



# Guidelines for the Design of CDM Projects and a Project related CDM Analysis

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## **Imprint**

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Published and produced by: Österreichische Energieagentur – Austrian Energy Agency  
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E-Mail: [office@energyagency.at](mailto:office@energyagency.at), Internet: <http://www.energyagency.at>

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Layout: Carmen Marksteiner

Produced and published in Vienna

Reprint allowed in parts and with detailed reference only. Printed on non-chlorine bleached paper.

# Table of contents

Executive Summary .....	1
<b>1 Introduction .....</b>	<b>3</b>
<b>2 The Clean Development Mechanism (CDM) .....</b>	<b>4</b>
<b>2.1 The Kyoto Protocol and CDM .....</b>	<b>4</b>
<b>2.2 The CDM project cycle.....</b>	<b>7</b>
2.2.1 Project design and formulation.....	8
2.2.2 National approval .....	10
2.2.3 Validation/Registration .....	10
2.2.4 Project financing.....	10
2.2.5 Transaction costs .....	10
2.2.6 Monitoring.....	11
2.2.7 Verification/Certification .....	11
2.2.8 Issuance of CERs .....	11
<b>2.3 CDM Activities .....</b>	<b>12</b>
2.3.1 Bundling of small scale CDM .....	12
2.3.2 Programme of activities (PoA) .....	12
<b>3 Guidelines for the design of CDM projects.....</b>	<b>14</b>
<b>3.1 General recommendations.....</b>	<b>14</b>
3.1.1 Sources of information for developing a CDM project .....	14
3.1.2 Choice of methodology .....	14
3.1.3 The validation process .....	14
3.1.4 The verification process .....	16
<b>4 Current CDM development.....</b>	<b>18</b>
<b>4.1 District heating projects in the CDM pipeline .....</b>	<b>21</b>
<b>5 CDM project examples.....</b>	<b>25</b>
<b>5.1 A retrofit programme for decentralised heating stations in Mongolia .....</b>	<b>25</b>
<b>5.2 Thermal efficiency improvement initiatives in coal fired boiler system .....</b>	<b>26</b>
<b>5.3 Efficiency improvement of turbine generator to reduce fossil fuel         consumption in the coal fired boiler system.....</b>	<b>27</b>
<b>5.4 JCT Phagwara small scale biomass project .....</b>	<b>28</b>
<b>5.5 Incauca S. A. fuel switch from coal to green harvest residues.....</b>	<b>29</b>
<b>5.6 Meizhou landfills gas recovery and utilization as energy.....</b>	<b>30</b>
<b>5.7 Jilin Tongyu Tuanjie wind project, 100.3 MW.....</b>	<b>31</b>
<b>5.8 Korea Land Corporation Pyeongtaek Sosabul-district new and         renewable energy model city (Photovoltaic system + solar water         heating system).....</b>	<b>32</b>
<b>6 CERs: demand and market prices .....</b>	<b>33</b>
<b>6.1 The European Union Emissions Trading Scheme (EU ETS) .....</b>	<b>33</b>

- 6.1.1 Revision of the EU ETS through the Climate and Energy Package of the EU .... 34
- 6.1.2 The role of “flexible mechanisms” for reaching the Austrian Kyoto target ..... 36
- 6.1.3 Overview of buyer countries ..... 37
- 6.2 CER market prices ..... 38**
- 6.3 Sources of finance for CDM projects ..... 39**
- 7 The Uliastai heating plant .....42**
  - 7.1 The framework for implementing CDM projects in Mongolia ..... 42**
  - 7.2 Development of a CDM project idea ..... 43**
    - 7.2.1 Description of the improvement of the Uliastai heating plant ..... 44
    - 7.2.2 CDM project idea ..... 46
      - 7.2.2.1 Recommendations for the realization of the CDM project idea..... 47
- 8 Abbreviations .....49**
- 9 List of Figures and Tables .....50**
- 10 Bibliography .....52**

## Executive Summary

Mongolia signed the Kyoto Protocol in December 1999, and since then Mongolia worked towards the implementation of the Clean Development Mechanism (CDM). A CDM designated national authority (DNA) which was officially registered at the Secretariat of United Nations Framework Convention on Climate Change, was established in 2004.

Until September 2009, only three CDM projects are registered at the CDM Executive Board:

- Taishir Hydropower Project, March 2007
- Durgun Hydropower Project, March 2007
- A retrofit programme for decentralised heating stations in Mongolia, July 2006

Mongolia's minor role in the CDM market becomes evident in the following figure, which shows the number of CDM projects in Asia by country. Most of the CDM projects in Asia are hosted by China and India.

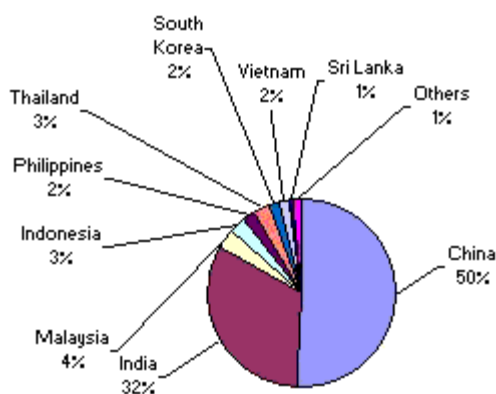


Figure 1 : Number of CDM projects in Asia by country

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

The purpose of this report is to increase awareness for CDM in Mongolia, and thus the report contains general information on CDM and the CDM market as well as recommendations for the design of CDM projects. One of the first items to check when developing a CDM project is whether it fits with an approved methodology. Another crucial point is that due to the complexity of the validation process, the stakeholders involved should maintain an open communication channel with each other and each of the parties involved dedicates a project manager, acting as a central point of contact, who is responsible for driving the process along and coordinates with the respective parties involved. In regard to the verification process through the Designated Operational Entity (DOE), the project developer should make sure that the project is implemented exactly as proposed in the design stage and as described in the registered PDD. This is of utmost importance, and will determine the success of the CDM project.

This report further investigates the feasibility of using CDM for the improvement of urban heating systems in Mongolia. Therefore, the existing district heating projects in the CDM

pipeline were analyzed. Since district heating projects may cover different project types (such as energy efficiency supply/distribution or renewable energy) they are hard to track. Only two methodologies are directly concerned with it:

- AM 0056 “Efficiency improvement by boiler replacement or rehabilitation and optional fuel switch in fossil fuel-fired steam boiler systems” (Type: EE Industry)
- AM 0058 “Introduction of a new primary district heating system” (Type: Energy distribution)

According to the CDM project pipeline none of the 159 EE Industry projects registered is a AM 0056 project and 5 of the 8 registered energy distribution projects are AM 0058 projects. All of these 5 projects are located in China. Furthermore, small scale district heating project activities can be found in the methodology AMS-II.B (Supply side energy efficiency improvements – generation). At the end of June 2009 there was only one DH related project (“A retrofit programme for decentralised heating stations in Mongolia”) registered in the CDM project pipeline.

In addition, the report also identifies potential partners and provides a list of multilateral, governmental and private sector carbon funds. Most of the funds prefer to contract projects that are well advanced in the planning stage and have already identified underlying finance for the project itself. These funds typically require some form of proof of the economic viability of the project and the technology used. Besides that, funds prefer projects which have already assessed their applicability under the CDM regulatory framework. That includes for example the existence of an approved methodology and an initial assessment of the likely emission reductions resulting from the project.

Based on the outcome of the refurbishment of the Uliastai heating plant a concrete CDM project idea was developed. In Mongolia approx. 450 small capacity heating stations (in aimag centres, soum centres and city suburbs not connected to centralized heating systems) with approx. 1,200 boilers and a total heat load of 800 MW are in operation in the country. About 20 % of these heating stations (90 -100) are located in aimag centres and rural villages. The individual heat load of these small capacity heating stations is between 0.8 and 2.1 MW. Almost 100 % of these district heating plants are fired by coal from local mines. The quality of the coal is low and the transportation and purchasing costs are high. Moreover, these heating systems are highly deteriorated missing any environmental standards. Against this background and the fact that the Uliastai heating station has been retrofitted successfully within the project “Improvement of district heating systems in urban centres of Mongolia” a CDM project idea “Improvement of heating systems in urban centres of Mongolia” was developed. In regard to the realization of this CDM project idea the use of a Programme of Activities (PoA) is strongly recommended in reference to the significant benefits compared to the bundling of small-scale projects into one single CDM project approach.

# 1 Introduction

This report was compiled in the frame of the EuropeAid/122884/C/ACT/Multi project “Improvement of district heating systems in urban centres of Mongolia”. Its purpose is to increase the awareness of CDM in Mongolia and to analyse the feasibility of using CDM for the improvement of district heating systems. The report starts of with some general information regarding CDM, such as the criterias that CDM projects must satisfy and the 7 steps of the CDM project cycle.

Chapter 3 provides guidelines for the design of CDM projects referring to the choice of methodology, the validation process and the verification process. This should help the project developer to navigate the main pitfalls regarding the development and implementation of a CDM project.

The current CDM development is analyzed in Chapter 4 exemplified by the growth in registered project activities, the registered project activities by region, the top countries by issued CERs and the CERs expected until 2012 from CDM projects in each sector. Chapter 4 also investigates the existing district heating projects in the CDM pipeline.

Chapter 5 gives information regarding CDM project examples such as “A retrofit programme for decentralised heating stations in Mongolia” or “Thermal efficiency improvement initiatives in a coal fired boiler system in India”.

Chapter 6 is dedicated to the description of the demand for CERs, the CERs market prices as well as the sources of finance for CDM projects. Since the EU ETS is currently the largest emission trading system in operation and also the most significant in terms of generating demand for CERs, it is analysed in more detail. In addition, the revision of the EU ETS through the Climate and Energy Package of the EU is also described.

Based on the experiences gained during the refurbishment of the Uliastai heating plant a concrete CDM project idea was developed. Chapter 7 starts of with some information about the improvement of the Uliastai heating plant, and then describes the new CDM project idea in more detail. The chapter further includes recommendations for the realization of the CDM project idea.

## 2 The Clean Development Mechanism (CDM)

### 2.1 The Kyoto Protocol and CDM <sup>1</sup>

The Kyoto Protocol<sup>2</sup> includes three cooperative mechanisms which should help Annex I Parties to reduce the costs of meeting their emissions targets by achieving emission reductions at lower costs in other countries than they could domestically. These are the following:

- International Emissions Trading permits allows countries to transfer parts of their “allowed emissions” (assigned amount units).
- Joint Implementation (JI) allows countries to claim credit for emission reduction that arise from investment in other industrialized countries, which result in a transfer of “emission reduction units” between countries.
- Clean Development Mechanism (CDM) allows emission reduction projects that assist developing countries in achieving sustainable development and that generate “certified emission reductions” for use by the investing countries or companies.

In reference to the overall project goal, this report will continue to focus on all the relevant issues surrounding CDM. CDM is supervised by the Executive Board, which accredits independent organizations (operational entities) to validate proposed CDM projects, to verify the resulting emission reductions and to certify those emission reductions as Certified Emission Reductions (CERs). Besides that, the Executive Board is responsible for the maintenance of a CDM registry, which issues new CERs, manages an account for CERs levied for adaptation and administration expenses, and maintain a CER account for each non-Annex I Party hosting a CDM project.

The following three requirements have to be met from all parties in order to participate in CDM:

- voluntary participation,
- establishment of the National CDM Authority,
- ratification of the Kyoto Protocol

Annex I Parties have to meet the following requirements in addition:

- establishment of the assigned amount under Article 3 of the Protocol,

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<sup>1</sup> Lee M., CDM Information and Guidebook, developed for the UNEP project “CD4CDM”, June 2004

<sup>2</sup> The Kyoto Protocol establishes legally binding commitments for the reduction of greenhouse gases produced by Annex I Parties (industrialized) nations, as well as general commitments for all member countries. As of 2008, 183 have ratified the protocol, which was initially adopted for use on 11 December 1997 in Kyoto (Japan) and which entered into force on 16 February 2005. Under Kyoto, industrialized countries agreed to reduce their collective GHG emissions by 5.2% compared to the year 1990.

- national system for the estimation of greenhouse gases
- national registry,
- annual inventory and
- accounting system for the sale and purchase of emission reductions.

Criteria that CDM projects must satisfy include:

- **Additionality:** Article 12 of the Protocol states that projects must result in “reductions in emissions that are additional to any that would occur in the absence of the project activity”. CDM projects must lead to real, measurable, and long-term benefits related to the mitigation of climate change. The additional greenhouse gas reductions are calculated with reference to a defined baseline. This baseline has to be established on a project-specific basis by the project participants complying with approved methodologies.

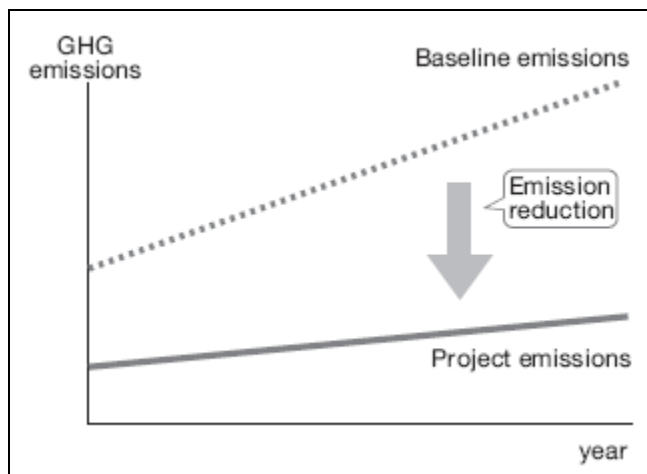


Figure 2: Concepts of baseline and additionality

- **Sustainable development:** The protocol specifies that the purpose of CDM is to assist non-Annex I Parties in achieving sustainable development. There is no common guideline for the sustainable development criterion and it is up to the developing host countries to determine their own criteria and assessment process. The criteria for Sustainable Development can be broadly categorized as:
  - **Social criteria:** The project improves the quality of life, alleviates poverty, and improves equity.
  - **Economic criteria:** The project provides financial returns to local entities, results in positive impact on balance of payments, and transfers new technology.
  - **Environmental criteria:** The project reduces greenhouse gas emissions and the use of fossil fuels, conserves local resources, reduces pressure on the local environments, provides health and other environmental benefits, and meets energy and environmental policies.

