



# Handbook with Checking List and Best Practice for CDM in China

## Guideline on Selling your CDM Project

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This material is part of the CDM China (EC Grant Agreement No: CN/ASIA PRO ECO II/04 (113210)), related to activity 2 – Capacity Building in CDM focused on the Private Sector. It is envisaged that the material here compiled does support the feasibility analysis of potential CDM projects in China.



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## **DECLAIMER**

This CDM handbook has been produced through the project “Capacity building on business opportunities for CDM projects in China”, with the financial assistance of the European Union. The contents of this document are the sole responsibility of project partners and can under no circumstances be regarded as reflecting the position of the European Union.

## FORWARD

CDM China project, supported by the Asia pro Eco Program<sup>1</sup> from the European Union, has the objective to support the Chinese private sectors so the private developers so they can realize the potential benefits of the Kyoto Protocol, mainly to foster the development of CDM project activities and related carbon trading concepts. This would facilitate an active and major participation on the part of the private sector in flexible mechanisms proposed by the Kyoto Protocol that aims to alleviate global greenhouse gas emissions.

This project also aims at addressing GHGs emissions reduction and consequently contributes to promote a healthier urban environment in China through capacity building primarily offered to local industry stakeholders. The capacity building process and the promotion of Clean Development Mechanism (CDM) will be developed through a collaborative set of activities involving local authorities and a local environmental NGO. The project is endorsed by the Climate Change Office of the National Development and Reform Council (NDRC), which supported its formulation unofficially, based on the identified gaps.

Within the scope of the Capacity Building on Business Opportunities for CDM Projects in China Project, was produced this handbook, that has the objective to enhance the marketability of those projects within the China context. The Handbook have five main sections, the first one with a general overview of the CDM market on China, a second with a suggested short feasibility procedure, third an analysis of the Baselines and Monitoring methodology that the editorial board considered more relevant for the Chinese context, forth an analysis of the main market related barriers present for the development of CDM projects in China, and a section with Final remarks.

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<sup>1</sup> The Asia Pro Eco Programme is a five-year European Union initiative, launched in 2002, based on the experience and the inputs provided by the Asia Eco Best Programme. With a budget of €31.5 million, the main target is to adopt policies, technologies and practices that promote cleaner, more resource efficient, sustainable solutions to environmental problems in Asia. The Programme provides support through grants to policy reinforcement, operational & practical dialogue, diagnostic studies, technology partnerships and demonstration projects in the field of the environment. The implementation will concentrate on specific projects under the Call for Proposals mechanism accessible to public or non profit organisations in Asia and the EU.

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## LIST OF ABBREVIATIONS

AR	Afforestation and Reforestation
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon dioxide
CO <sub>2e</sub>	Carbon dioxide equivalent
COP	Convention of Parties
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ERU	Emission Reduction Unit
GHG	Greenhouse Gases
HFCs	Hydrofluorocarbons
JI	Joint Implementation
ICERs	Long term Certified Emission Reduction
LULUCF	Land Use, Land-Use Change and Forestry
MFA	Chinese Ministry of Foreign Affairs
MOST	Chinese Ministry of Science and Technology
N <sub>2</sub> O	Nitrous oxide
NCCCC	National Coordination Committee on Climate Change
NDRC	National Development and Reform Commission
ODA	Overseas Development Assistance
PDD	Project Design Document
PFCs	Perfluorocarbons
SF <sub>6</sub>	Sulphur hexafluoride
tCERs	Temporary Certified Emission Reduction
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change
VERs	Verified Emission Reductions

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The Gold Standard website provides all information and documentation needed for applying the Gold Standard to a project, access to previously registered projects and a quarterly newsletter:

<http://www.cdmgoldstandard.org>

To contact the Gold Standard directly: [info@cdmgoldstandard.org](mailto:info@cdmgoldstandard.org); ph. +41 61 283 09 16

UNDP – UNDP Millenium Development Goals Carbon Facility –

<http://www.undp.org/mdgcarbonfacility/>

World Bank – Community Development Carbon Fund – <http://carbonfinance.org/cdcf/home.cfm>  
(minimum volume: 50'000 t CO<sub>2</sub>e p.a.)

Austrian JI/CDM programme – <http://www.ji-cdm-austria.at>

Beligan JI/CDM tender – <http://klimaat.be/jicdmtender/>

Climate Cent Foundation – <http://www.stiftungklimarappen.ch> – is a private Swiss institution with a government obligation and expressed interest in high sustainable development credits.

The following references are to other standards:

[www.climatecare.org](http://www.climatecare.org)

[www.myclimate.org](http://www.myclimate.org)

[www.climatefriendly.com](http://www.climatefriendly.com)

[www.climatefriendly.com](http://www.climatefriendly.com)

[www.amosfair.de](http://www.amosfair.de)

<http://co2mpensate.ch>

Plan Vivo is a system for managing the supply of VERs from rural communities in a way that promotes sustainable livelihoods. It has developed a manual setting out exactly how to do this, which is available at: <http://www.planvivo.org/manual/manual.html>.

## INTRODUCTION

This Guideline does not intend to be a CDM manual as many that can be found in the international literature, but yet a guide for private developers that can use it as a Guideline on developing and selling your CDM Project. From this perspective, it starts with the General Framework, where are presented some of the main stakeholders within the CDM business in China: main players, potential partnerships and associated Institutions for the Chinese Context.

In the second section a summary has been made on CDM project approval procedure in China, to guide the project developer in the building of his CDM project, from the initial considerations to the final PDD preparation.. It is in this proposal preparation phase that the third section would be most helpful with an analysis on currently proposed and approved CDM projects in China, indicating the CDM Baselines and Monitoring methodology successfully applied in China. For complete this section, a Checking list for PDD submission has been produced.

Different from other CDM guidance this Handbook put its major attention on carbon market issues. The last chapter is focused only on carbon credits' trading market, showing what are key aspects that differ good CDM projects from average ones, how to seek for buyers, Financing the initiative, who are most active CERs buyers in China, and so on.

At the end of the Handbook, there are Annexes with come additional information like Case Studies.

It is the wish of the project consortium that the reader does can relay in the information from this Handbook, to develop better, stronger and more consistent CDM projects in China. Relaying on the information here compiled to avoid the most common pitfalls and to find useful information that would easy the hard work that is to take from one CDM idea to a final PDD.

# 1. GENERAL FRAMEWORK

The United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty that was produced by the United Nations Conference on Environment and Development (UNCED), better known as the Rio Earth Summit, in 1992. The UNFCCC, entered into force in 1994 and ratified by 191 States, did not contain any binding obligations to reduce the greenhouse gas emissions but contemplated the possibility of being updated by specific protocols containing stricter measures. The supreme body of the Convention, that takes the most important decisions, is an annual meeting of its members, called Convention of Parties (COP); besides that there exists also other technical bodies.

In 1997, the third COP took place in the Japanese city of Kyoto where, after more than two years of intense negotiations, an amendment protocol to the UNFCCC, was signed. The Kyoto protocol envisaged binding emission restrictions for a group of 35 countries, the Annex I countries, of at least 5% in the commitment period 2008-2012. National targets are being indicated in the Annex B of the protocol and in some cases allow an increase of emissions but well below the levels of projected increases in the business as usual scenario. The Greenhouse Gases (GHG) covered by the Protocol are: Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Nitrous oxide (N<sub>2</sub>O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF<sub>6</sub>) each having a different greenhouse gas effect and whose unit measure is the metric tonne of CO<sub>2</sub> equivalent (see Table 1 below).

Greenhouse Gas	Global warming Potential
Carbon Dioxide (CO <sub>2</sub> )	1
Methane (CH <sub>4</sub> )	21
Nitrous Oxide (N <sub>2</sub> O)	310
Hydrofluorocarbons (HFCs)	140-11,700
Perfluorocarbons (PFCs)	6,500-9,200
Sulfur Hexafluoride (SF <sub>6</sub> )	23,900

**Table 1 - GHGs global warming potential (Source: UNFCCC 1995)**

The Kyoto Protocol entered into force on the 16 February 2005, after having reached the ratification of at least 55 countries that accounted for at least 55% of the carbon dioxide emissions of Annex I countries in 1990. At present<sup>2</sup> 174 countries have ratified the protocol, representing 61.6% of Annex I countries emissions.

The protocol set up a system to give a monetary value to the emissions reductions, and set up three flexibility mechanisms in order to help Annex I countries in reducing emissions at least cost, buying and selling carbon units. The trading of the carbon units is based on the principle that the effect of greenhouse gases on the atmosphere is independent from the place of emissions and that a part of the

<sup>2</sup> As of 4 June 2007

reductions can be achieved at lesser costs in countries whose technology is older and more polluting. The trading should be *supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments* (art.17).

The three flexibility mechanisms are Emission Trading, Joint Implementation and the Clean Development Mechanism and their rules have been set up by the Marrakech Agreements at COP7.

**Emission Trading** permits the exchange of carbon units from different origins:

An assigned amount unit (AAU) issued by an Annex I Party on the basis of its assigned amount pursuant to Articles 3.7 and 3.8 of the Protocol.

A removal unit (RMU) issued by an Annex I Party on the basis of land use, land-use change and forestry (LULUCF) activities under Articles 3.3 and 3.4 of the Kyoto Protocol. LULUCF<sup>3</sup>

An emission reduction unit (ERU) generated by a joint implementation project under Article 6 of the Kyoto Protocol.

A certified emission reduction (CER) generated from a clean development mechanism project activity under Article 12 of the Kyoto Protocol.

The **Joint Implementation (JI)** - is a mechanism that permits an annex I country to implement in another annex I country a project of emission reductions and acquire the emission reductions to reach its own targets.

The **Clean Development Mechanism (CDM)** - that is the object of this handbook, is a mechanisms that permits an annex I country to implement an emission reduction project in a non-annex I country (so a country without binding emissions targets) and acquire the Certified Emissions Reductions in order to meet its own Kyoto targets.

## 1.1. What are the CDM Projects?

Clean Development Mechanism is defined by the art. 12 of the Kyoto protocol as a project based emission reduction mechanism with the purpose *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*. CDM projects are investments in environment sound projects whose greenhouse gas emissions are lower with respect to the business as usual current technology adopted in the target country, called baseline. Following specific methodological rules and verification process, the difference between the baseline emissions and the emissions of the CDM projects generates Certified Emissions Reductions (CERs), expressed in tonnes of carbon dioxide equivalent, that can be traded under the rules of the Emission Trading Scheme, and thus generate additional budget for the project. CDM activities may include forestation and reforestation projects (LULUCF) that are a way to store

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<sup>3</sup> LULUCF activities have a great impact on the capacity of the heart of absorbing carbon emissions, with the Marrakech agreements there have been established the rules to take into account these activities in the Kyoto Protocol Framework. LULUCF is not a flexibility mechanism.

carbon dioxide in sinks, but the use of carbon credits generated with those activities is limited by a 1% per year of the Annex I party emission in the base year.

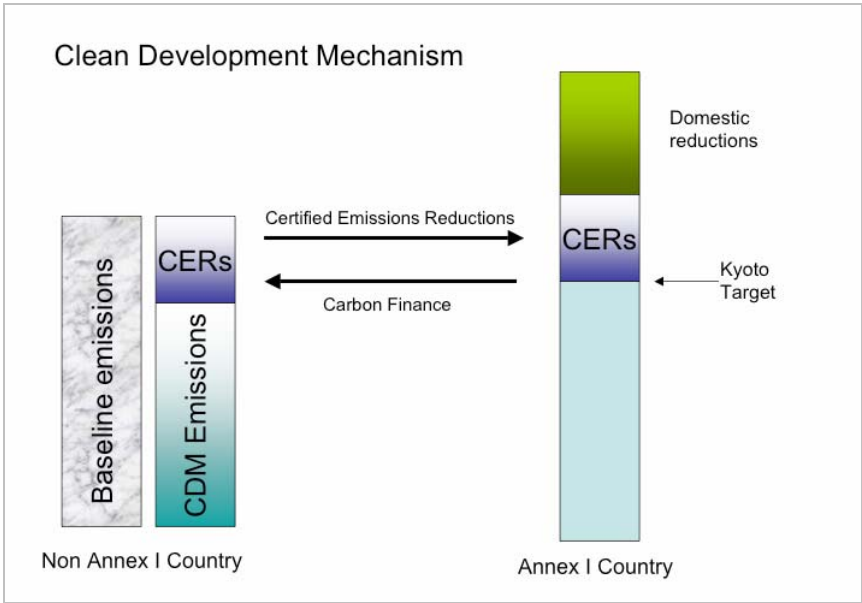


Figure 1 - Clean Development Mechanism

### 1.2. Who is Involved (actors)

The CDM process involves several actors, the project developers that set up and run the process, the Designated National Authority that is the national focal point of the CDM process, the Designated Operational Entity that have verification duties, the Buyers of the Carbon Emissions Reductions from Annex I countries and other governmental and non governmental actors.

#### 1.2.1 Project developer

The project developers are the project owners that submit their project to the CDM approval procedure. The project developers are responsible for providing all the documentations for the validation and verification process and for the implementation of the project and will benefit from the additional revenue obtained through the issue and selling of the Certified Emissions reductions. Only enterprises whose property is at least 51% Chinese are eligible to conduct CDM projects in China, the same rules apply to enterprises from Hong Kong, Macau and Taiwan that are conducting activities on China's mainland.

### *1.2.2 Designated national Authority - DNA*

The Designated national Authority (DNA) is the national authority responsible for the approval procedure of the CDM project upon compliance with internal laws and policies and international CDM regulations. In China the DNA is the National Development and Reform Commission (NDRC) that approves the projects after their revision from the National CDM board.

### *1.2.3 Designated Operational Entity - DOE*

The Designated Operational Entity is a key actor in the CDM procedure. It is an independent entity that is responsible for validate and request the certification of a CDM project and to verify the emissions reductions and request to the CDM board to issue the CERs. Each DOE is authorized only for certain kind of CDM activities (sectoral scope) and may be a national or international institution. The complete list of DOE with their respective sectoral scope is published at:

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

### *1.2.4 Buyers*

The Buyers of CERs are the Annex I parties that have to fulfill to Kyoto emission caps and that are not able or not willing to achieve the Kyoto targets only with domestic actions. Buyers can be enterprises, public institutions, and public or private carbon funds. The Chinese DNA performs a control on the price of the CERs in their process of approval of a CDM project to prevent extremely low prices and so protect the national interest. So in China project developers must negotiate with CERs buyers before the approval of their CDM projects, although project developers may request from the DNA a letter of endorsement that state that the project meets the eligibility criteria for CDM.

### *1.2.5 Other Stakeholders*

CDM projects have also other stakeholders involved in the process, like the local communities and the local and central government. Stakeholders comments have a specific part in the PDD document to submit for approval. CDM projects, as any other activities, have to comply with all the national laws and regulations that deal with the protection of the environment, of the workers, promotion of the economy etc. and be compliant with the sustainability criteria (social, economical, environmental and technological) that are fixed by each state.

## **1.3. Overall CDM Project registration process**

The CDM project cycle presents some differences from country to country (the specific Chinese CDM cycle will be analyzed in chapter 2 and chapter 3) but it is essentially made of 5 steps: Design,

Validation/registration, Monitoring, Verification/Certification and issuance. Simplified procedures and lower fees are available for the CDM projects that qualifies as Small Scale (see later 1.5).

**Design:** designing the project is the activity of the project developers, that have to consider the eligibility criteria, the additionality of the project (see later), the compliance with the national sustainable development criteria, and all the other economical and financial aspects. The project developers have to submit a Project Design Document (PDD) project design document for validation and get the approval from the DNA and DOE.

**Validation / Registration:** The national DNA should approve the project upon compliance with internal CDM rules. The project has to be validated by a Designated Operational Entity that will provide documentation to the CDM Executive Board of the UNFCCC regarding the approval of new methodologies or the use of already existing ones.

**Monitoring:** The project participants are responsible for the monitoring of the project and report to the DOE according with the monitoring plan designed for the project.

**Verification / Certification:** The Designated Operational Entity is responsible for verifying and certifying the GHGs emissions reductions of the CDM project. The DOE will then report to the CDM Executive Board.

**Issuance:** After having received the report from the DOE the CDM Executive Board will issue the CERs

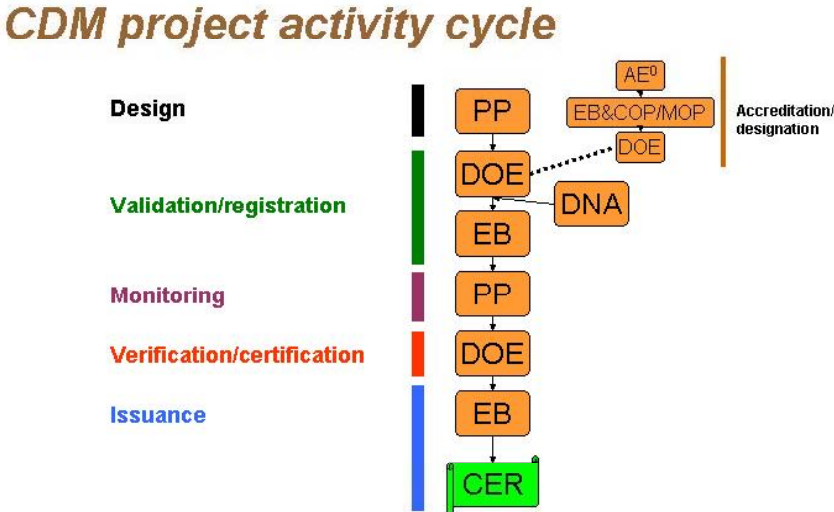


Figure 2 - CDM project cycle. (Source: UNFCCC)



CDM projects proponents may choose between two timeframes for generating credits from emissions reductions. In one case they can choose a 7 years crediting period, that may be renewed up to two times, upon methodological review from the DOE. In the second case they can choose a 10 year non renewable crediting period.

## 1.4. Methodologies

Methodologies are the central part of the CDM project cycle. Given a proposed project activity, to register it as a CDM project it is necessary to first define the project boundaries, then demonstrate that the project GHGs reductions are *real and measurable and would not have occurred in the absence of the proposed project* (additionality). So it is necessary to assess what is the Business As Usual scenario, estimating a baseline, and then demonstrate that the CDM project activities will lead to an emission reduction that would not have taken place otherwise.

### 1.4.1 Estimating Baselines

The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity (UNFCCC 2006a). Project developer may use one of the consolidated methodologies approved by the CDM Executive Board, one of the methodologies proposed and approved or propose a new one for approval, through the intermediation of the DOA.

There are various rules to define the baseline emissions; between them we recall that baselines shall be established:

By project participants in accordance with provisions for the use of approved and new methodologies,

On a project-specific basis

In a transparent and conservative manner

Taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector

The calculation of baselines should take into account:

Existing actual or historical emissions, as applicable, or

Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment, or

The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

Methodologies should include any leakage from the project, and should be defined in a way that CERs cannot be earned for decreases in activity levels outside the project activity or due to force majeure (UNFCCC 2006).

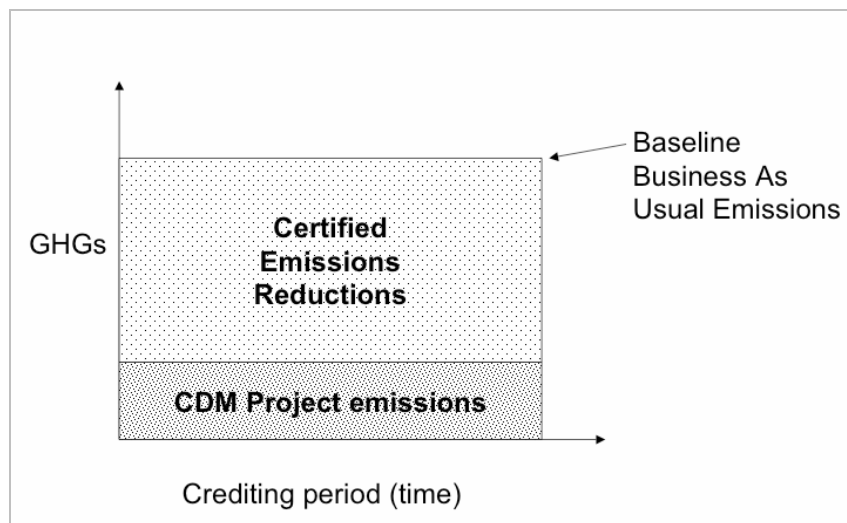


Figure 3 - Baselines and CERs

### 1.4.2 What is the Additionality?

Additionality of a CDM projects means that the emissions reductions of GHGs would not have been achieved in the absence of a CDM project. So the CDM procedure is able to overcome certain kind of barriers that prevent the normal business to achieve the same environmental standards.

So every “CDM idea”, before became a CDM Project, have to prove that it is really additional, for this purpose, the UNFCCC, in response to the worldwide controversy on the subject issued a Tool to assess if the CDM activities are indeed additional. This Tool consists of a 4 steps process that are applicable to all cases/countries/projects, not mandatory, but yet wise to be taken into consideration. The general vision of the 6 steps can be seen in Figure 4.

**Step 1.** The first step is to analyze and define a credible alternative scenario (that could also be the same project without CDM registration or another project with similar output);

**Step 2.** The second step is the investment analysis, aimed at assess if the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of certified emission reductions (CERs).

**Step 3.** The third step is the barrier analysis, aimed to demonstrate if there exist barriers that would prevent potential project proponents from carrying out the proposed project activity undertaken without being registered as a CDM project activity. These barriers can be regrouped in the following categories: Technological, Institutional, Capacity related, Legal / Policy, Financial, Market, Environmental, Social Awareness.

To each barrier categories two values may be given, the first is its significance and the second is the difficulty to remove the barrier. From the multiplication of these two, and sum for all the category an additionality index can be constructed.

**Step 4.** The fourth step is the common practice analysis, that is an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region.

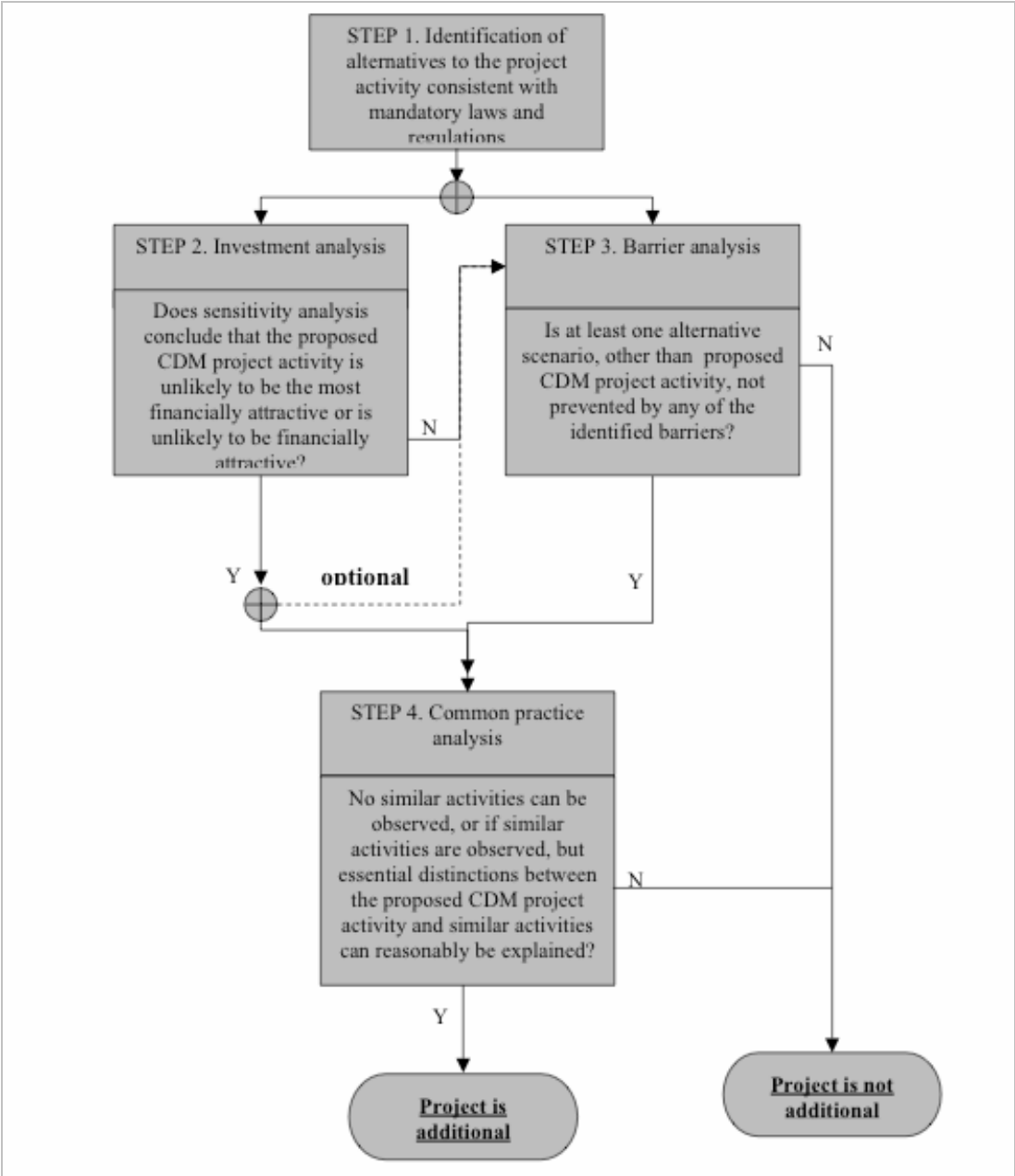


Figure 4 - Step wise Additionality Tool proposed by UNFCCC. (Source: UNFCCC)

## 1.5. Procedures

The procedures seen so far refers to a generic CDM project, anyway there could be four types of CDM projects that present some procedural differences:

Normal size CDM project

Normal Size Afforestation Reforestation CDM project

Small Scale CDM Project

Small Scale Afforestation Reforestation CDM project

There exist different Project Design Document (PDD) for the four types, the small scale CDM documents and procedure is simplified in order to alleviate the burden and the transaction costs for projects that will generate a limited amount of CERs.

### 1.5.1 *Normal size CDM projects*

In a normal size CDM project the PDD is structured in 5 parts:

**Part 1.** General description of the project activity, including locations, participants, kind of activity, technology, estimated CERs and public funding;

**Part 2.** Choice of the baseline and monitoring methodologies, between the ones already approved by the CDM Executive Board. If the project participants are willing to submit a new methodology they have to submit a separate document. In this section the projects proponents should explain the choice of the methodology, describe the GHGs emissions included in the project boundaries, describe the baseline scenario and assess the additionality of the project, include data and parameters and describe the monitoring plan;

**Part 3.** Project proponents with information about the duration of the project, starting date, and choice of the crediting period;

**Part 4.** Environmental impact study of the proposed activity, and shall include any trans-boundary impact;

**Part 5.** Dedicated to the Stakeholders comments, and how they have been taken into account by the project proponents.

### 1.5.2 *Normal size afforestation reforestation CDM projects*

Afforestation and Reforestation (AR) CDM projects aim to sequestrate CO<sub>2</sub> through vegetal sinks, using the capacity that plants have of transforming carbon dioxide through the photosynthesis and storing in their biomass. The AR CDM project presents some differences, and some additional complexities, from normal CDM projects, especially regarding duration, CERs (and their tradability) and methodologies. The main reason is that while a carbon sink effectively sequestrate CO<sub>2</sub>, it can

easily release it again in the atmosphere in case, for example, of fire. The crediting period for AR CDM projects is 30 years non-renewable or 20 years renewable up to two times (60 years in total). The CERs that can be obtained from AR CDM projects presents the particularity of expiring after a certain period of time and may be of two kinds:

Long term CERs (ICERs) that expires at the end of the crediting period or, where a renewable crediting period is chosen, at the end of the last crediting period of the project activity;

Temporary CERs (tCERs) that expires at the end of the commitment period subsequent to the commitment period for which it was issued.

Those differences are also reflected in the CDM AR PDD that is composed of 8 parts:

**Part 1.** General description of the proposed AR CDM project activity: in addition to the normal PDD data the projects proponents must decide between tCERs and ICERs;

**Part 2.** Duration of the project activity/crediting period: that is 30 years fixed or 20 years renewable for two times;

**Part 3.** Application of an approved baseline and monitoring methodology: in this section project proponents have to choose an approved methodology or compile a separate request to approve a new one;

**Part 4.** Estimation of ex-ante net anthropogenic GHGs removals by sinks and estimated amount of net anthropogenic GHGs removals by sinks over the chosen crediting period;

**Part 5.** Monitoring plan;

**Part 6.** Environmental impacts of the proposed AR CDM project activity;

**Part 7.** Socio-economic impacts of the proposed AR CDM project activity, in this section the project proponents have to make a socio-economic impact assessment, including information on, inter alia, local communities, indigenous peoples, land tenure, local employment, food production, cultural and religious sites, and access to fuel wood and other forest products;

**Part 8.** Stakeholder analysis.

### *1.5.3 Small scale CDM projects*

Small Scale CDM projects have simplified procedures and reduced fees, in order to reduce the involved transaction costs that otherwise would erode much, if not all, of the benefices obtained by CERs. In particular Small Scale CDM projects have:

A simplified project design;

Simplified methodologies for baseline determination and monitoring plans

Simplified provisions for environmental impact analysis;

Lower registration fees;

A shorter review period for the registration of Small Scale CDM project activities;

The same DOE can validate as well as verify and certify emission reductions for a specific Small Scale CDM project activity.

To be eligible for the Small Scale simplified procedure a project must meet one of the following requisites:

**Type I** are renewable energy project activities with a maximum output capacity of 15 MW (or an appropriate equivalent);

**Type II** are energy efficiency improvements projects which reduce energy consumption, on the supply and/or demand side with a maximum output of 60 GWh per year (or an appropriate equivalent);

**Type III** are other kind of project activities, characterized by emission reductions of less than, or equal, to 60 kt CO<sub>2</sub> equivalent annually.

The PDD for Small Scale CDM projects is simplified and presents the following parts:

**Part 1.** General description of the small-scale project activity: including the choice of the category;

**Part 2.** Application of a baseline and monitoring methodology, including the justification of the choice of the category;

**Part 3.** Duration of the project activity/crediting period;

**Part 4.** Environmental impacts;

**Part 5.** Stakeholders' comments.

#### *1.5.4 Small Scale Afforestation Reforestation CDM projects*

Similar with the previous case, also Afforestation and Reforestation projects of small scale can take advantage of simplified procedures in order to reduce the transaction costs. COP10 decided that the limit to be eligible for Small Scale AR CDM project is a removal of 10 kilotonnes of carbon dioxide per year, and that exceeding removals cannot be entitled for CERs. Small Scale AR CDM projects have the same tCERS and ICERS divisions and the same crediting period (30 years non-renewable or 20 years renewable two times) characteristics of larger AR CDM projects.

The simplified PDD of a AR CDM project is composed of the following parts:

**Part 1.** General description of the proposed small-scale AR CDM project activity, including site characteristics, choice between tCERS and ICERS crediting period;

**Part 2.** Application of a baseline and monitoring methodology, justification of the methodology;

**Part 3.** Estimation of the net anthropogenic GHG removals by sinks;

**Part 4.** Environmental impacts of the proposed small-scale AR CDM project activity;

**Part 5.** Socio-economic impacts of the proposed small-scale AR CDM project activity;

**Part 6.** Stakeholders' comments.

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## 2. CDM PROJECT APPROVAL PROCEDURE IN CHINA

*“Measures for Operation and Management of Clean Development Mechanism Projects in China” was issued formally by National Coordination Committee on Climate Change (NCCCC) in the October of 2005, which provides general rules and CDM project procedures as well as admission requirements. Refer to the information in detail indicated in website: <http://cdm.ccchina.gov.cn>.*

### 2.1. CDM Authorities in China

The concept of CDM was a new knowledge to the Chinese authorities around the early 21<sup>st</sup> Century. China ratified the Kyoto Protocol in August 2002, around one year later, in the October of 2003, National Coordination Committee on Climate Change (NCCCC) was established to be responsible for the affairs on climate change under the guidelines of the State Council. In the June 30<sup>th</sup>, 2004, the “Interim Regulations for CDM (Draft)” was released to manage the affairs associated with the CDM in China, which included 12 national ministries and major authorities (listed in Table 2). In the same date, “Measures for Operation and Management of Clean Development Mechanism Projects in China” was issued by the National Development and Reform Commission (NDRC), the Ministry of Science and Technology (MOST), and the Ministry of Foreign Affairs (MFA) and, later, in 12<sup>th</sup> October of 2005, modified by the NCCCC. This document provides general rules and project procedures as well as admission requirements. The serious processes for setting up a national regulation and system to service on CDM projects indicates the Chinese decision-makers realized the benefits of CDM projects in China. With the development in a fewer years, China has made great progress for implementation of CDM projects.

Authorities	Functions
National Coordination Committee on Climate Change (NCCCC)	Policy making and coordination of CDM related issues
Office of the National Coordination Committee on Climate Change	Secretary of the NCCCC and NCB: organizes the review of CDM application documents
National CDM Board (NCB)	Review and assesses the CDM projects, including the price of the sale of the CERs.
National Development and Reform Commission (NDRC)	Chinese DNA. Receives CDM applications from project owners, issues a “no objection letter” to the buyers, if needed, and issues the approval letter for the application.

**Table 2 - Major national CDM authorities in China**



In Figure 5 it is represented the organizational flow chart for CDM project approval in China.

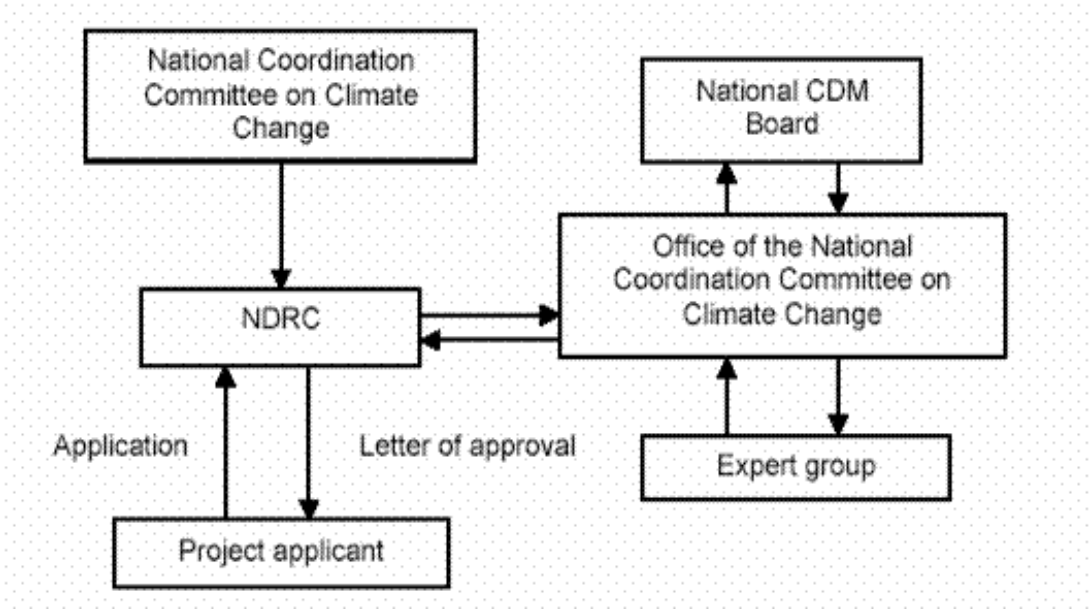


Figure 5 - Organizational flow chart for CDM project approval  
(Source: "CDM Country Guide for China", Institute for Global Environmental Strategies, Japan)

## 2.2. General Features of CDM Projects in China

The Chinese features for CDM projects are particular in three main aspects: (1) Approval of the project at local level; (2) Eligibility of the project owner; and (3) Price of CERs.

In China several items should be considered when submitting a CDM project:

**Priority areas.** Three priority areas set up by NCCCC for deploying CDM project includes: (1) Increase of energy efficiency; (2) Exploration of new energy and renewable energy; and (3) Coal bed methane.

**Eligibility of project owner.** Only Chinese enterprises (Chinese entities or citizens possess at least 51% of the properties) located in the territory of China are qualified to conduct CDM projects with international partners. Hong Kong, Macao, and Taiwanese enterprises are treated as Chinese enterprises to run on CDM projects in China’s mainland.

**Approval at local level.** The CDM project should be in accordance with the sustainable development of local society. The applicant must submit documents according to the requirements of local government and have to obtain the permission of the CDM project at local level.

**Price of CERs.** In China, the NCB is required to review the floor price of the sale of the CERs. The approval letter issued by the NDRC (see **Figure 6 – Project Approval procedures in China**Figure 6) for a CDM project states the floor price approved. The price of the CERs may vary, depending on the international carbon market, but the final price can not be lower than the floor price stated.

**Government levies.** In accordance to the “Measures for Operation and Management of Clean Development Mechanism Projects in China” Government levies are: 65% of the sale price of CERs for projects working for HFC and PFC emission reductions; 30% of the sale price of CERs for projects dealing with N<sub>2</sub>O emission reductions; and 2% of the sale price of CERs for remaining projects.

**Project design document.** The quality, content, and format of the PDD should be in accordance with the international CDM rules, formalities, and modalities;

**Baseline methodology and emissions reduction.** The application of Baseline methodology and calculation of emissions reduction should be consistent in the requirements of Executive Board;

**Funding and technology transfer.** In the Kyoto Protocol is requested that funds diverted from Annex I countries to Chinese CDM projects must not be invested in the Overseas Development Assistance (ODA) supported by developed countries;

**Crediting period.** The crediting period should be in accordance with international CDM rules, modalities, and formalities;

**Monitoring plan.** The project monitoring plan should be consistent in its technical merit and specific monitoring methodologies.

### 2.3. CDM Project Approval Cycle in China

The following steps are included for getting approval of a CDM project:

**Step 1.** The project applicants (including foreign partners) should submit to the NDRC, the Chinese DNA, the necessary documents as listed below:

Project approval document at local government level;

CDM project application letter (1 copy in Chinese);

Completed application form (15 copies in Chinese);

CDM project design document (PDD) (15 copies in Chinese, 5 copies in English);

General information on project construction and financing (15 copies in Chinese) that contains information as follows: (1) General introduction regarding the project owner; (2) General introduction with respect to foreign partner(s); (3) Project information; (4) Total investment and project financial information; (5) Brief description regarding technical issues of the project activity; (6) The amount of estimated GHG emissions reduction; (7) Benefits of the project in terms of Economic and environment; (8) Status of the project construction application, the results of the

environmental impact assessment (if approved, attach copies of the approval certificate); and (9) Current situation of the project.

Certificate of the proponent enterprise’s status (15 copies of its business license and other professional eligibility certificates [if any]).

Project applicants can submit additional documents to meet the requirements of the NDRC.

**Step 2.** The NDRC requests an expert review of the proposed project by relevant organizations, which should be conducted within 30 days;

**Step 3.** If the application passes the expert review, it is then submitted to the NCB, which then makes the decision on whether or not the project should be approved;

**Step 4.** Based on the recommendations from the NCB, the NDRC, jointly with MOST and the MFA, makes a final decision and then issues a letter to the project proponent.

**Step 5 (optional).** If project application is not approved by NDRC, project proponents should resubmit the necessary application forms and the relevant documentation, as indicated in step 1, start the entire approval process again.

The total review time (step 2 and 3) is usually 50 days, which consists of 20 days when the application is being reviewed by the NDRC and 30 days for the expert review.

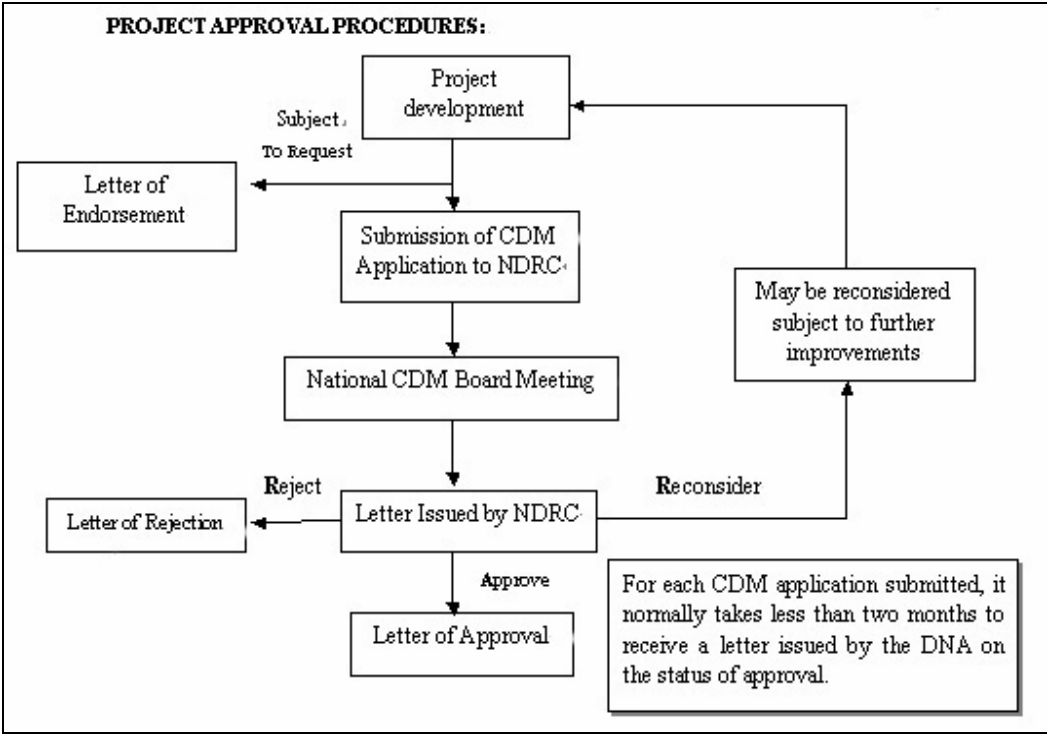


Figure 6 – Project Approval procedures in China (Source: <http://cdm.ccchina.gov.cn>)

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Clean Development Mechanism in China, Clifford Chance, client briefing March 2007.

### 3. ANALYSIS OF PROPOSED AND APPROVED CDM PROJECTS IN CHINA

The People Republic of China has rapidly become the most important host country for CDM projects, both for the number of submitted projects and for the amount of expected GHGs reductions and CERs produced. In both cases the "market share" of China is about the half of the world total.

