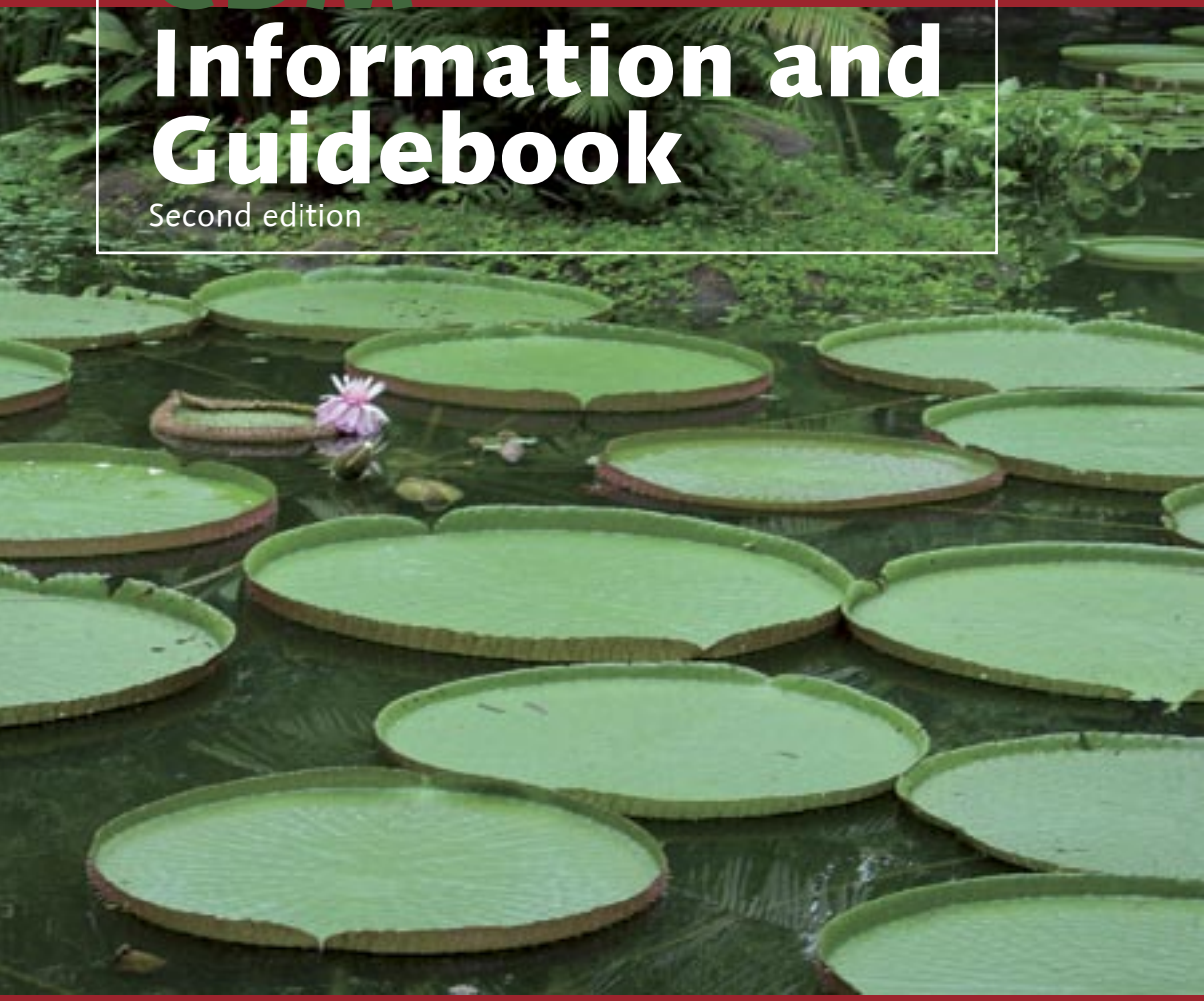
The UNEP project CD4CDM

CDM Information and Guidebook

Second edition



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developed for the UNEP project 'CD4CDM'

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Contents

Abbreviations

AAU	Assigned Amount Unit (unit for emissions trading)
AE	Applicant Entity (an entity applying to be a DOE)
AIJ	Activities Implemented Jointly
Annex B	The 39 developed countries in Annex B of the Kyoto Protocol that have GHG reduction commitments.
Annex I	The 36 developed countries in Annex I of the UNFCCC that had non-binding GHG reduction commitments to 1990 levels by 2000.
AP	Accreditation Panel (a panel under the EB)
AT	Assessment Team (made by the CDM Assessment Panel under the EB to evaluate each AE)
CDCF	Community Development Carbon Fund (a WB activity)
CDM	Clean Development Mechanism
CER	Certified Emission Reduction (unit for the CDM)
CERUPT	Certified Emission Reduction Unit Purchasing Procurement Tender
CO_2	Carbon Dioxide
COP	Conference of the Parties
COP/MOP	Conference of the Parties and Meetings serving as the meeting of the Parties to the Kyoto Protocol when the Kyoto Protocol enters into force.
DOE	Designated Operational Entity: an accredited organisation that validates and certifies CDM projects.
DNA	Designated National Authority
EB	Executive Board: the highest authority for the CDM under the COP/MOP.
EIA	Environmental Impact Assessment
EIT	Economies in Transition (former Soviet Union, central and eastern European countries)
ERU	Emission Reduction Unit (unit for JI)
EU ETS	European Union Emissions Trading Scheme
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GHG	Greenhouse gas

GWh	Gigawatt hour (million kWh)
GWP	Global Warming Potential
HFC	Hydrofluorocarbon
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
JI	Joint Implementation
kt	kilo tonnes (1000 tonnes)
kWh	kilowatt hour
LULUCF	Land Use, Land Use Change and Forestry
Mt	Million tonnes
MW	Megawatt
MMTC	Million metric tonnes of carbon
$MMTCO_2e$	Million metric tonnes of CO_2 equivalent
NGO	Non-governmental Organization
NOx	Nitrogen Oxide
O & M	Operation and Maintenance
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PCF	Prototype Carbon Fund (a WB activity)
PFC	Perfluorocarbon
PDD	Project Design Document
PV	Photovoltaic
SD	Sustainable Development
SF_6	Sulphur Hexafluoride
SHS	Solar Home System
SO_2	Sulphur Dioxide
TJ	Tera Joule (10^{12} joule)
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization
WMO	World Meteorological Organization

1. Introduction

Since the CDM was defined at COP3 in Kyoto 1997, it took the international community another 4 years to reach the Marrakech Accords in which the modalities and procedures to implement the CDM was elaborated. Even if more detailed rules, procedures and modalities have to be further developed, a general framework to implement the CDM and other Kyoto mechanisms are now in place.

Because of its importance and implication[1], many multilateral organizations, private consultancies, and NGOs have produced various types of CDM guideline. However, this difference in approaches will not significantly matter to project developers. If it matters, they should use the guidelines closest to their type of project. Depending upon their main purpose, each guideline has a different focus and a different approach. This guidebook will touch various important issues but give more focus on the CDM project cycle and the PDD (Project Design Document).

This guidebook to the CDM is produced to support the UNEP project "Capacity Development for the Clean Development Mechanism"[2] under which materials to cover other important issues such as project finance, sustainability impacts, baseline methodologies, legal framework and institutional framework are being developed in a more focused way. These materials will help all stakeholders better understand the CDM and will eventually contribute to maximize the effect of the CDM in achieving the ultimate goal[3] of UNFCCC and its Kyoto Protocol.

In chapter 2, an overview of the CDM is provided. This chapter draws upon a booklet titled "Introduction to the CDM"[4] which was previously published by UNEP RISØ Centre . It summarizes the national values and benefits of participation in the CDM with a brief background of the CDM.

Chapter 3 visits the issue of sustainable development from the perspective of a CDM project. The Kyoto Protocol clearly states that one of the purposes of the CDM is to assist Non-Annex I parties in achieving sustainable development. The selection of the SD criteria and the assessment of the SD impacts in the current

[1] Amomg the Kyoto mechanisms, the CDM is the only mechanism in which developing countries can participate to reduce GHG emissions.

[2] This project is funded by the Netherlands government and implemented in 12 developing countries by UNEP RISØ Centre with cooperation of regional centres.

[3] It is well elaborated in Article 2 of UNFCCC.

[4] Different language versions of booklet are available on the web, www.cd4cdm.org. English, French, Vietnamese, Japanese, Cambodian, Spanish, Chinese, Korean, Portuguese and Arabic versions are available now. Arabic version is available only with a hard copy.

operationalisation of the Kyoto Protocol are subject to a sovereign decision by the host countries. This chapter presents an example of Sustainable Development (SD) Indicators and major steps of an SD evaluation of CDM projects.

Chapter 4 explains the project cycle of the CDM. Each step of the CDM project cycle is explained from project design & formulation to the issuance of CERs. With informative tables and numbers, chapter 5 shows how to fill out the PDD (Project Design Document). These two chapters will help project developers who want to know how to make a PDD to develop CDM projects.

CDM projects generate both conventional project outputs and CERs. CERs, as a nascent commodity have important impact on project finance. Chapter 6 provides an overview on impact of CERs on project viability, sources of funds and risk management. The last chapter, Chapter 7, reviews recent CER market transactions and price trends.

Lastly, the appendices present frequently asked questions and answers, a short overview of existing guidelines, and a possible future list of eligible CDM projects categories.

Since the first edition was published in December 2003, a big progress has been made in the modalities and procedures of sink projects and the carbon market has been developing very fast. In order to include new information and changes made, this second edition adds a section for sink projects in chapter 4 and updates financial information and data in chapter 6 and 7.

This guidebook will give a comprehensive overview of the CDM, its project cycle and related issues. Each stakeholder is expected to take into account its own circumstances in utilizing this guidebook.

2. Overview of the Clean Development Mechanism

2.1 Background

Climate change emerged on the political agenda in the mid-1980s with the increasing scientific evidence of human interference in the global climate system and with growing public concern about the environment. The United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC) to provide policy makers with authoritative scientific information in 1988. The IPCC, consisting of hundreds of leading scientists and experts on global warming, was tasked with assessing the state of scientific knowledge concerning climate change, evaluating its potential environmental and socio-economic impacts, and formulating realistic policy advice.

The IPCC published its first report in 1990 concluding that the growing accumulation of human-made greenhouse gases in the atmosphere would "enhance the greenhouse effect, resulting on average in an additional warming of the Earth's surface" by the next century, unless measures were adopted to limit emissions. The report confirmed that climate change was a threat and called for an international treaty to address the problem. The United Nations General Assembly responded by formally launching negotiations on a framework convention on climate change and establishing an "Intergovernmental Negotiating Committee" to develop the treaty. Negotiations to formulate an international treaty on global climate protection began in 1991 and resulted in the completion, by May 1992, of the United Nations Framework Convention on Climate Change (UNFCCC).

The UNFCCC was opened for signature during the UN Conference on Environment and Development (the Earth Summit) in Rio de Janeiro, Brazil, in June 1992 and entered into force in March 1994. The Convention sets an ultimate objective of stabilizing atmospheric concentrations of greenhouse gases at safe levels. To achieve this objective, all countries have a general commitment to address climate change, adapt to its effects, and report their actions to implement the convention. The Convention divides countries into two groups: Annex I Parties, the industrialized countries who have historically contributed the most to climate change, and non-Annex I Parties, which include primarily the developing countries. The principles of equity and "common but differentiated responsibilities" contained in the Convention require Annex I Parties to take the lead in returning their greenhouse gas emissions to 1990 levels by the year 2000.

2.2 The Kyoto Protocol and the Clean Development Mechanism

2.2.1 Kyoto Protocol

The Convention established the Conference of Parties (COP) as its supreme body with the responsibility to oversee the progress toward the aim of the Convention. At the first session of the COP (COP 1) in Berlin, Germany, it was decided that post-2000 commitments would only be set for Annex I Parties. During COP 3 in Kyoto, Japan, a legally binding set of obligations for 38 industrialized countries and 11 countries in Central and Eastern Europe was created, to return their emissions of GHGs to an average of approximately 5.2% below their 1990 levels over the commitment period 2008-2012. This is called the Kyoto Protocol to the Convention.

The targets cover six main greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulphur hexafluoride (SF_6). The Protocol also allows these countries the option of deciding which of the six gases will form part of their national emissions reduction strategy. Some activities in the land-use change and forestry sector, such as afforestation and reforestation, that absorb carbon dioxide from the atmosphere, are also covered.

Negotiations continued after Kyoto to develop the Protocol's operational details. While the Protocol identified a number of modalities to help Parties reach their targets, it does not elaborate on the specifics. After more than four years of debate, Parties agreed at COP 7 in Marrakech, Morocco to a comprehensive rulebook – the Marrakech Accords – on how to implement the Kyoto Protocol. The Accords also intend to provide Parties with sufficient clarity to consider ratification.

2.2.2 CDM and Cooperative Mechanisms

The Protocol establishes three cooperative mechanisms designed to help Annex I Parties 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 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.

The mechanisms give countries and private sector companies the opportunity to reduce emissions anywhere in the world – wherever the cost is lowest – and they can then count these reductions towards their own targets. Any such reduction, however, should be supplementary to domestic actions in the Annex I countries.

Through emission reduction projects, the mechanisms could stimulate international investment and provide the essential resources for cleaner economic growth in all parts of the world. The CDM, in particular, aims to assist developing countries in achieving sustainable development by promoting environmentally friendly investment from industrialized country governments and businesses.

"The funding channelled through the CDM should assist developing countries in reaching some of their economic, social, environmental and sustainable development objectives, such as cleaner air and water, improved land-use, accompanied by social benefits such as rural development, employment, and poverty alleviation and in many cases, reduced dependence on imported fossil fuels. In addition to catalysing green investment priorities in developing countries, the CDM offers an opportunity to make progress simultaneously on climate, development, and local environmental issues. For developing countries that might otherwise be preoccupied with immediate economic and social needs, the prospect of such benefits should provide a strong incentive to participate in the CDM." (See page 21, Figueres, 2002 for more details)

2.3 CDM Overview[5]

The CDM allows an Annex I party to implement a project that reduces greenhouse gas emissions or, subject to constraints, removes greenhouse gases by carbon sequestration in the territory of a non-Annex I Party. The resulting certified emission reductions, known as CERs, can then be used by the Annex I Party to help meet its emission reduction target.

[5] *The project cycle of the CDM will be reviewed in more details in chapter 4.*

2.3.1 Administration

The CDM is supervised by the Executive Board, which itself operates under the authority of the Parties. The Executive Board is composed of 10 members, including one representative from each of the five official UN regions (Africa, Asia, Latin America and the Caribbean, Central Eastern Europe, and OECD), one from the small island developing states, and two each from Annex I and non-Annex I Parties.

The Executive Board will accredit independent organizations – known as operational entities – that will validate proposed CDM projects, verify the resulting emission reductions, and certify those emission reductions as CERs. Another key task of the EB is the maintenance of a CDM registry, which will issue new CERs, manage 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.

2.3.2 Participation

In order to participate in CDM, all parties (Annex I and non-Annex I Parties) must meet three basic requirements: i) voluntary participation, ii) establishment of the National CDM Authority, iii) ratification of the Kyoto Protocol. Annex I Parties moreover must meet additional requirements such as the following: i) establishment of the assigned amount under Article 3 of the Protocol, ii) national system for the estimation of greenhouse gases, iii) national registry, iv) annual inventory, and v) accounting system for the sale and purchase of emission reductions.

2.3.3 Project Eligibility

The Kyoto Protocol stipulates several criteria that CDM projects must satisfy. Two critical criteria could be broadly classified as additionality and sustainable development.

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". The 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.

Sustainable development. The protocol specifies that the purpose of the 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 may be broadly categorised 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.

2.4 National value and benefits

The basic principle of the CDM is simple: developed countries can invest in low-cost abatement opportunities in developing countries and receive credit for the resulting emissions reductions, thus reducing the cutbacks needed within their borders. While the CDM lowers the cost of compliance with the Protocol for developed countries, developing countries will benefit as well, not just from the increased investment flows, but also from the requirement that these investments advance sustainable development goals. The CDM encourages developing countries to participate by promising that development priorities and initiatives will be addressed as part of the package. This recognizes that only through long-term development will all countries be able to play a role in protecting the climate.

From the developing country perspective, the CDM can:

- Attract capital for projects that assist in the shift to a more prosperous but less carbon-intensive economy;
- Encourage and permit the active participation of both private and public sectors;
- Provide a tool for technology transfer, if investment is channelled into projects that replace old and inefficient fossil fuel technology, or create new industries in environmentally sustainable technologies; and,
- Help define investment priorities in projects that meet sustainable development goals.

Specifically, the CDM can contribute to a developing country's sustainable development objectives through:

- Transfer of technology and financial resources;
- Sustainable ways of energy production;
- Increasing energy efficiency & conservation;

- Poverty alleviation through income and employment generation; and,
- Local environmental side benefits

The drive for economic growth presents both threats and opportunities for sustainable development. While environmental quality is an essential element of the development process, in practice, there is considerable tension between economic and environmental objectives. Increased access to energy and provision of basic economic services, if developed along conventional paths, could cause long-lasting environmental degradation — both locally and globally. But by charting a different course and providing the technological and financial assistance to follow it, many potential problems could be avoided.

In comparing potential CDM projects with what might otherwise take place, it is clear that the majority will entail not only carbon reduction benefits, but also produce a range of environmental and social benefits within developing countries. Sustainable development benefits could include reductions in air and water pollution through reduced fossil fuel use, especially coal and oil, but also extend to improved water availability, reduced soil erosion and protected biodiversity. For social benefits, many projects would create employment opportunities in target regions or income groups and promote local energy self-sufficiency. Therefore carbon abatement and sustainable development goals can be simultaneously pursued.

Many options under the CDM could create significant co-benefits in developing countries, addressing local and regional environmental problems and advancing social goals. For developing countries that might otherwise give priority to immediate economic and environmental needs, the prospect of significant ancillary benefits should provide a strong inducement to participate in the CDM.

3. Synergies between CDM Projects and National Sustainable Development Priorities

As described in the previous chapter, the Kyoto Protocol stipulates that CDM projects must assist developing countries in achieving sustainable development (SD) in order to fulfil the eligibility criteria. However, the SD dimension should not merely be seen as a requirement of the CDM, it should be seen as a main driver for developing country interested in participating in the CDM.

This is so, since the selecting of the SD criteria and the assessment of the SD impacts in the current operationalisation of the Kyoto Protocol are decided to be sovereign matters of the host countries. Apart from GHG emission reductions, CDM projects will have a number of impacts in the host countries including impacts on economic and social development, and on the local environment, i.e. impacts on all of the three dimensions of SD. National authorities can thus use the SD dimension to evaluate key linkages between national development goals and CDM projects, with the aim of selecting and designing CDM projects in a way, where they explore, create and maximise synergies with local development goals.

The potential for such synergies is well documented. In many countries, there are various examples of energy efficiency and renewable energy initiatives that are part of sound development programmes with significant side-benefits on climate change. Other examples include price reform, agricultural soil protection, sustainable forestry, and energy sector restructuring, all of which have had substantial effects on the growth rates of greenhouse gas emissions, even though they have been undertaken without any reference to climate change mitigation or adaptation. This observation suggests that it may often be possible to build environmental and climate policy on development priorities that are vitally important to host countries. By exploring the main linkages between CDM projects and their impacts in the three dimensions of SD, host countries can design and select CDM projects that are associated with the largest development benefits.