While CDM lowers the cost of compliance with the Kyoto protocol for the industrialized countries, developing countries benefit from the contribution towards sustainable development e.g. through the transfer of technology and financial resources, sustainable ways of energy production, increasing energy efficiency or poverty alleviation through income and employment generation.

The sectors in which CDM projects may be implemented include:

- End-use energy efficiency improvement
- Supply-side energy efficiency improvement
- Renewable energy
- Fuel switching
- Agriculture
- Industrial processes
- Solvent and other product use
- Waste management
- Sinks (only afforestation and reforestation)

## 2.2 The CDM project cycle<sup>3</sup>

This chapter describes the 7 steps of the CDM project cycle, which are also illustrated in Figure 3.

### Project cycle for the CDM

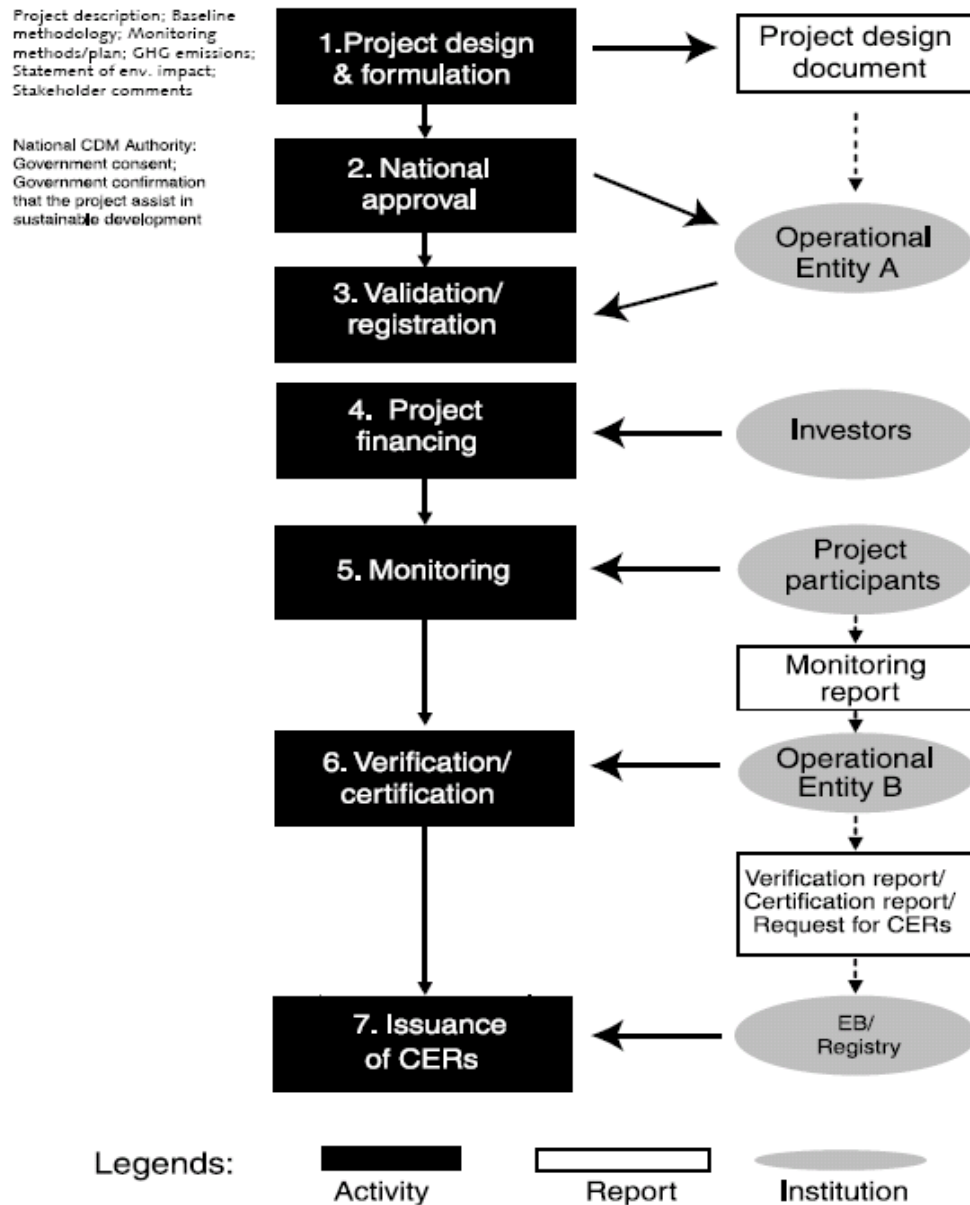


Figure 3: CDM project cycle

<sup>3</sup> Lee M., CDM Information and Guidebook, developed for the UNEP project "CD4CDM", June 2004

## 2.2.1 Project design and formulation

The first step in the CDM project cycle is the project design and formulation which has an influence on all the following steps. A thorough design and formulation of the project will increase the chance of an eventual success for the whole project.

In order to get a CDM project approved and registered by the Executive Board (EB), the project participants must prepare in a first step the so-called Project Design Document (PDD) following the detailed outline shown on the CDM website of the UNFCCC Secretariat<sup>4</sup>. The required content of a PDD is as following:

- A. General description of project activity
- B. Application of a baseline and monitoring methodology
- C. Duration of the project activity/crediting period
- D. Environmental impacts
- E. Stakeholders comments

Annex 1: Contact information on participants in the project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

For **small-scale CDM projects** there are easier requirements (simplified baseline and monitoring methodology) to reduce the transaction costs. According to the CDM procedures the following three types of small-scale CDM projects are possible:

- Renewable energy project activities with a maximum output capacity equivalent of up to 15 MW;
- Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15 GWh per year;
- Other project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 thousand tonnes of CO<sub>2</sub>equ annually.

These three types are interpreted by the EB as mutually exclusive. That means for example that when a project is not eligible for type I, it cannot be eligible for type III either, even though it emits less than 15 kt CO<sub>2</sub>.

Table 1 represents the small-scale CDM project activity categories agreed by the CDM EB until now.

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<sup>4</sup> <http://cdm.unfccc.int/UserManagement/FileStorage/EIRFDM4SFMJPKCM0AO405XLWZP1ES9>

Table 1: Approved small-scale CDM project activity categories

<b>Project types</b>	<b>Small-scale CDM project activity categories</b>
<b>Type I: Renewable energy projects</b>	<ul style="list-style-type: none"> <li>A. Electricity generation by the user</li> <li>B. Mechanical energy for the user with or without electrical energy</li> <li>C. Thermal energy production with or without electricity</li> <li>D. Grid connected renewable electricity generation</li> <li>E. Switch from non-renewable biomass for thermal application by the user</li> </ul>
<b>Type II: Energy efficiency improvement projects</b>	<ul style="list-style-type: none"> <li>A. Supply side energy efficiency improvements – transmission and distribution</li> <li>B. Supply side energy efficiency improvements – generation</li> <li>C. Demand-side energy efficiency activities for specific technologies</li> <li>D. Energy efficiency and fuel switching measures for industrial facilities</li> <li>E. Energy efficiency and fuel switching measures for buildings</li> <li>F. Energy efficiency and fuel switching measures for agricultural facilities and activities</li> <li>G. Energy efficiency measures in thermal applications of non-renewable biomass</li> <li>H. Energy efficiency measures through centralization of utility provisions of an industrial facility</li> <li>I. Efficient utilization of waste energy in industrial facilities</li> <li>J. Demand-side activities for efficient lighting technologies</li> </ul>
<b>Type III: Other project activities</b>	<ul style="list-style-type: none"> <li>A. Urea offset by inoculant application in soybean-corn rotations on acidic soils on existing cropland</li> <li>B. Switching fossil fuels</li> <li>C. Emission reductions by low-greenhouse gas emitting vehicles</li> <li>D. Methane recovery in animal manure management systems</li> <li>E. Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment</li> <li>F. Avoidance of methane emissions through controlled biological treatment of biomass</li> <li>G. Landfill methane recovery</li> <li>H. Methane recovery in wastewater treatment</li> <li>I. Avoidance of methane production in wastewater treatment through replacement of anaerobic systems by aerobic systems</li> <li>J. Avoidance of fossil fuel combustion for carbon dioxide production to be used as raw material for industrial processes</li> <li>K. Avoidance of methane release from charcoal production by shifting from traditional open-ended methods to mechanized charcoaling process</li> <li>L. Avoidance of methane production from biomass decay through controlled pyrolysis</li> <li>M. Reduction in consumption of electricity by recovering soda from paper manufacturing process</li> <li>N. Avoidance of HFC emissions in rigid Poly Urethane Foam (PUF) manufacturing</li> <li>O. Hydrogen production using methane extracted from biogas</li> <li>P. Recovery and utilization of waste gas in refinery facilities</li> <li>Q. Waste Energy Recovery (gas/heat/pressure) Projects</li> <li>R. Methane recovery in agricultural activities at household/small farm level</li> <li>S. Introduction of low-emission vehicles to commercial vehicle fleets</li> <li>T. Plant oil production and use for transport applications</li> <li>U. Cable Cars for Mass Rapid Transit System (MRTS)</li> <li>V. Decrease of coke consumption in blast furnace by installing dust/sludge recycling system in steel works</li> <li>W. Methane capture and destruction in non-hydrocarbon mining activities</li> <li>X. Energy Efficiency and HFC-134a Recovery in Residential Refrigerators</li> <li>Y. Methane avoidance through separation of solids from wastewater or manure treatment systems</li> <li>Z. Fuel Switch, process improvement and energy efficiency in brick manufacture</li> </ul>

Source: <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

If a project belongs to none of the approved categories of small-scale projects, the project developer should propose a new category to the EB before submitting a PDD.

## 2.2.2 National approval

All countries wishing to participate in the CDM must establish a National CDM Authority to evaluate and approve the projects and serve as a point of contact. In the host country the Designated National Authority (DNA) has the responsibility to decide whether the project activity makes a contribution to achieving the country's sustainability goals and whether the country agrees to participate in the project. Therefore a standardized system for the screening, evaluation and approval of projects should be implemented.

## 2.2.3 Validation/Registration

A designated operational entity (DOE; typically private companies), chosen by the project participants reviews the PDD, invites feedback from NGOs and local communities, and decides whether or not it should be validated. If validated, the DOE forwards it to the EB for formal registration. The DOEs accredited by the EB will be listed on the UNFCCC CDM website.

For the registration of a CDM project a fee has to be paid to the EB. The EB must register the CDM project within 8 weeks (4 weeks for small-scale CDM projects) of the date of receipt of the request.

## 2.2.4 Project financing

After validation and registration of the project, project developers start to implement the project which also implies project financing. Project financing involves risks from different sources such as project risks, political risks and market risks. Therefore project developers are required to properly manage any potential risks.

## 2.2.5 Transaction costs

Table 2 gives an overview of the CDM transaction costs which consist of pre-operational costs, implementation costs and trading costs. While transaction costs per ton of CO<sub>2</sub> for large projects is usually very small, for small-scale it can be quite significant.

Table 2: CDM transaction costs

	Transaction cost component	Description
<b>Pre-operational phase design</b>	Search costs	Costs incurred by investors and hosts as they seek out partners for mutually advantageous projects.
	Negotiation costs	Includes those costs incurred in the preparation of the PDD and also document assignment and scheduling of benefits over the project time period. It also includes expenses in organizing public consultation with key stakeholders.
	Baseline determination	Development of a baseline
	Approval costs	Costs of authorization from host country
	Validation costs	Costs incurred in reviewing and revising the PDD by operational entity
	Review costs	Costs of reviewing a validation document
	Registration costs	Registration by UNFCCC Executive Board
<b>Operational phase</b>	Monitoring costs	Costs to collect data
	Verification costs	Costs to hire an operational entity and to report to the UNFCCC Executive Board
	Review costs	Costs of reviewing a verification
	Certification costs	Includes costs in the issuance of CERs by UNFCCC EB
	Enforcement costs	Includes administrative and legal costs incurred in enforcing transaction agreements
<b>Trading</b>	Transfer costs	Brokerage costs
	Registration costs	Costs to hold an account in national registry

### **2.2.6 Monitoring**

Monitoring means the systematic surveillance of a project's performance by measuring and recording target indicators relevant to the objective of the project. Therefore a project developer has to prepare a monitoring plan which is transparent, reliable and relevant and which has to contain all relevant data to

- estimate GHG emissions occurring within the project boundary;
- determine the baseline THG emissions;
- determine the leakage<sup>5</sup>.

A monitoring methodology connected to the baseline methodology must be chosen in the database on the CDM homepage.

### **2.2.7 Verification/Certification**

Verification is the periodic independent review and ex post determination by the DOE of the monitored emission reductions that have occurred as a result of the CDM project. It includes the periodic auditing and monitoring results, the assessment of achieved emission reductions and the assessment of the project's continued conformance with the monitoring plan. The DOE produces a verification report and then certifies the amount of CERs generated by the CDM project.

According to the CDM procedures, a DOE cannot normally perform the verification/certification of a CDM project if it has validated the same project. Exceptions are small-scale CDM projects and projects where the EB gives permission.