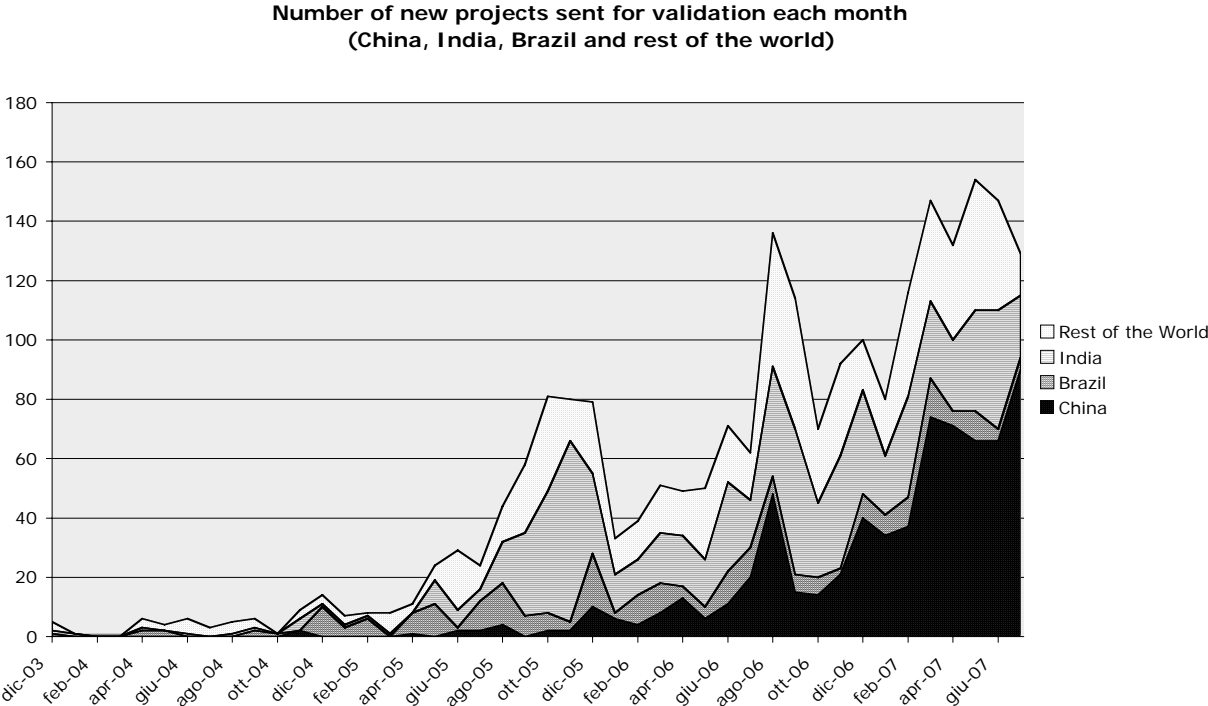


Figure 7 - Number of new projects sent for validation China, Brazil, India and rest of the world. (Source: elaboration of the author based on data from CDM pipeline made Jørgen Fenhann, UNEP Risø Centre).

China has started to host CDM activities later with respect of the other non annex I countries but starting from the beginning of 2006 the growth has been impressive (see Figure 7 and Figure 8). As of mid-2007, the number of CDM projects to be hosted in China submitted for validation each month is roughly the half of the world total. Also the amount of expected CERs at 2012 belonging to CDM projects hosted in China is greater than all the other countries put together and shows a growth rate significantly higher with respect of the other host countries.

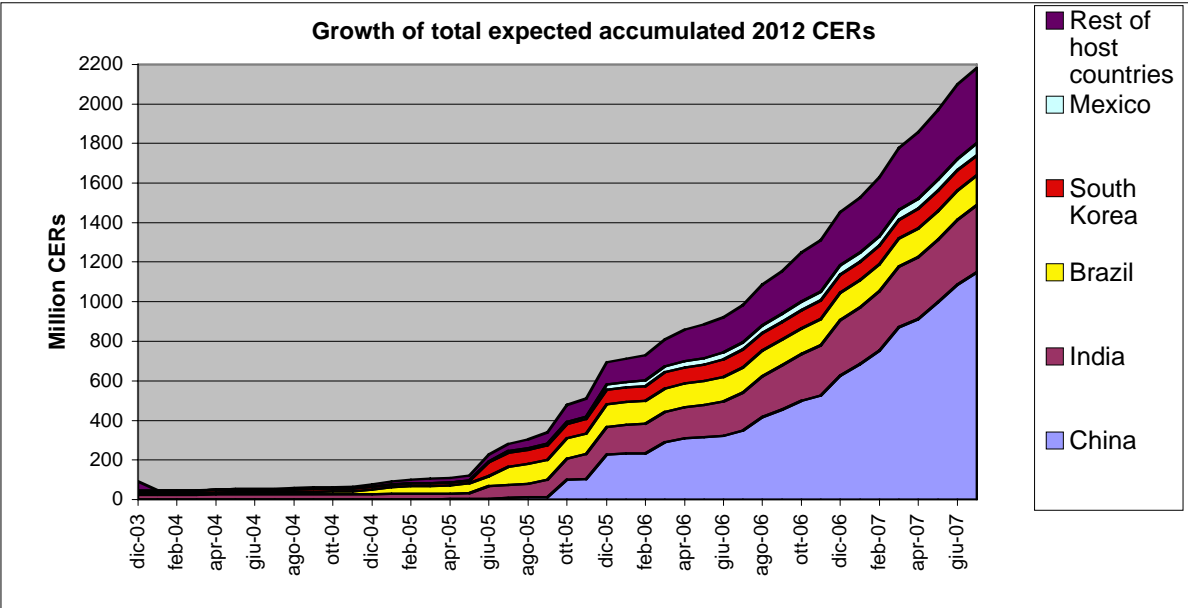


Figure 8 - Growth of total expected accumulated CERs at 2012, China, India, Brazil, South Korea, Mexico and rest of the world. (Source: Jørgen Fenhann, UNEP Risø Centre)

### 3.1 Priority Areas for CDM Projects in China

The Chinese government, through the NCCCC has set three priority areas for CDM projects:

- Increase of energy efficiency;
- Exploration of new energy and renewable energy;
- Coal bed methane.

The government has fixed differentiated levies on the CERs sales from different kind of CDM projects, 65% for projects working for HFC and PFC emission reductions; 30% for projects dealing with N<sub>2</sub>O emission reductions and 2% for remaining projects.

Energy consumption elasticity of China has surpassed one in recent years, there are three major energy-intensive sectors—industry, construction, and transportation—and all of them are key factors in maintaining China’s high GDP growth rate and improving the daily life of the people. However, up to now in three energy intensive sectors, specially in industry, China is still characterised by low energy efficiency and inferior energy technology application. Moreover, the growth of China’s GDP is very dependent upon fossil fuel consumption, coal is used for the greater portion of its energy supply, which is closely linked to high GHG emissions.

To meet the increasing energy demand gap and achieve the sustainable development target, development of renewable energy and improvement of energy efficiency has been widely recognised

as the main measures to go ahead. In fact, numbers of studies showed that the total GHG reduction potential in China is estimated to be about 777 million metric tons (tonnes) of carbon-equivalent, which includes 545 million tonnes from energy efficiency; 138 million tonnes from renewable energy sources, 67 million tonnes from coal-related methane; and 27 million tonnes from fuel switching and new technologies for power generation.

Accordingly, the Energy Conservation Law (ECL), Renewable Energy Law (REL), and other related legislative frameworks have been issued to require the government to develop special financial incentives to promote energy efficiency, renewable energy, and coal-mine methane/coal-bed methane (CMM/CBM) in China. Currently there are several financial incentive systems related to the development of renewable energy, energy efficiency, and coal-bed methane, for instance, foreign investment policies for area with CDM projects potential, special government levies on CDM projects, and etc. As incentives for energy efficiency, there are solutions like: favourable pricing for independent power producers; tax breaks for cogeneration and energy-saving generators; Favourable rates on loans for energy conservation projects; Rewards for energy savings by enterprises. Regarding incentives for renewable energy, there are subsidies provided by the central and local governments, which are one of the most popular economic incentives for RE development in China.

## **3.2 Approved CDM Projects in China**

We saw that China is the most important actor both for the number of project submitted and for the amount of expected CERs. Analyzing more in detail the CDM projects approved and pending for approval reveals interesting details about the sectors involved<sup>4</sup>.

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<sup>4</sup> Approved projects are considered only the projects whose status is known as “Registered”. Pending projects are considered the projects in all the other statuses (At Validation, Reg. Request, Request Review, Correction Request and Under Review).

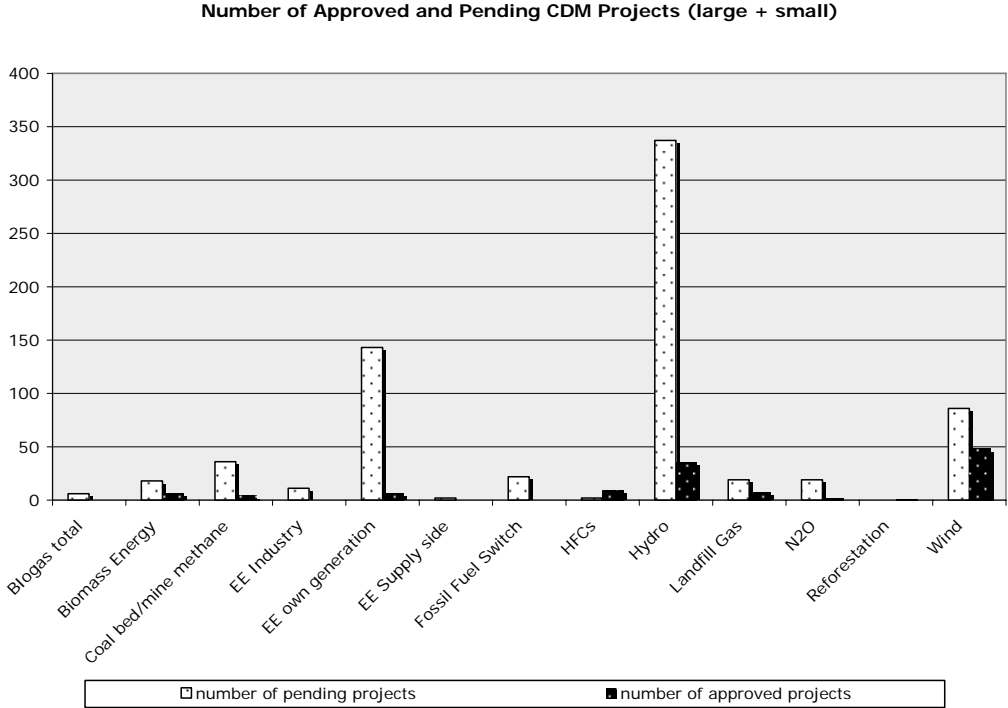


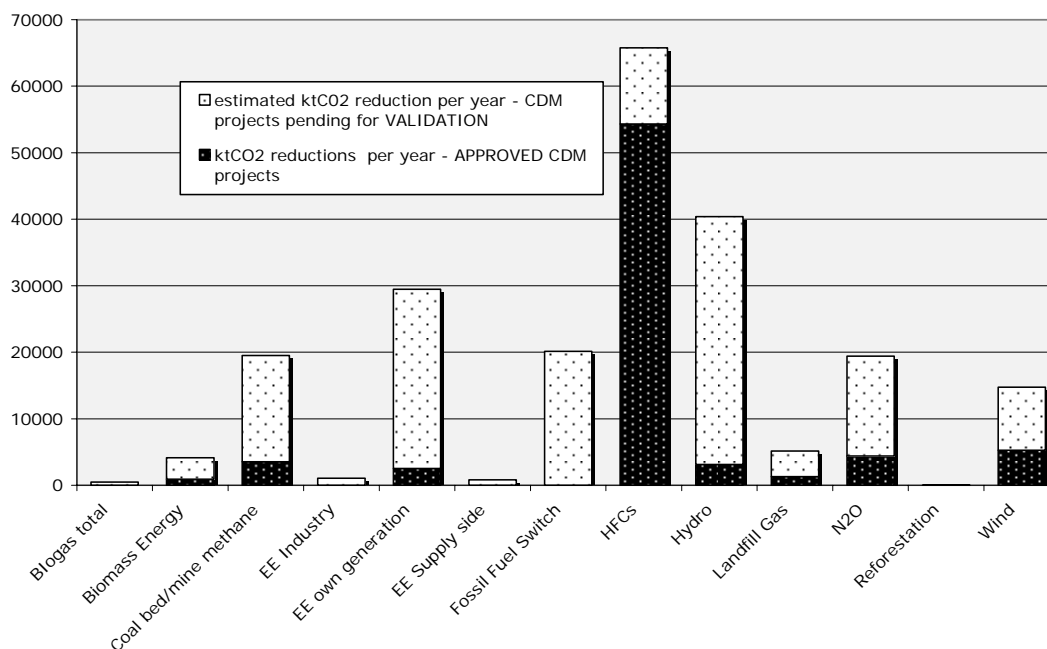
Figure 9 - Number of approved and pending CDM projects in China by type. (source: elaboration of the author based on data from UNEP Risoe CDM/JI Pipeline Analysis and Database, September 2007)

Considering only the number of projects, shown in 错误！未找到引用源。 , we see a consistent development of Hydro, Energy Efficiency and Wind projects (there are more than 300 hydro projects waiting for approval).

If we analyze the CDM project by the scale of GHGs reductions, the distribution between sectors is quite different. China saw the approval of few mega-projects in the HFCs sector that today represent 72% of the expected savings per year (due to the very high global warming potential of HFCs, from 140 to 11 700 times higher than Carbon Dioxide. See chapter 1 for details). All the Chinese HFCs projects (approved and pending) in fact deals specifically with the HFC23, a gas with a GWP potential 11700 times higher than CO<sub>2</sub> (the only other GHG with a greater GWP is Sulphur Hexafluoride) and thus able to generate 11700 times more CERs than CO<sub>2</sub> for each tonne of gas not dispersed in the atmosphere.

Considering also the projects still waiting for validation the distribution of total savings per year is more equilibrate between sectors, and we may notice increasing savings from the sectors of Energy Efficiency, Hydro, N<sub>2</sub>O and coal bed/mine methane, while the eleven HFC<sub>23</sub> projects (approved and pending) represent one third of the expected GHGs reduction per year (see 错误！未找到引用源。 and 错误！未找到引用源。 ). To be noted also the scarce presence of biogas and reforestation project in the total.



**CDM projects (large + small) by type and ktCO<sub>2</sub> eq. total savings per year**

 Figure 10 - CDM projects by type and ktCO<sub>2</sub> savings in China per year.

 (source: elaboration of the author based on data from *UNEP Risoe CDM/JI Pipeline Analysis and Database, September 2007*)

Type	Number of Approved Projects	ktCO <sub>2</sub> Reductions per year (in approved CDM projects)	Number of Pending Projects	Estimated ktCO <sub>2</sub> Reduction per year (in CDM projects pending for validation)	Total Estimated Savings of ktCO <sub>2</sub> eq. per year (approved and pending)	Share by sector (approved and pending)
Biogas total	0	0	6	473	473	0.2%
Biomass Energy	6	928	18	3189	4117	1.9%
Coal bed/mine methane	4	3523	36	15977	19500	8.8%
EE Industry	0	0	11	1069	1069	0.5%
EE own generation	6	2533	143	26937	29470	13.3%
EE Supply side	0	0	2	835	835	0.4%
Fossil Fuel Switch	0	0	22	20135	20135	9.1%
HFCs	9	54312	2	11458	65770	29.7%
Hydro	35	3110	337	37280	40390	18.3%
Landfill Gas	7	1310	19	3853	5163	2.3%
N <sub>2</sub> O	2	4396	19	15013	19409	8.8%
Reforestation	1	26	0	0	26	0.0%
Wind	48	5282.8	86	9460	14743	6.7%

<b>TOTAL</b>	<b>118</b>	<b>75420</b>	<b>701</b>	<b>145679</b>	<b>221099</b>	<b>100.0%</b>
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Table 3 - CDM project by type and size of GHGs reduction in China per year.

(source: elaboration of the author based on data from *UNEP Risoe CDM/JI Pipeline Analysis and Database*, September 2007)

## 4.1 Small Scale CDM in CHINA

In the previous paragraphs the actual and planned CDM projects of all sorts have been analyzed together to obtain a comprehensive analysis of the CDM projects in China. However, part of therefore analysed projects belongs to the category of Small Scale, that deserves a separate analysis for its peculiar characteristic: Small Scale CDM projects, due to their limited size and administrative costs, and to their simplified procedures, are more suited to be developed by local communities, small enterprises and therefore may give a valuable contribute to local sustainable development.

Type	Number of Approved Projects	ktCO <sub>2</sub> Reductions per year (in approved SSCDM projects)	Number of Pending Projects	Estimated ktCO <sub>2</sub> Reduction per year (in SSCDM projects pending for validation)	Total Estimated Savings of ktCO <sub>2</sub> eq. per year (approved and pending)	Share by sector (approved and pending)
Biogas total			1	31,7	32	0,6%
Biomass Energy			1	95,1	95	1,9%
Coal bed/mine methane					0	0,0%
EE Industry			1	5,7	6	0,1%
EE own generation			1	59,7	60	1,2%
EE Supply side					0	0,0%
Fossil Fuel Switch			2	35,3	35	0,7%
HFCs					0	0,0%
Hydro	18	386,1	111	4064,9	4451	90,0%
Landfill Gas			2	218,7	219	4,4%
N <sub>2</sub> O					0	0,0%
Reforestation			1	0,4	0	0,0%
Wind	2	49,5			50	1,0%
<b>TOTAL</b>	<b>20</b>	<b>436</b>	<b>120</b>	<b>4512</b>	<b>4947</b>	<b>100,0%</b>

Table 4 - SSCDM project by type and size of GHGs reduction per year (in China, data in 2007).

(Source: elaboration of the author based on data from CDM pipeline made Jørgen Fenham, UNEP Risø Centre)

At present, there are 20 Small Scale CDM Projects registered in China, all in the sector of Hydro except two Wind farms (Table 4 and Figure 11). There are 118 projects at validation and other two at other stages of the process (one at "registration request" and another one at "correction request"). The Hydro sector has a preponderant role also in the forthcoming projects. If we gather together both approved and still pending projects we observe that the share of Hydro is around 90% (with respect of the total expected savings from SSCDM).

It is evident that SSCDM has not yet deployed all its possibilities in the country, both in terms of number of projects and in terms of differentiation by type. The figures below detail the situation by number, type and stage of the project<sup>5</sup>.

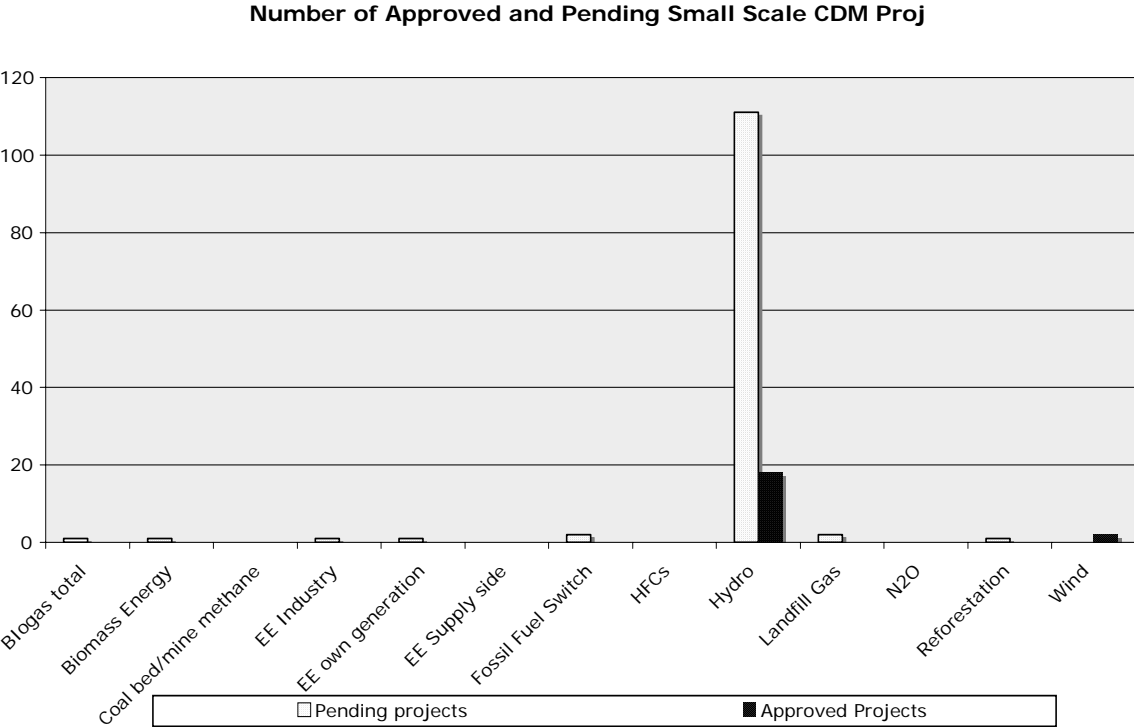


Figure 11 - Number of approved and pending SSCDM projects by type (data in 2007).  
 (Source: elaboration of the author based on data from CDM pipeline made Jørgen Fenhann, UNEP Risø Centre)

<sup>5</sup> Data from CDM Pipeline, elaboration from the author.

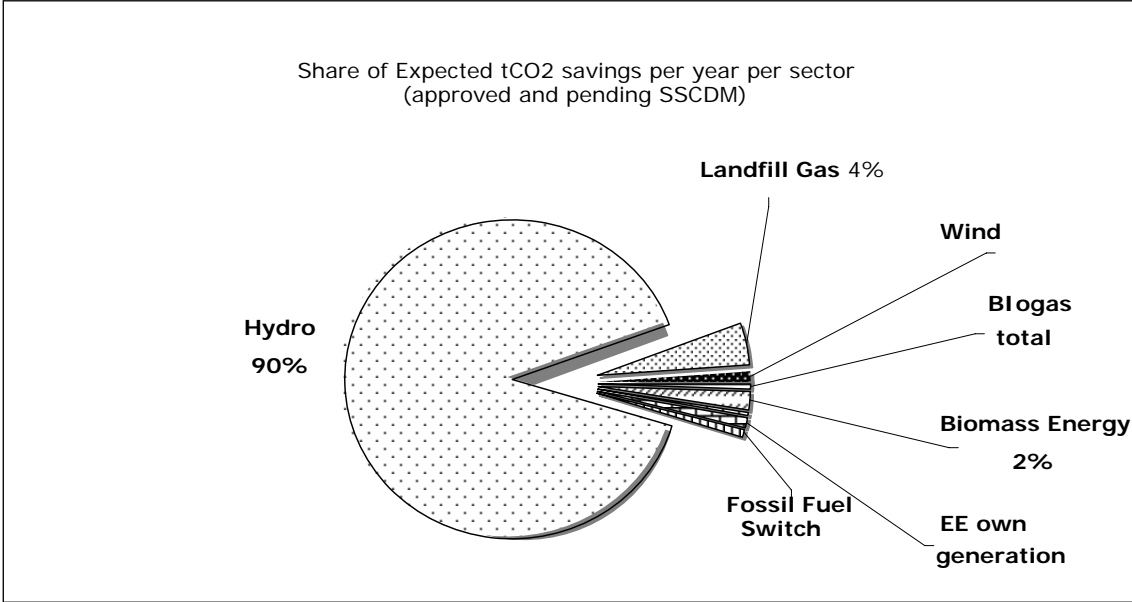


Figure 12 - Share of expected tCO2 savings by type of SSCDM project (approved plus pending, data in 2007).

(Source: elaboration of the author based on data from CDM pipeline made Jørgen Fenham, UNEP Risø Centre)

### 3.2 What are the Baselines Methodologies successful applied in China

The large number of CDM projects approved and sent for validation in China results has produced a great number of methodologies applied or proposed. Here follows a table with the main methodologies used by the CDM projects. All this information must be used in conjunction with the information available at the UNFCCC web based directory of information where the historical of each methodology can be found and what projects used each.

METHODOLOGY	DESCRIPTION
ACM0001	<b>Consolidated methodology for landfill gas project activities - Version 4</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_TX29WGSXE4781NKGQ_GCDPTHM2F3V3D">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_TX29WGSXE4781NKGQ_GCDPTHM2F3V3D</a>
ACM0002	<b>Consolidated methodology for grid-connected electricity generation from renewable sources - Version 6</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6W_UCN5744MN763">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6W_UCN5744MN763</a>
ACM0003	Emissions reduction through partial substitution of fossil fuels with alternative fuels in cement manufacture – Version 04 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_88CWL5ZY93M4D5KLB_MHF8CZLCA7312">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_88CWL5ZY93M4D5KLB_MHF8CZLCA7312</a>
ACM0004	<b>Consolidated methodology for waste gas and/or heat for power generation - Version 2</b>  <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_XIXYIGMQQIJ65GY3UJC_P3R90X4TG75">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_XIXYIGMQQIJ65GY3UJC_P3R90X4TG75</a>
ACM0006	<b>Consolidated methodology for grid-connected electricity generation from biomass residues - Version 3</b>

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	<a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_KH6OE4WYAX8K8ILKVFFKTZ0M6Z2YBD">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_KH6OE4WYAX8K8ILKVFFKTZ0M6Z2YBD</a>
ACM0008	<b>Consolidated methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring - Version 2</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_UAHWQQQYAJVSO577503JFMY2OWJIMG">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_UAHWQQQYAJVSO577503JFMY2OWJIMG</a>
ACM0009	Consolidated methodology for industrial fuel switching from coal or petroleum fuels to natural gas --- Version 3 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_O3O0SX1WXNHV11OYW3RPBKYFHQKZUX">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_O3O0SX1WXNHV11OYW3RPBKYFHQKZUX</a>
ACM0010	Consolidated baseline methodology for GHG emission reductions from manure management systems – Version 02 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_72UG1NTIHCHAVWKSICBMPVURGESL3O">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_72UG1NTIHCHAVWKSICBMPVURGESL3O</a>
AM0001	<b>Incineration of HFC 23 Waste Streams - Version 4</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_0KBQLZECD5S5YDGC7TIZZWT00ZWBN">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_0KBQLZECD5S5YDGC7TIZZWT00ZWBN</a>
AM0005	<b>Baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/AM0005.pdf">http://cdm.unfccc.int/UserManagement/FileStorage/AM0005.pdf</a>
AM0006	Approved baseline methodology AM0006 - “GHG emission reductions from manure management systems” <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_343163180">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_343163180</a>
AM0018	Baseline methodology for steam optimization systems – Version 01.1 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/4FO9Z753HAHSC6V9LFLSR2O3QYGZM4">http://cdm.unfccc.int/UserManagement/FileStorage/4FO9Z753HAHSC6V9LFLSR2O3QYGZM4</a>
AM0021	Baseline Methodology for decomposition of N <sub>2</sub> O from existing adipic acid production plants – Version 01 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_802035877">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_802035877</a>
AM0024	<b>Methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_0A9596GXQFS3URWTGN57MM3MD4E2BX">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_0A9596GXQFS3URWTGN57MM3MD4E2BX</a>
AM0025	<b>Avoided emissions from organic waste through alternative waste treatment processes – Version 08</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_FPM4AYTM4V8KV3PHJF2PGWAI20NOEF">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_FPM4AYTM4V8KV3PHJF2PGWAI20NOEF</a>
AM0028	<b>Catalytic N<sub>2</sub>O destruction in the tail gas of Nitric Acid or Caprolactam Production Plants – Version 04.1</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/BI6NRABEZOXOAM0ZP2NYO14DX3O19K3">http://cdm.unfccc.int/UserManagement/FileStorage/BI6NRABEZOXOAM0ZP2NYO14DX3O19K3</a>
AM29	Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas – Version 01.1 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_KTKZTS1HEG4JBIETV74WMLZY10061X">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_KTKZTS1HEG4JBIETV74WMLZY10061X</a>
AM34	Catalytic reduction of N <sub>2</sub> O inside the ammonia burner of nitric acid plants – Version 02 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_HPMLB4XF5J1FZQGG1QSBKMKZSBC570">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_HPMLB4XF5J1FZQGG1QSBKMKZSBC570</a>
AMS – I.C.	Thermal energy for the user with or without electricity – Version 11 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_NZ0ZPDY2NRQS6A8ZLT9JSXTBZNFKX2">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_NZ0ZPDY2NRQS6A8ZLT9JSXTBZNFKX2</a>

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<b>AMS-I.D.</b>	<b>AMS-I.D. : Grid connected renewable electricity generation</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_2GHDC30TPDJK04LS07SY07X9MFZRG5">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_2GHDC30TPDJK04LS07SY07X9MFZRG5</a>
AMS – II.D.	Energy efficiency and fuel switching measures for industrial facilities - Version 9 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_6JQBAJV8DJKHV7K1HAIM6BOH5YQNOR">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_6JQBAJV8DJKHV7K1HAIM6BOH5YQNOR</a>
AMS – II.E.	Energy efficiency and fuel switching measures for buildings – Version 8 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_NTKU32P14M5JCA2BTQP9GST7ODIRDN">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_NTKU32P14M5JCA2BTQP9GST7ODIRDN</a>
AMS – III.E.	Avoidance of methane production from biomass decay through controlled combustion – Version 12 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_D95FVQEF6OSKIW5AYMZYTRPTPPRYX">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_D95FVQEF6OSKIW5AYMZYTRPTPPRYX</a>
AMS-III.B.	AMS-III.B. : Switching fossil fuels <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_NU3DUQD2U62EYH96O9P82F1EF6OLZS">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_NU3DUQD2U62EYH96O9P82F1EF6OLZS</a>
<b>AR-AM1</b>	<b>Revised simplified baseline and monitoring methodologies for selected small-scale afforestation and reforestation project activities under the clean development mechanism – Version 03</b> <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_A3II6AX6KGW5GGBB7M6AI98UD3W59X4">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_A3II6AX6KGW5GGBB7M6AI98UD3W59X4</a>
AR – AMS0001	Revised simplified baseline and monitoring methodologies for selected small-scale afforestation and reforestation project activities under the clean development mechanism - Version 03 <a href="http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_A3II6AX6KGW5GGBB7M6AI98UD3W59X4">http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_A3II6AX6KGW5GGBB7M6AI98UD3W59X4</a>

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**Table 5 - Approved Methodologies used in CDM Projects in China (in Bold are the ones that were already used in registered CDM projects).**

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*REFERENCES*

- CDM pipeline, Jørgen Fenhann, UNEP Risø Centre: <http://cdmpipeline.org/>
- Global warming potential:  
[http://unfccc.int/ghg\\_emissions\\_data/information\\_on\\_data\\_sources/global\\_warming\\_potentials/items/3825.php](http://unfccc.int/ghg_emissions_data/information_on_data_sources/global_warming_potentials/items/3825.php)

## 4. MARKET ISSUES CONNECTED TO DEVELOPMENT OF CDM PROJECTS

It is essential for developers of CDM projects to be aware of the various factors related to the market for carbon emissions reduction credits (CERs). This will ensure development of viable CDM projects based on adequate margin derived from the sale of CERs. Furthermore, many CERs buyers may advance to the CDM project developer a portion of the project development and implementation costs. The various market risks involved in developing CDM projects must be taken into consideration. Finally, the contract signed by the CDM project developer with CERs credit buyers must ensure a sustainable and reasonable transaction for both the seller and the buyer, with risk fairly split between the two parties.

*In this chapter you will find details of the following elements concerning the market for CER credits:*

- *Typology of Buyers (multilateral or bilateral funds, corporations, asset managers, etc.) and the main differences among them*
- *Principal models of buyer market positioning (from simply buyer of secondary CERs on the carbon trading exchanges, to Buyer from a specific CDM project, to buyer + investor/project participant in a project, etc.)*
- *Elements of feasibility and risk analysis (from the buyer standpoint)*
- *Brief overview of ERPA contract and strategies (procedural steps in a typical ERPA negotiation, main elements of contract, purchasing strategies, ecc.)*
- *Brief overview of the most common purchasing (and other) requirements from interviewed EU buyers*
- *Types of pricing structures, and trends of CERs transactions in China*
- *The role of carbon finance in enhancing CDM project feasibility*

### 4.1 Overview of the carbon market

*The main types of markets relating to sale and purchase of carbon emission reduction credits are the **compliance** and **voluntary carbon markets**, and the **offset market**, which is a niche market involving either compliance or voluntary credits. These markets serve different purposes, but together they contribute to emission reductions and help to make projects more viable through carbon finance. Understanding these markets is important because they have different requirements, often are subject to different pricing, and support different types of CER reduction projects.*

The 'carbon market' involves a diverse set of buyers and sellers who are interested in trading carbon credits. Two main types of carbon markets exist: **compliance markets** and **voluntary**

**markets.** Each carbon market has different objectives, different names for the carbon credits traded, and different actors.

The intersect among compliance, voluntary and retail offset markets is shown in the following diagram (Figure 13)

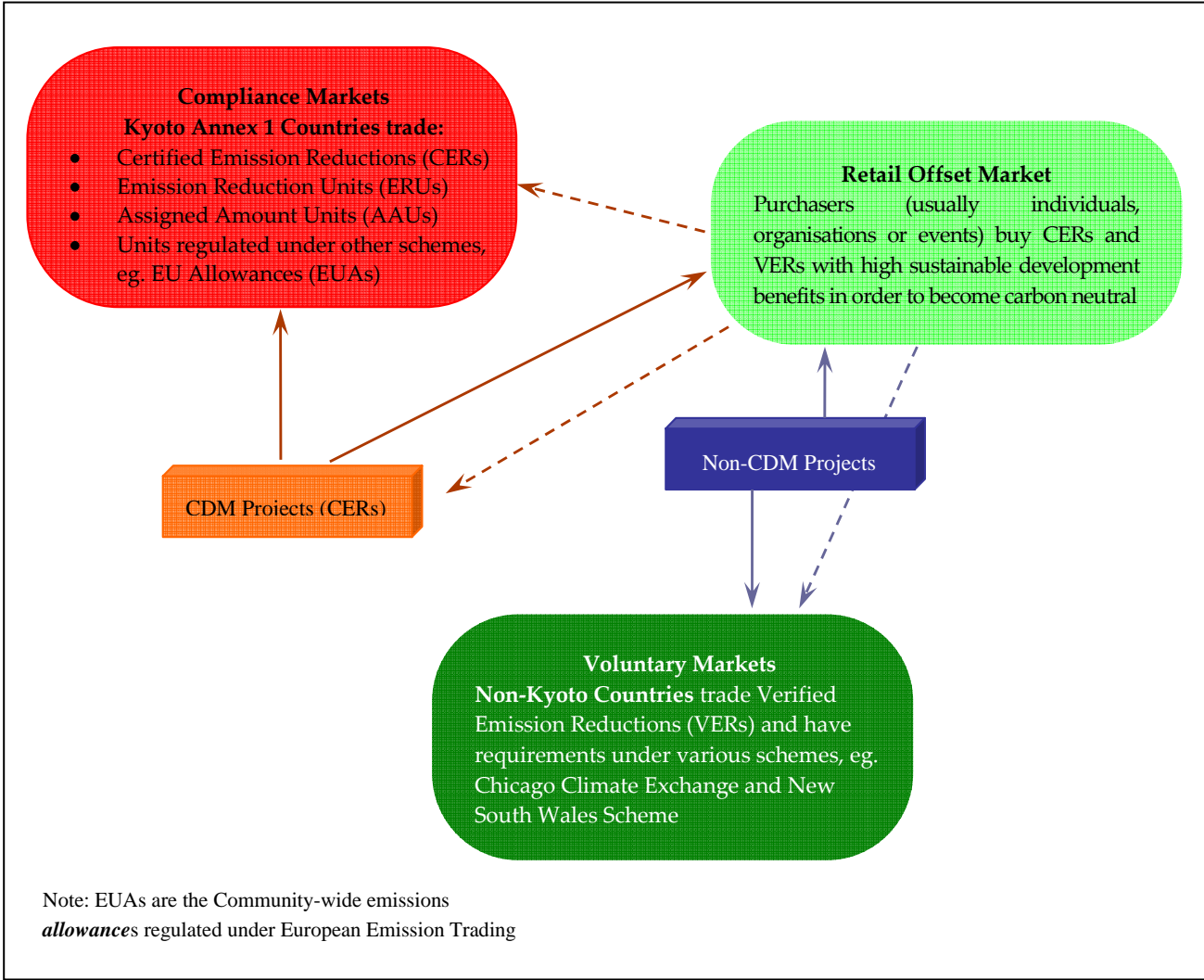


Figure 13 Relationship of carbon emissions markets

The main markets that might be of interest to Chinese CDM project developers are described in the following sections.

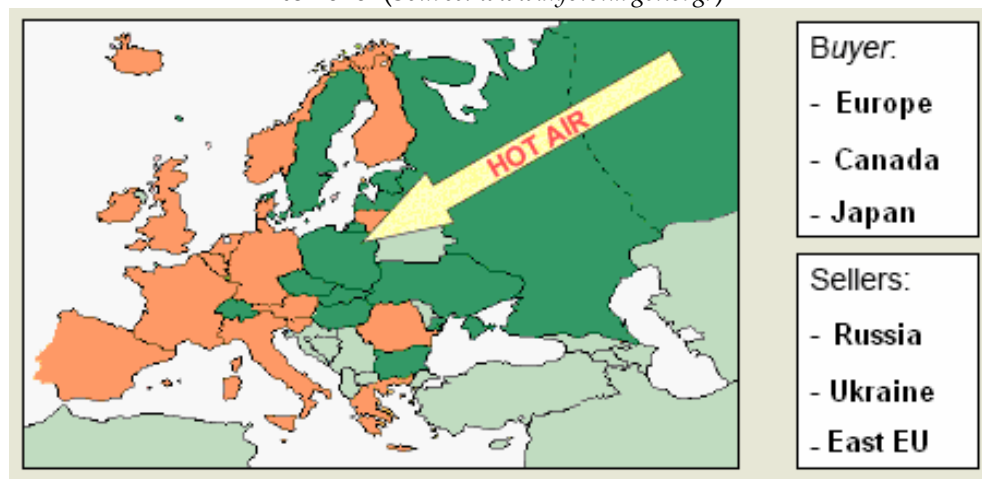
*4.1.1 Compliance markets*

In **compliance markets** the main players are the countries that have signed and ratified the Kyoto Protocol to the UNFCCC, and either must comply with carbon emissions reduction



targets or wish to sell surplus allocations of carbon emissions (see Figure 14), and European Union (EU) and other enterprises subject to carbon emissions limits. Market actors buy carbon credits in order to meet a mandatory, legally imposed emission reduction target, which they cannot achieve through internal emissions reductions.

Figure 14 Countries with surplus (green) or deficit (red) of AAUs (Assigned Amount Units) to 2010 (Source: [www.kyototarget.org/](http://www.kyototarget.org/))



Following are the principal compliance markets:

- Global AAU Market (the so-called Kyoto Market) – participants include the countries that signed and ratified the Kyoto Protocol with obligations to reduce Green House Gas, (GHG) emissions;
- European Emission Trading Market (EU ETS) – among the participants are EU enterprises that are subject to commitments of carbon emissions reductions (only the emissions of CO<sub>2</sub> are traded);
- International markets for CO<sub>2</sub>eq emissions credits from CDM/JI.
- Other regional and domestic markets, including: Canadian ETS, Japan ETS, UK ETS, Norwegian ETS.

According to the Kyoto Protocol, a Kyoto Protocol carbon emissions reduction unit is equal to 1 metric tonne of CO<sub>2</sub> equivalent. There are different Kyoto units exchanged in carbon markets, including:

- **AAUs:** Assigned Amount Units – are the unit of measure for a country's 'assigned amount' under the Kyoto Protocol. The assigned amount is the total amount of greenhouse gas emissions that each country listed in Annex B of the Kyoto Protocol has agreed not to exceed during the first commitment period (2008 to 2012).
- **ERUs:** Emission Reduction Units - credits related to tons of CO<sub>2</sub>eq reductions or emission removals generated for emission from joint implementation project.
- **CERs:** Certified Emission Units - credits issued for emission reductions from CDM project activities

- **RMUs:** Removal Units – credits generated by Annex I Parties by LULUCF (Land use, land-use change, and forestry) activities that absorb carbon dioxide.

Consequently, there are various financial intermediaries that have emerged in these markets:

- **Brokers:** facilitate trades by providing carbon trading services, including carbon mitigation strategy consulting services, to project owners, project developers, and to carbon credits buyers.
- **Funds:** the carbon finance approach has nowadays introduced new instruments and financial facilities. Through such facilities multiple public and private financing sources can be aggregated as funds which enable governments and private companies to purchase, with a competitive price, large volumes of carbon credits for meeting their commitments under the Kyoto Protocol or the European Union's Emission Trading Scheme at competitive prices. Currently, there exist eight main carbon funds and facilities: Prototype Carbon Fund(PCF), Community Development Carbon Fund (CDCF), Bio-Carbon Fund (BioCF), Netherlands CDM Facility (NCDMF), Netherlands European Carbon Facility (NECF), Italian Carbon Fun (ICF), Danish Carbon Fund (DCF), Spanish Carbon Fund (SFC) and Umbrella Carbon Facility (UCF). A certain percentage of the capitalisation of these funds comes from private capital.
- **Financial investors and speculators:** buy credits in carbon markets or directly from project owners, intending to re-sell those credits at a profit at a later stage.

#### *4.1.2 Voluntary markets*

**Voluntary markets** for carbon emissions trading are based on voluntary efforts to reduce emissions. In other words, these markets cater to entities (companies, governments, NGOs, individuals) that purchase carbon credits for purposes other than meeting regulatory targets. They are largely driven by the threat of future governmental regulation and compliance targets in non-Kyoto countries. For example, in anticipation of mandatory targets, companies in the US are learning how the carbon markets work by trading through voluntary schemes.

These markets follow a similar pattern to compliance markets, but the framework for transactions and criteria for projects are completely defined by each individual scheme or buyer. Credits in voluntary markets are dominated by *Verified Emission Reductions (VERs)*. VERs undergo a third-party check during validation and/or verification to increase their credibility.

### 4.1.3 Retail Carbon Offset markets

The retail Carbon offset <sup>6</sup> market refers to companies and organisations that invest in offset projects and then sell off portions of the emission reductions in relatively small quantities with a mark-up. Purchasers of retail offsets are typically corporations, events or individuals, aiming to become carbon neutral.<sup>7</sup> The activities in these markets aim at offsetting or compensating for emissions from an activity by an investment in an emission reduction activity elsewhere. Retailers can sell VERs, CERs, or ERUs for voluntary or regulatory purposes. However, the vast majority of retailers sell VERs to the voluntary market.

Still in the early stages of development, the voluntary carbon offsets market consists of a small but growing number of retailers located predominantly in Europe, notably the UK. The USA is also increasingly important as the location of offset market players. Small, exclusively focused retailers dominate the market comprising approximately half of all intermediaries, though larger brokers offering more sophisticated services are becoming active in this market.