In this chapter, we address the main issues related to assessing SD impacts of CDM projects from this perspective. First, a short introduction to the concept of SD is given and it is discussed and exemplified how possible SD criteria and indicators for CDM projects may be chosen based on national development objectives. This is followed by a hypothetical example on the application of SD indicators to CDM project evaluation. Finally, suggestions on major steps for a SD evaluation of CDM projects are provided.

3.1 Assessing sustainable development impacts – criteria and indicators

3.1.1 Conceptualising sustainable development and selecting sustainable development criteria

The first step in an effort to assess the SD impacts of CDM projects is for the host country to define and select specific aspects of and goals related to SD that are considered to be important. We call these aspects or goals the SD criteria. There is no universally accepted definition of sustainable development[6]. However, there is a common consensus to view the concept as encompassing three dimensions: the social, economic and environmental dimension. In the theoretical literature on sustainable development, the main focus of analysis has been environmental resources and the maintenance and composition of stocks of resources or 'capitals' (human, man-made, social and environmental) over time. This is not surprising given the origin of the concept, but in order to operationalise SD in the context of developing countries and CDM projects, there is a need for a more pragmatic approach to SD with a stronger emphasis on immediate development objectives such as poverty reduction, local environmental health benefits, employment generation and economic growth prospects, etc. In this way, synergies between CDM projects and national sustainable development goals are prioritised.

The suggested pragmatic approach is accordingly to focus on immediate development criteria related to the three dimensions of SD and let GHG emission reduction represent a long run SD criteria. The rationale for and underlying assumption of this approach is that: (a) criteria related to intra-generational equity, including poverty, are central to the concept of SD and a major target of global action as expressed through e.g. the Millennium Development Goals, and (b) development and economic growth in developing countries is not necessarily in conflict with sustainable development at the local, regional, or global level in the short and long run. Rather, sound development policies focussing on promoting efficiency in general as well as in energy production and use are assumed to benefit both immediate development goals, including economic growth and sustainable development.

In practice, this pragmatic approach seems to reflect what developing countries are already focussing on in their identification of sustainability criteria for CDM projects. <Table1> below lists examples of SD criteria for CDM project screening selected from some of the developing countries that have begun to identify these criteria.

[6] An often-cited definition is that of the World Commission on Environment and Development (1987), whereby SD is defined as 'development that meets the needs for the present without compromising the ability of future generations to meet their own needs'.

<Table 1> Examples of SD criteria identified by host countries

Social Criteria
Improve quality of life
Alleviate poverty
Improve equity
Economic Criteria
Provide financial returns to local entities
Result in a positive impact on balance of payments
Transfer new technology
Environmental Criteria
Reduce GHG emissions and the use of fossil fuels
Conserve local resources
Reduce pressure on local environments
Provide improved health and other environmental benefits
Meet local renewable energy portfolio standards and other environmental policies

Source: Based on Pembina (2003)

The table is of course not exhaustive, but it indicates that

- Most of the criteria are also major national development criteria
- Host countries see a potential for exploiting synergies between CDM projects and national SD priorities
- A relatively limited number of SD criteria can capture a broad variety of the SD impacts that CDM projects may have

Well designed CDM projects can thus offer attractive opportunities for supporting development priorities of host countries as reflected in e.g. general national development plans, in sectoral or local environmental plans, and in social development strategies. By including relevant criteria from existing plans and strategies in the selection of SD criteria for CDM projects, the additional effort related to the SD assessment process is furthermore minimised and consistency between environmental and broader development considerations is enhanced. These aspects are important, as it is sometimes argued in the debate that the SD impact assessment of CDM projects merely adds to transaction costs and is a complication that developing countries cannot afford. Taken one step further, some argue that competition for investment may result in a low priority on assuring broader SD impacts of CDM projects (see e.g. Thorne and Raubenheimer, p.12). It should be stressed, however, that while the SD assessment does involve some costs, these costs will be smaller than the benefits in the form of better-designed projects with larger impacts on national development goals.

The next step in the assessment process is to define indicators that reflect the chosen SD criteria. In other words, we need to translate the criteria into something that can be used to give us information about the performance of a given CDM project with respect to the chosen criteria. The issue of indicators is addressed in the following.

3.1.2 How to select SD indicators

One way of establishing a linkage between CDM projects and national sustainable development criteria is through the use of project evaluation indicators that reflect specific CDM project issues such as financial costs and GHG emission reductions as well as development criteria including economic, social, and environmental sustainability dimensions.

The application of SD indicators to CDM project evaluation is therefore a tool for checking how the CDM potentially can be used to create synergies with host country development objectives. Based on the chosen SD criteria as exemplified above, the indicators for the SD assessment should be chosen so that they simultaneously reflect the SD criteria and are easy to use and understand. A few more detailed comments are presented below on how SD indicators can be selected in order to meet these objectives.

First of all, an SD indicator or set of indicators should be comprehensive and measurable in order to be useful to the decision maker. Comprehensiveness should be understood in relation to the scope of the chosen SD criteria reflecting the economic, environmental, and social dimensions. Furthermore, comprehensiveness implies that knowledge of the level of a specific set of indicators enables the decision maker to assess the extent to which a given objective has been reached. Measurability means that the indicator can be defined and measured unambiguously and without excessive use of effort, time and costs.

In the case of CDM projects, the assessment of SD will involve a set of indicators and these should be selected so that they are:

- Complete: The set of indicators should be adequate to indicate the degree to which the overall objective of sustainability has been met. This implies that key SD issues are reflected in a local and global context, and that the economic, environmental, and social dimensions are covered.
- Operational: The set of indicators should be used in a meaningful way in the analysis. This in turn implies that the indicators should provide a balanced coverage of the area; that they are well defined and unambiguous; and that they should be policy-relevant, i.e.
    - Relate to areas that will be affected by policy decisions
    - Can be understood and related to policy decisions
    - Can be interpreted

- Decomposable: A formal decision analysis requires both the decision maker's preferences for consequences and his/her judgments about uncertain events are quantified. Because of the complexity involved, this will be extremely difficult for decision problems involving even a relatively modest number of indicators. It is therefore recommended that the set of indicators is decomposable, i.e. that the decisions can be broken down into parts involving a smaller number of indicators.
- Non-redundant: The indicators should be defined to avoid double counting of consequences.
- Minimal: It follows from the above that it is desirable to keep the set of indicators as small as possible. For instance it may be possible to combine indicators to reduce the dimensionality of the decision problem. It may also be possible to minimise costs, time and effort by letting the set of indicators be partly based on available data that is of a high quality and is regularly updated.

3.1.3 Examples of potential SD indicators that can be applied to CDM project evaluation

While the previous section gave some guidance regarding the process of defining and selecting indicators for assessing the SD impacts of CDM projects, this section presents an overview in table format of indicators that may be used to evaluate general economic, environmental, and social sustainability dimensions of CDM projects, based on the SD criteria selected by CDM project host countries (see <Table 2> below). The list of indicators presented in the table is not exhaustive and should only be seen as providing examples of indicators that countries may decide to use.

A few comments on applying SD indicators to CDM project evaluation are appropriate. First of all, a large number of SD indicators is available in the literature and it is therefore suggested that existing statistical material and measurement standards for the indicators be used to the extent possible. In this way economic SD indicators may, for example, be inspired by statistical standards from the United Nations (UN), energy can follow the International Energy Agency (IEA) format, and GHG emissions and carbon sequestration can follow Intergovernmental Panel on Climate Change (IPCC) guidelines. Well-defined international standards from e.g. the United Nations Development Programme, the World Bank (WB), and the World Health Organisation (WHO) may cover a number of social dimensions like equity aspects, health, and education. Similarly, there are international standards for environmental impact data, used in e.g. environmental impact assessments.

Secondly, as the number of references given above indicates, a comprehensive list of indicators covering all relevant project and SD aspects will almost inevitably be too long for any program to have as a core group of indicators to be evaluated. This is also the case for the indicators listed in <Table 2>. A sugge-

stion is accordingly for a host country to select a core set of indicators, which all projects must look at and a secondary set, which may be used depending on project details and design. This corresponds to the desirable properties of a set of indicators addressed above that the set should be comprehensive and complete, but at the same time minimal and decomposable.

A third comment is that in most cases it will be necessary for the CDM process to consider a number of qualitative indicators in addition to the quantitative indicators. Qualitative indicators are needed to capture impacts that are important and cannot be quantified, such as impacts on institutions, networks, etc. resulting from the project. As these examples and <Table 2> suggest, particularly the social dimension of sustainability is an area, where a combination of qualitative and quantitative information is usually required. The use of this combined information requires careful consideration with regard to comprehensiveness, consistency, and transparency in definition and presentation. Furthermore, the provision of information about social sustainability dimensions is complicated by the relatively premature state of the research and applications in this area compared with other aspects. In practice, it will subsequently be difficult to collect and interpret all the suggested information for individual policies and comparable policy assessments. 'CDM and Sustainable Development' provides a more detailed discussion about the qualitative information and how it can be used (URC, 2004).

A fourth and final comment is that as usual the impacts of the project should be compared to a baseline case. In relation to the table above, this implies that we are interested in the changes in the measurement standard of the indicators between the baseline case and the CDM project case.

<Table 2> Examples of major sustainability indicators that can be used in relation to CDM projects

SD criteria	Sectoral/Project level indicator	Measurement standard of indicator
Economic		***Quantitative:***
Growth (impact on national/ regional budgets)	GDP FDI	GDP Total financial costs
Employment	Employment	Change in the rate of unemployment
Investments	Net costs, financial flows Activity in energy sector, industry, agriculture etc.	Foreign exchange requirement ($ and share of investment)
Sectoral development	Technology access Market creation	Physical measures like energy demand and supply, economic measures, energy efficiency and affordability, energy security
Technological innovation	Learning	No. of technologies Price of technologies and maintenance cost Development over time
Environmental		***Quantitative***
Climate change	GHG emissions	GHG emissions
Air pollution	Local air pollution, particulates	Emissions of SO_2, NOx and particulates
Water	Rivers, lakes, irrigation, drinking water	Emissions in physical units Damages in physical and monetary units
Soil	Exposure to pollutants	Emissions in physical units Damages in physical and monetary units
Waste	Waste discharge and disposal	Emissions in physical units Damages in physical and monetary units
Exhaustible resources	Fossil fuels	Physical units
Biodiversity	Specific species	Number, monetary values

<Table 2> continued

SD criteria	Sectoral/Project level indicator	Measurement standard of indicator	
Social		*Quantitative*	*Qualitative*
Legal framework	Regulation, property rights	Physical regulation standards, tax value and revenue Land area distribution	Outline of major rules and property rights
Governance	Implementation of international agreements, enforcement	Cost of administrating and enforcing agreements and project management No. of infringements and sanctions	Characteristics of formal and informal authorities Quality of bureaucracy Contract enforceability
Information sharing	Institutions, markets, formal and informal networks	New institutions created No. of institutional units participating in policy implementation (companies, households, public sector, NGOs, individuals)	Description of networks; members, roles, interests
Equity	Distribution of costs and benefits, income distribution, local participation	Cost and benefits in economic units related to stakeholders, income segments, gender, geographical area, etc. Income generation adjusted with distributional weights Gini coefficient	Mapping local stakeholders and their participation Gender aspects

<Table 2> continued

Poverty alleviation	Income or capabilities created for poor people	Change in the number of people below poverty limit, income created to poor people Energy services provided to poor people (energy units)	Characteristics of poverty in terms of limited capabilities: Food, education, health, and limited freedom of choice
Education	Literacy rates, primary and secondary education Training	Literacy rates, enrolment rates, energy for education, time savings from reduced fuelwood collection used for education Changes in years of training	
Health	Life expectancy Infant mortality Major diseases Nutrition	Epidemics, nutrition, energy for clinics	

3.2 Applying sustainability indicators to CDM projects – An illustration

To illustrate how the SD impacts of a CDM project may be assessed in practice, the following hypothetical case example is constructed. The hypothetical CDM project considered is a rural biogas plant for household cooking, lighting, and electricity production. The project is assumed to replace the baseline activity, where cooking and heating is based on woodfuel and kerosene is used for lighting.

<Table 3> below gives an overview of the impacts of the case example CDM project compared to the baseline activity. No attempt has been made to quantify the indicators that have been chosen to assess the SD impacts of the project and in this sense <Table 3> presents a qualitative overview of the SD impacts. Furthermore, it is emphasised that the specific indicators of SD impacts of the CDM project should merely be seen as examples of aspects that countries may decide to consider.

The qualitative assessment of SD impacts illustrated in <Table 3> represents costs, energy access and affordability, employment, local and global environment, education and income generation. The assessment suggests that in most of these areas, the biogas project will have positive impacts compared with the baseline of woodfuel and kerosene consumption.

However, the project may imply that income generation and employment of people related to the woodfuel and kerosene consumption will experience a decrease in activity. It is therefore important to consider how the people affected may benefit from being integrated in the establishing of the biogas plant or in business activities generated by the improved energy access. Another possibility for getting more local development benefits out of this particular CDM project is to try to supplement the specific CDM project with an additional CDM project that creates employment opportunities for the people who are loosing their job in relation to the reduced woodfuel and kerosene supply. Examples of CDM projects with positive employment impact are plantation or agricultural projects and various energy projects that include construction work.

Most CDM projects in the energy sector will create multiple positive side impacts on SD indicators as the ones listed in <Table 3>. As just shown, there may be examples of projects with a negative employment impact in cases where labour-intensive fuel consumption is substituted, but most other SD impacts are likely to be either insignificant or positive. For example, there are only a few examples of trade offs between GHG emission reduction and local air pollution improvements. Such a trade off can occur in the transportation sector if diesel is substituting gasoline, because diesel consumption can have lower GHG emissions per km than gasoline, but have higher local air emissions.

<Table 3> Illustrative example of qualitative assessment of the SD impacts of introducing a biogas plant to substitute woodfuel and kerosene consumption

	Project costs	Energy access and affordability	Employment	Environmental impacts	Education	Income generation
Baseline case: Woodfuel for cooking and kerosene for lighting	Replacement costs of woodfuel cooking devices and kerosene lamps	High costs of woodfuel and kerosene	Employment related to woodfuel and kerosene provision	High local air pollution with associated health damages	Energy provision takes time from educational activities Lighting quality poor for studying	No power supply for local industry Households spend time on energy provision that substitutes income generation activities
CDM project: Biogas plant for electricity production	Capital costs of biogas plant and cooking and lighting appliances	Low costs of gas and electricity	Employment related to construction phase and maintenance	Low local air pollution with associated health benefits	Better lighting for studying	Energy supply supports development of local industry Households get more time for income generation activities
Net impact of replacing baseline case with CDM project	Probably higher project costs	Lower energy supply costs	Higher employment in project startup but lower permanent employment	Lower air pollution with associated health benefits	More time for education and better lighting facilities	More income generated

3.3 Major Steps of an SD Evaluation of CDM Projects

This chapter has aimed at illustrating how national authorities can use SD assessment of CDM projects as a tool for evaluating key linkages between national development goals and CDM with the aim to promote and design projects so that they create local development synergies. On the basis of the previous sections, this section suggests a 7-step procedure for conducting a SD evaluation of CDM projects

3.3.1 Project Evaluation Steps

The following SD assessment steps for CDM projects are suggested[7]:

Step 1

Selection of policy priorities that characterises the broader development context, for example as reflected in national plans and sectoral strategies. The policy priorities may be suggested or evaluated in stakeholder sessions and/or related to political decisions or official plans that have been developed in other policy contexts.

Step 2

Selection of major SD policy areas that are to be addressed in the CDM project evaluation taking the starting point in a broad range of national development policy themes. This will include economic, social, human and environmental policy dimensions.

Step 3

Initial screening of CDM project areas that are considered to be relevant and that should be included in the assessment of linkages to development policies.

Step 4

General outline of a procedure for evaluating SD impacts of CDM projects including:

- Selection of SD indicators.
- Design of an approach for assessing the indicators.
- Definition of a reporting format for the SD impacts of the CDM project with standards for representing economic, social, human, and environmental information in quantitative and/or qualitative terms.

[7] See a more detailed outline of the steps in relation to CDM project case examples in CDM and Sustainable Development, URC, 2004

Step 5

Detailed assessment of CDM project impacts on SD policies as part of project development. This may involve redesign of projects in order to incorporate SD policy priorities.

Step 6

Broader decision making on CDM project selection in the context of national SD contribution as part of more general activities to develop CDM project portfolios. This includes the initial establishment of a dialogue between government, national stakeholders and project developers.

Step 7

Broader evaluation of how the implemented CDM project has performed in relation to predetermined SD criteria as a supplement to monitoring, verification and certification procedures.

3.4 Conclusion

CDM projects offer opportunities for creating synergies between climate change policies and SD policies that encompass major national development priorities. These combined policy goals may be supported through a process in which potential CDM projects are screened against chosen SD criteria representing economic, social, and environmental aspects that host countries find important. Host countries can choose from a long list of potential indicators, including financial and technology transfer, income generation, employment creation, local environmental impacts, health, social development, and equity.

It may be advantageous to integrate SD evaluation into more general national development planning activities, for example through organisation of broad stakeholder workshops, evaluation of linkages to development plans, and careful screening of CDM projects with regard to their ability to assist SD.

4. The CDM project cycle

The next sections explain the seven steps of the CDM project cycle in <Figure 1> that is taken from "Introduction to the CDM"[8]. This introductory booklet gives a general background and overview of the CDM, describes the national value and benefits of the CDM, and shows the importance of a national CDM strategy.

The section on project design and formulation guides the reader through the content required in the Project Design Document (PDD) which must be made for each CDM project. It also describes the process for small-scale CDM projects. The section has a subsection for each of the items that are required in the PDD. Each subsection explains each step of CDM project cycle.

In addition to the seven steps (activities) in the CDM project cycle, <Figure 1> shows the institutions involved in the process and the reports which must be produced. Project participants are Parties to the Kyoto protocol or a private and/or public entity authorized by a Party to participate in CDM projects under the Party's responsibility.

Some of the activities in the CDM Project Cycle are the same as those for any other investment project. However, unique to the CDM are the steps to generate emission credits such as baseline setting, validation, registration, monitoring and verification/certification of emissions reduction.

