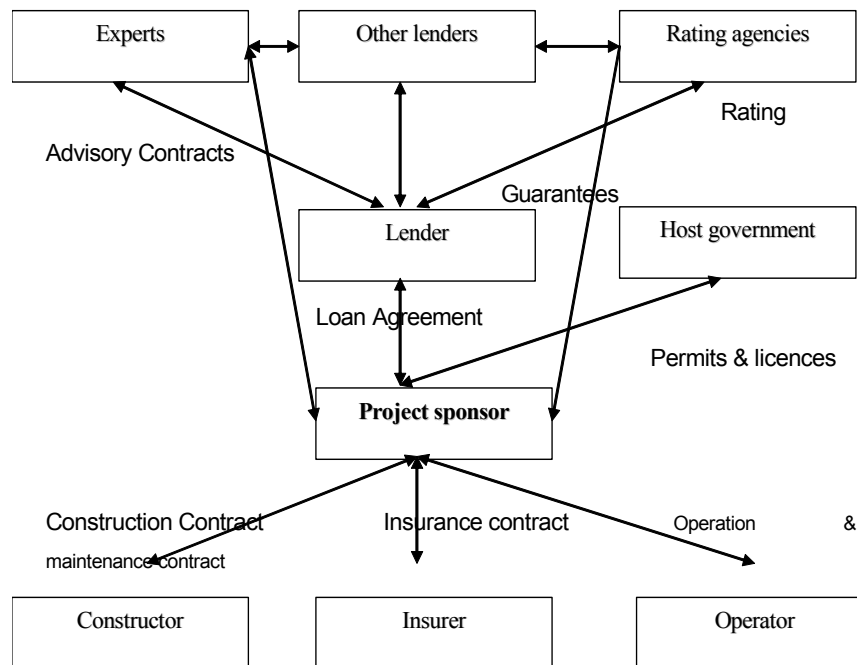
Figure: Parties involved in financing a project



Party	Role/responsibility
Project entity	<p>The project entity is often a Special Purpose Vehicle (SPV, also known as a special purpose Entity, SPE, or Special Purpose Company, SPC) such as a joint venture company or a limited partnership as set up specifically to undertake the project. Creating Special Purpose Vehicle may be useful in order to keep a project at arm's length from the project sponsors, for legal, tax or financial reasons. Alternatively, the project entity may be an individual, an existing company, a government agency, a charity, NGO or community organization. A project may also encompass several different entities. In such cases it is critical to have clear contractual arrangements in place specifying how the different entities are going to work together to implement the project.</p>
Sponsor	<p>Sponsors are those individuals, companies or other entities who promote or support a project because they have a direct or indirect interest in the project. Sponsors can include owners of the land on which the project will be situated, contractors, suppliers, buyers of the project's outputs, or other users of the project.</p>
Lender	<p>If the project is financed through debt, one or more banks may be involved in providing this. A loan from a group of banks is known as a syndicated loan. Typically one of the banks will take the lead role in arranging the finance and syndication agreements, while another (called the engineering or technical bank) will monitor the technical aspects of the project. Others may be appointed to deal with other specific aspects such as insurance. Other types of lenders may include individuals, corporations,</p>

	contractors, community groups and institutional investors such as the World Bank and other International agencies.
Equity Provider	Equity may be provided by project sponsors or third party investors. Equity providers will wish to ensure that the project produces a return on their investment as set out in the business plan or prospectus.
Constructor	Construction is usually carried out by specialist contractors who have responsibility for the completion of the works, and often have to assume liability for finishing construction on time and to budget. Lenders will usually require contractors to demonstrate a good track record in completing the same or similar project activities.
Operator	Operation of the project may be carried out by the project entity who could be one of the sponsors, or a third party appointed to be responsible for the operation and maintenance of the project facilities once completed.
Supplier	Various companies will supply goods and services to the project. Lenders will generally prefer supplier agreements and contracts to be in place for the delivery of essentials such as fuel and equipment. Equipment suppliers will generally be required to have a track record of supplying the relevant equipment and to provide equipment performance guarantees.
Buyer	A project may produce one or more outputs. Lenders will wish to have contracts in place with buyers of the outputs constituting the majority of the project's future cash flow. The nature of these contracts will be subject to particular scrutiny and the terms of a loan may be dependent upon factors such as the

	minimum price level in a contract and how various risks are apportioned between the buyer and the project entity. In order for a lender to place any reliance on a purchase agreement as an indication of a project's ability to repay a loan, the lender will need to be satisfied as to the credit-worthiness of the buyer.
Insurer	Insurers can assist in identifying and mitigating risks associated with the project. If a risk is to be mitigated by purchasing insurance, the lender will need to be satisfied as to the track record and credit-worthiness of the insurer.
Rating agencies	The rating agencies (e.g. Moody's, Standard & Poor's, Fitch Ratings) may be involved if the financing of the project involves the issue of securities.
Experts	Project sponsors and lenders will often call upon external experts to advise them on key technical, engineering, environmental and risk aspects of a project. Experts need to be able to demonstrate a track record of expertise in the relevant area.
Host government	The objectives and role of the host government will vary but may involve economic, social and environmental guidelines and issuance of relevant consents, permits and licenses. In some countries, the host government may be involved through state owned or controlled companies that may take on any of the above roles in relation to the project.



9.5 Financing Requirements

In general, the largest costs associated with a project are incurred at the construction stage, where even a relatively small engineering project can cost many millions of dollars. At this stage, for a commercially viable project, lenders and investors will only provide finance on the expectation that, on completion of construction and commissioning, the project will go on to generate revenue. This revenue should at least be sufficient to cover ongoing operation and maintenance costs for the operation phase, and also to provide a commercial return to the lenders and investors.

From the perspective of the lender the risk of financing a project does not drop significantly until after the project is commissioned, and this will affect the terms of financing. In some cases, lenders require independent proof of technical completion of the project and/or proof of financial completion in the form of significant

project revenues, in order to adjust financial terms, such as the interest rate of a loan.

During the early stages of planning a project, the chances of the project not proceeding (for example because the necessary permits cannot be obtained), and therefore not generating any future revenue, are significantly higher. Therefore, although the costs associated with the planning stage (typically in hundreds of thousands of dollars) are much lower than construction costs, the risk is much higher and different forms of finance are required, as shown in Figure above. The different forms of finance available for the planning and construction phases are discussed in further detail below.

Depending on the type of financing, the project sponsor will have to present different kinds of data and documentation to the lender at different stages. For example, for project financing, a minimum requirement for international banks is a business plan which includes at least feasibility studies, financial statements and financial projections. For corporate finance on the other hand, relationship banks may be more focused on collateral and long-term client relationships.

Similarly, there are a number of important milestones that the project sponsor will have to consider. Banks will consider requests for project financing only at a relatively advanced stage of the project cycle. For example, while it is useful to make contact with financial institutions at a pre-feasibility stage to identify potential interest, they will require the project to have feasibility studies completed and essential permits/licences granted before appraising a project for possible financing.

Most international banks require the above mentioned information and financial statements prepared in accordance with international financial reporting standards. The time required to arrange this needs to be factored into the project timeline.

Types of Finance Available

Grants

A grant is an amount of money provided by a third party to a project, person, organization that contributes to the objectives of the third party. In general, grants are provided to projects that are commercially marginal, and they do not need to be repaid (provided the stated purpose of the grant funding is achieved).

However, in some cases grants may be convertible to loans or equity if the project achieves commercial success (this will be stated in the terms and conditions of the grant.)

Loans (debt)

- I. **Senior Loans or debt:** The 'senior' debt is the debt which must be serviced before any other debt or equity in the project. This is generally a precondition of loans by large local or international banks. The debt is usually secured over the assets of the project, which can include the contracts for sale of outputs from the project.
- II. **Junior (or subordinate) loans or debt:** The 'Junior' or 'subordinate' debt has priority for repayment after senior debt (but still before equity). It is either unsecured, or has a lower priority claim between what senior debt lenders are willing to provide and equity that is available for a project.
- III. **Low interest loans or debt:** Loans at preferential (below market) rates may sometimes be obtained from multilateral banks for projects which meet particular economic, social or environmental objectives.
- IV. **Up-front payments:** For some projects, a buyer of some of the outputs from the project may be willing to pay up-front for future delivery for those outputs. Such up-front payments can be used to finance the project's up-front costs.
- V. **Lease finance:** Lease finance is similar to senior debt, except that instead of lending cash, the lessor 'lends' (or

rather, leases) an asset (e.g. land, buildings or equipment) in return for an agreed cash flow or rent'. The lessor continues to own the asset and can reclaim it in the event of non-payment by the lessee.

Equity

Equity is capital raised from shareholders. Shareholders have only a residual claim to the assets of the project company. In other words, they are last in line after other stakeholders such as senior and junior lenders have been repaid. This represents the highest level of risk, and the expected returns for equity holders are accordingly higher than for lenders.

Financing Models

The most common structures used to finance projects are:

- I. Project financing (in the specific sense of the term) – also known as limited recourse financing.
- II. Corporate financing; and
- III. Lease financing

Project Finance

The term 'project finance' (or 'project financing') refers to financing structures wherein the lender has recourse only or primarily to the assets of the project and looks primarily to the cash flows of the project as the source of funds for repayments. The terms 'limited recourse finance' and 'non-recourse finance' are often used interchangeably with 'project finance'.

The **principal advantages** of the project finance structure are:

- i. **Ability to raise large amounts of capital:** The structure enables large amounts of debt to be raised for capital-intensive projects.
- ii. **Limited recourse to assets of project sponsors:** The lenders only have recourse to the assets and cash flows of

the project rather than the general resources of the sponsors.

The **disadvantages** of the project finance structure include:

- i. **Set-up costs:** The costs of setting up the project finance structure can be significant, and can generally only be justified for larger scale projects (e.g. US \$ 20 million plus).
- ii. **Project-specific risk assessment and management:** Both lenders and equity providers must pay particularly close attention to the project-specific risks, and how those risks will be managed. This is in contrast to conventional lending, where the lender would primarily be concerned with the overall credit-worthiness of the borrower.

The **advantages** of corporate financing over project financing include:

- i. **Faster access to capital:** A company's internal capital allocation procedures should, in theory, be quicker at coming to a decision as to whether or not to invest in a project than an external lender, and even if external debt is required, a decision based on the credit-worthiness and assets of the company will be achieved more rapidly than a decision that depends on the due diligence of the cash flows and assets of a project.
- ii. **Confidentiality:** Keeping the financing of a project internal or at arm's-length by corporate borrowing rather than project financing, may help if the project sponsor is concerned about potential leaks of information about the project to competitors (or any other parties).
- iii. **Availability:** Quite simply, corporate financing may be one of the only financing options available for projects which are too small, too risky, or which involve counterparties which are not creditworthy for project financing to be possible.

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The **disadvantages** of corporate financing include:

- i. **Liability:** The Company is liable for any failure of the project and both internal capital and assets may be at risk if the project fails to perform upto expectations.
- ii. **Funding limits:** The amount of capital available will be limited either by internal budget constraints or by the company's ability to borrow (e.g. 60-90% of the company's assets).

Limited ability to transfer risks: There may be less scope to transfer risks to other parties.

Chapter-10

Carbon Finance

10.1 The Financial Assessment Process

The financial assessment process is a standard methodology for evaluating a project's financial viability, from an investor's perspective. The financial assessment of a project forms part of an investor's due diligence', or the overall process of investigation into the details of a proposed investment. Other aspects of the due diligence process would include an assessment of the ability of the management team to carry out the project, investigation of the technology involved, and ongoing monitoring of the implementation of the project post-financing. Here, however, we focus on the financial assessment process, pre-financing.

The key steps in the financial assessment process are:

- i. Development of a project model;
- ii. Analysis of financial indicators;
- iii. Sensitivity analysis; and
- iv. Risk assessment and mitigation.

Development of a Project financial Model

A financial model is the most critical element of the financial assessment process. Most financial models are structured in a similar way and have the following features (whether created as a project-specific spreadsheet model or using an off-the-shelf project finance package):

- a) **Assumptions-** All of the input variables to the model are usually kept together in one worksheet. Assumptions may be based on expert knowledge, forecasts, technical performance specifications, contract prices or other sources.

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The source of each assumption needs to be clearly identified so that investors can assess whether the assumption is reasonable.

- b) **Calculations-** The input variables are combined in a number of calculations, including tax, depreciation/amortization, loan balance and interest payments, and revenue and operating costs.
- c) **Outputs-** In general, the outputs of a financial model will include:
 - a. Cash flow statement;
 - b. Profit and loss;
 - c. Balance sheet; and
 - d. Key financial indicators such as debt and interest ratios, NPV and IRR.