Typically projects in voluntary carbon offsets market are micro to small scale (Figure 15), a manifestation of low demand but also of the prevalent project types; forestry dominates current project numbers, skewed by a number of retailers exclusively focused on these offsets, though renewable energy and demand side energy efficiency are growing in importance (Figure 16).

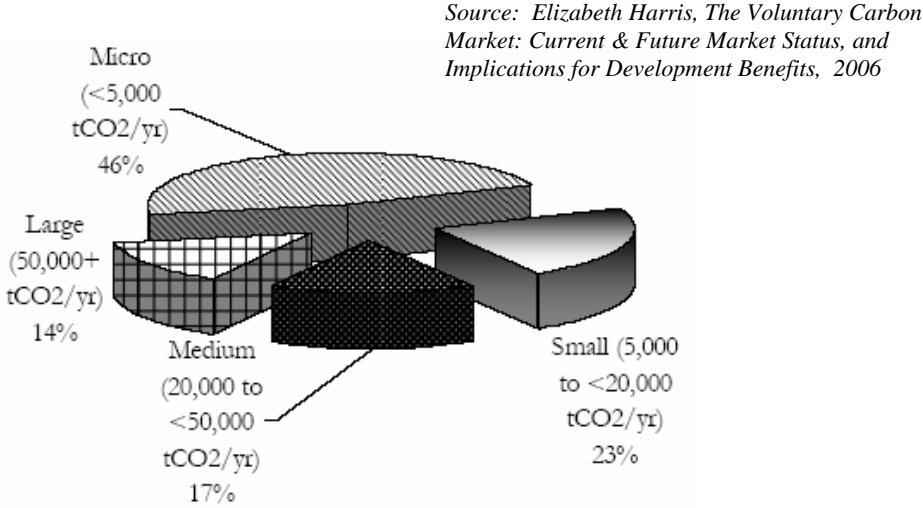
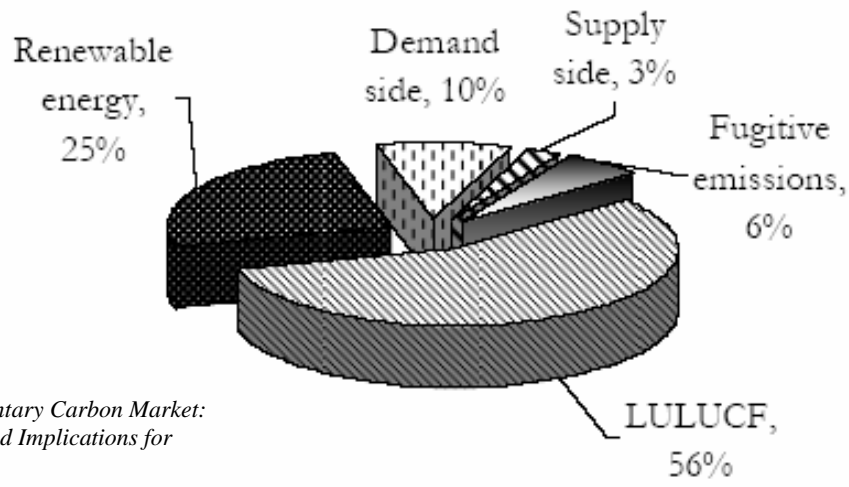


Figure 15: Project size (by number of projects - 2006 data)

<sup>6</sup> Carbon offsets are simply an emission reduction credit achieved by other organizations' projects elsewhere. Carbon offsets are typically measured in tons of CO<sub>2</sub>-equivalents (or 'CO<sub>2</sub>eq') and are bought and sold through trading platforms. In contrast to emissions trading, which is regulated by a strict formal and legal framework, carbon offsets generally refer to voluntary acts by individuals or companies that are commonly arranged by commercial or not-for-profit carbon-offset providers.

<sup>7</sup> Carbon neutral means calculating the amount of greenhouse gas emissions your life/daily activity creates, and paying to reduce the equivalent emissions from entering the atmosphere somewhere else.



Source: Elizabeth Harris, *The Voluntary Carbon Market: Current & Future Market Status, and Implications for Development Benefits*, 2006.

Figure 16: Project types (averaged share by number of projects – 2006 data)

#### 4.1.4 Other common standards used the in Carbon Market

The retail offset market operates outside formal regulations - no common set of rules applies. This has led to the evolution of a wide array of processes and standards (Figure 17). Moreover, in the retail offset market, secondary trades are rare events unless generated by sales from a project aggregator, retailer or broker to end-users of the credits. Once credits are sold, they will be cancelled and therefore removed from the market. It is worth noting that, in retail carbon offset markets credits are mostly purchased for corporate image purposes or out of genuine concern for climate change, in other words, quality in terms of environmental integrity and additional benefits is much more important than in the compliance market.

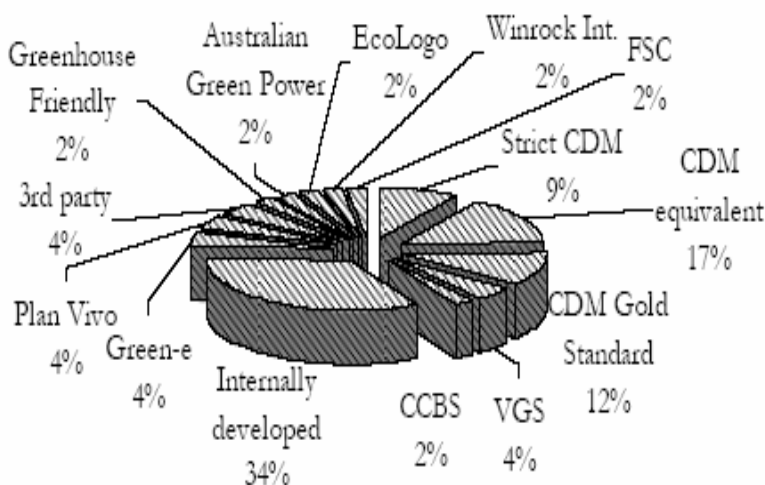


Figure 17: Market standards

FSC: Forestry Stewardship Council  
 Greenhouse Friendly: operated by Australian Government  
 CCBS: Climate, Community and Biodiversity Standard  
 VGS: Voluntary Gold Standard

(Source: Elizabeth Harris, *The Voluntary Carbon Market: Current & Future Market Status, and Implications for Development Benefits*, 2006)

Market standards that regulate the function of carbon emissions reduction markets and behaviour of the players:

- Allowances markets
  - EU ETS
  - New South Wales Greenhouse Gas Abatement Scheme (NES GGAS) in Australia (2003 – 2012), regulated by the state of New South Wales, creates emissions benchmarks for electricity retailers
  - Chicago Climate Exchange, a voluntary trading scheme in the US
  - UK ETS, companies can opt into scheme and receive financial incentives
  
- Project-based markets (compliance and voluntary)
  - CDM/JI, set by international regulatory authorities
  - the Gold Standard, created by a consortium of NGOs for energy projects
  - the Climate, Community, and Biodiversity (CCB) Standards, created by a consortium of NGOs and private sector for land-based carbon sinks projects
  - Self developed standards, created by individual providers of VERs
  - Labelling Schemes, developed by some providers

These are discussed further below.

#### ***New South Wales Greenhouse Gas Abatement Scheme***

(NSW GGAS) ([www.greenhousegas.nsw.gov.au](http://www.greenhousegas.nsw.gov.au))

NSW Greenhouse Gas Reduction Scheme (GGAS) commenced on 1<sup>st</sup> of January 2003. It is one of the first mandatory greenhouse gas emissions trading schemes in the world, aiming to reduce GHG emissions from power sectors.

GGAS establishes annual state-wide greenhouse gas reduction targets, and then requires individual electricity retailers and certain other parties who buy or sell electricity in NSW to meet mandatory benchmarks based on the size of their share of the electricity market. Monitoring the performance of benchmark participants is undertaken by the Independent Pricing and Regulatory Tribunal of NSW (IPART) in its role as Compliance Regulator.

#### ***Chicago Climate Exchange*** (CCX, [www.chicagoclimateexchange.com](http://www.chicagoclimateexchange.com))

Chicago Climate Exchange is North America's only and the world's first global marketplace for integrating voluntary legally binding emissions reductions with emissions trading and offsets for all six greenhouse gases. CCX emitting Members make a voluntary but legally binding commitment to meet annual greenhouse gas (GHG) emission reduction targets (4% emission reduction below a baseline period of 1998-2001). Those who reduce below the targets have surplus allowances to sell or bank; those who emit above the targets comply by purchasing CCX Carbon Financial Instrument™ (CFI™) contracts.

The commodity traded at CCX is the CFI contract, each of which represents 100 metric tons of CO<sub>2</sub> equivalent. CFI contracts are comprised of Exchange Allowances and Exchange Offsets. Exchange Allowances are issued to emitting Members in accordance with their Emission Baseline and the CCX Emission Reduction Schedule. Exchange Offsets are generated by qualifying Offset Projects.

***UK Emission Trading Scheme (2002-2006, UK ETS)***

([www.defra.gov.uk/environment/climatechange/trading/uk/index.htm](http://www.defra.gov.uk/environment/climatechange/trading/uk/index.htm))

The scheme was launched in March 2002 and ended in December 2006, with final reconciliation completed in March 2007. The UK ETS was the world's first economy-wide greenhouse gas emissions trading scheme. Participation was on a voluntary basis and combined incentives, penalties and flexibility. The goal of the scheme was established to reduce emissions by 11.9 million tCO<sub>2</sub>e for "Direct Participants" emissions.

Thirty-three organisations ("Direct Participants" (DPs) in the scheme) voluntarily took on emission reduction targets to reduce their emissions against 1998-2000 levels. They committed to reducing their emissions by 3.96m tonnes of carbon dioxide equivalent (CO<sub>2</sub>e) by the end of the Scheme. Over the lifetime of the scheme DPs have achieved emissions reductions of over 7.2 million tonnes of CO<sub>2</sub>e.

***Gold Standard*** (<http://www.camgoldstandard.com/>)

The *Gold Standard* is the world's only quality standard for carbon emission reduction projects with added sustainable development benefits and guaranteed environmental integrity (see Section 4.3 for more information). The Gold Standard label, endorsed by 42 NGOs worldwide, distinguishes projects and emissions under the Clean Development Mechanism, Joint Implementation, and Voluntary Offset markets. In order to meet the Gold Standard, projects must pass through three screens:

- 1) Project type screen – restricted to renewable energy and end-use energy efficiency projects (solar energy, biomass, wind, geothermal, small hydro, biogas)
- 2) Additionality and Baseline screen
- 3) Sustainable Development screen – cost and benefits associated with other environmental, economic, and social impacts; local stakeholder consultation prior to implementation

In other words, Gold Standard projects adhere to a sustainability best practice methodology: they employ renewable energy or energy efficiency technologies, actively seek local participation in project design, and result in demonstrable sustainable development benefits. DOEs conduct Gold Standard certification following the normal CDM process, but using the additional Gold Standard guidelines. Non-CDM/JI projects can also receive Gold Standard certification by following the guidelines and receiving validation from an accredited organisation.

### ***Climate, Community, and Biodiversity Standards (CCB Standards)***

([www.climatestandards.org](http://www.climatestandards.org))

The Climate, Community and Biodiversity Project Design Standards is a Gold standard equivalent for Land Use, Land Use Change, and Forestry (LULUCF) projects, developed by a group called the Climate, Community, and Biodiversity Alliance, which is a unique partnership among research institutions, corporations and non-governmental organizations (NGOs).

The CCB Standards evaluate land-based carbon mitigation projects in the early stages of development, and foster the integration of best-practice and multiple-benefit approaches into project design and evolution.

The standards were developed over two years and involved field-testing in four continents. Projects must satisfy 15 criteria to demonstrate net benefits to the climate, biodiversity, and socio-economic development.

### ***Labelling schemes***

Some labelling schemes have been created for companies that want to market their voluntary carbon reduction programmes. For instance, the Climate Neutral Network, an independent NGO created by an alliance of companies, has created the Climate Cool™ certification, whereby whole enterprises or individual products or services can obtain the label by reducing emissions internally and then offsetting the rest. Future Forests (FF), a UK based retailer, has trademarked the term CarbonNeutral™ and developed a protocol, consisting of standards that companies have to meet in order to declare themselves CarbonNeutral™.

## ***4.1.5 Trends in the market for carbon emissions reductions***

### ***- The Compliance Markets***

The expansion in the carbon market continued based primarily on project-based transactions in 2006. A strong majority (about 91%) of primary transactions for project-based credits came from CDM activities that represented a total reduction of 450 MtCO<sub>2eq</sub>, representing an increase of 32% in volume compared with 2005. CDM, even with its limitations, provided an effective vehicle for developing countries to participate in ongoing efforts to reduce carbon emissions.

The EU ETS and Kyoto Protocol Annex B governments are dependent on the CDM/JI carbon market in the short- to mid-term, as EU Member States may use CDM/JI credits (except for carbon sink projects) for compliance with EU ETS or for other use. The extent of this dependence is related to the price of EUAs – if this price is high, more cost-effective options may be found in CDM countries in the form of CERs. However, EU Member States have to decide national limits for use of CDM/ JI credits in the EU ETS, in order to ensure that emission reductions are achieved inside the EU.

The structure of the carbon market in 2006 is shown in Figure 18. The CDM market in 2006 was reflected by CERs sales, which were dominated by China, followed by India (Figure 19). Figure 20 shows market volume share by technology.

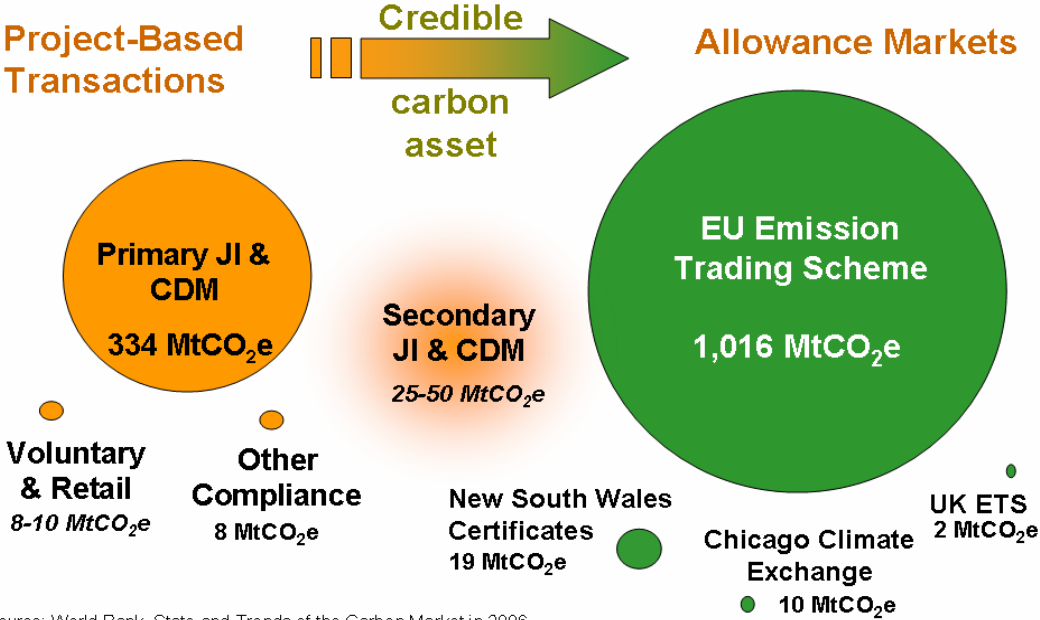


Figure 18 Structure of carbon market 2006

(Note: Secondary Market refers to the market where CERs are offered with a guarantee of delivery by a rated entity such as a bank or fund. As all project and delivery risks are borne by this entity, as opposed to a standard 'off take contract' with a project, secondary market CERs often command a higher price than those bought directly from a project.)



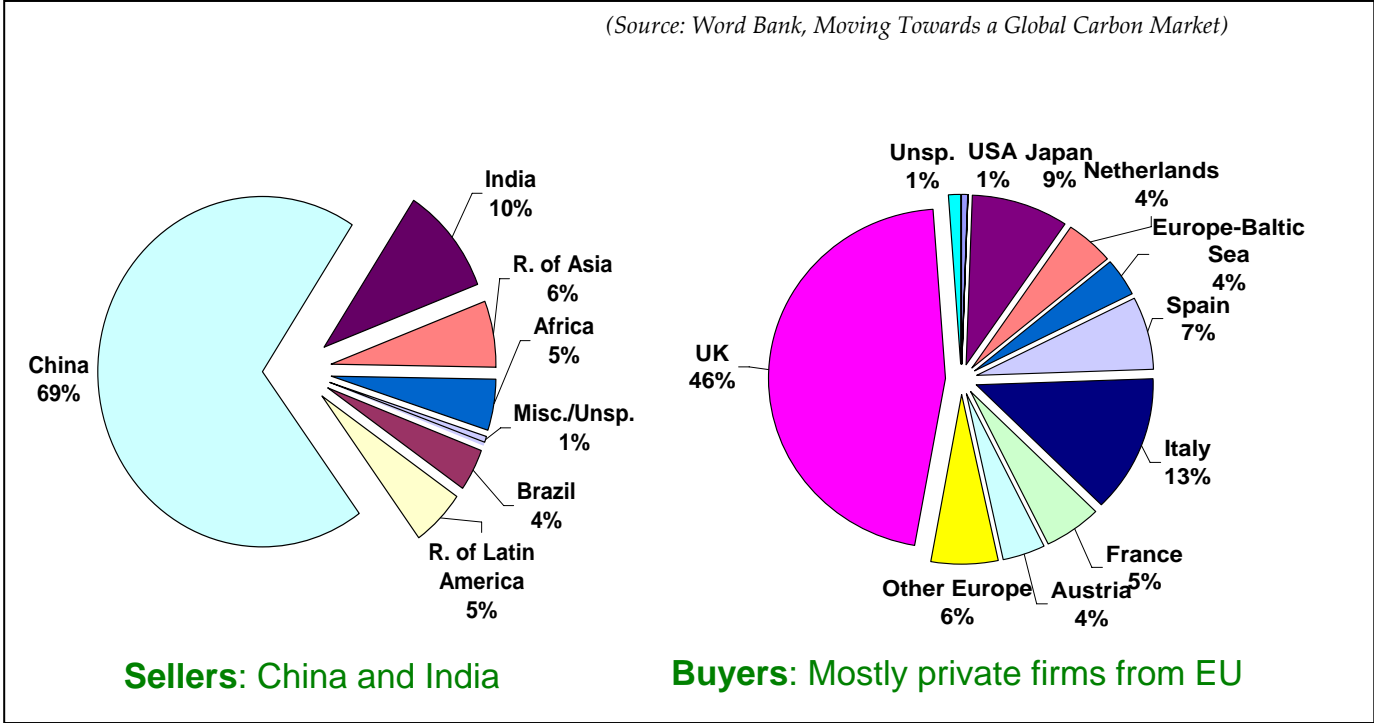


Figure 19 Carbon market share of volumes (Jan. - Nov. 2006)

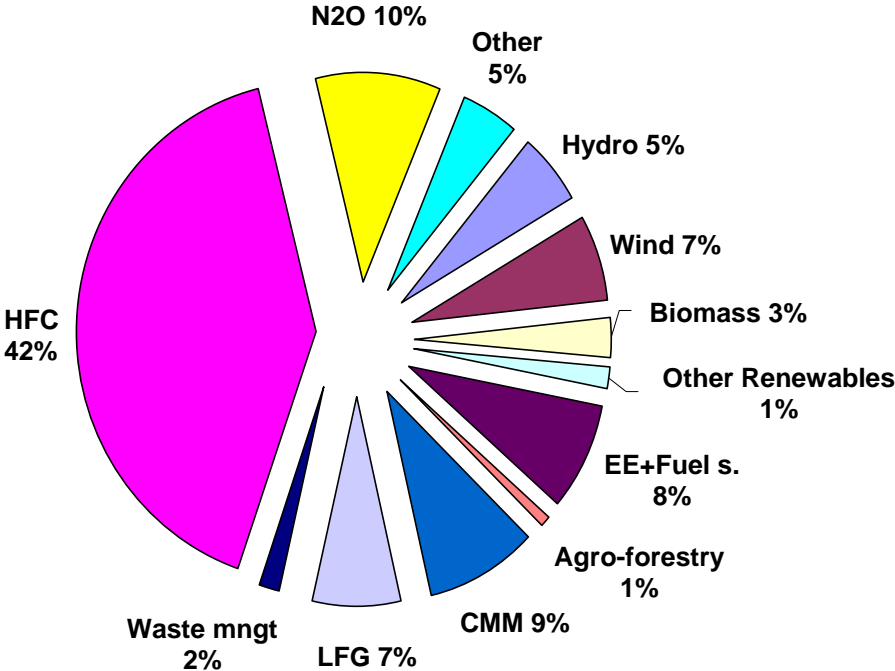


Figure 20 CDM market share of volumes by technology (Jan.-Nov. 2006 )

(Source: World Bank, Moving Towards a Global Carbon Market)

The UNFCCC meeting in 2005 allowed for “project activities under a programme of activities” to be registered as a CDM project activity – this is known as *programmatic CDM*. Programmatic CDM methodologies have yet to be approved and implemented, but they should encourage credits from larger emission reduction programmes. Programmatic CDM should reduce transaction costs as well as providing an opportunity for CDM to contribute towards public sector development goals, for example producing energy efficient low-cost housing.

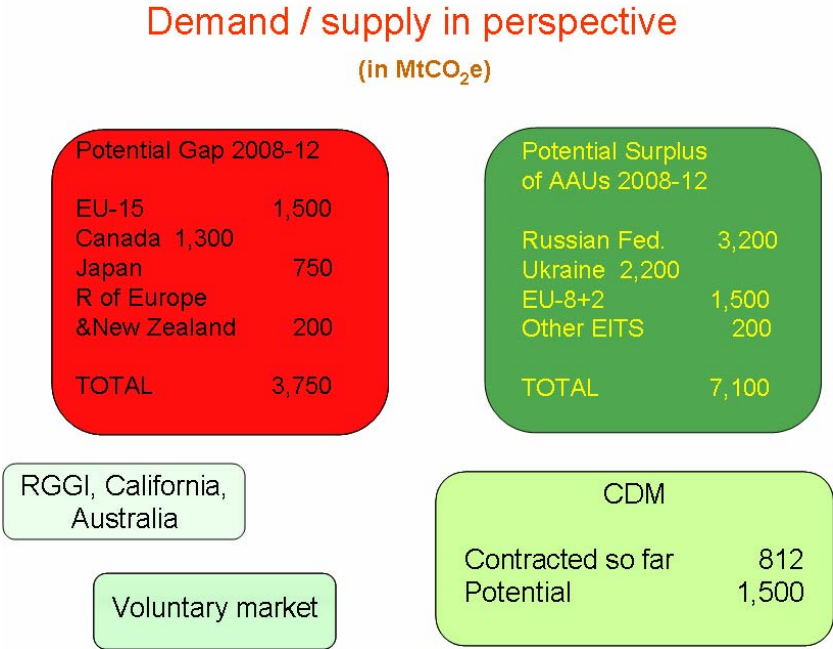


Figure 21 Carbon market’s perspective 2008-12  
 (Source: World Bank, *Moving Towards a Global Carbon Market*)

Compliance markets are still immature and shifts in prices of CERs may come about that would reflect a truer market value. This needs to be taken into account when negotiating prices for CERs as part of a CDM transaction. Other compliance markets may emerge in the future, for example in Canada and Japan. However, based on the study made by the World Bank, for the first Kyoto Protocol commitment period (2008 – 2012) indicated that the carbon market will have a global outlook such as the one given in Figure 21.

**- Voluntary Markets**

Given the small and fragmented nature of the voluntary markets (including the retail one) and the lack of any centralised registration for non-CDM projects, it is very difficult to estimate the size of the market with much accuracy. However, recent estimation made by the World Bank shows global carbon markets have doubled in size over the past year, in voluntary markets about US\$100 million credits have been exchanged for the first three quarters of 2006.

Voluntary markets are likely to grow as public awareness increases with respect to the threat of climate change.

Moreover, these markets are currently accessible for projects with additional benefits, due to a current demand focus on small scale forestry, renewables as well as energy efficiency projects, which are unfeasible under strict market rules. Project developers, especially individuals and smaller organisations, can operate in voluntary markets with high sustainable development benefits by avoiding the bureaucratic procedures and high transaction costs associated with the CDM registration process.

#### *4.1.6 Types of CER buyers, brokers and retailers*

*The structures of carbon markets are complex - each market has its transaction standards. Consequently, there are different actors involved in the carbon credit transaction processes. In this section our attention will be focused on CER purchase side. It is very important to understand the identify and nature of the parties involved in carbon emissions reduction credit trading, and their roles in this process.*

*Brief overview of the most common purchasing (and other) requirements from interviewed EU buyers (if possible, otherwise we indicate the basic requirement only for each investor/buyer) Multilateral or bilateral funds, corporations, asset managers, etc.) and the main differences among them.*

*Public funding for CDM implementation, Carbon funds/facilities at the World Bank, such as Italian carbon fund, Portuguese carbon fund, Danish CDM fund, Austrian CDM facilities. CER buyers active in China will be identified.*

The type of carbon buyers that you wish to negotiate with will be determined by all the other elements of your carbon transaction strategy. However, it is worth noting that the counterparty to your carbon sale can be important in terms of forging relationships or partnership links for the provision of needed technologies.

From the financial side, the buyer's credit standing is important, since it can improve your project finance structure and reduce your project's risk.

CER buyers can assume different institutional and market forms, as summarized earlier, and consequently they develop different approaches to the carbon market. Those that configure themselves as direct buyers – meaning that they purchase CERs directly from a specific CDM project or set of projects – tend to choose one of the following main carbon transaction strategies. In some cases, they remain simply buyers and delegate the direct relationship with the project owner to a CDM consultant, as shown in Figure 21.

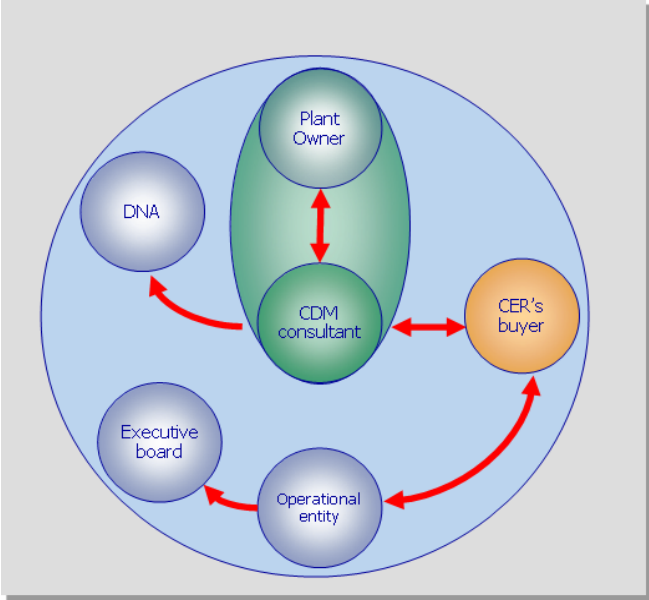


Figure 21 Relations/interfaces among parties in CERS transaction

(Source: Enel, Massimiliano Varrucchi, 'Enel CDM experience in China', CDM Capacity Building Course in Beijing, Nov. 2006)

This strategy shifts a central role to the CDM consultant which acts a broker between the project owner and the buyer, controls the process and influences the CER owner, works with a third party project developer or takes in also such role. This strategy maybe appropriate for large scale CER buyers, which need to delegate the project development and can take the financial risk of higher transaction costs because they end up outsourcing them as they prefer to reduce their direct engagement. ENEL Group (the largest Italian power company), for instance, one of the largest buyer of CERs in China, has adopted such strategy.

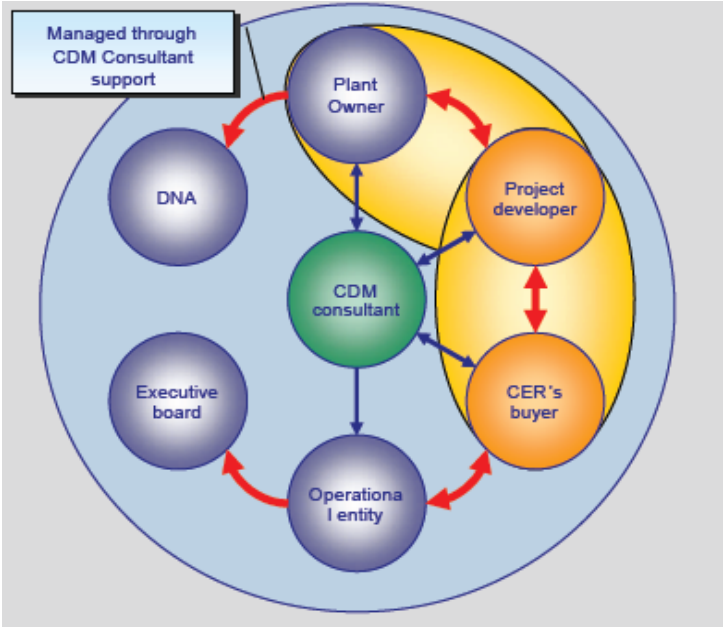


Figure 22 Interfaces among parties in CERS transaction

(Source: Enel, Eliano Russo, 'CDM ERPA', Montreal, 2005)

Another possibility for CERs buyers is to play a more proactive role and assume also the responsibility of

project developer (or have a direct and close relation with a project developer), working closely with the project owner. In such model, summarized in Figure 22, the consultant retains a smaller role in offering technical assistance, and the buyer has the advantages related to the position of first mover and of provider of technology transfer, factors that will likely be reflected in the definition and negotiation of the ERPA with the project owner.

## Market Buyers

- **World Bank/Prototype Carbon Fund** finances projects that produce high-quality GHG emission reductions
- **World Bank Umbrella Carbon Facility (UCF)** was created in December 2005, the UCF will aggregate multiple sources of funding to purchase large volumes of emission reductions
- **Natsource GHG Credit Buyers Pool** is a US\$ 200 million GHG-Credit Aggregation Pool that will purchase project-based GHG emission reductions
- **Certified Emission Reduction Unit Procurement Tender (CERUPT)** provides project funding to purchase CERs
- **Emission Reduction Unit Procurement Tender (ERUPT)** purchases carbon emission reductions
- **International Finance Corporation-Netherlands Carbon Facility (INCaF)** purchases project-based carbon emission reductions
- **Swiss Re**, among the largest global re-insurance companies, is one of the leaders in voluntary action to mitigate climate impact.
- **HSBC** made headlines, in December 2004, by becoming the first major bank to commit to becoming carbon neutral. They have planned a three-pronged approach of energy efficiency, green energy, and carbon offsets. Both CERs and VERs are being considered, with the main criteria being credibility – that the offset must be genuinely additional.

## Market Facilitators/brokers

Carbon market facilitators/brokers are another interesting part operating in Carbon market, which provide GHG trading services to companies. Brokers also match buyers and sellers for CDM and JI projects and might provide their clients with carbon mitigation strategy consulting services. They generally charge a 7.5 per cent commission.

Following are some examples of brokers:

- **Asian Development Bank Renewable Energy, Energy Efficiency and Climate Change (REACH)** facility works cooperatively with development funds in Denmark, the Netherlands and Canada

- **Global Environment Facility (GEF)** provides cost-sharing grants and concessional funding to help fund projects that protect the environment (climate change mitigation is one of its four focus areas)
- **Carbon Brokers Natsource, Cantor Fitzgerald/CO2e.com, Evolution Markets LLC**
- **Trexler Climate and Energy Services**
- **EcoSecurities**
- **CO2e**

### Retailers in voluntary market

Currently retailers active in carbon market include individuals, businesses, government departments or whole cities, and international events. Some are for-profit and others are non-profit. Examples of retailers are (Source: IIED, Nadaa Taiyab, Exploring the market for voluntary carbon offsets, 2006):

- **Future Forests (UK)**, a for-profit firm, is the largest and oldest retail offset provider in the UK. **Future Forests** invests in GHG offset projects in the UK and internationally and has attracted large private sector clients and high profile celebrities. **Future Forests** offset 120,000 tCO<sub>2</sub>e in 2004 and, up to 2006, 750,000 tCO<sub>2</sub>e in total.
- **PrimaKlima (Germany)**, founded in 1991, is a non-profit organisation that invests in tree planting projects in developed and developing countries. However, 2,000 of the 3,200 hectares of the reforested land are located in Germany. For its trading **PrimaKlima** charges a one-off payment of EUR 75 to sequester 1 ton of CO<sub>2</sub> every year for fifty years, the equivalent of approximately, EUR 1.50 / ton CO<sub>2</sub>e.
- The **FACE Foundation**, in the Netherlands, began in 1990 as an alliance between Dutch power companies to offset emissions from a future coal-fired power plant. In the late 1990s, the alliance fell apart and FACE Foundation teamed up with Triodos Bank to create **Business For Climate**, which is a for profit organisation that sells emissions reductions from **FACE Foundation** projects to individuals, companies, and governments. The projects follow the same criteria and undergo the same rigorous verification procedures as CDM and JI projects. The projects are located in Uganda, Malaysia, the Czech Republic, Ecuador, and Costa Rica.
- **Atmosfair (Germany)**, **Climate Care (UK)**, and **MyClimate (Switzerland)**, are examples of offset providers committed to providing high quality energy-based offsets located in developing countries, with sustainable development benefits. **Atmosfair**, as a non-profit organisation, is interesting in that it is a retailer that exclusively develops CDM projects that also meet Gold Standard criteria, in order to ensure the highest standards of credibility. Its projects include solar kitchens in India and waste-to-electricity projects in Brazil, which it plans to replicate elsewhere once the technology is fully tested and ready to be disseminated. The organisation is very new, founded in the summer of 2004, and, as of January 2005, had received over EUR 45,000 in revenue from more than 1,500 customers.

**Climate Care (UK)**, a for-profit company, specifically does not develop CDM projects, as it aims to create carbon reductions that cannot be used to meet national targets and that would not have occurred in the absence of Climate Care. Climate Care primarily focuses on energy-based projects with high sustainable development benefits in developing countries.

**MyClimate (Switzerland)**, an NGO founded in 2002 as a spin-off from the Swiss Federal Institute of Technology (Switzerland), invests only in renewable energy or energy efficiency projects in developing countries. Projects meet CDM criteria and follow Gold Standard guidelines.

- **EADEnvironmental (USA)**, offers individuals and businesses a means to offset their electricity consumption through 'Renewable Energy Certificates' and 'Environmental Action Certificates.' Prices range from US\$5 - \$7.50/500kWh of electricity use. Its target customer base is generally in the north eastern part of the US, including universities.

### Possible sources of Carbon finance

'Carbon finance' is the general term applied to resources provided to a project to purchase greenhouse gas (GHG) emission reductions ("carbon" for short). Moreover, the objective of carbon finance is to find the lowest cost emissions reduction possibilities. Under the Kyoto Protocol and other policies to combat climate change, projects that reduce emissions of GHGs also generate a valuable new commodity. The sale of emission reduction units, or as commonly known, "carbon credits", can significantly boost financial returns on climate-friendly projects.

Commitments of carbon finance for the purchase of carbon have grown rapidly since the first carbon purchases began less than eight years ago. Currently, there are numbers of sources available for carbon finance, such as:

- World Bank/Prototype Carbon Fund
- Certified Emission Reduction Unit Procurement Tender
- IFC-Netherlands Carbon Facility
- Chicago Climate Exchange (CCX)
- GHG-Credit Aggregation Pool
- Asia Development Bank (ADB)
- GEF

### Carbon finance at the World Bank

Carbon finance is the general term applied to resources provided to a project to purchase greenhouse gas (GHG) emission reductions (so called "carbon" for short). Since the first carbon purchases began eight years ago, commitments of carbon finance for the purchase of carbon have grown rapidly; naturally the World Bank is involved in carbon finance.

Currently, there are 11 carbon funds and facilities managed by the World Bank Carbon Finance Unit (CFU) on behalf of the contributor: **Prototype Carbon Fund, BioCarbon Fund, Community Development Carbon Fund, Italian Carbon Fund, The Netherlands CDM Facility, The Netherlands European Carbon Facility, Danish Carbon Fund, Spanish Carbon Fund, Umbrella Carbon Facility, Carbon Fund for Europe, Forest Carbon Partnership Facility**, all these funds are contributed by governments and companies in OECD countries and will be used to purchase project-based greenhouse gas emission reductions in developing countries and countries with economies in transition within the framework of the Kyoto Protocol's Clean Development Mechanism (CDM) or Joint Implementation (JI). In particular,

- **Prototype Carbon Fund (PCF, <http://carbonfinance.org/>)**, a partnership between seventeen companies and six governments (Table 6), and managed by the World Bank, invests contributions made by companies and governments in projects designed to produce Emission Reductions fully consistent with the Kyoto Protocol and the emerging framework for JI and the CDM. Contributors (or "Participants") in the PCF will receive a pro rata share of the Emission Reductions, verified and certified in accordance with agreements reached with the respective countries "hosting" the projects.

As the first carbon fund, the PCF started to operate in April 2000, and shall be terminated before 31 December 2012, unless the Participants, by unanimous vote, decide to continue. Up to now, the fund has a total capital of \$180 million.

**Table 6 Contributors in the PCF**

GOVERNMENTS	COMPANIES/Sector/Country
Government of Canada	• British Petroleum - Amoco / Oil / Great Britain
Government of Finland	• Chubu Electric Power Co. / Electricity/ Japan
Government of Norway	• Chugoku Electric Power Co./Electricity/ Japan
Government of Sweden	• Deutsche Bank / Financial / Germany
Government of the Netherlands	• Electrabel / Energy / Belgium
Japan Bank for International Cooperation	• Fortum / Energy / Finland
	• Gaz de France / Energy / France
	• Kyushu Electric Power Co. / Electricity / Japan
	• MIT Carbon / Trade / Japan
	• Mitsubishi Corp. /Trade /Japan
	• Norsk Hydro / Oil / Norway
	• RaboBank /Financial / Netherlands
	• RWE /Electricity / Germany
	• Shikoku Electric Power Co./ Electricity/ Japan
	• Statoil ASA Oil Norway
	• Tohoku Electric Power Co. / Electricity/ Japan
	• Tokyo Electric Power Co. / Electricity / Japan



**BioCarbon Fund** (BioCarbon, <http://carbonfinance.org/>), a public/private fund administrated by the World Bank, provides carbon finance for projects that sequester or conserve greenhouse gases in forests, agro-ecosystems and other ecosystems.

The Fund is composed of two Tranches: Tranche One started operations in May 2004, has a total capital of \$53.8 million and is closed to further participation; Tranche Two was operationalized in March 2007 and remains open to contributions.

The participants in BioCarbon are reported in the following Table 7.

**Table 7 BioCarbon Fund participants**

GOVERNMENTS	COMPANIES/Sector/Country
Government of Canada	• Agence Française de Développement/ Int. Development / France
Government of Italy	• Eco-Carbone as representative of Lesley Investments Ltd./ Project development/ France
Government of Luxembourg	• Idemitsu Kosan Co., Ltd. / Oil/ Japan
Government of Spain	• Japan Petroleum Exploration Co., Ltd / Oil / Japan
Government of Ireland	• Sumitomo Chemicals / Chemicals & Pharmac./ Japan
	• Sumitomo Joint Electric Power Co. /Electricity/ Japan
	• Suntory / Food and Beverage / Japan
	• The Japan Iron and Steel Federation / Iron and Steel / Japan
	• The Okinawa Electric Power Co., Inc./ Electricity / Japan
	• Tokyo Electric Power Co., Inc./ Electricity / Japan
	• Natsource BioCF II Investments Corporation / United Satates
	• Syngenta Foundation for Sustainable Agriculture / Switzerland
	• Zero Emissions Carbon Trust / Spain

**Community Development Carbon Fund** (CDCF, <http://carbonfinance.org/>), a public/private fund designed in cooperation with the International Emissions Trading Association and the United Nations Framework Convention on Climate Change, supports projects that combine community development attributes with emission reductions to create "development plus carbon" credits, and will significantly improve the lives of the poor and their local environment.

The fund started its operation in March 2003 to extend the benefits of carbon finance to the poorest countries and poor communities in all developing countries. The first tranche of the fund was capitalized at \$128.6 million with the participation of nine governments and 15 corporations/organizations (Table 8). Currently, this tranche is closed to further subscriptions.

**Table 8 Community Development Carbon Fund participants**

GOVERNMENTS	COMPANIES/Sector/Country
Government of Austria	• BASF/Int. Development/ Chemical / Germany
Government of Canada	• Daiwa Securities SMBC Principal Investments Co. Ltd./ Financial/ Japan
Government of Denmark (Danish Carbon Fund)	• Electricidade De Portugal(EDP)/Electriciy/ Portugal
Government of Italy	• ENDESA / Energy / Spain
Government of Luxembourg	• FUJIFILM Corporation / Chemicals / Japan
Government of Spain	• Gas Natural / Energy services / Spain
Government of the Brussels Capital-Region ( Belgium)	• Göteborg Energi AB /Energy services/ Sweden
Government of the Netherlands	• Hidroeléctrica del Cantábrico/Electricity/ Spain
Government of Walloon Region ( Belgium)	• Idemitsu Kosan Co., Ltd. / Oil / Japan
	• Kreditanstalt Für Wiederaufbau(KfW)/ Development Agency / Germany
	• Nippon Oil Corporation / Oil / Japan
	• Rautaruukki /Steel manufacturing / Finland
	• Statkraft Carbon Invest AS / Energy / Norway
	• Statoil / Oil / Norway
	• Swiss Re / Insurance / Switzerland
	• The Okinawa Electric Power Co., Inc./ Electricity / Japan

*Italian Carbon Fund* (ICF, <http://carbonfinance.org/>), a public/private fund created by the Italian Ministry for the Environment and Territory and managed by the World Bank, provides carbon finance to purchase only greenhouse gas emission reductions from projects in developing countries and countries with economies in transition that may be recognized under such mechanisms as the Kyoto Protocol's CDM and JI.

The fund was put in operation in March 2004, having an initial endowment from the Italian Government of US\$15 million. Moreover, the Fund is open to the subscription of Italian entities for 24 months from its constitution; the minimum contribution from each additional participant is set at US\$1 million. In 2005 the fund had a total capital of 150 million euro, the first tranche was closed on 30 June 2006.

Currently, there are six companies taking part in the Italian Carbon Fund:

- Cementerie Aldo Barbetti S.p.A. (Cement Producer)
- Endesa Italia S.p.A. (Electricity Utility)
- Enel Trade S.p.A (Electricity Utility)
- ERG S.p.A. (Energy and Petroleum sectoral operator)

- Italcementi S.p.A. (Cement Producer)
- S.I.E.T. S.p.A. (Electricity Utility)

From the fund, the participants will receive a quota of emission reductions in proportion with their contributions.