The certification is a written assurance by the DOE that during a specified time period, a project activity achieved the emission reductions as verified. The DOE has to inform the project participants and the EB of its certification decision and has to make the certification report publicly available. The certification reports constitutes a request to the EB for issuance of CERs equal to the verified amount of emission reductions. Unless a project participant or three Executive Board members request a review within 15 days, the EB will instruct the CDM registry to issue the CERs.

### **2.2.8 Issuance of CERs**

The EB has to issue the CERs to the project partners within 15 days after the date of receipt of the request for issuance.

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<sup>5</sup> Leakage is a measurable emission increase or decrease that is attributable to the project, but which is outside of the CDM project boundary or timeframe.

## 2.3 CDM Activities

In order to set the scene for the analysis to follow regarding the feasibility of using CDM for the improvement of district heating systems in Mongolia, it is paramount to introduce the concept of bundling and the concept of Programme of Activities within the CDM in more detail.

### 2.3.1 Bundling of small scale CDM

Bundle defines as bringing together several small scale project activities to form a single CDM project activity or portfolio without the loss of distinctive characteristics of each project activity. Project activities within a bundle can be arranged in one or more sub-bundles, with each project activities retaining it distinctive characteristics. Such characteristics include its:

- technology/measure;
- location;
- application of simplified baseline methodology.

Project activities within a sub-bundle belong to the same type. The sum of the output capacity of project activities within a sub-bundle shall not exceed the maximum output capacity limit for its type.

Project activities wishing to be bundled shall indicate this when making a request for registration and provide a written statement along with the submission of the bundle indicating:

- That all project participants agreed that their individual project activities are part of the bundle
- One project participant who represents all project participants in order to communicate with the EB in accordance with approved Modalities and Procedures of Communication

It is important to understand that the composition of bundles cannot change over time and that all project activities in the bundle have to have the same crediting period (i.e. the same length and the same starting date of the crediting period).

### 2.3.2 Programme of activities (PoA)

The Programmatic Approach was officially established in 2007 by the adoption of Guidelines and Procedures for PoA by the CDM EB. The PoA approach was designed in order to increase the possibility for small scale projects. A PoA is a voluntary coordinated action by a private or public entity which coordinates and implements any policy/measure or stated goal, which leads to GHG emission reductions or enhancement of GHG removals that are additionally to any that would occur in the absence of the PoA, via an unlimited number of CDM programme activities (CPA).

A CDM PoA occurs at two levels:

- Programm level
  - PoA is the organisational and financial framework that provides structure to the activities, and is managed by a coordinating entity for a period of no longer than 28 years.
- Activity level
  - A single measure or a set of measures to reduce GHGs is applied to many plants/installations of the same type over the time life of the Programme.

There are significant difference between the PoA approach and bundling of small scale projects:

Table 3: Differences between bundling and PoA approach

	<b>Bundle</b>	<b>PoA</b>
<b>Sites</b>	Ex-ante identification of exact sites	GHG reductions must be estimated ex-ante. Exact sites may not be known, but type and maximum potential volume is known
<b>Project participants</b>	1) Each single activity is represented by a CDM project participant. 2) Project participants are identical to entities achieving reductions	1) Only the entity implementing the programme represents the project activity as a CDM project participant. 2) The project participant does not necessarily achieve the GHG-reducing activities, but rather promotes others to do so.
<b>Project activities</b>	1) Each activity in the bundle is an individual CDM project activity. 2) Composition does not change over time. 3) All projects in a bundle must be submitted and start at the same time.	1) The sum of all individual activities under the programme is the CDM project activity. 2) No pre-fixed composition (uptake on an incentive could be unknown). 3) Programme is validated and registered based on identification of targeted activities. Actual reductions are not confirmed until verification, and that can be done by sampling.
<b>Size</b>	The size of the bundled small-scale activities has to be under the standard small-scale threshold	The size of the single CPAs have to be below the small-scale threshold, allowing the overall PoA size to be unlimited.

Source: CD4CDM Working Paper No. 3, 2007

## 3 Guidelines for the design of CDM projects

### 3.1 General recommendations<sup>6</sup>

#### 3.1.1 Sources of information for developing a CDM project

When developing a CDM project it is worthwhile to visit the UNFCCC-CDM website (<http://cdm.unfccc.int>), where all rules and decisions governing the CDM can be found.

Other useful links include:

<http://www.cd4cdm.org>

<http://cdmpipeline.org>

#### 3.1.2 Choice of methodology

One of the first items to check when developing a CDM project is whether it fits with an approved methodology. The list of baseline and monitoring methodologies approved by the CDM Executive Board can be found in the “Methodologies” section of the UNFCCC-CDM website. If none of the approved methodologies fit, a new one or a revision to an old one needs to be proposed. This can be an operose process, increasing the costs and delaying the potential CDM-based return on the project. New methodologies are officially submitted by the DOE on behalf of the project developers.

#### 3.1.3 The validation process

Figure 4 shows the complexity of the validation process and the interaction required between the project developer, the DOE, the DNA of the host country, the CDM EB and other stakeholders affected by the project activity such as the local population. Therefore it is crucial that the parties involved maintain an open communication channel with each other and that each of the parties involved dedicates a project manager, acting as a central point of contact, who is responsible for driving the process along and coordinates with the respective parties involved.

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<sup>6</sup> UNEP Riso Centre, CDM PDD Guidebook: Navigating the Pitfalls, developed fort he UNEP project „CD4CDM”, April 2008

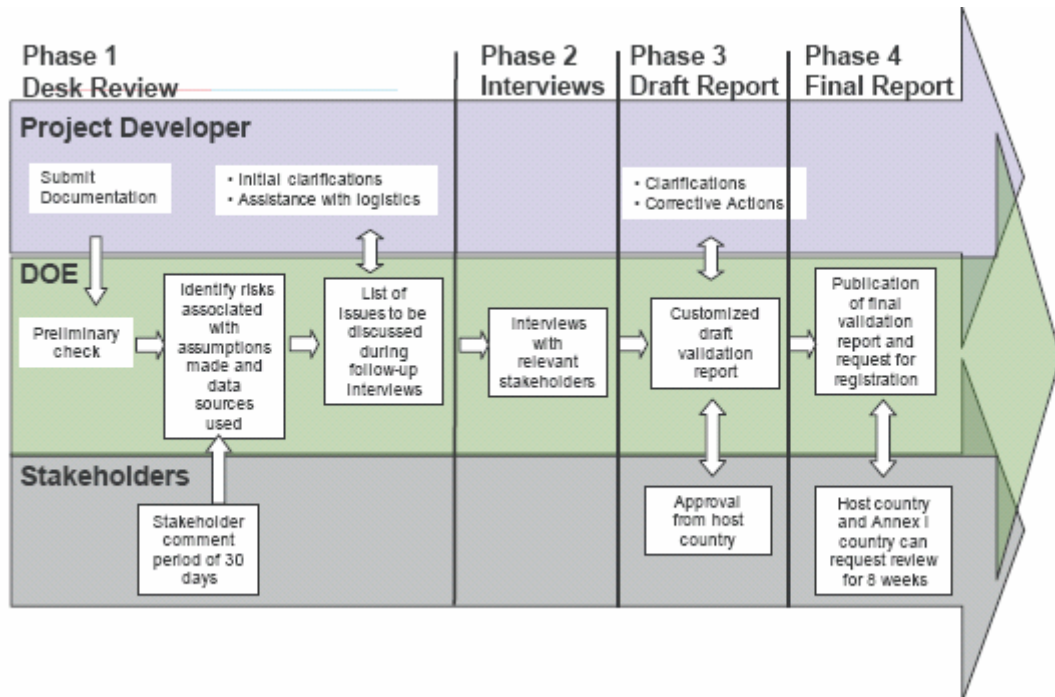


Figure 4: Steps of the validation process

Source: UNEP Riso Centre, CDM PDD Guidebook: Navigating the Pitfalls, developed for the UNEP project „CD4CDM“, April 2008

Some concrete recommendations for the project developer during the validation process are:

- Small-scale project should not be defined as a full scale project;
- All project participants should be identified clearly;
- All the applicability criteria indicated for a particular methodology should be addressed and supported with verifiable source of information;
- Baseline scenario should be explained sufficiently;
- Evidence of environmental impact assessment (EIA) and/or required construction/operating permits should be provided;
- The process of receiving an Letter of Approval (from all relevant DNAs) should be initiated at an early stage;
- A written confirmation that funding will not result in a diversion of official development assistance should be obtained from the relevant Annex I country DNA;
- The modalities of communication with the Executive Board in terms of CERs issuance and allocation instructions should be clearly stated and signed by all project participants;
- The technology should be described sufficiently;
- Project additionality has to be explained sufficiently;

- PDDs should contain sufficient evidence for the determination of the baseline scenario;
- Significant risks related to the viability of the baseline during the crediting period have to be identified;
- Information in the PDD has to be consistent and logical;
- Claims in the PDD have to match with the actual situation on project site;
- The project boundaries should be defined clearly;
- The information on the measurement methods and source of data as part of data/parameter description in the monitoring plan has to be sufficient;
- All deviations from the monitoring methodology should be justified fully and the DOE shall seek guidance from the EB on the acceptance of the deviation before submitting the project for registration;
- Detailed monitoring and project management procedures should be in place prior to the commencement of the crediting period;
- Environmental impacts of the project should be assessed formally and managed as required by host country law;
- The local stakeholder involvement process should be in line with the host country requirements and all relevant stakeholders should be contacted;
- All additional documents such as the financial calculation sheets, emission reduction calculations and evidences should be provided along with the PDD right at the start of the validation;
- Sufficient information on physical location allowing unique identification of the project activity should be provided.

#### **3.1.4 The verification process**

Verification by a Designated Operational Entity (DOE) is the periodic independent review and ex post determination of monitored emissions reduction that have occurred as a result of a registered CDM project activity during the verification period. In concrete, the objectives of the verification activity are:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan
- to evaluate the GHG emission reduction data and express a conclusion with a high, but not absolute, level of assurance about whether the reported GHG emission re-

duction data is “free” of material misstatements<sup>7</sup> and about whether the reported GHG emission data is sufficiently supported by evidence; i.e. monitoring records.

- to check the relevance and reliability of reported emissions (and calculated reductions), related to: accuracy, completeness and consistency of the information

Thus, the project proponent should send the following documents to the DOE:

- monitoring report,
- registered PDD including the monitoring plan;
- final validation report registered,
- monitoring records (project emissions, baseline emissions and leakage, as applicable)
- excel file with GHG emissions reduction calculation in a reproducible format and indicating the source of every single input

Some concrete recommendations for the project developer during the implementation of the project and the verification process are:

- The projects should be implemented exactly as proposed in the design stage as described in the registered PDD. In cases where there are changes in the implementation of the project compared to the registered PDD, the DOE performing the verification should seek guidance from the EB on how to proceed;
- Monitoring equipment should be adequate and should therefore guarantee a monitoring project performance of high quality;
- To avoid that project equipment is different from that described at project registration, it is useful to verify technical and commercial specifications of equipments and measurement devices with the technology suppliers;
- A critical analysis of the gap between ex ante estimated CER detailed in the PDD, and the actual CER claimed in the monitoring report should be provided in the monitoring report by the project participants.
- The crediting period should be the same as the project was registered. If a change is needed a special procedure (annex 31 of EB 24 report) should be followed.
- Document control and records based on a quality standard such as ISO 9001 should be followed.

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<sup>7</sup> In the context of verification of CDM projects, a material misstatement is defined as a misstatement due to errors, omissions, and misrepresentations in the reported emission reductions, which exceeds a materiality threshold of (1% for large projects, and 5% for small-scale projects) of the final emission reductions. Issues that may cause risk for material misstatement of emission reductions should be identified through the use of a project-specific checklist. The DOE should ensure that the checklist cover all necessary specific project requirements that have impact on project performance. (UNFCCC, CDM – Executive Board; CDM Validation and Verification Manual, 2008).

## 4 Current CDM development

Figure 5 shows the growth in registered project activities, projects in pipeline and projected CERs. At the end of 2008 1,231 projects have been registered and 4,200 have been submitted for validation. Since May 2007 the CDM projects increased by more than two times.

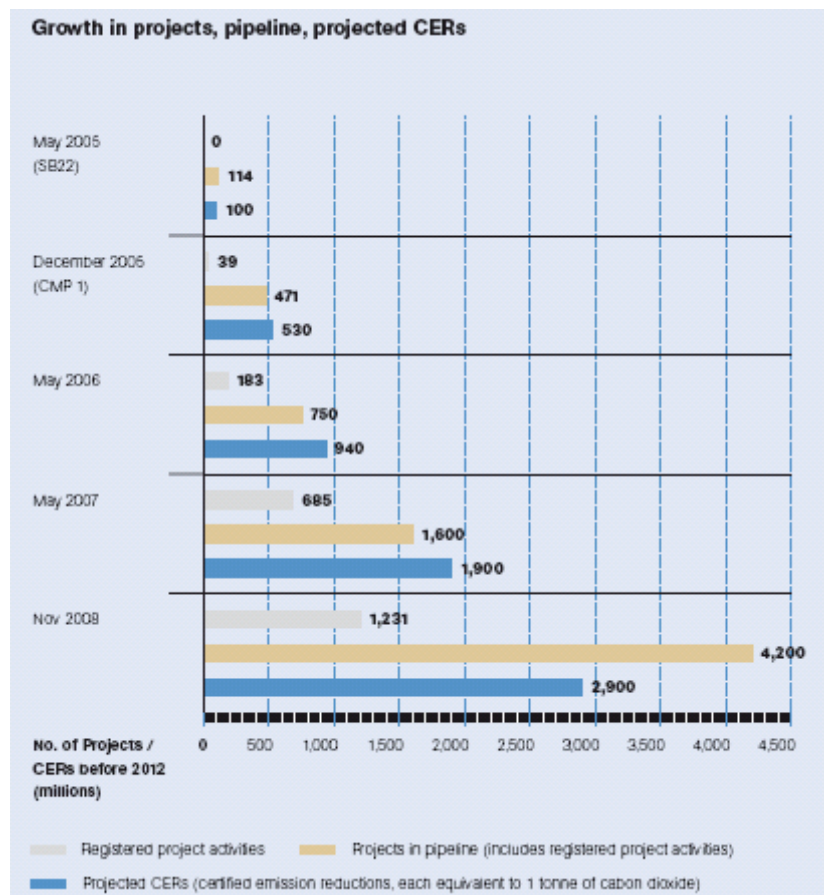


Figure 5: Growth in registered project activities, project in pipeline and projected CERs

Source: [http://unfccc.int/resource/docs/publications/08\\_cdm\\_in\\_brief.pdf](http://unfccc.int/resource/docs/publications/08_cdm_in_brief.pdf)

From the 1,231 registered projects, 30.95 % are located in Latin America and the Caribbean, 66.13 % in Asia and Pacific, 2.27 % in Africa and 0.65 % in other regions (see Figure 6).