The most important outputs for a lender are the cash flow statement and Debt Service Cover Ratio (DSCR) over the term of the loan. The outputs are usually summarized on a year to year basis, but finer detail (e.g. month-by-month figures) may be required for certain projects (particularly where production, demand or prices exhibit seasonal variation).

Key Financial Indicators

While detailed financial model outputs such as a month-by-month cash flow statement provide the necessary information required to assess a project's viability, a number of different indicators may be used to summarize the situation. The relative importance of different indicators differs between providers of debt and equity, although the underlying principles are the same.

The most important of these indicators are:

- a. **Project Net Present Value (NPV) and internal Rate of Return (IRR):** The NPV of a project is defined as the sum of the future discounted cash flows of the project (before making any assumption about how the project will be

financed). Future cash flows are discounted by an appropriate discount rate reflecting the cost of capital, in order to convert to an equivalent Present Value. These Present Values are then added up to calculate the Net Present Value. Therefore calculating the NPV requires an assumption to be made about the appropriate discount rate (this may be the Weighted Average Cost of Capital for a firm, or a more project-specific discount rate). A positive NPV indicates that (at the assumed cost of capital) the project is good investment (i.e. will yield a positive return).

The internal Rate of Return of a project is a related concept, defined as the discount rate for which a project's NPV is equal to zero. Therefore the project IRR can be calculated and compared with either the Weighted Average Cost of Capital for a firm, or the IRR of similar projects. In any case the project IRR should be higher than the prevailing long-term interest rate in the currency in which the project is being financed (otherwise it would be more worthwhile to put the finance on deposit at that interest rate, which would presumably have lower risk than investing it in the project).

- b. **Equity IRR:** The IRR can also be calculated specifically as the rate of return to the equity providers, after deducting loan interest and repayments (this requires assumptions to be made about the financing structure). The equity provider can only receive return from post-tax profits (or sale of their shares), and the issue of dividends is typically limited by covenants with the lender, to ensure that debt repayment milestones are achieved first. This needs to be taken into account when calculating the equity IRR (since later returns have a lower Present Value).
- c. **Earnings Before Interest, Tax, depreciation and Amortisation (EBITDA):** This is a measure of the ability of a project to meet its minimum financing costs (not including loan repayments). A minimum interest cover ratio is often applied by a lender, both when assessing a project, and as an ongoing requirement during the loan (after completion of construction and commencement of earning). A normal

interest cover ratio requirement would be around 4 or 5 (higher for riskier projects).

- d. **Debt Service Cover Ratio (DSCR):** This is calculated as the ratio of EBITDA to all debt servicing requirement (i.e. interest plus loan repayments), shown as the ratio of the blue (EBITDA) to orange (debt service) squares. There is usually some flexibility in how the loan repayments are scheduled, such that the project will meet a minimum DSCR throughout the term of the loan (and in particular, during the first few years), if it achieves a conservative performance forecast. Such flexibility may include interest and/or loan repayment holidays and stepped interest rates and /or loan repayments over the term of the loan. A lender's minimum DSCR requirement is always greater for a relatively risky project that might require a DSCR greater than 2; the cost of debt would also be correspondingly higher.

10.2 Sensitivity Analysis

If a project appears to be financially viable, based on analysis of the relevant financial indicators using conservative or at least 'central case' assumptions, then a more detailed sensitivity analysis will be undertaken.

The objective of the sensitivity analysis is to establish which of the input assumptions to the financial model has the greatest impact on the financial outcome. It is important to understand which variable can have the greatest impact, as also which is most likely to have the greatest impact, either singly or in combination with other variables.

Specialized software can help with running scenarios to examine the impact of specified changes in assumptions on selected financial indicators. However, while a purely mechanical manipulation of the input variables can identify which has the greatest potential impact (e.g. by comparing the impact of a $\pm 10\%$ change in each variable), assessing the likely range of each assumption (and combinations of reason why banks prefer to lend only to projects they have experience with). However, for slightly

more unusual projects, it may be possible for the bank to rely on independent experts to assist with the financial assessment.

The sensitivity analysis is related to the next stage, risk assessment and management, since many of the key sensitivities can be contractually hedged to reduce the risk to the lender. For example, key supply and purchase contracts may be fixed by volume and price.

10.3 Risk Assessment and Management

Lenders and investors will be particularly concerned with the assessment of all the risks associated with a project and an agreement, with the project sponsors, on appropriate means to manage or mitigate those risks.

Types of Risk

Conventional project risks can be divided in terms of the three phases they could occur in; planning, construction and operation risks. Typically, a lender will only commence in-depth financial assessment of a project after the planning phase is completed and the project has the necessary permits and licences to operate. However, they may enter into discussions with a project developer and conduct a preliminary assessment at an earlier stage.

Table: Risks during different phases

Planning Phase	Construction Phase	Operation Phase
Feasibility risk	Time over-run risk	Technology risk
Permit-Licence risk	Capital cost over-run risk	Market risk
		Supply risk
		Operating risk

		Political, legal and regulatory risks
		Financial risk
		Counterparty risk

Planning Phase Risks

- a. **Feasibility risk:** The risk that feasibility studies will find that a project is not feasible. Such a finding should not be viewed as a negative outcome, since it is better to discover a project is not feasible during the planning stage than at any later stage, when much more money has been spent. To some extent the risk may be mitigated by conducting feasibility studies in stages, for example with an initial screening phase to determine whether the project appears to be feasible according to the most important criteria for its success/failure.
- b. **Permit/licence risk:** The risk that permits or licences essential for the construction or operation of the project will not be granted by the relevant authorities. This risk is often specifically addressed in feasibility studies, for example by commissioning experts with experience of similar projects to provide an independent assessment of the risk. A proper understanding of the relevant regulatory regime is essential and early engagement with the relevant authorities is often desirable.

Construction Phase Risks

- a. **Time over-run risk:** The risk that the project is not commissioned on schedule. Where there is a strong contractor responsible for the construction this risk can be managed through the contracts with the construction company and equipment providers, in the form of incentives (e.g. bonuses for timely completion) and/or penalties (e.g. performance bonds or completion guarantees allowing for

monetary damages to be imposed for delay in delivery or completion).

- b. **Capital cost over-run risk:** The risk that the costs involved in implementing the project are higher than expected. This can be managed through entering into fixed-price contracts for the principal project components.

Operation Phase Risks

- a) **Technology risk:** The risk that the equipment installed does not perform to expected specifications. This can be managed through purchasing from a reputable supplier and requiring a performance guarantee, with monetary damages to be imposed for performance shortfall.
- b) **Market risk:** The risk of price fluctuations for the outputs of the project. Prices may be lower than expected due to lower demand or increased supply from competitors. This can be managed through entering into a long-term purchase agreement. At one end of the spectrum is a 'take or pay' fixed-price contract, where the buyer must either take the output or pay for it even spot transaction which leaves the seller fully exposed to the market risk. There are many different options in between these two extremes, and it is up to the buyer and seller to negotiate the most mutually acceptable option.
- c) **Supply risk:** The risk that supplies of key inputs to the project cannot be maintained, or increase in price. As with market risk, this can be managed through supply contracts fixing some or all of the volume and/or price of key inputs.
- d) **Operating risk:** The risk that the project as a whole will not perform to expectations, and in particular the risk that the cost of operation and maintenance will be higher than expected. This can be managed through contracts with the operator requiring a certain level of performance and allowing monetary damages to be imposed for poor performance; and also by entering into long-term contracts with an operator to cap the operation and maintenance costs. Operating risk may also be mitigated by purchasing

insurance to cover the risk of occurrence of specified events that would affect project performance or costs.

- e) **Political, legal and regulatory risks:** The risks associated with the country in which the project is situated not being sufficiently stable to ensure the continued operation of the project according to expectation including the risk of war, revolution, insurgency, terrorism, civil unrest, expropriation, nationalization, inability to enforce contracts, or changes in the legal or regulatory regime. This risk can be managed at the planning stage by screening the countries and securing insurance against specific events, and obtaining guarantees from the host government, export credit agencies and/or international institutions.
- f) **Financial risks:** The risk that interest rates, inflation, currency exchange rates or other financial variables may adversely affect the financial performance of the project. These risks can be managed through supply and purchase agreements (for example, ensuring that both are in the same currency), or through financial instruments such as interest rate or currency hedges.
- g) **Counterparty risk:** The risk that a counterparty to a contract will fail to honor that contract. This can occur in relation to any contract at any stage of the project, but is typically most critical in relation to construction contracts and major supply and purchase contracts. This risk can be managed by ensuring that counterparties have a good credit rating.

Assessing Risk

The sponsors of the project will typically undertake their own risk assessment early in the project planning process, as they will be exposed to the risks during the planning phase, whereas the lenders will undertake their risk assessment at a later stage, focusing on construction and operation phase risk. At either stage, risk assessment is generally undertaken through the steps described below.

- i. **Risk Identification:** This step consists of identifying all of the risks associated with a project. Project sponsors may rely on their own knowledge of the project risks, or may commission studies from independent experts. Lenders usually commission expert risk analysts to undertake this (e.g. an insurance company involved in the project).
- ii. **Risk Matrix:** A matrix is drawn up to plot each risk against the phase of the project in which it occurs, its likely impact and the parties affected by the risk, and how it is expected to be mitigated. This can form the basis of negotiations between parties as to the apportionment of the various risks.
- iii. **Quantitative Risk assessment:** Once the risks have been identified and defined in terms of which the party must bear the risk, a quantitative risk assessment may be carried out on the project as a whole. The output may be a quantitative estimate of the total value at risk, or a comparative risk index (enabling the risk of a project to be compared with the risk of other similar projects).

Absolute risk is a measure of the risk posed by a specific event without countermeasures being taken. It is defined as the product of two factors; the likelihood of an event occurring, and the significance of the impact (if it does occur). Past records and professional judgments may be used to provide quantitative data for both factors. 'Significance' may either be an index (e.g. scale from 1-10) or a monetary amount (damages).

This assessment may then be modified to discount the absolute risk by a factor reflecting the availability of risk management options to reduce either the likelihood of an event occurring, or its impact.

Managing Risk

There are essentially three options for managing risks:

- i. **Change the project:** Once a risk has been identified and understood, particularly in the early planning stages, it may be possible to change the project to minimize the risk. For example, it may be possible to seek a purchaser to buy the

output of the project in the same currency as the major supply contract for inputs to the project to reduce exposure to currency risk.

- ii. **Allocate the risk to the most appropriate party:** Generally speaking, the entities best able to manage a risk are those that best understand the risk and/or have some degree of control over it. In other words, it is usually the entity most closely associated with a risk which can bear that risk at lowest cost. For example, equipment suppliers have the best understanding of and control over the reliability of their equipment. They are, therefore, in the best position to manage technology risk by providing the project with an equipment performance guarantee. Nevertheless, it must be noted that, from an investor's or lender's point of view, allocating a risk to another party does not necessarily eliminate that risk; it simply transforms it into a counterparty risk. Guarantees will only provide effective risk management if the guarantee provider has a good credit rating and track record in the relevant activity.
- iii. **Transfer the risk to a third party:** Financial instruments may be used to transfer risks to third parties, for example through hedging, third party guarantees or insurance. Hedging involves the use of derivatives markets, for example to fix future prices of commodities, currencies or interest rates. Third party guarantees may be provided by Export Credit agencies or international institutions such as the World Bank's Multilateral Investment Guarantee agency. Insurance involves the transfer of a risk to a third party who is able to bear that risk through diversification, that is, by combining a large number of unrelated (non-systematic) individual risks to reduce the impact on the overall portfolio.

Chapter-11

Financing A CDM Project

Introduction

This section deals with the development of the concept of financing emission reduction projects and provides details on the financing requirements and both current and possible future financing models for CDM projects.

11.1 From Rio to Kyoto

The market for emission reductions is still very young. It can trace its beginnings to the signing of the UN Framework Convention of Climate change (UNFCCC) in 1992, which, by adopting a voluntary target to stabilize emissions at 1990 levels by 2000, created the first global incentive for governments to invest in projects to reduce net emissions of anthropogenic GHGs to the atmosphere.