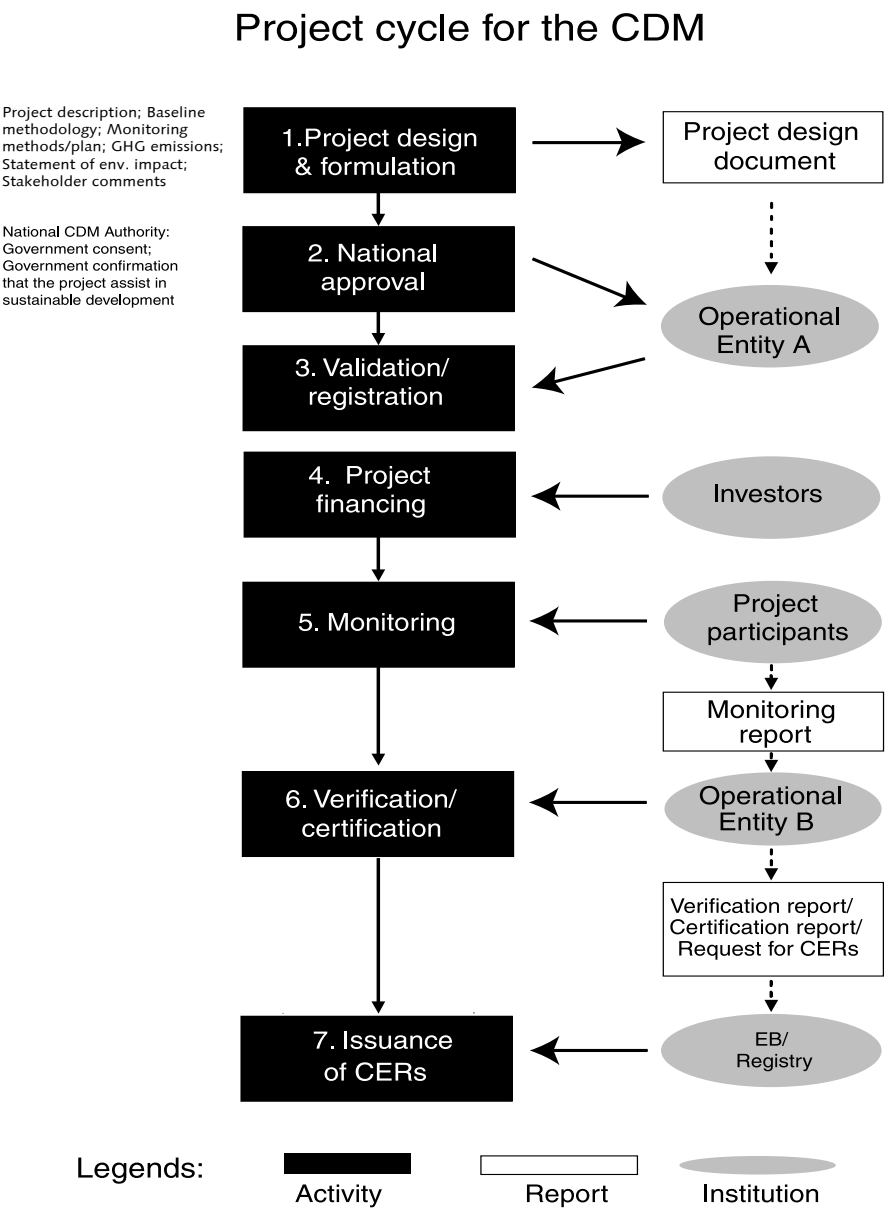
4.1 Project design and formulation

Annex A of the Kyoto Protocol specifies six targeted gases and sectors/source categories where emissions reduction activities can take place. The CDM can include projects in the following sectors:

- 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)

[8] This can de downloaded in several languages from the project website: http://www.cd4cdm.org/publications.htm

<Figure 1> The CDM project cycle



Source: Introduction to the CDM, UNEP RISOE Centre, 2002

CDM projects must result in real and measurable climate change benefits and should be additional to any that would occur in the absence of the project activity. To establish additionality, the project emissions must be compared to the emissions of a reasonable reference case, identified as the baseline. The baseline will be established on a project-specific basis by the project participants complying with approved methodologies. These baseline methodologies are being developed on the basis of three approaches in the Marrakech Accord:

- Existing actual or historical emissions;
- Emissions from a technology that represents an economically attractive investments; or,
- Average emissions of similar project activities undertaken in the previous five years under similar circumstances and whose performance is among the top 20% of their category.

CDM projects must also have a monitoring plan to collect accurate emissions data. The monitoring plan, which constitutes the basis of future verification, should provide confidence that the emission reductions and other project objectives are being achieved and should be able to monitor the risks inherent to baseline and project emissions. The monitoring plan can be established either by the project developer or by a specialized agent. The baseline and monitoring plan must be devised according to approved methodologies. If the project participants prefer a new methodology, it must be authorized and registered by the Executive Board. However, for small-scale CDM projects, simplified baseline methodologies and monitoring plans can be used.

Project design and formulation is the first step in the CDM project cycle (see <Figure 1>) and will have a critical influence on all the following steps. A careful design and formulation of the project will give a higher chance of the eventual success of the whole project. Some initiatives, such as the PCF and CERUPT, have developed formats (project idea note or project concept note) as a preliminary step to the PDD.

In order to get a CDM project approved and registered by the Executive Board (EB), the project participants must prepare a Project Design Document (PDD) following the detailed outline shown on the CDM website of the UNFCCC Secretariat[9]. The present outline of the PDD is shown in <Table 4>. The PDD for the small-scale CDM has exactly the same chapters with 3 annexes less. However, there are some differences in the text between the two PDDs because of the simpler requirements for small-scale CDM project activities.

[9] Visit http://cdm.unfccc.int/Reference/Documents to get PDD for normal CDM projects and small-scale CDM projects. Both are available in six UN languages.

<Table 4> Required content of a Project Design Document (PDD)

A.	General description of project activity
B.	Baseline methodology
C.	Duration of the project activity/crediting period
D.	Monitoring methodology and plan
E.	Calculation of GHG emission by sources
F.	Environmental impacts
G.	Stakeholder comments
Annex 1.	Contact information on project participants
Annex 2.	Information regarding public funding
Annex 3.	New baseline methodology
Annex 4.	New monitoring methodology
Annex 5.	Table of baseline data

Note: Annex 3-5 are not necessary for the small-scale CDM and Annex 3-4 are expected to be removed from the PDD and included in two separate stand-alone forms.

More detailed explanation of each chapter of PDD will be given in the next chapter.

4.1.1 Eligibility

All projects that satisfy the additionality and sustainable development criteria are acceptable under the CDM. For the normal CDM, no positive list of project types has been made. However, limitations have been set on the following projects:

- Forestry. Sink projects allowed are only afforestation and reforestation, and Annex I Parties can only add CERs generated from sink projects to their assigned amounts up to 1% of their baseline emissions for the first commitment period. Further guidelines for carbon sinks will be developed to ensure they are environmentally sound. At COP9, an annex to the modalities and procedures for CDM on how to treat afforestation and reforestation project activities was decided.
- Nuclear energy. Annex I Parties must refrain from using CERs generated through nuclear energy to meet their targets.

Large projects are likely to become more attractive than small-scale projects since they will generate large quantities of CERs at lower transaction costs per unit of emission credit. To facilitate the development of small-scale projects, simpli-

fied modalities and procedures were developed to reduce transaction costs.

The EB has decided that a project can have more than one host country. This could be relevant for cross border transmission lines, or hydro projects on rivers running along borders.

4.1.2 Additionality

The project activity is expected to result in GHG emission reduction, which is additional to any that would occur in the absence of the certified project activity, i.e. it should not be included in the baseline. The additionality should be shown by following the additionality part of the methodologies approved by the EB.

At its 10th meeting the EB provided some examples of how to demonstrate the additionality of a project[10]:

a) A flow-chart or series of questions that lead to a narrowing of potential baseline options.
b) A qualitative or quantitative assessment of different potential options and an indication of why the non-project option is more likely.
c) A qualitative or quantitative assessment of one or more barriers facing the proposed project activity (such as laid out for small-scale CDM projects).
d) An indication that the project type is not common practice (e.g. occurs in less than [< X%] of similar cases) in the proposed area of implementation, and not required by a Party's legislation/regulation.

4.1.3 Small-Scale CDM projects categories

According to modalities and procedures for the CDM, three types of small-scale CDM projects are possible. For the first two, there is a maximum size of the activity that reduces emissions, but for the third type, there is a maximum on the total emission from the project at the end of the project activity. The three types of small-scale CDM projects are:

I) Renewable energy project activities with a maximum output capacity equivalent of up to 15 MW (or an appropriate equivalent)[11];

[10] This can be found in the Guidance/clarification part of the UNFCCC CDM home page http://cdm.unfccc.int/Reference/Guidclarif

[11] According to the EB, the maximum output for a type I project is an installed/rated capacity as indicated by the manufacturer regardless of the actual load factor.

II) 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; or

III) Other project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 thousand tonnes (kt) of carbon dioxide equivalent annually.[12]

These three types are interpreted by the EB as mutually exclusive. For example when a 60 MW wind turbine project is not eligible for type I, it cannot be eligible for type III either, even though it emits less than 15 kt CO_2. The EB has also decided that peat is not eligible for a Type I project, since it is not considered renewable. Table 5 shows a list of eligible small-scale CDM projects, indicating that sink projects are not eligible for small-scale CDM.

<Table 5> The EB's present version[13] of small-scale CDM project activity categories

Project types	Small-scale CDM project activity categories
Type I: Renewable energy projects	A. Electricity generation by the user B. Mechanical energy for the user C. Thermal energy for the user D. Renewable electricity generation for a grid
Type II: Energy efficiency improvement projects	A. Supply side energy efficiency improvements - transmission and distribution B. Supply side energy efficiency improvements - generation C. Demand-side energy efficiency programmes for specific technologies D. Energy efficiency and fuel switching measures for industrial facilities E. Energy efficiency and fuel switching measures for buildings
Type III: Other project activities	A. Agriculture B. Switching fossil fuels C. Emission reductions by low-greenhouse gas emission vehicles D. Methane recovery E. Methane avoidance
Types I - III:	Other small-scale project

[12] *UNFCCC – The Marrakech Accords, 2001, Decision 17/CP.7 (Article12), para 6(c)*

[13] http://cdm.unfccc.int/methodologies

The last row in <Table 5> indicates that the developers of small-scale CDM projects can propose additional small-scale project categories. Unlike the proposal for full-scale CDM projects, the proposal for a new project activity category should be submitted directly to the EB without going through a DOE.

If a new project belongs to none of the existing categories of small-scale projects, the project developer should propose a new category to the EB before submitting a project PDD. The proposal must include a description of how a simplified baseline and monitoring methodology would be applied to the new category. Once the EB accepts a proposed new category, the EB will amend <Table 5> and its appendix to the small-scale modalities and procedures[14] to include the new category. The project developer may then submit the project PDD in this new category to the EB for consideration.

In Appendix A, we present a table showing possible activities for normal CDM projects by extending <Table 5> with additional rows showing project categories eligible for the normal CDM projects such as industrial process, transport, and LULUCF. The table has also been expanded with an extra column showing illustrative project activities for each of the activity categories.

Another general condition for small-scale CDM projects is related to the combination of renewable and non-renewable components within the boundary of one project. If the project adds a unit that has both renewable and non-renewable components, the eligibility limit of 15 MW applies only to the renewable component.

4.1.4 Bundling and debundling

Bundling will reduce the transaction cost because a large number of small projects can be combined in one PDD. Projects may be bundled as long as the total size is below the limits for a single project as listed for the 3 small scale project types above.

Debundling a large CDM project into consecutive small-scale parts is not eligible for a small-scale CDM project if the total is greater than the small-scale project eligibility. The EB has elaborated a procedure as an annex to the modalities and procedures for small-scale CDM, which shall be applied to a small-scale project to assess whether it is a debundled portion of a larger project. The procedure is defined as follows:

A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

[14] *http://cdm.unfccc.int/EB/Meetings/010/eb10repan1.pdf*

- with the same project participants;
- in the same project category and technology/measure; and
- registered within the previous 2 years; and
- whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

4.1.5 Sink projects

The general Modalities & Procedures (M&P) for the CDM did not cover sink projects (afforestation and reforestation projects). COP7 requested the Subsidiary Body for Scientific and Technological Advice (SBSTA), which meets twice a year, to develop M&P for afforestation and reforestation project activities under the CDM in the first commitment period (2008-2012). They were adopted as an annex to the existing M&Ps at COP9 in Milan, December 2003 (FCCC/SBSTA/2003/L.27).

However, the general M&P for CDM already gave some guidance for sink projects:

only afforestation and reforestation (A&R) projects are eligible and the maximum use of CERs from A&R projects should be less than 1% of the 1990 emissions of the Party. Other sinks like revegetation, forest management, cropland management and grazing land management are not allowed under the CDM but only as Joint Implementation projects in Annex-I countries.

Avoided deforestation is allowed for normal small-scale CDM projects, e.g. where it can be proved that installation of efficient wood stoves reduce the deforestation.

The A&R terms are defined in the following way:

Afforestation is the direct human-induced conversion of land that has not been forested for a period of at least 50 years into forested land through planting/seeding.

Reforestation is in the first commitment period (2008-2012) limited to lands that did not contain forest on 31 December 1989.

There are some restrictions on the definition of a forest. The DNA in the CDM host country should make an assessment and report the value in each of the following three categories, which will be used for all projects in the first commitment period in the country:

- A minimum tree cover of 10-30%
- A minimum forest area of 0.05 – 1.00 ha
- A minimum tree height of 2-5 metres

According to the M&P for LULUCF CDM projects, small-scale LULUCF CDM project will also be allowed. For normal small-scale CDM projects, a separate M&P was developed. A similar special M&P will be developed for small-scale LULUCF CDM projects. It should be finalised at the 20th sessions of Subsidiary Bodies (SB 20) in June 2004 and adopted at COP10 based on the submissions from the Parties which was made before 28 February 2004.

The LULUCF M&P contain only the following rules for small-scale CDM projects:

- The greenhouse gas removal of less than 8 ktCO_2/year.
- The projects must be developed by low-income communities and individuals as determined by the host Party.

The M&P also contains the following important rules:

Since the benefits from sink projects accrue over longer periods of time than benefits from other CDM projects the crediting period will be longer than for normal CDM projects. The crediting period begins at the start of the afforestation or reforestation project activity. Just like normal CDM projects, there are two options for the crediting period:

- A maximum of 20 years which may be renewed two times, provided a DOE confirms that the baseline is still valid or has been properly updated taking into account of new data.
- A maximum of 30 years.

All carbon stored must be accounted. The following carbon pools are defined:

- Above-ground biomass
- Dead wood
- Litter
- Below-ground biomass
- Soil organic carbon

A carbon pool can be excluded from the emission accounting in the project if that does not increase the net GHG removal.

The procedure for establishing baseline and monitoring methodologies is the same as that for normal full-scale CDM projects. There is no methodology at the beginning. Methodologies will be approved by the EB as project participants submit them for approval. The project participants must base these new methodologies on one of the following three *approaches*:

1. Existing or historical changes in carbon stocks in the carbon pools within the project boundary.

2. Changes in carbon stocks in the carbon pools within the project boundary from land use that represent an economically attractive course of action, taking into account barriers of investment.

3. Changes in carbon stocks within the project boundary from the most likely land use at the time the project starts.

The PDDs for LULUCF CDM projects will contain the same information as for normal PDDs:

- General description of the project activity
- Baseline methodology (including additionality)
- The choice of crediting period
- Monitoring methodology
- Calculation of GHG emissions
- Environmental impacts
- Stakeholder comment

However, there will be some additional requirements:

- The project description must contain the exact location of the projects, a list of the carbon pools selected, the present environmental conditions, the legal title of the land, the current land tenure and the right of access.
- There must always be an analysis of the environmental & socio-economic impact. If negative impacts are considered significant by the project participants or the host party, an environmental/socio-economic impact analysis must be made.
- The DOE which validates the CDM project must make the PDD available for public comments in a period of 45 days (30 days for normal CDM projects).
- Management activities, including harvesting cycles, means that the carbon stored can vary over time. Therefore the time of verification should be selected in such a way as the systematic coincidence of verification and peaks in the carbon stored can be avoided.

In the submissions by the Parties and the workshops where the development of the LULUCF M&P were discussed many proposals were made for treating the non-permanence issue since the risk of non-permanence of the carbon stored is an inherent feature of sinks – in contrast to the permanent nature of emission reductions in the energy sector. Carbon in forest sinks is vulnerable to natural disturbances such as pest outbreaks, wildfires and diseases, and agricultural practices and land management. The solution chosen was to let the CERs from LULUCF CDM projects expire after a certain time. The project participant must in the PDD choose one of the two options:

- tCERs or 'temporary CERs' that expires at the end of the commitment period following the one during which it was issued.
- lCERs or 'long-term CERs' that expires at the end of the crediting period chosen.

The initial verification and certification by a DOE may be undertaken at a time selected by the project participants. In order to show the permanence of the carbon stored, both tCERs and lCERs should be verified and certified every 5 years thereafter.

Environmental NGOs had been very eager that large monoculture industrial plantations (including genetically modified trees) should be excluded because they threaten biological diversity, watershed protection, and local sustainable livelihoods. They urged parties to explicitly ask for multi-species cultures that increase or at least preserve biodiversity. However, the negotiation ended up with a text (the M&P) saying that it is up to the host country to evaluate the risks associated with the use of potentially invasive alien species and genetically modified organisms.

The COP had invited the Intergovernmental Panel on Climate Change (IPCC) to elaborate methods to estimate, measure, monitor and report changes in carbon stock and GHG emissions. This IPCC report called "Good Practice Guidance for LULUCF in the preparation of national greenhouse gas inventories under the Convention" was finally approved at COP9. The baseline and monitoring methodologies and the Project Design Document (PDD) should be consistent with this document.

4.2 National approval

One purpose of the CDM is to assist developing countries in achieving sustainable development. The developing country government is responsible for screening the projects and deciding whether a project meets that requirement. The host country should therefore develop national criteria and requirements to ensure a coherent, justifiable and transparent assessment. It is important that these criteria are in agreement with national development priorities[15].

All countries wishing to participate in the CDM must designate a National CDM Authority to evaluate and approve the projects, and serve as a point of contact. Although the international process has given the general guidelines on baselines and additionality, each developing country has the responsibility to determine the national criteria for project approval.

The national CDM Authority must issue the necessary statements that the project developers participate voluntarily in the project and must confirm that the project activity assists the host country in achieving sustainable development.

4.2.1 Designated National Authority (DNA)

A host country must establish a Designated National Authority, which will have the responsibility to decide whether the project activity makes a contribution to achieving the country's sustainable development goal and whether the country agrees to participate in the project.

One of the key elements for attracting CDM investments is the host country's application of quick and transparent procedures for screening, evaluation and approving projects. To achieve this goal, the National CDM Authority should implement a standardized system for this activity. The key question is what the mandate of the DNA and its individual staffs should be?

The DNA must obtain an overview of the existing legal environment and establish an enabling regulatory framework for evaluation and approval of CDM projects. This includes:

i) development of national criteria and respective information requirements to ensure a coherent, justifiable and transparent assessment of CDM projects in accordance with the CDM Executive Board's decisions (additionality, sustainability);
ii) ensuring the compliance of CDM projects with relevant national policy and regulatory regimes;
iii) elaboration of guidelines and procedures for project approval.

[15] *See chapter 3 for more details on sustainable development criteria.*

One important factor in establishing a DNA is an institutional sustainability. This is dependent on the level of activity, revenue generated and hence ability to self-finance the institution and its legal status.

There is no single approach to developing DNA. A number of approaches are possible and they must take into account the needs and resources of each individual country. Some lessons can be learned from the national AIJ (Activities Implemented Jointly) entities that were created under the pilot phase. "Establishing National Authorities for the CDM – A Guide for Developing Countries" (See Appendix B) compares and contrasts the various types of national entities in South American countries and tries to identify some lessons learned. However, cross-sectoral coordination is indispensable since the very nature of CDM is multi-sectoral.

Five approaches to developing the DNA are briefly suggested: a single government department model, a two-unit model, an inter-departmental government model, FDI-piggyback model, outsourcing model:

Single government department model
One department or ministry undertakes all the activities of the DNA. This would most likely be the environment department. The DNA is hence located within the climate change unit or directorate. Since CDM projects may involve different sectors and validation requires specific technical expertise, the department may invite technical experts from other government agencies/ministries upon demand. This effectively means that the DNA acts as a secretariat. The experts can collaborate with the DNA secretary or focal point to evaluate/analyse and validate the project. The secretariat would thus be ultimately responsible for approval of the CDM projects.