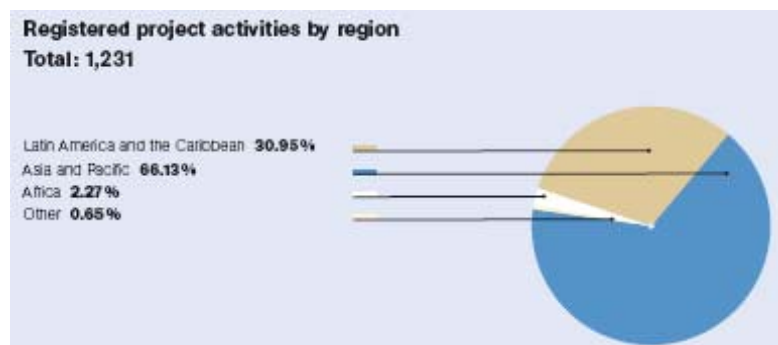


Figure 6: Registered project activities by region

Source: [http://unfccc.int/resource/docs/publications/08\\_cdm\\_in\\_brief.pdf](http://unfccc.int/resource/docs/publications/08_cdm_in_brief.pdf)

Analysing the number of CDM projects in Asia by country (see Figure 7) it can be seen that most of the projects (50 %) are hosted by China followed by India with 32 %.

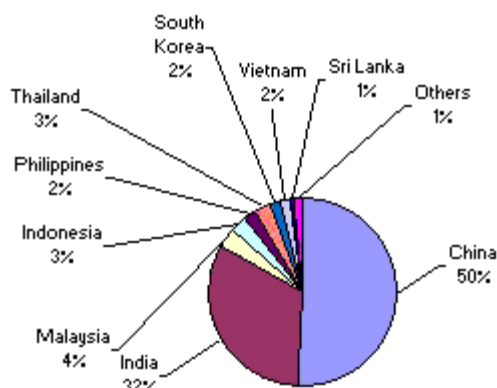


Figure 7: Number of CDM projects in Asia by country

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

By the 1<sup>st</sup> of July 2009, 4 projects are hosted by Mongolia: 1 energy distribution (district heating boiler) project in Ulaanbaatar, 2 hydro power projects in Khovd and Govi-Altai and 1 wind park project in Töv.

Analysing the issuance of CERs, 44 % have been issued to projects in China. The line in Figure 8 shows that 96 % of all issued CERs are covered by projects in 8 countries: China, India, South Korea, Brazil, Mexico, Vietnam, Chile and Egypt.

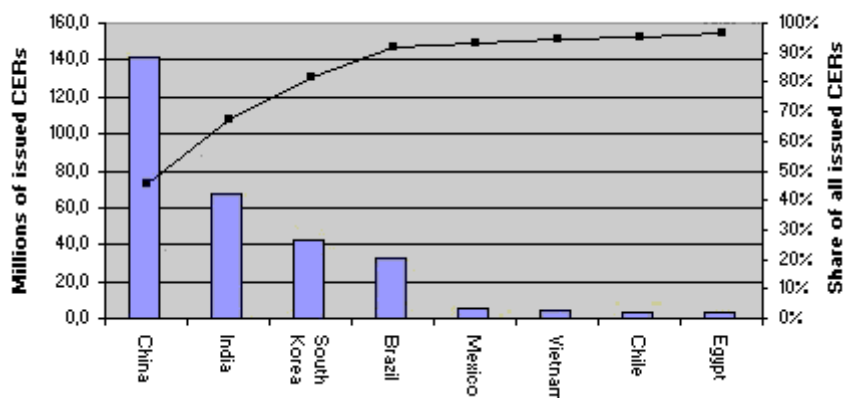


Figure 8: Top countries by issued CERs

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

Figure 9 shows the allocation of CERs expected until 2012 from CDM projects in each sector. While 60 % of the CDM projects are renewable, they take 36 % of the CERs. Energy efficiency takes 10 % of the CERs for supply-side EE and only 1 % for demand-side EE. The HFC, PFC and N<sub>2</sub>O projects only account for around 2 % of the projects but represent 27 % of their CERs in 2012.

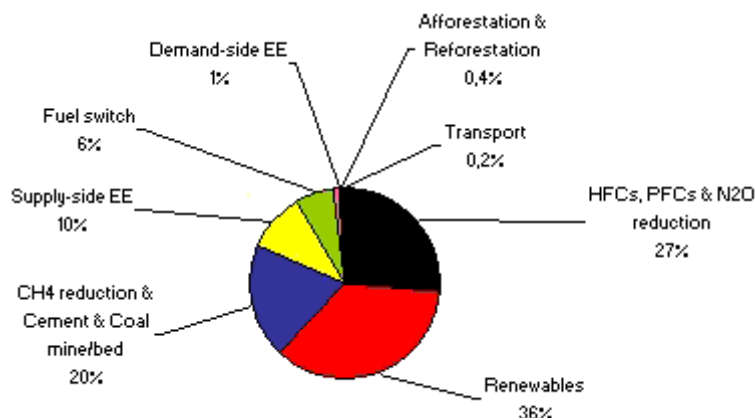


Figure 9: CERs expected until 2012 from CDM projects in each sector

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

According to the World Bank report “State and Trends of the Carbon Market 2009”<sup>8</sup> there is a severe downturn in the CDM market. A combination of the global economic downturn, uncertainty over the future of the UN’s CDM in the absence of a post 2012 climate treaty, and new competition in the Kyoto offsets market from less-regulated AAU credits were behind the fall off. Besides that, there is continuing frustration regarding the regulatory process. Delays and inefficiencies along the project cycle have continued, leading to higher transaction costs, losses in CER volumes and lower market values. Figure 10 shows that over the period April 2008 to March 2009 about 9 % of the projects requesting registration were rejected or withdrawn, 14 % were registered after a request for review was initiated and 45 % was registered after a review. The most frequently cited reason for rejection was that the project developer did not demonstrate additionality convincingly enough.

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<sup>8</sup> The World Bank, State and Trends of the Carbon Market 2009, Washington, D.C., May 2009

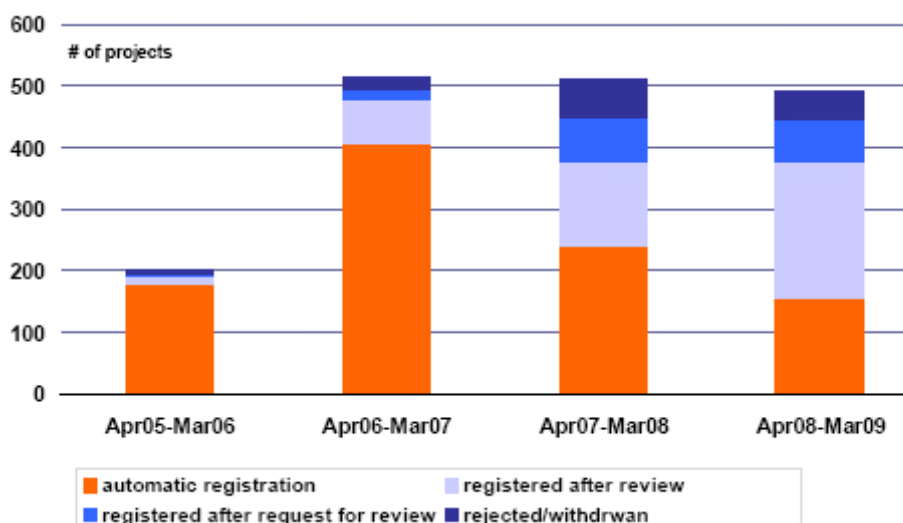


Figure 10: Increased scrutiny by the the CDM EB at registration

Source: *The World Bank, State and Trends of the Carbon Market 2009, Washington, D.C., May 2009*

Proposals for improving the CDM are discussed by a broad range of stakeholders. These proposals can be classified into three main issues: strengthening governance; improving the efficiency of the CDM process and, broadening the scope of the mechanism.<sup>9</sup>

#### 4.1 District heating projects in the CDM pipeline

As district heating projects may cover different project types (such as energy efficiency supply/distribution or renewable energy) they are hard to track. Only two methodologies are directly concerned with it:

- AM 0056 “Efficiency improvement by boiler replacement or rehabilitation and optional fuel switch in fossil fuel-fired steam boiler systems” (Type: EE Industry)
- AM 0058 “Introduction of a new primary district heating system” (Type: Energy distribution)

<sup>9</sup> For more information see for instance IETA, *State of the CDM 2008: Facilitating a smooth transition into a mature environmental financing mechanism*; UNEP, *A reformed CDM – including new mechanisms for sustainable development* (2008)

In Table 4 the CDM projects are grouped in types that are sorted according to descending frequency in the pipeline. The accumulated 2012 CERs is the total GHG reduction in the projects from the start or the crediting period until the end of 2012.

Table 4: CDM projects grouped in types

Type	CDM							
	number		CERs/Ayr (000)		2012 CERs (000)		CERs Issued (000)	
Hydro	1216	27%	131802	21%	479871	17%	11053	4%
Wind	714	16%	65135	11%	268973	10%	13025	4%
Biomass energy	646	14%	40287	7%	194255	7%	13041	4%
Methane avoidance	516	12%	24063	4%	117602	4%	5160	2%
EE own generation	411	9%	57062	9%	249281	9%	11559	4%
Landfill gas	270	6%	41234	7%	209035	8%	6068	2%
EE Industry	159	4%	5970	1%	28453	1%	994	0%
Fossil fuel switch	122	3%	40702	7%	178340	6%	2886	1%
N2O	67	1%	47818	8%	249501	9%	64467	21%
Coal bed/mine methane	67	1%	30035	5%	129870	5%	1262	0%
EE Supply side	42	1%	14951	2%	28998	1%	360	0%
Afforestation & Reforestation	49	1%	2497	0%	12362	0%	0	0%
Cement	30	1%	5824	1%	32122	1%	1203	0%
Solar	32	1%	681	0%	2232	0%	1	0%
Fugitive	26	1%	11497	2%	54569	2%	4600	1%
HFCs	23	1%	82498	13%	479243	17%	171893	56%
Geothermal	15	0%	3433	1%	16801	1%	454	0%
EE Service	16	0%	194	0%	816	0%	4	0%
EE Households	11	0%	839	0%	3319	0%	0	0%
Transport	10	0%	988	0%	4779	0%	132	0%
PFCs and SF6	12	0%	3175	1%	10643	0%	0	0%
Energy distrib.	8	0%	2449	0%	9700	0%	0	0%
Tidal	1	0%	315	0%	1104	0%	0	0%
Agriculture	1	0%	26	0%	260	0%	0	0%
CO2 capture	3	0%	29	0%	167	0%	43	0%
<b>Total</b>	<b>4467</b>	<b>100%</b>	<b>613505</b>	<b>100%</b>	<b>2762297</b>	<b>100%</b>	<b>308206</b>	<b>100%</b>
HFCs, PFCs & N2O reduction	102	2%	133491	22%	739387	27%	236360	77%
Renewables	2624	59%	241653	39%	963236	35%	37575	12%
CH4 reduction & Cement & Coal mine/bed	913	20%	112708	18%	543623	20%	18336	5,9%
Supply-side EE	461	10%	74462	12%	287980	10%	11919	3,9%
Fuel switch	122	2,7%	40702	6,63%	178340	6,5%	2886	0,9%
Demand-side EE	186	4,2%	7003	1,14%	32588	1,2%	998	0,3%
Afforestation & Reforestation	49	1,1%	2497	0,4%	12362	0,4%	0	0,0%
Transport	10	0,2%	988	0,2%	4779	0,2%	132	200%

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

None of the 159 EE Industry projects is a AM 0056 project and 5 of the 8 energy distribution projects are AM 0058 projects. These 5 projects are shown in the following table.

Table 5: AM 0058 projects in the CDM project pipeline

Title	Host country	Status	Credit Start	2020 ktCO2	Credit buyer
Southern District Heating Network in Urumqi City	China	At Validation	Jan. 2009	8176	UK(Carbon Resource Management)
Ningxia Shizuishan District Heating System Project	China	At Validation	Nov. 2009	3550	Germany (KfW)
Qitaihe District Heating Project	China	At Validation	Jan. 2009	7376	n.a.
Hohhot Western District Heating System Project	China	At Validation	Oct. 2009	2761	Luxembourg (Peony)
Nehe District Heating Project	China	At Validation	Oct. 2009	1512	UK (British Gas Trading)

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

Small scale district heating project activities can be for example found in the methodology AMS-II.B (Supply side energy efficiency improvements – generation). At the end of June 2009 there was only one DH related project (“A retrofit programme for decentralised heating stations in Mongolia”, see chapter 5) in the CDM project pipeline.