Sweden is considered to have pioneered the practice of investing in projects in other countries (renewable energy and energy efficiency in the Baltic States from 1993 onwards) with the specific aim of reducing carbon emissions, although the early schemes were only later officially recognized under the Activities Implemented Jointly Pilot phase. The financial model for these investments consisted of investor companies paying for the full cost of the project in return for the promise of carbon credits generated as a result of the activities, should they eventually qualify under a future regulatory framework. The transaction costs of developing these projects were very high and this combined with uncertainty over the possibility of generating or transferring carbon credits were committed yearly during the two years from the signing of the UNFCCC in 1992 to the First Conference of Parties (COP-1) in 1994 (Eco Securities, 2000).

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The first officially recognized 'joint implementation' carbon emissions reduction project is generally acknowledged to have been the Decin fuel switching project, launched in 1994 as a bilateral effort between the Czech city of Decin and a coalition of US energy companies, to adapt a large coal power station to run on natural gas. The US companies provided the project with a US\$600,000 non-interest bearing loan, in return for a contract to receive a percentage of the plant's emission reduction credits, for use under a possible future emissions trading scheme. The project was officially approved by both the US initiative on Joint Implementation and the Czech JI programme.

At the First Conference of Parties to the UNFCCC, in 1994, the Activities Implemented Jointly (AIJ) Pilot Phase was established, during which projects were to be conducted with the aim of establishing protocols and experience, but without allowing crediting between developed and developing countries. As the lack of crediting did not create real incentives for investor participation, the annual level of investment in carbon projects dropped from US\$57 million to US\$14.8 million. All the same project proposals continued to be developed with a joint call for proposals by the Canadian energy company project proposals being submitted.

From 1994 onwards, the Netherlands also began to establish itself as a leading player in the emissions reduction market, financing a number of energy efficiency, fugitive gas capture and fuel switching projects throughout Eastern Europe. Like the earlier Swedish projects, these were undertaken on the assumption that an international system of emissions credit transfer would eventually arise.

In 1995, the US Initiative on Joint Implementation resumed financing energy projects, including the massive Restages fugitive gas capture project in Russia (estimated to reduce nearly 31 million tonnes of CO₂, in Berlin, the voluntary targets were unlikely to be met).

The increased likelihood of future carbon taxes, quotas, trading schemes, etc. also resulted in wide variety of voluntary climate change related actions across many industry sectors. For example, BP invested US\$1 billion in the solar industry and Shell

created its Shell Renewable International division, while Toyota and Mercedes Benz invested heavily in low emission vehicles and the Federation International de l' Automobile (FIA), the organization responsible for Formula One competitions decided to offset the GHG emissions of their events. The Insurance and re-insurance industries also formed a group under the auspices of UNEP and launched UNEP Statement of Environmental commitment by the insurance Industry, which developed into the insurance industry Initiative in 1997.

In 1997, Australia formed the Australian Greenhouse Office and began a programme of renewable energy, energy efficiency and fugitive gas capture projects in developing countries in the Asia-Pacific region. A global association of large electricity companies, the E-7 became one of the first industrial coalitions to sponsor multiple AIJ projects, bringing commercial investment to a field that had until then been dominated by government investors.

The World's first independent carbon offsets verification service was established by Eco Securities and SGS Forestry in 1997 in Costa Rica, underpinning the Costa Rican national programme for the sale of the world's first carbon denominated securities (Certified Tradable Offsets, or CTOs), resulting from the sequestration of carbon in Costa Rica's forests. The first CTOs were purchased by the Norwegian government for US\$10/tCO₂ and subsequent trades were handled through the Chicago Board of Trade.

In December 1997, the Kyoto Protocol was negotiated, resulting in the adoption of binding commitments by developed countries and the 'flexible mechanisms' of emissions trading. Joint implementation (JI) and the Clean Development Mechanism, which effectively superseded AIJ.

11.2 After the Kyoto negotiations

The conclusion of the Kyoto Protocol negotiations in late 1997 led to a massive increase in carbon emission reduction project activity, in both the public and private sectors. The Dutch government launched the first major tendering programme for carbon credits from CDM projects, CERUPT, in 2000, followed by

ERUPT, aimed at JI projects only, in 2002. In 1998, BP announced a target to reduce its emissions from internal activities to 10% below 1990 levels by 2010, together with a pilot emissions trading scheme across 12 of its business units. The scheme was rolled out across the entire company in 2000. Shell also introduced a voluntary internal emissions trading scheme in 2000. New South Wales State Forests concluded sales of carbon sequestered in plantation forests to Australian power companies in late June 1998. In 1999 the World Bank approved the establishment of the Prototype Carbon Fund (PCF), which became operational in April 2000 as a coalition of seventeen private sector companies and six governments, with a capitalization of US\$180 million.

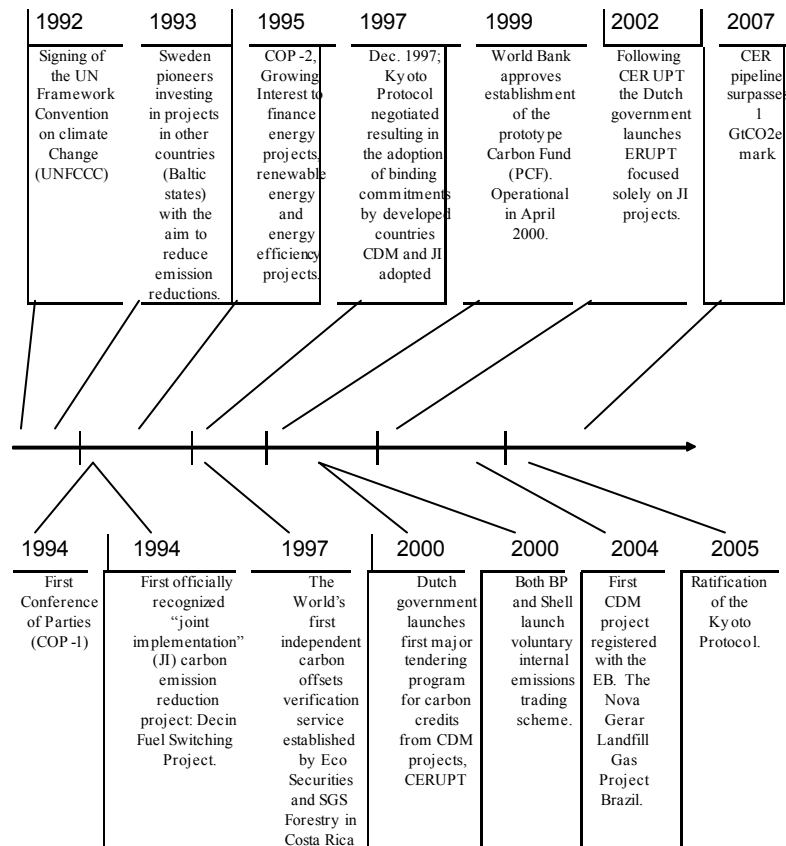
In late 2004, the first CDM project was registered with the EB; the Nova gerar Landfill gas project in Brazil. The project was implemented as a joint venture between the private sector CDM project developer Eco Securities and the management of the landfill operations, S.A. Paulista. Nova Gerar signed an agreement with the British landfill-gas-to-power company energy for leasing and operation to the gas collection devices and the power plants. The funding for the project was drawn principally from two major sources. First, EnerG facilitated the deployment of the energy generation equipment, which accounted for a significant part of the project investments, through a leasing arrangement. Second, a long-term ERPA was signed with the Netherlands Clean development Mechanism Facility, managed by the World Bank. This ERPA served as a financial guarantee for the leasing contract between NovaGerar and EnerG.

Since then an ever-increasing number of CM projects have been developed and registered with the EB and, in 2006, the volume of emission reductions in the UNFCCC pipeline passed the 1 billion tonnes mark (of total projected emission reductions by 2012). With the exponential growth in the CDM market, the number of participants has also expanded rapidly, both in terms of the number of companies involved in developing CDM projects around the world, and in the number of financial stakeholders in the market.

To sum up, the carbon market has evolved from the early days of direct investments in emission reduction projects by a small number of leading governments and private sector companies, to a mature market in which projects can draw from a range of different financing options, due to the existence of CERs as a globally recognized, tradable commodity.

Brief History of Financing Carbon Projects

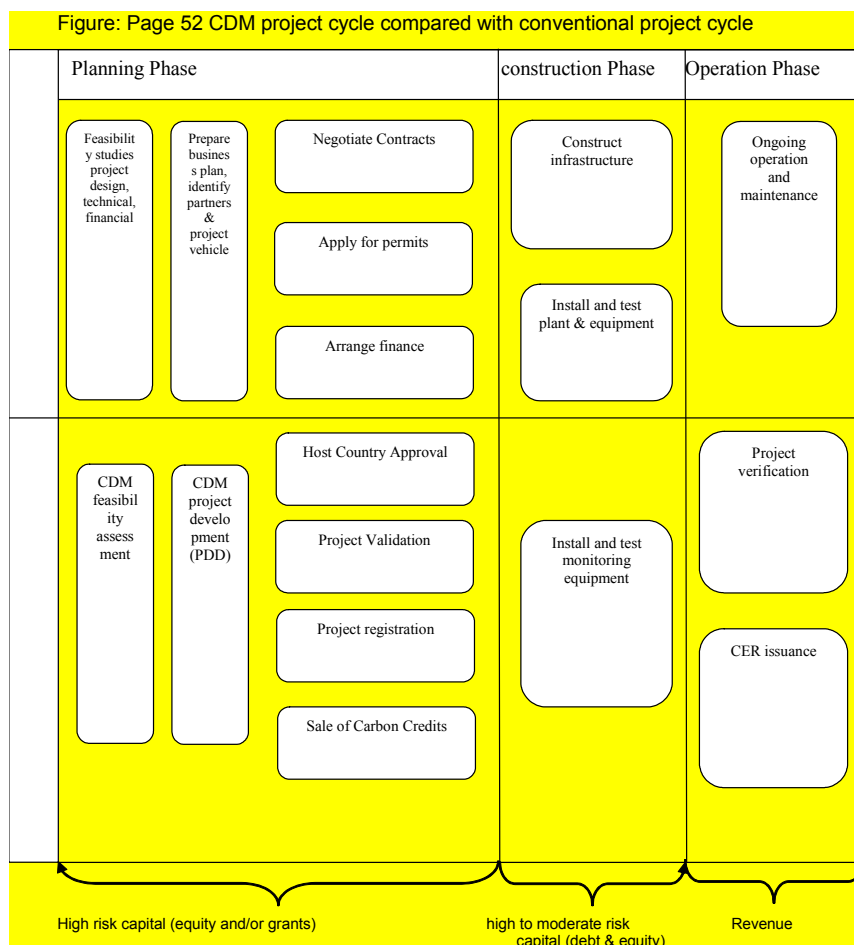
Figure Page no. 49 Key milestones for carbon project finance



The CDM Project Cycle

A CDM project can be thought of as a conventional project with an additional CDM-specific component. The figure below compares the CDM project cycle with the conventional project cycle.

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It is worth noting, however, that in reality it is possible that the various actions and events will not fall neatly into the three phases set out above. For example, it may be possible to commercialise the carbon credits even before a PDD has been fully developed, provided a buyer is willing to take on the risks associated with passing the various hurdles of host country approval, validation and registration. On the other hand, a project may be put through the CDM project cycle after it has already been constructed, provided that evidence can be provided that the incentive from the CDM was seriously considered in the decision to go ahead with the project.

11.3 Parties involved in Financing a CDM project

The parties involved in financing a CDM project are essentially the same as the parties involved in financing a conventional project with the following unique elements:

Entity	Role/responsibility
Project host	The project host is the entity providing the land, facilities or resources that are required to undertake the CDM project in the developing country location of the project. There may be more than one project host – for example, for a wind farm project, one party may own the land and another may install the wind turbines. Project hosts may be individual companies, or government institutions.
CDM project developer	The CDM project developer is the entity responsible for driving the project through the CDM project cycle. The project host may take on this role, or it may be provided by a specialized CDM project developer company.
CDM project participant	Project Participant' has a specific meaning under the CDM. A project participant is either a Party to the Kyoto Protocol (i.e. a government) involved in the project, or a private entity authorized by a party involved to participate in the project. Decisions on the distribution of CERs from a project may only be taken by project participants. The project participants may agree between themselves (and declare in a document filed with the CDM Executive Board at the time of registration, known as the Modalities of Communication) for one or more of the project participants to be the Focal Points(s).