The DNA secretariat may also be responsible for marketing and promotion of CDM. The DNA secretariat can design CDM promotion material and furnish it to the FDI office and other relevant stakeholders. However, conflicts of interest are likely to arise if the DNA plays a role of CDM promotion office. To prevent the possibility of such conflicts of interest, the CDM promotion office may be established as a separate organization.

A two-unit model
In some cases it could be appropriate to split the activities of the DNA into two parts: The first part could be located in the department responsible for climate change while the second part could be located elsewhere as an independent unit. This separation responds to the concern of avoiding possible conflicts of interest in the process of project formulation and approval.

Inter-departmental government model
This entails establishing a structure which allows all relevant government departments to be integrated into the DNA as permanent members. The ministry of

environment can act as the coordinator but all member departments undertake approval of projects. A committee to operationalise this approval could be set up.

The coordinator acts as the registration office and thus receive project proposals on behalf of the DNA. The coordinator then communicates with other DNA members. The coordinator also communicate with the EB but upon agreement within the DNA.

FDI-piggyback model
Most countries have a Foreign Direct Investment (FDI) institutional framework, which promotes foreign investment. Typically this comprises a promotion office and an approval or implementation office. These institutions receive projects from foreign investors and evaluate and approve projects using pre-structured criteria which largely reflect the national development priorities and interests.

The FDI framework could thus be adapted for the CDM and be used as the DNA. The investment office would thus receive and approve projects. Typically the investment office receives projects from various areas and hence has an established system of handling these. However, given the special nature of the CDM, involving GHG emission reductions, relevant technical experts could be sourced by the investment office when a CDM project is submitted in order to assist in validating the GHG emission reductions. In this case, the FDI office would promote the CDM along with its other investment promotion activities.

Outsourcing model
Host countries may choose to outsource the bulk of DNA services from a private agency. This agency can evaluate the projects and validate them. The agency would report to a government agency which plays the role of DNA and then the government would forward the project approval letter to the DOE.

4.3 Validation/Registration

4.3.1 Validation

A designated operational entity (DOE), chosen by the project participants, will then review the project design document, invite feedbacks from NGOs and local communities, and decide whether or not it should be validated. These operational entities will typically be private companies such as auditing and accounting firms, consulting companies and law firms capable of conducting credible and independent assessments of emission reductions. If validated, the operational entity will forward it to the Executive Board for formal registration. The DOEs accredited by the EB will be listed on the UNFCCC CDM website.

On the UNFCCC CDM website there is also a separate list of the new applicant entities (AEs) which are under accreditation process, including a list of scopes (see below) for which they have applied[16].

Some of these new applicant entities can be used to forward proposals for new baseline and monitoring methodologies to the EB. A list of these AEs is also available at the UNFCCC CDM website[17]. An applicant entity may submit a new methodology to the EB only if the following conditions are met:

- A CDM Assessment Team (CDM-AT), which will carry out the investigations of whether the AE has the necessary qualifications to become a DOE, has been assigned to the AE by the CDM-Assessment Panel (CDM-AP) under the EB, and
- The AE maintains documentary evidence (e.g. a procedural report) for each new methodology submitted to the EB.

The DOEs can be accredited for 15 sectoral scopes. The project participants should therefore check under which of the scopes their project fits, and choose for validation a DOE that is accredited for that scope. The definition of the scopes in <Table 6> is based on the list of sectors/sources in Annex A of the Kyoto Protocol. Some sectors are missing from the table, but the DOEs can propose new sectoral scopes.

<Table 6> Sectoral scopes for which AEs can be accredited[18]

1	Energy industries (renewable - / non-renewable sources)
2	Energy distribution
3	Energy demand
4	Manufacturing industries
5	Chemical industry
6	Construction
7	Transport
8	Mining/Mineral production
9	Metal production
10	Fugitive emissions from fuels (solid, oil and gas)
11	Fugitive emissions from production and consumption of
	halocarbons and sulphur hexafluoride
12	Solvents use
13	Waste handling and disposal
14	Afforestation and reforestation
15	Agriculture

[16] http://cdm.unfccc.int/DOE/CallForInputs

[17] http://cdm.unfccc.int/DOE/AEnewMeth

[18] http://cdm.unfccc.int/DOE/scopes.html

The DOE selected shall review the PDD and any supporting documentation to confirm if:

a) Parties in the project have ratified the Kyoto Protocol
b) The PDD has been publicly available, comments have been invited from local stakeholders for a period of 30 days, a summary of the comments provided with a report on how due account was taken of any comments (part G. of the PDD, see Table 4).
c) Project participants have submitted to the DOE the analysis of the environmental impact of the project and, if the impacts are considered significant, have undertaken an environmental impact assessment following the procedures of the host Party.
d) The project activity is expected to result in a GHG emission reduction which is additional.
e) The baseline and monitoring methodologies are among those already approved by the EB, or a new methodology that has followed the Modalities and Procedures for establishing a new methodology.

Procedure for new baseline methodologies:

The proposed new methodology must be forwarded to the EB with the draft PDD. The DOE shall check whether documents are complete and forward, without further analysis, this new methodology to the EB for its review and approval.

Procedure for existing baseline methodologies:

The DOE must make the validation report publicly available upon transmission to the EB.

Prior to the submission of the validation report to the Executive Board, the DOE must have received from the Designated National Authority 1) a written approval of voluntary participation in the project and 2) confirmation that the project activity assists it in achieving sustainable development.

Procedure for new small-scale CDM categories:

As mentioned in section 3, small-scale CDM project participants can propose additional small-scale project categories directly to the EB without using a DOE.

How much will it cost to get a project through the CDM project cycle?

<Table 7> shows that a minimum estimate of the transaction cost for validation & certification of a CDM project is about US$70,000 and simplified procedures for small-scale CDM could reduce this to US$23,000.

<Table 7> Validation & verification costs

	Estimated costs (US$)
Baseline study	18,000 – 23,000
Monitoring plan	7,000 – 15,000
Validation	15,000 – 30,000
Legal & contractual arrangements	23,000 – 38,000
Verification	7,000 per audit

Source: EcoSecurities, May 2002

Note: See < Table 12> and <Table 13> in chapter 6 for more details.

At the moment the EB is working to reduce the transaction costs for small-scale CDM projects. The source gives an overview of the possibilities for reducing these transaction cost. One possibility to reduce the transaction cost is to use DOEs based in developing countries. However, as yet there are very few AEs from developing countries. By PCF, the biggest transaction cost of a CDM contract to date is $300,000 as per their records.

4.3.2 Registration

At the 6th meeting of the EB, it was decided that a fee of between US$ 5,000 and 30,000 should be paid to the EB for the registration of a CDM project. <Table 8> shows an EB decision that the registration fee for small-scale CDM projects has been reduced to US$5,000 and that for other CDM projects increases progressively to US$30,000 with annual emission reduction of the CDM project. This administration fee for examining the CDM projects for registration will be paid up-front but the fee will be deducted from the share of proceeds at the issuance of CERs.

With a bundling of small-scale projects, if the total size of the bundled project does not exceed a limit for small-scale, it can pay only US$5,000 which is for a small-scale CDM project. Therefore, bundling of many small projects within the limit of small-scale can save administration fee.

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. If a request for a review has been made by a Party involved in the project activity or at least three members of the EB, the registration can be delayed until the next EB meeting for a review.

<Table 8> Administration fee for a CDM project registration (see Annex 5 in[19])

Annual CO_2-eq. reduction	Fee in US$
<=15,000	5,000
>15,000 and <= 50,000	10,000
>50,000 and <=100,000	15,000
>100,000 and <=200,000	20,000
>200,000	30,000

4.4 Project financing[20]

With the validation and registration of the project, project developers will take actions to implement the project which will generate an emission reduction credit as well as other conventional benefits to create financial income. Project financing is a common and crucial part of project implementation in every project. There are multilateral and bilateral sources of funding to develop CDM projects. This project financing also involves risks from different sources and requires project developers to properly manage any potential risks[21], including project risks, political risks, and market risks. Project risks includes whether the project meets all the requirements of the CDM and whether the project will generate the emission reduction credits estimated in the PDD. Political risks include the entry into force of the Kyoto Protocol and ratification of the Protocol by participating governments. Market risks include the price of CERs and transaction costs.

Public funding for CDM projects from Parties in Annex I is not to result in the diversion of official development assistance (ODA) and is to be separate from and not counted towards the financial obligations of Parties included in Annex I (Decision 17/CP.7, the Marrakech Accords).

4.5 Monitoring

The carbon component of a mitigation project cannot acquire value in the international carbon market unless submitted to a verification process designed specifically to measure and audit the carbon component. Therefore, once the

[19] *http://cdm.unfccc.int/EB/Meetings/006/eb06rep.pdf*

[20] *This section will be further explained in chapter 6 of this document.*

[21] *The list of risks in this section will not be exhaustive.*

project is operational, participants prepare a monitoring report, including an estimate of CERs generated and submit it for verification to an operational entity.

Monitoring is a systematic surveillance of a project's performance by measuring and recording target indicators relevant to the objective of the project. The project's developers should prepare a monitoring plan which is transparent, reliable and relevant. Therefore, the monitoring plan needs to provide detailed information related to the collection and archiving of all relevant data necessary to

- estimate GHG emissions occurring within the project boundary;
- determine the baseline GHG emissions;
- determine the leakage.

As an example, the following information should be monitored:

- Fuel consumption
- Activity levels
- Emission factors
- Heat produced and replaced
- Electricity produced and replaced
- Grid losses
- Fuel prices/subsidies/taxes

If the project is a demand-side energy efficiency project consisting of many devices, it is costly to monitor all of them. For Small-Scale projects it is therefore suggested that it is enough to monitor an appropriate sample of the devices installed. For technologies with fixed loads while operating, such as lamps, the sample can be small while for technologies that involve variable loads, such as air conditioners, the sample may need to be relatively large. In either case, monitoring should include annual checks of a sample of non-metered devices to insure that they are still operating. Monitoring should consist of monitoring the "power" and "operating hours" or the "energy use" of the device installed using an appropriate methodology.

The Marrakech Accords shows necessary information which a monitoring plan should provide as follows:

- The collection and archiving of all relevant data necessary for estimating or measuring anthropogenic emissions by sources of greenhouse gases occurring within the project boundary during the crediting period;
- The collection and archiving of all relevant data necessary for determining the baseline of anthropogenic emissions by sources of greenhouse gases

within the project boundary during the crediting period;

- The identification of all potential sources of, and the collection and archiving of data on, increased anthropogenic emissions by sources of greenhouse gases outside the project boundary that are significant and reasonably attributable to the project activity during the crediting period;
- The collection and archiving of information relevant to assess the environmental impacts of the project, including trans-boundary impacts;
- Quality assurance and control procedures for the monitoring process;
- Procedures for the periodic calculation of the reduction of anthropogenic emissions by sources by the proposed CDM project activity, and for leakage effects;
- Documentation of all steps involved in the calculations of leakage and the procedures for the periodic calculation of the emission reductions during the lifetime of the project.

Monitoring shall be planned and implemented by project participants. A monitoring methodology connected to the baseline methodology must be chosen in the database on the CDM homepage.

4.6 Verification/Certification

Verification is the periodic independent review and ex post determination by the DOE of the monitored reductions in anthropogenic emissions by sources of GHGs that have occurred as a result of a registered CDM projects activity during the verification period. It will include the periodic auditing of monitoring results, the assessment of achieved emission reductions and the assessment of the project's continued conformance with monitoring plan[22]. The operational entity must make sure that the CERs have resulted according to the guidelines and conditions agreed upon in the initial validation of the project. Following a detailed review, an operational entity will produce a verification report and then certify the amount of CERs generated by the CDM project.

According to paragraph 27 (c) of the Modalities and Procedures, an Operational Entity cannot normally perform the verification/certification of a CDM project if it has validated the same project. This is only possible for Small-Scale CDM projects and for single projects where the EB gives permission.

Certification is a written assurance by the DOE that, during a specified time period, a project activity achieved the reductions in anthropogenic emissions by sources of GHGs as verified. The DOE shall inform the project participants,

Parties involved and the EB of its certification decision in writing immediately upon completion of the certification process and make the certification report publicly available. The certification report shall constitute a request to the EB for issuance of CERs equal to the verified amount of reductions of anthropogenic emissions of GHGs. Unless a project participant or three Executive Board members request a review within 15 days, the Executive Board will instruct the CDM registry to issue the CERs.

4.7 Issuance of CERs

The EB must issue the CERs to the project partners within 15 days after the date of receipt of the request for issuance. As early as possible in the project design negotiations, contracts on carbon credit ownership must be made between the project participants. The rights and obligations of each participant should be clear. These rights could include the option to sell CERs to third parties. The contract should also specify the insurance coverage on the project and it should stipulate the rules for resolution of disputes between the parties.

In addition two percent of the CERs issued must be paid to assist in meeting the costs of adaptation. The least developed countries are exempted from this fee.

The CDM Registry being developed by the UNFCCC Secretariat will keep track of all issuances of CERs. When the EB has issued the CERs they are placed in a pending account in the CDM Registry. From here the CERs will move to the Party's legal entity's account according to a split specified in the request from project participant.

[22] *See page 22 of CDM CAPSSA Guidelines.*

5. The Project Design Document (PDD)

In this chapter, we will describe each chapter of the present version of the PDD and provide information on how to fill it out (see <Table 4>). Footnote 9 shows the URL address of the PDD for normal CDM project activities and the PDD for small-scale CDM project activities. As the process evolves, the PDD may be changed in the future.

5.1 General description of project activity

This section of both PDDs (section A) should include the following information:

- Project title
- Short description of the project activity
  - the purpose of the project activity
  - the view of the project participants of the project activity's contribution to sustainable development (max. one page)
- List of Party(ies) and private and/or public entities involved in the project activity.
- Information allowing a unique identification of the project activity, including the location.
- Specification of project activity category(ies) using the list on the UNFCC CDM website.
- Description of transfer of environmentally safe and sound technology in the project (not in small scale?).
- Brief explanation of how GHG emission is reduced.
- Information of public funding and affirmation that it does not result in a diversion of official development assistance.
- Confirmation that the project activity is not a debundled component of a larger project activity (only for the small-scale PDD).

5.2 Baseline methodology

This section of both PDDs (section B) should include the following information:

- Title and reference to the UNFCCC CDM website for the project category (for small-scale CDM) or methodology (for normal CDM) applicable to the project activity.

- Justification of the choice of methodology.
- Explanation of how and why the project is additional and therefore not the baseline scenario.
- Description of the project boundary.
- Details of the baseline and its development.

The EB has chosen a bottom-up approach for the definition of the baselines and the monitoring methodologies - each new baseline methodology must be approved. Few baseline methodologies will be available in the database on the UNFCCC CDM website at the beginning. It will be built up by experience in coming years. When the EB receives a project proposal using a new baseline methodology, it will be forwarded to the Methodology Panel, who will (within 7 days) send it to 2 experts (from a roster of experts maintained by the EB) who will make a desk review (within 10 days) of the methodology and report back to the Methodology Panel. This panel will then advise the EB as to whether this new methodology is acceptable. This procedure for the review of a new methodology shall be done expeditiously, if possible at the next meeting of the EB (for normal CDM not later than four months).

The basis for developing baselines for the normal CDM is described in Article 48 of the Modalities and Procedures for CDM of the Marrakech Accords where 3 approaches are described. The acceptable baseline must be based on one of the following approaches:

"In choosing a baseline methodology for a project activity, project participants shall select from among the following approaches the one deemed most appropriate for the project activity, taking into account any guidance by the executive board, and justify the appropriateness of their choice:

(a) Existing actual or historical emissions, as applicable; or

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

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

Paragraph 47 in the modalities and procedures for the CDM says, "the baseline shall be defined in a way that CERs cannot be earned for decreases in activity levels outside the project activity or due to force majeure".

An output or product linked definition of baseline values (CO_2-eq./unit of output) is recommended in all circumstances, unless the project participants can

demonstrate why this is not applicable. If a project activity increases the output or the lifetime, a different baseline should be applied to this part.

For the small-scale CDM, standardized baselines are already in place. They are defined in Appendix B of "Simplified Modalities and Procedures for the small-scale CDM": "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories[23]" and are described in the section below.

The EB has in its "Further Clarifications on Methodological Issues" from the 10th meeting mentioned the problem whether the baseline must be calculated and fixed before the project starts (ex-ante) or at the time of certification (ex-post). The statement is: "The ex-post calculation of baseline emission rates may only be used if proper justification is provided. Notwithstanding, the baseline emission rates shall also be calculated ex-ante and reported".

5.3 Small-scale standardized baselines

In order to simplify the procedures for small-scale CDM projects, the EB has proposed standardized baselines for some of the project categories in <Table 5>. For all small-scale projects it is suggested that the leakage calculation is not required, except if the project employs used equipment transferred from another site. In this subsection you will find a short description about the baselines proposed for each project category. <Table A1> in the appendix shows technologies in each of the categories.

I. renewable energy projects

IA. Electricity generation by the user

In this category it is assumed that the electricity generation is a stand-alone application, not connected to a distribution grid or a mini-grid.

The energy baseline is the electricity consumption of the technology in use or what would have been used in the absence of the project activity. This may be

1) an estimate of the average annual individual consumption (in kWh) observed in closest grid electricity systems among rural grid-connected consumers belonging to the same category

   or

2) the estimated annual output of the installed renewable energy technology

The emission baseline is the energy baseline described above multiplied by 0.9kgCO_2/kWh (default value).

[23] http://cdm.unfccc.int/EB/Meetings/007/eb7ra06.pdf

IB. Mechanical energy for the user
The baseline is the estimated emissions due to serving the same load with a diesel generator i.e. fuel consumption saved times the emission coefficient for diesel. The diesel displaced is calculated as:

1) the power requirement x hours of operation/year x diesel emission factor from <Table 9>

   or

2) diesel fuel consumption/hour x hours of operation x 3.2 kgCO_2/kg diesel

IC. Thermal energy for the user
If fossil-fuelled technologies are replaced:

the baseline = the fuel consumption of the technologies that would have been used in the absence of the project activity x an emission coefficient (IPCC value) for the fossil fuel displaced.

If non-renewable sources of biomass is displaced:

the baseline = the non-renewable biomass consumption x an emission coefficient (IPCC value) for this biomass.

For renewable technologies replacing electricity:

the baseline = the electricity consumption x the relevant emission factor in <Table 9>

It should be remarked that, although sink projects (except afforestation and reforestation) are not yet eligible under the CDM, avoided deforestation is eligible for small-scale CDM projects, but only in the category concerned with thermal use of energy.

ID. Renewable electricity generation for a grid
For a system in which all fossil-fuel fired generating units use fuel oil or diesel fuel:

the baseline = the annual kWh generated by the renewable unit x an emission coefficient for a modern diesel generating unit of the relevant capacity operating at optimal load as given in <Table 9>.

For other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2/kWh) calculated in a transparent and conservative manner as the average of the "approximate operating margin" and the "build margin", where:

The "approximate operating margin" is the weighted average emission (in

kg CO_2/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. The "build margin" is the weighted average (in kg CO_2/kWh) of recent capacity additions, defined as the most recent 20% of plants built or the 5 most recent plants, whichever is greater. If the build margin data is not available, the weighted average emission (in kg CO_2/kWh) of the current generation mix will be used.

