



# INTRODUCTION TO THE CLEAN DEVELOPMENT MECHANISM

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## Abstract

One of the most difficult challenges facing the world today is the twin-issue of global warming and climate change.

Parties to the 1992 United Nations Framework Convention on Climate Change commit to stabilizing emissions of six greenhouse gases that contribute the most to global warming. Under the 1997 Kyoto Protocol, Annex I countries (industrialized countries and economies in transition) commit to reducing their carbon emissions by an average of 5.2 per cent below their 1990 levels in the time period 2008-2012. To achieve these reduction targets at the least cost, the Kyoto Protocol gives financial value to carbon emission reductions by creating an "environmental commodity" and three flexible market mechanisms.

This paper discusses the Clean Development Mechanism, the mechanism in which non-Annex I (developing) countries, such as the Philippines, can participate.

## 1. Introduction

Over the last century, human activities — burning of greater quantities of fossil fuel, clearing of more forests, harmful farming methods — have all contributed to increasing greenhouse gases (GHGs) in the atmosphere, particularly carbon dioxide, methane, and nitrous oxide. While these gases occur naturally and are essential for life on earth, their increasing amounts in the atmosphere have produced higher global temperatures and changes in climate. The earth is now experiencing hotter temperatures than before, extreme weather occurrences, and changing rainfall patterns, and rising sea levels.

Such changes in the planet's climate are expected to have dire impacts on health, agriculture, forest, water resources, and coastal areas:

*The current warming trend is expected to cause extinctions. Numerous plant and animal species, already weakened by pollution and*

*loss of habitat, are not expected to survive the next 100 years. Human beings, while not threatened in this way, are likely to face mounting difficulties. Recent severe storms, floods and droughts, for example, appear to show that computer models predicting more frequent 'extreme weather events' are on target.*

*Sea level rose on average by 10-20cm during the 20th century, and an additional increase of 9-88cm is expected by the year 2100. (Higher temperatures cause ocean volume to expand, and melting glaciers and ice caps add more water.) If the higher end of that scale is reached, the sea could overflow the heavily populated coastlines of such countries as Bangladesh, cause the disappearance of some nations entirely (such as the island state of the Maldives), foul freshwater*

*supplies for billions of people, and spur mass migrations.*

*Agricultural yields are expected to drop in most tropical and sub-tropical regions — and in temperate regions, too, if the temperature increase is more than a few degrees Celsius. Drying of continental interiors, such as central Asia, the African Sahel, and the Great Plains of the United States, is also forecast. These changes could cause, at a minimum, disruptions in land use and food supply. And the range of diseases such as malaria may expand. ([http://unfccc.int/essential\\_background/items/2877.php](http://unfccc.int/essential_background/items/2877.php))*

Thus, one of the most difficult challenges facing the world today is the twin-issue of global warming and climate change.

## 2. United Nations Framework Convention for Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) is the 1992 treaty that sets the framework for global efforts to address climate change due to global warming. Parties to the treaty commit to stabilizing anthropogenic (caused by human activity) emissions of six greenhouse gases (GHGs) that contribute the most to global warming — carbon dioxide, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons, and sulphur hexafluoride (**Table 1**).

The potential of each of these gases to heat up the atmosphere is measured by its Global Warming Potential (GWP) relative to carbon dioxide (CO<sub>2</sub>), the most commonly occurring GHG with a GWP of 1. For example, methane (CH<sub>4</sub>) is 21 times more potent as a GHG than carbon dioxide (CO<sub>2</sub>) and 1 ton of CH<sub>4</sub> is equivalent to 21 tons of CO<sub>2</sub>.