Moreover, the ICF purchases emission reduction credits from the following projects:

- Renewable energy, especially, small-medium hydropower plants, wind energy farms, cogeneration plants and biomass projects
- Management of agricultural residues and urban wastes
- Energy efficiency improvement
- High GWP gases emission reductions (N<sub>2</sub>O and HFC23)

The approval of the projects will be made by ICF’s participants. The foreseen fund distributions by region and by technology are shown in the Figure 23 and 24 below, respectively; the total emission reductions of 14,600,000 t CO<sub>2</sub>e until 2012 has been expected.

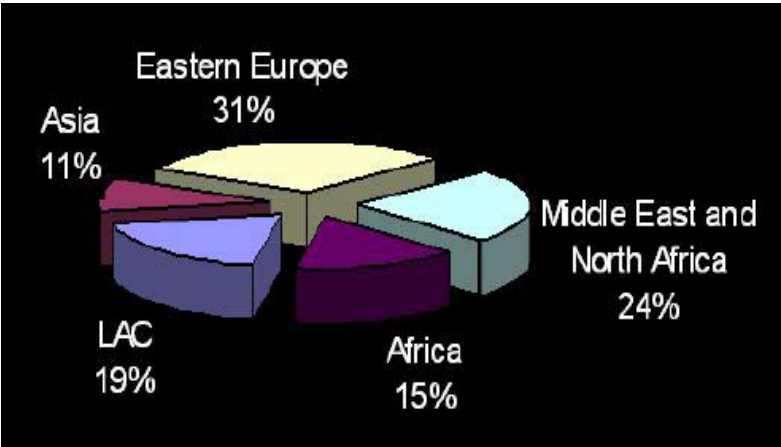


Figure 23 ICF distribution by Region (Source: World Bank)

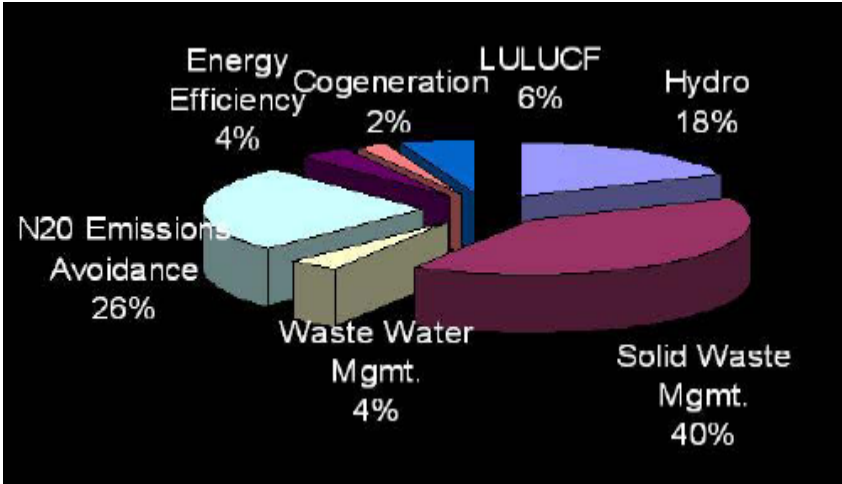


Figure 24 ICF distribution by technology (Source: World Bank)

**The Netherlands European Carbon Facility** (<http://carbonfinance.org/>), is a fund established by the Netherlands' Ministry of Economic Affairs on behalf of the Netherlands' Government, aimed to purchase greenhouse gas emission reductions from projects located in countries with economies in transition for the benefit of the Netherlands. In August 2004 the Netherlands' Ministry of Economic Affairs signed an agreement appointing the World Bank and the International Finance Corporation (IFC) as Trustees of the Netherlands European Carbon Facility.

The Facility has a total capital of \$56 million and plans to purchase 10 million tons of greenhouse gas emission reductions. Moreover, it is expected that the Facility will stimulate also private capital flows for sustainable development and enhance participants' knowledge of Joint Implementation and carbon finance as a tool to reduce the costs of implementing Kyoto obligations.

**Danish Carbon Fund** (DCF, <http://carbonfinance.org/>), is a public/private fund created in January 2005 with the participation of the Danish Ministry of Foreign Affairs and the Danish Ministry of the Environment and one private sector company (DONG Energy). The DCF is open to considering CDM projects throughout the developing world and as such treats all regions equally, without favoring one particular region over another. Moreover, the DCF seeks to contribute to the mitigation of greenhouse gases in countries with economies in transition.

The fund has a preference for projects in the areas of wind power, combined heat and power (co-generation), hydropower, biomass, and landfills.

In the summer of 2005, three other private sector participants (Aalborg Portland, Nordjysk Elhandel, and Maersk Olie) joined the DCF, increasing the Fund's capital from 46.3 million euros in January 2005 to 57.985 million euros in August 2005.

**Spanish Carbon Fund** (SCF, <http://carbonfinance.org/>), a public/private partnership administered by the World Bank, was created in 2004 through an agreement between the Ministries of Environment and Economy of Spain and the World Bank. The scope of the fund is to purchase greenhouse gas emission reductions from projects developed under the Kyoto Protocol to mitigate climate change while promoting the use of cleaner technologies and sustainable development in developing countries and countries with economies in transition.

Projects that may be eligible under the Spanish Carbon Fund include:

- Renewable energy, including small or medium hydro projects and wind projects
- Biomass and agricultural residues products, such as rice husks, sugar cane bagasse, paper plant residues, for generating heat and electricity
- Urban waste management.
- Industrial processes improvement

The Fund was started by using financial resources provided by the Spanish Government, and now is open to the participation of Spanish public and private entities; the minimum contribution for private sector participants is set at US\$2.5 million payable under annual installments. Up to now the SCF has a total capital of \$278.6 million.

The participants of SCF are reported in Table 9.

**Table 9 Spanish Carbon Fund participants**

Public organization	Private company /Sector
Ministry of Environment	• Abengoa, S.A. / Energy
Ministry of Economy and Finance	• Azuliber 1, S.L./ Ceramic Tiles
	• Cementos Portland Valderrivas, S.A. / Cement Producer
	• Compañía Española de Petróleos, S.A. / Oil
	• Endesa Generación / Electricity
	• Enel Viesgo Generación, S.L. / Electricity
	• Gas Natural SDG, S.A. / Gas Supply
	• Compañía Española de Petróleos, S.A. / Oil
	• Hidroeléctrica del Cantábrico, S.A. / Energy
	• Iberdrola Generación, S.A.U. / Electricity
	• Oficemen/ Cement Producer
	• Repsol YPF, S.A. / Oil
	• Unión Fenosa Generación, S.A. / Electricity

**Umbrella Carbon Facility** (UCF, <http://carbonfinance.org/>), is an aggregating facility to pool funds from existing carbon funds managed by IBRD (The International Bank for Reconstruction and Development) and from other participants' contributions for the purchase of emission reductions from large projects. The Facility would have multiple tranches; the first tranche is dedicated to purchasing Certified Emission Reductions (CERs) from the China HFC-23 projects.

The Fund has a total capital of \$719 million.

**Forest Carbon Partnership Facility** (<http://carbonfinance.org/>), is a framework for piloting activities that would reduce emissions from deforestation and degradation using a system of policy approaches and performance-based payments. The framework is developed under the requirement of developing and industrialized countries, aimed to assist developing countries in their efforts to reduce emissions from deforestation and land degradation (REDD) by setting the stage for a future, large-scale system of positive incentives over the medium term (5-10 years).

The targeted volume of the facility would be approximately US\$ 250 million.

**Carbon Fund for Europe** (CFE, <http://carbonfinance.org/>), a trust fund established by the World Bank, in cooperation with the European Investment Bank (EIB), is designed to help European countries meet their commitments to the Kyoto Protocol and the European Union's Emissions Trading Scheme (EU ETS).

The CFE will purchase greenhouse gas emission reductions through the Kyoto Protocol's Clean Development Mechanism and Joint Implementation from climate-friendly investment projects from either bank's portfolio as well as self-standing projects.

The CFE is directed towards the EU Member States and the European private sector. Carbon credits will be purchased from projects eligible under the Kyoto Protocol's CDM and JI and will be compatible with the EU ETS in order to facilitate the participation of private companies with EU emission reduction requirements. The emission reductions can be used against obligations under the Kyoto Protocol or for other regulated or voluntary greenhouse gas emission reduction regimes.

The participants of CEF are:

- Fondo Portugues de Carbono, Portugal
- Government of Ireland
- Government of Luxembourg
- Government of the Flemish Region, Belgium

plus a private company Statkraft operating in energy sector.

In summary, World Bank Carbon Funds purchase V/CERs and ERUs. To obtain these funds, project proposer must follow the conditions and the approval procedures established by Funds' Participants.

- **Minimum project requirements** for Carbon Finance at the World Bank

Type of Project

- Greenhouse gases' reductions should be those established under the Kyoto Protocol (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub>); and
- afforestation and reforestation projects in non-Annex I countries, and a whole range of land use, land-use change and forestry projects in Annex I countries.

Adequate Emission Reductions (ERs) Volume

The ER volume must be big enough to make a project viable under the CDM; for a small-scale project should generate a minimum threshold of 50,000 tCO<sub>2</sub>e/year.

Competent Project Participants and Clear Institutional Arrangement

- Technically experienced and sound project developers, with clear division of functions.

- Demonstration of sound legal arrangement, for instance, who owns, who operates, and what type of agreement between project participants as well as with third party (e.g. power purchase agreement, ownership agreement, water right)

*Viable Business and Operation Model that Helps Reduce Transaction Costs*

- Potential for scale-up
- Involvement of intermediaries who can invest, bundle, and implement project-related CDM services locally

*Ratification of Kyoto Protocol by the Host Country*

Has the host country ratified the Kyoto Protocol or expressed its intention to ratify the Kyoto Protocol in due course? Project should identify specific locations for its implementation.

*Expected Schedule*

Project should be operational before January 2008

*Sound Financing Structure*

- Sound financial profile of project sponsors and co-financiers.
- The sooner the project can achieve financial closure, the better the chances of selection are

*Technical Summary of Project*

- Project should be replicable and/or facilitate technology transfer for the country;
- Technology to be applied must be an established and commercially feasible one in somewhere other than the country in consideration; and
- Project proposal should contain sample cases of the technology applied in the past in order to show its commercial feasibility.

*Expected Environmental Benefits*

Evidence should be given that the project is additional to the baseline or reference scenario, which represents the most likely or business-as-usual scenario in the country.

*Safeguard Policies of the World Bank Group*

The Bank Group has a body of well-developed, mandatory Safeguard policies which apply to all World Bank operations, as well as an extensive set of good practices. The project must be consistent with these safeguard policies and the host country's overall sustainable development framework.

*Contribution to Sustainable Development*

As defined by the host country. For some end-of-pipe type of projects, contribution to sustainable development can be manufactured through re-investment in host community of some revenues from carbon finance.

**- Submission of proposal**

As the first step of project cycle -PIN screening, the PIN (Project Idea Note ) template and any other additional documents, please send them to [projects@carbonfinance.org](mailto:projects@carbonfinance.org).

It is worth to remark that the PIN is used as a first screening and to provide feedback to the proponents. At this stage it is purely the exchange of an idea and there are no legal obligations on either party to proceed further. Your project will be reviewed and comments will be provided in due time.

#### **- Financing**

Unlike other World Bank development products, the World Bank Carbon Finance Unit (CFU) does not lend or grant resources to projects, but rather contracts to purchase emission reductions similar to a commercial transaction, paying for them annually or periodically once they have been verified by a third party auditor. Moreover, The CFU will not provide debt and/or equity finance for the baseline component of the project. The baseline component of the project should be financed by other sources.

### **The Netherlands CDM Facility**

This CDM Facility was also created under an agreement signed between the World Bank and the Netherlands in May 2002, to support projects in developing countries that generate potential credits under the Clean Development Mechanism (CDM) established by the Kyoto Protocol to the UN Framework Convention on Climate Change.

The fund purchases Emission Reductions from projects in the following categories: (i) renewable energy technology, such as geothermal, wind, solar, and small-scale hydro-power; (ii) clean, sustainably grown biomass (no waste); (iii) energy efficiency improvement; (iv) fossil fuel switch and methane recovery; (v) sequestration.

Up to now, the total capitalization of the fund stands at approximately €136 million, or 31 million tCO<sub>2</sub>e.

The project cycle for this CDM facility differs from in somehow other carbon funds/facilities managed by the World Bank.

#### **- Submission of proposal**

Currently investors from all over the world may submit CDM-project proposals at all times at the following intermediary organisations contracted by the Government of the Netherlands:

- Rabobank, focuses on the food and agribusiness. (contact person: Ms Jenneke Segers at [Jenneke.Segers@rabobank.com](mailto:Jenneke.Segers@rabobank.com))
- IFC, contact address: [carbonfinance@ifc.org](mailto:carbonfinance@ifc.org), with reference to the IFC-Netherlands Carbon Facility (INCAF)
- IBRD, contact address: [helpdesk@carbonfinance.org](mailto:helpdesk@carbonfinance.org), with reference to the Netherlands Clean Development Facility (NCDF)



- CAF, focuses on projects in Latin America and the Caribbean. (contact person: Jorge Barrigh at JBarrigh@caf.com).
- The Community Development Carbon Fund (CDCF), for small scale projects in the least developed regions. ( contact address: helpdesk@carbonfinance.org with reference to CDCF

**- Eligible projects**

Projects eligible for CDM would include renewable energy, such as wind, solar, geothermal, hydro and biomass (clean) energy; energy improvement; transportation improvement; recovery and utilization of methane from waste landfills and coal mines and/or fossil fuels-switching to less carbon-intensive sources (example: from coal to natural gas).

Apart from the carbon funds and facilities managed by the World Bank, there are other numbers of carbon funds. For instance,

**Japan Greenhouse Gas Reduction Fund (JGRF, [www.jcarbon.co.jp/](http://www.jcarbon.co.jp/))**

Japan Greenhouse Gas Reduction Fund (JGRF) is Japan's first carbon fund established in 2004 by a total of 33 entities, to promote GHG gas reduction projects and to buy CERs/ERUs credits resulting out of the projects, for use in the first commitment period, 2008 -2012.

The JGRF was set up by the Japan Bank for International Cooperation (JBIC) in December 2005, the committed Fund amounted to \$141.5m. Carbon Fund and the Development Bank of Japan (DBJ) geographically focuses on Asia, Central and South America and Eastern Europe. Typical project sizes are up to \$17milions, according to portfolio guidelines.

The JGRF operates according to Credit Purchase Scheme.

**GHG Credit Aggregation Pool (GG-CAP, [www.natsource.com/news/index.asp?n=453/](http://www.natsource.com/news/index.asp?n=453/))**

This fund was initiated by Natsource Asset Management to provide buyers with high quality greenhouse gas (GHG) emission reductions (ERs) that can be applied against their GHG emissions limitations. As a "buyers pool" the GG-CAP will combine the purchasing power of the participants to acquire and manage the delivery of a large volume of compliance instruments created by the project-based mechanisms included in the Kyoto Protocol.

Since Oct. 2005, Natsource Asset Management has closed the Greenhouse Gas Credit Aggregation Pool, with total commitments of euro 455 million (US\$550 million) from 26 participants.

The participants in the program are among the largest consumer product, manufacturing, energy and utility companies in Europe, Japan, and North America, and have a combined market capitalization of more than US\$300 billion. The fund refers to projects in agriculture, energy efficiency, fugitive emissions, industrial processes, renewable energy, sequestration and transportation in Africa, Central Asia, Eastern Europe, Latin America and Southeast Asia as well as Oceania.

More details on this fund is available from Aline Ribas at [aribas@natsource.ca](mailto:aribas@natsource.ca) or on the related website: [www.natsource.com/news/index.asp?n=453](http://www.natsource.com/news/index.asp?n=453)

**KfW Carbon Fund** ([http://www.kfw-foerderbank.de/EN\\_Home/Carbon\\_Fund/index.jsp](http://www.kfw-foerderbank.de/EN_Home/Carbon_Fund/index.jsp))

This Carbon Fund established by KfW Bankengruppe (KfW banking group) in cooperation with the German government has a portfolio of 50m Euros. CDM and JI projects in developing and industrial/transition countries, respectively, are eligible for funding.

Since mid-2004 KfW Carbon Fund has been active in the carbon market. In conjunction with the European Investment Bank (EIB), KfW Bankengruppe (KfW banking group) has now launched the second procurement programme for emission certificates. German and European enterprises are invited to participate in the programme in order to acquire certificates for their own use.

**Portuguese Carbon Fund** ([http://www.blueclimate.com/blueclimate/2006/11/portuguese\\_carb.html](http://www.blueclimate.com/blueclimate/2006/11/portuguese_carb.html))

Portugal will invest in a carbon fund, which will be the fourth or fifth largest in the world (354 million euro), to insure that Portugal can meet its Kyoto targets for the 2008-2012 Kyoto commitment period.

Under Portugal's plan and its Kyoto Protocol target, the country should not emit more than 77.19 million tonnes of carbon dioxide a year in 2008-2012, which is also the key period for the Kyoto pact aimed at averting damaging climate change.

The Portugal carbon fund will be used to invest in Kyoto Protocol Clean Development Mechanism projects that reduce greenhouse gas emissions in developing countries. The fund will also be used for reforestation and afforestation projects that reduce carbon dioxide levels in the atmosphere by acting as carbon sinks.

**The Austrian JI/CDM- Programme** (<http://www.ji-cdm-austria.at/en/portal/> )

The Austrian JI/CDM Programme has been established, aimed at buying Emission reductions for the Austrian government to achieve its commitment under the Kyoto Protocol, through project-related Flexible mechanisms: Joint Implementation (JI) and Clean Development Mechanism (CDM).

The programme involves:

- the purchase of emission reduction credits from JI or CDM projects and investment in funds and facilities., and
- the financing of particular immaterial services, such as Baseline Studies etc., which are necessary in respect to JI or CDM projects.

In 2003 Kommunalkredit Public Consulting (KPC) was appointed for the Programme Management on behalf of the Austrian Minister of Agriculture and Forestry, Environment & Water Management. The total purchasing volume is 45 million tonnes Emission Reductions.

Specific Features related to the programme are:

- AAA rated buyer
- Excellent relationships to governments and UNFCCC
- Flexible and customer oriented
- Up to 50% prepayment of contract value

- Financial support for project development

### **The Danish CDM-Programme**

(<http://www.danishcdm.um.dk/en/menu/GeneralInformation/>)

There are four main objectives established by the Danish CDM Programme:

- Contribute to meeting Denmark's greenhouse gas reduction targets through the purchase of Certified Emission Reductions
- Promote the transfer of technology and sustainable development to developing countries
- Promote integration of Danish companies in the CDM market
- Expand the CDM market through improvements in institutions and capacity development in developing countries

In other words, this CDM Programme is engaged in not only direct project development through official Danish representation in selected CDM-eligible countries, but also the purchases of CO<sub>2</sub> credits indirectly through international funds (such as the above-mentioned Danish carbon fund managed by the World bank).

The Danish CDM Programme has been established with a broad scope of potential CDM projects in mind. In principle, all types of CDM project proposals will be considered. High-quality projects with significant impact on sustainable development trademark the Programme.

Further, the Programme combines financing the preparatory phase of a project with CO<sub>2</sub>-credit purchasing. In conjunction with the purchase of CO<sub>2</sub> credits, the Programme can provide support to project development and financing by recruiting local and international project developers.

### **The Global Environment Facility (GEF)** (<http://www.gefweb.org/default.aspx>)

GEF is an independent financial organization, established in 1991, to help developing countries fund projects and programs that protect the global environment. GEF grants support projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

For Climate change mitigation, GEF supports projects that reduce or avoid greenhouse gas emissions in the areas of renewable energy, energy efficiency, and sustainable transport.

As the financial mechanism of the Climate Convention, GEF allocates and disburses about \$250 million dollars per year in projects in energy efficiency, renewable energies, and sustainable transportation. Moreover, it manages two special funds under the UNFCCC – the Least Developed Countries Fund and the Special Climate Change Fund.

#### 4.1.7 Most active carbon credits buyers in current Chinese market

Current CER buyers active in China, based on information provided by the DNA, are listed in Annex 2. Table 10 below shows the 15 most active CERs buyers in China.

**Table 10 Carbon emissions reduction credit buyers active in China**

(Source: <http://cdm.ccchina.gov.cn/english/>, CDM Project overview (May, 2007))

Top 15 buyers	Projects
EcoSecurities	146
IBRD (International Bank of Reconstruction and Development)	55
Agrinergy	41
Cargill International	40
EDF Trading	38
Carbon Asset Management Sweden	38
ENEL	34
Trading Emissions	34
Energy Systems International	28
Kommunalkredit	25
CAMCO	20
Noble Carbon	20
Mitsubishi UFJ Securities	18
Danida	18
Mitsubishi	17

As mentioned in section 4.1.6, also in China CER buyers apply common used approaches developed for other carbon market. Normally they prefer act as direct buyer in order to purchase CERs directly from a specific project or set of projects from project owner(s) with economic price. In these cases, CER buyers may configure either project developers or simple buyers delegating the direct relationship with the project owner to a CDM consultant. The CDM consultant, in his turn, will provide also CER buyers and project owners with technical assistance (such as, PIN/PDD preparation, business meeting organisation, applying for CDM approval, and etc.) for getting approval of project(s) as CDM project(s).

In recent two years China is getting more and more familiar with CDM, both Chinese government and industrial sectors are aware of the opportunities and advantages brought from this Kyoto flexible mechanism, consequently, the carbon market in China becomes one of most active CER market in the world. In fact, up to November of 2006, 69% of CERs available in the market has been delivered from China. Many CDM consulting centres/agencies have been created by following this CDM boom; they act as CER brokers between the project owner and the buyer, controls the process and influences the CER owner, works with a third party project developer or takes in also such role.

Nowadays, because of language difficulty most part of project owners or developers prefers to delegate their project to those professional CDM consultants instead to have a direct relationship with CER buyers. For a CER buyer, the cooperation with Chinese CDM consultants would play a central role in his strategy for the carbon market in China.

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#### FURTHER INFORMATION

- The World Bank & International Emissions Trading Association (2007), 'State and Trends of the Carbon Market 2007', which can be download from:  
[http://carbonfinance.org/docs/Carbon\\_Trends\\_2007-\\_FINAL\\_-\\_May\\_2.pdf](http://carbonfinance.org/docs/Carbon_Trends_2007-_FINAL_-_May_2.pdf)
- Elizabeth Harris, *The Voluntary Carbon Market: Current & Future Market Status, and Implications for Development Benefits*, 2006
- The following sites, where up-to-dated information on carbon price and trends are provided:
  - **Point Carbon** (for carbon price forecasts and GHGs trading market analysis):  
[www.pointcarbon.com](http://www.pointcarbon.com)
  - **Climate-L** (focusing on climate change policy and issues):  
<http://www.iisd.ca/email/climate-L.htm>
  - **World Bank's Carbon Finance Unit**: <http://carbonfinance.org/>

## 4.2 Carbon credit transaction strategies

*Developing a strategy for transaction of the carbon credits of a project, will require careful consideration of various aspects of the project and the carbon market. These may change from time to time up to the point at which a sale contract is concluded. The **type of project**, whether it is intended for transaction as a CDM or in the voluntary market, will have an impact on this strategy, affecting the risk profile, the transaction costs and the price of the credits. Whether the project achieves the Gold Standard, and the extent of the contribution of the project to furthering sustainable development, will also have an impact on this strategy. These aspects will in turn affect the **type of buyer** that is involved in the transaction. It is also important to consider where the purchaser offers expertise, technology, or reputation that may be important for attracting additional finance to the project. The **timing of the sale** is important for cash-flow implications, but delaying the sale may lead to a higher price. **Reducing project risk** is a major concern and impacts upon the transaction strategy. Project partners with a negative profile may increase project risks. Finally, the **type of pricing mechanism** could vary from up-front sales at a fixed price to a future sale at a price determined according to a pricing index. The owner's risk appetite will be influential in this choice.*

*Timing the sale of your credits will be dependent on your financing needs, but **the stage at which you sell may affect the price** – for instance a forward sale for a project that is not yet completed carries additional risks to the purchaser and this may lead to a lower price. Aspects such as insurance and penalty clauses become relevant. You will also need to guess at future price fluctuations in the market. The contract for a forward sale is called an **Emissions Reduction Purchasing Agreement (ERPA)**. Of course, some project developers will have a higher risk profile and this will affect the possibility and price for a forward sale. An important factor which affects the value from carbon credits is the cost of producing them or **transaction costs**. CDM projects usually involve more transaction costs and therefore greater risks.*

The previous sections have discussed many of the financial issues and considerations involved when developing a carbon mitigation project. These can be summarized under a number of categories, which are outlined in the remainder of this section. Through addressing each category you will develop a **carbon transaction strategy** enabling you to optimize the benefits that carbon revenues can bring. Keep in mind that the sequence is not predetermined: developing a carbon transaction strategy is an iterative process that only ends once the project is transacted.

### 4.2.1 Carbon credit transaction structures

A carbon credit transaction occurs when the rights to carbon credits are transferred. These transactions occur along similar lines in both the compliance and voluntary markets. Several basic structures for transactions have already emerged in carbon markets:

- Spot market trades
- Forward sale for delivery of carbon credits at fixed prices
- Forward sale for delivery of carbon credits at floating prices
- Upfront payment for future stream of carbon credits
- Option payment for future delivery of carbon credits

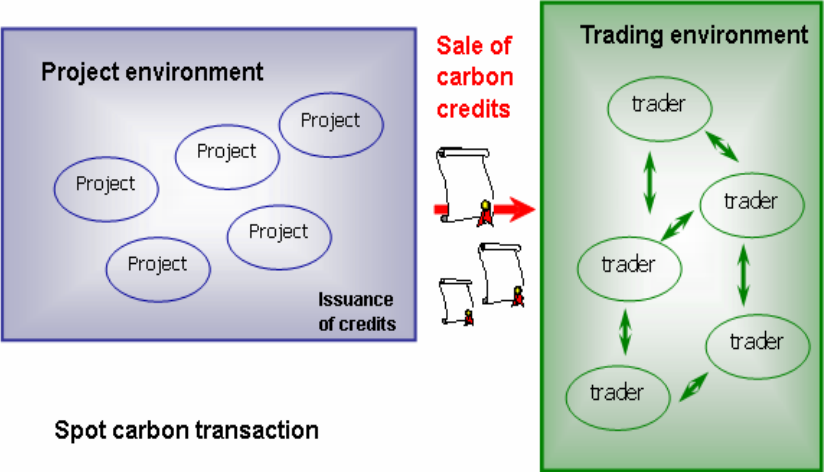
The first three structures mentioned above are the most utilised in carbon markets.

#### Spot and Forward Sales

Spot market transactions take place when actual, existing, verified or certified credits are transferred. There is very little risk to the purchaser because the credits have been successfully generated and verified by a carbon auditing organisation. These transactions have the potential to command some of the highest prices. Spot transactions have only been possible in the CDM market since 2005, as this was when the first CERs

were registered and issued. Such sales of certified CERs are also known as transactions of “secondary market” CERs, underlining the fact that buyers deal with a lower risk product, in a way a sort of carbon “commodity” traded in the financial markets. The secondary market for CERs is emerging slowly, as the financial market infrastructure for such deal grows, together with the volume of CERs to be exchanged. Voluntary market spot transactions may well have been occurring prior to this, as credits do not need to be certified, however, transparency in this market is still limited.

Forward sales are the most common transaction form. A forward sale is the promise to purchase credits once they are generated, at a specified price. Sometimes forward sales allow for a prepayment, enabling a project developer to secure some of their finances up front. There can be penalties for non-delivery of carbon credits.



(Source: CLIMATE FOCUS, C. Streck, I. Manzano, C. de las Indias, Contracting Carbon - Successful Negotiations and Balanced Contracts, 2007)

## 4.2.2 Carbon credit trading risks, price and transaction costs

### Key issues of risk in carbon deals

Most CDM development projects need the security and financial collateral that an **Emissions Reduction Purchasing Agreement (ERPA)** provides and/or a portion of the carbon revenues upfront that can be gained from a forward transaction (see section 4.2.6 on ERPAs). In order to optimize revenues secured under this contract, you need to understand the nature of the risks associated with a CER transaction and price, and expand on your project's Risk Mitigation Plan to incorporate carbon project specific risks which are discussed below. You also need to understand and consider market price fluctuations and keep informed about the new policy dynamics and scenarios and the associated evolution of the international carbon markets.

Risks associated with the underlying project are relevant to the carbon credit price, because if your project fails or underperforms, the volume and timing of credits are affected. In addition, there are risks specific to developing the project as an emission reduction project. The extent of these risks depends on whether the project is being undertaken as a CDM or voluntary credit project.

- ✓ **CDM project:** requires the development or adaptation of a CDM registered methodology, development of a Project Design Document (PDD), validation, host country approval, registration, monitoring and verification.
- ✓ **Voluntary credit project:** requires validation of the methodology, monitoring and verification plus any other steps required by the purchaser.

At each stage in these processes the project could fail, resulting in failure to generate the emission reduction credits. For example, if the CDM project doesn't get approved by the host country DNA, then it won't generate carbon credits. If a voluntary project is not validated, neither will it be able to generate carbon credits. Each stage therefore represents a risk that the project will not be implemented.

In carbon deals, credit buyers have different risk reward profiles, in the same way as different types of financiers. Government purchasers, funds and retail offset purchasers may be more willing to provide upfront financing for projects than private sector companies, or hedge funds. Multilateral financial institutions may be more willing to enter into forward sales early in the project development cycle, although their prices are correspondingly low. Purchasers also differ in terms of credit volumes and prices. The key element is therefore to match the objectives of the project owner and those of the carbon purchaser in the carbon transaction.

Finally, we will look into the possible risks related to the most common used carbon credit transaction markets: Spot market and Forward contract.



If you do not require carbon finance to *implement* your project, consider selling your credits over the **spot market**, as you could maximize your project revenue in this way. Importantly, first check that your project complies with additionality requirements, as indicated in the previous chapters.

**Forward sales** are usually priced on the residual risk remaining in the project at the time of transaction. In the compliance market, the higher the risk that the credit won't be generated, the lower the price the buyer will be willing to pay. This is because the carbon credit buyer may face penalties if it doesn't hold the credits by a certain time. Price competition is less severe in the retail offset market, as buyer's objectives are less time constrained and they often have a development objective or an ethical objective as well. As there is limited transparency in the retail market, the price/risk connection in the retail market is also less clear and straightforward.

In short, the main risks of two carbon credit transactions are summarised and compared in the Table 11.

**Table 11 Main risks of two carbon credit transactions**

	<b>Forward contract</b>	<b>Spot market contracts</b>
<b>Financing</b>	Advance payment possible. ERPA can be used as collateral.	
<b>Market and price risk</b>	Shared between seller and buyer.	Seller takes market risk.
<b>Cashflow</b>	Secure and predictable.	Depends on when the seller wishes to sell its (issued) CER. Seller can take advantage of bullish tendencies in the market.
<b>Delivery risk management</b>	Seller should be careful in issuing delivery guarantees and accept penalties. Forward CERs carry the project risk.	Spot market CERs are "risk-free" CERs with no further project risk attached. The developer assumes the risk that the project does not produce less or no CERs.
<b>Contractual arrangement with the buyer</b>	Individually negotiated long term off-take and financing agreements.	Highly standardized spot market contracts.
<b>Pricing</b>	Negotiated forward price which reflects the risk sharing and the expectation of the parties at the time of contract signing.	The spot price depends on the perceived value of CERs at the time the trade takes place.

(Source: CLIMATE FOCUS, C. Streck, I. Manzano, C. de las Indias, Contracting Carbon - Successful Negotiations and Balanced Contracts, 2007)

## Pricing

There is no single price for carbon transactions because risk allocation between buyer and seller varies with each contract structure. Whilst CER prices are determined by the risk of the underlying project, their prices are also determined by the price of carbon, which is related to the marginal cost of carbon emission abatements in compliance countries. The most liquid and transparent carbon market currently is the EU Emissions Trading Scheme (EU ETS) and the European Union member states are taking global leadership in the compliance with Climate Change Policies. Therefore the price of carbon quoted is often this EU ETS market price. Other prices quoted are those paid for CDM transactions, or for voluntary transactions. The Kyoto market of Assigned Amount Units, the government Kyoto unit, is far less transparent, with transaction prices seldom being released into the public domain.

Moreover, **Kyoto compliant credits are usually more expensive** than credits for the non-voluntary market. There are two reasons for this. Firstly, only Kyoto compliant credits can be used towards the national Kyoto emission reduction targets, and secondly, because of the international significance of the credits the project developer or credit owner needs to fulfil a number of requirements with regard to their validation, monitoring and verification.

As reference,

- **EU ETS price** is available through PointCarbon's daily newsbriefs ([www.pointcarbon.com](http://www.pointcarbon.com)).
- **Voluntary carbon prices** can be implied by prices on the Chicago Climate Exchange ([www.chicagoclimatex.com](http://www.chicagoclimatex.com)) and the prices retail offsets are being sold for on intermediary websites (see the reference list in Section 4.1).

A view on future prices is particularly difficult to ascertain. The variability of prices negotiated is still high and denotes how the carbon markets are still far from mature markets: for instance, CER transactions that have ranged in the 2005-2006 period from as low as € 4/tCO<sub>2</sub> to € 24/tCO<sub>2</sub> (IETA, 2006). To some extent, however, such variability is also functional to the different levels of risks of the proposed transactions (see Section 4.2.2). The CER average price, in theory, should be close to the long-term (2012) marginal cost of abatement in the Annex B countries, however since the EU ETS market is the only one with operational maturity, as mentioned this market currently sets the CER price standards. It is thus recommended to remain on top of movements in the international markets by following the news sites referred to in this guide, building relationships with buyers, brokers, policy negotiators and those tracking the development of the market and the international climate change mitigation effort.

## Non-Price Carbon Project Risk Mitigation

Apart from accepting a lower price due to your project containing residual risk associated with the generation of carbon credits, there are non-price risk mitigation options that can be used to improve the risk profile of your project. These include insuring against residual risk through **carbon insurance** or generating developer portfolios (holding a **carbon credit reserve**). You

can also share carbon finance with the community, using local content and labour to bring down approval risk, ensuring the project meets the country’s sustainable development criteria. Sharing carbon finance with the community also promotes ownership and provides an incentive to the project.

Undertaking your project as a **Gold Standard** CDM or voluntary project is a valuable risk reduction strategy (see Section 4.3). If your project complies with the Gold Standard, a premium rating, it is highly likely to also comply with CDM or voluntary purchaser requirements. This ‘pre-screening’ reduces the risk of project failure at any stage of the project cycle.

**Transaction costs**

Both CDM and voluntary markets projects incur costs that are additional to normal project planning costs. These costs, which are termed **transaction costs**, are associated with demonstrating that emission reduction credits have occurred and with securing a carbon sale. **Transaction costs** occur at various stages of the project cycle – see the table below. They include pre-registration and post-registration costs<sup>8</sup>. Pre-registration costs refer to: developing the project concept and design, validating and registering the project, and gaining host country approval. Post-registration costs include monitoring and verification costs. Transaction costs vary between project types, sizes and whether CERs or VERs are generated. Small scale projects usually incur costs 20-40% lower than large projects, in the range of US\$45,000-90,000; while for large CDM projects transaction costs, typically range from US\$60,000 to US\$200,000. The transaction costs estimation is reported in the following Table 12.

**Table 12. Transaction costs estimation**

CDM project cycle	Estimated transaction cost (US\$)
<u>Project preparation</u> (including Project assessment, PDD preparation, development of carbon credits sales agreement, etc., usually done by a consultancy company)	60,000 – 180,000 depending on the complexity, the scale of the project, on the required technologies and expertise, and also on the extent to which local and international consultants are involved.
<u>Validation</u> (by a DOE)	15,000 – 25,000
<u>Registration fee</u> (by the EB)	■ for the first 15,000, US\$ 0.10/CER;

<sup>8</sup> For the latest figures, see UNDP’s forthcoming publication, ‘An Assessment of Progress with Establishing the Clean Development Mechanism’, UNDP, March 2006

Registration is an advance payment of the SOP-Admin (share of proceeds to cover administrative expenses) for the emission reductions achieved during the first year; and shall be deducted from the share of proceeds for administrative expenses	<ul style="list-style-type: none"> <li>for any generated CER above this value they will be charged US\$ 0.2/CER</li> </ul> <p>Nevertheless, the maximum registration fee payable based on this calculation shall be USD 350,000. Further, no registration fee has to be paid for CDM project activities with expected average annual emission reduction over the crediting period below 15,000 t CO<sub>2</sub> equivalent.</p>
<u>Monitoring costs</u>	depending on project size and samples needed, as well as on monitoring methods and intensity
<u>On-going verification</u> (by DOE)	depending on the size and the complexity of the project; may cost US\$ 15-25,000 per audit
<u>Issuance fee</u> (by the EB)	In accordance to the on-time registration fee scheme, only be effected once the SOP-Admin has been received
<u>Adaptation levy</u> (by the EB)	2% of the CERs generated to support adaptation in countries that will be most affected by climate change
<u>Taxes/levy</u> (by the host country)	<p>Some countries claim a share of a project’s CERs in exchange for issuing a letter of Approval.</p> <p>In China, the levies from the CDM revenues are: HFC23 65%; NO2 30% and Priority Areas and others 2%. The levies collected will be used for climate relevant activities.</p>

Importantly, in CDM the “law case” approach applies and therefore an existing and approved CDM methodology can be used for new similar CDM projects: this is a factor that reduces significantly transaction costs. The cost of developing a new methodology if no approved methodology is available can be considerable. Note too that CDM transaction costs can be as much as double the transaction costs associated with developing a voluntary project – see table below for a comparison. Furthermore, projects generating low volumes of carbon credits have proportionately higher costs than large volume projects (see Table 13).

**Table 6 – Comparison between CDM and voluntary market**

CDM ACTIVITY ELEMENT <sup>9</sup>	CDM	VOLUNTARY MARKET	Non-CDM GOLD	CDM GOLD STANDARD
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<sup>9</sup> Adapted from SSN CDM Toolkit and Ecoscurities, 2002, PCF presentation, COP 8, Side Event, New Delhi, 24/10/02

		STANDARD		
PDD development	√	√ (Less costly)	√	√
Securing carbon purchasers	√	√	√	√
Public Process	√	Depends on scheme	√	√
Validation	√	√ (Less costly, DOE not necessarily required)	√	√
Approval	√	n/a	√	√
Registration	√	n/a	√ Internal GS registration	√
Share of Proceeds Admin Charge	√	n/a	n/a	√
Adaptation levy	√	n/a	n/a	√
Monitoring	√	√ (Less costly, DOE not necessarily required)	√	√
Verification/issuance	√	√ (Less costly, DOE not necessarily required)	√	√
Broker commission			If broker is used	
Legal and Contractual arrangements	√	√ (Less onerous, voluntary project)	√	√
Revenues for Sustainable Development	√	√√	√√	
Specific government taxes on credits	Potentially*	Less likely	Less likely	

*Note: for revenue from CDM Projects, the levies established by the Chinese government are: HFC23 65%; NO<sub>2</sub> 30% and Priority and others 2%.*

### Carbon Project Type

Carbon credits can be generated through a number of different project types. These include CDM, Gold Standard CDM and voluntary market projects which may or may not comply with any other standards system. Your choice of project type will determine the transaction costs to be born for its design and preparation, the price of the credits, what type of buyer is interested in your credits (compliance or offset) and will impact on the project’s carbon risk profile.

The price of project carbon credits is generally affected by:

- The risk of credit delivery
- The validity and standardization of the methodologies used to measure and verify the emissions reductions
- The sustainable development benefits of the project
- The prevailing carbon market price movements

Delivery risk and market prices being equal, Gold Standard CERs command the highest prices, followed by CERs or Gold Standard VERs, then VERs. Transaction costs are analogous to price, Gold Standard CERs are highest, then CERs, then Gold Standard VERs, then VERs. In addition, small credit volume projects incur the highest transaction costs per credit price. As a rule of thumb, large scale CDM projects generating less than 20,000 credits per annum run the risk of transaction costs being greater than credit revenues, and the same for small scale projects below 8,000 credits<sup>10</sup>. **Bundling**<sup>11</sup> a number of smaller projects together as one bigger project is one way of reducing transaction costs.

***BUNDLING***

*A number of projects of the same type can be bundled together to reduce transaction costs. Importantly, these projects should be in the same geographic area and should be at a similar development stage. They should also be aggregated by an institution.*

In deciding what form should be the most appropriate for your carbon project, consider not only the financial implications, but also the implications for the project's reputation, its ability to leverage other financial parties to commit funding to it, the type of credits parent companies or major investors in the project may require, and the use of the project in policy lobbying.

#### *4.2.4 Timing of Transaction and Risk's impact on CERs price*

The timing of a transaction is closely related to the project's financing needs, the level of risk in the project, and the owner's objectives and confidence in the carbon market. Financing a project involves financial costs, even if it is financed on the owner's balance sheet. As is the case with all sources of finance, one needs to compare costs and financing terms. Transacting your project early will help to secure up-front financing but will mean sacrificing the opportunity of receiving an higher carbon credit price that would possibly be negotiated at later stage. In other words, the price that a seller can expect to negotiate for a CDM project

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<sup>10</sup> De Gouvello and Coto (2003) as cited in AfricaPractise Carbon Finance for Africa, an Investor's Guide (2006)

<sup>11</sup> See [http://www.unido.org/file-storage/download/?file\\_id=1856](http://www.unido.org/file-storage/download/?file_id=1856) for a full definition of bundling.

CERs flow is lower at the early stages of development, when there are more uncertainties and higher risks on the outcomes of the whole process. Looking at the CER demand side, one of the most common buyer’s strategies has been to engage the CDM project owner/developer in the early stages of the CDM project cycle in order to negotiate low CER prices, in accordance with the high risk of non-delivery in case the project does not conclude the cycle with the registration as planned. Such strategy will most certainly imply that negotiated CER price will be below the spot market CER prices. On the contrary, from the perspective of the CER supply side, the seller that is able to carry on independently the whole CDM project cycle and obtain the registration, will gain contractual power and reduce the risk of non-delivery, thus securing a capacity to produce a higher CER price.

CER that are ready for hand over and which therefore pose no risk to the purchase will attract higher prices through the spot market. However, if your project cannot attract any cheaper financing, or any finance at all early on, then an advance sale may be the best option. The project owner’s appetite for risk is also important here. Consider too that you may have additional objectives in the carbon sale: a secure carbon contract can act as collateral for investors or debt providers for the underlying project; it may also indicate confidence in the project or serve to show that a company or government is proactively tackling the issue of climate change.