This category also covers landfill gas and other CH_4 gases from waste that is used for electricity generation

<Table 9> Emission coefficients for small diesels

Mini grid kg CO_2 /kWh	24 h Service	4-6 h service	With storage
Load factors	25%	50%	100%
<15 kW	2.4	1.4	1.2
15-35 kW	1.9	1.3	1.1
35-135 kW	1.3	1	1
135-200 kW	0.9	0.8	0.8
>200 kW	0.8	0.8	0.8

II. Energy efficiency improvement projects

II A. Supply side energy efficiency improvements - transmission and distribution
New technologies or measures may be applied to existing systems or may be part of an expansion of the systems.

For a retrofit of an existing system, the energy baseline is the technical losses of energy calculated as either the measured performance of the existing equipment or using a performance standard.

For a new system the energy baseline is the technical losses of energy calculated using a performance standard for the equipment that would otherwise have been installed.

The emission baseline is the energy baseline multiplied by an emission coefficient as for category ID. For district heating systems use an IPCC default emission factor for the fossil fuel used by the system.

II B. Supply side energy efficiency improvements – generation
The technologies or measures may be applied to existing systems or be part of a new facility.

For a retrofit of an existing system, the energy baseline is calculated as the monitored performance of the existing generating unit.

For a new facility, the energy baseline is the technical losses calculated using a performance standard for the equipment that would otherwise have been installed.

The emission baseline is the energy baseline multiplied by an IPCC default emission coefficient for the fuel used by the generating unit.

II C. Demand-side energy efficiency programmes for specific technologies
The technologies may replace existing equipment or be installed at new sites.

If the energy displaced is a fossil fuel, the energy baseline is the existing fuel consumption or the amount of fuel that would be used by the technology that would have been implemented otherwise. Here the emission baseline is the energy baseline x an IPCC default emission factor.

If the energy displaced is electricity, the energy baseline is calculated as the number of devices x the power in W of the device x the average annual operating hours of the device/the technical loss in the grid. This energy baseline is multiplied by an emission coefficient as for category ID.

II D. Energy efficiency and fuel switching measures for industrial facilities
This category covers project activities aiming primarily at energy efficiency. A project activity that involves primarily fuel switching falls into category IIIB.

The technologies may replace existing equipment or be installed at a new facility.

The baseline calculation is the same as that in IIC.

II E. Energy efficiency and fuel switching measures for buildings
This category covers project activities aimed primarily at energy efficiency. A project activity that involves primarily fuel switching falls into category IIIB.

The baseline calculation is like for IIC.

III. Other project activities

III A. Agriculture
The Executive Board considers that more work is needed before proposing simplified baselines for this category.

III B. Switching fossil fuels
This category comprises fossil fuel switching in existing industrial, residential, commercial, institutional or electricity generation applications.

The emission baseline is the current emission of the facility.

III C. Emission reductions by low GHG emission vehicles
The energy baseline is the energy use per unit of service for the vehicle that would otherwise have been used x the average annual units of service per vehicle x the number of vehicles affected x the emission coefficient for the fuel used by the vehicle that would otherwise have been used.

If electricity is used by the vehicles, the associated emissions shall be estimated in the same way as in category ID.

III D. Methane recovery
This category covers landfill gas and other gases containing CH_4 from waste that is only captured and flared. If CH_4 is used for electricity or heat production, use the same way as in category IC or ID.

The emission baseline is the amount of methane that would be emitted to the atmosphere during the crediting period in the absence of the project activity.

III E. Methane avoidance
The Executive Board has requested the Meth Panel to develop simplified methodologies for this section.

5.4 Duration of the project activity/crediting period

This section of both PDDs (section C) should include the following information:

- Duration of the project activity including the starting date and operational lifetime.
- Choice of the crediting period.

According to the 'Modalities and Procedures for the CDM', there are two possibilities for the crediting period:

- A period of maximum 10 years
- A period of maximum 7 years, with the potential for renewal for two additional periods at most.

Credits for projects initiated after January 2000 and before the adoption of decision 17/CP.7 on 10 November 2001, and registered before 31 December 2005, may be claimed exceptionally prior to the registration. Certified emission reductions (CERs) obtained during the period from the year 2000 up to the beginning of the first commitment period can be used to assist in achieving compliance in the first commitment period.

The crediting period starts after project registration. In the 'CDM glossary[24]' written by the EB, the starting date of a project activity has been defined as follows: "The starting date of a CDM project activity is the date at which the implementation or construction or real action of a project activity begins.

In many cases project participants would prefer a longer crediting period to the 10 year option without a renewal. However, there is a risk that the original baseline is not valid after the 7-year period. In this case it should be revalidated by a Designated Operational Entity (DOE). For revalidation, only an updating of the data used in setting the baseline is needed, since the baseline methodology should not be changed.

Section 4.1.5 mentions that the crediting period of sink CDM projects is either 30 years or 3x20 years.

5.5 Monitoring methodology and plan

This section of both PDDs (section D) should include the following information:

- Name and reference to the UNFCCC website of the approved methodology applied to the project activity.
- Justification of the choice of the methodology and why it is applicable to the project activity.
- Tables to be filled with information on to data to be monitored
- Name and contact information of person/entity determining the monitoring methodology.

The project participants must include a monitoring plan in the PDD. A detailed description of this plan must be included in this section of the PDD, including an identification of the data and its quality with regard to accuracy, comparability, completeness and validity.

The monitoring plan must include a justification of the choice of the methodology and why it is applicable to the project activity. The monitoring methodologies approved by the EB can be found in the database on the UNFCCC CDM website[25]. A new monitoring methodology can be suggested to the EB in the same way as for baseline methodologies.

The Procedures and Modalities being formulated by the EB for small-scale CDM projects also includes simplified monitoring methodologies.

[24] http://cdm.unfccc.int/Reference/Documents

[25] http://unfccc.int/cdm/methapp.html

According to "Modalities and Procedures for the CDM", a monitoring plan must provide for:

- Collection and archiving of data necessary for calculating emissions within the project boundary
- Collection and archiving of data necessary for determining the baseline, as applicable
- Collection and archiving of data necessary for calculating leakages, where this needs to be considered
- Quality assurance and control procedures

Monitoring data required for verification and issuance are to be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

5.6 Calculation of GHG emission by sources

This section of both PDDs (section E) should include the information about calculation of GHG emission reductions by sources.

A way to proceed could be first to make a list of the GHG emission sources associated with the project and make a distinction among:

- Direct on-site emissions
- Direct off-site emissions
- Indirect on-site emissions
- Indirect off-site emissions

(the site is where the project activity is taking place)

Direct on-site emissions could be emissions from fuel combustion in the project.

Direct off-site emissions could be baseline emissions from heat/electricity which used to be delivered from the grid but which is going to be produced by the project. These old power plants are inside of the project boundary. Another example could be CH_4 emissions reduction from landfills due to a project where CH_4 is collected and used/burned.

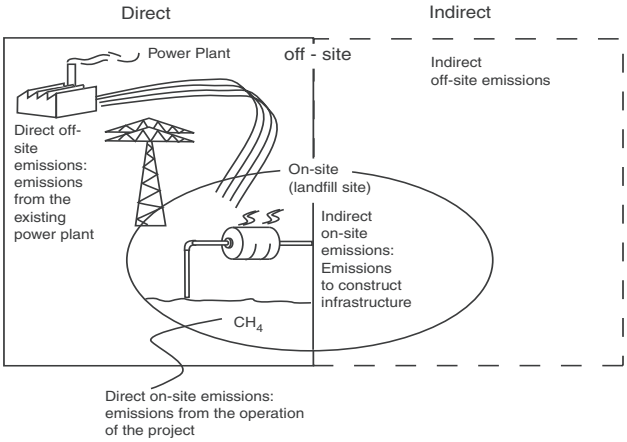
Indirect on-site emissions from energy consumption, for example for the construction of a hydropower dam, power intake, tunnels, roads, pipelines, can be excluded since they are small compared to the emissions from the plant and difficult to measure.

Indirect off-site emissions from the production of the raw materials must be outside of the boundary, since they are not directly influenced by the project activity.

The next step is to conclude which of these emissions are inside the project boundary. The project boundary can include both on-site and off-site emissions. The project boundary encompasses all anthropogenic emissions under control of the project participants. The general rule is that emissions should not be taken into account unless they are directly controlled or influenced by the project.

It is a good idea to draw a graph showing the main components of the project, the flow of energy and its boundary and outside connections. Indicate which components will be added, removed, or refurbished by the project.

<Figure 2> Illustration of direct, indirect, on-site and off-site emissions from landfill gas power plant project



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. Leakage calculations are required for small-scale CDM project activities except if renewable energy technology or energy-efficiency equipment is transferred from another activity. This exception was introduced in order to avoid cases in which an investor gained CERs just by exchanging old equipment with some new equipment at another site.

Upstream emissions should be placed within the project boundary in cases where the project developer can significantly influence these emissions.

This section of the PDD must be for each gas and source, including descriptions of the formulae used to calculate the emission within the project boundaries both for the project activity and the baseline. The formula used for leakage calculation must also be described. Finally a table must be included with the values of the size of the emissions using the formulae mentioned.

5.6.1 Emission factors

Unless better emission factors are available, the Revised 1996 IPCC Guidelines for National GHG Inventories[26] should be used to calculate emissions.

A CDM project needs to reduce the emissions of carbon dioxide or one of five GHGs in <Table 11>: CO_2, methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) or sulphur hexafluoride (SF_6).

The default IPCC CO_2 emission factors for the most common fuels are shown in <Table 10>. In table I-I in the IPCC Guidelines mentioned above, these emission factors (plus some more rarely used fuels) are listed in the unit of tonnes of Carbon emitted per TJ fuel (t C/TJ). In order to convert them into t CO_2 /TJ they are multiplied by 44/12 (the molecular weight of CO_2 divided by the atomic weight of Carbon)

<Table 10> IPCC CO_2 emission factors

Fuel	t CO_2 /TJ
Natural gas	56.1
LPG	63.1
Gasoline	69.3
Jet Petroleum	71.5
Kerosene	71.9
Crude oil	73.3
Diesel	74.1
Fuel oil	77.4
Orimulsion	80.7
Coal	94.6
Petroleum coke	100.8
Lignite	101.2
Peat	106.0
Coke	108.2

[26] http://www.ipcc-nggip.iges.or.jp/public/gl/invs6.htm

5.6.2 Global Warming Potentials

In the emission calculation all results must be converted into CO_2–equivalents (CO_2–eq.). This is done by multiplying the emissions by the Global Warming Potential (GWP) in <Table 11>. If, for example, the emissions were 10 tonnes of CH_4, the CO_2-equivalent is 210 tonnes CO_2-eq., which is 10 multiplied by 21.

The GWPs are estimated by complex modelling of the chemical interaction in the atmosphere and will change over time as the knowledge about atmospheric chemistry improves. But new values must first be used after they have been published in an IPCC Assessment Report and a meeting of the Conference of the Parties (COP) under the UNFCCC has decided to use them.

<Table 11> Global Warming Potentials

Species	Chemical Formula	100 years GWP
Methane	CH_4	21
Nitrous oxide	N_2O	310
Sulphur hexafluoride	SF_6	23900
Perfluoromethane	CF_4	6500
Perfluoroethane	C_2F_6	9200
Perfluorobutane	C_4F_{10}	7000
HFC-23	CHF_3	11700
HFC-32	CH_2F_2	650
HFC-43-10	$C_5H_2F_{10}$	1300
HFC-125	C_2HF_5	2800
HFC-134a	CH_2FCF_3	1300
HFC-143a	$C_2H_3F_3$	3800
HFC-152a	$C_2H_4F_2$	140
HFC-227ea	C_3HF_7	2900
HFC-236fa	$C_3H_2F_6$	6300
HFC-245ca	$C_3H_3F_5$	560

Source: Table 2.9 in the IPCC Second Assessment Report "Climate Change 1995, the science of Climate Change". (The later GWPs from the Third Assessment Report must not be used, since they are not accepted by the COP.)

5.7 Environmental impacts

The objective of any CDM project should be to provide environmental and social benefits as well as reduce GHG emissions. However, if the host country requires an Environmental Impact Assessment (EIA), or stakeholder input shows that there are local environmental or social concerns about the initiative, a CDM

project should be evaluated using the highest international environmental and social assessment procedures and standards.

The conclusions from these assessments must be included in section F in the PDD and the assessments should be attached.

5.8 Stakeholder comments

The DOE doing the validation must make the project design document for the CDM project publicly available. NGOs and other stakeholders have a 30-day period to comment on the PDD and thereafter the DOE must describe how comments by stakeholders have been invited and compiled; a summary of the comments received; and a report on how due account was taken of any comments received.

These comments therefore form an official input as part of the prescribed validation and registration process, creating an unknown factor in the project development cycle that investors cannot ignore. In order to get a feeling of how the NGO community is mobilising in this area, it is recommended that readers view "CDM Watch"[27], created by a number of NGOs. Some stakeholders will have problems in making their comments. Often the PDDs will be posted on the Internet and stakeholders in rural projects often have no access to the Internet. Likewise there is no requirement that documents be made available in a language familiar to stakeholders.

5.9 Annex 1: Contact information on participants in the project activity

According to the CDM Glossary, project participants are Parties or private and/or public entities (authorized by a Party to participate) that take decisions on the allocation of CERs from the project activity under consideration.

5.10 Annex 2: Information regarding public funding

If public funding from Annex I Parties is involved, this annex should contain information on the sources of public funding for the project activity, including an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligation of those Parties.

[27] http://www.cdmwatch.org/

5.11 Annex 3: New baseline methodology and Annex 4: New monitoring methodology (not for small-scale CDM)

When a proposed new methodology is forwarded to the EB it must contain a draft PDD. The most important part here is Annex 3 and 4, where the new methodology is described. These two annexes are thus only used for proposing new methodologies.

In a later version of the PDD these annexes will be separated form the PDD and transformed into "stand alone" forms to be submitted together with the draft PDD.

Since there is a strong link between baseline and monitoring methodologies, new baseline and monitoring methodologies shall be proposed and approved together.

5.12 Annex 5: Baseline data (not for small-scale CDM)

Tables of the key elements used to determine the baseline (variables, parameters, data sources, etc.) should be presented here. For approved methodologies you may find a draft table on the UNFCCC CDM site.

6. Financing CDM Projects

6.1 CDM Project Viability

CDM projects produce both conventional project output and carbon benefits (CERs). The value of carbon benefits and its impact on project viability are influenced by several factors such as the amount of CERs generated by the project, the price of CER and the transaction costs involved in securing CERs.

6.1.1 Quantity of CERs

The amount of CERs generated by the project depends on the greenhouse gas displaced by the project and the crediting period selected.

Renewable energy and energy efficiency projects displace carbon intensive electricity and/or heat generation. Grid-based or off-grid projects that displace more carbon intensive coal and diesel fuels generate more CERs than those that displace natural gas. Projects that capture methane and greenhouse gases other than CO_2 produce more CERs since the global warming potential (GWP) of methane and other gases are several times higher than that of carbon dioxide.

As discussed earlier, the Marrakech accord stipulates two crediting period options: 7 years with twice the option of renewal (totalling 21 years) or, 10 years without renewal.

6.1.2 Price of CERs

The price of CERs is determined in the carbon market. At present, the carbon market is a 'loose collection of diverse transactions' where emission reductions are exchanged. There are three main markets where greenhouse gas emission reductions are traded: project based or "baseline and credit" system; allowance market or "cap and trade" system, and; voluntary market (refer to Chapter 7 for carbon market description).

The pricing of CER is highly speculative. The PCF considers several parameters in determining its price in the PCF's carbon purchase agreement. Moreover, certain project parameters command price premiums under the PCF program. These include: i) the existence of government guarantees, ii) project generation of social benefits, and iii) the exclusion of preparation costs in the total project cost. In C-ERUPT program, prices are also differentiated according to technology type. CER from renewable energy project forms the reference price (maximum price of EUR 5.5 per CER). CERs from sustainable grown biomass projects as well as from energy efficiency projects are priced 20% lower (maximum price of EUR 4.5) while those from fuel switching and methane recovery projects are

40% cheaper (maximum price of EUR 3.3).

At present there is no single CER price but differentiated according to risks, technology type and social development components. The current PCF CER rate ranges from US$3 to 4 per ton of CO_2; under the C-ERUPT program, it revolves around US$ 4 to 4.5 per ton of CO_2.

Several economic models forecast a single carbon price since these models assume a competitive and unfettered markets. With the US presence in the GHG market, these models projected a very high carbon prices. After the Bonn Agreement and Marakkech Accords, and with the absence of the US in the market, these models projected low carbon prices. In reality, the carbon markets are fragmented and prices generated by these markets are differentiated. In a recent GHG market analysis, Natsource (2002) forecasts prices for project-based carbon emission reductions (both JI and CDM markets) to vary from US$3 to 5 for the period 2002-2005, US$2.5 to 9.0 during 2005-2007, and US$5 to11 from 2008-2012.

6.1.3 Transaction Costs

Transaction costs are those that arise from initiating and completing transactions to secure CERs. These consist of pre-operational costs (or upfront costs), implementation costs (i.e. costs spread out over the entire crediting period), and trading costs (Table 12). Pre-operational costs include direct expenses for search, negotiation, validation, and approval. Implementation costs are those incurred for monitoring, certification, and enforcement while trading costs are those incurred in trading CERs such as brokerage costs and costs to hold an account in national registry.

PCF's pre-operational transaction costs amounts 229 thousand Euros (265 thousand dollars) while Ecosecurities (2002) estimates the minimum up-front transaction cost at around 70 thousand Euros (£42,000) (Table 13).

Several studies show that the transaction cost per ton of CO_2 for large projects is very small or even negligible while that for small-scale projects is quite significant. Given this, it is obvious that investors would prefer large-scale projects. Fast-tracking small-scale projects (simplifying the procedures and standardizing the information and reporting requirements) not only reduces transaction costs but also improves project financial viability. According to Ecosecurities (2002), fast-tracked procedures lead up to around 67% reduction in transaction costs.

<Table 12> CDM Transaction Costs

	Transaction Cost Component	Description
Pre-operational Phase Design	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 Project Design Document that also documents 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 Project Design Document by operational entity
	Review Costs	Costs of reviewing a validation document
	Registration Costs	Registration by UNFCCC Executive Board/JI Supervisory Committee
Operational Phase	Monitoring Costs	Costs to collect data
	Verification Costs	Costs to hire an operational entity and to report to the UNFCCC Executive Board/Supervisory Committee
	Review Costs	Costs of reviewing a verification
	Certification Costs	Includes costs in the issuance of Certified Emission Reductions (CERs for CDM) and Emission Reduction Units (ERUs for JI) by UNFCCC Executive Board
	Enforcement costs	Includes administrative and legal costs incurred in enforcing transaction agreements
Trading	Transfer Costs	Brokerage costs
	Registration Costs	Costs to hold an account in national registry

Source: Michaelowa, A., Stronzik, M., Eckerman, F., and Hunt, Alistair, 2003..