	In this case, only the Focal Point(s) decide on the distribution of CERs from the project.
Focal Point	The Focal Point for a CDM project participant or participants named in the Modalities of Communication as the Focal Point for the Project.
CER buyer	In theory, any entity may purchase CERs from a project. However, in order to be able to use the CERs for compliance under the Kyoto Protocol or any mandatory scheme linked to the Kyoto Protocol, the purchaser of the CERs must either be an Annex I Party or be authorized by an Annex I country Designated National Authority, in order to be able to transfer CERs from a CDM project into an account in the registry of the country of the purchaser.
Designated Operational Entity (DOE)	The DOE is required to validate the project prior to registration as a CDM project, and to verify the emission reductions of a project prior to issuance of CERs. Essentially, it plays the role of independent auditor.
Designated national Authority (DNA)	The DNA of the developing country in which the project is located is required to authorize the project (by issuing a Letter of Approval) prior to validation. DNAs of Annex I countries are required to approve any Annex I project participants.
CDM Executive Board(EB)	The CDM Executive Board is responsible for administering the procedures relating to the registration of projects and issuance of CERs.

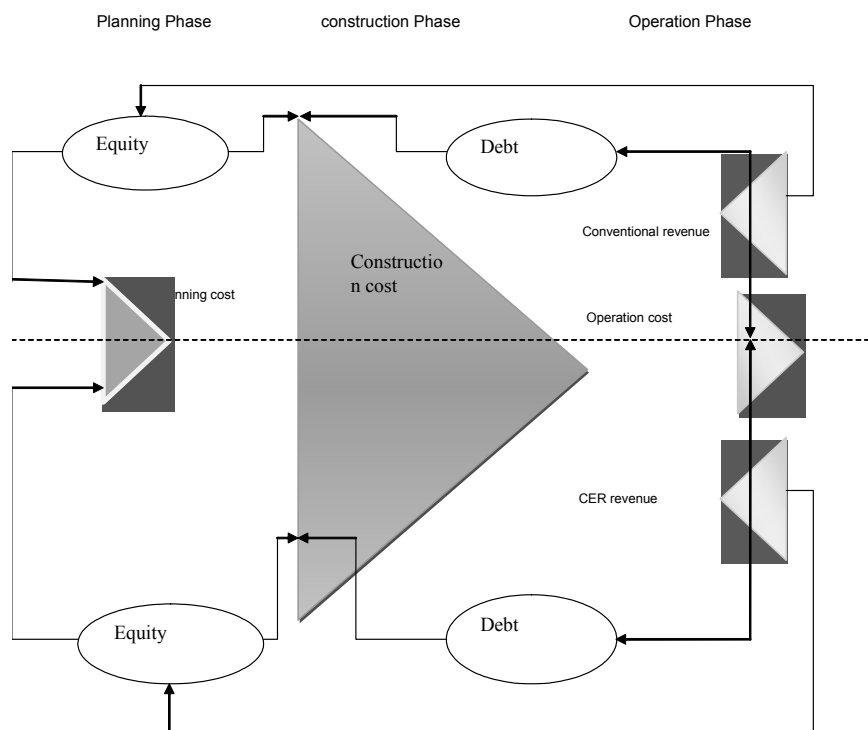
Financing Requirements of a CDM project

The financing requirements of a CDM project can vary tremendously, depending on the project types. For example, the

capital costs of renewable energy projects can vary from around US\$1,000/MW for generation of electricity from landfill gas to US\$10,000/KW for solar home systems using photovoltaic cells. Likewise, the costs during the planning of a CDM project can vary significantly depending on specific feasibility studies that may be required (e.g. at least 12 months of wind resource monitoring for a wind turbine project), as well as country-specific, technology-specific and location-specific requirements for permits and licenses, environmental impact assessment and stakeholder consultation. Finally, costs during operation can vary from very low levels for some renewable energy projects using free resources such as the sun and wind, to relatively high levels for projects dependent upon purchase of fuel or other inputs.

The diagram below illustrates a number of general points about the financing requirements of a CDM project over the three project phases, and how these requirements are typically met.

Figure: page 54 financing requirements of a CDM project



The following general observations may be made (while recognizing that the diversity of CDM projects means that there are exceptions to virtually any general rule):

- The CDM-specific project costs are usually smaller than the non-CDM specific project costs:
- The largest cost is incurred at construction (including purchase of plant and equipment, etc.)
- Annual operation costs are usually low in relation to construction costs, although they may exceed construction costs over the lifetime of the project;
- Cost during the planning stage are usually financed by equity;

- e. Costs during construction may be financed in a variety of ways (explained further in section 5.7 below – for example by various combinations of equity and debt, as shown here)
- f. CDM projects may have ‘conventional’ revenue streams (such as electricity sales, or sales of other outputs) in addition to CER revenues);
- g. Costs during operation are covered by the conventional revenue (if any) and lastly to provide a return on equity.

CDM-specific Project Costs

In addition to the costs that would be incurred by a project regardless of whether or not it was registered as a CDM project; certain specific costs are associated with the various stages of the CDM project cycle, as set out in the Table below.

Table: Specific costs associated with CDM stages

Activity	Cost (large-scale, US\$)	Cost (small scale, US\$)	Type of cost
Planning phase			
Initial feasibility study i.e. Project Idea Note (PIN)	5,000-30,000	2,000-7,500	Consultancy fee or internal
Project Design Document (PDD)	15,000-1,00,000	10,000-25,000	Consultancy fee or internal
New methodology (if required)	20,000-1,00,000(incl. US\$ 1,000 UN registration fee)	20,000-50,000	Consultancy fee or internal
Validation	8,000-30,000	6,500-	DOE fee

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		10,000	
Registration fee (advance on SOP-Admin-see below)	10,500-3,50,000	0-24,500	EB fee
Total CDM – specific costs planning phase	38,500-6,10,000	18,500-1,17,000	
Construction phase			
Construction, plant & equipment	Variable, depending on project type		Constructor's fees
Installation of monitoring equipment	Usually minimal relative to total plant & equipment cost		Constructor's fees
Total CDM-specific costs-construction phase	Usually minimal relative to total plant & equipment cost		
Operation Phase			
UN Adaptation Fund Fee	2% of CERs	2% of CERs	EB fee
Initial verification (incl. system check)	5,000-30,000	5,000-15,000	DOE fee

Financing a CDM Project

Ongoing verification (periodically)	5,000-25,000	5,000-10,000	DOE fee
Share of Proceeds to cover administration expenses (SOP-Admin)	The fee paid at registration is effectively an advance that will be 'trued up' against actual CERs issued over the crediting period (if different to emission reductions projected at registration). SOP-Admin is not capped.		EB fee
Total CDM-specific costs-operation phase	Variable-minimum 2% of CERs plus 5,000/year (if verification undertaken annually)		

1. US\$0.10/CER for the first 15,000 CERs per year and US\$ for any CERs above 15,000 CERs per year (max US\$ 3,50,000). The minimum shown here has been calculated as 15,000 CERs/year over a single 7-year crediting period.
2. As for large scale, unless total annual average emission reductions over the crediting period are below 15,000 t CO₂-e/year, in which case no fee is payable. Maximum calculated at 25,000 CERs/year over 7-year crediting period.

Sources : CCPO, 2005; UNEP, 2004 and Eco-Securities market information

In addition to the costs shown above, a number of governments may charge a fee for the approval of a CDM project. For example, China charges 65% of CER revenue for HFC projects or 2% of CER revenue for energy efficiency projects.

While most of the costs listed above are one-off costs incurred during the planning phase of the project, the costs of ongoing verification and the SOP Admin fees are incurred whenever issuance of credits for a project is required.

It should be noted that the upper ends of the cost ranges, in particular for large-scale PDDs and new methodologies, represent a 'worst case' scenario where an extremely large, complex project is being developed. On the other hand, the upper end of the range for registration costs represents a project with annual emission reductions of 182,500 t CO₂ –e/year crediting period, which is not unusual and is far exceeded by some of the larger projects. Therefore, for large projects with emission reductions beyond this level, SOP-Admin fees will eventually exceed the up-front registration fee.

11.4 Types of Finance Available for a CDM Project

The main sources of finance for these CDM-specific project costs during the planning phase are:

- i. **Government tenders and carbon funds:** which will often pay a proportion of these costs in return for a contract to purchase some or all of the resulting CERs.
- ii. **Private sector CDM project developers:** who may cover part or all of the CDM-specific costs in return for a contract to purchase some or all of the resulting CERs; and
- iii. **Project hosts:** either public or private sector entities which provide their own internal funds to develop projects with which they have an association as, for example, landowner, fuel supply provider, or off-taker of the non-CER outputs of a project.

The situation is more complex with regard to the costs incurred during the construction phase. As noted elsewhere, these costs are generally much larger than the planning phase costs, CDM projects are still relatively 'small' (typically under US\$20 million). Nevertheless, the potential sources of finance include:

- a. **Lenders:** who may provide limited recourse debt to relatively large projects with secure revenue stream and relatively low risks, or to other projects with recourse to a financially strong sponsor;

- b. **Private sector CDM project developers:** who may be able to finance (usually smaller) projects with their own equity;
- c. **Project hosts:** who may be able to finance (usually smaller) projects from their own internal funds;
- d. **Equipments suppliers:** who may provide assets on lease or credit; and
- e. **CER buyers:** who may provide up-front payments against future CER deliveries.

Financing Models for CDM Projects

Conventional project financing

CDM projects face a number of structural challenges in obtaining any form of financing, and particularly bank debt. Projects are typically relatively small; climate-friendly technologies such as renewable are usually more capital intensive than fossil fuel alternatives; and lenders to developing country projects often required higher interest rates or repayment over shorter loan terms than the project's revenues can support (Bishop, 2004). In addition, the CDM-specific risks can be significant: it was not until the entry into force of the Kyoto Protocol in February 2005, for example, that one major source of CDM-specific uncertainty (i.e. the legal foundation of the entire market) was eliminated. All of this has led to a relative scarcity of bank debt in CDM projects to date. Nevertheless, there are some exceptions, for example those described in the case studies below.

The advantage of conventional project financing for a CDM project (from the point of view of the project sponsor) include:

- a. **Ability to raise large amounts of capital:** generally speaking, banks have access to far larger amounts of capital than equity providers;
- b. **Improved rate of return of equity:** by financing a proportion of the project with debt (which has a lower cost of capital than equity) the equity providers improve the rate of return on their contribution to the project; and

- c. **Limited or no recourse to the assets of the project sponsors:** Should the project fail the assets of the project sponsors would not be at risk.

The disadvantages include:

- a. **Costs and time taken to obtain finance:** Lenders will need to undertake extensive due diligence before deciding whether or not to offer a loan to a project, which can be time-consuming and costly.
- b. **Contracts must be with credit-worthy counterparties:** Since the lenders only have recourse to the cash flows of the project, they will want to be sure that the contracts for the major outputs of the project are with reliable counterparties;
- c. **Delayed returns on equity:** Lenders will require to be repaid first, before any return is made to equity providers. This may delay any return on equity for some years.

Alternative Financing Options

The largest source of capital potentially available for CDM projects is bank debt. However, there are three main factors preventing wider use of bank debt to finance CDM project:

- 1) **Small project size:** The typical small size of CDM projects means that bank overheads would make up a larger proportion of the total loan, thereby increasing the cost of bank debt and/or making it less appealing for banks to allocate resources to loans to CDM project developers.
- 2) **Need for speed:** Project developers are in need of capital at relatively short notice. Because the existence of a market for CERs is currently only guaranteed until the end of 2012, every month of delay to a project reduces the overall return. However, banks required a certain amount of time to assess the different risks associated with financing a project.
- 3) **Risk:** The principle of additionality dictates that, in most circumstances (the only exceptions being where insurmountable non-financial barriers can be demonstrated), CDM projects are not financially viable without CER revenue.

Therefore the CDM-specific risks are of critical importance. Because the carbon market is still relatively young, experience and understanding of the CDM has not percolated widely into the financial community, and many institutions refrain from financing CDM projects simply because they have no experience in 'pricing in the risk'.

- 4) **Partial risk guarantees to insure against host country non-compliance:** For some projects, lender may require assurance from the host government, over and above project-specific Letters of Approval, before agreeing to finance a project. For example, a lender might require assurances that the government will not seek to 'nationalise' CERs or attempt to re-negotiate price agreed in ERPAs. Alternatively, a lender might require a commitment from the government to provide tariff increases that are required to make the project financially viable.
- 5) **CER derivatives:** An alternative to up-front payment for CERs would be for the project developer to sell a call option on delivery of a certain amount of CERs at an agreed price, on an agreed future delivery date. This would mean that the developer would have an obligation to sell that volume of CERs to the buyer, at the agreed price, if the buyer should choose to exercise the option at the most CERs have been sold under forward contract, under which no cash actually changes hands until the agreed delivery date (unless some form of up-front payment has been agreed). A call option differs from this because it has a current value (i.e. the buyer pays the writer of the option –the project developer – an option price now, in return for the right to exercise the option later).