**Table 1. GHG to be reduced under the UNFCCC**

Greenhouse Gases (GHG)	Global Warming Potential (GWP)
Carbon Dioxide (CO <sub>2</sub> )	1
Methane (CH <sub>4</sub> )	21
Nitrous Oxide (N <sub>2</sub> O)	296
Perfluorocarbons (PFCs)	5700 - 11900
Hydrofluorocarbons (HFCs)	120 - 12000
Sulphur Hexafluoride (SF <sub>6</sub> )	22,200

The UNFCCC, divides the world into two categories: Annex I comprised of Annex II (Industrialized Countries) plus the Economies in Transition; and Non-Annex I Countries, comprised of developing countries. The Philippines, Thailand, Malaysia, Indonesia, Laos, Cambodia, Vietnam, China, India, Brazil, Argentina, etc. are Non-Annex I (**Table 2**).

Annex I	Non - Annex I
<b>Annex II (Industrialized Countries) :</b> Australia, Austria, Belgium, Canada, Denmark, EC, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, USA  <b>Economies in Transition:</b> Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Monaco, Poland, Romania, Russian Federation, Slovakia, Slovenia, Ukraine	<b>Rest of ratifying countries &amp; developing countries</b>

**Table 2: UNFCCC – Division of Parties**

### 2.1 Kyoto Protocol

Following the UNFCCC, the more powerful and legally binding 1997 treaty known as the Kyoto Protocol quantified GHG emission reduction targets within a specified time frame. Annex I countries commit to reducing carbon emissions by an average of 5.2 per cent below their 1990 levels in the time period 2008-2012. Although there seems to be no consensus on the exact figure, the estimated required emissions reductions total over 700 million tons CO<sub>2</sub>.

**Table 3** shows selected quantified emission limitations for Annex I countries, using 1990 as the base year and 100 as the base level of emissions. For example, Japan's emission limitation of 94 per cent means that it will have to reduce its emissions by six per cent from its 1990 levels. There are no emissions limitations for Non-Annex I countries.

Protocol gives financial value to GHG emission reductions. One CER is equivalent to 1t of CO<sub>2</sub> emissions reduced. As a financial instrument, a CER can be bought and sold. Price is set by demand and supply. Currently, the price is US\$3-5 per CER or per ton of CO<sub>2</sub> emissions reduced. CERs are often referred to as "carbon credits".

**Table 3: Selected Quantified Emissions Limitations (%) for Annex I**

Industrialized Countries		Economies in Transition	
Australia	108	Bulgaria	92
Canada	94	Baltics	92
EU bubble	92	Croatia	95
(Germany	75)	Czech Republic	92
(Portugal	140)	Hungary	94
Japan	94	Poland	94
Norway	101	Romania	92
New Zealand	100	Russia	100
USA	93	Ukraine	100

For the Kyoto Protocol to take effect, the treaty had to be ratified by 55 countries representing 55 per cent of the world's total anthropogenic GHG emissions for 1990. Although the United States and Australia decided not to ratify, the Kyoto Protocol went into effect on 16 February 2005, following its ratification by Russia.

CERs are traded through three Flexible Market Mechanisms:

1. Emissions Trading – done between Annex I countries
2. Joint Implementation (JI) – done between Annex I countries
3. Clean Development Mechanism (CDM) – carried out between Annex I and Non-Annex I countries. (*Non-Annex I or developing countries can only participate in CDM. They are not eligible for Emissions Trading nor JI.*)

## 2.2 Certified Emissions Reduction

The framers of the Kyoto Protocol considered the cost of achieving GHG emission reductions. A survey of the literature indicates that in Annex I countries, the cost of reducing one ton of GHG may reach up to US\$100 compared to US\$ 5-15 in Non-Annex I countries. However, regardless of where it is achieved, any reduction in GHG emissions has global impact. How then can GHG emissions be effectively reduced at the least cost?

Through the creation of a financial instrument called a Certified Emissions Reduction (CER) unit and three flexible market mechanisms, the Kyoto

Thus, a CER may be considered an "environmental commodity". In effect, CERs are a by-product generated by a project: they are financial instruments that can be sold to bring additional revenues to a project. Financial returns from the sale of CERs vary with project type. Generally, they are higher for methane capture projects (due

to methane's 21 GWP) and relatively lower for renewable energy projects.