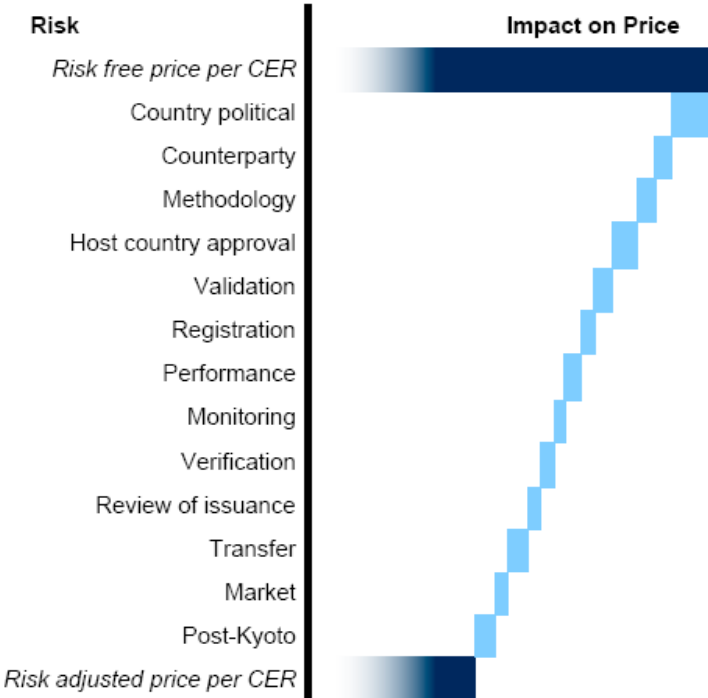


Figure 25 shows that the CER price can be actually reduced to a “risk-adjusted” level by internalizing several CDM project specific risk factors. You may consider the need to identify at least the following main categories of risk in a CER transaction, some of which quite challenging to “measure”:

**Figure 25 Risks’ impact on price in carbon credit transaction**  
(Source: UNEP, 2006)

1. Registration/CER Issuance Risk. The risk of non-delivery of a CER flow, as the project will not be deemed as additional and therefore registered according to the UNFCCC standards.
2. Performance Risk. These are the risk factors related to issues that reduce the actual delivery of CERs from a project. For instance, the CER flows from the project have been

overestimated in the PDD, or some other default event reduces drastically the volume of actual CERs that can be delivered during project implementation. Actually the data available up to the end of 2006 confirm that so far the CERs flows of registered project have been over estimated and equal about 50 % of CERs projected in the PDDs.

3. Counterparty Risk. This is referred as the risk that the buyer/seller actually do not honour their contractual commitments.
4. Carbon Market Risks. These are those risks related to the uncertainties that in the future the CERs can be used in the compliance markets of the EU ETS or other compliance markets. They are reflected also in price fluctuations related to the dynamics of the carbon markets. Given that the reference prices for CERs are currently the prices in the EU ETS market, the fluctuations in this market constitute a significant risk factor for the CDM operators.

**4.2.5 CDM Risk Mitigation**

CDM risk mitigation will be a constant challenge until your ERPA is signed and your project financing secured. You will need to seek for risk mitigation opportunities and, for instance, avoid financial or others partners that worsen your project’s risk profile. Conversely, you may wish to secure good quality financial partners through the carbon transaction. Specific risk mitigation actions maybe considered for the main risk factors, although for some of them mitigation is more uncertain. Some of these risk mitigation/management measures are reported in the following Table 14.

**Table 14 CDM risks and related mitigation measurements**

Risk Categories	Risk Mitigation Instruments
<ul style="list-style-type: none"> <li>▪ Kyoto/CDM process                             <ul style="list-style-type: none"> <li>▪ CER registration risk (delay of registration, failure of registration, CER calculation, baseline risk, UNFCCC Policy)</li> <li>▪ Letters of approval</li> <li>▪ Modalities for communication</li> <li>▪ issuance risk</li> </ul> </li> </ul>	<p>It is difficult to manage such risks and generally it is important to build a very straightforward communication with the Executive Board of the UNFCCC and the DNA, thus minimizing the chances for misunderstanding/ misinterpretations. The use of professional consultants, for instance, that know well the CDM project cycle would be a risk mitigation measure.</p>
<ul style="list-style-type: none"> <li>▪ Project risks                             <ul style="list-style-type: none"> <li>▪ Jurisdiction-specific issues</li> <li>▪ Counterparty issues (reliability of buyer, Balance Sheet)</li> <li>▪ Approvals/compliance with domestic law</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Obligation to act as a prudent operator</li> <li>▪ Reporting requirements</li> <li>▪ Due diligence requirements in host country</li> <li>▪ Restricting other project participants</li> <li>▪ Credit support, Material Adverse Change clause</li> </ul>



<ul style="list-style-type: none"> <li>▪ Operational risk</li> <li>▪ Issuance of CERs</li> </ul>	<ul style="list-style-type: none"> <li>▪ Due diligence and credit analysis</li> <li>▪ ERPA states how CER issuance process will be managed and by whom</li> </ul>
<ul style="list-style-type: none"> <li>▪ Performance/delivery risk                         <ul style="list-style-type: none"> <li>▪ production failure/non-issuance</li> <li>▪ allocation among project participants</li> <li>▪ methods of delivery</li> <li>▪ payment</li> <li>▪ force majeure</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Performance guarantees</li> <li>▪ Escrow arrangements</li> </ul> <p>further, these risks should be managed through:</p> <ul style="list-style-type: none"> <li>▪ more conservative attitude in PDD development;</li> <li>▪ appropriated contractual means;</li> <li>▪ deeper information on technologies and local frameworks</li> </ul>
<ul style="list-style-type: none"> <li>▪ Compatibility with back-to-back arrangements</li> </ul>	<ul style="list-style-type: none"> <li>▪ Conform back-to-back agreements (e.g. the same event would be a force majeure under both contracts)</li> </ul>
<ul style="list-style-type: none"> <li>▪ Carbon markets risk (market volatility, CER entry restriction-Cap Risk, ITL, hot Air)</li> <li>▪ Post 2012</li> </ul>	<ul style="list-style-type: none"> <li>▪ It is important to become aware that the carbon markets are in an evolutionary process, that the dynamics between the EU ETS market and the CDM need to be monitored, that the implications of role of new players (i.e. Russia and Ukraine) needs to be understood. The existing data series on the EU ETS prices show that a considerable price volatility has taken place and the buyer and seller need to mitigate the associated risks with contractual arrangements in the ERPA.</li> <li>▪ The parties may agree on anything from a fixed price to a price indexed to the future EUA values at time of delivery. One possible compromise solution that allows to reduce risks related to market price fluctuations for both the buyer and the seller is to establish a floor CER price that would assure a minimum revenue flow to the seller and at the same time a ceiling CER price that would ensure the maximum price a buyer would have to pay.</li> </ul>

#### 4.2.6 *Relationship of pricing mechanisms to ERPA negotiation*

How you price your credits in your ERPA will depend on the associated risks, as mentioned above, on your risk tolerance (that is, what level of risk you are prepared to take, in keeping with your financial situation – many sellers are risk averse), view of the carbon market, and total project financial structure. The price agreed upon can vary between a fixed total upfront payment to a price payable on delivery that is fixed to an index price in a stated market such as the EU ETS; or to a combination of anything in between.

As the carbon market matures, so increasingly sophisticated pricing mechanisms will become possible. Pricing mitigates risk and requires that you are up to speed on current market developments.

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#### REFERENCES:

- The SSN Toolkit Guide, a useful introduction to CDM, [www.cdmguide.org](http://www.cdmguide.org),
- UNIDO – CDM's: [www.unido.org/doc/45989](http://www.unido.org/doc/45989).
- Africa Practice's *Carbon Finance for Africa – an Investor's Guide*:  
<http://www.africapractice.com/uploads/CarbonReport.pdf>
- UNDP MDG Carbon Facility , a guide called Mobilizing Carbon Finance for the Millennium Development Goals,  
<http://www.energyandenvironment.undp.org/undp/index.cfm?module=Library&page=Document&DocumentID=5662>. More general information about the UNDP MDG Carbon Facility is at:  
<http://www.undp.org/mdgcarbonfacility/>.
- 'CDM for small, sustainable projects: where is the value added?' Emily Tyler, SSN Feb 2006: country guides for Asia, <http://www.iges.or.jp/en/news/topic/0512cdm.html>.
- Nevitt, P (1995) *Project Financing 6<sup>th</sup> ed* Euromoney Books

### The ERPA (revised IETA templates)

*Emissions Reduction Purchase Agreement (ERPA) is the most essential contract document in Kyoto compliant transactions that is used to transfer carbon credits between two parties. The buyer pays the seller cash in exchange for carbon credits, thereby allowing the purchaser to emit more carbon dioxide into the atmosphere. The standards for this agreements are outlined by the International Emissions Trading Association (IETA). Importantly, an ERPA needs to be drawn up, which governs the sale and purchase of emission reduction credits and incorporates all the elements shown in the diagram below. An ERPA is simply a contract that documents the sale of carbon credits in the same way as any other purchase agreement.*

The ERPA is used in many contexts:

- Unilateral CDM Projects: Non-Annex 1 countries make the project alone and sell CERs
- Forward agreements with Host country project developers
- Spot agreements
- Incorporated into finance documentation in a debt finance contract for part payment in CERs or in investment agreements in an equity investment in return for revenue stream from CERs
- Non- recourse PF for a CDM Project, ERPA must be satisfactory to financiers

ERPAs tend to be written with the purchaser in mind, and should be critically assessed. A carefully constructed, legally sound ERPA should ensure that risk is allocated fairly between the buyer and the seller of carbon credits. Figure 25 below provides a schematic view of the inputs to the ERPA, all discussed in previous sections.

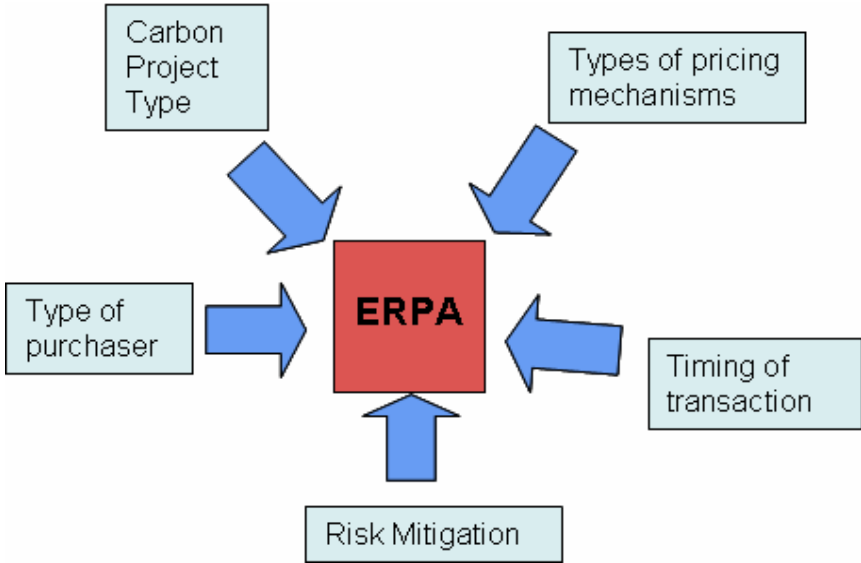


Figure 25 The inputs to a ERPA

For ERPA examples, see the templates provided by IETA reported in the Annex 3.

(<http://www.ieta.org/ieta/www/pages/getfile.php?docID=450>).

(<http://www.ieta.org/ieta/www/pages/download.php?docID=1318>)

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## References:

- The **SSN Toolkit Guide**, a useful introduction to CDM, [www.cdmguide.org](http://www.cdmguide.org),
- **UNIDO – CDM’s**: [www.unido.org/doc/45989](http://www.unido.org/doc/45989).
- **Africa Practice’s Carbon Finance for Africa – an Investor’s Guide**:  
<http://www.africapractice.com/uploads/CarbonReport.pdf>
- **UNDP MDG Carbon Facility** , a guide called Mobilizing Carbon Finance for the Millennium Development Goals,  
<http://www.energyandenvironment.undp.org/undp/index.cfm?module=Library&page=Document&DocumentID=5662>. More general information about the UNDP MDG Carbon Facility is at:  
<http://www.undp.org/mdgcarbonfacility/>.
- ‘CDM for small, sustainable projects: where is the value added?’ Emily Tyler, SSN Feb 2006: country guides for Asia, <http://www.iges.or.jp/en/news/topic/0512cdm.html>.
- Nevitt, P (1995) *Project Financing* 6th ed Euromoney Books
- ERPA samples developed by IETA, <http://www.ieta.org>

## **Sustainable development benefits of CDM projects**

*CDM projects often have very high sustainable development benefits, which are not fully recognised by the main carbon markets. The retail offset markets do recognise this, and standards such as the Gold Standard have developed to capture this value, and establish a criteria for sustainable development benefits.*

Early political negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) made clear that cost-effective mitigation strategies were required for both developed and developing countries in order to reduce global greenhouse gas emissions. The Kyoto Protocol, main instrument of the Convention, set up the Clean Development Mechanism (CDM) as a cost-effective mechanism which allows investors to receive carbon credits in exchange for greenhouse gas emission reductions in developing countries, whilst the host country receives investment, which aims to be in line with its sustainable development principles.

China is the largest developing country. As a result of rapid economic growth during the past 20 years, China's contribution to global greenhouse gas emissions has grown steadily. Despite rapid modernisation, China's energy needs are still dependent on coal, the most carbon-intensive fossil fuel. Coal continues to account for about 70% of annual energy use, and is the major contributor to China's atmospheric emissions of greenhouse gases. The prospect of rising greenhouse gas emissions and persistently high emissions of other pollutants has increased China's need for cleaner technologies and more efficient processes. As well as contributing to global efforts to tackle climate change, cleaner technologies can reduce emissions of the gases which cause urban smog and acid rain. The Clean Development Mechanism (CDM), which is being established as part of the international agreement on climate change, can potentially help China to reduce its emissions through the acquisition of cleaner technologies from international sources.

Many believe that the CDM, if properly implemented as it is designed, has the potential to assist China in pursuing its development path in a sustainable way. It is in China's own interest to raise its energy efficiency, to switch to other renewables, and to eliminate serious environmental problems, and at the same time to contribute to the global GHG mitigation. The CDM may have the potential to assist China in achieving all these goals. It may allow China to cooperate with developed countries, getting access to additional foreign investment and public finance to replenish China's own energy and environmental investments, obtaining advanced and efficient technology, and reducing environmental pollution associated with burning of fossil fuels.

However, although the main focus for project developers and stakeholders is realising the sustainable development benefits of their projects, this is not the primary focus of a typical carbon buyer. Buyers' main interests are normally the cost effective transfer of ownership of

the generated emission reductions. Projects with high volume emission reductions are therefore generally more attractive to buyers – they allow fulfilment or partial fulfilment of an obligation towards reaching a target, at a low proportionate cost for the transaction.

The search for the largest volume at the lowest ‘price’ is driving the compliance market. However, this only fulfils one of the Kyoto Protocol’s objectives for the CDM: that of helping to achieve cost-effective reductions. It neglects the second objective, that of the host country’s sustainable development. The definition of ‘sustainable development’ is country-specific and defined by the host country. However, this means that the standards, and practical implementation of these standards, vary widely from country to country. Hence, for a buyer or stakeholder concerned about sustainable development, most often those operating through the offset market, every project’s contribution to sustainable development needs to be assessed in a structured and transparent manner.

Currently, the offset market is very fragmented. Many intermediaries exist offering purchasers wishing to offset their emissions an opportunity to buy and retire credits. Most of these services are web based, accompanied by pictures and stories of the projects involved, and the methodologies used to calculate the emission reductions. However, there is no standardisation in the approaches of all these intermediaries, some of whom develop their own projects, and some of whom rely on external project developers.

The need for standardisation of this market, in order to avoid false claims of carbon reductions and sustainable benefits – a process known as *greenwashing*, has been recognised. A key issue is that of additionality, and false crediting of non-additional activities (i.e. activities which would have happened anyway and therefore do not deserve the benefit of a “credit” for carbon reductions). Such standardisation efforts include the Gold Standard, which is focused on in this Guide. The references at the end of this section list several other standards in use in the offset market. Note that at the time of writing many weaknesses still remain in the market. So check carefully the approach you use, if it is not Gold Standard. Aspects to look out for include the existence of independent validation, a robust process for retiring credits, management of double counting issues, and different definitions of additionality.

## The Gold Standard

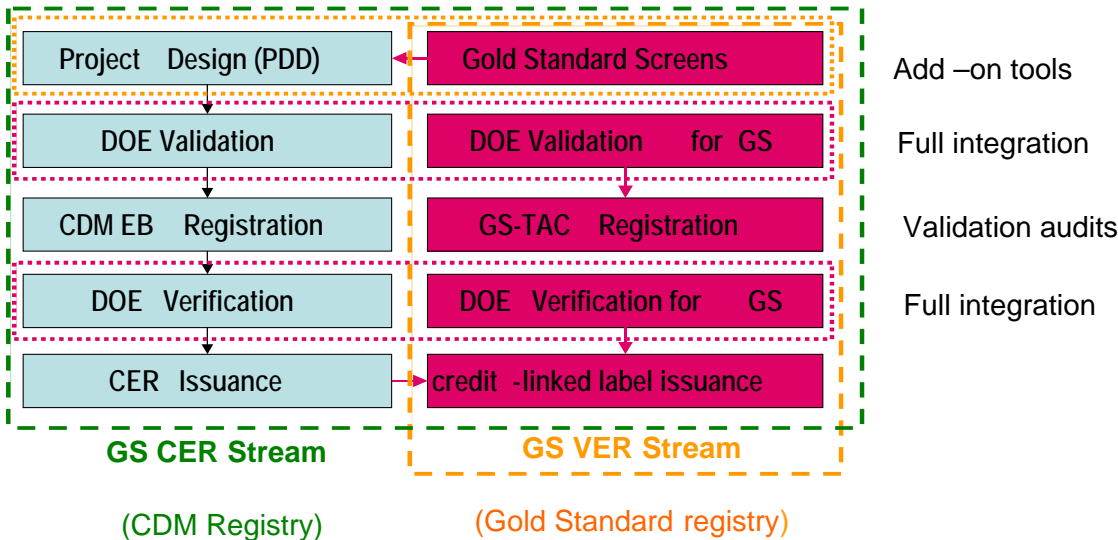
The Gold Standard, discussed earlier, is a credible and independently audited benchmark for projects with sustainable development benefits and thus represents premium quality carbon credits.

Currently, a group of over 40 NGOs has supported this standard, which includes a set of tools that enables the development of projects which show their special benefits (beyond their emission reductions) in a structured way, with contributions from relevant local stakeholders. This **Gold Standard** is complemented by additional requirements:

- **Projects must contribute to a long-term change in energy systems** – i.e. they must promote the use of non-fossil sources of energy (in practice, this means projects must use renewable energy/energy efficiency technologies).
- **Projects must be truly and clearly additional** – i.e. help to keep the global emission of greenhouse gases neutral, by not crediting projects that would have happened anyway.

If these requirements are fulfilled then projects can be said to further sustainable development. The Gold Standard label is awarded to projects who can demonstrate these additional benefits. The award is based on clear and rigorous validation, registration and verification procedures (see figure below). The Gold Standard is open to projects aiming at the voluntary and as well as the compliance markets.

The diagram below shows the interaction between the CDM and the Gold Standard procedures. Note that the Gold Standard elements are all add-ons to the core CDM process.



The Gold Standard is, essentially, a series of simple tests that a project developer applies to the project. The tests are called "screens" and they check to make sure that the project is truly additional and that it helps assist the shift from a fossil-fuel based to a renewable energy based economy. The tests are rigorous, so a developer reduces his project risk by applying this additional quality-control into the project design.

The advantage of Gold Standard registration is a clear market differentiation and increased reputation among buyers looking for more than emission reductions. The formal support of over 40 NGOs helps insure against the risk of a negative image arising from supporting sub-standard projects. It also protects the reputation of project developers. Project developers are included in the project design process from the outset, which means projects are unlikely to be stalled by parties who feel ignored or overruled in the project development process. This element reduces delivery risk.

Risks to a purchaser's reputation are the primary risk in the voluntary market, as the buyer's engagement is based on their intention of increasing their reputation. As a result, Gold Standard projects are most sought after in this market, especially due to the fragmentation of the carbon market, which has resulted in their being no *one* standard procedure for developing a project, and no way of assuring a buyer it is buying true reductions that do no harm.

Delivery risk is hard to quantify, but it is of major importance in the compliance market. Buyers here depend on a certain amount of credits being delivered on time in order to meet their obligations. Often projects with high sustainable development benefits are those with the greatest delivery risk because they involve multiple, small stakeholders, the public sector and new technologies. Gold Standard registration can reduce this risk by applying higher standards to the project development procedure, meaning that the Gold Standard is also attractive for compliance buyers. Note here how the Gold Standard comprises all the requirements of the CDM, but goes further. Hence it is completely compatible with the CDM process.

These additional benefits, plus a higher willingness to pay for projects with demonstrable sustainable development benefits, lead to more favourable conditions for transacting Gold Standard projects. Gold Standard registration, at minor additional cost, has been shown to lead to better returns. These higher returns can simply be a higher price being paid per carbon credit. Less obvious but all the more important for a typical Gold Standard project is the willingness of the project buyer to accept higher risks, because they are buying for the sustainable development benefits as much as for the carbon credits. In other words a buyer will be more willing to accept the risk that the carbon credits may not be delivered because they are also investing in the sustainable development benefits of the project. This can be in the form of up-front payments, payments for part of the project development or project validation/registration, better access to underlying project finance with local or international financial institutions, etc. In short, projects become more bankable, or they become bankable in the first place.

The benefits of the Gold Standard alone will not make a project happen, but they can in part provide the soft tools to attract the right amount of attention that is needed for project implementation – as well as hard benefits. The Gold Standard tools are universally applicable. They give host countries and project developers the freedom to define for themselves what a good project is. At the same time they can show the outside world the project's premium quality using the simple tool of the Gold Standard label.

The recent growth of the voluntary market and concern around neglect of the sustainable development objective in the CDM, have increased market opportunities for Gold Standard projects – despite overall market volumes remaining low. Other important initiatives to select projects based on their sustainable development value generally come from multilateral institutions (e.g. UNDP, World Bank) or national governments (e.g. Austrian, Belgian JI/CDM tenders).



## REFERENCES

- The Gold Standard website provides all information and documentation needed for applying the Gold Standard to a project, access to previously registered projects and a quarterly newsletter:
- <http://www.cdmgoldstandard.org>
- To contact the Gold Standard directly: [info@cdmgoldstandard.org](mailto:info@cdmgoldstandard.org); ph. +41 61 283 09 16
- UNDP – UNDP Millennium Development Goals Carbon Facility – <http://www.undp.org/mdgcarbonfacility/>
- World Bank – Community Development Carbon Fund – <http://carbonfinance.org/cdcf/home.cfm> (minimum volume: 50'000 t CO<sub>2</sub>e p.a.)
- Austrian JI/CDM programme – <http://www.ji-cdm-austria.at>
- Belgian JI/CDM tender – <http://klimaat.be/jicdm tender/>
- Climate Cent Foundation – <http://www.stiftungklimarappen.ch> – is a private Swiss institution with a government obligation and expressed interest in high sustainable development credits.

The following references are to other standards:

- [www.climatecare.org](http://www.climatecare.org)
- [www.myclimate.org](http://www.myclimate.org)
- [www.climatefriendly.com](http://www.climatefriendly.com)
- [www.climatefriendly.com](http://www.climatefriendly.com)
- [www.amosfair.de](http://www.amosfair.de)
- <http://co2mpensate.ch>
- Plan Vivo is a system for managing the supply of VERs from rural communities in a way that promotes sustainable livelihoods. It has developed a manual setting out exactly how to do this, which is available at: <http://www.planvivo.org/manual/manual.html>.

## Perspectives of global carbon market and the positioning of China

To the extent that Climate Change issues consolidate as primer topics in the global political agenda, the future of the carbon markets should be defined by positive trends. The latest policy commitments of the European Parliament are confirming the fact that Europe is taking global leadership for an increasing use of market mechanisms to reduce GHG emissions. The Kyoto mechanisms, with all their limits, paved the way for global carbon trading. What needs to be stated clearly is that carbon considerations have nowadays entered the discourse of mainstream businesses and investors. If a new infrastructural investment can greatly improve its “carbon profile” by adding a marginal additional investment cost, it is likely that the developers are going to include such consideration in their business planning. As reminded by the European Commission Delegation in China, “...the latest figures suggest that the EU Member State governments have budgeted over €2.83 billion for purchasing 550mt CO<sub>2</sub>e

during the period 2008-2012. It is fair to say that EU governments (and EU companies) drive the development of the CDM" (Mr. Agne, 2006).

According to Natsource, the EU, Japan and Canada are likely to be 3 to 4 billion tonnes short of achieving emission reduction targets in 2008-2012. Continued growth in trading of project-based emission reductions is forecast.

### **International trends in 2005 and 1st quarter 2006**

- HFC23 destruction projects accounted for 58% of traded reductions
- 78% of traded emissions reduction in 2005 and the first quarter of 2006 were non-CO2 gases
- Landfill gases were 9% of traded volume
- Coal mine methane gases were 6% of traded volume
- Hydroelectric power, wind, biomass and other renewables and energy efficiency projects accounted for 12% (down from 25% in 2004)

The contribution of China to the global carbon markets is potentially quite significant. In the specific CDM markets, at the end of June 2007, the Chinese DNA had approved over 500 projects and the China share of expected CERs from CDM projects registered by the UNFCCC was over 43 % of global CERs. Some of the CDM buyers also pointed out that China carbon market is attractive for the possibility to develop and implement a wide range of technological applications in CDM projects. However, the growth of the Chinese CDM market depends also on the capacity to improve the local policy and regulatory framework. Some of the interviewed buyers have pointed out that there are still risk factors specific to China that reduce their appetite for carbon business development, among which: a certain uncertainty with Chinese DNA approval process and with the ability or engagement in CDM monitoring of CDM project owners; the regulatory risks (setting of a minimum price and expectations of a rising minimum price).

### **Market Operators pre-conditions for engaging in CDM projects in China**

This final section contains some reflections that are best understandable if contextualized with the following premise: the Asia Pro Eco II project CDM Capacity Building for Private Sector in China - of which this Handbook is part of the project outcomes - has developed a dialogue with European and Chinese carbon buyers right at the outset of project start, with the view of facilitating the interaction with the primary project beneficiaries: the Chinese enterprises recipients of the CDM capacity building actions. This has resulted in a series of informal and formal exchanges on the carbon market in China with some of the most active carbon market

operators which have met the project beneficiaries and have been exposed to their initial CDM business propositions (and some of them have become real CDM partnerships). An open ended survey was submitted to over 20 China CDM carbon market operators. The survey has helped to focus on who are the CERs buyers active in China (indicating their sector/project preferences, criteria etc., what are the main barriers for CER buyers in China, what strategies have been implemented for overcoming barriers. But most importantly for the reader of this handbook, it has given some insights on the mindset and the frameworks that are important for them to engage in a CDM business discussion in China. Some of them have agreed to share the information o their “pre-requisites” for engaging in CDM business dialogue with Chinese enterprises. The Table 16 below offers a summary of some of the most interesting answers to the specific question: “name briefly the first 3 business pre-requisites (the minimal conditions that you require for setting up a business meeting with project owners) that are necessary for engaging with CDM project owners in China, working towards the signing of an ERPA”.

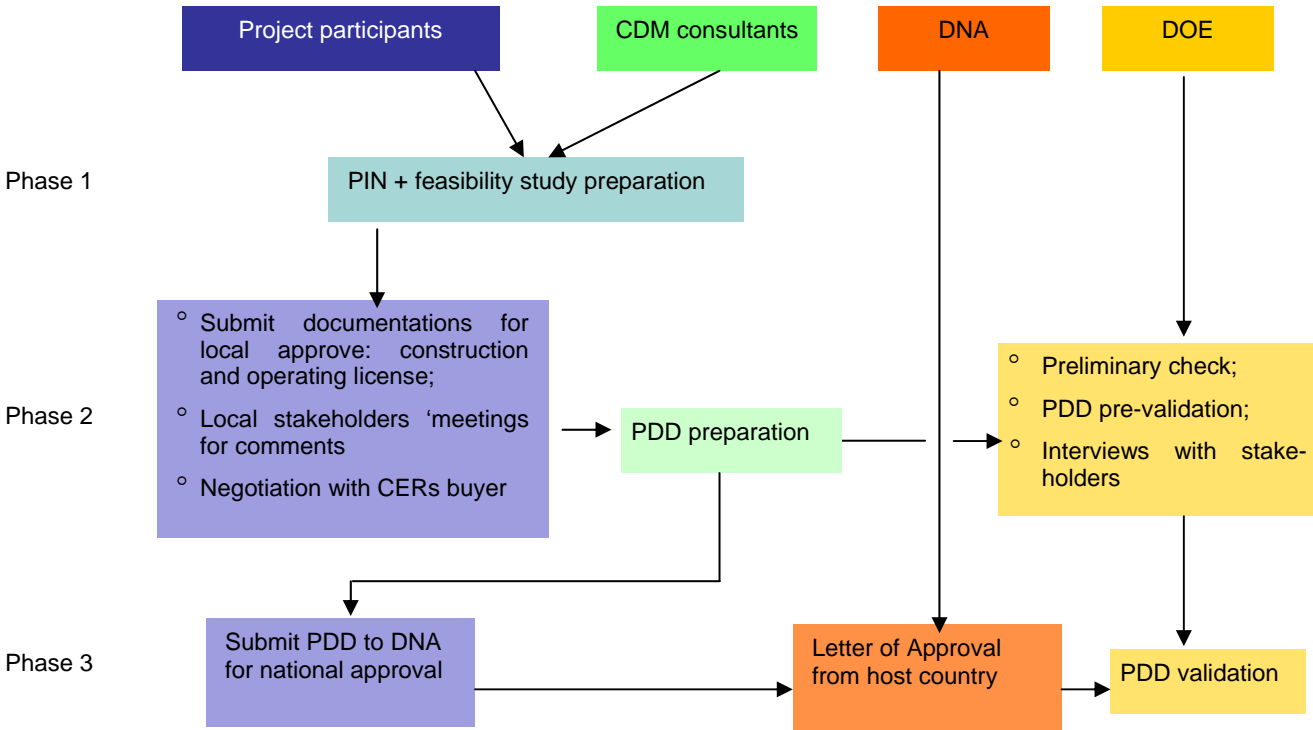
**Table 16 Most essential ‘pre-requisites’ for potential CERs selling**

CDM Buyer	Answer on 3 most essential “pre-requisites” for starting CDM business dialogue with potential selling parties
Arreon Carbon	<ol style="list-style-type: none"> <li>1. Have an emissions reduction project capable of producing a minimum of 100,000 CERs per annum;</li> <li>2. The proposed CDM project is in a sector with strong additionality;</li> <li>3. There is clear ownership of the CDM project</li> </ol>
European Carbon Fund	<ol style="list-style-type: none"> <li>1. Possibility to do a <i>Due Diligence</i> on both the proposed project and on the project developer;</li> <li>2. Contract in English language (with Chinese translation) and under English law (with HK or Singapore arbitration);</li> <li>3. A minimum size of project delivering at least 50k CERs per year</li> </ol>
Factor	<ol style="list-style-type: none"> <li>1. A feasibility study has been performed;</li> <li>2. The proposed project has gone through the main approvals in the CDM pipeline;</li> <li>3. A company description is provided</li> </ol>
Natsource	<ol style="list-style-type: none"> <li>1.Natsource requires a Project Information Note (PIN), Project Design Document, Term- sheet or other documentation with detailed Project Information in order to perform its initial evaluation of projects;</li> <li>2. Natsource requires an indication of the preferred transactional structure, including financing requirements, and an idea of CER price expectations;</li> <li>3. Natsource requests a period of exclusivity to enable us and the Project Owner to work quickly and efficiently on agreeing a transaction for the CER Sale.</li> </ol>

**Annex I**

**Checking list for PDD submission**

The following figure shows the generic CDM approval - validation process and the timeline for CDM project development; it is a very complicated process which takes several months. Before to start the first step of this process: PDD submission, a potential CDM project developer shall make essential checks first in order to ensure that the project will be not rejected by DOE (Designated National Authority) in the early phase of the validation process.



The checks shall be focalized on different aspects:

- typical eligibility check (checking the elementary requirements that they must meet to be qualified as CDM projects)
- check for admission requirements asked by the Chinese Government
- check of essential elements in PDD which ensure CDM project developer to avoid common mistakes and pitfalls when preparing a CDM Project

**Typical check of the basic eligibility requirements of the project**

- Whether the project concerns a nuclear activity? YES , NO

*(If the project activity is nuclear, then the project developers should refrain from this activity as a CDM project activity according to the provisions of the Marrakech Accords.)*
- Whether the project achieves GHGs emission reductions? Specify which will be reduced through project activities.

*(The Kyoto Protocol specifies for industrialised countries quantified commitments for the reduction of six GHGs).*

CO<sub>2</sub> ; CH<sub>4</sub> ; N<sub>2</sub>O ; HFC ; PFC ; SF<sub>6</sub>
- Whether the project generates real, measurable and long term benefits to the mitigation of climate change? YES , NO

*(A CDM project should generate real emission reductions, which shall be based on the activities of the project. The emission reductions of the project should not be eliminated in the short or medium term. The emissions reductions can be monitored. This is important for the accurate calculation of the emission reductions achieved through the project activities.)*
- Whether there are the barriers which hinder the project from being implemented? Specify which will be reduced through project activities.

*(A rough estimate of the existence of barriers, which hinder the project implementation, is required in this field in order to initially indicate that the project may be additional. According to the barriers approach, the project is considered additional when it removes barriers beyond the baseline scenario. The additionality is a mandatory requirement for a project to be qualified as CDM project)*

technological barriers	<input type="checkbox"/>
institutional barriers	<input type="checkbox"/>
financial barriers	<input type="checkbox"/>
market barriers	<input type="checkbox"/>
capacity related barriers	<input type="checkbox"/>
social and awareness barriers	<input type="checkbox"/>

**Check for admission requirements asked by the Chinese Government**

Through this step, a CDM project proposer shall verify whether the activities of project are in accordance with Chinese Governmental CDM’s general rules and related admission requirements:

*(The approval of the CDM project by the host country is a requirement for the eligibility of the project according to the provisions of the Marrakech accords)*

- whether potential CDM project activities shall be in line with China’s laws and regulations;

meet sustainable development strategies/policies and other general requirements as requested by national economic and social development plans?

YES , NO

in particular, regarding sustainable development, the dimension/s of sustainable development which are supported by the project activity shall be specified:

- environmental dimension
- social dimension
- economical dimension
- technological dimension

*(According to the Kyoto Protocol, a CDM project must assist the host country to achieve sustainable development.)*

- whether the activities of project have been approved by relevant authorities under the State Council<sup>12</sup>? YES , NO
- whether the priority of project achieves falls in with the priority area established by the Chinese Government? Specify which is the priority area of project activities.

*(Priority areas for CDM projects are: Energy efficiency improvement; Development and utilization of new and renewable energy; and Methane recovery and utilization.)*

- Energy efficiency improvement:
- Development and utilization of new and renewable energy:
- Methane recovery and utilization:

- whether project activities will promote the transfer of environmentally sound technologies? YES , NO
- whether CDM project proposer has sufficient information on the stakeholder consultation process? YES , NO
- whether project owner shall be wholly Chinese enterprise or Chinese holding enterprise? YES , NO

*(According to China CMD's rules, a CDM project must be hold by a Chinese enterprise with at least 51% of share)*

- whether potential CDM project owner has certificate of enterprise status, as well as other relevant information like brief description of the **construction project** and descriptions of **project financing** (including **price of CER's**)? YES , NO

*(During the potential CDM project approval process, the Chinese National CDM Board will review eligibility of the project owner; PDD; Baseline calculation and amount of CERs; price of CERs; funding and technology additionality; crediting period; effectiveness of sustainable development)*

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<sup>1</sup> The potential CDM project shall be approved first at local level, the provincial Development and Reform Commissions (DRC) are the relevant local authorities responsible for project pre-approving; the construction and operating license shall be issued at the end of project's approval. The documents requested for local pre-approval are:

- Project feasibility study;
- Environment Impact Assessment.

**Check of essential elements in PDD to avoid common mistakes and pitfalls**

- whether project participants have been identified clearly? YES , NO
- whether the technology used by project activities is sufficiently described? YES , NO
- whether the baseline scenarios is sufficiently explained? YES , NO
- whether the baseline information is sufficiently supported by evidence and/or reference? YES , NO
- whether the applicability conditions of the applied baseline methodology are explained sufficiently? YES , NO
- whether the selected GHG emission reduction calculation methodology is justified sufficiently or correctly applied? YES , NO
- whether the project boundaries is clearly identified and described? YES , NO
- whether major risks to the baseline are identified and described? YES , NO
- whether project additionality is correctly and clearly explained? YES , NO 
  - in particular,
    - whether the investment analysis<sup>13</sup> is made in a transparent manner and all the relevant assumptions are provided in the PDD? YES , NO
    - whether the barriers<sup>14</sup> are identified, that would prevent the implementation of type of the proposed project activity in absence of the CDM? YES , NO
- whether the project and/or crediting start date are clearly explained? YES , NO
- whether the monitoring methodology is justified sufficiently? YES , NO

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<sup>13</sup> All critical technical and economic parameters and assumptions, such as capital costs, fuel prices, lifetimes, and discount rate or cost of capital, should be clearly presented. The analysis of financial indicators like Net Present Value (NPV) and Internal Rate of Return (IRR) does not need to be included in the PDD, but should be provided to the DOE upon request.

If the NPV is positive, which means the project is typically attractive without a CER revenue; while, if the NPV is negative, the project would probably be additional.

<sup>14</sup> Technical barriers are sometimes put forward when there are none. If all the technologies involved are commercially available and have been used effectively in the host country, there are normally no technical barriers. Investment barriers can include barriers other than solely economic/financial ones. As an example, there could be an investment barrier because debt funding is not available for this type of project due to the risks associated with the project activity.