Securitisation of CERs: Another option for alternative financing should be to 'securitise' a supply of CERs by forming an SPV which owns the legal title to the CERs, and issuing bonds on the SPV to individual investors (usually done with the help of an investment bank or specialized securities company). This would only be viable for very large projects, or 'pools' of CERs from smaller projects.

Chapter-12

The Sale of CERs – A Legal Perspective

Introduction

The Emissions Reductions Purchase Agreement or, as we affectionately call it, the ERPA witnesses the sale and purchase of certified emissions reduction receipts (CERs). Just like any other contract, the ERPA is special and in addition to the buyer and the seller agreeing to buy and sell CERs, the ERPA documents the framework for the entire understanding between parties whether in respect of finance, performance securities or other structural and administrative matters in respect of the Project.

The ERPA could come into existence at any point in time, when CERs have been issued to the Seller or mid-way through the Project cycle or even at the time of conception of the Project. What one requires is a buyer, a seller, and an understanding between them that they will so transact.

The ERPA is unique because (a) It often records an agreement for sale and purchase of a commodity not in existence on the date of the agreement, a quasi-commodity; (b) the market is developing and there is some uncertainty about the rules and regulations within which parties operate; (c) their performance of obligations by parties is contingent upon multi-levels of agreements between various stakeholders including project developers, operators, and operational entities, and could even include the host countries' continued commitment to the Kyoto Protocol.

The uncertainty may be attributable more to the unusual interaction between public international law and private players rather than the absence of confines within which parties must operate. The ERPA is, after all, born out of the Clean Development Mechanism (CDM), which finds mention in the Kyoto Protocol, an international treaty, and the sellers, when they are

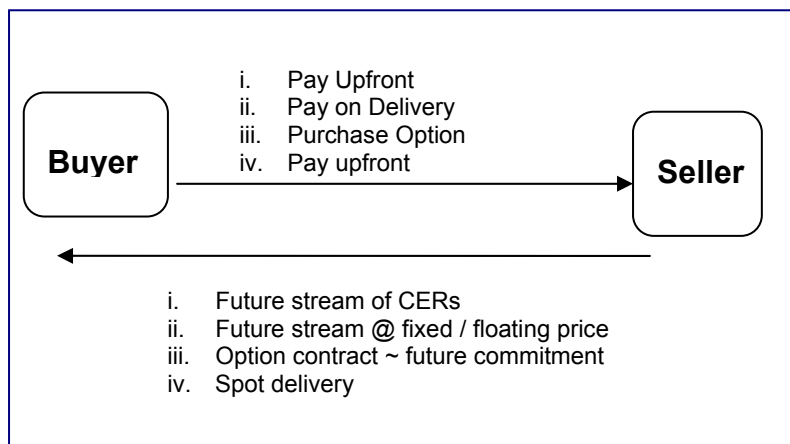
private entities, must operate within this larger framework of national and international policy and understanding.

The ERPA also chronicles a long term commitment between buyer and seller that could stretch from 7 to 10 or even 20 years, it brings together different cultural and business perspectives, allocates risks between parties; buyers may purchase for reasons ranging from compliance to brokerage, and there is a marked difference between the negotiating or bargaining power between parties.

1 Transaction structures

The appropriate structure will have a correspondingly appropriate contract, charting the transaction and its nuances. Some of the structures (see *Fig.2*) one encounters in the sale of CERs are:

- i. Upfront payment (in part or full) for a future stream of CERs.
- ii. Forward contract at either a fixed or floating price and payment on delivery of CERs.
- iii. Option agreement where the option to buy or sell, at a future date, is purchased.
- iv. Spot agreement for one time payment and one time delivery; no commitment for the future.



Transaction Structures *Fig. 2*

Each of the aforesaid structures would come with their separate risks for buyers and sellers and different mechanisms for execution, all of which will be incorporated in the ERPA.

2 Clauses in the ERPA

The ERPA, as other contracts would, begins with a brief description of parties and the recitals, a summation of facts and context that explain the background of the ERPA.

The *Sale & Purchase and Delivery & Payment* clauses note the quantity of CERs to be delivered over the term of the contract, the delivery schedules and vintages. The mechanism for delivery and payment is detailed in this clause. Given the nature of this contract, one makes a distinction between completion of delivery of the contracted CERs and the transfer of title to these CERs offering additional protection, at least contractually, to Sellers.

Detailed steps for delivery would include a delivery notice of anticipated quantities; this is the clause where Buyer is often obligated to provide payment security like a letter of credit etc. The trigger for sellers' resort to the security is also specified here.

Sellers typically undertake to include buyers as project participants and this is a continuing obligation depending on the terms of the contract and the purposes for which buyers purchased the CERs; it is necessary in the absence of an international transaction log and clear transfer mechanisms for the issued CERs. It is not possible, in the current set-up, to transact with a party that is not a project participant.

A regular request from buyers is that the 'focal point' rights be transferred to them. It is important to carefully consider the facts before allowing buyers this right. The 'focal point' is the person nominated by project participants, in respect of a certain project, to be the single point contact for all communications with the Executive Board and is also the person who will issue instructions for transfer of CERs from the sellers' registry account to the account(s) of buyer(s).

Any adjustments to be made to the quantities liable to be delivered and the corresponding payment for the same, whether dependent

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on baseline revisions or factoring associated risks, are typically provided for under these clauses.

Costs and *taxes* are usually divided into ‘pre-delivery’ and ‘post-delivery’ costs and taxes, and the obligation is divided between sellers for the former and buyers for the latter.

The nature of *representations and warranties* are as would be required under the ERPA by both parties. Boilerplate representations and warranties with respect to authority, corporate power and creation and with more specific reference to context transfer of unencumbered title from seller and that of sufficient funding from buyer are usually noted.

Sellers may fail to deliver at the agreed time, or agreed quantity, of CERs. This is *delivery failure*. Buyers may fail to pay for or otherwise take receipt of delivery of agreed CERs. This is *receipt failure*.

The *failure to transact* is usually provided for with obligations on the defaulting party to make good the loss or indemnify the other party for losses incurred. Providing the mechanism for delivery and payment is incomplete without a record of the consequences in case of failure.

What would constitute a *default* of the ERPA? What are the consequences of the same? Most of the times, the ‘events’ triggering the default provisions are well defined in the ERPA subject to materiality and other qualifiers signifying parties’ commitment to continue in spite of minor deficiencies that are remediable.

Greater protection is offered to parties with the concept of the ‘*reasonable and prudent operator*’, fairly typical of the ERPA in respect of certain obligations. Conceptually, parties are protected from liability that may otherwise arise from all and every default or failure under the ERPA.

Parties need to be careful about their *choice of* procedural and substantive *law*. While most parties execute agreements with little or no intention of disputing their bargain, disputes are a reality and

need to be kept in mind for dealing with practicalities and likely costs to the *dispute resolution* mechanism.

Boilerplate or *miscellaneous* clauses including confidentiality, assignment, severability, and entire agreement are features in most contracts including ERPA.

Going forward

Given the larger object of the CDM, should the ‘additionality’ principle extend to buyers investing in Projects or technology transfer transactions, or were buyers and sellers to evolve such structures, the ERPA and related documentation would be different, based on the specifics. One would have to examine foreign investment laws, third party liability issues and even liability of parties *inter se*.

While the move is toward standardisation of contracts, most transactions have an element that is peculiar to them and the ERPA, or for that matter any contract, must capture this element while providing for the principles and intentions of parties that may be of assistance should the document become the subject of disagreement or even dispute between the parties.

One can imagine an active market developing for the transacting of this commodity, and the ERPA becoming just one of the methods for sale of CERs. Any development on this, front however, would be accompanied by regulatory and contractual obligations.

Chapter-13

Professional Opportunities in the Emissions Markets

1. Project Identification

An oft repeated complaint is that India despite its having large number of projects, is still only scratching the surface so far as the potential projects are concerned. A major factor contributing to this low utilization of potential is lack of awareness amongst Indian promoters of possible carbon abatement opportunities. Members being in touch with the pulse of the industry are well placed to identify and advise on potential emission reduction initiatives.

2. Project Management

As described earlier, the project registration process is long and technical, involving meticulous documentation. These are all skills that members can bring to bear in successful project management. Moreover, financing structures can include equity and debt, which members can help in arranging and advising on. Members can also act as Consultants during negotiations with the buyers and add value on trading strategies and risk mitigation.

3. Portfolio Management

Portfolio management is critical since sub-optimal strategies in an immature and often volatile market can have a significant impact on value and reputation.

Advisory services are required for:

- How to manage the client's expected CERs / VERs
- Provide inputs for managing its public image in this perspective
- How to manage post 2012 situation

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- Advise on optimal contract types and clauses suited to each project
- Advise on price and delivery arrangements

Chapter-14

Carbon Finance- Case Studies

Case Study-1

Project Financing of an Independent Power Producer

Project finance is often used for Independent Power Producer (IPP) projects. For example, a project to develop a 500 MW gas-fired power station (combined cycle gas turbine) might require an initial outlay of around US \$2 million for the project design, feasibility studies and approvals; (i.e. the planning phase), followed by construction costs of around US \$ 300 million.

The project sponsors would establish an SPV to carry out the project. The initial US\$2 million for the planning phase would be provided by the project sponsors as an equity investment. The SPV would enter into a long-term (e.g. 15 year) power purchase agreement (PPA) with an electricity off-taker, for example a national electricity utility or a large electricity consumer.

The SPV would also seek to enter into some form of long-term gas supply arrangement, or at the very least to hedge its exposure to increases in gas prices (for example by linking the price paid for electricity under the PPA to a gas price index). The SPV would also enter into contracts with a construction company to construct the plant, an insurer to provide various forms of insurance and a company to provide operation and maintenance of the plant.

This 'package' of contracts could then be taken to a bank, which, after conducting all of its due diligence, might offer the SPV a loan of, say, 70% of the capital (US\$210 million) at an interest rate of 8% and a loan term of 15 years. Interest and loan repayments (assuming fixed, 'mortgage style' combined interest and loan repayments) could then be around US\$ 24.5 million/year.

The output from the project could be expected to be around 2.85 TWh/year (assuming an average load factor of 65%). At a sale price of (say) US\$ 60/MWh, this would generate annual revenue of

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around US\$171 million. Fuel costs would use up around 60% of this, leaving US\$68.3 million/year. Annual operating costs of around US\$ 30 million/Year would result in an EBITDA of around US\$38.3 million/year, or 1.56 times debt service. The annual profit over the first 15 years would be around US\$14 million, thus providing a 12% return (over 15 year) on the US\$92 million in equity (US\$90 million for construction plus \$2 million for the planning phase) provided by the project sponsors. However, assuming that the plant continues to operate under similar conditions for a further 10 years beyond the end of the 15 year loan term, this would increase the equity IRR to 17%.

Question 1 Make strength, weakness, opportunity and threat (SWOT) analysis of above project financing.

Question 2. “Power purchase agreement is not visible from long term gas supply arrangement”. Comment.

Case Study-2

Corporate Financing of an Industrial Energy Efficiency Project

Company X owns and operates a large industrial plant such as an oil refinery or chemicals plant. An opportunity might exist to improve the energy efficiency of one of the processes by installing a new piece of equipment, costing say US\$10 million. Implementing the project will save the company money (reducing energy costs, say by US\$ 1 million/year). If the investment is well planned and the company sufficiently large, the company might be able to finance such a project entirely from its own reserves. Alternatively, the company could borrow part of the capital from a bank (or syndicate of banks), with its broader assets as collateral for the loan provided the company is sufficiently credit-worthy.

In such a scenario, several roles which would be distinct under a project financing model are collapsed into one. Company X, the project sponsor, is also the project entity, the ‘supplier’ of the industrial process the project is based upon, and the ‘buyer’ of the energy savings’ produced by the project. It could also be the constructor and operator of the new equipment.

Question 1. Discuss how an energy efficient project is in favour of project sponsors.

Question 2. What role should rating agencies play in covering insurance risk of the project ?

Question 3. As consultant would you advise the company to borrow part of capital from a bank with its broader assets as collateral for loan.

Question 4. What role should the government play in the implementation of the above project ?

Question 5. Will you suggest lease financing in the above situation ?

Lease financing

Leasing essentially involves the supplier of an asset financing the use and possibly also the eventual purchase of the asset, on behalf of the project sponsor. Assets which are typically leased include land, buildings, and specialized equipment. Ownership of the assets remains with the lessor unless purchased by mutual agreement at the end of the lease. A lease may be combined with a contract for operation and maintenance of the asset. It may also be a sub-set of a broader financing model (e.g. project finance or corporate finance).