### 3. Clean Development Mechanism

The Clean Development Mechanism (CDM) assists Non-Annex I countries in achieving sustainable development as they contribute to global efforts to reduce GHG emissions. Countries hosting CDM projects benefit through investment, technology transfer, and local sustainable development.

At the same time, CDM allows Annex I countries to meet their obligations to reduce GHG emissions in a flexible and cost-effective manner. Annex I countries and companies can obtain CERs from CDM projects through direct investments in those projects or by buying the CERs produced by the projects.

While the Kyoto Protocol legally binds Annex I countries to reduce GHG emissions according to the agreed limitations, it should be emphasized that there is no such requirement for Non-Annex I countries.

#### 3.1 Market Players in CDM

Buyers of CERs are Annex I countries, such as Japan, the Netherlands (through CERUPT/ERUPT programmes), the UK, the EU, Austria, and Finland; companies like Tokyo Electric, etc.; carbon funds such as Prototype Carbon Fund (PCF), Community Development Carbon Fund (CDCF), Japan Carbon Fund (JCF), etc.; and brokers such as Natsource, EcoSecurities, and Cantor Fitzgerald.

Sellers of CERs are Non-Annex I companies, such as Philippine National Power Corporation - Exploration Corporation (PNOC EC) and North Wind, both in the Philippines; ATBiopower in Thailand; and Bumibiopower in Malaysia.

#### 3.2 CDM Requirements

To qualify for CDM, a project activity must fulfill, among others, the following requirements:

- It must *contribute to the sustainable development* of the host country
- GHG emissions reductions must be *real and measurable, and have long-term benefits*
- GHG emissions reductions must be *additional* to any reductions in a business-as-usual (BAU) scenario.

Official documents describe additionality as follows:

*Reductions in emissions that are additional to any that would occur in the absence of the certified project activity. (Kyoto Protocol, Article 12)*

*A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. (Marrakech Accords, Article 43)*

Translated into practical, business language, additionality means that CDM status is likely to be given to projects that are difficult to implement due to impediments such as investment barriers, technological barriers, barriers due to prevailing practice, institutional and regulatory barriers, and overall competitive disadvantage. Even if they do reduce GHG emissions, projects that can be implemented in a normal, business-as-usual manner do not need the financial enhancement provided by CDM. Thus, any BAU projects are likely to be disqualified.

### 3.3 CDM Opportunities

The following types of projects qualify for CDM:

- Renewable Energy
- Energy Efficiency Improvement
- Methane Recovery
- Fossil Fuel Switching
- Land Use and Land Use Change, Forestry (LULUCF) – eventually; at present the UNFCCC CDM Executive Board is still working on the modalities and procedures for such projects

There are also opportunities in small-scale CDM projects, for which the modalities and procedures have been simplified:

Type (I): Renewable Energy — maximum output capacity (installed/rated) equivalent to 15MW

- Electricity generation by the user
- Mechanical energy for the user
- Thermal energy for the user
- Renewable electricity generation for a grid

Type (II): Energy Efficiency Improvement — reduce energy consumption by up to equivalent of 15GWh/yr

- Supply Side energy efficiency improvements — Transmission and Distribution
- Supply Side energy efficiency improvements — Generation
- Demand Side energy efficiency programmes for specific technologies
- Energy efficiency and fuel switching measures for industrial facilities
- Energy efficiency and fuel switching measures for buildings
- Energy efficiency and fuel switching measures for agricultural facilities and activities

Type (III): Others — both reduce anthropogenic emissions by sources

and directly emit less than 15k tons CO<sub>2</sub> equivalent/yr

- Agriculture
- Switching fossil fuels
- Emission reductions by low-greenhouse emission vehicles
- Methane recovery
- Avoidance of methane production from biomass decay through controlled combustion

### 3.4 CDM Process

In order to qualify for CDM and thus be eligible for CERs, a project activity must undergo the CDM process as required by the UNFCCC. This process is in addition to the normal procedure undertaken to implement a project. In terms of timing, it is advisable to complete most of the CDM process before project implementation to avoid confusion as to whether a project activity could be considered BAU and is, therefore, not qualified for CDM.