- whether the monitoring and project management procedures are defined? YES , NO
  
- in case that some public funding from an Annex I Party will be used by the project, whether it is written that funding will not result in a diversion of official development assistance? YES , NO



## Annex 2 **List of most active CER buyers in China**

<p><b>Enecore Carbon Ltd (Italy):</b> <a href="http://www.enecore.com">www.enecore.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All energy related fields; Afforestation and Reforestation; N<sub>2</sub>O Decomposition and Elimination Project.</li> <li>- <b>Purchase Scale:</b> 8,000,000 tCO<sub>2</sub>e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy115.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy115.pdf</a>)</p>
<p><b>Fortis Merchant Bank (Denmark):</b> <a href="http://www.merchantbanking.fortis.com">www.merchantbanking.fortis.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields.</li> <li>- <b>Purchase Scale:</b> 500,000 tCO<sub>2</sub>e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy114.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy114.pdf</a>)</p>
<p><b>Vattenfall Europe Generation AG &amp; Co. KG (Germany):</b> <a href="http://www.vattenfall.com">www.vattenfall.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields.</li> <li>- <b>Purchase Scale:</b> N.A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy112.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy112.pdf</a>)</p>
<p><b>Rabobank Nederland (Holland):</b> <a href="http://www.rabobank.com">www.rabobank.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> N<sub>2</sub>O Decomposition and Elimination, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal, Waste Heat Recovery and Utilization, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement, Biomass Power, Small hydro and Agricultural Waste Capture</li> <li>- <b>Purchase Scale:</b> 100,000 - 500,000tCO<sub>2</sub>e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy110.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy110.pdf</a>)</p>
<p><b>Belgian JI/CDM Programme (Government CDM initiative, Belgium):</b>  <a href="http://www.climatechange.be/climat_klimaat/jicdmtender/index.htm">http://www.climatechange.be/climat_klimaat/jicdmtender/index.htm</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization/Burning Power Generation, Other Energy Saving and Efficiency Improvement Project</li> <li>- <b>Purchase Scale:</b> N.A.</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy106.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy106.pdf</a>)</p>
<p><b>South Pole Carbon Asset Management Ltd. (Switzerland):</b> <a href="http://www.southpolecarbon.com">www.southpolecarbon.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N<sub>2</sub>O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> 4,000,000 tCO<sub>2</sub>e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy105.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy105.pdf</a>)</p>
<p><b>Macquarie Bank Limited (UK):</b> <a href="http://www.macquarie.com">www.macquarie.com</a></p>

<ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N<sub>2</sub>O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation , Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> &gt;500,000 tCO<sub>2</sub>e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy102.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy102.pdf</a>)</p>
<p><b>3C Climate Change Consulting Holding AG</b> (Germany): <a href="http://www.3c-company.com">www.3c-company.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> No special requirement</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy98.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy98.pdf</a>)</p>
<p><b>TFS Energy (Tradition Financial Services) Ltd</b> (UK): <a href="http://www.tfsbrokers.com">www.tfsbrokers.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N<sub>2</sub>O Decomposition and Elimination, Renewable Energy Power Generation, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation</li> <li>- <b>Purchase Scale:</b> N.A.</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy96.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy96.pdf</a>)</p>
<p><b>MGM Carbon Portfolio, SARL</b> (Investment fund, Luxemburg): <a href="http://www.mgminter.com">www.mgminter.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N.A.</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy94.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy94.pdf</a>)</p>
<p><b>ORBEO</b> (France) : <a href="http://www.orbeo.com">www.orbeo.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N.A.</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy92.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy92.pdf</a>)</p>
<p><b>European Investment Bank</b> (Luxemburg) : <a href="http://www.eib.org">www.eib.org</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N.A.</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy90.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy90.pdf</a>)</p>
<p><b>Shell Trading</b> (UK): <a href="http://www.shell.com">www.shell.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N.A.</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy88.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy88.pdf</a>)</p>
<p><b>Carbon Ventures Limited</b> (UK): <a href="http://www.carbonventures.com">www.carbonventures.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N<sub>2</sub>O Decomposition and Elimination, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation</li> <li>- <b>Purchase Scale:</b> N/A.</li> </ul>

(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy86.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy86.pdf</a> )
<p><b>ICECAP (UK):</b> <a href="http://www.icecapltd.com">http://www.icecapltd.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> &gt; 100,000 tCO<sub>2</sub>e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy83.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy83.pdf</a>)</p>
<p><b>Finnish Carbon Procurement Programme</b> (Government CDM initiative, Finland): <a href="http://www.environment.fi">www.environment.fi</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy81.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy81.pdf</a>)</p>
<p><b>Sindicatum Carbon Capital Limited (UK):</b> <a href="http://www.carbon-capital.com">www.carbon-capital.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy79.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy79.pdf</a>)</p>
<p><b>Japan Carbon Finance, Ltd (Japan):</b> <a href="http://www.jcarbon.co.jp">www.jcarbon.co.jp</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> to be decided on project-to-project basis through project selection process</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy77.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy77.pdf</a>)</p>
<p><b>Japan Bank For International Cooperation (Japan):</b> <a href="http://www.jbic.go.jp">www.jbic.go.jp</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy75.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy75.pdf</a>)</p>
<p><b>Asian Development Bank (Philippine):</b> <a href="http://www.adb.org">www.adb.org</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy73.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy73.pdf</a>)</p>
<p><b>EDF Trading (France):</b> <a href="http://www.edftrading.com">www.edftrading.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy71.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy71.pdf</a>)</p>
<p><b>RWE Power AG (Germany):</b> <a href="http://www.rwe.com/cdm-ji">www.rwe.com/cdm-ji</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy70.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy70.pdf</a>)</p>
<p><b>CAMCO International Limited (UK):</b> <a href="http://cdm.ccchina.gov.cn/">http://cdm.ccchina.gov.cn/</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields, such as Coal Bed Gas Recovery &amp; Utilization, N<sub>2</sub>O Decomposition</li> </ul>

<p>and Elimination, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal, Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement.</p> <ul style="list-style-type: none"> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy68.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy68.pdf</a>)</p>
<p><b>Climate Change Capital Limited</b> (UK): <a href="http://www.climatechange-capital.com">www.climatechange-capital.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> No particular requirement</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy65.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy65.pdf</a>)</p>
<p><b>Mitsui &amp; CO.,Ltd.</b> (Japan): <a href="http://www.mitsui.com">www.mitsui.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> No restriction</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy63.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy63.pdf</a>)</p>
<p><b>China Carbon N.V.</b> (Holland): <a href="http://www.chinacarbonfund.com">www.chinacarbonfund.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> 1-2 million tCO2e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy60.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy60.pdf</a>)</p>
<p><b>Natsource</b> (USA, Offices in United Kingdom, Japan, Canada &amp; USA): <a href="http://www.natsource.com">www.natsource.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields, such as Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal, Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement, Afforestation and Reforestation.</li> <li>- <b>Purchase Scale:</b> Minimum 50,000 tCO2e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy58.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy58.pdf</a>)</p>
<p><b>Noble Carbon Credits Ltd.</b> (Ireland): <a href="http://www.thisisnoble.com">www.thisisnoble.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> No minimum or maximum</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy51.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy51.pdf</a>)</p>
<p><b>Kommunalkredit Public Consulting GmbH (KPC)</b> - Austrian JI/CDM-Programme: <a href="http://www.ji-cdm-austria.at">www.ji-cdm-austria.at</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp;</li> </ul>

<p>Utilization\Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</p> <ul style="list-style-type: none"> <li>- <b>Purchase Scale:</b> Projects from 150.000 CERs - to 3.000.000 CERs (total)</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy49.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy49.pdf</a>)</p>
<p><b>Essent Energy Trading B.V.</b> (Holland): <a href="http://www.essenttrading.com">www.essenttrading.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> 500,000 - 5,000,000 tCO2e/y until 2012</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy47.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy47.pdf</a>)</p>
<p><b>The World Bank Carbon Finance Unit</b> (Multilateral): <a href="http://www.carbonfinance.org">www.carbonfinance.org</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> No special requirement</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy45.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy45.pdf</a>)</p>
<p><b>Enel Trade SpA</b> (Italy): <a href="http://www.enel.it">www.enel.it</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination , HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> 20,000,000 tCO2e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy42.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy42.pdf</a>)</p>
<p><b>Chubu Electric Power Co., Inc.</b> (Japan): <a href="http://www.chuden.co.jp/english/index.html">http://www.chuden.co.jp/english/index.html</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy41.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy41.pdf</a>)</p>
<p><b>Energy Systems International B.V.</b> (Holland)</p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination , HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy39.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy39.pdf</a>)</p>
<p><b>Idemitsu Kosan Co., Ltd.</b> (Japan): <a href="http://www.idemitsu.co.jp">http://www.idemitsu.co.jp</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination,</li> <li>- Renewable Energy Power Generation, Waste Heat Recovery and Utilization, Other Energy</li> </ul>

<p>Saving and Efficiency Improvement, Afforestation and Reforestation</p> <ul style="list-style-type: none"> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy37.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy37.pdf</a>)</p>
<p><b>ENDESA, S.A.</b> (Spain): <a href="http://www.endesa.es">www.endesa.es</a>, <a href="http://www.endesa.com/eci">www.endesa.com/eci</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Landfills Gas Recovery&amp; Utilization\ Burning Power Generation, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> Preference from 1,000,000 CERS per contract</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy35.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy35.pdf</a>)</p>
<p><b>EcoSecurities Group plc</b> (UK): <a href="http://www.ecosecurities.com">www.ecosecurities.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement, Afforestation and Reforestation</li> <li>- <b>Purchase Scale:</b> No upper limit</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy33.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy33.pdf</a>)</p>
<p><b>Toyota Tsusho Corporation</b> (Japan): <a href="http://www.toyota-tsusho.com">www.toyota-tsusho.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> 10,000,000 ton-CO2e by the year of 2012</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy31.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy31.pdf</a>)</p>
<p><b>Arreon Carbon UK Ltd</b> (UK): <a href="http://www.arreon.com">www.arreon.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N2O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement, Afforestation and Reforestation</li> <li>- <b>Purchase Scale:</b> No upper limit.</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy29.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy29.pdf</a>)</p>
<p><b>Trading Emissions Limited</b> (UK): <a href="http://www.tradingemissionsplc.com">www.tradingemissionsplc.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Renewable Energy Power Generation Project</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy27.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy27.pdf</a>)</p>
<p><b>The Kansai Electric Power Co. Inc.</b> (Japan): <a href="http://www.kepco.co.jp/english/index.html">http://www.kepco.co.jp/english/index.html</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Renewable Energy Power Generation Project</li> </ul>

<ul style="list-style-type: none"> <li>- <b>Purchase Scale:</b> Total about 560,000 t-CO<sub>2</sub>e</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy23.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy23.pdf</a>)</p>
<p><b>Carbon Resource Management Ltd. (UK):</b> <a href="http://www.carbonresouce.com">www.carbonresouce.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N<sub>2</sub>O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement, Afforestation and Reforestation</li> <li>- <b>Purchase Scale:</b> N/A</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy21.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy21.pdf</a>)</p>
<p><b>European Carbon Fund (Luxemburg):</b> <a href="http://www.europeancarbonfund.com">www.europeancarbonfund.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N<sub>2</sub>O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation</li> <li>- <b>Purchase Scale:</b> 50,000 to 2,000,000 tCO<sub>2</sub>e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy20.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy20.pdf</a>)</p>
<p><b>Japan Carbon Finance, Ltd. (Japan):</b> <a href="http://www.jcarbon.co.jp">www.jcarbon.co.jp</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields.</li> <li>- <b>Purchase Scale:</b> 141,500,000 USD</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy18.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy18.pdf</a>)</p>
<p><b>Marubeni Corporation (Japan):</b> <a href="http://www.marubeni.com">www.marubeni.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Coal Bed Gas Recovery &amp; Utilization, N<sub>2</sub>O Decomposition and Elimination, HFC-23 Decomposition, Renewable Energy Power Generation, Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization, Landfills Gas Recovery &amp; Utilization\ Burning Power Generation, Converter Gas Recovery and Utilization, Other Energy Saving and Efficiency Improvement</li> <li>- <b>Purchase Scale:</b> Following is our principle and details are subject to discussion project by project:             <ul style="list-style-type: none"> <li>【Under 200,000tCER / year】 We act as a CER purchaser.</li> <li>【Over 200,000tCER / year】 We act as a project developer including providing fund if necessary and CER purchaser.</li> </ul> </li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy14.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy14.pdf</a>)</p>
<p><b>Carbon Asset Management Sweden AB (Sweden):</b> <a href="http://www.camsweden.se">www.camsweden.se</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> All fields</li> <li>- <b>Purchase Scale:</b> 40,000,000 tCO<sub>2</sub>e/y</li> </ul> <p>(Further information: <a href="http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy13.pdf">http://cdm.ccchina.gov.cn/website/cdm/pdf/Buy/Buy13.pdf</a>)</p>
<p><b>Luso Carbon Fund (Portugal):</b> <a href="http://www.lusocarbonfund.com">http://www.lusocarbonfund.com</a></p> <ul style="list-style-type: none"> <li>- <b>Fields to invest:</b> Fields to invest: Coal Bed Gas Recovery &amp; Utilization Project , N<sub>2</sub>O</li> </ul>

<p>Decomposition and Elimination Project , HFC-23 Decomposition Project , Renewable Energy Power Generation Project , Natural Gas Power Project as Substitute of Fuel/Coal , Waste Heat Recovery and Utilization Project , Landfills Gas Recovery &amp; Utilization\ Burning Power Generation Project , Converter Gas Recovery and Utilization Project , Other Energy Saving and Efficiency Improvement Project</p> <ul style="list-style-type: none"><li>- <b>Purchase Scale:</b> 1,000,000 t CO2e/year</li></ul>
<p><b>Ecoprogresso</b> (Portugal): <a href="http://www.ecoprogresso.pt">http://www.ecoprogresso.pt</a></p> <ul style="list-style-type: none"><li>- <b>Fields to invest:</b> All fields</li><li>- <b>Purchase Scale:</b> 500,000 t CO2e/year</li></ul>



**ANNEX 3 ERPA EXAMPLE: CDM ERPA DEVELOPED BY IETA, V2**

**CDM Emission Reductions  
Purchase Agreement -  
v 2.0 2004**

**(Name of the Project)**

**by and between**

**[PROJECT ENTITY]**

**and**

**[\*\*]**

example

**Dated, [Date]**

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**EMISSION REDUCTIONS PURCHASE AGREEMENT**

[\*\*], a [private][public] company [with limited liability] incorporated under the laws of [\*\*], having its seat at [\*\*] ("**Project Entity**")  
and  
[\*\*], a [private][public] company [with limited liability] incorporated under the laws of [\*\*], having its seat at [\*\*] (the "**Buyer**")

**WHEREAS:**

- A. [Name of the Host Country] ("**Host Country**") has ratified the United Nations Framework Convention on Climate Change (the "**UNFCCC**") on [date] and has [ratified/acceded] on [date] to the Protocol that was adopted at the Third Conference of the Parties to the UNFCCC in Kyoto, Japan on December 11, 1997 (the "**Kyoto Protocol**").
- B. [Host Country has authorized the Project Entity to participate in the Project and [\*\*] has authorized the Buyer to participate in the Project.]
- C. The Project Entity intends to carry out the Project, as described in Schedule 1, which is expected to result in reduction in greenhouse gas emissions that are additional to any that would occur in the absence of the Project.
- D. The Project Entity wishes to sell, and the Buyer wishes to purchase, upon the terms and conditions of this Emission Reductions Purchase Agreement (this "**Agreement**"), Certified Emission Reductions generated by the Project.

The Parties hereby agree as follows:

**ARTICLE I**

**Definitions; Interpretation; Headings; Schedules**

**Section 1.01 Definitions**

Unless the context otherwise requires, the following capitalized terms shall have the following meanings wherever used in this Agreement and its preamble:

"**Additional ERs**" means in a Year any ERs generated by the Project which are likely to qualify as CERs in excess of the Minimum Amount for such Year as reported in the Annual ER Reports to the extent such ERs are not meant to make up for any Transfer Failure in a previous Year.

"**Annual Payment**" means the amount set out in Section 5.02.

"**Annual ER Report**" means a report provided by the Project Entity setting out the amount of GHG Reductions generated by the Project during the previous Year as monitored in accordance with the Monitoring Plan and which includes all other data as may be required to be collected and recorded by the Monitoring Plan and which shall serve as the monitoring report required to be provided to the Operational Entity under the International UNFCCC/Kyoto Protocol Rules.

**"Assigned Amount Unit" or "AAU"** means a unit issued pursuant to the International UNFCCC/Kyoto Protocol Rules and is equal to one metric tonne of carbon dioxide equivalent, calculated in accordance with the International UNFCCC/Kyoto Protocol Rules.

**"Bankruptcy Proceedings"** means, in relation to any person:

- (a) the making of an assignment or arrangement for the benefit of creditors;
- (b) the filing of a petition or commencement of proceedings under any bankruptcy or similar law, or having such a petition filed against such person, which petition is not dismissed for a period of 30 days;
- (c) the levy of an attachment for execution against the whole or any material part of its assets;
- (d) such person becoming (or is, or could be, deemed by law or a court to be) insolvent or unable to pay its debts; or
- (e) such person stops, suspends or threatens to stop or suspend payment of all or a material part of its indebtedness or begins negotiations or takes any other step with a view to the deferral, rescheduling or other readjustment of all or a material part of its indebtedness.

**"Baseline"** means the scenario that reasonably represents the anthropogenic emissions by sources of GHGs that would occur in the absence of the Project as described in the International UNFCCC/Kyoto Protocol Rules.

**"Baseline Study"** means a written report of the Baseline prepared as part of the Project Design Document.

**"Buyer's Account"** means the account of Buyer [to be] established in the national CDM registry of [\*\*].

**"Carbon Dioxide Equivalent" or "CO<sub>2</sub>e"** means the base reference for the determination of global warming potential of Greenhouse Gases in units of carbon dioxide.

**"Certification"** and **"Certified"** each means the written assurance by the Operational Entity that, during a specified time period, the Project has achieved the GHG Reductions as reported in the Verification Report.

**"Certification Report"** means the document setting out the Certification.

**"Certified Emission Reduction" or "CER"** means a unit issued pursuant to Article 12 of the Kyoto Protocol as well as all other relevant International UNFCCC/Kyoto Protocol Rules and is equal to one metric tonne of carbon dioxide equivalent, calculated in accordance with the International UNFCCC/Kyoto Protocol Rules.

**"Clean Development Mechanism" or "CDM"** means the mechanism referred to in Article 12 of the Kyoto Protocol.

**"Commissioning" or "Commissioned"** means the satisfactory completion of the Project by the Project Entity in accordance with such procedures and tests as from time to time constitute usual and prudent industry standards and practices to demonstrate to the reasonable satisfaction of the Buyer that the Project is capable of commercial operation and of generating GHG Reductions for the purpose of, inter alia, this Agreement.

**"Consents"** means any consent, authorization, registration, filing, license, permit, approval, agreement, authority or exemption from, by or with a competent authority, required for the construction, maintenance and operation of the Project.

**"Contract CERs"** means the CERs sold under, and to be forwarded pursuant to, Section 3.01 arising from the first [\*\*] tonnes of GHG Reductions from the Project regardless of the Year in which they are created.

**"COP/MOP"** means the Conference of the Parties to the UNFCCC serving as the Meeting of the Parties to the Kyoto Protocol.

**"Credit Facility"** means the credit facility entered into between [\*\*] and the Project Entity dated [\*\*].

**"Crediting Period"** means the period in which GHG Reductions from the Baseline are Verified and Certified by an Operational Entity for the purpose of [Issuance](#) of CERs and which shall commence after the first Emission Reductions are generated by the Project.

**"Designated Operational Entity"** or **"DOE"** means an entity designated by the COP/MOP, based on the recommendation by the Executive Board as qualified to Validate proposed CDM project activities or to Verify and Certify GHG Reductions.

**"Emission Reductions"** or **"ERs"** means any right, interest, credit, entitlement, benefit or allowance to emit (present or future) arising from or in connection with any GHG Reduction by the Project and includes any right that may be created under any regulatory or legal regime as a result of the GHG Reductions whatsoever.

**"Euro"** or **"€"** means the lawful currency of the participating member states of the European Union that have adopted the single currency in accordance with the Treaty establishing the European Community, as amended by the Treaty on the European Union.

**"Event of Default"** has the meaning ascribed thereto in Section 13.01.

**"Excess ERs"** means any ERs generated by the Project which are likely to qualify as CERs in excess of the Contract CERs as reported in Annual ER Reports.

**"Executive Board"** means the executive board of the Clean Development Mechanism that is established pursuant to the International UNFCCC/Kyoto Protocol Rules.

**"Expiry Date"** means [\*\*]

**"Financial Close"** means the first date on which drawdown is permissible under the Credit Facility for the financing of the Project.

**"Force Majeure"** means, in respect of either Party, any occurrence of Physical Force Majeure or one or more of the following event(s) or circumstance(s) (only) which are beyond the reasonable control of the affected Party acting (and having acted) in accordance with prudent operating practice and which results in or causes the failure of the affected Party to perform any of its obligations under this Agreement:

- (a) [strike, lockout or other industrial disturbance affecting [power generators] in [\*\*] generally; or]
- (b) act of the public enemy, war declared or undeclared, threat of war, terrorist act, blockade, revolution, riot, insurrection, civil commotion or public demonstration, provided that a lack of funds shall not be treated as an event of Force Majeure.

"**Global Warming Potentials**" means the global warming potentials used to calculate the carbon dioxide equivalence of Greenhouse Gases as accepted or subsequently revised in accordance with Article 5 of the Kyoto Protocol.

"**Greenhouse Gases**" or "**GHGs**" means the six gases listed in Annex A to the Kyoto Protocol.

"**GHG Reduction**" means the removal, limitation, reduction, avoidance, sequestration or mitigation of GHGs emissions.

"**Gross Negligence**" means any act or omission, whether deliberate or not, which in the circumstances (including both the probability and seriousness of the consequences likely to result) would be regarded by those familiar with both the Project activity and surrounding circumstances (including without limitation the Project Entity's obligations under this Agreement) as amounting to the reckless disregarding of the consequences, being more fundamental than a failure to exercise proper skill and care.

"**Host Country**" means[\*\*].

"**Initial Verification Report**" means a report commissioned by the Buyer during the construction of the Project to ensure all Monitoring Plan-mandated data collection and management systems are in place to allow subsequent successful Verification and Certification of the GHG Reductions.

"**International UNFCCC/Kyoto Protocol Rules**" means the UNFCCC, the Kyoto Protocol, the Marrakesh Accords, any relevant decisions, guidelines, modalities and procedures made pursuant to them, as amended from time to time.

"**Issuance of CERs**" means the issuance of CERs by the CDM registry administrator of the specified quantity of CERs into the pending account of the Executive Board in the CDM registry, upon being instructed to do so by the Executive Board.

"**Issued CERs**" has the meaning ascribed thereto in Section 5.01.

"**Kyoto Protocol**" means the protocol to the UNFCCC adopted at the Third Conference of the Parties to the UNFCCC in Kyoto, Japan on December 11, 1997 as may be amended.

"**Letter of Approval**" means the letter through which the Host Country inter alia approves the Project for the purposes of Article 12 of the Kyoto Protocol [substantially in the form of] [a copy of which is attached as] Schedule 5.

"**Letter of Credit**" means an irrevocable, standby letter of credit issued or confirmed by a bank or financial institution with a credit rating of at least [\*\*] assigned by Standard & Poor's or [\*\*] assigned by Moody's substantially in the form of Schedule 6.

"**Marrakech Accords**" means Decision 2/CP.7 through Decision 24/CP.7 inclusive of the COP in its seventh session, held at Marrakech, Morocco from October 29 to November 10, 2001.

"**Minimum Amount**" means the minimum number of GHG Reductions to be generated by the Project in any given Year and to be forwarded to the Buyer as Contract CERs as set out in Schedule 2.

"**Monitoring**" means activities of collecting and recording data in accordance with any relevant standards or conditions provided for under the International UNFCCC/Kyoto Protocol Rules that allow the assessment of the GHG Reductions resulting from the Project pursuant to the terms of the Monitoring Plan.



**"Monitoring Plan"** means the set of requirements for Monitoring incorporated in Schedule 3 of this Agreement, as such schedule may be amended from time to time in accordance with Section 7.03.

**"Operational Entity"** means (i) a Designated Operational Entity, or, in the absence thereof, (ii) an entity, independent from the Buyer, the Host Country and the Project Entity, which has:

- (A) applied for accreditation as a designated operational entity under the International UNFCCC/Kyoto Protocol Rules; and
- (B) not been previously employed on Project related activities, and which unless otherwise authorized by the Buyer and the Executive Board performs either the Validation of the Project or the Verification and Certification of the GHG Reductions generated by the Project.

**"Option"** has the meaning ascribed thereto in Section 4.01(a).

**"Option CERs"** has the meaning ascribed thereto in Section 4.01(d).

**"Parties"** means the Project Entity and the Buyer, and each of them shall be individually referred to as a **"Party"**.

**"Physical Force Majeure"** means (except to the extent that any of the same arise from an electrical or mechanical breakdown at the Project) the occurrence of lightning, fire, storm, flood, earthquake, accumulation of snow or ice or explosion which are beyond the reasonable control of the affected Party acting (and having acted) in accordance with prudent operating practice and which results in or causes the failure of the affected Party to perform any of its obligations under this Agreement.

**"Production Failure"** means the failure to generate the Minimum Amount of GHG Reductions in a given Year.

**"Project"** means the project activity described in Schedule 1 of this Agreement to be implemented in accordance with the International UNFCCC/Kyoto Protocol Rules.

**"Project Commissioning Date"** means the date on which the Project is fully Commissioned.

**"Project Design Document"** or **"PDD"** means a description of the Project [to be] submitted for Validation in accordance with the International UNFCCC/Kyoto Protocol Rules.

**"Project Documents"** means together or individually the Baseline Study, the Project Design Document, the Monitoring Plan, the Validation Report, the Verification Report, the Certification Report and the Letter of Approval.

**"Registration"** or **"Registered"** means the formal acceptance by the Executive Board of a Project as a CDM project activity.

**"Replacement CERs"** means CERs from the Project or from a project approved by the Buyer, supplied to the Buyer to replace any shortfall of GHG Reductions or Contract CERs as a result of a Production Failure or a Transfer Failure by the Project Entity, so as to enable full delivery of the Contract CERs and which may, if the Buyer requests, be substituted with AAUs.

**"Share of Proceeds"** means any share of the Emission Reductions deducted by the CDM registry administrator in accordance with the Kyoto Protocol to cover administrative expenses and to assist in meeting costs of adaptation.

**"Taxes"** means all national, state, regional, provincial, local, foreign and other net income, gross income, gross receipts, sales, use, ad valorem, transfer, franchise, profits, license, lease, service, service use

withholding, payroll, employment, excise, severance, stamp, occupation, premium, property, windfall profits, fuel, gas import, customs, duties or other taxes, fees, assessments or charges of any kind whatsoever imposed by any governmental entity, whether in effect at the time of this Agreement or thereafter imposed, together with any interest and any penalties, additions to tax or additional amounts with respect thereto.

"**tCO<sub>2</sub>e**" means metric tonnes of Carbon Dioxide Equivalent.

"**Third Party**" means a party other than the Buyer or the Project Entity.

"**Transfer Failure**" means the failure, for any reason whatsoever, of the Project Entity to have forwarded to the Buyer a number of Contract CERs equivalent to the Minimum Amount for a particular Year.

"**United Nations Framework Convention on Climate Change**" or "**UNFCCC**" means the United Nations Framework Convention on Climate Change adopted in New York on May 9, 1992.

"**Unit Price**" means [US\$] [€] for each CER measured in tCO<sub>2</sub>e.

["**United States Dollars**" and "**US\$**" each means the lawful currency of the United States of America].

"**Validation**" and "**Validated**" each means the process of independent evaluation of the Project by an Operational Entity against the requirements of the CDM in accordance with the International UNFCCC/Kyoto Protocol Rules.

"**Validation Report**" means a written report prepared by the Operational Entity of the Validation.

"**Verification**" and "**Verified**" each means the periodic independent review and ex post determination by an Operational Entity of GHG Reductions monitored in accordance with the Monitoring Plan that have occurred during the relevant period as a result of the Project being carried out in accordance with the International UNFCCC/Kyoto Protocol Rules.

"**Verification Report**" means a written report prepared by the Operational Entity of the Verification which independently assesses the Annual ER Report and the amount of GHG Reductions generated by the Project for the preceding Year.

"**Year**" means the twelve month period commencing on the Project Commissioning Date and each subsequent 12 month period commencing on the anniversary of the Project Commissioning Date thereafter.

## **Section 1.02 Interpretation; Headings; Schedules**

- (a) In this Agreement unless the context requires another meaning, a reference:
- (i) to any document (including this Agreement) is to that document as varied, amended, novated, ratified or replaced from time to time;
  - (ii) to any Party includes that Party's executors, administrators, successors and permitted assigns, including any person taking by way of novation and, in the case of a trustee, includes any substituted or additional trustee;
  - (iii) to the singular includes the plural and vice versa, and to a gender includes all genders;

- (iv) to a Party means a Party to this Agreement, and to an Article, Section or Schedule is to an Article, Section or Schedule of this Agreement (unless specified otherwise); and
  - (v) to any International UNFCCC/Kyoto Protocol Rules, statute or to any treaty or statutory provision includes any statutory modification or re-enactment of it or any treaty or statutory provision substituted for it, and all protocols, rules, modalities, guidelines, procedures, ordinances, by-laws, regulations, rules and statutory instruments (however described) issued under it.
- (b) The terms of this Agreement shall be interpreted in a manner that is consistent with the International UNFCCC/Kyoto Protocol Rules.
  - (c) The Schedules to this Agreement are an integral part hereof.
  - (d) The headings of the Articles and Sections are inserted for convenience of reference only and do not affect the interpretation of this Agreement.

## ARTICLE II

### Conditions Precedent[; Kyoto Protocol]

#### Section 2.01 Conditions Precedent

The provision of this Agreement (other than Articles I, II, VI, VII, IX, XI, XIII, XIV and XV) are conditional upon each of the following occurring:

- (a) the grant of all necessary Consents and such Consents being in full force and effect;
- (b) the Project having been Validated and Registered;
- (c) [the Host Country having authorized the Project Entity to participate in the Project];
- (d) [\*\*] having authorized the Buyer to participate in the Project];
- (e) [the Host Country having issued the Letter of Approval];
- (f) the Project having reached Financial Close by [\*\*];
- (g) the furnishing of a Letter of Credit in the amount of [\*\*] by the [Buyer]/[Project Entity] to the [Project Entity]/[Buyer] by no later than the date at which the Project achieves Financial Close; and
- (h) the Project having been Commissioned by [\*\*];
- (i) [the Kyoto Protocol having entered into force]<sup>1</sup>

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<sup>1</sup> This Agreement provides for an acceptance by the Buyer of ERs in Section 10.01. This conditions precedent should only be inserted if the Buyer is not willing to take the risk of the Kyoto Protocol not entering into force.

## **Section 2.02 Waiver**

The conditions set forth in Section 2.01 sub [a, b, c, d, e, f, and h] are for the benefit of, and may only be waived or deferred by, the Buyer. The condition set forth in Section 2.01 sub g is for the benefit of, and may be waived or deferred by, the [Project Entity]/[Buyer].

## **Section 2.03 Date for fulfilling conditions**

If not all conditions set forth in Section 2.01 have been satisfied (or waived) by [\*\*], unless otherwise provided in Section 2.01, this Agreement (other than Articles I, II, VI, VII, IX, XI, XIII, XIV and XV) shall not become binding and enforceable.

## **Section 2.04 Progress report**

The Project Entity shall provide a report to the Buyer every [30/60/90] days following the date of this Agreement or at such other time as the Buyer may reasonably request, setting out the Project Entity's progress toward fulfilling the conditions precedent set forth in Section 2.01 [other than sub g] and relevant actions taken or events occurring since the latest such report and a statement of the Project Entity's reasonable expectation as to whether and when each such condition precedent that has not yet been fulfilled will be fulfilled.

## **[Section 2.05 Kyoto Protocol<sup>2</sup>**

This Agreement shall be valid and binding also in the event the Kyoto Protocol does not enter into force. In such event the CERs to be delivered hereunder shall be ERs which shall be verified, certified and delivered as provided in this Agreement.]

## **ARTICLE III**

### **Purchase and Sale of Certified Emission Reductions**

#### **Section 3.01 Purchase and Sale**

The Project Entity agrees to sell to the Buyer and the Buyer agrees to purchase from the Project Entity the Contract CERs together with any Option CERs requested by the Buyer. **[If Share of Proceeds is for the account of the Project Entity:** All CERs to be delivered under this Agreement shall be net of the Share of Proceeds][ **If Share of Proceeds is for the account of the Buyer:** The Share of Proceeds shall be deemed to be part of the CERs delivered under this Agreement.

#### **Section 3.02 Minimum Amount**

- (a) Each Year the Project Entity shall have the Project generate the Minimum Amount set out in Schedule 2 and have CERs corresponding to these GHG Reductions issued and forwarded to the Buyer.<sup>3</sup>
- (b) Where the Project generates more than the Minimum Amount in a particular Year, any Additional ERs generated in that Year shall be [Verified and Certified and upon Issuance of CERs be forwarded to the Buyer as part of the Contract CERs until the total amount of Contract

<sup>2</sup> Insert only if condition precedent sub (i) is not used.

<sup>3</sup> The sum of all Minimum Amounts should add up to the Contract CERs.

CERs sold under this Agreement has been forwarded to the Buyer.][at the disposal of the Project Entity]

- (c) Where the Project Entity fails (i) to generate the Minimum Amount and (ii) to have an amount of CERs corresponding to the Minimum Amount forwarded to the Buyer, in a given Year then Article XII shall apply.

example

## ARTICLE IV

### [Option to Acquire [Additional]<sup>4</sup> [Excess]<sup>5</sup> ERs

#### Section 4.01 Call Option

- (a) In consideration of the Buyer's purchase of the Contract CERs, the Project Entity grants the Buyer an option exercisable at the Buyer's sole discretion to purchase all or part of any [Additional][Excess] ERs on the same terms and conditions as the Buyer purchases the Contract CERs under this Agreement (the "**Option**"), provided that the purchase price for any [Additional][Excess] ERs shall be the then prevailing market price to be agreed upon by the Project Entity and the Buyer in good faith].
- (b) The Project Entity shall, within [\*\*] days of the provision of the first Annual ER Report in accordance with Section 7.02 finding that [Additional][Excess] ERs have been generated notify the Buyer of the total quantity of such [Additional][Excess] ERs [together with an indication of the then prevailing market price].
- (c) Within [\*\*] days of receipt of the Project Entity's notification meant sub (b) above, the Buyer shall provide written notice in the form of the notice attached hereto as Schedule 4 to the Project Entity of its intention whether or not to exercise the Option for the Year immediately passed [together with an acceptance of the prevailing market price as indicated by the Project Entity or an alternative for the prevailing market price indicated by the Project Entity].
- (d) Following notification by the Buyer to the Project Entity of its intention to exercise the Option (whether in whole or part), the Project Entity shall arrange for Verification and Certification of the [Additional][Excess] ERs or part of the [Additional][Excess] ERs (as the case may be) ("**Option CERs**") in accordance with the procedures set out in this Agreement.]

### [Option to Sell [Additional]<sup>4</sup>[Excess]<sup>5</sup> ERs

#### Section 4.01 Put Option

- a) In consideration of the Project Entity's sale of the Contract CERs, the Buyer grants the Project Entity an option exercisable at the Project Entity's sole discretion to sell all or part of any [Additional][Excess] ERs [up to a maximum of [\*\*]] generated by the Project on the same terms and conditions as the Buyer purchases the Contract CERs under this Agreement (the "**Option**"), provided that the purchase price for any [Additional][Excess] ERs shall be the then prevailing market price to be agreed upon by the Project Entity and the Buyer in good faith].
- b) The Project Entity shall, within [\*\*] days of the provision of the first Annual ER Report in accordance with Section 7.02 finding that [Additional][Excess] ERs have been generated notify the Buyer of the total quantity of [Additional][Excess] ERs [together with an indication of the then prevailing market price].

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<sup>4</sup> Use when Additional ERs are at the disposal of the Project Entity, see Section 3.02(b)

<sup>5</sup> Use when Additional ERs will be forwarded to the Buyer as part of the Contract CERs, see Section 3.02(b)

- c) Within **[\*\*]** weeks of the first Annual ER Report finding that **[Additional][Excess]** ERs have been generated, the Project Entity shall provide written notice in the form of the notice attached hereto as Schedule 4 to the Buyer of its intention whether or not to exercise the Option for the Year immediately passed **[together with an acceptance of the prevailing market price as indicated by the Project Entity or an alternative for the prevailing market price indicated by the Project Entity]**.
- d) Following notification by the Project Entity to the Buyer of its intention to exercise the Option (whether in whole or part), the Project Entity shall arrange for Verification and Certification of the **[Additional][Excess]** ERs or part of the **[Additional][Excess]** ERs (as the case may be) ("**Option CERs**") in accordance with the procedures set out in this Agreement.]

#### **Section 4.02 Exclusivity**

The Project Entity may solicit bids from, and enter into negotiations with, any Third Party to sell the **[Additional][Excess]** ERs in any given Year **[Add when Call Option alternative is used: , provided that prior to the expiration of the period in Section 4.01(b) such soliciting and negotiations are made subject to the Call Option right of the Buyer]**.

### **ARTICLE V**

#### **Price and Payment**

##### **Section 5.01 Unit Price**

The Buyer shall pay the Project Entity the Unit Price for each Contract CER and **[the prevailing market price agreed upon for]** each Option CER forwarded to the Buyer in accordance with this Agreement (the "**Issued CERs**").

##### **Section 5.02 Annual Payment**

The Buyer agrees to pay the Project Entity the Annual Payment within **[\*\*]** days of the date the Issued CERs are credited to the Buyer's Account or are otherwise forwarded with the approval of the Buyer. The Annual Payment shall be equal to (i) the product of the Unit Price and each Contract CER **[and each Option CER]** **[and (ii) the product of the prevailing market price agreed upon and each Option CER]** forwarded to the Buyer in accordance with this Agreement.

##### **Section 5.03 Form of Payment**

Payments will be made by the Buyer:

- (a) in **[US\$/€]**; and
- (b) to an account which has been nominated in writing by the Project Entity at least **[\*\*]** days prior to the date the Annual Payment is due and payable.

##### **Section 5.04 Costs**

- (a) Any costs and expenses regarding the preparation of the Project Documents, Validation, Registration, Verification, Certification and Issuance of CERs, including fees and expenses

payable to the Operational Entity and the Executive Board are for the account of the [Project Entity][Buyer].

- (b) Any costs and expenses regarding the Initial Verification Report, if any, the creation and maintenance of the Buyer's Account and the authorization of the Buyer by [\*\*] are for the account of the Buyer.
- (c) Each Party will bear its own costs and expenses in connection with the preparation, negotiation and execution of this Agreement.

#### **Section 5.05 Taxes**

Any Taxes that may be payable with regard to the Project and the sale, purchase and transfer pursuant to this Agreement shall be borne by the [Project Entity][Buyer] [, except for Taxes imposed by [\*\*], which shall be for the [Buyer's][Project Entity's] account.]

### **ARTICLE VI**

#### **Initial Verification; Validation and Registration; Baseline**

##### **Section 6.01 Initial Verification**

- (a) At least [\*\*] days prior to the Commissioning of the Project, the Project Entity shall notify the Buyer in writing of the expected Project Commissioning Date.
- (b) Upon receipt of notification pursuant to Section 6.01(a), the Buyer has the right to arrange for an Initial Verification Report to be prepared for the Project by an Operational Entity.
- (c) The Buyer shall instruct the Operational Entity to provide a copy of the Initial Verification Report to both the Buyer and the Project Entity.
- (d) In the event that the Initial Verification Report indicates that the Project is not in compliance with the International UNFCCC/Kyoto Protocol Rules on monitoring requirements and, in the opinion of the Operational Entity, there is no reasonable prospect of such compliance being obtained within a further [\*\*] months then the Buyer may terminate this Agreement by giving notice to the Project Entity.

##### **Section 6.02 Operational Entity**

- (a) The Project Entity shall select and contract with the Operational Entity to undertake Validation of the Project from a shortlist of Operational Entities mutually agreed with the Buyer.
- (b) The Project Entity shall inform the Buyer of the name of the Operational Entity it has contracted with to perform the Validation.

##### **Section 6.03 Validation and Registration**

- (a) The Project Entity [shall prepare the Project Design Document, including the Baseline Study, and submit the Project Design Document and any supporting documents as meant in paragraph 37 of Decision 17/CP.7 of the Marrakesh Accords to the Operational Entity for Validation.][has prepared the Project Design Document, including the Baseline Study, and has submitted the



Project Design Document and any supporting documents as meant in paragraph 37 of Decision 17/CP.7 of the Marrakesh Accords to the Operational Entity on [date].]

- (b) [The Parties agree to seek a [seven (7) year Crediting Period to be renewed twice, adding up to a total Crediting Period of twenty-one (21) years][10 year Crediting Period]]. [The Crediting Period shall be [seven (7)][ten (10)] years.]
- (c) [The Project Entity shall instruct the Operational Entity to submit a request for Registration to the Executive Board in the form of a Validation Report. In the event that (i) the Operational Entity determines that the Project does not meet Validation requirements, or (ii) the Executive Board does not accept Registration of such Project, then the Project Entity shall make appropriate revisions and resubmit such Project for Validation and subsequent Registration.][ The Project has been Registered on [date].]
- (d) Until the earlier of (i) the Kyoto Protocol entering into force, and (ii) the Executive Board accepting request for Registration in anticipation thereof, Registration shall be deemed to occur upon the issue by the Operational Entity of the Validation Report. Upon the occurrence of an event meant sub (i) or (ii) of this paragraph, the Project Entity shall instruct the Operational Entity in accordance with paragraph (c).

#### **Section 6.04 Baseline**

In the event that a renewal of the Baseline is required by the International UNFCCC/Kyoto Protocol Rules at any time, the Project Entity shall arrange for such renewal of the Baseline.

### **ARTICLE VII**

#### **Monitoring Plan**

#### **Section 7.01 Monitoring Plan**

- (a) The Project Entity shall:
  - (i) fully implement the Monitoring Plan set out in Schedule 3 no later than the Commissioning;
  - (ii) install, operate and maintain the facilities and equipment, and employ and train staff, necessary for gathering all such data as may be required by the Monitoring Plan;
  - (iii) establish and maintain data measurement and collection systems for all indicators listed in the Monitoring Plan;
  - (iv) observe, implement and meet all other requirements contained in the Monitoring Plan, in particular those pertaining to environmental and social performance and operational management systems; and
  - (v) ensure the Project is maintained and prepared to allow for Verification and Certification as required by the Monitoring Plan.

#### **Section 7.02 Annual ER Report**

Each Year the Project Entity shall, within [\*\*] days of the end of that Year, provide the Buyer with an Annual ER Report.

### **Section 7.03 Amendments to Monitoring Plan**

Each of the Buyer and the Project Entity may introduce amendments to the Monitoring Plan:

- (a) when such amendments are necessary to reflect any guidelines for Monitoring, Verification and reporting under International UNFCCC/Kyoto Protocol Rules;
- (b) when such amendments appear warranted by concerns identified by the Operational Entity; or
- (c) in the event that a renewal of the Project Baseline in accordance with the provisions of Section 6.04 leads to an outcome which is substantially different from that in the Verification Report,

provided that such amendments shall only have effect upon the approval thereof by both Parties.

## **ARTICLE VIII**

### **Verification and Certification**

#### **Section 8.01 General Requirements**

All GHG Reductions generated by the Project, until the end of the term of this Agreement, shall be subject to Verification and Certification by an Operational Entity in accordance with and subject to the provisions of this Article.

#### **Section 8.02 Operational Entity**

- (a) The Project Entity shall select the Operational Entity to undertake Verification and Certification of the GHG Reductions from a shortlist of Operational Entities mutually agreed with the Buyer.
- (b) The Project Entity shall inform the Buyer of the name of the Operational Entity it has selected to perform the Verification and Certification.

#### **Section 8.03 Verification and Certification**

- (a) The Project Entity shall instruct the Operational Entity to undertake the Verification and Certification of the GHG Reductions each Year within [\*\*] days after receipt by the Buyer of the Annual ER Report.
- (b) In the event that there is a discrepancy between the Annual ER Report and the Verification Report, the Verification Report shall prevail.

## **ARTICLE IX**

### **Project Operation and Management**

#### **Section 9.01 Project Operation**

The Project Entity shall:

- (a) carry out the Project with due diligence and efficiency and in conformity with appropriate administrative, financial, engineering and environmental practices and all other relevant requirements of this Agreement including without limitation the requirements of Section 7.01;
- (b) carry out the Project in accordance with the applicable International UNFCCC/Kyoto Protocol Rules;
- (c) at all times operate and maintain its plant, machinery, equipment and other property, and from time to time, promptly as needed, make all necessary repairs and renewals thereof, all in accordance with sound engineering, financial and environmental practices and the requirements of Section 7.01;
- (d) satisfy any obligations in respect of applications for all Consents and authorizations required by applicable law to implement, operate and maintain the Project; and
- (e) keep the Project insured in accordance with applicable law and prudent industry practice, which may be in the form of self-insurance.

## ARTICLE X

### Certified Emission Reductions

#### Section 10.01 Authorization

The Project Entity shall direct the Executive Board as to the forwarding of CERs up to an amount equal to the Contract CERs and, if applicable, Option CERs.

#### Section 10.02 General Communication

The Parties agree that the Buyer shall serve as the focal point for all communications with regard to the Project with the Executive Board and the UNFCCC secretariat, in particular with regard to instructions regarding allocations of CERs upon issuance of CERs. Nevertheless, all communications to the Executive Board shall be copied to the Project Entity. All communications received from the Executive Board shall be immediately forwarded to the Project Entity. Any Executive Board communications sent or received by the Project Entity concerning the Project shall be immediately forwarded to the Buyer.

#### Section 10.03 Establishment of Accounts

- (a) The Project Entity shall, if directed by the Buyer, establish an account to hold CERs under the national CDM registry of [\*\*].
- (b) The Buyer shall establish the Buyer's Account prior to the date of the first Verification Report.

#### Section 10.04 Delivery of CERs

Delivery of CERs under this Agreement takes place upon the CDM registry administrator forwarding such CERs to the Buyer's Account.

#### Section 10.05 Provisional Issuance of CERs

Until the earlier of (i) the Kyoto Protocol entering into force, and (ii) the Executive Board, through the CDM registry administrator, issuing CERs in anticipation thereof, Issuance of CERs and delivery of such CERs hereunder shall be deemed to occur upon the issue by the Operational Entity of the Certification Report and the receipt by the Buyer of an irrevocable written statement by the Project Entity that it has assigned all its right, title and interest in the ERs certified in such Certification Report to the Buyer. Upon the occurrence of an event meant sub (i) or (ii) of this paragraph, the Buyer may instruct the Operational Entity to submit the Certification Reports issued prior thereto to the Executive Board and direct the Executive Board to have the CDM registry administrator forward CERs to the Buyer's Account up to an amount equal to the Contract CERs and, if applicable, Option CERs deemed to be issued and delivered under this Agreement. So long as neither the event meant sub (i), nor the event meant sub (ii) has occurred, the Buyer shall accept the assignment of ERs described in this Section as due compliance by the Project Entity with its obligation to deliver CERs under this Agreement up to the quantity of the ERs so assigned. Therefore the risk of the Kyoto Protocol not entering into force shall be for the account of the Buyer.