The Advantages of leasing include:

1. **Less stringent requirement:** The requirements for entering into a lease are relatively less stringent than those for obtaining bank debt.
2. **Limited liability:** The total liability to the project entity is generally significantly less than the total cost of the asset (depending on the terms of the lease - for example, the penalty for breaking lease before full term could vary from the full cost of the remainder of lease to a fraction based on a minimum notice period).

The disadvantages of leasing include:

1. **Need for minimum level of credit-worthiness:** Lease finance is only possible when the project entity can establish a minimum level of credit-worthiness to satisfy the lessor. A 'bond' or up-front deposit may be required and the lease payments will include (whether implicitly or explicitly) a 'risk premium' determined by the lessor to compensate for both their cost of capital and the risks involved in having their assets in the hand of a third party.

Project Financing of Eucalyptus Planter Project

Case Study-3

The Planter project involved the establishment of eucalyptus plantations in degraded areas that would be harvested after seven years and converted to charcoal for use in the pig-iron industry. The project would reduce emission by displacing the use of coal for the same purpose in the pig-iron industry.

The PCF entered into a contract to purchase Verified Emission Reductions from the project, with the hope that the project could eventually be registered as a CDM project and generate CERs. The PCF therefore took on all CDM risk. The PCF also agreed to pay for the emission reductions during the growth of the trees, rather than at the point of displacement of coal in the pig-iron industry. This resulted in revenue to the project starting in the project's second year, rather than the eighth year (when non-CER revenue would also start from the sale of charcoal to the pig-iron industry).

This highly secure revenue stream, starting in the second year of the project, allowed the project to obtain a loan from Rabobank Brazil, under which the repayment schedule was structured to match the expected payments from the PCF.

As an added precaution, the payments from the PCF were made directly to the lender rather than to the project sponsor. This enabled Rabobank to consider the transaction 'country risk free' and eliminated the need to purchase country risk insurance, which

was unavailable for Brazil at the time. The project therefore became bankable. Structuring the loan repayments to match the emission reduction payment schedule also enabled Rabobank to increase the loan term from two years with out carbon finance to five years with carbon finance (Bishop, 2004).

Learnings:

- i. An ERPA with a highly rated counterparty can help to mitigate risks associated with non-payment.
- ii. Denomination of the ERPA in a hard currency can help to eliminate currency risk.
- iii. In this case the agreement to make payments directly to Rabobank further decreased the risk to the lender.
- iv. Structuring the loan repayments to match the emission reduction payments schedule (or vice versa) can increase a lender's willingness to finance a project and/or allow them to extend the term of a loan.

Financing of a Biomass Electricity Generation CDM Project

Case Study-4

The project involved the construction of a 20 MW (net electricity output) plant burning biomass to produce electricity that is supplied to the project host country's electricity grid. The project generates CERs because it (a) displaces grid electricity generated from fossil fuels and (b) eliminates methane emissions from the biomass, which previously was left to rot in the sun.

The Key features of the project were as follows:

- i. Capital requirement approximately US\$40 million;
- ii. Electricity output approximately 150 GWh/year;
- iii. Relatively high emission reductions due to avoided methane emissions (GWP=21) plus displaced grid electricity (emissions factor around 0.5tCO₂-e/MWh);

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- iv. Single buyer for electricity output (national electricity utility, AA-rated);
- v. Reliant for fuel supply (500 tonnes/day) on a large number of small primary producers.

Project financing was considered for this project because the capital requirement was sufficiently large to interest a bank (particularly because a number of similar projects were planned to follow), and because the project had several revenue streams, including the possibility of a long-term power purchase agreement with a reliable off-taker. The country was also one in which project financing for independent power producer (IPP) projects was well-established.

As with traditional project finance arrangements, a special purpose vehicle (SPV) was created in order to take the financial risk off the balance sheet of the project sponsors and limit recourse to the parent companies. 64% of the capital was provided in the form of senior debt by two banks, one local and the other international; the remaining 36% was equity provided by a group of project sponsors. A number of agreements were signed between the SPV and other project stakeholders to facilitate the project financing, including;

- i. A 25-year power purchase agreement (PPA) with the off-taker for the energy;
- ii. An ERPA to 2012 with a European buyer;
- iii. A turn-key engineering, procurement and construction agreement with an international contractor;
- iv. An operations and maintenance contract;
- v. A fuel supply agreement with the local suppliers of biomass;
- vi. An implementation agreement with the host government;
- vii. Credit agreements with the lenders;
- viii. A contribution agreement with third party investors; and

Learnings:

- a. Project development was very long (8 years from conception to commissioning). Setbacks included the 1997 Asian financial crisis and the withdrawal of a major equity investor at an advanced stage (for reasons unrelated to the project activity itself).
- b. The senior debt provision was based only on the electricity revenue and not on any CER revenue or revenue from sales of ash to cement plants. Nevertheless, the intention for future projects based on this model is that debt will be secured on CER and ash revenue streams as well as electricity.
- c. The possibility of CER revenue did, however, contribute to the interest of the equity investors in the project and helped to justify the long (and costly) project planning phase.
- d. The project experienced delays in the CDM approval process. However, the fact that senior debt was obtained on the basis of conventional revenue and not CER revenue meant that this did not delay the construction of the plant.
- e. Due to the rural, decentralized nature of the biomass providers, more fuel supply agreements were entered into than were strictly required, in order to provide a contingency in case some of the millers failed to deliver. The fuel supply agreements were for 7 years and covered the transport of the biomass and the way in which the value of biomass was assessed before and after transportation.
- f. The fact that a share of the project debt was in an international currency, whereas the major revenue (electricity and ash sales) was in local currency, meant that the project was exposed to currency risk. Some of the risk of the unstable local currency of the host country may be mitigated since the CER revenue stream will be in US\$, helping to match the debt service payment currencies to the revenue streams.

Project Financing of a Hydro Electricity generation CDM Project

Case Study-5

The project involved the construction of several small run-of-river hydro electricity generation facilities (less than 15 MW total capacity). The primary project sponsor was a local entity. The project generates CERs because it displaces grid electricity generated from fossil fuels.

The key features of the project were as follows:

- a. Phased capital requirements totalling some US\$17 million.
- b. Long-term power purchase agreement with local utility;
- c. Difficult local financing environment with banks charging high interest rates and requiring loan guarantees; and
- d. Emission reduction purchase agreement with the World Bank PCF.

The first phase of the project was financed with a senior loan (approx US\$2,50,000) from a non-profit organization specializing in providing small loans to sustainable energy projects. The loan was provided on commercial terms and took revenue from emission reductions (via a contract with the PCF) into account. Equity was provided by the project sponsor.

For later phases, a syndicate of 5 banks provided 70% of the total capital requirement as senior debt. The project sponsor contributed 11% as equity, and two mezzanine finance providers contributed the remaining 19% in the form of preferred shares (paying a specific dividend, paid before other equity shareholders). The most recent phase of the project involves an additional US\$2 million, required to implement efficiency improvements to the existing infrastructure. This is being provided by further mezzanine finance in the form of preferred shares. These preferred shares

are subordinated to the previously issued preferred shares and pay both a specific dividend and an equity 'kicker' (i.e. enabling the lender to share in dividends to ordinary shareholders).

Learnings^[v9]:

1. The project took over 3 years to secure finance, but was eventually successful both in obtaining finance and in registering as a CDM project.
2. Project construction costs over-ran, and this additional cost had to be covered by the project sponsor.
3. The participation of the specialized lender was essential to the project's success.

The project involved the construction of a 20 MW (net electricity output) plant burning biomass to produce electricity that is supplied to the project host country's electricity grid. The project generates CERs because it (a) displaces grid electricity generated from fossil fuels and (b) eliminates methane emissions from the biomass, which previously was left to rot in the sun.

100% Equity Financing of a Landfill Gas Capture CDM Project

Case Study-6

The Project involves the design, construction and operation of a landfill gas collection and flaring system on an urban landfill in a Central American host country. The project generates CERs because it avoids the methane from the landfill being vented directly to the atmosphere. In a later stage, the collected landfill gas will be used for electricity generation, thereby generating further CERs from the displacement of grid electricity generated from fossil fuels.

The Key features of the project were:

- a. Landfill owned and operated by local municipal authority.
- b. No legal requirement to capture flared gas; also, and revenues from captured gas insufficient to justify capital expenditure of around US\$ 1.5 million.

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- c. Electricity generation potential 2-4 MW (with additional investment of US\$2-4 million); and
- d. Emission reduction potential 1,00,000-2,00,000 t CO₂-e/year.

The project was developed by an unincorporated joint venture between three companies with expertise in gas collection and flaring, electricity generation and CDM project developments. All finance was provided by the joint venture partners (including a significant amount of in-kind support). The joint venture partners also provided all technical, operational and CDM expertise, and took on all the risks associated with these aspects of the project.

A contract was signed with the local authority, providing for a royalty fee to be paid from the sale of CERs. The design, installation and testing of the gas collection and flaring equipment took place along with the preparation of CDM documentation. The result was that the project was registered and commenced gas flaring within 7-8 months from the date of signing the contract with the local authority.

Lessons learnt:

The following success factors were identified as critical reasons why this model was capable of delivering a project in record time:

- a. Contract negotiations with the local authority were relatively rapid, as the project developer offered a single contract to deliver all aspects of the project at no up-front cost to the local authority, with the added attraction of a future royalty revenue stream. While the local authority might have developed the project on its own, the net benefit (after taking into account internal costs, external costs, opportunity costs due to a longer project development timetable, and technical, operational and CDM risks) would almost certainly have been lower.
- b. The joint venture partners involved in each aspect of the project – gas collection and flaring, the CDM project cycle and electricity generation – were each experts in the field and wholly responsible for delivering that aspect, rather than relying on sub-contractors. This ensured that each party had

a full incentive to make that aspect of the project work, and to ensure delivery as rapidly as possible.

Build-Own-Operate-Transfer (BOOT) of a biogas CDM Project

Case Study-7

The project involves the construction and operation of an anaerobic digester and associated facilities to produce biogas from the wastewater stream and biomass arising from the production process of a company (the 'host company') producing starch from tapioca. The project generates CERs because it avoids the methane emissions associated with the current waste disposal system, also, the biogas produced will be used to displace emissions from the combustion of heavy fuel oil in the company's burners.

The key features of the project were:

- a. A single host company provides the necessary inputs (waste water and biomass) and takes the outputs (biogas) of the project, thus necessitating integration with the existing production site; and
- b. Relatively low capital expenditure requirement (around US\$1 million).

The solution proposed to the host company was Build-Own-Operate-Transfer (BOOT) business model. Under this code, a CDM project developer offered to develop, finance, construct, own and operate the required infrastructure for a period of 10 years, after which the project's assets would be transferred to the host company for a purely nominal sum and the host company's staff trained in the operation of the facility. The project developer therefore took on all financial, technical, operational and VDM risks associated with the project. In addition, the project developer invested 100 % equity in the project in order to avoid any delays which could have been caused by identifying other lenders to the project.

The host company took on very few risks and commitments. It agreed to supply the land required for the development of the project (for a nominal rental) and to make its waste stream and biomass available over the 10 years period of the contract. In

order to ensure that the methane generation potential of the anaerobic digester was met, the quantity of the waste water stream and its characteristics were pre-defined in the contract with the project developer.

In addition, the host company agreed to purchase the biogas produced by the project at a favourable price, pegged to the current prices for the heavy fuel oil which it replaces. This link between the two commodities ensures that the discount will remain significant while a calling and floor price are defined to ensure a certain price range for the host company and the project developer. The amount of biogas required by the company in order to fire its boiler is pre-defined in the contract and the project guarantees delivery of the defined amount of gas. All excess biogas which is produced by the project will be delivered to the company for free rather than being flared.

In return, the project developer takes full ownership of the CERs generated by the project, paying the host company a fixed royalty per CER, to be paid after issuance of the CERs.

Lessons Learnt:

- a. This model is capable of delivering a project rapidly, as it relies solely on relatively simple contractual agreement between two parties. However, this assumes that the project developer has all these inputs to the project. If elements of this expertise have to be outsourced, the costs and time taken to develop the project are likely to be much higher than when a single project developer can provide all the necessary inputs.
- b. The BOOT model is suitable for a project which is integrated into another site, particularly where the lifetime of the asset is likely to exceed the CDM crediting period of the project (and therefore the period of interest to the project developer).