#### Project Design Document

The CDM process begins with the production of the Project Design Document (PDD), which incorporates project details including plans, technology, equipment and operations, and financial feasibility.

The PDD requires the project developer to incorporate climate change issues into their business plan. It must include the project's contribution to the host country's sustainable development, an environmental impact assessment, socioeconomic contributions, and local stakeholders' comments and participation. It must also include a Monitoring and Verification Plan (MVP) for the project. The PDD must also address the parameters for CDM, among them the determination of a baseline, calculations of project emissions and emission reduction, and the issue of additionality.



The UNFCCC CDM Executive Board must first approve the baseline and monitoring methodologies laid out in the PDD. The list of approved methodologies is available on the UNFCCC CDM website (<http://cdm.unfccc.int>). If there are no approved baseline and monitoring methodologies applicable to a specific project activity, then an application for a new baseline and monitoring methodology must be submitted to the CDM Executive Board for approval.

The template for a PDD is also available on the UNFCCC CDM website. This template must be strictly followed in terms of content and form, down to the typeface and font size.

### **Validation**

The next step in the CDM process is validation. Validation is the due diligence process for CDM projects. It entails a thorough review of the information contained in the PDD and other relevant documents.

The purpose of the validation is to confirm that a project meets the mandatory UNFCCC/Kyoto Protocol requirements, CDM modalities, host country, and other requirements. It assures stakeholders of the project's quality and intended generation of emission reductions. A major step in the validation process is the 30-day publication of the PDD on the UNFCCC CDM website, subjecting the project activity to international public scrutiny and comments for the sake of transparency.

Validation is undertaken by an independent third party — a Designated Operational Entity (DOE), accredited by the UNFCCC CDM Executive Board. Operating entities in the certification/verification business undergo a rigorous process to obtain this designation. It should be noted that DOEs are legally and financially liable for the consequences of their actions in the CDM process. The lists of DOEs and applicant operating entities are also available on the UNFCCC CDM website.

### **Host Country Endorsement/Approval**

It is mandatory that a project be endorsed/approved by the host country through the Designated National Authority (DNA) for CDM. The DNA confirms that "a project is voluntary and assists in achieving sustainable development."

Host-country endorsement/approval is necessary for completing the validation process. Thus, the DOE cannot issue its final Validation Report without prior host-country DNA endorsement/approval.

### **Registration**

Following successful validation, an application for registration is submitted to the CDM Executive Board. Registration constitutes formal acceptance by the CDM Executive Board of a validated project as a CDM project activity. It is a prerequisite for the verification, certification, and issuance of CERs.

The CDM process continues after the project is implemented and is operating.

### **Monitoring**

Due to the requirement that emission reductions be real and measurable, project participants must collect and archive relevant data, as stated in the PDD. Such data provides the basis for verification.

### **Verification / Certification**

The purpose of verification is to ascertain whether monitored emission reductions have in fact occurred as a result of a registered CDM project activity.

As in validation, verification is conducted by an independent third party — a Designated Operational Entity (DOE). The verifying DOE is normally different from the validating DOE. However, to help minimize costs, small-scale CDM project activities may be validated and verified by the same DOE.

Certification is the written assurance by the DOE that during a specified time period, a project activity achieved the reductions in greenhouse gases as verified.

### **Issuance of CER and Registration**

The Certification Report by the DOE is then submitted to the CDM Executive Board, constituting a request for the issuance of CERs. The issued CERs are then recorded in the CDM registry.

### **3.5 Status of CDM**

At the international/UNFCCC level, the Kyoto Protocol entered into force on 16 February 2005. The CDM Executive Board has approved 21 Baseline and Monitoring Methodologies, but none yet for LULUCF; designated four DOEs; and registered two projects — Nova Gerar Landfill Gas (LFG) to Energy in Brazil and Rio Blanco Small Hydroelectric in Honduras. (Updates available at UNFCCC CDM website.)