## ARTICLE XI

### Representations and Warranties

#### Section 11.01 The Project Entity Representations

The Project Entity represents and warrants to the Buyer in each of the following terms as at the date of this Agreement and at the Project Commissioning:

- (a) The Project Entity is duly organized and validly existing under the laws of [\*\*] and is qualified to conduct its business in [\*\*].
- (b) The execution, delivery and performance of this Agreement are within its powers, have been duly authorized by all necessary action and do not violate or conflict with or require any consent or waiver under any of the terms or conditions in its governing documents or any material contract to which it is a party or by which any of its assets are bound or affected, or any law, rule, regulation, order, statement of claim, judgment, decree or other legal or regulatory determination applicable to it.
- (c) All Consents necessary for:
  - (i) the Project Entity to perform its obligations under this Agreement; and
  - (ii) the conduct of the business of the Project Entity and the construction, maintenance and operation of the Project, have been obtained and are in full force and effect. As of the Project Commissioning Date, the Project Entity has not received any notice of violation of any material Consents relating to the Project.
- (d) This Agreement constitutes legal, valid and binding obligations of the Project Entity enforceable in accordance with its terms.
- (e) There are no Bankruptcy Proceedings pending or being contemplated by the Project Entity or[, to its knowledge,] threatened against the Project Entity.
- (f) There are no claims, actions, proceedings or investigations pending or[, to the Project Entity's knowledge,] threatened against or relating to the Project Entity before any competent authority that may materially adversely affect its ability to perform this Agreement.

- (g) The Project Entity is not subject to any judgment, rule, order, statement of claim, injunction or decree of competent authority that materially adversely affects its ability to perform this Agreement.
- (h) This Agreement, the execution and delivery of this Agreement and the fulfillment and compliance with the terms of this Agreement by the Project Entity will not materially conflict with any of, or require the consent of any person under, any loan or security agreement, or other material agreement to which the Project Entity is a party.

### **Section 11.02 Buyer Representations**

The Buyer represents and warrants to the Project Entity in each of the following terms as at the date of this Agreement and at the Project Commissioning Date:

- (a) It is duly organized and validly existing under the laws of [\*\*] and is qualified to conduct its business in [\*\*].
- (b) The execution, delivery and performance of this Agreement are within its powers, have been duly authorized by all necessary action and do not violate or conflict with or require any consent or waiver under any of the terms or conditions in its governing documents or any material contract to which it is a party or by which any of its assets are bound or affected, or any law, rule, regulation, order, statement of claim, judgment, decree or other legal or regulatory determination applicable to it.
- (c) This Agreement constitutes the legal, valid and binding obligations of the Buyer enforceable in accordance with its terms.
- (d) There are no Bankruptcy Proceedings pending or being contemplated by it or[, to its knowledge,] threatened against the Buyer.
- (e) There are no claims, actions, proceedings or investigations pending or[, to the Buyer's knowledge,] threatened against or relating to the Buyer before any competent authority that may materially adversely affect its ability to perform this Agreement.
- (f) The Buyer is not subject to any outstanding judgment, rule, order, statement of claim, injunction or decree of competent authority that materially adversely affects its ability to perform this Agreement.
- (g) This Agreement, the execution and delivery of this Agreement and the fulfillment and compliance with the terms of this Agreement by the Buyer will not materially conflict with any of, or require the consent of any person under, any loan or security agreement, or other material agreement, to which the Buyer is a party.

## **ARTICLE XII**

### **Failure to Generate or Transfer Minimum Amount**

#### **Section 12.01 Production Failure or Transfer Failure**

- (a) Should the Project Entity know, or reasonably anticipate, at any point in time that there will be or has been a Production Failure or a Transfer Failure in respect of any given Year, then the

Project Entity shall immediately give a notice to the Buyer advising the Buyer of this existing or anticipated failure. The notice must include the following information:

- (i) details as to the Project Entity's failure (or anticipated failure, as the case may be) to generate the Minimum Amount or to have the requisite number of Contract CERs forwarded to the Buyer;
  - (ii) the total shortfall of GHG Reductions and/or Contract CERs;
  - (iii) the likely delay before the shortfall can be recovered and the extent to which the Minimum Amount for the subsequent Year is to be affected; and
  - (iv) any other details requested by the Buyer.
- (b) For the purposes of this Article, where the number of Contract CERs, excluding for the avoidance of doubt any Option CERs, forwarded to the Buyer exceeded the Minimum Amount in a preceding Year or Years such that the cumulative aggregate Minimum Amount has been met in the Year the shortfall has occurred or will occur, this shortfall shall not constitute a Production Failure or a Transfer Failure.

#### **Section 12.02 Buyer's Rights in Event of Production Failure or Transfer Failure**

On receipt of a notice from the Project Entity under Section 12.01 above, or upon an Annual ER Report or Verification Report finding that the Minimum Amount has not been generated for the Year to which that report relates, such that the Project Entity cannot have the requisite number of Contract CERs issued and forwarded to the Buyer, the Buyer may in its sole discretion:

- (i) accept the shortfall where it believes it can be recovered in the subsequent Year and that the Minimum Amount and the equivalent number of Contract CERs to be forwarded for the subsequent Year will not be affected;
- (ii) require the Project Entity to propose a plan of action to remedy the shortfall and which includes appropriate adjustments to the Minimum Amounts or number of Contract CERs to be forwarded in Schedule 2;
- (iii) require the Project Entity to, at its cost, provide Replacement CERs in the same quantity as the shortfall amount which will enable full delivery of the Contract CERs; or
- (iv) where such Production Failure or Transfer Failure is the result of an event of default under Section 13.01, terminate this Agreement in accordance with Article XIV.

#### **Section 12.03 Rights in the Event of Gross Negligence, Fraud or Willful Misconduct**

- (a) Where a Production Failure or Transfer Failure is a result of Gross Negligence, fraud or willful misconduct (including the provision of false or misleading representations or warranties) on the part of the Project Entity, then the Buyer shall, in addition to its rights under Section 12.02 be entitled to exercise the right to:
- (i) terminate this Agreement and seek to recover all costs and damages from the Project Entity; and

- (ii) recover liquidated damages from the Project Entity in an amount that represents a genuine estimate of the losses, damages and costs suffered by the Buyer as a result of the Production Failure or Transfer Failure.
- (b) In addition to Section 12.03(a) the Project Entity shall indemnify the Buyer for any additional liabilities incurred as a result of a Production Failure or Transfer Failure.

## ARTICLE XIII

### Events of Default

#### Section 13.01 Events of Default

- (a) The occurrence at any time with respect to a Party of any of the following events constitutes an Event of Default with respect to such Party:
  - (i) the Party fails to pay when due any amount payable by it under this Agreement and such failure is not remedied within [\*\*] days after written notice of such failure is given to such Party;
  - (ii) the Party fails to comply in any material respect with or perform in any material respect any of its other obligations under this Agreement other than the events that are specifically and expressly covered elsewhere in this Section 13.01 and (if it is capable of remedy) such failure is not remedied to the reasonable satisfaction of the other Party within [\*\*] days after written notice of such failure is given to the Party by such other Party;
  - (iii) any representation or warranty made or repeated or deemed to have been made or repeated by the Party in this Agreement proves to have been incorrect or misleading (in any material respect when made or repeated or deemed to have been made or repeated);
  - (iv) the commencement of Bankruptcy Proceedings in respect of the [Party][Buyer][or][the Project Entity];
  - (v) the Project Entity fails to maintain all necessary Consents in respect of the Project or the performance of its obligations under this Agreement or fails to comply with all applicable laws;
  - (vi) in respect of the Project Entity:
    - (i) the failure to achieve Financial Close by [\*\*];
    - (ii) the failure to notify the Project Commissioning Date in accordance with Section 6.01(a).
  - (vii) The dissolution or liquidation of the [Project Entity][Buyer] or changes in the ownership structure of the [Project Entity][Buyer] in a manner that detrimentally affects its ability to [carry out the Project in the reasonable opinion of the Buyer][pay any amounts due hereunder in the reasonable opinion of the Project Entity];

- (viii) Material delay in the construction of the Project or other materially adverse change in the status of the Project construction or delay in the commencement of initial operations which will prevent the Project from achieving the Commissioning on or prior to [\*\*].

## ARTICLE XIV

### Termination

#### Section 14.01 Suspension on Default

Upon the occurrence of any Event of Default or at any time thereafter while such Event of Default subsists, the non-defaulting Party may by notice to the defaulting Party suspend performance of its obligations under this Agreement. If, prior to the exercise of rights under Section 14.02, such Event of Default is remedied, the notice served under this Section 14.01 shall be deemed to be withdrawn automatically.

#### Section 14.02 Termination on Default

Upon the occurrence of an Event of Default or at any time thereafter while such Event of Default subsists (subject to any applicable grace period), the non-defaulting Party may terminate this Agreement [\*\*] days after the giving of written notice to the defaulting Party of its intention so to terminate.

#### Section 14.03 Non-Default Termination

Either Party may terminate this Agreement on or at any time after the occurrence of any of the following events:

- (a) either Party's obligations under this Agreement being suspended by reason of (i) an event of Force Majeure (other than Physical Force Majeure) continuing for more than [\*\*] consecutive days or for more than [\*\*] days in any Year or (ii) an event of Physical Force Majeure continuing for a period in excess of [\*\*] days in any Year; or
- (b) a change in law that renders the Agreement illegal or unenforceable or results in a Party becoming unable to perform its obligations under this Agreement (except to the extent that the Parties agree to amend this Agreement pursuant to Section 15.09).

#### Section 14.04 Automatic Termination

This Agreement shall terminate automatically on the Expiry Date.

## ARTICLE XV

### Miscellaneous Provisions

#### Section 15.01 Amendments to the Agreement

Except as otherwise provided herein, this Agreement may not be amended except by a written agreement executed by Buyer and the Project Entity.



## Section 15.02 Confidentiality

The Parties shall treat the terms of this Agreement and all information provided under or in connection with it (collectively, “**Confidential Information**”) as confidential and may not either disclose Confidential Information or use it other than for *bona fide* purposes connected with the Agreement without the prior written consent of the other Party, except that consent is not required for disclosure to:

- (a) directors or employees of a Party, as long as they in turn are required by that Party to treat the Confidential Information as confidential in favour of the other Party on terms substantially the same as those set out in this Section 15.02;
- (b) persons professionally engaged by a Party, as long as they (i) are subject to statutory professional secrecy rules or similar legal concepts under applicable law, or (ii) in turn are required by that Party to treat the Confidential Information as confidential in favour of the other Party on terms substantially the same as those set out in this Section 15.02;
- (c) the extent legally required by any government, agency or regulatory authority having jurisdiction over that Party;
- (d) any bank, other financial institution or rating agency to the extent required in relation to the financing of a Party’s business activities, as long as the bank or other financial institution or rating agency, as the case may be, is required by that Party to treat the Confidential Information as confidential in favour of the other Party on terms substantially the same as those set out in this Section 15.02 [and then only subject to prior [consultation with][notification to] the other Party];
- (e) the extent required by any applicable laws, judicial process or the rules and regulations of any regulated market or recognised stock exchange [and then only subject to prior [consultation with][notification to] the other Party];
- (f) any intended assignee of the rights and interests of a Party under this Agreement or to a person intending to acquire an interest in a Party or that Party’s holding company as long as the intended assignee or acquirer in turn is required by that Party to treat the Confidential Information as confidential in favour of the other Party on terms substantially the same as those set out in this Section 15.02;
- (g) the extent that the Confidential Information is in or lawfully comes into the public domain other than by breach of this Section 15.02; or
- (h) price reporting agencies for the calculation of an index as long as the identity of the other party is not revealed. It must also be a precondition of the disclosure agreement between a Party and the price reporting agency that only the price is released by the price reporting agency and not the identity of either Party.

## Section 15.03 Notices

- (a) Any notice, communication, statement, request or correspondence required or permitted under the terms of this Agreement shall be in writing, in the English language (it being understood that any such communication in a language other than English shall be of no force and effect), and shall be delivered personally, or via courier, mail, or facsimile to the address and telecopier numbers provided below.

For the Project Entity:

[\*\*]

For the Buyer:

[\*\*]

- (b) Any notice, communication, statement, request or correspondence made or delivered by a Party to the other Party hereunder will only be effective:
- (i) if by way of fax, when received in legible form; or
  - (ii) If by way of letter, when it has been delivered at the relevant address or [\*\*] days after being deposited in the post postage prepaid in an envelope addressed to such other Party at that address.

#### **Section 15.04 Evidence of Authority**

The Parties shall furnish to each other sufficient evidence of the authority of the person or persons who will, on their behalf, take any action or execute any documents required or permitted to be taken or executed by the respective Parties under this Agreement, and the authenticated specimen signature of each such person.

#### **Section 15.05 Assignment**

- (a) The Project Entity may not assign or transfer its rights or obligations under this Agreement to any party without the prior written consent of the Buyer, such consent not to be unreasonably withheld, except that the Project Entity may assign its right to receive payments from the Buyer for Contract CERs and Option CERs to a Third Party. Any other such purported assignment or transfer without such consent shall be deemed ineffective and void.
- (b) The Buyer may assign all or a part of its rights (including, but not limited to, the right to receive CERs, the option to purchase [Additional][Excess] ERs) under this Agreement at any time to any one or more parties.

#### **Section 15.06 Survival of Provisions**

The respective rights and obligations of the Parties contained within Sections 12.03, 15.02, 15.03, 15.06, 15.10, 15.11 and 15.12 will survive any termination under this Agreement.

#### **Section 15.07 Execution in counterparts; Language**

This Agreement shall be executed in two counterparts in the English language, each of which shall be an original.

#### **Section 15.08 Entire Agreement**

This Agreement constitutes the entire agreement and understanding of the Parties with respect to its subject matter and supersedes and extinguishes any representations previously given or made with respect to its subject matter other than those given or made in the Agreement, but nothing in this section 15.08 limits or excludes any liability for fraud in relation to those representations.

#### **Section 15.09 Severability**

If any provision or part of a provision of this Agreement is found by a court, arbitrator or other authority of competent jurisdiction to be void or unenforceable, that provision or part of a provision is to be deemed

deleted from this Agreement and the remaining provisions to continue in full force and effect. The Parties shall in this event seek to agree upon a valid and enforceable provision or part of a provision to replace the provision or part of a provision found to be void and unenforceable.

**Section 15.10 Applicable Law**

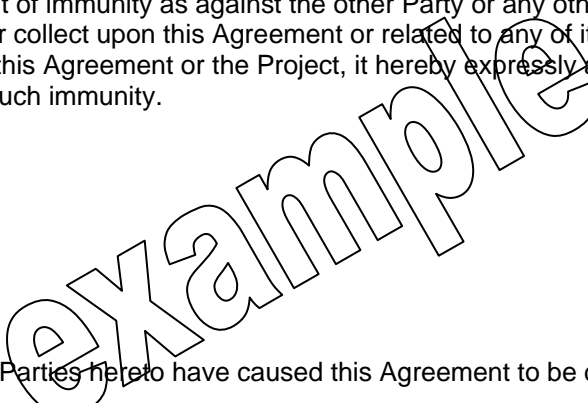
This Agreement is governed by and to be construed in accordance with [\*\*] law.

**Section 15.11 Arbitration**

The Parties agree that any difference or dispute arising under, out of or in connection with this Agreement that the Parties are unable to settle between themselves is to be resolved by arbitration in accordance with the rules for arbitration of disputes relating to natural resources and/or the environment of the Permanent Court of Arbitration, the number of arbitrators shall be three (3) and the place of arbitration shall be [\*\*] . The language of arbitration is English. The appointing authority is the Secretary-General of the Permanent Court of Arbitration.

**Section 15.12 Waiver of Sovereign Immunity**

Each Party hereby irrevocably agrees that, to the extent it or any of its assets or property has or hereafter may acquire any right of immunity as against the other Party or any other Person from any legal proceedings to enforce or collect upon this Agreement or related to any of its other liabilities or obligations in connection with this Agreement or the Project, it hereby expressly and irrevocably waives and agrees not to assert any such immunity.



**IN WITNESS WHEREOF**, the Parties hereto have caused this Agreement to be duly executed as of the date first above written.

\_\_\_\_\_  
[\*\*]

By:  
Title:

\_\_\_\_\_  
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By:  
Title:

**SCHEDULE 1**

**DESCRIPTION OF THE PROJECT**

example

**SCHEDULE 2**

**MINIMUM AMOUNT AND CONTRACT CERs**

Year	Period	Minimum Amount of GHG Reductions to be generated by Project and forwarded to the Buyer as Contract CERs
1	Commissioning Date – [*]	
2		
3		
4		
5		
6		
7		
8		

example

**SCHEDULE 3**  
**MONITORING PLAN**

example

**SCHEDULE 4**

**OPTION NOTICE**

To: [Project Entity]  
[Address Details]

[Additional][Excess] Emission Reductions Option

In accordance with the Option to acquire [Additional][Excess] ERs under the Emission Reductions Purchase Agreement dated [\*\*] (the "Agreement") between:

[Project Entity] ("Project Entity")

and

(the "Buyer")

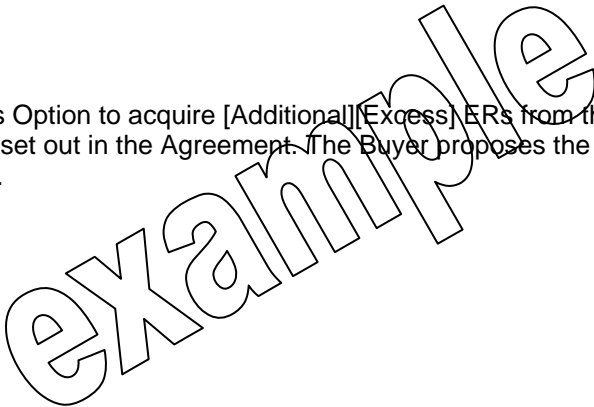
The Buyer hereby exercises its Option to acquire [Additional][Excess] ERs from the Project Entity on the same terms and conditions as set out in the Agreement. The Buyer proposes the prevailing market price to be [EUR][US\$] [\*\*] per CER.

Place:  
Dated:

\_\_\_\_\_

[\*\*]

By:  
Title:



## SCHEDULE 5

### Example Letter of Approval Host Country

Letter head of Designated National Authority

To: the Operational Entity

Undersigned, as a legal and authorized representative of the Designated National Authority ("National Authority") of the [\*\*] ("Host Country"),

[Preambles, references, political statements.]

referring to: proposal number. <number of proposal indicated by Project Entity>, named <name proposal>, hereafter to be referred to as 'the CDM project', located location> <any other information needed to identify the project> by [\*\*], hereafter to be referred to as 'Project Entity', dated <date proposal>, declares that:

1. Host Country is a Party to the Kyoto Protocol.
2. National Authority recognises the CDM project to be a Clean Development Mechanism project in accordance with article 12 of the Kyoto Protocol.
3. National Authority confirms that the CDM project contributes towards realization of the country's sustainable development goals.
4. National Authority confirms that it is participating in the CDM project voluntarily.
5. National Authority authorizes the Project Entity to participate in the CDM project.
6. National Authority irrevocably accepts the issue of all CERs generated through the CDM project to the Project Entity or its designee during the [\*\*] year crediting period of the CDM project, subject to the deduction corresponding to the share of proceeds to cover administrative expenses and to assist in meeting cost of adaptation as meant in article 12 paragraph 8 of the Kyoto Protocol. For the avoidance of doubt, this acceptance is deemed to be the request to the CDM registry administrator meant in paragraph 6 sub (c) of Appendix D to Decision 17/CP.7 of the Marrakesh Accords.
7. National Authority authorizes the Project Entity to communicate with the CDM executive board on its behalf on the allocation of CERs as provided for in this Letter of Approval.
8. In case the Kyoto Protocol will not enter into force or for as long as the Kyoto Protocol has not entered into force, Host Country agrees that the Project Entity is entitled to, and authorized to sell and transfer, any rights, title and interest in respect of greenhouse gas emission reductions generated by the CDM project.

Drafted <date>, <city, country>

Signed

For the Host Country:

Full Name Country:

Name:



## **ANNEX 4**

### **CASE STUDIES: THREE SUCCESSFUL REGISTERED CDM PROJECTS IN CHINA**

- **Case 1: China Shenzhen Xiaping Landfill Gas Collection and Utilization Project**
- **Case 2: Case study of Waste Heat Recovery Project in cement sector**
- **Case 3: China Xiaogushan Hydropower Project**

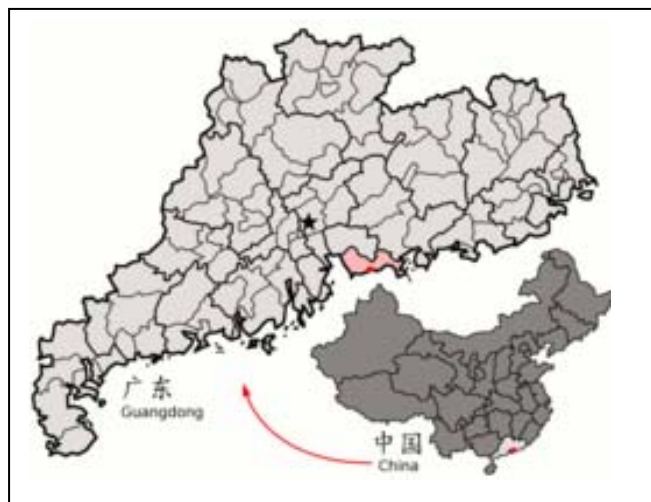
[Title of Case study]

## China Shenzhen Xiaping Landfill Gas Collection and Utilization Project

[Location of project]

Shenzhen is a sub-provincial city of Guangdong province in southern China, extreme proximity with the boundary of Hong Kong, Xiaping landfill is the largest sanitary landfill site in Shenzhen, located in a northwest to southeast valley, 2 km west to the Buji town; the proposed CDM project is sited within the Xiaping Landfill site in the Qingshuihe River area, Luohu District.

The landfill site has been put into operation since Oct, 1997, having a designed operation period of 25 years. Now, every day there are 3,000 t urban waste (mainly from Luohu District and Futian District) disposed in the landfill site.



Moreover, Shenzhen is sited also in a sub-tropical maritime region, with frequent tropical cyclones in summer and early autumn, with an average temperature of 22.4°C year-round (72°F) although daytime temperatures can exceed 35°C.

[Project owner/Project developer]

The Shenzhen Xiaping Landfill Gas Collection and Utilization Project was developed by Shenzhen Lisai Development Co. Ltd. As a private environmental protection company established in 2000, the company is experienced in advanced environmental technology research, design, production, installation, shakedown test, operation and consultation, having participated in the design and construction working processes for 20 environmental protection facilities.

[Current status of project]

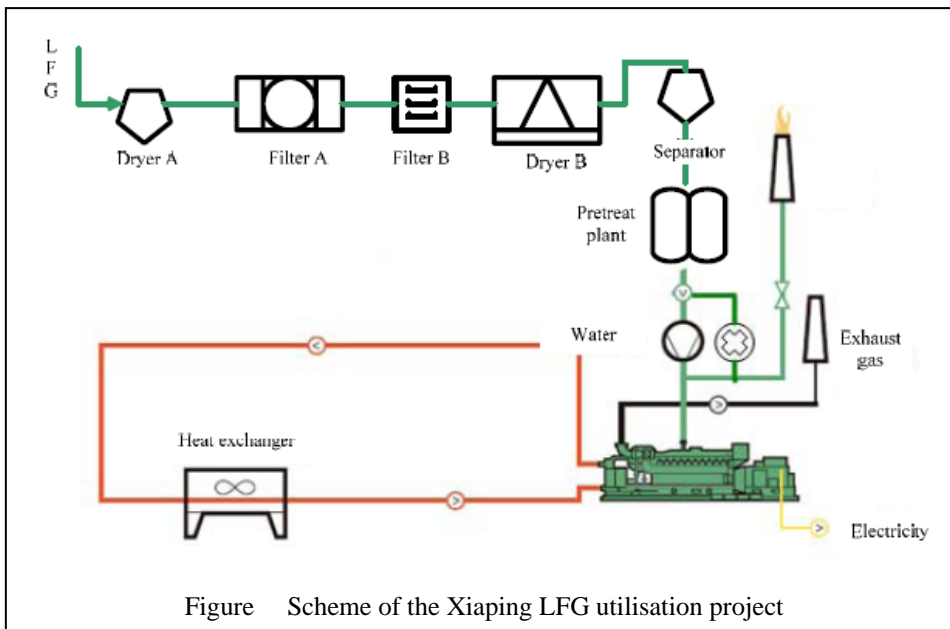
Registered in EB in May 2007. It has been foreseen that the project would start to supply electricity to South China Power grid from the beginning of July 2006.

The project owner has already signed Emission Reduction Purchase Agreement (ERPAS) with the Climate Change Capital Carbon Fund, a specialist merchant banking group with the headquarter in United Kingdom.

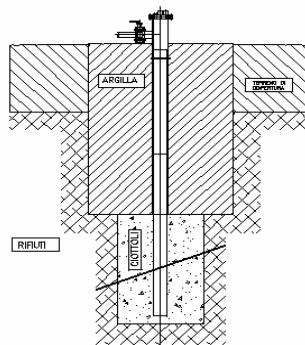
**[Description of project]**

As declared in its title, the main objectives of the Shenzhen Xiaping Landfill project are to capture and utilize biogases generated by the organic matters inside landfilled urban solid wastes through anaerobic decomposition, in order to produce electricity and in the meantime to reduce GHG emissions by avoiding directly release of LFG into atmosphere as biogases contain about 50% methane.

The registered CDM project activities include the installation of a LFG collection system, covering the Xiaping Landfill, and a gas turbine power generation system utilizing collected LFG; moreover, excess collected LFG will be flared in an enclosed flare torch. The scheme of the project is shown in the following figure.



In particular, the *LFG collection system* applied in the Xiaping Landfill site consists of numbers of vertical wells multi-hole collection pipes, valves, LFG clean system as well as all the necessary equipments for metering, measuring and adjusting, such as gas sampling ports, pressure and temperature indicators, filters, flow meters, a PLC control system and continuous gas analyzers.



Example of vertical well

Regarding the solution of vertical wells, comparing to horizontal channel collection method, vertical well collection method is

widely used in landfills for its characteristics in simple structure, high efficiency, low investment and better seal performance.

For *electricity production*, GE-Janbacher power generators were installed in the Xiaping landfill site; the electricity produced by the project will be delivered to the South China Power Grid. The total installed capacity of power generation plant is 8 MW.

*Flaring of the exceeding biogas*: an enclosed LFG flaring system is directly connected to the LFG collection system, which consists of tower and flare equipment with continuous igniter, the biogas exceeding the maximum capacity of generators will be flared into the flaring system. Moreover, the flaring system will be used for biogas combustion during periodical maintenances.

As mentioned above, the implementation of this project will destroy methane generated by organic substances contained in urban solid wastes, the estimation of emission reduction shows that about 9,904,006 tons CO<sub>2</sub> equivalent of anthropogenic emissions of greenhouse gases will be reduced for the duration of the 21-year chosen crediting period; annual average estimated CO<sub>2</sub> emission reduction over the crediting period amounts to 471,619 tons.

**[Baseline Methodology applied]**

For estimating emission reduction, the registered CDM project has adopted Baseline Methodology ACM0001 (“Consolidated monitoring methodology for landfill gas project activities”, version 4, <http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html>) in conjunction with AMS-I.D. (“Grid connected renewable electricity generation”, version 9, <http://cdm.unfccc.int/methodologies/SSCMethodologies/approved.html>).

The methodology ACM0001 is applicable to landfill gas capture project activities, where the baseline scenario is the partial or total atmospheric release of the gas and the project activities include following situations:

- a) the captured gas is flared; or
- b) the captured gas is used to produce energy (e.g. electricity/thermal energy), but no emission reductions are claimed for displacing or avoiding energy from other sources; or
- c) the captured gas is used to produce energy (e.g. electricity/thermal energy), and emission reductions are claimed for displacing or avoiding energy generation from other sources.

The present registered CDM project fulfils the conditions of **ACM0001 solution C**, i.e. the captured land fill gas is directly flared or used to produce energy and part of the credits from displacing grid electricity is claimed.

Further, **AMS-I.D. methodology** has been used as one of main project activities is to supply of electricity generated by LFG combustion to South China Power Grid, but with the capacity of **LFG power plant lower than 15 MW**.

**[Project boundary]**

For estimating emission reduction, it is very important to define the project boundary related to the baseline methodology applied. The project boundary shall encompass all anthropogenic emissions by sources of GHG under the control of the project participants that are significant and reasonably attributable to the CDM project activity. In other words, all project activities within this boundary will be taken into consideration when quantifying the project emission(s) (see figure below).

According to ACM0001 baseline methodology, the project boundary is the site of the project activity where the LFG will be captured and destroyed/used.

In detail, the following project activities and emission sources are considered within the project boundaries:

- **CH<sub>4</sub> not collected from the landfill site.** Considering 80% of the area available for gas collection, 60% operating efficiency of the collection system, only 48% of LFG generated in the site will be captured, and the rest 52% LFG will be emitted to the atmosphere directly.
- **CO<sub>2</sub> emission from the combustion of LFG** in the flares and electricity generator. When combusted, methane is converted into CO<sub>2</sub>. As the CO<sub>2</sub> released during the combustion process was originally sequestered from atmosphere by biomass so that these emissions are not counted as project emissions.
- **Electricity required for the operation of the project activity** (pumps, flares and other auxiliary equipments) should be accounted in the project emissions and monitored.

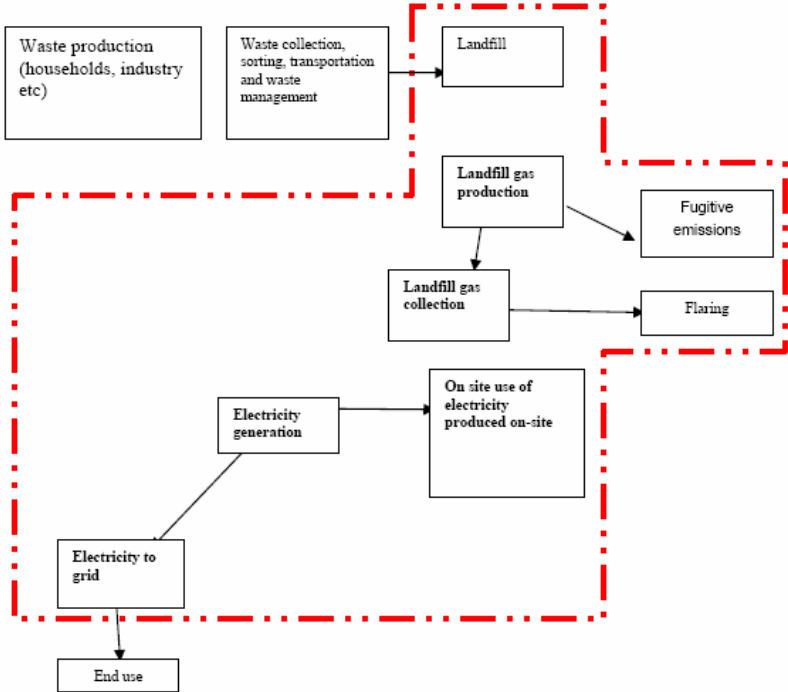


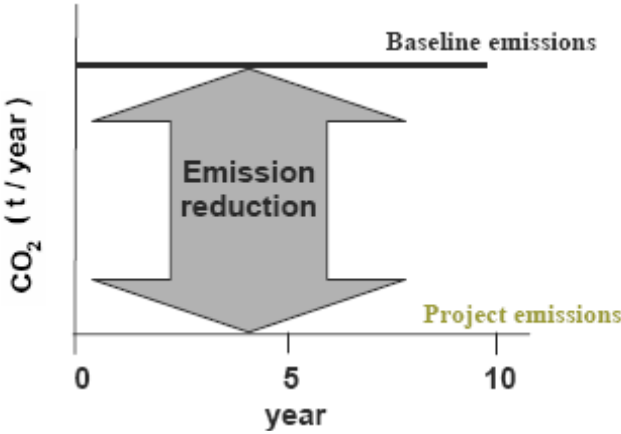
Figure: Flow chart of project boundaries (staggered line indicates boundaries)

Referring to AMS-I.D., the project activity boundary will include power generation units connected to the regional grid to which project activity is linked, as net quantity of electricity fed into the grid should be used to account for emission reductions due to displacement of electricity in other power plants.

[Calculation GHG emissions]

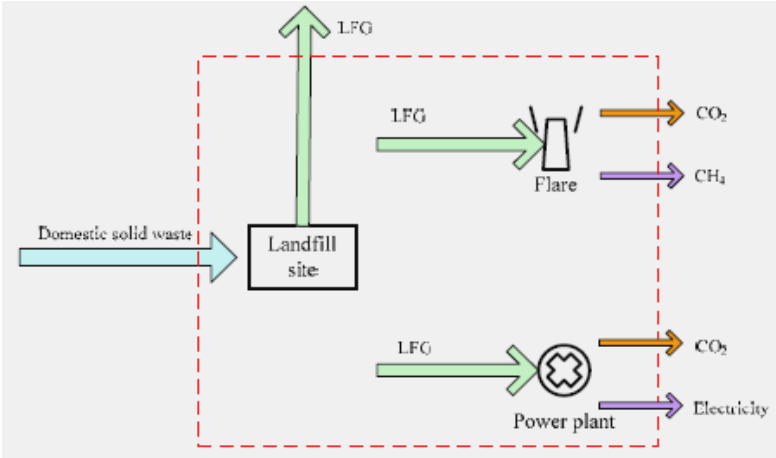
The emission reduction derived from the project activities means that less anthropogenic CO<sub>2</sub> emissions will be reduced in the absence of the CDM project activity (baseline emission), as illustrated in the figure on right side.

For the present case, the baseline shall be defined as the most likely future scenario in the absence of the proposed CDM project activity, i.e.



- continuing uncontrolled release of LFG to the atmosphere – baseline emission

whilst the project emissions will be those emissions derived from project activities, such as electricity generation, LFG flaring, and etc.(see figure below).



Applying the Consolidated Methodology ACM0001 and AMSI.D, the emission reduction of the present registered CDM project (i.e., within the boundary of the project) shall be estimated as follows:

$$ER_y = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4} + EL_y * CEF_{electricity,y}$$

where,

- $ER_y$  : GHG emission reduction achieved by the project activity during a given year “y” (tCO<sub>2e</sub>);
- $MD_{project,y}$  : Amount of methane actually destroyed/combusted during the year “y” (tCH<sub>4</sub>);
- $MD_{reg,y}$  : Amount of methane that would have been destroyed/combusted during the year “y” in the absence of the Proposed Project activity (tCH<sub>4</sub>);
- $GWP_{CH4}$  : Approved Global Warming Potential value for methane (21tCO<sub>2e</sub>/t CH<sub>4</sub>);
- $EL_y$  : Net quantity of electricity displaced during the year “y”, in megawatt hours (MWh);;
- $CEF_{electr,y}$  : CO<sub>2</sub> emission factor of the electricity displaced in South China Power Grid, during the year “y” (tCO<sub>2</sub>/MWh)

further,

$$MD_{project,y} = MD_{electricity,y} + MD_{flared,y}$$

$$EL_y = EL_{EX,LFG} - EL_{IMP}$$

where:

$MD_{electricity,y}$ : LFG used to generate electricity in year “y”

$MD_{flared,y}$ : LFG flared in year “y”

$EL_{EX,LFG}$ : net quantity of electricity exported during year y, generated by collected landfill gas, in MWh

$EL_{IMP}$ : net incremental electricity imported, defined as difference of project imports less any imports of electricity in the baseline, to meet the project requirements, in MWh

No leakage effects, moreover, need to be accounted under this methodology.

Therefore, following this combined methodology, GHG emission reduction derived from project activities can be quantified through the calculations of  $MD_{project,y}$ ,  $MD_{reg,y}$ ,  $EL_y$ , and  $CEF_{electr,y}$ .

The estimation of these three parameters can be made through the following steps:

1. calculation of theoretical methane generation
2. determination of LFG collection Efficiency
3. assessment of methane available for power generation/flaring
4. determination of LFG used to generate electricity ( $MD_{electricity,y}$ )
5. quantification of LFG flared ( $MD_{flared,y}$ )
6. estimation of  $MD_{reg,y}$
7. calculation of  $CEF_{electr,y}$

### Step 1 theoretical Methane Generation

According to IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC Guidelines), LFG generates over time can be calculated as following formula:

$$Q_y = \sum_x [(A \cdot k \cdot MSW_T(x) \cdot MSW_F(x) \cdot L_0(x)) \cdot e^{-k(y-x)}]$$

where:

$x$ : is initial year to  $y$ ,  $x=1,2,\dots,y$ ;

$A$ : is normalization factor which corrects the summation,  $A = (1 - e^{-k})/k$ ;

$k$ : is methane generation rate constant (1/a);

$MSW_T(x)$ : is the total municipal solid waste (MSW) generated in year  $x$  (t/a)

$MSW_F(x)$ : is the fraction of MSW disposed at SWDS in year  $x$ ;

$L_0(x)$ : is the methane generation potential (t CH<sub>4</sub>/t waste).



$$L_o(x) = MCF(x) \cdot DOC(x) \cdot DOC_F \cdot F \cdot 16/12$$

where:

$MCF(x)$ : methane correction factor in year  $x$ , is the methane correction factor in year  $x$  (fraction);

$DOC(x)$ : is the degradable organic carbon (DOC) in year  $x$ , (fraction) (tC/t-waste);

$DOC_F$ : is the fraction of DOC dissimilated;

$F$ : is the fraction by volume of CH<sub>4</sub> in LFG;

16/12 : is the conversion from C to CH<sub>4</sub>.

$$DOC = (0.4 \cdot A) + (0.17 \cdot B) + (0.15 \cdot C) + (0.3 \cdot D)$$

where:

$A$ : normalization factor, is the fraction of MSW that is paper and textiles;

$B$ : methane generation rate, is the fraction of MSW that is garden waste, park waste or other non-food organic putrescibles;

$C$ : is the fraction of MSW that is food waste;

$D$ : is the fraction of MSW that is wood or straw.

For estimating Shenzhen LFG generation, the following values have been applied:

▪	A = 0.9341
▪	K = 0.138
▪	$DOC_F = 0.55$ ;
▪	$DOC(x) = 0.148$
▪	$MCF(x) = 1.0$
▪	A = 6.30 (paper), 6.08 (textile)
▪	C = 61.14
▪	D = 2.32

## Step 2      **determination of LFG collection Efficiency**

To know how many methane can be captured for further utilisation, the following factors are needed to be taken into consideration:

- Oxidation factor
- Landfill site area covered by LFG collection system
- Efficiency of the well collection system

For Shenzhen LFG utilisation case, a value of 80% has been applied as the proportion of landfill site area covered by LFG collection system ( $f_{\text{recover}}$ ); the efficiency of the LFG collection system has estimated at the level of 60%.

## Step 3      **assessment of methane available for power generation/flaring**

The amount of methane captured during the year “y” ( $Q_{project,y}$ ) is estimated as follows:

$$Q_{project,y} = Q_y * f_{recover} * EF_{recover}$$

where:

$Q_y$ : is CH<sub>4</sub> generated in year y (t);

$f_{recover}$ : is the fraction of area covered by the operational collection system;

$EF_{well}$ : is the collect wells operating proportion.

#### Step 4 determination of LFG used to generate electricity

The quantity of methane destroyed by combustion for power generation in the year “y” ( $MD_{electricity,y}$ ) can be calculated by using the formula below:

$$MD_{electricity,y} = Q_{electricity,y} * w_{LFG-CH_4,y} * D_{CH_4}$$

where,

$Q_{electricity,y}$ : is the amount of LFG combusted for power production;

$w_{LFG-CH_4,y}$ : is the methane fraction of the LFG and expressed in m<sup>3</sup>CH<sub>4</sub>/m<sup>3</sup>;

$D_{CH_4}$ : is the methane density expressed in ton/m<sup>3</sup>.

For estimating Shenzhen Xiaping LFG project, the following values have been applied:

- $w_{LFG-CH_4,y} = 0.5$
- $D_{CH_4} = 0.0007198 \text{ ton/m}^3$

#### Step 5 quantification of LFG flared

The methane flared during year “y” can be estimated through:

$$MD_{flared,y} = Q_{flared,y} * w_{LFG-CH_4,y} * D_{CH_4} * FE$$

where,

$Q_{flared,y}$ : is the quantity of LFG flared during year “y”; expressed in m<sup>3</sup>CH<sub>4</sub>/m<sup>3</sup>

$FE$ : is the flare efficiency.

For this case study, the flare efficiency applied is given below.

$$\blacksquare \quad FE = 99\%$$

**Step 6 estimation of the quantity of methane that would have been destroyed/combusted in the absence of the Proposed Project**

Since there is no regulatory or contractual requirement for landfill operator to specify  $MD_{reg,y}$ , an “Adjustment Factor” (AF) is used to consider the amount of methane destroyed in the baseline scenario. The amount of methane may be destroyed:

$$MD_{reg,y} = MD_{project,y} * AF$$

Currently there are no Chinese regulatory which obliges landfill site to destroy methane, for the present registered CDM Project, therefore, an AF of 0% will be used to account for any self burning.

**Step 7 calculation of CO2 emission factor of the electricity displaced in the grid**

According to AMS-I.D, the methodology presented in ACM0002 to determine combined margin emission factor has been adopted to calculate  $CEF_{electricity,y}$ , i.e., the emission factor  $CEF_{electricity,y}$  is a weighted average of the Operating Margin emission factor ( $EF_{OM,y}$ ) and the Build Margin emission factor ( $EF_{BM,y}$ ). In particular, simple Operating Margin (OM) is applicable in our case.

- Calculation of the Operating Margin emission factor ( $EF_{OM,y}$ )

Following ACM0002, the OM is calculated as the generation weighted average emissions per electricity unit (tCO2/MWh) of all generating sources serving the system, excluding low-operating cost and must run power plants using a 3-year generation weighted average, it can be obtained through the following formula:

$$EF_{OM, simple,y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_j GEN_{j,y}}$$

where,

$F_{i,j,y}$  is the amount of fuel  $i$  (in a mass or volume unit) consumed by relevant power sources  $j$  in year(s);  
 $j$  refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid;

$COEF_{i,j,y}$  is the CO<sub>2</sub> emission coefficient of fuel  $i$  (tCO<sub>2</sub>/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources  $j$  and the percent oxidation of the fuel in year (s) ,

$GEN_{j,y}$  is the electricity (MWh) delivered to the grid by sources  $j$ .