Low Interest Loan from a Development Institution

Case Study-8

The project involved a Europe-based development bank providing a five year loan of €1.1 million to a project host company in central

Asia for the construction of a mini-hydro project. The host company used the loan to install a second turbine which, while only working for limited amount of time per year, will increase the company's total electricity production by 23%. The electricity will be sold to the host country's government, under guarantees lasting until 2016, at prices negotiated once a year.

The company had experienced difficulties in attracting bank loans for the project; interest rates were high and banks were reluctant to take on the risk of investing in a small-scale hydro project. The project host company had even approached the turbine supplier to help identify sources of finance but was unsuccessful. It approached the development bank and they negotiated a €1.1 m loan at a 9% interest rate, significantly lower than the rate offered by the domestic banks.

Being the sole lender to the project, the bank accepted all of the risk involved in the project. The bank also carried all costs of the development of the CDM component for the project. If the project is successfully registered, it will be the first mini-hydro project registered under the CDM in the host country. Registration will improve the viability of the project, as carbon credits will be paid for in hard currency. By assisting with the development of the carbon component, the bank expects to demonstrate that the country can benefit from small-scale renewable energy projects and the international emissions trading market.

Lessons Learnt:

- a. Development banks can function as lenders if no other financing options are available to the project developer.
- b. Development bank funding is compatible with the CDM, provided it can be sufficiently demonstrated that no official development assistance has been diverted.

Chapter-15

Industry-Wise Eligible Projects

Given below is an illustrative list of projects which can be taken up by companies belonging to various sectors and the strategies which would help them develop a CDM Project in order to earn 'credits'. Industries which are trying to reduce emissions and in the process earn carbon credits, include steel, power generation, cement, fertilizers, waste disposal units, plantation companies, and chemical plants etc.

SECTOR	STRATEGIES
Cement	-Mixing fly ash to cement -Use biomass instead of coal -Waste heat recovery from power generations
Sugar	-Bagasse-based cogeneration plant. -Use of ethanol instead of fossil fuel
Power	-Using of wind, steam, thermal power
Fertilizer	-Thermal oxidation plant of treatment of green house gases-Reduction of N ₂ O in nitric acid/other fertilizer manufacture -Waste heat recovery - Methane recovery and reuse
Textile	-Solar energy for water heating -Friction ad jet air spinning
Agriculture	-Fuel efficient irrigation pump sets
Transportation	-Fuel shifting from liquid fuel to CNG/LPG
Iron and Steel	-Basic Oxygen furnace gas waste heat recovery -Oxy fuel use in reheating furnaces.
Paper & Pulp	-Energy efficiency improvements -Biomass based cogeneration

Chapter-16

Projects in India

The table below provides examples of various CDM projects, the Strategies adopted in order to gain them, along with the CERs earned.

Name of the Company	Sectors	Project undertaken	CERs earned/ likely to earn	Profit made/ Expected
Gujarat Ambuja Cement	Industrial Process	Blended Cement(mixing of fly ash in cement which brings down clinker which is a Constituent of CO ₂)	4,00,000	N.A.
ACC	Industrial Process	Blended Cement	4,00,000-4,50,000	Rs.18-20 Crore*
Shree Cement	Industrial Process	Blended Cement	3,50,000	N.A.
Rajshree Sugars	Renewable Energy	Bagasse-based power project	80,000 earned	Rs 3.6 crore*
The Godavari Sugar Mills Ltd	Renewable Energy	24 MW Bagasse Based Co-generation Power Project	1,70,103	N.A.

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Gujarat Fluorochemicals Limited	Energy Efficiency	Setting up plant for Greenhouse Gas Emission Reduction by Thermal Oxidation of HFC 23.	16,30,185	N.A.
SRF Ltd (a company into nylon tyre cord and fluorochemicals business)	Energy Efficiency	Setting up plant for Greenhouse Gas Emission Reduction by Thermal Oxidation of HFC 23.	1295449	Close to Rs 500 crore in FY 07
Sun-n-Sand Hotels Pvt. Ltd. at Satara	Renewable Energy	Generation of electricity from 1.2 MW capacity wind mills	13,294	N.A.

Projects in India

Gujarat Alkalies and Chemicals Limited	Fuel Switching	Switching of fuel from naphtha to natural gas in the captive power plant(CPP)	3,06,121	N.A.
JSW Steel Limited	Energy Efficiency	Generation of Electricity through combustion of waste gases from Blast furnace and Corex units	1364852	N.A.
Tata Steel Ltd.	Energy Efficiency	Generation of power through the depressurization of the blast furnace gas in a top-pressure recovery turbine (TRT)	7,26,280*	N.A.
Nahar Spinning Mills Ltd.	Renewable Energy	Rice Husk based cogeneration project	10,948	N.A.

*Over a period of 10 years as most Carbon Credit projects are for 10 years.

Chapter-17

Conclusion

1. Clean Development Mechanism offers great business opportunities to India as it does to all developing countries in general (but, of course, we are looking at the benefits Indian Companies can reap exploiting it).
2. CDM projects have huge profit margins and hence Indian Companies can make use of this in order to earn profits and fulfill their social responsibility.
3. The revenue earned through the Clean Development Mechanism projects must be greater than the cost incurred in project registration; cost incurred in machinery etc. because the success in earning credits depends on the project being executed at minimum cost.
4. Generation of Credits through Verified Emission Reduction (VER) is simpler compared to Certified Emission Reduction. However, the price of VER is less compared to CER. Standardization of VER is gaining momentum and market value of VER is going to increase in the years to come.
5. Since the price is based on demand-supply situation, determination of the price is tough as this would depend on the requirement of the European and other developed countries. Thus, the prices of CERs are speculative in nature.
6. An overview of the current status of Clean Development Mechanism projects shows that, India has the highest number of Clean Development Mechanism projects registered and also has the highest number of expected Certified Emission Reduction generated, second only to those of China. Hence, India and Indian companies have a great profit making opportunity in Carbon Credits.

“CARBON CREDITS - PAY OR GET PAID FOR YOUR ACTION TOWARDS THE ENVIRONMENT”

Chapter-18

ANNEXURES

Annexure No. 1

The Green house gases identified by the Kyoto protocol and their Global Warming Potential:

Gas	Global Warming Potential
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	21
Nitrous oxide (N ₂ O)	310
Hydrofluorocarbons (HFCs)	140-11,700
Perfluorocarbons (PFCs)	7,000-9,200
Sulphur hexafluoride (SF ₆)	23,900

Source : http://www.cseindia.org/programme/geg/cdm_faq.htm

As issued by IPCC Third Assessment Report. 2001 Climate Change: The Scientific Basis. Intergovernmental Panel on Climate Change

Annexure No. 2:

Countries included in Annex B to the Kyoto Protocol and their emission targets.

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Country	Target (1990** - 2008/2012)
EU-15*, Bulgaria, Czech Republic, Estonia, Latvia, Liechtenstein, Lithuania, Monaco, Romania, Slovakia, Slovenia, Switzerland	-8%
US***	-7%
Canada, Hungary, Japan, Poland	-6%
Croatia	-5%
New Zealand, Russian Federation, Ukraine	0
Norway	+1%
Australia	+8%
Iceland	+10%

* The 15 States who were EU members in 1990 will redistribute their targets among themselves, taking advantage of a scheme under the Protocol known as a “bubble”, whereby countries have different individual targets, but which combined make an overall target for that group of countries. The EU has already reached agreement on how its targets will be redistributed.

** Some EITs have a baseline other than 1990.

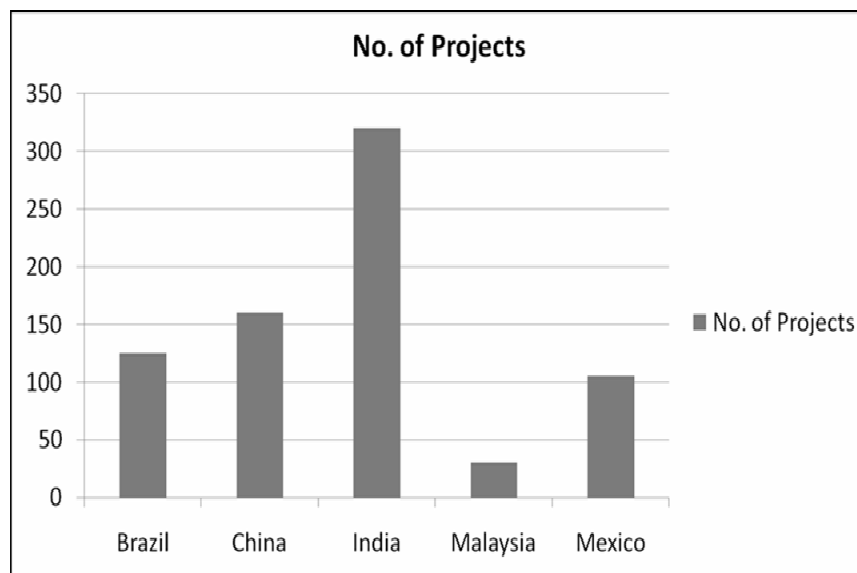
*** The US has indicated its intention not to ratify the Kyoto Protocol.

Note: Although they are listed in the Convention's Annex I, *Belarus* and *Turkey* are not included in the Protocol's Annex B as they were not Parties to the Convention when the Protocol was adopted.

Source: http://unfccc.int/kyoto_protocol/background/items/3145.php

Annexure No 3:

Registered Projects by Host Party



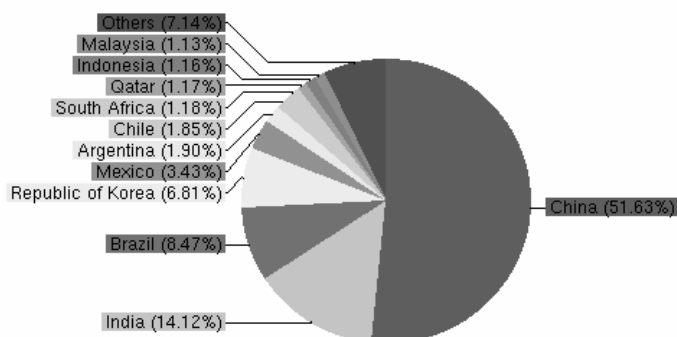
Source: IDBI-Carbon Development March 2008 Issue-SSD 016

Annexure No. 4:

Expected average annual CERs from Registered projects by host party.

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Expected average annual CERs from registered projects by host party. Total: 214,482,027



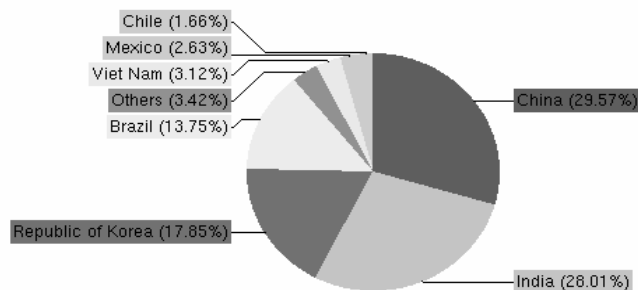
<http://cdm.unfccc.int> (c) 14.05.2008 13:53

Source: <http://cdm.unfccc.int/index.html>

Annexure No. 5:

CERs issued by host party

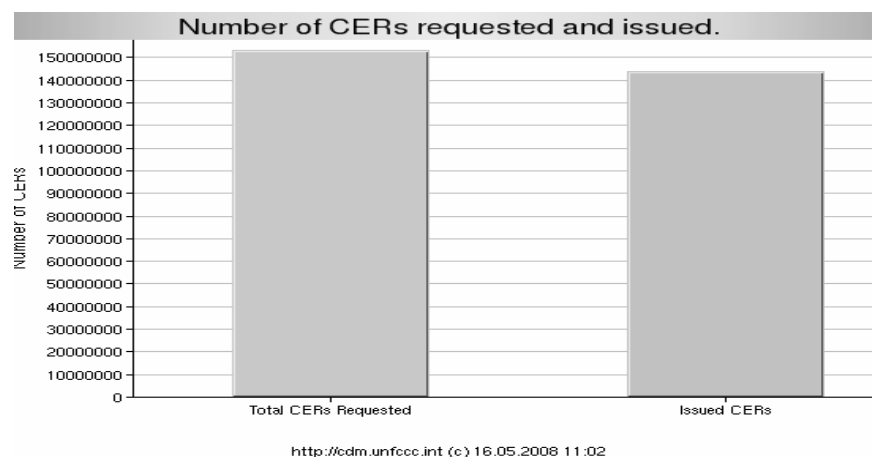
CERs issued by host party. Total 143,760,593