At the national level, the Philippines ratified the Kyoto Protocol on 20 November 2003 and Executive Order 320 designated the Department of Environment and Natural Resources (DENR) as DNA on 25 June 2004. The Philippine Designated National Authority (DNA) is still in the process of being established. Although the Rules and Regulations Governing the National Approval have been drafted and were subjected to a multi-sector consultation on 16 February 2005, there seems to have been no further progress to date.

More progress has been achieved at the project level. There are several CDM candidates from the Philippines — landfill gas, biomass, wind, wastewater, etc. — in various stages along the CDM process. The most advanced is PNOC EC's Payatas Landfill Gas (LFG) to Energy Project, which has completed the required 30-day PDD posting for public comments as part of the validation process.

### **3.6 Barriers to CDM**

While there are many opportunities in CDM, there are also barriers at all levels.

At the international level, the modalities and procedures are constantly being refined, causing delays within the CDM process. There is also no framework yet for the post-2012 commitment period.

At the national level, the Philippine DNA is lagging behind the private sector. The proposed institutional structure and approval process are too bureaucratic.

While there are various barriers and risks at the project level, this presentation focuses on two potentially problematic aspects of financing a CDM project: 1) financing the underlying project itself and 2) financing the CDM process.

In the first instance, project financing is difficult to obtain for CDM projects. In general, there is still no lending window for CDM projects within host-country development banks and commercial banks. To qualify for CDM, projects are supposed to be marginal, not commercially viable. If a project activity can be implemented without the assistance of CDM, then it would be considered business-as-usual. However, to secure a bank loan, a project must prove to its creditors that it is commercially viable. This is certainly a "Catch-22" situation!

This causes great concern. While there is much focus on the buying and selling of CERs, not enough attention has been given to financing the underlying projects. And yet, the effectiveness of CDM hinges on projects actually being implemented. Without operationalized projects, there will be no generation of GHG emissions reductions. Thus, there will be no CERs to trade!

The equity side is more promising. Investors from Annex I are increasingly attracted by a project's CDM designation.

In the second instance, financing is also needed to prepare a project to qualify for CDM. The transaction costs associated with the CDM process — PDD production, validation, registration, verification and certification—are over and above the costs of implementing the project. Depending on project specifics, the cost of the CDM process alone ranges from US\$65,000 for small-scale projects to US\$120,000 for regular projects. (See PCF Annual Reports [www.prototypecarbonfund.org](http://www.prototypecarbonfund.org))

#### 4. Lessons Learned

The private sector will be the main driver for CDM projects. It is the private sector that will provide the investments needed to implement projects that will help reduce global GHG emissions.

For project participants, going through the CDM process is like running a gauntlet. There are very specific requirements that have to be fulfilled at every step of the process. The CDM process necessitates a very strong commitment, time, effort, and money. Without more concrete support from host governments, there will be a dearth of CDM projects.

CDM is not a panacea for global warming, climate change, and sustainable development. Nonetheless, it is the first, concerted step in addressing these difficult global challenges. Used properly and effectively, CDM offers a valuable and powerful

tool — an environmental commodity known as a CER unit— for mitigating GHG emissions and assisting sustainable development.

While CDM is still a fairly new development, much progress has been achieved over the last three years, as various stakeholders at all levels have gone up the learning curve. Yet, much more can and must be done.

#### 5. Recent Developments

CDM has progressed quite rapidly since this presentation was given at the National Workshop on Payments for Environmental Services in March 2005. This section is an update.

At the international/UNFCCC level, as of 23 September 2005 the UNFCCC CDM Executive Board has approved a total of 27 Baseline and Monitoring Methodologies, 23 Registered CDM Project Activities, and 10 Designated Operational Entities.

In the Philippines, the DENR Secretary signed the Rules & Regulations Governing the National Approval Process of the National Authority for the Clean Development Mechanism on 31 August 2005. The DENR now serves officially as the Philippine DNA.

In addition to PNOC EC's Payatas Landfill Gas (LFG) to Energy Project, 7 small animal waste projects completed the required 30-day PDD publication for comments as part of the validation process.





## Part Three: Papers Circulated