<Table 13> CDM Transaction Cost Estimates

	Project Cycle	EcoSecurities, 2002 (£)	PCF (US $)
Pre-operational Phase Design	Preparation and review		40,000
	Baseline Study	12,000 – 15,000	20,000
	Monitoring Plan	5,000 – 10,000	20,000
	Environmental Assessment	-	
	Stakeholder Consultation	-	
	Approval	-	
	Validation	10,000 – 20,000	30,000
	Consultation and project appraisal		105,000
	Legal and Contractual Arrangements	15,000 – 25,000	50,000
Operational Phase	Sales of CERs	5% - 15% of CER Value	
	Adaptation Levy*	2% of the CER value annually	
	Risk Mitigation	1%-3% of CER value annually	
	Verification	5,000 per audit	25,000 (initial) 10,000-25,000 (periodic) 10,000-20,000 (periodic supervision)
	Executive Board Administration	To be determined (*X*% of CER value)	

* *Projects in least developed countries are exempted from the 2% adaptation levy.*

Sources: Ecosecurities, 2002; PCF presentation COP 8, Side Event, New Delhi, 24 October 2002.

The Danish Government offers grants to firms in Thailand to kick start CDM projects. In addition, The European Investment Bank intends to launch a Transaction Assistance Facility which will help in project identification and preparation and carbon credit marketing. The facility will provide a grant, which is repayable from the revenue generated by the sale of carbon.

6.1.4 Impact of CERs on Project Viability

The net financial gain derived from the sale of CERs is the difference between the project CER value and the transaction costs. There are three elements that influence the net impact of CERs on project profitability: value of CERs (low CER value implies low net benefits), overall transaction costs (high transaction costs yield low net benefits), and up-front transaction costs (high upfront payments could also result in low benefits). Project developers generally expect up-front transaction costs within the range of 5 to 7% of the net present value of the revenue or total transaction costs around 10 to 12% of the net present value of revenue (Ecosecurities, 2002). A positive net financial gain means that CER revenues improve the financial viability of the project. <Table 14> shows the impact of CERs on IRRs in selected projects.

<Table 14> Impact of CERs on project IRR

Country	Project	IRR without carbon finance (%)	IRR with carbon finance (%)	Change in IRR (%)
Costa Rica	wind power	9.7	10.6	0.9
Jamaica	wind power	17.0	18.0	1.0
Morocco	wind power	12.7	14.0	1.3
Chile	Hydro	9.2	10.4	1.2
Costa Rica	Hydro	7.1	9.7	2.6
Guyana	bagasse	7.2	7.7	0.5
Brazil	biomass	8.3	13.5	5.2
India	solid waste	13.8	18.7	5.0

Source: PCF Annual Report 2001

The effect of CER cash flow on project IRRs vary by project type. The impact of CERs on wind power project IRR is relatively small (few percentage points increase) while it is substantially important for fugitive methane capture projects. More CERs are generated by methane capture projects since the global warming potential of methane is 21 times higher than carbon dioxide. This makes methane capture projects relatively attractive to CDM project developers. In fact, for the first 45 projects submitted to the CDM Executive Board for methodology review, 27% (12 projects) are methane gas capture projects.

6.2 Securing Project Funds

6.2.1 CER Generation and Trading

Governments and private companies from non-Annex 1 parties are the main

buyers of CERs. CERs are developed and exchanged under three main different models:

- unilateral model – the host country develops and invests in a project, and sells or banks CERs. The project developer bears all risks and benefits related to the preparation and sale of CERs.
- bilateral model – this involves partnership between a project developer and Annex 1 country. The objective of the partnership is for the Annex 1 country to receive the CERs realized from the project through emission reduction purchase agreement (ERPA) or as a result of some other financial consideration.
- Multi-lateral model – this is considered as a variant of the bilateral model. CERs are sold to a fund, which manages a portfolio of projects. The fund spreads the risk of investment while the investors spread their risks by investing in several different funds.

The carbon finances at the World Bank (Prototype Carbon Fund, Community Development Fund, and BioCarbon Fund) are examples of multi-lateral funds using the World Bank as fund manager. The Dutch Government adopts several means of procuring emission reduction credits, through multi-lateral organizations such as World Bank and International Finace Corporation, through banks (*e.g.* Rabo bank), through bilateral contracts and via its own tender (C-ERUPT). Japan, Germany and Denmark use banks and other financial institutions in managing their CDM funds. More recently, Canada and several European countries have initiated bilateral transactions with several developing and Eastern European countries (refer to Chapter 7 for carbon market development).

6.2.2 Sources of Project Funds

CDM projects require upfront investments that are normally obtained from different sources such as loans, equity, grants, and upfront payments for emission reductions.

- Loans or debts refer to funds lent to CDM project owners by financiers. Debt can be obtained through public markets (bonds) or private placements (bank loans and institutional debt).
- Equity refers to funds funneled to the CDM project by company shareholders. Equity may be sourced from internal sources (sponsors) or external investors (public or private markets). The return on equity is obtained either from dividends or from sale of shares.
- Grants are funds provided by institutions and governments to CDM project owners and developers who contribute to donors' objectives. Grants need not be repaid and oftentimes, cover only a percentage of project costs.

- Upfront payment for CER purchase. The carbon purchase agreement often stipulates payment on agreed price upon delivery of CERs but CER buyers sometimes provide upfront payment upon purchase. For example, the PCF provides upfront payment up to 25% of the total CER value. However, to compensate for increased risk, upfront payments are discounted.

Like conventional projects, financing CDM projects can be arranged either through corporate or project financing. These are described as follows:

- In project financing, a project company is formed and investments are viewed as assets of the company. Investment funds are sourced either from equity or debt. Assets and cash flow secure debts. Creditors do not have recourse to the other resources of sponsors.
- Under corporate financing, new projects are undertaken as extension of assets of the existing company. Capital investments and borrowing are not placed under the project account. Loans are considered as company debts and lenders have full recourse to all the assets and revenues of the company over and above those generated in the new project.

Additional project revenues (i.e. CER) could be used to service debts and leverage debt financing. Guest et al (2003) presents that the carbon cash flow can help increase debt carrying capacity: The carbon revenues could help increase debt leverage of project by increasing the debt service coverage ratio (DSCR) levels of the project. In addition to improving debt capacity, there are other options to debt service through the carbon cash flow. These include: pre-paying debt based on Forward Emission Reduction Purchase Agreements (ERPAs); depositing carbon cash flow directly with banks for credit against debt service thereby lowering liability on electricity cash flow; and using ERPAs and/or forward carbon sales as collateral for loans (this is the case for Plantar project in Brazil where the CER purchase agreement with the PCF was used as collateral for commercial bank financing).

The existence of CER has important implications for stakeholders. For project sponsors and partners, it implies improved project profitability and in cases that upfront CER payment is obtained, less equity and debt requirements. Those involved in the risk transfer process such as contractors and suppliers, will have to bear increased risks. While for agencies that provide risk mitigation, this offers an opportunity to expand services to emission reduction components. For project lenders, this entails additional analysis on the quality of the financial flow from CER value. For CER buyers, this requires assessment of the overall project since project performance is correlated with CER delivery.

6.3 Risk Management

CDM projects face two types of risks: conventional project risks and CDM-related risks. Conventional project risks relate to uncertainties in project performance and in the market of project output while CDM-specific risks refer to uncertainties in the Kyoto process and its implementation as well as the market performance of carbon assets.

Project risks may be broadly classified into i) construction risks (referring to time and cost overrun), and ii) operational risks (involving technology performance, fuel, or product supply, market, operation, political, legal, environmental, and financial factors). Though these risks are generic to projects, these relate to project performance, which affect its ability to deliver the expected quantity of CERs.

On the other hand, CDM-related risks contain following risk categories:

- policy risks – this includes risk that the Kyoto Protocol will not be ratified; risk that the host country will not comply with its obligations; and risk that specific baselines and procedures used in the project will not be approved.
- market risk - CER pricing is highly speculative and that the development of the CER market and the evolution of CER prices are highly unpredictable.

Risk management principles apply to both categories of project risks, namely:

- allocation of risks to contracting parties who best understand the risks, and
- transfer of risks to a third party who uses financial tools.

There are several financial tools for risk management; these include hedging, guarantees and insurance products. In financial hedging, the derivative markets are used to fix future prices of commodities, currencies and interest rates. Financial derivatives market can also be used for emission commodities. These include: call and put options, collars, swaps and forward contracts. With insurance, a third party is paid to bear a particular risk. Insurance is often used to mitigate political risks and natural hazards.

A number of international agencies provide political risk insurance and guarantees. The European Investment Fund, for example, offers guarantees on debt financing to infrastructure projects including those in the energy sector. The International Bank for Reconstruction and Development (IBRD) likewise provides guarantees against interest rate conversions or swaps; interest rate caps and collars, currency conversions or swaps and commodity swaps. Several other risk mitigation organizations provide or broker mitigation products in the SO_2, NO_X emission reduction markets.

The PCF assumes CDM-specific risks and assigns project equity sponsors and creditors to bear project risks. In managing the Kyoto risk, the PCF i) seeks commitment from host countries for Kyoto Protocol ratification and compliance, and for the transfer of CERs; ii) shares this risk with project sponsors (in the case of Chile for example, PCF commits to a higher CER price once the Government ratifies the Kyoto Protocol and provides a letter of approval to PCF); and in some cases, requires the Kyoto ratification as a requirement in the carbon purchase agreements. Exposure to baseline risks is managed by commissioning a rigourous baseline study, monitoring plan and third party validation. For market risks, the PCF assumes market risks and agrees to pay the contract price regardless of the actual market price at the time of delivery.

Project risks are assessed by commissioning rigorous and independent assessment of baseline and project risks, and structuring emission reduction purchase transaction to either mitigate risks or transfer them to parties that are best able to manage them. Tools in structuring transactions used by the PCF include over-collateralization (limiting the amount of emissions reductions that PCF commits to purchasing in a transaction), payment upon delivery, restrictions on upfront purchases, structural seniority (purchasing emissions reductions generated in earlier years of the project), seniority in the purchase (establishing structurally that PCF has a senior interest in emissions reductions generated by the project), and credit enhancement through insurance, guarantees and other risk management tools.

Equity fund providers that target carbon credits include: Dexia-FondElec Energy Efficiency and Emission Reduction Fund (71 million Euros, since 2000). FondElec Latin American Clean Energy Services Fund (US$ 31 million, since 2001). Global-Asia Clean Energy Services Fund, FE Clean Energy Group (US$100-150 million) (seeking for 20-25 % returns). Private-public partnerships that provide upfront financing to CDM projects include Climate Investment Partnership.

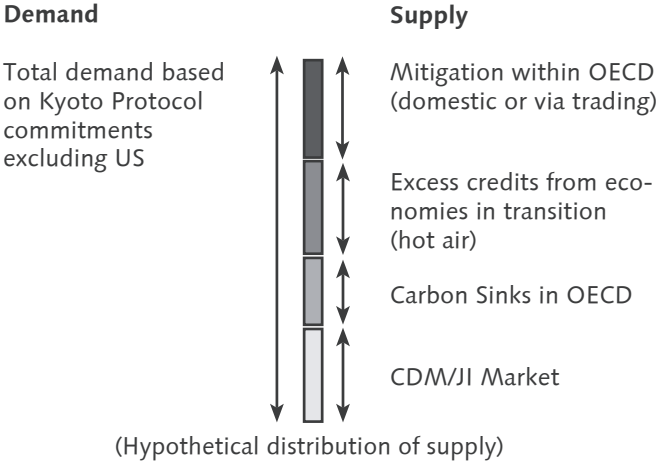
The Danish Government offers grants to firms in Thailand to kick start CDM projects. In addition, The European Investment Bank intends to launch a Transaction Assistance Facility which will help in project identification and preparation and carbon credit marketing. The facility will provide a grant, which is repayable from the revenue generated by the sale of carbon.

7. Market Intelligence

7.1. Demand and Supply of CERs

The Kyoto Protocol requires Annex 1 countries to stabilize their GHG emissions to an average of 5.2% below their 1990 emissions over the period 2008-2012. The total amount of emissions to be mitigated during the stabilization period will mainly depend on the overall growth of the emissions. This will be influenced mainly by the economic growth as well as the measures to be adopted by these economies. The numbers in <Table 15> show that many Western industrialized countries have net positive emissions in 2000 with respect to their Kyoto emission targets. Recent reports indicate that greenhouse gas emissions in 2002 and 2003 have continued to rise in many of these countries such as Australia, Austria, Finland, Germany, Japan, Norway, and the United Kingdom. Projections for 2010 show that the emissions gap will increase further in most of these countries even with full implementation of their current policy measures (Table 15). Most of the Eastern European countries however have their emissions in 2000 below their Kyoto targets, and as also shown in Table 15, their present positions could be maintained until 2010 with the current policies to mitigate greenhouse gas emissions.

<Figure 3> Demand and Supply of Emission Reduction Credits



Source: Adopted from Prototype Carbon Fund Annual Report 2001.

<Table 15> GHG Emissions of Annex 1 Countries in 2000 and 2010

Country	Emissions reduction target under the Kyoto Protocol (% of 1990 emissions)	Emissions in 2000 (actual levels) $MMTCO_2e$	Emissions in 2000 (% of 1990 emissions)	Projected Emissions in 2010 (% of 1990 emissions)
Australia	+8	501	+18	+16
Austria	-13*	80	+3	+12
Belgium	-7.5*	152	+7	+16
Bulgaria	-8	78	-51	-42
Canada	-6	726	+20	+19
Croatia	-5	22 (1995)	-30	-
Czech Republic	-8	148	-23	-32
Denmark	-21*	69	-1	+15
Estonia	-8	20	-55	-69
Finland	0*	74	-4	+17
France	0*	550	-2	+6
Germany	-21*	991	-19	-32
Greece	+25*	130	+24	+36
Hungary	-6	84	-17	
Iceland	+10	3	+7	-2
Ireland	13*	67	+25	+28
Italy	-6.5*	547	+5	+11
Japan	-6	1386	+11	+7
Latvia	-8	11	-64	
Liechtenstein	-8	0.218 (1999)	0	+2
Lithuania	-8	24 (1998)	-54	
Luxembourg	-28*	5.971	-56	
Monaco	-8	133	+33	
Netherlands	-6*	216.916	+3	+19
New Zealand	0	76.956	+5	+38
Norway	+1	55.263	+6	+22
Poland	-6	386.187	-32	
Portugal	27*	84.700	+30	+54
Romania	-8	164.026 (1994)	-38	-28
Russian Federation	0	1.965.346	-35	-20
Slovakia	-8	49.165	-33	-27
Spain	15*	385.987	+35	+48
Sweden	4*	69.356	-2	+1
Switzerland	-8	52.743	-1	-7.2
Ukraine	0	454.934	-51	
UK	-12.5*	649.106	-13	-15
USA	-7	7.001.225	+14	+16
Total		17.281.439		

Source: emissions data in 2000, HYPERLINK "http://ghg.unfccc.int" http://ghg.unfccc.int; emissions data in 2010, Annex 1 countries Third National Communications, http://unfccc.int.

Note: The numbers in parenthesis show different years. Emissions projections are based on 'with measures' scenario, and reference economic growth.

** According to burden sharing agreement, average of EU 15 is –8%.*

Several options exist for many Annex 1 countries to meet this legally binding obligation (Figure 3). These include domestic mitigation measures, development of carbon sinks, trade of excess credits (hot air) from economies in transition, and trade of credits from CDM (CERs) and JI projects (ERUs). A number of EU states have disclosed to purchase emissions reductions from JI and CDM projects. The Netherlands government has planned to purchase annual emissions reduction of around 12 $MMTCO_2e$, Italy at around 11 $MMTCO_2e$, and Austria, Belgium, Denmark and Ireland combined at around 10 $MMTCO_2e$ during the period 2008-2012. As shown in Table 16, the projected emissions reductions supply is estimated to be between 1177 and 2064 $MMTCO_2e$ per year. The CER supply could range from 55 to 183 $MMTCO_2e$. As of early 2004, however, there are only 82 CDM projects that have reached Project Design Documentation stage, which could yield an accumulated CER supply of 23.4 million in 2007.

The projected demand and supply balance shows that there will be a net surplus of emissions reductions in 2010, which ranges from around 366 $MMTCO_2e$ to 1873 $MMTCO_2e$. These surplus scenarios however will only materialize if emissions reductions supply will be freely traded in a competitive market. In reality, this will depend on the willingness of the supplying countries to issue and transfer, as well as on the receiving governments to recognize and use these emissions reductions for the Kyoto Protocol compliance.

The demand of CERs is therefore affected by several factors such as the growth of emissions in Annex 1 countries, abatement costs in developed countries, the markets of "hot air" and the JI market. The CER demand could be high or low, depending on the development of the above determining factors.

<Table 16> Supply and Demand Balance in Kyoto First Period Commitments without US: Limiting Scenarios

$MMTCO_2e$/year average	Low Surplus Scenario (High Demand, low supply)		High Surplus Scenario (Low Demand, high supply)	
	% change 2000-2010	*$MMTCO_2e$/ year*	*% change 2000-2010*	*$MMTCO_2e$/ year*
Demand		**811**		**191**
EU-15	7	440	-3	110
Japan	10	213	-3	62
Canada	15	224	0	136
Other GHGs		44		-7
Managed Forests		-110		-110
Supply		**1177**		**2064**
Russia	20	389	0	719
Ukraine	20	246	0	319
Accession 10	25	165	5	275
Other EIT	25	88	0	132
Other GHGs		88		290
Managed forests		147		147
CDM (equiv. annual)		55		183
Surplus		**366**		**1873**

Source: Grubb et al. 2003.
Note: data were converted from MMTC/year.

7.2 CER Market Development

7.2.1 Carbon markets

The CER market is one of the fragmented carbon markets. The global carbon market consists of diverse greenhouse gas reduction transactions and can be broadly classified as follows:

- Project-based or baseline and credit system. Emission reductions are created and traded through a given project or activity. CDM and JI are examples of the project-based system where CERs and ERUs are generated respectively.
- Allowance market or cap and trade system. Emission allowances are defined by regulations at the international, national, regional or firm level. Examples of allowance market include the Emissions Trading under the Kyoto Protocol (global), EU ETS (regional), the UK and the Danish trading systems (national), and BP and Shell internal trading (firm).

Various motivations of carbon buyers result in the differentiation of the carbon market. These are the following: i) immediate compliance in the national markets where buyers seek to comply with existing legislative obligations and constraints; ii) Kyoto pre-compliance where buyers expect the project to be registered under either JI or CDM; iii) voluntary compliance where buyers aim to use the emission reductions to meet part of their voluntary targets; and iv) retail schemes where buyers wish to be climate-neutral in order to demonstrate their social responsibility or promote particular brand (PCF, 2003)

7.2.2 Linkage between project-based and EU allowance markets

The European Commission recently recognized the fungibility of carbon credits (CERs and ERUs) and EU allowance units (EAUs), and proposed the linkage between the EU ETS and the project-based emissions reductions. The European Parliament adopted the linking Directive in April 20, 2004, and it will enter into force once adopted by the EU Council and published in the EC Official Journal. The Directive allows CER conversion into EAU from 2005 and ERU conversion from 2008. These credits can be used in EU-ETS regardless whether or not the Kyoto Protocol enters into force.

Limitations on projects eligible in EU ETS are specified in the Directive. Nuclear and sinks are not allowed though there is a possibility that sinks may be allowed after 2008. Large hydro projects will only be allowed if it satisfies the rules set by the World Commission on Dams.