Even if the district heating projects are still rare in the CDM pipeline the potential is high. In 2003 the heat production by urban networks around the world was 3,300 TWh. With 1,750 TWh Russia is the leading heat producer, accounting more than half of the global production. With 500 TWh or 15 % of the global production China is on the second place.

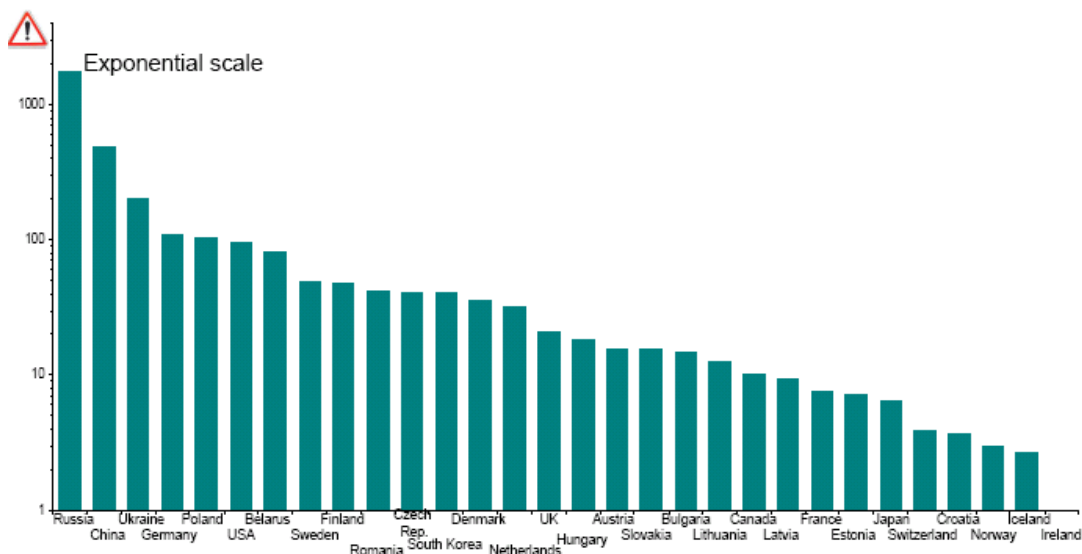


Figure 11: Heat production by urban networks worldwide in 2003 (TWh)

Source: Dalkia, *District Heating and project mechanisms (CDM/JI)*, presentation of Duconloner S. at COP 13 – IETA – 11/12/2007

Figure 12 visualizes the challenges of DH in transition economies and emerging countries. A low energy efficiency on the supply and demand side and also a underdeveloped contribution of renewable energy sources bears a high GHG emission reduction potential and therefore CDM opportunities.

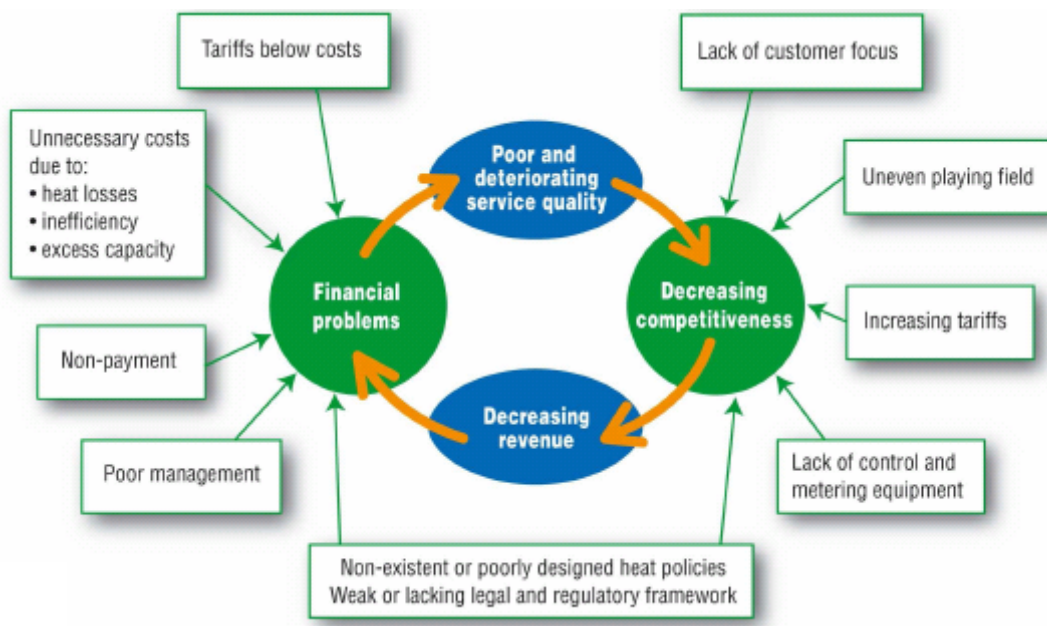


Figure 12: DH challenges in transition economies and emerging countries

Source: Dalkia, District Heating and project mechanisms (CDM/JI), presentation of Ducoloner S. at COP 13 – IETA – 11/12/2007

For example, in China more than 300 cities with district heating facilities covering more than 100 million inhabitants exist. Due to the strong urbanization and the still high number of remaining small individual boilers the demand for district heating is increasing.

For the development of new district heating projects it is essential that:<sup>10</sup>

- current methodologies are improved through the enlargement of their boundaries;
- fixed baseline concept should be used as it is already the case in all electricity projects;
- baselines are standardized country by country and additionality tests are simplified;
- capacity building on CDM for local stakeholders so that CDM is integrated as an additional revenue to modernize and develop district heating plants;
- a transparent post 2012 regime: district heating rehabilitation and development are massive investment projects with very long-term perspectives (up to 25 years); therefore the market needs to have certainty on the future regime to launch new CDM projects

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<sup>10</sup> Dalkia, District Heating and project mechanisms (CDM/JI), presentation of Ducoloner S. at COP 13 – IETA – 11/12/2007

## 5 CDM project examples

### 5.1 A retrofit programme for decentralised heating stations in Mongolia

Title	<b>A retrofit programme for decentralized heating stations in Mongolia</b>
Host country	Mongolia (Ulaanbaatar)
Authorized participants	<ul style="list-style-type: none"> <li>• Prokon Nord Energiesysteme GmbH, Leer/Germany</li> <li>• Mongol Zuukh XXI Ltd., Ulaanbaatar/Mongolia</li> </ul>
Status	Registered
Type	Energy distribution
Sub-type	District heating boilers
Methodology	AMS-II.B.
Crediting period	September 2006 – September 2016
CO <sub>2</sub> (kt) reduction over the crediting period	119
Credit buyer	n.a.
PDD Consultant	PROKON Nord
Validator	TÜV Nord
URL	<a href="http://cdm.unfccc.int/Projects/DB/RWTUV1150300431.15/view">http://cdm.unfccc.int/Projects/DB/RWTUV1150300431.15/view</a>
Description	Subject of this project is the retrofitting of a bundle of four heating stations in Ulaanbaatar and the wider suburban areas of Mongolia's capital by replacing outdated and inefficient boiler units based on Russian and Chinese designs by modern high efficiency 1.5 MW boiler units (MZ 1.500 XXI).

## 5.2 Thermal efficiency improvement initiatives in coal fired boiler system

Title	<b>Thermal efficiency improvement initiatives in coal fired boiler system</b>
Host country	India (West Bengal)
Authorized participant	Indian Rayon & Industries Limited – Unit Jaya Shree Textiles
Status	Registered
Type	EE supply side
Sub-type	Higher efficiency steam boiler
Methodology	AMS-II.B.
Crediting period	Apr 2001 – March 2011
CO2 (kt) reduction over the crediting period	54
Credit buyer	n.a.
PDD Consultant	Indian Rayon and Industries
Validator	SGS
URL	<a href="http://cdm.unfccc.int/Projects/DB/SGS-UKL1139821468.24/view">http://cdm.unfccc.int/Projects/DB/SGS-UKL1139821468.24/view</a>
Description	<p>The purpose of the project activity is to improve the efficiency levels of the coal fired boiler, which provides process steam to the production department of Jaya Shree Textiles. The energy efficiency measures include:</p> <ul style="list-style-type: none"> <li>• Installation of bed modulation system</li> <li>• Implementation of an automatic Furnace Draft control system</li> </ul>

### 5.3 Efficiency improvement of turbine generator to reduce fossil fuel consumption in the coal fired boiler system

Title	<b>Efficiency improvement of Turbine Generator to reduce fossil fuel consumption in the coal fired boiler system</b>
Host country	India (West Bengal)
Authorized participants	<ul style="list-style-type: none"> <li>• ITC Paperboards and Speciality Papers Division (PSPD) Tribeni Unit</li> <li>• ABN AMRO Bank N.V. London Branch</li> </ul>
Status	Registered
Type	EE supply side
Sub-type	Power plant rehabilitation
Methodology	AMS-II.B.
Crediting period	April 2002 - Mar 2012
CO <sub>2</sub> (kt) reduction over the crediting period	40
Credit buyer	United K. (ABN AMRO Bank)
PDD Consultant	PricewaterhouseCoopers
Validator	DNV
URL	<a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1166678969.46/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1166678969.46/view</a>
Description	<p>The purpose of the project is to improve the efficiency of the current turbine by replacing the turbine (TG-1) with an efficient alternative and avoid excessive GHG emission occurring from fossil fuel combustion to generate steam used for electricity. The project leads to direct reduction of steam consumed for generation of electricity and thus directly avoids combustion of fossil fuel used for generation of steam. ITC Paperboards and Speciality Papers Division (PSPD) at Tribeni meet its electricity demand through in-house generation and buys small quantities of power from state grid electricity system, i.e. West Bengal State Electricity Board.</p>

## 5.4 JCT Phagwara small scale biomass project

Title	<b>JCT Phagwara Small Scale Biomass Project</b>
Host country	India (Punjab)
Authorized participant	<ul style="list-style-type: none"> <li>• JCT Ltd.</li> <li>• Agrinergy Ltd.</li> </ul>
Status	Registered
Type	Biomass energy
Sub-type	Agricultural residues: rice husk
Methodology	AMS-I.D.
Crediting period	January 2006 - December 2015
CO2 (kt) reduction over the crediting period	280
Credit buyer	United K. (Agrinergy), Switzerland, Austria (Kommunalkredit)
PDD Consultant	Agrinergy
Validator	TÜV-SÜD
URL	<a href="http://cdm.unfccc.int/Projects/DB/TUEV-SUED1129222566.24/view">http://cdm.unfccc.int/Projects/DB/TUEV-SUED1129222566.24/view</a>
Description	The project activity consists of the installation of a 5.5 MW extracting cum condensing turbine generator at the Phagwara textile plant in order to generate electrical power for the textile mill. The new turbine generator is fed by a boiler that burns biomass (rice husk). Through this project the amount of electricity bought from the Punjab State Electricity Board will be reduced.

## 5.5 Incauca S. A. fuel switch from coal to green harvest residues

Title	<b>Incauca S.A. Fuel Switch from coal to green harvest residues</b>
Host country	Colombia (Cauca)
Authorized participant	Ingenio del Cauca S. A.
Status	Registered
Type	Biomass energy
Sub-type	Bagasse power
Methodology	AM36
Crediting period	October 2008 - October 2015
CO2 (kt) reduction over the crediting period	429
Credit buyer	Netherlands (CAF)
PDD Consultant	Ecoinvest
Validator	DNV
URL	<a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1207388201.46/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1207388201.46/view</a>
Description	<p>The objective of the "Incauca Fuel Switch Project" is the displacement of coal consumption through the recollection of discarded leaves during the harvesting process. The normal recollection process applied in Columbia and as usual in the Latin American sugar cane fields implies the abandoning of a great amount of leaves in the field. When the field is burned to collect the sugar cane, between a 10 to 15% rests on the field as "barbojo". This is increased recently due to the new environmental regulations that limit the burning of the cane field previous of the collection, reaching 40 to 45 % of residues abandoned over the harvested field. For this reason Incauca recollects those residues for energy purposes.</p>

## 5.6 Meizhou landfills gas recovery and utilization as energy

Title	<b>Meizhou landfills gas recovery and utilization as energy</b>
Host country	China (Guangdong)
Authorized participant	<ul style="list-style-type: none"> <li>• Shenzhen PhasCon Technologies Co., Ltd.</li> <li>• Kommunalkredit Public Consulting GmbH</li> </ul>
Status	Registered
Type	Landfill gas
Sub-type	Landfill power
Methodology	ACM1
Crediting period	September 2005 - August 2012
CO2 (kt) reduction over the crediting period	4396
Credit buyer	Austria (Kommunalkredit)
PDD Consultant	Phascon, UNIDO-ITPC
Validator	DNV
URL	<a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1135170125.82/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1135170125.82/view</a>
Description	Shenzen PhasCon Technologies Co. Ltd implements landfill gas collection and utilization activities at 8 landfill sites. This involves investing in a gas collection system, leachate recycling system, flaring equipment and a modular electricity generation plant at each landfill site, as well as generator compound at each site. The generators will combust the methane in the landfill gas to produce electricity for feed into the grid.