<http://cdm.unfccc.int> (c) 16.05.2008 10:53

Annexure No 6:

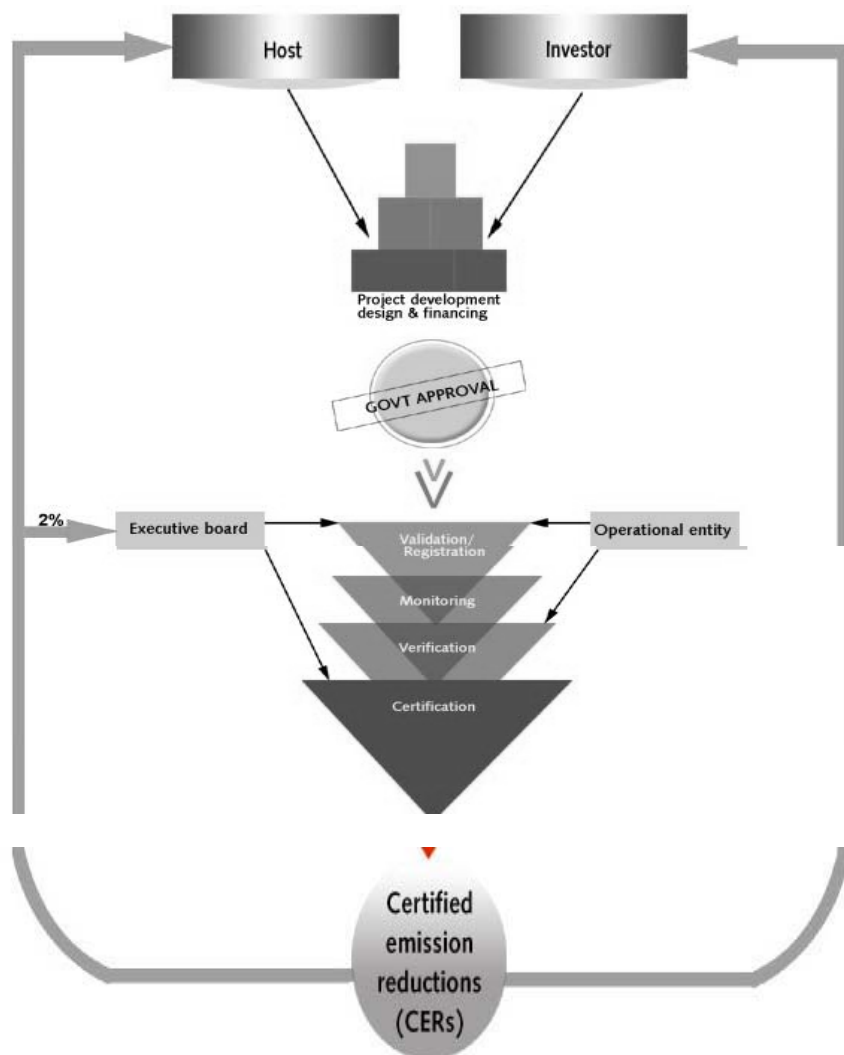
No of CERs requested and issued:



Title	Number of CERs
Issued CERs	143,760,593
Total CERs Requested	153,160,803

Annexure No. 7

The CDM Project Cycle:



Source: <http://envfor.nic.in/cc/index.htm>

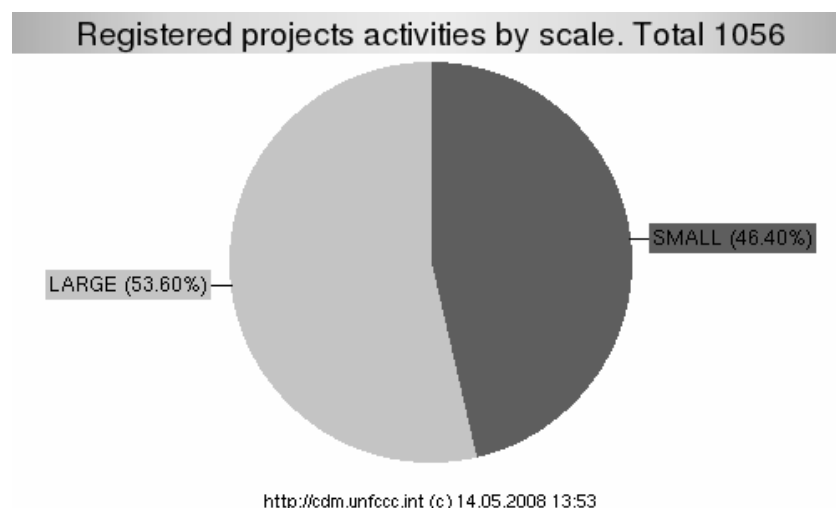
Annexure No.8

Common Methodologies adopted by Small Scale Projects by some Indian Companies.

ID	Name of the company	Project title	Methodology	Project type	CERs	Validator	Other party
CDM1102	Grasim Cement	Energy efficiency by up-grading a clinker cooler in cement manufacturing	AMS-II.D.	Energy efficiency	N.A.	SGS	N.A.
CDM0108	Nahar Spinning Mills Ltd.	Rice Husk based Cogeneration Project	AMS-I.C.	Biomass energy	10948	DNV	Germany
CDM0065	Shree Renuka Sugars (SRS)	Bagasse Cogeneration	AMS-I.D.	Biomass energy	N.A	KPMG	N.A.
CDM0109	Oswal Woolen Mills Ltd	3.5 MW Rice Husk based Cogeneration Project	AMS-I.C.	Biomass energy	11501	DNV	Germany

Annexure No. 9:

Registered Projects under Large and Small Projects by UNFCCC

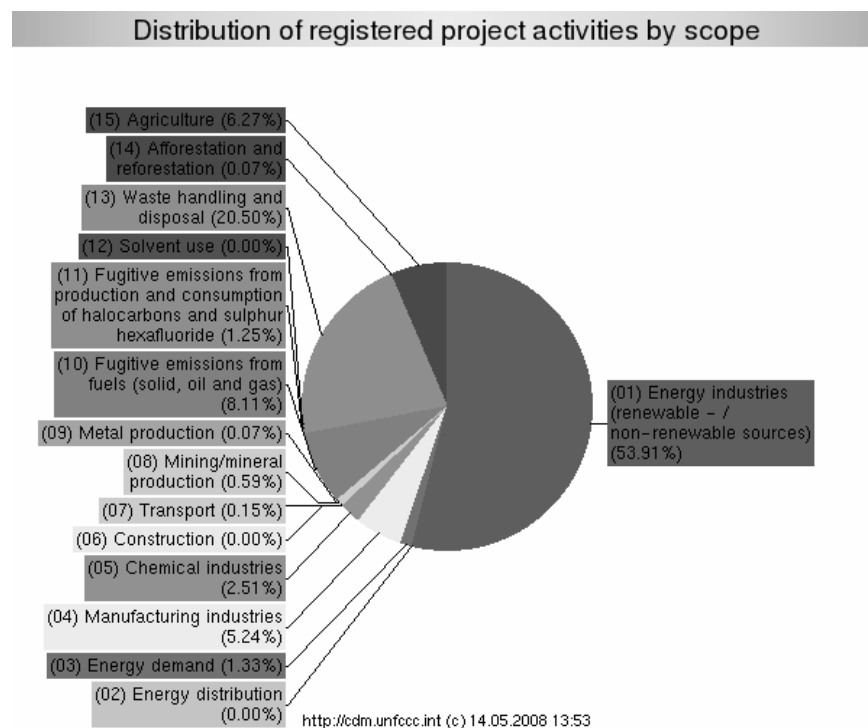


SCALE	REGISTERED PROJECTS
Large	566
Small	490

Source: <http://cdm.unfccc.int/index.html>

Annexure No. 10:

Distribution of projects under different activities.



Source: <http://cdm.unfccc.int/index.html>

Annexure No. 11

International Buyers of CDM

Country governments in Annex I are the ultimate beneficiaries of CERs. However several private players are also involved in CDM, acting as brokers and intermediaries. Private funds that buy and sell CERs are also active. The following table estimates the funds available for purchasing carbon credits – which could come from CDM or from JI.

Clean Development Mechanism and Carbon Credits – A Primer

Multilateral Fund	Size funds (millions US\$)
World bank funds	408.6
WB Netherlands CDM facility	180
WB - Italian Carbon Fund	80
IFC Netherlands Carbon Facility	52.36
CAF - Netherlands Carbon Facility	47.6
Government or local institution administered funds	
Austrian JI/CDM program	257.04
KFW Carbon Fund	59.5
Swedish energy agency	25.12
Flemish Government JI/ CDM tender	83.3
Belgian JI/CDM tender	11.9
Finnish CDM/JI pilot tender	11.9
Rabobank-Dutch government CDM facility	10 million tonnes C02
Private funds	
Japan Carbon Finance Ltd.	141.5
European Carbon Fund	124.95
GG-CAP Greenhouse Gas Credit Aggregation Pool	85.68
ICECAP	40-50

Source: http://www.cseindia.org/programme/geg/cdm_faq.htm

Annexure No. 12

Price of CERs:

Pricing and Trading Volume of CO₂ on the European Climate Exchange for the period between 14th March 2008 to 10th April 2008.



Settlement Prices ('Sett') reflect the weighted average of trades during the daily settlement period (16:00- 16:15 hours UK local time).

LIST OF REFERENCES

Internet:

http://www.cseindia.org/programme/geg/cdm_faq.htm

http://www.cseindia.org/programme/geg/cdm_guide.htm

<http://www.dna-cdm.menlh.go.id/en/>

<http://www.cdmindia.nic.in/>

<http://carboncreditworld.net>

<http://envfor.nic.in/cc/index.htm>

<http://cdm.unfccc.int/index.html>

<http://www.icbe.com>

<http://www.ficci.com>

<http://www.asiscarbon.com/news.htm>

<http://www.mcxindia.com>

<http://www.pointcarbon.com>

http://www.iisd.ca/process/climate_atm.htm

<http://www.moneycontrol.com>

<http://www.worldbank.org>

<http://www.carbonyatra.com>

<http://www.idbibank.com/idbi/ccb.asp>

<http://www.cdmindia.com>

<http://www.onlinecarbonfinance.com>

Clean Development Mechanism and Carbon Credits – A Primer

<http://www.cdmindia.nic.in>

<http://www.ctrade.org>

<http://www.ulipoint.com>

<http://www.cdmrule.org>

<http://cdm.unfccc.int/Projects/projsearch.html>

and other internet search

Books:

- Kyoto Protocol Issues and Implications- ICFAI University Press, Edited by Sandipa Lahiri Anand and Asis Kumar Pain

Newspapers and Magazines:

- Economic Times Dated 22nd April 2008

Chapter-20

GLOSSARY

Assigned Amount: An “**Assigned Amount**” is the total amount of greenhouse gas that each ratifying country is allowed to emit during the ‘first commitment period’ (2008 – 2012) of the Kyoto Protocol. AAUs are issued by governments that have emission reduction commitments, and can be traded between countries pursuant to international emissions trading, provided that these countries are fully compliant with eligibility requirements.

Bundling: Combination of several small-scale project activities to form a single project activity or portfolio to decrease transaction costs per unit of emission reductions.

European Union Emission Trading Scheme (EU ETS): The European Union Emissions Trading Scheme is an EU wide cap and trade emissions trading system that trades in “EU Allowances” (EUAs). **EU Allowances** are allocated units (tons) of CO₂ that grant the holder – typically a private emitter of GHGs– to emit the equivalent quantity of CO₂ towards meeting emission obligations in the EU ETS. Allowances are essentially rights to emit unique to cap and trade schemes, issued by national governments and allocated to emitters either by auctions, regulation or specific decree. In other words, **EU ETS** is European market-based mechanism that distributes emission quota between major GHG emitting industries, and allows trade between these to meet emission caps cost-effectively.

Greenhouse gases (GHGs): Greenhouse gases (GHGs) are trace gases that control energy flows in the Earth's atmosphere by absorbing infra-red radiation.

Host Country: A host country is the country where a JI or CDM project is physically located. A project has to be approved by host country to receive CERs or ERUs.

Leakage – ‘Net change of GHG emissions which occurs outside the project boundary and which is measurable and attributable to

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the CDM project activity'. Decrease or increase of greenhouse gas-related benefits outside the boundaries set for defining a project's net greenhouse gas impacts that result from project activities.

Voluntary Market: Voluntary markets for emission reductions cover those buyers and sellers of Verified Emission Reductions (VERs), which seek to manage their emission exposure for non-regulatory purposes.