There is no cap set on imported CERs and ERUs in the approved Directive (the draft Directive proposed a 6% cap). But it is expected that each Member State

will source 50% of the reductions from domestic actions rather than imported emissions reductions. Each State however is responsible of setting the limits for its regulated companies.

The restrictions on certain projects may form two tier CERs: those that can be imported into the EU ETS and those that cannot. On the other hand, the removal of the cap on CER importation could potentially increase the demand of CERs and raise its price. With this, it is expected that the two markets, to some extent, will converge.

7.2.3 Current buyers and CER transactions

Project-based transactions (CDM and JI) dominate the global trade of greenhouse gas emission reductions. It represented 85% of the total transaction volume in 2002, and 97% between 1996 and 2002 (PCF Plus, 2002). The total carbon market volume traded in 2001 was about 13 $MMTCO_2e$, increasing to 29 $MMTCO_2e$ in 2002, and reaching to more than 70 $MMTCO_2e$ in the first 10 months of 2003 (PCF, 2003). Point Carbon (2004) projected that the total volume will reach 100 $MMTCO_2e$ in 2004.

The World Bank's PCF and the Dutch Government's C-ERUPT tender are the current main buyers of CERs through direct purchase transactions. As of 2003, the PCF has signed 7 emission reductions purchase agreements (ERPAs) with total emissions reductions of 12.19 $MMTCO_2e$. Also, PCF has 144 projects under preparation and received 420 project idea notes. The C-ERUPT tender, on the other hand, approved 18 projects in 2003 aimed to generate emissions reductions of 16.7 $MMTCO_2e$. A number of PCF projects have been operational since 2002. Most of the PCF and C-ERUPT's projects would be commissioned between 2003-2007. CDM portfolios were also launched by Austria, Denmark, Finland and Sweden. The Austrian government opened a tender for CDM projects in December 2003. Denmark is cooperating with Thai industries and will select 5 projects for actual CDM implementation. The Finnish Government launched a tender for small-scale projects and is currently engaged with preliminary discussions with 7 CDM project sponsors. Sweden launched a tender in 2002 and selected 5 projects in India, Brazil and South Africa. Most recently, Belgium announced its plan to purchase emissions reductions of around 2.46 $MMTCO_2e$ annually in the period 2008-2012.

CER procurement funds are growing and expanding. As shown in <Table 17>, three new public-private partnership funds have been recently launched by the World Bank: the Community Development Carbon Fund, the Bio-Carbon Fund and the Italian Carbon Fund. Public-private partnership funds to purchase CERs were also established by the European Investment Bank, Japanese Banks, Germany's KfW and Ecosecurities-Standard Bank of London (Danish CDM Facility). In addition to the Government of the Netherlands, several European governments have launched CDM funds. These governments have used several

vehicles in CER procurement such as government-own tenders through banks and multilateral institutions. Bilateral transactions are also emerging. Several European governments and the government of Canada have signed MOUs with several Latin American and Asian countries for the development of projects and supply of CERs.

CERs purchased through public-private partnership and government funds are mainly used for Kyoto compliance. Private funds are also being established to secure CERs for purposes other than compliance. Mitsubishi Corporation of Japan recently purchased emission rights from a Chilean Hydropower project for trading purposes. More recently, Cumbria Energy, Investic Bank and Less carbon launched ICECAP, a vehicle to purchase CERs for large industrial emitters and Annex 1 governments. Mitsubishi Securities Company and Mizuho Securities Company are also planning to be involved in the purchase of carbon emissions certificates to cater to the needs of their business clients. Aside from trading, institutions interested in becoming carbon neutral with their activities could be another buyer of CERs. The Dutch Development Finance Company, for example, have announced their intention to compensate carbon dioxide emissions from their activities in developing countries and that it plans to purchase CERs from projects the company finances.

7.3 CER Prices

The fragmented nature of the global carbon market generates differentiated prices for emissions reductions as shown in <Table 18>. Allowance markets generate high emission reduction prices since the delivery risks are believed to be minimal. Though JI and CDM are both project-based, PCF pays higher prices for ERUs since JI are supported by Host Country Agreements and Assigned Amount Units, which reduces PCF's exposure to risks. ERUPT however in its January 2003 tender for JI projects have specified a price range similar to C-ERUPT tender for CDM projects.

The current price spread of CERs is US$ 3 – 6 per TCO_2e (Table 16). PCF's price average is relatively lower than that of C-ERUPT's. The Finnish Government's offer for CER's from its pilot programme is lower than C-ERUPT's price range since it focuses on small-scale projects which have higher transaction costs and delivery risks. Among the CDM projects being contracted by PCF, a price premium of US$ 0.5 per TCO_2e has been offered to the Colombia Jepirachi Wind Farm sponsors for the delivery of activities that improve the social conditions of the local indigenous population that hosts the project.

C-ERUPT's CER offer prices are on the other hand differentiated according to technology types. Renewable energy in general, except biomass, has been assigned with a premium price. Biomass and energy efficiency projects, and fuel switching and methane projects are respectively priced 20 and 40 % lower than renewable energy projects.

<Table 17> CER Procurement Funds

Public-Private Partnerships	Government Funds	Private Funds
Multilateral Institutions **The World Bank** • Prototype Carbon Fund (US$ 180 million) • Community Development Carbon Fund (US$ 100 million) • World Bank Bio-Carbon Fund (US$ 100 million) • Italian Carbon Fund (US$15 million) • Spanish Carbon Fund (under discussion) **European Investment Bank** • Proposed Carbon Investment Trust **Other Financial Institutions** **Japan** *Japan Bank for International Cooperation (JBIC) and Development Bank of Japan* • Joint Carbon Fund (10 billion yen) **Germany** *KfW* German Carbon Fund (€ 50 million) **Denmark** *Ecosecurities and Standard Bank of London* • Denmark Carbon Facility (DKK 59 million)	**Own Tender** • Denmark CDM Program • Dutch Government C-ERUPT Program • Finnish CDM/JI Pilot Program (€ 20 million) • Sweden International Climate Investment Program – CDM • Austria JI/CDM Procurement Program • Belgium CDM/JI Program **Through Commercial/Development Banks** • Rabo Bank (Dutch Government) **Through Multilateral Institutions** • World Bank (The Netherlands Clean Development Facility - € 70 million) • IFC (IFC-Netherlands Carbon Facility - € 44 million) **Through Bilateral Transactions (signed MOUs)** • Austria: discussions with China • Canada: Costa Rica, Colombia, Chile, Nicaragua, Tunisia, South Korea • Denmark: Malaysia; discussions with China, South Africa • Finland: China, Costa Rica, El Salvador, Nicaragua, India • France: Colombia and Morocco • Italy: Algeria, China, Cuba, Cyprus, Egypt, El Salvador, Israel, Morocco • Netherlands: Colombia, Costa Rica, El Salvador, Panama, Uruguay, Bolivia, Nicaragua, Guatemala, Honduras. Under negotiation: Indonesia, Philippines).	**For trading** • ICECAP (Cumbria Energy, • Investec Bank and Less Carbon) • Mitsubishi Corporation (purchased emission rights from Hidroelectrica Guardia Vieja, SA) • Mitsubishi Securities Co. • Mizuho Securities Co. • Voluntary use (carbon dioxide neutral) • Dutch Development Finance Company

The CER is being differentiated from other emission reduction instruments due to its high delivery risks. Moreover, there is no standardized CER price. Instead CERs are differentiated according to its related risks, sustainable development component, and technology type. The CER price differentiation could evolve into the following categories: i) CERs from projects that fulfil the WWF Gold Standard, ii) CERs from projects with community development features, iii) CERs from standard projects, and iv) long-term and temporary CERs from forestry projects (Michaelowa, A., CDM Monitor, March 11, 2004).

With the entry of CERs in the EU allowance market under the linking Directive, CER price could rise to EU allowance price. The EU ETS could potentially set the limit of CER prices which is equal to EU allowance price minus a risk premium.

<Table 18> Carbon Emission Reduction Prices (per TCO_2e)

Project-Based		Allowance Markets
Clean Development Mechanism	**Joint Implementation**	
PCF[1] • US$3.0-3.5 • premium of US$0.5 per ton of CO_2e for projects with developmental components (Colombia Wind Farm) **CERUPT**[2] **(maximum prices)** • renewable energy – €5.5 • biomass energy - €4.4 • energy efficiency - €4.4 • fuel switch and methane - €3.3 • average price - €4.7[3] **Finnish Government**[4] • small-scale - €2.47-3.2	**PCF**[5] • US$ 3.5-4.0 **ERUPT**[6] • First tender average price - €8.46 (closed in April 2001) • Second tender average price - €4.78 (closed in March 2002) • Third tender - expected price range - €3.0-5.0[7] (closed in January 2003) **Denmark-Romania JI**[8] • estimated price range €5.40-8.10	**Regional** • EU-ETS[8] € 5.0-7.0 (indicative price); € 13.059 (forward price in Jan 2004); € 7.1710 (forward price in Apr 2004) **National** • UK-ETS[9] – Bid price £1.75, offer price £2.25 **Firm** • BP Emissions Trading Scheme[10] (Scheme discontinued in 2001) average in 2000 – US$7.6 average in 2001 – US$39.63

[1]PCF Annual Report 2002; [2]C-ERUPT Tender Document 2002; [3]Carbon Market Europe (March 21 2003); [4]http://global.finland.fi*; [5]PCF Annual Report 2002; [6]Environmental Finance (February 2003); [7]GHG Market Trends 2/2003; Carbon Market Europe (March 7, 2003); [8]Carbon Market Europe (May 2 2003); [9]Carbon Market Europe (August 15 2003); [10]ww.bp.com/files/15/Climate_Change_2001_performance_1541.pdf*

Appendix A: Frequently Asked Questions and Answers

This annex will provide commonly asked questions about the CDM and its implementation.

1. What is the Climate Change Convention?

The United Nations Framework Convention on Climate Change – UNFCCC was agreed at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, 1992. This agreement aims at the stabilization of greenhouse gases in the atmosphere, at a level that would prevent dangerous changes to the climate. So all countries have the commitment to address the climate change problem, but the countries are divided into two groups with different level of commitments: Annex I parties and non-Annex I parties. There are also Parties included in Annex II which were members of the OECD in 1992, of which there are currently 24, and have a special obligation to provide "new and additional financial resources" to developing countries to help them to tackle climate change.

2. What is the Kyoto Protocol?

It is a Protocol to the UNFCCC adopted at the COP 3 in Kyoto, Japan in 1997. The Protocol sets binding commitments by 39 developed countries and economies in transition, listed in Annex B, to reduce their GHG emissions by an average of 5.2 per cent on 1990 levels (the first commitment period, 2008 - 2012).

3. What is the difference between Annex I and Annex B parties?

The UNFCCC divides countries in two main groups: Annex I parties that include the industrialized countries and countries with "economies in transition" / EITs (the Russian Federation, the Baltic States and several other Central and Eastern European countries). All the others are called non-Annex I countries.

The Kyoto Protocol strengthens the Convention by committing Annex I Parties to individual, legally binding targets to limit or reduce their GHG emissions. The individual targets for Annex I Parties are listed in the Kyoto Protocol's Annex B. In practice, Annex I of the Convention and Annex B of the Kyoto Protocol are used almost interchangeably. However, strictly speaking, it is the Annex I countries which can invest in CDM projects and non-Annex I countries can host CDM projects.

4. What are the Kyoto mechanisms?

Because mitigations costs would be high for Annex I parties, the Kyoto Protocol also establishes flexible mechanisms that can be used to achieve the objectives of the convention in a cost-effective and flexible way. These are Emissions Trading (ET), Joint Implementation (JI), and the Clean Development Mechanism (CDM).

5. What is the difference between CDM, JI and AIJ?

The Clean Development Mechanism (CDM) and Joint Implementation (JI) differ with respect to the target nations. The CDM targets non-Annex I countries, while JI concerns only Annex I countries. A more important distinction arising from this issue is that CDM generates additional emissions reduction credits, as non-Annex I nations are not subject to emission caps, while JI only results in the exchange of allowances between two developed economies. In Activities Implemented Jointly (AIJ) no allowance banking is permitted, as AIJ represents a prototype or pilot phase of both CDM and JI. Consequently AIJ projects can be carried out either among industrialized countries or between Annex I and non-Annex I nations.

6. How does the CDM concept work?

Annex I countries that have ratified the Kyoto Protocol can invest in projects that both reduce GHGs and contribute to sustainable development in non-Annex I countries. A CDM project provides certified emissions reductions (CERs) to Annex I countries, which they can use to meet their GHG reduction commitments under the Kyoto Protocol. Article 12 of the Kyoto Protocol sets out three goals for the CDM: i) To help mitigate climate change; ii) To assist Annex I countries attain their emission reduction commitments, and iii) To assist developing countries in achieving sustainable development.

7. What kind of GHGs are the targets for emission reductions?

In addition to contribute towards sustainable development, CDM project candidates looking for approval under the CDM must lead to real, measurable reductions in greenhouse gas emissions, or lead to the measurable absorption (or "sequestration") of GHGs in a developing country. The six GHGs and gas classes coming from varied sources of the economy are: carbon dioxide – CO_2 (source: fossil fuel combustion; deforestation; agriculture); methane – CH_4 (source: agriculture; land use change; biomass burning; landfills); nitrous oxide – N_2O (source: fossil fuel combustion; industrial; agriculture); hydrofluorocarbons – HFCs (source: industrial/manufacturing); perfluorocarbons – PFCs (source: industrial/manufacturing); sulphur hexafluoride – SF6 (source: electricity transmission; manufacturing).

8. What is a CDM project baseline?

The baseline for a CDM project is the scenario used to show the trend of anthropogenic GHG emissions that would occur in the absence of the proposed CDM project. The baseline basically shows what would be the future GHG emissions without the CDM project intervention. Each CDM project has to develop its own baseline. Once a baseline methodology has been approved by the Executive Board, other projects can use it too. For small-scale projects, guidance is provided on standard baselines.

9. What is additionality in CDM projects?

GHG emissions from a CDM project activity must be reduced below those that would have occurred in the absence of the project. It must be shown that the project would not have been implemented without the CDM. Without this "additionality" requirement, there is no guarantee that CDM projects will create incremental GHG emissions reductions equivalent to those that would have been made in Annex I countries, or play a role in the ultimate objective of stabilizing atmospheric GHG concentrations.

10. Why is additionality important?

CERs generated by CDM projects that are used by Annex 1 countries to meet their Kyoto targets allow emissions in these countries to rise. Therefore if CERs are awarded to activities that would happen without the CDM project, i.e. for reductions that would occur anyway, Annex 1 emissions are allowed to rise without a corresponding cut elsewhere, thereby raising global emissions. The only winners are the buyers of cheap credits, because host countries do not receive new investment and climate change is not being mitigated.

11. What is the project boundary?

The project boundary defines the area within which emissions reductions or sequestration occurs. Emissions reductions must occur on the project site or "upstream" from the project. For example, in projects that reduce electricity consumption through efficiency or fuel substitution in a region where power is produced from fossil fuels, the emissions reductions occur upstream at the power plant.

12. What is "Leakage"?

Leakage refers to any GHG emissions that occur outside of the project boundary, as a result of the project.

13. Who can implement CDM projects?

CDM projects can be implemented through non-profit, public and private partnerships, including the participation of local communities and groups where the projects take place. However since the CDM is a market-based mechanism it was designed precisely with the private sector in mind, and it is within this sector that emissions cuts will be made and traded. The private sector is also the recipient of increasing investment flows that can be coupled with CDM projects.

14. Why is the CDM important for developing countries?

CDM projects assist developing countries to achieve sustainable development. Industrialized countries have developed domestic policies to comply with the Kyoto Protocol. This has led to a growing demand for carbon credits. Developing countries may supply such carbon credits. While many factors influence the size and stability of the global market, facts indicate that this market would move billions of dollars a year, increasing foreign investment capital flow in developing countries. In this context, the CDM projects offer many opportunities for various actors:

Actor	Reason for participation
Developing country	Promote sustainable development through investment
Developed country	Meet Kyoto Protocol commitments at low costs
Non-governmental organizations	Promote environment and development
Corporations	Offset emissions; investment opportunity
Niche company	Commercial opportunity; diffuse technology
Industry associations	New opportunities for members
Brokers	Commercial opportunity
Development banks	Promote sustainable development; create new markets
Institutional investors	Portfolio diversification; socially responsible investing

Source: Baumert et al. 2000.

15. What are the requirements to participate in the CDM projects?

Participation in a CDM activity is possible only if participating countries are parties to the Kyoto Protocol. Countries also need to designate a National Authority for the CDM in order to participate, which should be situated so that it can effectively coordinate the agencies responsible for setting sustainability policies, environmental and investment regulations, and the organizations involved in CDM project development. In this context, developing countries need to define the sustainable development criteria. The success of CDM projects in developing countries will depend on the institutional and policy environment in which they operate.

Additional to the above two conditions, Annex I countries must have a system for tracking greenhouse gas emissions and sinks and a registry; submitted a GHG inventory, and be in compliance with its target. See paragraphs 28-34 of the Marrakech Accords.

16. What sectors may qualify for CDM projects?

According to the Kyoto Protocol, investments in various sectors of non-Annex I countries may qualify for CDM credits

Sector	Source Category
Energy	Fuel combustion: energy industries; manufacturing industries and construction; transport; other sectors. Fugitive emissions from fuels: solid fuels; oil and natural gas; other
Industrial processes	Mineral products; chemical industry; metal production; other production; production and consumption of halocarbons and sulphur hexaflouride; other
Solvent and other product use	
Agriculture	enteric fermentation; manure management; rice cultivation; agricultural soils; prescribed burning of savannas; filed burning of agricultural residues; other
Waste	Solid waste disposal on land; wastewater handling; waste Incineration; other
Land-use, land-use change, and forestry	Afforestation; reforestation; avoided deforestation for thermal energy in small-scale projects

Source: Kyoto Protocol, Annex A.

17. Who will administer CDM projects internationally and domestically?

Internationally, the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) shall have authority over and provide guidance to the CDM. The COP/MOP is autonomous from COP, and the Meeting of Parties establishes the CDM Executive Board at the international level. The first meeting of the COP/MOP will take place after the Kyoto Protocol enters into force.

Domestically, Parties participating in the CDM establish the CDM Designated National Authority for approving CDM projects. Furthermore, a Designated Operational Entity – DOE, which is either a domestic legal entity or an international organization accredited and designated, on a provisional basis until confirmed by the COP/MOP. The Executive Board (EB) has two key functions: to validate and subsequently to request registration of a proposed CDM project activity, which will be considered valid after 8 weeks if no request for review was made; and, to verify emission reduction of a registered CDM project activity, certifying as appropriate and requesting the Board to issue Certified Emission Reductions accordingly.

18. What are carbon dioxide equivalents (CO_2-eq)?

CO_2-eq provides a universal standard of measurement against which the impacts of releasing (or avoiding the release of) different greenhouse gases can be evaluated. Every greenhouse gas has a Global Warming Potential (GWP), a measurement of the impact that particular gas has on "radiative forcing", i.e., the additional heat/energy that is retained in the Earth's ecosystem through the addition of this gas to the atmosphere. The GWP of a given gas describes its effect on climate change relative to a similar amount of carbon dioxide and is divided into a three-part "time horizon" of twenty, one hundred, and five hundred years. As the base unit, carbon dioxide numeric is 1.0 across each time horizon. This allows the greenhouse gases regulated under the Kyoto Protocol to be converted to the common unit of CO_2-eq.