## 5.7 Jilin Tongyu Tuanjie wind project, 100.3 MW

Title	<b>Jilin Tongyu Tuanjie wind project</b>
Host country	China (Jilin)
Authorized participant	<ul style="list-style-type: none"> <li>• Jilin Longyuan Wind Power Co., Ltd.</li> <li>• Kommunalkredit Public Consulting GmbH</li> </ul>
Status	Registered
Type	Wind
Methodology	ACM2
Crediting period	September 2007 - August 2014
CO2 (kt) reduction over the crediting period	3502
Credit buyer	Austria (Kommunalkredit)
PDD Consultant	CREIA
Validator	DNV
URL	<a href="http://cdm.unfccc.int/Projects/DB/DNV-CUK1169716720.28/view">http://cdm.unfccc.int/Projects/DB/DNV-CUK1169716720.28/view</a>
Description	The project's purpose is to install and operate a grid-connected wind farm in Jilin Province. The wind farm will consist of 118 Gamesa G58 wind turbines of 850 kW nominal capacity, for a total capacity of 100.3 MW. The investment also includes civil and electrical infrastructure of the wind farm and the installation of a 220 kV substation on site as well as the construction of 49 km operational road.

## 5.8 Korea Land Corporation Pyeongtaek Sosabul-district new and renewable energy model city (Photovoltaic system + solar water heating system)

Title	<b>Korea Land Corporation Pyeongtaek Sosabul-district new and renewable energy model city</b>
Host country	South Korea (Gyeonggi-do)
Authorized participant	Korea Land Corporation
Status	Registered
Type	Solar
Sub-type	Solar PV
Methodology	AMS-I.C.+AMS-I.D.
Crediting period	Jan 2015 - Dec 2021
CO2 (kt) reduction over the crediting period	27
Credit buyer	n.a.
PDD Consultant	Ecoeye
Validator	KEMCO
URL	<a href="http://cdm.unfccc.int/Projects/DB/KEMCO1209009690.84/view">http://cdm.unfccc.int/Projects/DB/KEMCO1209009690.84/view</a>
Description	Korea Land Corporation (KLC) will develop Pyeongtaek Sosabul-district to a eco-friendly, renewable energy district. Therefore photovoltaic systems should be installed on houses, apartments, schools, etc. The total generating capacity is 4.7 MW.

## 6 CERs: demand and market prices

CERs are demanded by sovereign states as well as non-state entities. The demand from sovereign states arises from their commitments under the Kyoto Protocol, whereas demand from non-state actors may arise from either voluntary or legislative commitments to reduce their GHG emissions, speculation, or a combination of the above.

Canada, Japan and the EU15 provide the majority of gross global demand for carbon credits, due to the gap between their Kyoto targets and current emission projections. Within the EU15, Spain and Italy have the largest gross gaps between current projections and their Kyoto targets.

Due to an increasing interest in the mitigation of climate change, the market for voluntary emission reductions (VERs) (including actors ranging from private individuals to public and private institutions) is also growing. For example, financial institutions (such as HSBC, Credit Suisse or UBS) or also large events (such as Fifa World Cup, Olympic Games or Formula One championships) voluntarily offset emissions to become “carbon neutral”. To meet this demand for VERs, a number of companies and organisations offer a variety of carbon offsets. While some offer carbon offset units which are not developed under the CDM, others also offer CERs for purchase, which can be retired from the carbon market and thus function as carbon offsets.<sup>11</sup>

### 6.1 The European Union Emissions Trading Scheme (EU ETS)<sup>12</sup>

As the EU ETS is currently the largest emission trading system in operation and also the most significant in terms of generating demand for CERs it will be analysed in the following chapter in more detail.

Generally under emissions trading schemes an overall limit is set on the GHG emissions that the installations falling under the scheme are allowed to emit. This cap is distributed amongst the participants in the form of allowances, or permits to emit. The participants may then choose to use their assigned allowances to cover their emissions or to some degree reduce their emissions and sell excess allowances to other participants.

Table 6 shows the total value transacted at the global carbon market in 2007 and 2008. The share of allowances and derivatives transacted under the EU ETS on the total value transacted is 73 % (91,9 billion US\$) in terms of US\$ and 64 % in terms of MtCO<sub>2e</sub>.

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<sup>11</sup> UNEP Riso Centre, Guidebook to Financing CDM Projects, developed for the UNEP project „CD4CDM”, May 2007

<sup>12</sup> [http://ec.europa.eu/environment/climat/emission/index\\_en.htm](http://ec.europa.eu/environment/climat/emission/index_en.htm); UNEP Riso Centre, Guidebook to Financing CDM Projects, developed for the UNEP project „CD4CDM”, May 2007

Table 6: Volumes and Values at the carbon market in 2007 and 2008

	2007		2008	
	Volume (MtCO <sub>2e</sub> )	Value (MUS\$)	Volume (MtCO <sub>2e</sub> )	Value (MUS\$)
<b>Project-based Transactions</b>				
Primary CDM	552	7,433	389	6,519
Jl	41	499	20	294
Voluntary market	43	263	54	397
<i>Sub total</i>	636	8,195	463	7,210
<b>Secondary CDM</b>				
<i>Sub total</i>	240	5,451	1,072	26,277
<b>Allowances Markets</b>				
EU ETS	2,060	49,065	3,093	91,910
New South Wales	25	224	21	183
Chicago Climate Exchange	23	72	69	309
RGGI	n.a.	n.a.	65	246
AAUs	n.a.	n.a.	18	211
<i>Sub total</i>	2,108	49,361	3,276	92,859
<b>TOTAL</b>	<b>2,984</b>	<b>63,007</b>	<b>4,811</b>	<b>126,345</b>

Source: The World Bank, *State and Trends of the Carbon Market 2009*, Washington, D.C., May 2009

The EU ETS started in January 2005 and the first phase ran from 2005 to 2007. The second phase coincides with the first commitment period under the Kyoto Protocol (2008-2012). The five main sectors covered by the EU ETS are heat generation, iron and steel, mineral oil refineries, mineral industry (cement, glass, ceramics), and the pulp and paper sector. In the first phase 11,500 plants or installations were covered accounting for approximately 45 % of the EU's emissions.

Based on the National Allocation Plan (NAP), which is prepared in advance of each phase of the EU ETS, each Member State allocates EU allowances (EUAs) to the installations. In order to allow companies to explore fully their comparative advantages, the EU ETS allows companies to trade surplus EUAs between themselves. In this way, companies that are successful in reducing their GHG emissions beyond their target generate a surplus of allowances and can sell them to companies that do not meet their targets. Besides that, the "Linking Directive" allows companies to purchase CERs from CDM projects (and also ERUs from JI projects) to achieve their targets.

### 6.1.1 Revision of the EU ETS through the Climate and Energy Package of the EU<sup>13</sup>

In December 2008 the Climate and Energy Package was adopted by the European Parliament, making carbon market continuity beyond 2012 more concrete. Strengthening and expanding the EU ETS is a core element of the package, whose main objectives are:

<sup>13</sup> The World Bank, *State and Trends of the Carbon Market 2009*, Washington, D.C., May 2009

- to reduce overall GHG emissions to 20 % below 1990 levels by 2020 (possibly scaling up to 30 % in the event of a satisfactory international agreement being reached);
- to increase the share of renewable energy sources to 20 % by 2020; and,
- to improve energy efficiency by 20 % by 2020.

To achieve the reduction goal, sectors already covered by the EU ETS assume a larger share of the effort, with required reductions of 21 % below 2005 levels, while other sectors (such as transport, agriculture and waste, building) take on a target of 10 % below 2005 levels. This target is differentiated among Member States (with criteria reflecting, among other things, GDP per capita) leading to national targets ranging from -20 % to 20 % below 2005 levels.

Results from the revision of the EU ETS through the Climate and Energy Package (for phase III of the EU ETS) are for example:

- Auctioning: It is estimated that about half of the allowances which will be auctioned increase up to 70-80 % until 2020, which is a significant increase from 4-5 % today. Full auctioning will start in 2013 for electricity producers (with concessions made to some Member States, taking into account the status of the electricity sector and GDP per capita).
- At least 50 % of the revenues from auctioning will be used for low-carbon and climate-resilient growth, both within and outside the EU.
- An increase of 20 % of approximately 300 MtCO<sub>2e</sub> in additional allowed volumes of credits from projects is expected. This results in a new estimated maximum demand of about 1,700 MtCO<sub>2e</sub> over the entire 2008-2020 period.
- Emissions from aviation, from all flights taking off and landing within the EU, will be included from 2012 onwards. Aviation emissions currently represent about 3 % of the overall EU emissions, however they are growing rapidly. Aviation emissions are to be capped at 97 % of a 2004-06 baseline in 2012, further declining to 95 % from 2013 onwards. Specific aviation allowances will be issued, with 85 % handed over for free, with that number possibly decreasing beyond 2012. CERs and ERUs can be surrendered for compliance up to a 15 % limit of emissions.
- Banking or carry-over of unused CERs and ERUs issued before 2013 will be valid for exchange with phase III allowances until March 31, 2015.
- In the event of an international agreement, and consistent with the resulting stricter EU-wide emission reductions, additional credits from projects up to 50 % of the incremental reductions could be utilized.
- The European Commission (EC) wants to include CDM credits from land use, land use change and forestry projects from EU ETS because of concerns with non-permanence, monitoring and reporting requirements and potential price impact.
- Rules governing the use of credits beyond 2012 make CERs and ERUs issued before 2012 particularly attractive, as nothing except the complementarity limit would

restrict their use. CERs and ERUs issued after 2013 from projects that were registered before 2012 would also likely to be a safe bet. Finally, CERs issued from new projects in Least Developed Countries (LDCs) registered after 2012 are also attractive for post 2012 compliance.

- In the case of extremely high price levels, a quantitative intervention in the market is allowed: If for more than six consecutive months, the allowance price is more than three times the average price of allowances during the two preceding years on the European market, the Commission will convene a meeting with Member States. If it is found that the price evolution does not correspond to market fundamentals, the Commission may either allow Member States to bring forward the auctioning of a part of the quantity to be auctioned, or allow them to auction up to 25 % of the remaining allowances in the New Entrant Reserve.

### 6.1.2 The role of “flexible mechanisms” for reaching the Austrian Kyoto target<sup>14</sup>

According to the Kyoto Protocol and the “Burden Sharing Agreement” within the EU, Austria has to reduce greenhouse gas emissions in the first commitment period from 2008-2012 by 13% in comparison to the basis year 1990. To reach this goal, the Austrian federal government and the federal states (Länder) adopted in 2002 a common “climate strategy”. This strategy was evaluated in 2006 and was used as the basis for the new national climate strategy which was adopted from the ministerial council on 21 March 2007.

The climate strategy 2007 is based on a broad mix of various, mainly national measures (industry, thermal renovation of houses, an expansion of public transport). Additionally, Austria uses the project related flexible mechanisms of the Kyoto Protocol. The purchasing target of the Austrian JI/CDM Programme is **45 million tons of emission reductions** in the time between 2008-2012. For reaching this target a budget of 531 Mio. EUR is available.

In 2003, Kommunalkredit Public Consulting (KPC) was appointed for the Austrian JI/CDM Programme Management on behalf of the Austrian Minister of Agriculture and Forestry, Environment & Water Management.

Until the end of June 2009, Austrian authorized buyers (private and public) were involved in 93 CDM projects.<sup>15</sup> These projects include the following project types: hydro (32 %), wind (22%), biomass energy (13 %), EE own generation (12%), methane avoidance (10 %), EE service (3%), landfill gas (3%), coal bed/mine methane (1 %), EE households (1 %), EE industry (1 %), N<sub>2</sub>O (1%) and solar (1 %).

In 16 projects Austrian PDD consultants were involved.

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<sup>14</sup> <http://www.ji-cdm-austria.at>

<sup>15</sup> Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

### 6.1.3 Overview of buyer countries

As shown in Table 7 and Table 8 European buyers are dominating the CDM market. Especially the UK, Switzerland, the Netherlands and Sweden are important buyers.

Table 7: Buyer countries

Buyer countries	Number of projects
Austria	80
Belgium	24
Canada	74
Czech Republic	3
Denmark	63
Finland	34
France	71
Germany	202
Greece	
Hungary	
Iceland	
Ireland	14
Italy	92
Japan	464
Latvia	
Luxembourg	24
Netherlands	433
New Zealand	1
Norway	36
Portugal	5
Spain	133
Sweden	220
Switzerland	560
United K.	1155
CDCF	4
WBCE	1
NEFCO	
IBRD	1
CCAC16	
n.a.	1479
Total	5173

*Note: For some projects there are more than one buyer country. Only for the projects that have requested registration the buyer is known with certainty. For the rest of the projects the information is based on the PDD.*

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

The top 20 authorized buyers are shown in the following table.

Table 8: Top 20 authorized buyers

Top 20 buyers	Projects
EcoSecurities	294
Carbon Asset Management Sweden	154
AgCert	96
Mitsubishi	93
RWE	89
EDF Trading	88
Vitol	78
Cargill International	70
CAMCO	68
Carbon Resource Management	67
Trading Emissions	63
MGM Carbon Portfolio	62
Kommunalkredit	62
Marubeni	61
ENEL	60
KfW	53
Grinergy	49
Essent Energy Trading	48
Climate Change Capital	48
Danish Ministry of Climate & Energy	45

Source: UNEP Risoe CDM/JI Pipeline Analysis and Database, July 1st 2009: <http://cdmpipeline.org>

Even during the current economic downturn, European utilities are still active but price-sensitive buyers. They are purchasing CERs with an eye to the next EU ETS phase (III) compliance needs, as well as on making small profits from trading.

## 6.2 CER market prices <sup>16</sup>

Because of the lower demand for products during the current economic slowdown in Europe, companies substantially cut back their production and power consumption and consequently their emissions decreased. Due to the free allocations in phase II of the EU ETS, companies were holding more free allowances than they needed for compliance (typically industrial sectors such as steel and cement) and they decided to sell EUAs on the market to raise cheap cash in a difficult credit environment. The higher supply and lower demand for allowances brought substantially lower prices for EUAs.