In order words, the CO<sub>2</sub> emission coefficient  $COEF_{i,j,y}$  can be obtained as:

$$COEF_i = NCV_i \times EF_{CO_2,i} \times OXID_i$$

where,

$NCV_i$  is the net calorific value (energy content) per mass or volume unit of a fuel  $i$ , in TJ/mass or volume unit;

$OXID_i$  is the oxidation factor pf the fuel I (see page 1.29 in the 1996 revised IPCC Guidelines for default values) ;

$EF_{CO_2,i}$  is the CO<sub>2</sub> emission factor per unit of energy of the fuel  $i$ , in tCO<sub>2</sub>e/TJ

▪ Calculation of the Build Margin emission factor ( $EF_{BM,y}$ )

The BM emissions factor ( $EF_{BM,y}$ ) is the generation-weighted average emission factor (tCO<sub>2</sub>/MWh) of a sample of power plants  $m$  excluding power plant capacity additions registered as CDM project activities.

$$EF_{BMe,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m,y}}{\sum_m GEN_{m,y}}$$

where,

$F_{i,m,y}$  is the amount of fuel  $i$  (in a mass or volume unit) consumed by  $m$  power plants in year(s)  $y$ ;

$m$  refers to the power plants included in the same group;

$COEF_{i,m,y}$  is the CO<sub>2</sub> emission coefficient of fuel  $i$  (tCO<sub>2</sub>/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by  $m$  power plants and the percent oxidation of the fuel in year (s)  $y$ ,

$GEN_{m,y}$  is the electricity (MWh) delivered to the grid by  $m$  power plants..

It is worth to remark that The Build Margin is calculated ex-ante, based on the most recent information available on plants already built at the time of PDD submission. As such, the Build Margin will be fixed throughout the selected crediting period.

▪ Calculation of the baseline emission factor ( $EF_v$ )

Finally, the baseline emissions factor ( $EF_{y,tCO_2/MWh}$ ) is calculated as the weighted average of the OM emission factor and the BM emission factor.

$$EF_y = \omega_{OM} \times EF_{OM,y} + \omega_{BM} \times EF_{BM,y}$$

The weighting of the OM and BM emissions factors used are the default values suggested by the methodology as follows:

$$w_{OM} = 0.5; \quad w_{BM} = 0.5$$

In order to facilitate CDM project development and make more precise on emission reduction estimation, since 2006 the Chinese DNA has published all the CO<sub>2</sub> emission factors of the electricity displaced in the different grids located in the China. Further, the data was updated on 9 August 2007 (<http://cdm.ccchina.gov.cn/web/index.asp>).

In conclusion,

- The  $EF_{OM,y}$  of the South Grid is 0.885 tCO<sub>2</sub>/MWh;
- the  $EF_{BM,y}$  of is 0.331 tCO<sub>2</sub>/MWh; and
- the  $CEF_{electricity,y}$  of the South Grid is 0.608 tCO<sub>2</sub>/MWh, which is the average of  $EF_{OM,y}$  and  $EF_{BM,y}$ .

[Additionality]

The additionality of the present registered CDM project is analyzed by means of “Tool for the demonstration and assessment of additionality” (<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>), which provides three analysis methods: simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III).

Step for additionality analysis	Out-comings of analysis
<ul style="list-style-type: none"> <li>▪ Step 0. Preliminary screening based on the starting date of the project activity;</li> </ul>	<p>LFG power plant can not obtain attractive investment return rate only with generation revenue, while with the revenue from CERs the financial situation will be improved significantly.</p>
<ul style="list-style-type: none"> <li>▪ Step 1: Identification of alternative to the project activity consist with current laws and regulations;                             <ul style="list-style-type: none"> <li>- 1a Define alternatives to the project activity</li> <li>- 1b Enforcement of applicable</li> </ul> </li> </ul>	<p>1a Plausible and credible alternatives available to the Proposed Project include:</p> <ul style="list-style-type: none"> <li>- <i>Alternative 1:</i> The landfill operator could continue the current business as usual practice of not collecting and flaring LFG from the waste management operations.</li> <li>- <i>Alternative 2:</i> The landfill operator would invest in a LFG collection system as well as a flaring system.</li> </ul>

<p>laws and regulations</p>	<ul style="list-style-type: none"> <li>- <i>Alternative 3</i>: The landfill operator would invest in a LFG collection system as well as a flaring system and a LFG to power system.</li> </ul> <p>1b current applicable laws and regulations:</p> <ul style="list-style-type: none"> <li>- the National Action Plan for Collection and Utilization of Landfill Gas (12/2001),</li> <li>- the Technical Code for Sanitary Landfill of Municipal Domestic Refuse (CJJ17-1988), and</li> <li>- the Standard for Pollution Control on the Landfill Site for Domestic Waste (GB16889-1997).</li> </ul> <p>Current priorities of the authorities are to prevent illegal dumping and to improve the conditions at “uncontrolled” sites, which apply lower standards.</p>																								
<ul style="list-style-type: none"> <li>▪ Step 2: Investment analysis;             <ul style="list-style-type: none"> <li>- 2a Determine appropriate analysis method</li> <li>- 2b Benchmark Analysis Method (Option III)</li> <li>- 2c Calculation and comparison of financial indicators</li> <li>- 2d Sensitivity analysis</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Key financial indicators of the project:             <p><i>Without CDM revenue:</i></p> <ul style="list-style-type: none"> <li>- IRR: 1.25%</li> <li>- NPV (million RMB, 8% discount rate): -25.32</li> </ul> <p><i>With CDM revenue:</i></p> <ul style="list-style-type: none"> <li>- IRR: 29.96%</li> <li>- NPV (million RMB, 8% discount rate): 50.08</li> </ul> </li> <li>▪ Sensibility analysis             <table border="1" data-bbox="646 1020 1386 1157"> <thead> <tr> <th>Change</th> <th>-10%</th> <th>-5%</th> <th>Baseline IRR</th> <th>5%</th> <th>10%</th> </tr> </thead> <tbody> <tr> <td>Investment</td> <td>2.55%</td> <td>1.87%</td> <td>1.25%</td> <td>0.67%</td> <td>0.12%</td> </tr> <tr> <td>Generation</td> <td>-3.88%</td> <td>-0.98%</td> <td>1.25%</td> <td>3.11%</td> <td>4.82%</td> </tr> <tr> <td>O&amp;M Cost</td> <td>4.38%</td> <td>2.88%</td> <td>1.25%</td> <td>-0.62%</td> <td>-3.06%</td> </tr> </tbody> </table> </li> </ul> <p>The objective of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions.</p>	Change	-10%	-5%	Baseline IRR	5%	10%	Investment	2.55%	1.87%	1.25%	0.67%	0.12%	Generation	-3.88%	-0.98%	1.25%	3.11%	4.82%	O&M Cost	4.38%	2.88%	1.25%	-0.62%	-3.06%
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<ul style="list-style-type: none"> <li>▪ Step 3. Barrier analysis;             <ul style="list-style-type: none"> <li>- 3a Identify barriers that would prevent the implementation of type of the Project activity</li> <li>- 3b Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the Proposed Project activity)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ The major barrier that the proposed project faces is technology barrier.</li> <li>▪ The barriers identified would only prevent the implementation of the present Project and would not prevent implementation of <i>Alternative 1</i> and <i>Alternative 2</i>.</li> </ul>																								
<ul style="list-style-type: none"> <li>▪ Step 4. Common practice analysis</li> </ul>	<ul style="list-style-type: none"> <li>▪ With the increasing of organic content of the waste, methane emission from landfills has become one of the fastest growing sectoral sources of GHG in China.</li> <li>▪ In general the standards were not followed due to investment and technology barriers.</li> </ul>																								

	<ul style="list-style-type: none"> <li>▪ To date there has been limited development of LFG collection and utilization projects in China.</li> <li>▪ Large number of landfills, there exist problems such as having inappropriate or no cover system, limited or no compaction, no gas control system.</li> <li>▪ Currently in China, the municipal waste is disposed by using the technology of traditional landfills, without consideration of collection and utilization of LFG.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Step 5. Impact of CDM Registration.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The Proposed Project could not been put into operation, because, in the absence of anticipated CDM revenue, the project owner is unlikely to move forward the Proposed Project in order to cut down investment losses.</li> <li>▪ If the proposed project could be successfully registered at the EB, the CER sales revenue would supplement the sales income to gain investment return higher than that of the baseline scenario.</li> </ul>

**Conclusion**

To summarize, it can be proved that the proposed project activity is not (part of) baseline scenario. Without support from CDM, the proposed project scenario would not occur.

**[Sustainable development]**

The contributions of Proposed Project to the implementation of sustainable development locally and globally are summarized as follows:

- Improving local environment: By recovering and utilizing landfill gas, the proposed project can reduce the risk of the fire and/or explosion in the landfill site, and the odor from landfill site, thus facilitate to improve the local environment.
- Facilitating the transfer of advanced landfill gas collecting and utilization technology: The landfill gas electricity generation system adopted by the proposed project is unit of J320GSC21 manufactured by GE Jenbacher Co. Ltd. in Austria. Through the implementation of the proposed project, these advanced technologies will be introduced to China, which will facilitate the localization and diffusion of such technologies in China
- Improving management level of landfill gas collection and utilization in China
- Provide more than 30 employment opportunities for local community.

**[Monitoring methodology]**

“Consolidated monitoring methodology for landfill gas project activities” (ACM0001, version 4) has been foreseen to be adopted, as the project fulfils the conditions of ACM0001-Option c, i.e. the captured land fill gas is directly flared or used to produce energy and part of the credits from displacing grid electricity is claimed)

The approved ACM0001 monitoring methodology shall be used in conjunction with the approved ACM0001 baseline methodology,

Additionally, the capacity of LFG power plant is lower than 15 MW, therefore, AMS-I.D. monitoring methodology is applied as well to the present Project; of which Option 2 is chosen as the monitoring method, in order to keep in line with ACM0001 monitoring methodology.

The key definitions of monitoring and verification are:

- **Monitoring:** the systematic surveillance of the project’s performance by measuring and recording performance-related indicators relevant in the context of GHG emission reductions.
- **Verification:** the periodic ex-post auditing of monitoring results, the assessment of achieved emission reductions and of the project’s continued conformance with all relevant project criteria by a selected Designated Operational Entity.

**[Environment impacts]**

An Environmental impact assessment was completed in accordance with Chinese regulation as part of the feasibility study for the Proposed Project and has been approved by Environment Protection Bureau of Shenzhen.

Flowing environmental effects (air quality, water quality and noise) have been identified for the Proposed Project and measures and procedures to mitigate the possible effects were provided based on the Ambient Air Quality Standard (GB3095-1996), the Integrated Wastewater Discharge Standard (GB8978-96), the Standard of Environmental Noise of Urban Area (GB3096-93), and the Standard of Noise at Boundary of Industrial Enterprises (GB12348-90).

In conclusion, environmental impacts arising from this project are considered insignificant.

**[DNA approval]**

The approval letter from DNA of China was issued on 15 May of 2006, remarking that:

- 1) China approved the Kyoto Protocol to the United Nations Framework Convention on Climate Change on 30 August 2002, and is a Party to the Kyoto Protocol.



- 2) The Shenzhen Xiaping Landfill Gas Collection and Utilisation Project complies with the permission requirements provided for in the Measures for Operation and Management of Clean Development Mechanism Project in China, and assists China in achieving sustainable development.
- 3) Shenzhen Lisai Development Co.Ltd is hereby authorised as China's participant to voluntarily participate in and carry out the project activity.
- 4) Shenzhen Lisai Development Co. Ltd is permitted to transfer to Climate Change Capital Carbon Fund s.a.r.l. that is authorised by the Government of United Kingdom no more than 2,700,000 tCo<sub>2e</sub> in total Certified Emission Reductions (CERs) or a period of 7 years from the starting date of this project..

[Title of Case study]

### **Case study of Waste Heat Recovery Project in cement sector**

We use the “6.5MW WHR Project in Huasheng Tianya Cement Co., Ltd” as example to show how to develop waste heat recovery project in cement sector as CDM project.

[Location of project]

This project is on site waste heat recovery project in the cement factory: Industry Development Zone, Shuiwei village, Changjiang County, Hainan, P. R. China.

[Project owner/Project developer]

The project owner is Huasheng Tianya Cement Co., Ltd, which is also the owner of the cement plant.

CERs buyer: Carbon Asset Management Sweden AB

[Current status of project]

Registered in EB at 10 Jun 2007

[Description of project]

This project is to use the pure waste heat from 5000 tons per day cement production line to generate power, before this project the waste heat is vented directly to atmosphere and no other use. The installed capacity is 6.5 MW and the net power supply is approximately 47,146MWh. The generated power will be used by the power plant itself and the cement production procedure. The cement plant used to import all the electricity from Hainan grid, after the waste heat recovery project is under operation, the cement plant will decrease the electricity imported from Hainan grid, the Hainan grid is mainly composed by fossil fuel power plant. So this project will decrease 38,400 tCO<sub>2</sub>e per year.

The cement production involves four main procedures: raw material preparation, grinding, clinker production, clinker storage and grinding. Most of energy is consumed in the clinker production procedure. So waste heat recovery system will be used to effectively utilize the low temperature waste heat of the exit gases from Suspension Preheater (SP) and Air Quenching Chamber (AQC) in cement production. The waste heat recovery system consists of waste heat recovery boilers (SP boiler and

AQC boiler), steam turbine generator, controlling system, water-circulation system and dust-removal system etc. The waste heat will be fed to SP boiler and AQC boiler where steam will be produced. Then, the steam from SP boiler and AQC boiler will be fed to steam turbine generator to produce electricity. The operation, control, monitoring and data logging of the system will be done by DCS system.

**[Baseline Methodology applied]**

When the project was developed, there had two baseline methodologies available for this project: AM0024 "Methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants" and ACM0004 "Consolidated baseline methodology for waste gas and/or heat for power generation". Now the ACM0004 is substituted by "Consolidated baseline methodology for greenhouse gas(GHG) emission reductions for waste gas or waste heat or waste pressure based energy system" All the detail methodologies are available at: <http://cdm.unfccc.int/methodologies/PAMethodologies/approved.html>

Following are the discussion which methodology is better for this project.

The character of project is:

- This project will generate power by utilizing low temperature waste heat of exit gases from SP and AQC in cement production.
- The proposed project activity will generate electricity which will be connected to Hainan Power Grid thereby displacing electricity generation with fossil fuels in the grid.
- No fuel switch is being done in the process.
- Electricity will be used within the cement plant
- Before this project, the waste heat is no use and vented directly to atmosphere.

AM0024 is applicable for:

- The electricity produced is used within the cement works where the proposed project activity is located and excess electricity is supplied to the grid; it is assumed that there is no electricity export to the grid in the baseline scenario (in case of existing captive power plant);
- Electricity generated under the project activity displaces either grid electricity or from an identified specific generation source. Identified specific generation source could be either an existing captive power generation source or new generation source;
- The grid or identified specific generation source option is clearly identifiable;
- Waste heat is only to be used in the project activity;
- In the baseline scenario, the recycling of waste heat is possible only within the

boundary of the clinker making process (e.g. clinker production lines in baseline scenario could include some heat recovery systems to capture a portion of the waste heat from the cooler end of the clinker kiln and use this to heat up the incoming raw materials and fuel - so called Type 1 Waste Heat Utilization as described in explanatory note below).

ACM0004 is applicable for:

- that displace electricity generation with fossil fuels in the electricity grid or displace captive electricity generation from fossil fuels;
- where no fuel switch is done in the process, where the waste heat or pressure or the waste gas is produced, after the implementation of the project activity

Comparing the character of this project activity with the applicable condition of AM0024 and ACM0004, we know that AM0024 and ACM0004 are applicable for this project activity. Then which methodology is better for this project activity?

Comparing the AM0024 and ACM0004, we know that AM0024 is more complex because it considers the baseline scenario that the recycling of waste heat is possible only within the boundary of the clinker making process. In this case AM0024 need more data to calculate the GHG emission reduction: AM0024 need 26 data and 11 data be monitored; AM0004 only need 19 data and 3 data be monitored. For this project activity, the waste heat was no use before. So ACM 0004 is much fitter for this project. To make thing easier, this project choose ACM0004 as baseline methodology.

**[Project boundary]**

According to the ACM0004, the project boundary includes the source related the project emission and baseline emission. In this case, the project emission source includes the waste heat recovery plants and the heat source, cement production lines, the specifics are: AQC and rotating kiln generating the waste heat of the project, heat recovery boilers (SP boiler and AQC boiler), waste heat generator unit and its auxiliary facilities. The baseline emission includes: all the power stations which compose the Hainan grid. Following table shows the detail information about the project boundary

	Source	Gas	Included or Excluded	Justification / Explanation
<b>Baseline</b>	Hainan Power Grid	CO <sub>2</sub>	Included	Main emission source
		CH <sub>4</sub>	Excluded	Excluded for simplification. This is conservative
		N <sub>2</sub> O	Excluded	Excluded for simplification. This is

				conservative
<b>Project Activity</b>	The project activity	CO <sub>2</sub>	Excluded	No auxiliary fuels are fired in the project activity, so the emissions resource will be excluded
		CH <sub>4</sub>	Excluded	Excluded for simplification.
		N <sub>2</sub> O	Excluded	Excluded for simplification.

[Calculation GHG emissions]

According to ACM004 and the project activity, the project emission and leakage are 0. So in order to calculate the GHG emission, we only need calculate the baseline emission which refer to OM and BM of Hainan grid.

According to ACM0004, the GHG emission calculation refers to ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

1. EF<sub>OM</sub>:

ACM0002 gives 4 ways to calculate OM: (a) Simple OM, (b) Simple adjusted OM, (c) Dispatch Data Analysis OM, or (d) Average OM. Dispatch Data Analysis OM is the first option, but the information is not available in China due to business secret. Same reason Simple adjusted OM is not applicable. Average OM can only be used where low-cost/must run resources constitute more than 50% of total grid generation and detailed data to apply option (b) is not available. But for the Hainan grid, the low-cost/must run resources constitute less than 50% of total amount grid generating output. So Simple OM is the only option.

Following is the detail:

$$EF_{OM, simple, y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}} \tag{1}$$

where:

$F_{i,j,y}$  is the amount of fuel  $i$  (in a mass or volume unit) consumed by relevant power sources  $j$  in year(s)  $y$ ,

$j$  refers to the power sources delivering electricity to the grid, not including low-operating cost and must run power plants, and including imports to the grid,

$COEF_{i,j}$  is the CO<sub>2</sub> emission coefficient of fuel  $i$  (tCO<sub>2</sub> / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power

sources  $j$  and the percent oxidation of the fuel in year(s)  $y$ , and  $GEN_{j,y}$  is the electricity (MWh) delivered to the grid by source  $j$ .

$$COEF_i = NCV_i \times EF_{CO_2,i} \times OXID_i \quad (2)$$

where:

$NCV_i$  is the net calorific value (energy content) per mass or volume unit of a fuel  $i$ ,

$OXID_i$  is the oxidation factor of the fuel (see page 1.29 in the 2006 Revised IPCC Guidelines for default values),

$EF_{CO_2,i}$  is the CO<sub>2</sub> emission factor per unit of energy of the fuel  $i$ .

## 2. $EF_{BM}$ :

ACM0002 calculates the Build Margin (BM) emission factor based on sample group “ $m$ ,” which consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_m GEN_{m,y}} \quad (3)$$

where:

$F_{i,m,y}$  is the total amount of fuel  $i$  (in a mass or volume unit) consumed by all the sample power sources  $m$  in year(s)  $y$ ,  $m$  refers to the sample power plants serving the grid, excluding those low-operating cost and must-run power plants, and including imports to the grid.

$COEF_{i,m,y}$  is the total amount the CO<sub>2</sub> emission coefficient of fuel  $i$  (t CO<sub>2</sub>/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by sample power sources  $m$  and the oxidation rate of the fuel in year(s)  $y$ ,

$GEN_{m,y}$  is the electricity output (MWh) supplied to the grid by the sources  $m$ .

## 3. $EF_y$

$$EF_y = \omega_{OM} \times EF_{OM, y} + \omega_{BM} \times EF_{BM, y} \quad (4)$$

For the waste heat recovery project,  $\omega_{OM} = \omega_{BM} = 0.5$  by default.

#### 4. $BE_y$

$$BE_y = EF_y \times EG_y \quad (5)$$

#### 5. $ER_y$

$$ER_y = BE_y - PE_y - L_y = BE_y = EF_y \times EG_y \quad (6)$$

$EG$  is the net quantity of electricity generated by the project activity during the year  $y$  in MWh,

For this project:

$EF_{OM} = 1.0064$  tCO<sub>2</sub>e/MWh,  $EF_{BM} = 0.6226$  tCO<sub>2</sub>e/MWh,  $EF_y = 0.5 \times EF_{OM} + 0.5 \times EF_{BM} = 0.8154$  tCO<sub>2</sub>e/MWh

$ER_y = EF_y \times EG_y = 0.8154$  tCO<sub>2</sub>e/MWh \* 47,146 MWh = 38,400 tCO<sub>2</sub>e

#### [Monitoring methodology]

Since the baseline methodology is ACM0004, in order to in accordance with the baseline methodology, the monitoring methodology also uses ACM0004.

Since the GHG emission reduction is based on two factors:  $EF_y$  and  $EG_y$ , the  $EF_y$  is ex-ante and fixed, the only “the net power supply from the waste heat power station” need be monitored and recorded. They use 3-phase Multi-function Electricity Meter to monitoring the data. Based on daily monitoring data, the monthly monitoring report must be compiled carefully. All monitoring data will be preserved throughout the whole 10 years crediting period and the following two years. In order to make sure the reliability of the data, all the measuring instruments would be calibrated by Bureau of Quality and Technical Supervision in Changjiang County at least once a year.

#### [Environment impacts]

This project is to use waste heat to generate power and substitute the electricity supplied from Hainan grid. This project reduce 47,146 MWh consumption per year which mainly generated by fossil fuel before this project. So this project would reduce carbon dioxide, sulphur oxides, nitrogen oxides, and other air pollutants.

The only concern will be Acoustical Environment Impact, but comparing to the noise caused by cement production lines, the noise magnitude from waste heat recovery

power station is less. And also the noise be kept below the permissible level. And also the project owner will do all necessary measurement to minimize the noise pollution. Generally this project has positive environment impacts.

[DNA approval]

According to “Measures for Operation and Management of Clean Development Mechanism Projects in China” article 15:

To review CDM project activities mainly from the following aspects:

- (1) Participation qualification;
- (2) Project design document;
- (3) Baseline methodology and emission reductions;
- (4) Price of CERs;
- (5) Terms relating to funding and technology transfer;
- (6) Crediting period;
- (7) Monitoring plan; and
- (8) Expected sustainable development effectiveness.

There are few things need be careful:

**The participation qualification:** since the emission reduction resource is owned by the Government of China and the emission reductions generated by specific CDM project belong to the project owner, revenue from the transfer of CERs shall be owned jointly by the Government of China and the project owner. So article 11 regulates: Chinese funded or Chinese-holding enterprises within the territory of China are eligible to conduct CDM projects with foreign partners.

**Price of CERs:** To make sure the benefit of Chinese project owner, the DNA has guiding price which fluctuate. If the CERs price is lower than the guiding price, DNA wouldn't approve it.

**Expected sustainable development effectiveness:** one idea of CDM is to contribute the sustainable development of developing countries such as China. So what's the benefit of the propose project to China is very important.

**References:**

1. Project Design Document of “6.5MW WHR1 Project in Huasheng Tianya Cement Co., Ltd.”
2. Baseline Methodology ACM0004 “Consolidated baseline methodology for waste



- gas and/or heat for power generation”
3. Baseline Methodology AM0024 ““Consolidated baseline methodology for waste gas and/or heat for power generation”
  4. Monitoring Methodology ACM0004 ““Consolidated monitoring methodology for waste gas and/or heat for power generation”
  5. Baseline Methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”
  6. “Measures for Operation and Management of Clean Development Mechanism Projects in China”
  7. Side-by-Side: ACM4 & AM24 Methodologies, Sophie Chou

[Title of Case study]

## **China Xiaogushan Hydropower Project**

[Location of project]

The Location of project is on the Heihe River in the Sunan Yugu Autonomous County, Zhangye City of Gansu province, China.

[Project owner/Project developer]

Xiaogushan Hydropower Co. Ltd., Peoples' Republic of China.

[Current status of project]

The construction of project was finished in the middle of 2006, Xiaogushan Hydropower plant has started to supply electricity to Gansu grid from the July of 2006.

[Description of project]

The main objectives of the Xiaogushan Hydropower Project include building a hydropower plant with the generation capacity of 102 MW, which produces 394 gigawatt-hours per year and in long-term average terms, supplies electricity to the Gansu grid with a net amount of 370 gigawatt-hours per year. The implementation of project could supply reliable power to the Zhang Ye district and the nearby township and villages. This project reduces the amount of 3,128,919 tons CO<sub>2</sub> equivalent of anthropogenic emissions of greenhouse gases in ten years comparing with the same size of existing thermal power plant.

Project Activities consist of building a 102 MW run-of-river hydropower plant, construction of an intermediate substation, extending a 110kV transmission lines up to the Gansu's Zhangye 110/330kV substation, building an additional 110kV line to the nearby villages to supply them with more reliable electricity, and expanding the Zhangye substation to eventually accommodate additional lines from the Xiaogushan Hydropower Company (XHC).

The components of the hydropower plant include:

1. One diversion weir with an active storage capacity of 1,3 Mm<sup>3</sup>;
2. An intake power tunnel (9100m) with flow of 105,5 m<sup>3</sup>/s, providing a rated water head of 117m;
3. A surface power station for three turbines: 2 x 40MW and 1 x 22MW;
4. A 110kV high voltage switchyard;
5. 27km of 110kV transmission lines for power evacuation.

The following table summaries the key technical data for the equipment used in the project.

Parameter	Unit	Amount	Comment
Floodgate length	m	2061,5	
Floodgate height	m	26,5	
Maximum length of construction for stored water	m	93,7	
Floodgate size	m	8 x 8	
Designed Flood discharge capacity	m <sup>3</sup> /s	1750	
Proven flood discharge capacity	m <sup>3</sup> /s	2960	
Size of main station building	m	55×18×35.65	Length x Width x Height
Size of substation	m	43.7×18×16.5	Length x Width x Height
Size of Transformer station	m	65 x 58	Length x Width
Large Turbine Capacity	MW	41,67	2 x Turbines with number HL180—LJ—208 (375 r/min)
Small Turbine capacity	MW	22.92	1 x turbine with number HL180—LJ—154 ( 500 r/min)

The estimated potential GHG emission reductions is 312,891 tCO<sub>2</sub>e annually, generating an expected total reductions over 3,128,919 tCO<sub>2</sub>e for the duration of the 10-year crediting period.

**[Baseline Methodology applied]**

Baseline Methodology applied in the project is a Consolidated Methodology: ACM0002 version 5 - Consolidated methodology for grid-connected electricity generation from renewable sources that is available on line at <http://cdm.unfccc.int/methodologies/view?ref=ACM000> because the Project is a grid-connected zero-emission renewable power generation activity and meets all the restrictions of ACM0002:

1. The Project is a run-of-river hydro power plant;
2. The Project is not an activity that involves switching from fossil fuels to renewable energy at the project site;
3. The geographic and system boundaries for the Gansu Power Grid is clearly identified and information on the characteristics of this grid at aggregate level is available.

**[Project boundary]**

Only CO<sub>2</sub> is included in the ER calculation. The Gansu Power Grid is considered as the project boundary. No leakages or indirect emissions were identified for the Project.

**[Calculation GHG emissions]**

According to the indication of the methodology and the situation of this hydropower project, project emission is zero (renewable energy), leakage is zero since no more reservoir increased, no more soil flooded, then the amount of emission reduction is created by the displaced fossil fuel generation.

Following The Methodology, the baseline emission factor is calculated using a combined margin (CM) approach, and Emissions reductions will be claimed based on the total CO<sub>2</sub> emissions mitigated by the Project, through 4 steps described below:

- 1) Calculate the Operating Margin Emission Factor; 2) Calculate the Build Margin Emission Factor; 3) Calculate the Baseline Emission Factor by combining two Margins: OM and BM as a weighted average; 4) Calculate the baseline emissions reductions.

**Step 1 – Calculation of the Operating Margin Emission Factor**

Three major formula and necessary information of calculations are indicated below, please refer the project PDD for details

(<http://cdm.unfccc.int/UserManagement/FileStorage/SWUTACPQTJ8KM08D347OBBTAXWOCU7>).

$$(1) \quad EF_{OM, simple, y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_j GEN_{j,y}}$$

$$(2) \quad COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i$$

$$(3) \quad GEN_{Thermal, Grid, y} = GEN_{Thermal, Plants, y} * EGCC_y / ESCC_y$$

The simple Operating Margin Emission Factor is calculated as a 3-year average, based on the electricity generation mix of the Gansu Power Grid (low operating cost/must run power plants are not included).

Information listed from Table 1 to 3 are the basic data of the Gansu Power Grid in year 2001, 2002, 2003.

Table 1. Basic data of the Gansu Power Grid in year 2001.

Plant data aggregated by fuel type	Installed capacity (MW)	Grid Average Electricity Generation Coal Consumption (Standard Coal kg/Mwh)	Grid Average Power Supply Unit Coal Consumption (Standard Coal kg/Mwh)	GEN <sub>Fuel, Plants, y</sub> Electricity Generation (Gwh)	GEN <sub>Fuel, Grid, y</sub> Electricity Supply (Gwh)	Parasite Use Rate
Year 2001						
Thermal power plant	3,875	357	385	18,485	17,141	7.33%
Hydro power plant	3,118	-		11,030	10,988	0.38%
Wind Power	8	-		14	14	
Import					1,010	
<b>Total</b>	<b>7,002</b>			<b>29,529</b>	<b>29,153</b>	

Data Source: China Electric Power Yearbook 2002, P623-625

Table 2. Basic data of the Gansu Power Grid in year 2002.

Plant data aggregated by fuel type	Installed capacity (MW)	Grid Average Electricity Generation Coal Consumption (Standard Coal kg/Mwh)	Grid Average Electricity Supply Coal Consumption (Standard Coal kg/Mwh)	$GEN_{Fuel, Plants, y}$ Electricity Generation (Gwh)	$GEN_{Fuel, Grid, y}$ Electricity Supply (Gwh)	Parasite Use Rate
Year 2002						
Thermal power plant	3,882	352	377	23,504	21,945	6.83%
Hydro power plant	3,239	-		10,759	10,719	0.37%
Wind Power	8	-		18	18	
Import						
<b>Total</b>	<b>7,129</b>			<b>34,281</b>	<b>32,683</b>	

Data Source: China Electric Power Yearbook 2003, P584,585,592

Table 3. Basic data of the Gansu Power Grid in year 2003.

Plant data aggregated by fuel type	Installed capacity (MW)	Grid Average Electricity Generation Coal Consumption (Standard Coal kg/Mwh)	Grid Average Power Supply Unit Coal Consumption (Standard Coal kg/Mwh)	$GEN_{Fuel, Plants, y}$ Electricity Generation (Gwh)	$GEN_{Fuel, Grid, y}$ Electricity Supply (Gwh)	Parasite Use Rate
Year 2003						
Thermal power plant	4,745	351	376	29,494	27,533	6.65%
Hydro power plant	3,281	-		9,812	9,776	0.37%
Wind Power	22	-		33	33	
Import						
<b>Total</b>	<b>8,047</b>			<b>39,339</b>	<b>37,342</b>	

Data Source: China Electric Power Yearbook 2004, P709

Therefore using data from the Gansu power system from 2001, 2002, and 2003, the system emission factor can be obtained using the Simple OM methodology:

Table 4. Calculation of Operating Margin Emission Factors in 2001 for the Gansu Grid.

Fuel	Unit	Fuel Consumptions	Emission Factor	NCV	Fraction of Carbon Oxidised	Emissions	% of total Emissions by fuels
			CTon/Tj	Tj/A		Tons	
	A	B	C	D	E	$F=B*C*D*E*44/12$	
Raw Coal	104 Tons	846.37	24.73	209.08	0.98	15,725,134.73	98.6%
Coke Oven Gas	108 M3	0.14	20.2	1672.6	0.995	17,257.03	0.1%
Other Gas	108 M3		20.2	522.7	0.995	-	0.0%
Crude Oil	104 Tons	0.06	20.2	426.52	0.995	1,885.98	0.0%
Diesel	104 Tons						0.0%
Fuel Oil	104 Tons	2.08	20.2	426.52	0.99	65,052.01	0.4%
LPG	108 M3					-	0.0%
Refinery Gas	108 M3					-	0.0%
Natural Gas	108 M3	0.62	15.3	3893.1	0.995	134,732.76	0.8%
Other Petroleum Product	104 Tons					-	0.0%
Other Coking product	104 Tons					-	0.0%
Other Energy (Standard Coal)	104 Tons	0.43	24.73	292.8	0.98	11,188.22	0.1%
Total Emission for Gansu Grid (tons)						15,955,250.73	
Total Electricity Generation of Gansu Grid (Gwh)						18,447.00	
Total Electricity Supply of Gansu Grid (Gwh)						Total Electricity Generation*(1-rate of parasite use)	
						17,094.83	
Simple OM Emission Factor for Gansu Grid (TCO <sub>2e</sub> /Mwh)						0.933	

Table 5. Calculation of Operating Margin Emission Factors in 2002 for the Gansu Grid.

Fuel	Unit	Fuel Consumptions	Emission Factor	NCV	Fraction of Carbon Oxidised	Emissions	% of total Emissions by fuels
			CTon/Tj	Tj/A		Tons	
	A	B	C	D	E	$F=B*C*D*E*44/12$	
Raw Coal	104 Tons	1156.02	24.73	209.08	0.98	21,478,278.12	98.5%
Cleaned Coal	105 Tons	0.91	24.73	263.44	0.98	21,303.19	0.1%
Coke Oven Gas	108 M3	0.04	20.2	1672.6	0.995	4,930.58	0.0%
Other Gas	108 M3	0.08	20.2	522.7	0.995	3,081.69	0.0%
Crude Oil	104 Tons					-	0.0%
Diesel	104 Tons						0.0%
Fuel Oil	104 Tons	1.7	20.2	426.52	0.99	53,167.51	0.2%
LPG	108 M3					-	0.0%
Refinery Gas	108 M3					-	0.0%
Natural Gas	108 M3	0.53	15.3	3893.1	0.995	115,174.77	0.5%
Other Petroleum Product	104 Tons					-	0.0%
Other Coking product	104 Tons					-	0.0%
Other Energy (Standard Coal)	104 Tons	5.07	24.73	292.8	0.98	131,916.97	0.6%
Total Emission for Gansu Grid (tons)						21,807,852.83	
Total Electricity Generation of Gansu Grid (Gwh)						23,426.00	
Total Electricity Supply of Gansu Grid (Gwh)						Total Electricity Generation*(1-rate of parasite use)	
						21,826.00	
Simple OM Emission Factor for Gansu Grid (TCO <sub>2e</sub> /Mwh)						0.999	

Table 6. Calculation of Operating Margin Emission Factors in 2003 for the Gansu Grid.

Fuel	Unit	Fuel Consumptions	Emission Factor	NCV	Fraction of Carbon Oxidised	Emissions	% of total Emissions by fuels
			C Ton/Tj	Tj/A		Tons	
	A	B	C	D	E	F=B*C*D*E*44/12	
Raw Coal	104 Tons	1479.62	24.73	209.08	0.98	27,490,605.59	98.2%
Coke Oven Gas	108 M3	1.54	20.2	1672.6	0.995	189,827.31	0.7%
Other Gas	108 M3	0.12	20.2	522.7	0.995	4,622.53	0.02%
Crude Oil	104 Tons					-	0%
Diesel	104 Tons						
Fuel Oil	104 Tons	1.19	20.2	426.52	0.99	37,217.26	0.1%
LPG	108 M3					-	0%
Refinery Gas	108 M3					-	0%
Natural Gas	108 M3	0.54	15.3	3893.1	0.995	117,347.88	0.4%
Other Petroleum Product	104 Tons					-	
Other Coking product	104 Tons					-	
Other Energy (Standard Coal)	104 Tons	5.86	24.73	292.8	0.98	152,472.08	0.5%
Total Emission for Gansu Grid (tons)						27,992,092.64	
Total Electricity Generation of Gansu Grid (Gwh)						29,595.00	
Total Electricity Supply of Gansu Grid (Gwh)						Total Electricity Generation*(1-rate of parasite use)	
						27,627.25	
Simple OM Emission Factor for Gansu Grid (TCO2e/Mwh)						1.013	

The system emission factor is gotten as 0.982 using the average of the emission factors of Gansu grid from year 2001 to 2003.

	Year 2001	Year 2002	Year 2003	Simple OM
tCO2 / MWh	0.933	0.999	1.013	0.982

### Step 2 – Calculation of the Build Margin Emission Factor

Major formula and necessary information of calculations are indicated below, please refer the project PDD for details

(<http://cdm.unfccc.int/UserManagement/FileStorage/SWUTACPQTJ8KM08D347OBBTAXWOCU7>).

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_m GEN_{m,y}}$$

The emission factor of standard coal is calculated using formula below and based on IPCC default value.

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i$$

Key Parameters	Net Calorific Values	Carbon Emission Factors	Fraction of Carbon Oxidised	Conversion Factor	COEF <sub>standard coal</sub>
Unit	TJ/10 <sup>3</sup> ton	tC/TJ	Fraction	tCO2/tC	tCO2/ton of standard coal
Formula	A	B	C	D	A*B*C*D/1000
	29.28	24.73	0.98	3.67	2.602

The COEF standard coal is 2.602 tCO2/ton of standard coal.

The carbon emission factor for the newly build coal-fired power plants is calculated using the following formula:

$$EF_{\text{Coal-fired new plants}} = ESCC_{\text{Coal-fired new plants}} * COEF_{\text{standard Coal}}$$

The following are the key parameters for the calculation of EF Coal-fired new plants

Key Parameters	Power Plant Efficiency (ESCC)	COEF <sub>standard coal</sub>	EF <sub>Coal-fired new plants</sub>
Unit	kg of standard coal /Mwh	tCO2/ton of standard coal	tCO2/Mwh
	F	H	F*H/1000
	328.4	2.602	0.854

The carbon emission factor for the newly build coal-fired power plants is 0.854 tCO2/Mwh.

The following table shows the calculation of the base-year installed capacity, the composition of new capacity addition by fuel types, data source and the calculation process.

Table 7. Calculation of fuel mix of the 20% of total electricity supplied by new capacity

	A	B	C	D	E
	Installed Capacity 2000	Installed Capacity 2003	Baseyear - Installed Capacity	New Capacity Additions	Average Generation Hours in 2003
Data Source	Calculated from China Electric Power Yearbook 2001 - Page 666	China Electric Power Yearbook 2004 - Page 709	Calculated value to set the new capacity to generate 20% of total electricity supply in 2003	B-A	Calculated Generation/installed capacity by fuel type
Thermal power plant	3,600.00	4,745.00	3,634.92	1,110.08	6,216
Hydro power plant	2,952.00	3,280.60	2,962.02	318.58	2,991
Wind Power		21.60	-	21.60	1,528
Nuclear Power					
Total	6,552.00	8,047.20	6,597.60	1,449.60	
Capacity as of Installed Capacity of 2003	81%	100%	82%	18%	

Table 8. Calculation of Weighted average Build Margin Emission Factor

	F	G	H	I	J
	Parasite Use Rate	Electricity Supplied to grid from new capacity (Gwh)	Split of electricity supplied from New Capacity	Emissions Factor of newly built power plants (tCO2e/MWh)	Weighted Average Build Margin Emissions Factor, EF_BMy
Data Source		D*E*(1-F)/1000	G by fuel type/ (Total of Column G)		I*H
Thermal power plant	6.00%	6,486.02	86.8%	0.854	0.742
Hydro power plant	0.37%	949.31	12.7%	-	-
Wind Power		33.00	0.4%	-	-
Nuclear Power				-	-
Total		7,468.33	100%		0.742



Total Electricity supply in 2003 (Gwh)	37,341.66
Electricity supplied from new capacity (G) as % of total Electricity supply in 2003	20%

The build margin emission factor as a result of above computation is 0.742 tCO<sub>2</sub>e/Mwh.

### Step 3 – Calculation of the Baseline Emission Factor

The Baseline Emission Factor was gotten using a combined margin (CM), which consists of the simple average of both OM and BM. All margins expressed in tCO<sub>2</sub>/MWh.

$$CM = 0.5 * OM + 0.5 * BM$$

$$CM = 0.5 * (0.982 + 0.742) = 0.862 \text{ tCO}_2 / \text{MWh}$$

The Baseline Emission Factor is 0.862 tCO<sub>2</sub>/MWh.

### Step 4 – Calculation of the Baseline Emissions Reductions

The estimated CER per year for The Project, calculated as:

$$ERs \text{ per year} = CMEF * (\text{Estimated Annual Project Electricity Supply in MWh})$$

In the first phase, the annual electricity supply of the project is 370 GWh, the emission reductions is:  $0.862 * 370,395 = 319,277 \text{ tCO}_2$  per year.

It is conservatively prediction that 80% of average electricity will be expected to generate for the first reporting year, then, the ER for the first reporting year is  $319,277 * 80\% = 255,422 \text{ tCO}_2$ .

The ERs for the first crediting period:

**3,128,919 tCO<sub>2</sub> of ERs**

#### [Monitoring methodology]

Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources (ACM0002) is applied for the project because it is a grid-connected zero-emission renewable power generation activity and meets all the requirements stated in the Monitoring Methodology (ACM0002):

1. The Project is a run-of-river hydro power plant;
2. The Project is not an activity that involves switching from fossil fuels to renewable energy at the project site;
3. The electricity grid is clearly identified (as the Gansu Power Grid) and information is publicly available on the characteristics of the grid.

In addition, no leakages were identified and hence will not be monitored.

The variables of Electricity generation from the Project will be monitored according to the rule of the Monitoring Methodology.

**[Environment impacts]**

The project carried out an environmental impact assessment (EIA) in accordance with national, regional and local environmental regulations. The results of the EIA were positive.

**[DNA approval]**

The approval letter from DNA of China was issued on August 30 of 2005, remarks indicated in the letter contain: 1) China ratified the Kyoto Protocol to be a Party on August 30 2002; 2) the Xiaogushan hydropower project meets the permission requests of Chinese regulations for development of CDM project; 3) Gansu Zhangye Xiaogushan Hydropower Company Ltd. is permitted to be as Chinese participant and implement the project activity; 4) Gansu Zhangye Xiaogushan Hydropower Company Ltd. is allowed to sell Emission Reductions from the project to the Prototype Carbon Fund in total of 3,200,000 tCO<sub>2</sub>e.