19. Can CDM Credits be traded?

CERs earned from CDM projects may be exchanged with other corporations or national governments. A company that has earned CERs may also choose to bank them so they can be traded in post Kyoto commitments. This is a useful strategy if the company does not require the credits in the current period and anticipates an increase in their market value.

20. How will the global CDM market develop?

The future of the global market will depend largely on the demand for CDM projects from companies and countries in the north. Without the USA participating in the Kyoto CDM market (although it may set up a parallel market on its own) the demand is likely to be substantially constrained, reducing capital available for the development of these projects.

Furthermore, developing countries that are looking to the CDM market to promote both inward investments and sustainable development projects, will judge the market not just by how many CDM projects it is able to generate but also by how many countries have been able to benefit. If only a few developing countries benefit, then it may be difficult for the rest of the developing countries to agree to further extensions of the CDM concept in future commitment periods.

21. How Much Are CERs Worth?

The international market for CERs and other Kyoto credit units has yet to be established. However, trading monitored by carbon brokers (e.g. CO_2e.com) report current price of emissions reduction credits in existing carbon markets between US$3/t CO_2 and US$5/t CO_2. The expected market price of CERs, which might be generated from a CDM project, would dictate the project developer decision in soliciting carbon financing through the CDM or not. It will also dictate the CER purchaser determination to provide carbon financing or not. For example, it would not be worthwhile to invest in a CDM project at a cost of US$20/t CO_2 if credits can be purchased on the market for less than US$10/t, or emissions can be reduced domestically for US$15/t.

22. Can CDM secure project funding partly (e.g. incremental cost) or on full basis?

The CDM contribution will strictly depend on the expected results in terms of emission reductions (expected CERs subject to verification and certification). One can assume CDM contribution being within 5 and 20% of the total investments. But we can imagine higher contributions if a project has higher performance in terms of emission reductions

23. What are the generic disbursement modalities of the CER allocation?

Generically, the CDM market should follow the same rules as any other market-based goods: the donor purchases the CERs that are supposed to be available immediately. The payment is made accordingly. The most obvious modality is to make disbursements at the end of the year, after emission reductions are certified. For the time being, the CDM market is not yet in place, and is determined by a few institutional pilot initiatives (PCF, CERUPT, etc.). These initiatives include some flexible modalities aimed at encouraging the project implementation (e.g. possibility to get advance instalment to support investment).

24. Will companies based in countries that have not ratified the Kyoto Protocol be allowed to trade in carbon credits to meet their domestic targets?

According to Section 33 of the Marrakech Accords private or public entities in countries that are not parties to the Kyoto Protocol will not be allowed to be involved in CDM projects. Such entities must be authorised by their country. There is still a lot of debate, however, if the Marrakech Accords leaves room for such private or public entities to engage in trading of carbon credits accruing from CDM projects.

25. What is the Gold Standard?

The Gold Standard is an independent best practice benchmark for CDM (Clean Development Mechanism) and JI (Joint Implementation) greenhouse gas offset projects. It provides project developers with a tool to ensure that the CDM and JI deliver credible projects with real environmental benefits and, in so doing, confidence to host countries and the public that projects represent new and additional investments in sustainable energy services. It sets out a code of best practice on many issues in the PDD and incorporates a small number of extra screens necessary to deliver real contributions to sustainable development in host countries plus long-term benefits to the climate. Projects are restricted to investments in renewable energy and end-use energy efficiency and must demonstrate clear additionality, use of conservative baselines and significant contribution to sustainable development on the basis of open and transparent stakeholder consultation.

26. Are there any risks involved in CDM projects?

CDM projects are essentially similar to other conventional project investments. The major difference between conventional projects and CDM projects is that with CDM projects there are conditions of GHG emission reduction and sustainable development. As such investments risks are basically the same one would face in other project investments. However, the additional risk in CDM projects would be elements that may result in absence of GHG emission reduction, and hence non-issuance of CERs.

27. Who will be responsible for monitoring GHG emission reductions of a CDM project?

Monitoring will be the responsibility of the project developers. Before the project can be registered with the Executive Board, a monitoring plan must be drawn up. The project developers will have the responsibility of ensuring that their project result in the reduction of GHG emission and monitoring this according to the plan. The monitoring results will be verified by a Designated Operational Entity (similar to an audit for GHG emissions).

28. Will there be any penalty for failure to meet the sustainable development criteria?

It is not stipulated anywhere that CER will not be issued due to failure to meet sustainable development criteria. It will therefore be up to the host country to ensure that elements of sustainable development in the project documents are well documented and clear at the very beginning of the project. If there are serious concerns, these could be raised with the designated operational entity (para. 62.g), but project developers merely have to "address the concerns".

29. How can a host country define whether a CDM project will be conducive to sustainable development?

Each country defines its own criteria for sustainable development. The host country can check for Sustainable Development using a matrix developed in accordance with their development requirements and priorities.

Matrices developed by SouthSouthNorth and the Gold Standard are good examples.

30. What is the procedure for issuing a certificate and by whom?

For the certificates to be issued, a request must be submitted to the EB by the DOE which verifies the monitored reductions in emissions. The DOE will produce a verification report and then certify the amount of CERs generated by the CDM project. The EB issues the CERs to the project partners within 15 days after the date of receipt of the request for issuance.

Certification is a written assurance by the DOE that, during a specified time period, a project activity achieved the reductions in anthropogenic emissions by sources of GHGs as verified. The DOE shall inform the project participants, Parties involved and the EB of its certification decision in writing immediately upon completion of the certification process and make the certification report publicly available. The certification report shall constitute a request to the EB for issuance of CERs equal to the verified amount of reductions of anthropogenic emissions of GHGs. Unless a project participant or three Executive Board members request a review within 15 days, the Executive Board will instruct the CDM registry to issue the CERs.

The CDM Registry being developed by the UNFCCC Secretariat will keep track of all issuances of CERs. When the EB has issued the CERs they are placed in a pending account in the CDM Registry. From here the CERs will move to the Party's legal entity's account according to a split specified in the request from project participant.

Appendix B: Overview of Other CDM Guidelines

This appendix gives the reader an overview and a short description of other guidelines to the CDM.

The internet address from which the guidelines can be downloaded will be found in the Reference Section.

1. A Layperson's Guide to the Clean Development Mechanism.

UNCTAD-Earth Council, July 2002

This guide gives a quick overview of what CDM is all about. The target is a reader with no previous knowledge about the CDM.

Part I provides a 4 pages overview of UNFCCC and the CDM.

Part II describes the CDM as defined in the Marrakech Accord. It goes through the CDM project cycle and provides a table of CDM project examples

Part III consists of the four annexes describing: The Executive Board, Standards for the accreditation of Operational Entities, CDM Registry requirements, and a table of Global Warming Potentials.

An appendix of 35 pages comprises 23 pages copied from the CDM Modalities and Procedures, 7 pages of the Dutch CDM Baseline template and 5 pages of the PCF-PIN (Project Idea Note). Therefore half of the guideline are material which the reader can download from the Internet.

2. The CDM guidebook, A Resource for Clean Development Mechanism Developers in Southern Africa.

Energy and Development Research Centre (EDRC), University of Cape Town, July 2002.

This guide is directed to small-scale project developers, small businesses, NGOs and community based organisations. It tries to bridge the gap between general CDM introductions and technical manuals on project design.

The first two chapters (12 pages) give a overview of the background for the CDM and the CDM Project Cycle.

Chapter 3 describes how to calculate baselines, with data for the avoided emissions from kerosene & candles by a solar home system. Chapter 4 shows how to calculate the economics in a project.

Chapter 5 gives an interesting list of the key risks facing CDM projects and discusses possible investors in CDM projects and how to approach them. Chapter 6 provides an overview of monitoring methods and requirements. Finally chapter 7 describes CDM opportunities in South Africa.

In the Appendices, (A) gives details for 5 projects: electric power in S.A., wood waste in Zimbabwe, short-rotation forestry in East Africa, natural gas fired power plant, energy-efficient lighting in low-income housing, and energy-efficient lighting for retail chain store.

Appendices (B-C) are the contents of the Project Design Documents according to the Marrakech Accord and for the PCF. Appendix (D) gives an overview of relevant contacts.

3. CERUPT Guideline: Vol. 1 Introduction; Vol. 2a Baseline Studies, Monitoring and Reporting; Vol. 2b Baseline studies for specific project categories; Vol. 2c Baseline studies for small-scale project categories.

Ministry of Housing, Spatial Planning and Environment of the Netherlands, 2001.

This guide is intended to help CERUPT project developers/investors selling CERs to the Dutch Government.

Vol. 1 describes the terminology used in the guidelines. Vol. 2a contains the reporting form for a baseline study as an annex. The other text is instructions about how to fill out that form, including some further definitions, for example of direct on-site, direct-off site, indirect on-site and indirect off-site emissions. Vol. 2b gives specific guidance including specific application forms for baselines and monitoring issues for three types of CERUPT projects: fuel switch projects (including renewable projects), combined heat and power projects and landfill gas projects.

Vol. 2c mentions the definition of Small-Scale CDM Projects. For grid connected projects the appendix list the CO_2 emission factors to be used for the period 2000-2012 in t CO_2 /MWh for all non-Annex I countries. The values for 2000 are the emission/electricity production from fossil fuels in 1999 whereas the 2012 values are based on the best available technology for natural gas combine cycle plants. For off-grid projects the document copies the preliminary information on baselines from the Executive Board.

4. A User's Guide to the Clean Development Mechanism (CDM).

Pembina Institute for Appropriate Development (second edition), February 2003, 83 pp.

This Guide provides companies interested in using the CDM, and potential CDM project hosts in developing countries, with all the information necessary to develop environmentally sound CDM projects and steer them through the approval process. The Guide includes the following topics:

- The basic rules governing the CDM;
- CDM project types;
- Various investment roles for companies using the CDM;
- A step-by-step procedure on how to develop a CDM project;
- Special features of energy efficiency CDM projects;
- Simplified procedures that can be used for small CDM projects;
- Special features of energy efficiency CDM projects; and
- Examples of CDM project opportunities (in Bangladesh, China, India and Indonesia).

5. Project Developers Guide for the CDM

Lloyd Masters Consulting for UNDP, October 2000, 65 pp.

The guide is developed in connection with the UNDP/WBCSD project 'Engaging the Private Sector in the CDM'. The project aimed to create a 'learning-by-doing' scenario, and the purpose of the guide is to aid the national stakeholders in considering, choosing, preparing and submitting CDM projects in their country. The guide includes three sections: Section I gives an overview of the CDM. Section II describes the project cycle (incl. project design, validation, registration, monitoring, verification, certification, issuance). Section III is an example of how a CDM project is carried through in Brazil, and therefore the guide appeal particularly to stakeholders in Brazil.

6. Clean Development Mechanism (CDM) Manual

EcoSecurities, Inc, for UNDP (revison 2 draft as of Nov. 2002)

The objective of the manual is to provide a tool to assist UNDP country offices to effectively meet the national demands of diverse stakeholders in their respective countries to make Clean Development Mechanism (CDM) projects efficiently and equitably operational. Chapter 1 discusses the focus of UNDP's learning-by-doing CDM capacity development activities -- primarily on creating

and strengthening enabling environment for efficient CDM operations with in the framework of sustainable development. Subsequent chapters describe the Clean Development Mechanism and the CDM process cycle. Once the CDM process cycle and the issues of contracts and transaction costs have been discussed and clarified, Chapter 4 highlights the concepts of CDM Governance and how the process can be managed. Finally, Chapter 5 deals with the market for CERs. Annexes describe, the Marrakech Accords, the New Delhi Accords, The Gold Standards for CDM and JI projects, the PCF PIN and Baseline analysis.

7. CDM Project Manual

NIRAS for the Danish Energy Authority by CSDA, Climate Change Knowledge Network and IISD, April 2003, 122 pp.

The manual is a guide to Danish developers of projects in developing countries. It covers the international set of rules of the area and lies close to the Clean Development Mechanism (CDM) Manual by EcoSecurities. Chapter 1 provides an introduction to and a background description of the CDM. Chapter 2 gives information on commercial issues of CDM. Chapter 3 gives an overview of the project cycle. Chapter 4 presents a checklist for screening of eligibility of the proposed CDM. This will give information on whether the project is likely to generate CERs or not. Chapter 5 provides detailed guidance to fill out a Project Design Document (PDD). Chapter 6 and 7 contains two parts of the PDD. The Host Party Approval can be found in Chapter 6, and the baseline study is discussed in Chapter 7. Chapter 8 describes the simplified procedures that can be adopted to reduce transaction costs of small-scale CDM projects. The annex contains the CDM PDD.

8. Establishing National Authorities for the CDM – A Guide for Developing Countries

Christiana Figueres (editor), 2002, 162 pp.

The guide is step-by-step guide for developing countries interested in establishing a national authority. It focuses primarily on the institution-building activities to CDM, and hereby it differs from many of the other guides and manuals on CDM. Chapter 1 begins with a quick review of the science of climate change and the history of the international climate change negotiations. Chapter 2 is a description of how the CDM will operate at the international level, including the CDM project cycle from the perspective of the operational entities. Chapter 3 focuses on the national level. It recounts the experiences that some Latin American Countries have had as they established CDM offices and derives lessons from it. Chapter 4 specifies the individual steps that have been found useful in the process of establishing a national authority. Chapter 5 explains the regulatory functions it may choose to perform. Chapter 6 describes the main types of

projects that national authorities will be evaluating and summarizes the methodology with which emission reductions can be quantified in each project type. The five annexes include a list of the countries that have signed/ratified the Kyoto Protocol, samples of national criteria for submission of projects in Latin American countries, sample format for a Project Idea Note and Project Concept Note developed by the World bank, and an example of a PDD.

9. Preliminary Validation Manual

The Prototype Carbon Fund, November 2002, 44pp.

The manual has been developed for use on an interim basis for the validation of GHG projects under the Kyoto Protocol (JI and CDM). Its content is drawn on experiences gathered by the Prototype Carbon Fund as in validation of other GHG projects. The manual focuses on the validation process of the CDM project cycle, and its purpose is to provide instructions regarding the validation process, serve as a tool for third party validators, and present a template for validation reports and opinion. The manual describes the different steps of the validation process: Project criteria, guiding principles, transparency, project documentation etc. The manual differs from most of the other manuals and guidelines by the main focus on one part of the CDM project cycle.

10. CDM Capacity Building Amongst the Private Sector in Southern Africa (CDM CAPSSA).

Baker and McKenzie Law Firm, and by F. Thomas, and S. Ulrich, IER, Germany, April 2003

This document presents an explanation of the financial, institutional, and legal issues pertaining to the Clean Development Mechanism (CDM). It was originally prepared for CDM stakeholders in a group of South African countries, including Botswana, South Africa, Mozambique, Swaziland, Zambia, and Zimbabwe. The document was presented during the WSSD meetings in South Africa. It is intended to act as a guide for host country CDM stakeholders who will be involved in various stages of preparation, implementation, and monitoring of CDM projects. The document outlines the specific steps to be followed in baseline calculations and calculations of emission reductions. It also presents the ingredients needed for effective monitoring and verification of CDM projects, as well as the various approaches for financing of CDM projects. A fair share of the document is allocated for the legal and institutional sides of CDM, including legal considerations for the establishment of a Designated National Authority.

Appendix C: A possible future list of eligible CDM projects categories

When the CDM starts operating, no eligible project activity categories exist except for the small-scale CDM projects (see Table 5, main text). Below we have assumed that the definition of small-scale CDM project categories will influence the future normal CDM projects activity categories.

The table shows the existing eligible small-scale project activity categories. We have added some categories not present at the moment: Industrial process, transport, LULUCF and other categories.

<Table A1> A possible future list of eligible CDM project categories

Project types	Project activity categories	Illustrative project activities
Type I: Renewable energy projects	A. Electricity generation by the user	Photovoltaics, off grid (Solar home systems, public systems.) Solar water pumping Solar desalination Small hydro Small wind power Wind battery chargers Oil-plants (Jatropha, Biodiesel etc.) fuelled generation
	B. Mechanical energy for the user	Water mills Wind-powered mechanical water pumps
	C. Thermal energy for the user	Solar water heating Solar Dryers Solar cookers Farm/enterprise scale biogas Improved cooking stoves Biomass combustion for water heating/space heating & drying Biomass fueled cogeneration
	D. Renewable electricity generation for a grid	Hydro power Wave power Tidal power Turbine upgrading/replacement, etc. Large photovoltaics Solar thermal power Wind/diesel units Large off shore wind turbine Large on shore wind turbine Larger biogas plants Landfill gas plants Biomass gasification Biomass fuelled cogeneration Waste fuelled power Landfill gas plants Geothermal power

Project types	Project activity categories	Illustrative project activities
Type II: Energy efficiency improvement projects	A. Supply side energy efficiency improvements - transmission and distribution	Electricity transmission and distribution, efficiency improvement Heat transmission and distribution, efficiency improvement
	B. Supply side energy efficiency improvements - generation	Efficiency improvement at power plants Efficiency improvement at district heating plants Efficiency improvement at district heating plants
	C. Demand-side energy efficiency programmes for specific technologies (at many sites)	Higher efficiency lighting Higher efficiency refrigerators/freezers Higher efficiency fans/air conditioning Higher efficiency electric motors Other improved household electrical appliances Other improved service electrical equipments Other improved industrial electrical equipments
	D. Energy efficiency and fuel switching measures for industrial facilities (at a single industrial facility)	Energy efficiency measures (motors, pumps, cooling etc) Fuel switching with energy efficiency as primary aim More efficient industrial processes (steel, paper, tobacco, etc.)
	E. Energy efficiency and fuel switching measures for buildings	Energy efficiency measures (appliances, better insulation, etc.) Fuel switching with energy efficiency as primary aim
Type III: Other project activities	A. Agriculture (no methodologies available yet)	Reduction of enteric fermentation (CH_4) Manure management (CH_4 & N_2O) Water management in rice cultivation (CH_4) Improved fertilizer usage (N_2O)
	B. Switching fossil fuels	Fuel switching as primary aim (energy efficiency can be included)
	C. Emission reductions by low-greenhouse emission vehicles	A number of vehicles is replaced with lower emission vehicles
	D. Methane recovery and avoidance	Coalbed methane recovery Capture and flaring of landfill gas
Other categories not present at the moment	X. Industrial processes	Emission reduction from cement production Control of coal dump fires Reduced CH_4 leakage from natural gas transmission & distribution Reduction of NMVOC emissions Reduce N_2O emission in adipic acid production Reduced emission of HFCs, PFCs or SF6
	Y. Additional transport categories	Transport mode switching Improved urban planning and traffic management Activity change Load factor increases
	Z. Some future possible LULUCF categories	Afforestation Reforestation
	O. Other categories	Improved charcoal production kilns

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CDM Information and Guidebook will give a comprehensive overview of the CDM, its project cycle and related issues such as a linkage with sustainable development goals, financing and market intelligence. The appendices present frequently asked questions and answers, a short overview of existing guidelines, and a possible future list of eligible CDM projects categories.

This guidebook to the CDM is produced to support the UNEP project "Capacity Development for the Clean Development Mechanism" implemented by UNEP RISOE Centre on Energy, Climate and Sustainable Development in Denmark. The overall objective of the project is to develop the institutional capability and human capacity for implementation of the CDM in developing countries.

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