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<sup>16</sup> The World Bank, State and Trends of the Carbon Market 2009, Washington, D.C., May 2009

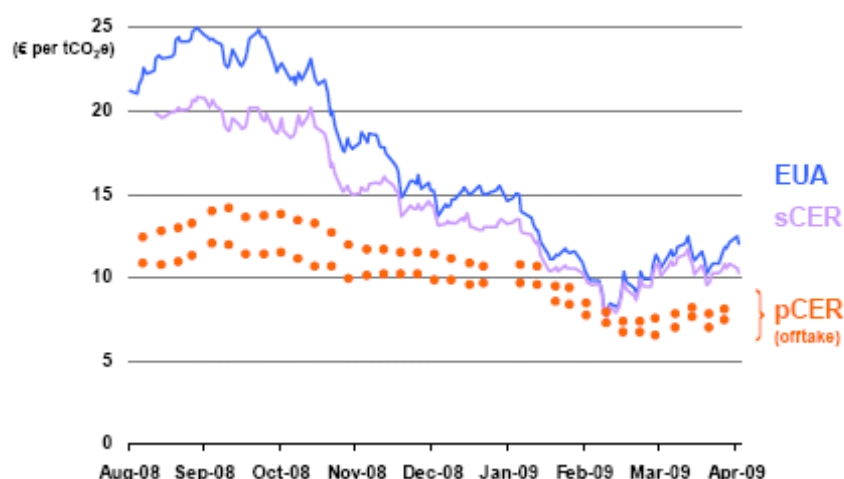


Figure 13: Carbon prices

Source: *The World Bank, State and Trends of the Carbon Market 2009, Washington, D.C., May 2009*

According to the latest CER price news (June 2009)<sup>17</sup>, the prices for secondary market CERs recovered in May but are not assessed as high enough for a healthy primary market in new CDM projects. Higher oil prices and the general return of confidence to the EU carbon market led to the ongoing rise, albeit with some volatility along the way. The benchmark CER price, in future contracts for December 2009 delivery closed at 12.73 Euro on the European Climate Exchange on May 29 2009 (up 1.30 Euro on its April 2009 closing price). December 2010 closed at 12.80 Euro and December 2012 at 13.41 Euro. The development on the primary CER market (where CERs are generated from new projects) is not so positive: forward prices in the primary market currently range from 7.50 to 10.00 Euro for a flow of CERs delivered across 2009-2012 according to the IDEAcarbon pCER Index.

The major problem for the primary CER market in the lower carbon price environment in 2009 is that issued CERs are selling for no or not much more than it costs project developers to produce them.

### 6.3 Sources of finance for CDM projects<sup>18</sup>

The following section identifies potential partners in the EU and provides a list of multilateral, governmental and private sector carbon funds. It is by no means exhaustive but it provides an indication of the existing types of funds and their characteristics.<sup>19</sup>

Most of the funds in Table 9 prefer to contract projects that are well advanced in the planning stage and have already identified underlying finance for the project itself. These funds typi-

<sup>17</sup> <http://www.carbonpositive.net/viewarticle.aspx?articleID=1566>; CDM projects suffer despite CER rises, June 2009

<sup>18</sup> UNEP Riso Centre, Guidebook to Financing CDM Projects, developed for the UNEP project „CD4CDM“, May 2007

<sup>19</sup> For more information consult the funds websites.

cally require some form of proof of the economic viability of the project and the technology used. Besides that, funds prefer projects which have already assessed their applicability under the CDM regulatory framework. That includes for example the existence of an approved methodology and an initial assessment of the likely emission reductions resulting from the project.

Table 9: Multilateral & Government Carbon Funds

Fund	Website	Management	Characteristics
Austrian JI/CDM Programme	<a href="http://www.ji-ddm-austria.at/en">www.ji-ddm-austria.at/en</a>	Kommunalkredit Public Consulting	all CDM project types
Belgian JI/CDM Tender	<a href="http://www.klimaat.be/jicdm-tender/">www.klimaat.be/jicdm-tender/</a>	Belgian Federal Government	all CDM project types with a preference for small scale projects in energy efficiency and renewable energy
BioCarbonFund	<a href="http://www.carbonfinance.org">www.carbonfinance.org</a>	World Bank Carbon Finance Group	afforestation/reforestation CDM projects
CAF-Netherlands CDM Facility	<a href="http://www.caf.com">www.caf.com</a>	Corporation Andina de Fromento (CAF)	CDM projects in energy, mass transport, industry and waste sector
CAF-Spain Carbon Initiative	<a href="http://www.caf.com">www.caf.com</a>	Corporation Andina de Fromento (CAF)	CDM projects in energy, mass transport, industry and waste sector
Community Development Carbon Fund	<a href="http://www.carbonfinance.org">www.carbonfinance.org</a>	World Bank Carbon Finance Unit	all CDM project types that make sustainable contribution to community development
Danish Carbon.dk Public Procurement Programme	<a href="http://www.danishcarbon.dk">www.danishcarbon.dk</a>	Danish Environmental Protection Agency (DEPA)	CDM projects in renewable energy, fuel switching, energy efficiency, methane capture, industrial emission reductions
EcoSecurities/Standard Bank Carbon Facility	<a href="http://www.ecosecurities.com">www.ecosecurities.com</a> , <a href="http://www.standardbank.com">www.standardbank.com</a>	EcoSecurities, Standard Bank	all CDM project types except sequestration projects
Flemish Government JI/CDM Tender	<a href="http://www.energiesparen.be/fxm">www.energiesparen.be/fxm</a>	The Flemish Region	all CDM project types with a preference for energy efficiency and renewable energy
Italian Carbon Fund	<a href="http://www.carbonfinance.org">www.carbonfinance.org</a>	World Bank Carbon Finance Unit	all CDM project types with a preference for renewable energy, methane capture, gas flaring & carbon sequestration
Multilateral Carbon Credit Fund (MCCF)	<a href="http://www.ebrd.com">www.ebrd.com</a>	European Bank for Reconstruction and Development (EBRD), European Investment Bank (EIB)	CDM projects & facilities of Green Investment Schemes (GIS)
Netherlands Carbon Facility (INCaF)	<a href="http://www.ifc.org/carbonfinance">www.ifc.org/carbonfinance</a>	International Finance Corporation (IFC)	all CDM project types with a preference for renewable energy, energy efficiency, capture and use of methane, fuel switching
Netherlands CDM Facility	<a href="http://www.carbonfinance.org">www.carbonfinance.org</a>	World Bank Carbon Finance Unit	CDM projects in renewables, biomass, energy efficiency, fuel switch, methane recovery, carbon sequestration
Prototype Carbon Fund (PCF)	<a href="http://www.carbonfinance.org">www.carbonfinance.org</a>		all CDM project types
Rabobank-Dutch Government CDM Facility	<a href="http://www.rabobank.com">www.rabobank.com</a>	Rabobank	all CDM project types
Spanish Carbon Fund	<a href="http://www.carbonfinance.org">www.carbonfinance.org</a>	World Bank Carbon Finance Unit	all CDM project types with a preference for renewable energy, biomass, agricultural waste, urban waste management, industrial processes
Swedish International Climate Investment Programme SICLIP 2002-2012	<a href="http://www.stem.se">www.stem.se</a>	Swedish Energy Agency	all CDM project types with a preference for renewable energy, energy efficiency, small-medium sized projects

Source: UNEP Riso Centre, *Guidebook to Financing CDM Projects*, developed for the UNEP project „CD4CDM“, May 2007

*Project eligibility criteria for private carbon funds (listed in Table 10) are in many cases similar to the criteria set out for the multilateral and governmental carbon funds.*

Table 10: Private Carbon Funds

<b>Fund</b>	<b>Website</b>	<b>Management</b>	<b>Characteristics</b>
European Carbon Fund	<a href="http://www.europeancarbonsfund.com">www.europeancarbonsfund.com</a>	IXIS Environment and Infrastructure	all CDM project types with emissions reductions of 50,000-1m t CO <sub>2</sub> per year
GG-CAP Greenhouse Gas Credit Aggregation Pool	<a href="http://www.natsource.com">www.natsource.com</a>	Natsource	CDM projects in agriculture, cement, chemicals, mining, petroleum, pulp and paper, waste management, fuel switching, renewable energy, energy efficiency, fugitive gases, catalytic destruction
ICECAP	<a href="http://www.icecapltd.com">www.icecapltd.com</a>	ICECAP Carbon Portfolio Lim.	all CDM project types
Japan Carbon Finance Ltd.	<a href="http://www.ecosecurities.com">www.ecosecurities.com</a> , <a href="http://www.jcarbon.jp">www.jcarbon.jp</a>	EcoSecurities, Japan Carbon Finance	small-scale CDM projects
KfW Carbon Fund	<a href="http://www.kfw.de/carbonfund">www.kfw.de/carbonfund</a>	Kreditanstalt für Wiederaufbau (KfW)	all CDM project types

*Source: UNEP Riso Centre, Guidebook to Financing CDM Projects, developed for the UNEP project „CD4CDM”, May 2007*

*Project eligibility criteria for multilateral and private financiers (as listed in Table 11) are in many cases similar to the criteria set out for the multilateral and governmental carbon funds.*

Table 11: Multilateral and private financiers

<b>Name of Financier</b>	<b>Website</b>
Asian Development Bank	<a href="http://www.adb.org">http://www.adb.org</a>
African Development Bank	<a href="http://www.afdb.org/">http://www.afdb.org/</a>
European Bank for Reconstruction and Development	<a href="http://www.ebrd.org">http://www.ebrd.org</a>
European Investment Bank	<a href="http://www.eib.org">http://www.eib.org</a>
Export Import Bank (USA)	<a href="http://www.exim.gov">http://www.exim.gov</a>
Export Import Bank (Japan)	<a href="http://www.jbic.go.jp">http://www.jbic.go.jp</a>
Global Environmental Facility	<a href="http://www.gefweb.org">http://www.gefweb.org</a>
Inter American Development Bank	<a href="http://www.iadb.org">http://www.iadb.org</a>
International Fund for Agricultural Development	<a href="http://www.ifad.org">http://www.ifad.org</a>
International Monetary Fund	<a href="http://www.imf.org">http://www.imf.org</a>
Kreditanstalt für Wiederaufbau (German Bank for Reconstruction and Development)	<a href="http://www.kfw.de">http://www.kfw.de</a>
North American Development Bank	<a href="http://www.nadb.org/">http://www.nadb.org/</a>
Overseas Economic Cooperation Fund (Japan)	<a href="http://www.jbic.go.jp">http://www.jbic.go.jp</a>
Swedish International Development Agency	<a href="http://www.sida.se/">http://www.sida.se/</a>
United States Agency for International Development	<a href="http://www.usaid.gov/">http://www.usaid.gov/</a>
World Bank Group (including IBRD, IDA, IFC, and MIGA)	<a href="http://www.worldbank.org">http://www.worldbank.org</a>

*Source: UNEP Riso Centre, Guidebook to Financing CDM Projects, developed for the UNEP project „CD4CDM”, May 2007*

## **7 The Uliastai heating plant**

### **7.1 The framework for implementing CDM projects in Mongolia**

Mongolia ratified the United Nations Framework Convention on Climate Change (UNFCCC) on September 30, 1993 as a non-Annex I country and it came into force on March 21, 1994.

On December 15, 1999, State Great Khural ratified the Kyoto Protocol and Mongolia has met one of the main requirements for participation in Clean Development Mechanism. As a non-Annex I country Mongolia does not have any quantitative obligations regarding greenhouse gases emissions reduction or limitation.

On the following year, July 19, 2000, the Mongolian government approved its Climate Change National Program by its resolution No: 120 and designated the Ministry of Nature, Environment, and Tourism to implement the National Strategy. Twice, in 2002 and 2004, Climate Change National Committee at the interagency level was established by Minister of Nature, Environment, and Tourism, however it did not hold its meeting regularly and was not operational. The CDM Designated National Authority was established as a Designated National Authority (DNA) by Minister's order No: 207 in November 19, 2004 and No: 200 in June 22, 2006 respectively. Due to the Parliamentary election in 2004, CDM Designated National Authority was re-established in 2006, now it still needs to re-nominate Designated National Authority and Appraisal Committee members regarding election, government re-alignment, and appointments.

With regards to climate change, green house reduction, and clean development mechanism, there are national strategies, policies, and laws that regulate CDM projects and DNA especially sustainable development, environmental assessment, monitoring and research, improving dialogue, information exchange and co-operation amongst all stakeholders.

National Committee on Climate Change in Mongolia is currently at the Ministry of Nature, Environment, and Tourism and, discussions are being held to form a working group led by the State Secretary of MNET to develop Climate Change Adaptation Program and activate the Climate Change National Committee. The Chairman of CDM Appraisal Committee and Head of CDM Designated National Authority should be members of the National Committee on Climate Change in order to report on CDM issues and involve themselves in the discussion of regulatory issues, investment climate and policy formulation and updates etc.

So far, three CDM Projects are registered, Taishir Hydropower Project in Mongolia on March 16, 2007, Durgun Hydropower Project in Mongolia on March 23, 2007, A retrofit programme for decentralised heating stations in Mongolia on July 28, 2006 were registered at the CDM Executive Board, UNFCCC. The Salkhit wind park project was submitted for validation on August 20, 2007 and the clarification and corrective actions were requested from NewCom LLC.

Although only three projects were registered at the CDM Executive Board, over a dozen of Project Idea Notes are being developed under the "Capacity Building for Development and Implementation of Carbon Finance Projects" implemented by the Ministry of Nature, Environment, and Tourism and the World Bank and funded by PHRD Grant. According to the

CDM project cycle diagram, a host country approval is mandatory before or after validation by the Designated Operational Entity. The most critical step in the CDM project cycle is to develop the Project Design Document with its Investors or by project sponsor or through professional consulting companies.

The potential sectors for CDM projects in Mongolia include renewable energy, energy efficiency, fossil fuel switch, waste management, coal mine, transportation and agriculture. The greenhouse gas mitigation options in Mongolia are summarized in the following table in more detail.

Table 12: Greenhouse gas mitigation options in Mongolia

<b>Energy supply sector:</b>
Increase renewable options
<ul style="list-style-type: none"> <li>• Hydro power plants</li> <li>• Wind farms</li> <li>• PV and solar heating</li> </ul>
Efficiency improvement of heating boilers
<ul style="list-style-type: none"> <li>• Efficiency improvement of existing HOB</li> <li>• Installation of new boilers with higher efficiency</li> <li>• Converting steam boilers into small capacity thermal power plant</li> </ul>
Improvement of household stoves and furnaces
<ul style="list-style-type: none"> <li>• Modernization of existing household stoves and furnaces</li> <li>• Implementation of new design household stoves and furnaces</li> <li>• Change of fuels for household stoves and furnaces</li> </ul>
Improving the quality of coal
<ul style="list-style-type: none"> <li>• Coal briquette</li> <li>• Application of effective mining technology and facilities, including selective mining, dewatering system coal handling plant</li> </ul>
CHP improvement options
<ul style="list-style-type: none"> <li>• Efficiency improvement</li> <li>• Reduction of internal use</li> </ul>
<b>Energy demand sector:</b>
District heating and built environment
<ul style="list-style-type: none"> <li>• Building insulation improvements</li> <li>• Improvements of district heating system in buildings</li> <li>• Lighting efficiency improvements</li> </ul>
Industry
<ul style="list-style-type: none"> <li>• Increase efficiency of industrial buildings</li> <li>• Motor efficiency improvements</li> <li>• Technology change (e.g. dry process of cement industry and others)</li> </ul>

Source: Ministry of Nature, Environment and Tourism, CDM in Mongolia (brochure); [www.cdm-mongolia.com](http://www.cdm-mongolia.com)

## 7.2 Development of a CDM project idea

Based on the experiences made during the refurbishment of the Uliastai heating plant a concrete CDM project idea was developed. This chapter starts of with some information regarding the improvement of the Uliastai heating plant and will then describe the developed CDM project idea in more detail.

### 7.2.1 Description of the improvement of the Uliastai heating plant

In the frame of the project “Improvement of district heating systems in urban centres of Mongolia”<sup>20</sup> the district heating plant in Uliastai was refurbished. The refurbishment of the heating plant was completed in October 2008 and contained the installation of 3 new boilers, 3 high effective energy saving pumps and water softening equipment, 3 ash holding devices and 3 economizers, 2 additional water tanks and automatic control system, pipes and valves and 3 chimneys. Besides that, the hydraulic balancing of the secondary heating network according to the measurement on site with an ultraflow portable meter and the washing of existing district heating pipes and the replacement of corroded pipes and valves contributed to following positive results:

- Coal consumption decreased by 60 %
- Decrease of the electricity demand of the heating plant in operation up to 45 %
- Heat efficiency increased up to 70 %,
- Halving the misuse and loss of heat circuit water,
- Improvement of living conditions: room temperature increased from 11 C to 18-80 C,
- Improvement of the operator’s working conditions,

A detailed technical description of the Uliastai heating plant before and after the refurbishment is shown in **Fehler! Verweisquelle konnte nicht gefunden werden.** and **Fehler! Verweisquelle konnte nicht gefunden werden.**

Table 13: Description of the technology employed until 2008

Indicators	Unit	Value
Boiler houses	Number	1
Substations	Number	There are no substations. The heat plant supply heat for 24 consumers.
Length of district heating network	km	3 km /including supply and return pipes)
Operation in summer time	h/day	No.
Operation in winter time	h/day	24 h per day for 8 months
Network losses	%	15
Installed boilers	Number	3
Total installed boiler capacity	MWh	App. 1.2
Fuel input (if available, please specify for a period of 5 years)	t/y	2003 -1275t/y 2004 -1280 t/y 2005 - 1270 t/y 2006 - 1120 t/y

<sup>20</sup> See <http://www.district-heating.mn/>

		2007 – 1050 t/y
Total electricity consumption (if available, please specify for a period of 5 years)	kWh/y	2003 -158779 2004 -160586 2005 - 156944 2006 - 139460 2007 – 89922
Heat production (if available, please specify for a period of 5 years)	gcal/y	2003 -9100 2004 -9500 2005 - 9800 2006 - 11600 2007 – 10900
Calorific value of coal	kkal/kg	7098-7542
Moisture	%	4.1
Ash	%	5.0
Sulphur S	%	1.2
V <sup>r</sup>	%	25.5

Table 14: Description of the technology currently employed

Indicators	Unit	Value
Boiler houses	Number	1
Substations	Number	There are no substations. The heating plant is supplying heat for 25 consumers.
Length of district heating network	km	3 km /including supply and return pipes)
Operation in summer time	h/day	No.
Operation in winter time	h/day	24 h per day for 8 months
Network losses	%	15
Installed boilers	Number	3
Total installed boiler capacity	MWh	App. 1.5
Fuel input (New boilers started into operation from 8 of October 2008)	t/y	2008 – 580 tn / 4 months (January, February, March, April) 2008 – 252.8 tn / 3 months October, November and December) (after installation of new boiler 2009 -368.3 tn /first 4 months
Total electricity consumption (New boilers started into operation from 8 of October 2008)	kWh/y	2008 - 22546 (last three months) 2009 -25975.2 (first four months)
Heat production (New boilers started into operation from 8 of October 2008)	tn/h	2008 - 99600 2009 - 132852

Calorific value of coal	kkal/kg	7098-7542
Moisture	%	4.1
Ash	%	5.0
Sulphur S	%	1.2
V'	%	25.5

### 7.2.2 CDM project idea

In Mongolia approx. 450 small capacity heating stations (in aimag centres, soum centres and city suburbs not connected to centralized heating systems) with approx. 1,200 boilers and a total heat load of 800 MW have been under operation in the country. About 20 % of these heating stations (90-100) are located in aimag centres and rural villages. The individual heat load of these small capacity heating stations is between 0.8 and 2.1 MW. Almost 100 % of these district heating plants are fired by coal from local mines. The quality of the coal is low and the transportation and purchasing costs are high. Furthermore these heating systems are highly deteriorated, missing any environmental standards. Against this background and the fact that the Uliastai heating station has been retrofitted successfully within the project "Improvement of district heating systems in urban centres of Mongolia" a CDM project idea described in the following table was developed.

Table 15: CDM project idea – Improvement of heating systems in urban centres of Mongolia

Title	<b>Improvement of heating systems in urban centres of Mongolia</b>
Location of the project	Mongolia (aimag centres of western provinces such as Govi-Altai, Khovd, Bayan-Ulgii and Uvs)
Objective of the project	Retrofitting of heating stations in Mongolian aimag centres by replacing outdated and inefficient boiler units
Status	Letter of no objection is applied
Methodology	AMS-II.B. (Supply side energy efficiency improvements – generation) or Program of Activities (PoA)
Estimated CO2 reduction	30,000 t CO2/year (in total: approx. 300,000 t CO2)
Expected environmental and social benefits	The project will lead to a decrease in air and soil pollution. Furthermore heat supply will become more reliable.
Possible project start	Year 2010

### 7.2.2.1 Recommendations for the realization of the CDM project idea

Recommendations regarding the realisation of the above mentioned CDM project idea include:

- Use of a Programme of Activities (PoA)<sup>21</sup> because of the significant benefits compared to bundling of small-scale projects into one single CDM project.
  - A Programme of Activities (PoA) is a voluntary coordinated action by a private or public entity<sup>22</sup> which coordinates and implements any policy/measure or stated goal, that leads to GHG emission reductions that are additional to any that would occur in the absence of the PoA, via an unlimited number of CDM programme activities (CPAs).
  - The CDM programme activities can be successively added during the lifetime of the PoA.
  - A PoA shall apply one approved baseline and monitoring methodology, involving one type of technology or measure which is applicable to all CPAs.
  - The duration of the PoA (which may not exceed 28 years) shall be defined by the entity at the time of request for registration of the PoA. Any CPA can be added to the PoA at any time during the duration of the PoA by a coordinating/managing entity.
  - The crediting period of a CPA will be either a maximum of seven years which may be renewed at most two times or a maximum of 10 years with no option of renewal. The duration of crediting period of any CPA shall be limited to the end date of the PoA.
  - Advantages of PoAs:
    - The individual project activities need not to be defined in advance.
    - The exact sites of the project activities (CPAs) need not to be defined in advance.
    - The individual project activities can be included into the PoA at any time without the need for further registration.
    - Aggregation of small scale (SSC) projects can go beyond SSC limits.

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<sup>21</sup> For more information see: [http://cdm.unfccc.int/Reference/PDDs\\_Forms/PoA/index.html](http://cdm.unfccc.int/Reference/PDDs_Forms/PoA/index.html)

<sup>22</sup> This entity could for example be the Non Governmental Organization "Mongolian Energy Association"

Table 16: Differences between single project, bundling and PoA approach

Single Project	Project Bundle	Programme of Activities
Single Location	Multiple Locations	Multiple Location (time and space)
Single Project Participant	Multiple PP's	Multiple PP's
Only one Project registered	A number of Project Activities submitted as 1 Project	One PoA registry and multiple Projects (CPA's)
One period for creditation	Same period of creditation for all projects	Different crediting period for the CPA's according to the life cycle of the PoA
PP ex-ante	All PP's ex-ante	Only one PP ex-ante, rest join later

- Use the UNFCCC CDM Bazaar<sup>23</sup>, a Web-based facility which serves as a platform for exchange of information on Clean Development Mechanism (CDM) project opportunities.
  - The UNFCCC CDM Bazaar covers supply of and demand for CDM projects, i.e. the actions taken by project sellers, buyers and service providers (in a broad sense). The key objective of the Bazaar is to facilitate the creation of an efficient global CDM market through sharing information related to project activities and transactions of Certified Emissions Reductions (CERs) among stakeholders worldwide.
  - The UNFCCC CDM Bazaar is a global "virtual information exchange place" open to all interested parties. It aims to be a facilitating initiative that will help to reduce transaction costs in the CDM project cycle as well as to encourage increased information exchange and dialogue among current and potential future project participants and other market players. As such, the Bazaar will generally enhance the capacity of Non-Annex I members of the UNFCCC.
  - The UNFCCC CDM Bazaar functions as a cost-free service.
  - The UNFCCC CDM Bazaar is not a "deal-maker" as this function lies within the realm of private sector intermediaries and service providers.
- Further enhance CDM knowledge and understanding in Mongolia
  - It is necessary to carry out further capacity building for CDM for all involved stakeholders (via workshops, study tours, etc.)
  - Strengthen the existing institutional structures to involve relevant ministries in CDM management
  - Integrate CDM issues into development strategies and policies of the main concerned sectors

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<sup>23</sup> For more information see: <http://www.cdmbazaar.net>

## 8 Abbreviations

AAU	Assigned Amount Unit
CAF	Corporation Andina de Fomento
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2</sub> e	Carbon Dioxide Equivale
CPA	CDM programme activities
DEPA	Danish Environmental Protection Agency
DH	District Heating
DNA	Designed National Authority
DOE	Designated Operational Entity
EB	Executive Board (of the CDM)
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EE	Energy Efficiency
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EU	European Union
EUAs	European Union allowances
EU ETS	European Union Emission Trading Scheme
GHGs	Greenhouse gases
IFC	International Finance Corporation
JI	Joint Implementation
KfW	Kreditanstalt für Wiederaufbau
KPC	Kommunalkredit Public Consulting
LDCs	Least Developed Countries
NGO	Non-governmental Organisation
PCF	Prototype Carbon Fund
PIN	Project Idea Note
PDD	Project Design Document
PoA	Programme of Activities
UNFCCC	United Nations Framework Convention on Climate Change

## 9 List of Figures and Tables

Figure 1 : Number of CDM projects in Asia by country ..... 1

Figure 2: Concepts of baseline and additionality ..... 5

Figure 3: CDM project cycle ..... 7

Table 1: Approved small-scale CDM project activity categories ..... 9

Table 2: CDM transaction costs ..... 10

Table 3: Differences between bundling and PoA approach ..... 13

Figure 4: Steps of the validation process ..... 15

Figure 5: Growth in registered project activities, project in pipeline and projected CERs ..... 18

Figure 6: Registered project activities by region ..... 18

Figure 7: Number of CDM projects in Asia by country ..... 19

Figure 8: Top countries by issued CERs..... 19

Figure 9: CERs expected until 2012 from CDM projects in each sector..... 20

Figure 10: Increased scrutiny by the the CDM EB at registration ..... 21

Table 4: CDM projects grouped in types ..... 22

Table 5: AM 0058 projects in the CDM project pipeline ..... 22

Figure 11: Heat production by urban networks worldwide in 2003 (TWh) ..... 23

Figure 12: DH challenges in transition economies and emerging countries ..... 24

Table 6: Volumes and Values at the carbon market in 2007 and 2008 ..... 34

Table 7: Buyer countries..... 37

Table 8: Top 20 authorized buyers..... 38

Figure 13: Carbon prices ..... 39

Table 9: Multilateral & Government Carbon Funds..... 40

Table 10: Private Carbon Funds ..... 41

Table 11: Multilateral and private financiers .....	41
Table 12: Greenhouse gas mitigation options in Mongolia.....	43
Table 13: Description of the technology employed until 2008 .....	44
Table 14: Description of the technology currently employed.....	45
Table 15: CDM project idea – Improvement of heating systems in urban centres of Mongolia .....	46
Table 16: Differences between single project, bundling and PoA approach .....	48

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Nachhaltigkeit  
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